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DE MINIMIS WASTE IMPACTS ANALYSIS METHODOLOGY, IMPACTS - BRC USER'S GUIDE AND METHODOLOGY FOR RADIOACTIVE WASTES BELOW REGULATORY CONCERN - (USED AS A REFERENCE IN OU5 RI REPORT)

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REPORT

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Vol. 2

De Minimis Waste Impacts Analysis Methodology

IMPACTS – BRC User's Guide and Methodology for Radioactive Wastes Below Regulatory Concern

Draft Report for Comment

Prepared by Jonathan M. Forstom, Daniel J. Goode

Prepared for
U.S. Nuclear Regulatory Commission

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Draft Report for Comment

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NOTICE

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ABSTRACT

This report describes the methodology and computer program used by NRC to evaluate radiological impacts associated with petitions to have specific slightly contaminated radioactive waste streams designated as "below regulatory concern." These wastes could be treated and disposed of at facilities which are not licensed for low-level radioactive waste management.

The IMPACTS-BRC computer program is implemented on IBM-PC microcomputers using the FORTRAN programming language. Radiological impacts (doses) are estimated for several pathways including direct gamma radiation exposure, worker inhalation and exposure, offsite atmospheric and water releases, and intruder exposures. Annual impacts are calculated for the maximum individual, critical groups, and general population. The treatment and disposal options include onsite incineration, incineration at municipal and hazardous waste facilities, and disposal at sanitary landfills and hazardous waste landfills. Modifications to the program (from Volume 1) are primarily for microcomputer compatibility and to provide information needed to evaluate the petitions.

Default environmental and facility parameters are developed representing conservative assumptions about site selection and operational procedures. In particular, the parameters of the groundwater pathway model are modified to represent more conservative assumptions than the original model (Volume 1).

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1 INTRODUCTION AND SUMMARY

1.1 Purpose

The purpose of this report is to document the Nuclear Regulatory Commission's technical capability to perform radiological assessments for the evaluation of petitions to have specific radioactive waste streams designated as below regulatory concern (BRC). Section 10 of the Low-Level Radioactive Waste Policy Amendments Act of 1985 mandated the NRC to develop this technical capability. In compliance with this mandate, a computer program, IMPACTS-BRC, was developed from prior NRC technology. This program calculates impacts (radiological doses) resulting from disposal of very low-level waste, using a variety of non-licensed treatment and disposal options.

This report also serves to provide potential petitioners with the means to evaluate their proposed activities by the same methods the NRC will use in considering their petitions. These evaluations are required of petitioners if the NRC is to respond expeditiously to their petitions. Petitioners are also being asked to provide the NRC with the input data needed to properly execute IMPACTS-BRC in order for the NRC to act expeditiously.

1.2 Scope

The IMPACTS-BRC methodology is a modification of the technology developed by NRC contractor Dames & Moore, reported by O.I. Oztunali and G.W. Roles in Volume 1 of NUREG/CR-3585, "De Minimis Waste Impacts Analysis Methodology." Most of the technical assumptions and calculational methodology have remained the same. The aim of this report (Volume 2) is to describe only the changes made to the De Minimis methodology and to provide a user guide for IMPACTS-BRC. Information regarding the assumptions, techniques, and calculational methodologies which remain unchanged can be obtained from Volume 1. This report corresponds to Version 1.0 of IMPACTS-BRC.

1.3 Summary

This report is divided into two parts. Part I is the user's guide to operation of IMPACTS-BRC, Version 1.0. It provides an overview of the program, defines input, options, and output, and describes program implementation. It includes example problems to help familiarize the user with the program and to verify proper execution.

The FORTRAN source code and an executable module of IMPACTS-BRC, along with the default BRC input decks and data for the example problems, are supplied on a 5¼ inch floppy computer diskette. This diskette is available from the National Energy Software Center (NESC), Argonne National Laboratory, 9700 South Cass Ave., Argonne, Illinois 60439. The contents and use of this diskette is also described in Part I.

Part II of this report (Volume 2) describes the differences between IMPACTS-BRC and the computer code published in Volume 1. It also describes differences in the procedures and assumptions, including default input data, between the De Minimis methodology (Volume 1) and the BRC methodology.

The computer program published in Volume 1 was programmed in FORTRAN for a mainframe computer, specifically a VAX 11/780. Several changes in IMPACTS-BRC were required to implement it on an IBM-PC microcomputer. These changes involved input/output procedures and use of certain compiler commands to optimize storage. No attempt was made to optimize overall performance of the program on the IBM-PC, and it is clear that a thorough re-programming, with the IBM-PC application in mind, would improve operation.

Several other changes have been made in developing IMPACTS-BRC which were not required for compatibility. Groundwater dispersion has been dropped from the model of groundwater transport because the long-term health impacts are not sensitive to this parameter, and because the computational effort was high for this term. Nuclide-specific accounting has been added in a new output file. The facility types have been modified to correspond to options likely to be considered under NRC's BRC policy.

The default environmental and facility data have been modified from the example presented in the De Minimis NUREG/CR-3585, Volume 1. The changes are more conservative and result in higher calculated impacts. Most of the data changes have been in parameters of the groundwater pathway. A non-default environmental dataset has been developed for use in estimating maximum individual exposures. The three regional site environmental datasets are used to estimate critical group and cumulative population impacts.

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2 OVERVIEW

IMPACTS-BRC is a computer program which calculates the impacts (radiological doses) from the handling, recycling, incineration, and/or disposal of very low-level radioactive waste at facilities which are not licensed for low-level radioactive waste management. The program includes a number of regional location, disposal facility, and waste treatment options. Pathways for which the impacts are calculated include transportation, operations, air and water transport to offsite receptors, and intrusion into disposed waste. These calculated impacts are used to support NRC rulemaking on petitions to designate specific waste streams as below regulatory concern which would allow their treatment and disposal at facilities that are not licensed for low-level radioactive waste management.

IMPACTS-BRC is intended to be a "dynamic" program, in that it can be easily adapted to very specific situations from the generic form in which it is supplied. Because generic facility, environmental, and radionuclide data are supplied with the program, the user may estimate radiological impacts simply by choosing the desired treatment and disposal options and supplying the characteristics of the waste stream. Or, the user may make the program as situation-specific as desired, simply by changing any or all of the generic data to reflect a specific set of circumstances.

2.1 Computer Requirements

IMPACTS-BRC is written in IBM-PC FORTRAN Version 2.00 and runs on 640K IBM-PC and compatible computers. The program has been run under IBM-DOS Version 2.10 and should be fully upward compatible. An 8087 math co-processing chip is a useful option, but is not required for program operation. A harddisk system also provides certain operational advantages, but is not required. The program runs in a batch mode using three input data files and generating two output data files. Because portions of the output are printed on 128 character lines, a printer with the capacity to handle lines of this width is also needed.

2.2 Input

The first input file, TAPE1.DAT, contains nuclide specific data for each of 85 radionuclides. Generally, this file will not require user editing, except under the most specific of circumstances. The second input file, TAPE2.DAT, contains data on the reference environments and facilities used by IMPACTS-BRC. This file may require user editing for certain situations. The third input file, TAPE5, contains data for the waste stream and chosen treatment and disposal options. This file must be edited or created by the user for the specific waste stream(s) and facilities to be considered.

2.3 Output

The first output file, TAPE6.OUT, contains the calculated doses for each pathway for the entire waste stream, indicating the doses from all radionuclides combined. The second output file, TAPE10.OUT, contains ICRP doses for most pathways for each individual nuclide in the waste stream, indicating their relative contributions to the total dose.

3 DESCRIPTION OF INPUT DECKS AND MODIFICATION PROCEDURES

IMPACTS-BRC uses three input files, described here in the order in which they may require user modification. Data within these files can be changed or added to, or entirely new files created, using a file editing program such as EDLIN, supplied with IBM-DOS. When creating or editing any of these files, it should be noted that data must be right justified within the data fields.

Tables are used to describe the contents of each of the input files, on a card by card basis. In this report, the term "card" refers to a line in the input file, corresponding to a physical computer card. For each card type within a file, these tables provide the following:

(1) the input format for the required data,

(2) a schematic illustration of the locations for each variable,

(3) a list and description of the input variables.

Following the card type tables for each input deck is a figure illustrating the sequence of card types within that deck.

3.1 TAPE5

This input file contains the characteristics of the waste stream and the options under which its impacts are to be calculated. It must be created by the user for the specific waste stream(s) and treatment/disposal options to be considered.

Two variables within TAPE5 require explanation beyond that contained in the card type tables. On Card Type 1, if the user specifies the data index (IDAT) as 1 or 3, a number of non-default facility parameters must be added to TAPE2.DAT by the user for the program to operate. The non-default site environment parameters, required when IDAT is specified as 2 or 3, have been provided in TAPE2.DAT on the supplied diskette. For the BRC methodology, these parameters correspond to a conservative site used to estimate maximum individual exposures.

On Card Type 3, the sorting options for the processing index (IP = 3, 4, or 5) should only be used when the disposal facility is a sanitary landfill (IQ = 2 on Card Type 1). These "sorting options" allow the consideration of three waste treatment processes that might take place at a municipal incinerator:

- Sorting Option 1 - The waste is reduced in size (by such equipment as hammermills), incinerated, and the residue buried at the landfill.

- Sorting Option 2 - The waste is reduced in size, separated into combustible and non-combustible fractions, the combustible fraction is incinerated, and the residue and non-combustible fraction are buried at the landfill.

- Sorting Option 3 - The waste is reduced in size, separated into combustible and non-combustible fractions, and the combustible fraction is incinerated. Recyclable materials (metal and glass) are recovered from the non-combustible fraction and recycled. Incineration residue and non-recyclable materials are buried at the landfill.

Tables 1 through 4 describe the four card types used in TAPE5, and Figure 1 depicts the sequential structure of the file. Appendix D contains a hardcopy of the TAPE5 (EXAMPLE5.DAT) that appears on the supplied diskette. This is the data used for the example problems, which are discussed in Section 6.

3.2 TAPE2.DAT

This input file contains data on the reference environments and facilities used by IMPACTS-BRC. It requires editing when the user opts to supply site-specific facility data for use in the impact calculations (IDAT = 1 or 3 in TAPE5). In this case, the user must insert the site-specific facility data into the file, according to Card Types 8 and 9.

Portions of the generic BRC data in TAPE2.DAT are different from that used in the De Minimis methodology. These changes were made to increase the conservatism of IMPACTS-BRC (see Part II). The user is encouraged to alter the generic data supplied in TAPE2.DAT according to data obtained for the specific situation to be modeled. If such changes are used in the preparation of a petition for BRC rulemaking, they should be documented and justified within the petition.

Tables 5 through 14 describe the ten card types used in TAPE2.DAT. Figure 2 shows the sequential structure of the file, including where Card Types 8 and 9 would be inserted. Appendix C contains a hardcopy of TAPE2.DAT as it appears on the supplied diskette.

3.3 TAPE1.DAT

This input file contains nuclide specific data for the 85 radionuclides recognized by IMPACTS-BRC, which are listed in Table 15. This file does not require any editing. However, the user may elect to change the provided data (such as the retardation coefficients) in order to reflect a specific set of circumstances. Information for other nuclides, not currently included, could alternatively be input in this file. These changes should be documented and justified if they are used in the preparation of a petition for BRC rulemaking.

Tables 17 through 19 describe the five card types used within TAPE1.DAT, and Figure 3 illustrates the sequential structure of the file. A hardcopy of TAPE1.DAT as it appears on the supplied diskette is contained in Appendix B.

TABLE 1

DATA INPUT FORMAT FOR CARD TYPE 1, TAPE5

Card Type 1

Format (8I3)

IR	IDAT	IQ	NSTRD	IPOP	ILFE	IINS	IOFL	
1 3	6	9	12	15	18	21	24	

Columns	Variable	Parameter	Index Values	Description
1 - 3	IR	Region index	1	Humid, low permeable soil (Northeast)
			2	Humid, moderately permeable soil (Southeast)
			3	Semi-arid (Southwest)
4 - 6	IDAT	Data index	0	Use default parameters for chosen region
			1	Use non-default facility parameters*
			2	Use non-default environment parameters**
			3	Use both 1 and 2
7 - 9	IQ	Disposal facility index	1	Onsite incinerator/sanitary landfill
			2	Municipal incinerator/sanitary landfill
			3	Onsite incinerator/hazardous waste landfill II
			4	Hazardous waste incinerator/landfill I
			5	Hazardous waste incinerator/landfill II (more conservative)
10 - 12	NSTRD	Number of waste streams		Number of waste streams to be modeled under the same disposal options (Card Type 1)
13 - 15	IPOP	Facility environment index	1	Rural environment (for population exposure calculations)
			2	Urban environment
16 - 18	ILFE	Disposal facility life		Length of time that the disposal facility is operational (yrs)
19 - 21	IINS	Institutional control period		Length of time between closure of the facility and loss of active institutional control (yrs)
22 - 24	IOFL	Overflow index	0	No leachate overflow impacts calculated
			1	Impacts of leachate overflow are calculated

* User must provide, see Card Types 8 and 9 in TAPE2.DAT.
** Provided for the maximum individual site, see Card Type 10 in TAPE2.DAT.

TABLE 2

DATA INPUT FORMAT FOR CARD TYPE 2, TAPE5

Card Type 2

Format (A10, 3E10.3)

BASN	BAS(1,1)	BAS(1,2)	BAS(1,3)	

1 10 20 30 40

Columns	Variable	Description
1 - 10	BASN	Waste stream name (up to 10 characters)
11 - 20	BAS(1,1)	Total mass of the waste stream [metric tons (MT = 2.2 tons)]
21 - 30	BAS(1,2)	Density of the waste stream (MT/m^3 or g/cm^3)
31 - 40	BAS(1,3)	Volume of the waste stream (m^3)

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TABLE 3

DATA INPUT FORMAT FOR CARD TYPE 3, TAPE5

Card Type 3

Format (5I5, 10X, 8I5)

ID	IA	IK1	IK2	IP		IX1	IX2	IX3	IX4	IC1	IC2	IC3	IC4	
1 5	10	15	20	25	35	40	45	50	55	60	65	70	75	

Columns	Variable	Parameter	Index Values	Description
1 - 5	ID	Dispersability index	0	Near zero - waste is solidified in vinyl ester styrene, etc.
			1	Slight to moderate - waste is solidified in cement
			2	Moderate - trash, dewatered resins
			3	Severe - dewatered sludge, ash, dirt, powders
6 - 10	IA	Accessability index	1	Ordinary waste
			2	Activated metals
11 - 15	IK1	First packaging index	0	Not packaged
			1	Metal containers
			2	Other containers
16 - 20	IK2	Second packaging index	0-100	Percent of metal packages recycled - used when IK1 = 1
21 - 25	IP	Processing index	1	Disposal
			2	Incineration and disposal
			3	Sorting option 1 ┐
			4	Sorting option 2 ├ Use only if IQ = 2
			5	Sorting option 3 ┘
26 - 35	blank			
36 - 40	IX1	Distribution index 1		Number of shipping vehicles
41 - 45	IX2	Distribution index 2	0-100	Percent of vehicle load which is de minimis waste
46 - 50	IX3	Distribution index 3		Number of processing facilities
51 - 55	IX4	Distribution index 4		Number of disposal facilities
56 - 60	IC1	Composition index 1	0-100	Weight percent of combustible component of waste
61 - 65	IC2	Composition index 2	0-100	Weight percent of metal component of waste
66 - 70	IC3	Composition index 3	0-100	Weight percent of glass component of waste
71 - 75	IC4	Composition index 4	0-100	Weight percent of other components of waste

Note: All of the variables on Card Type 3 are stored in array ISPC(1, J), J = 1 - 5, 8 - 15.

Composition indices are only used when a sorting option is specified (IP > 2).

TABLE 4

DATA INPUT FORMAT FOR CARD TYPE 4, TAPE5

Card Type 4

Format (5(A6, 1X, A1, E10.3, 2X))

NUCD	S	COND		Same for 2nd nuclide	Same for 3rd nuclide	Same for 4th nuclide	Same for 5th nuclide
1 6	7 8	18	20	40	60	80	100

Columns	Variable	Description
1 - 6	NUCD(1)	Nuclide name (must be from Table 15)
7	blank	
8	S = SOLD(1)	Solubility class - *, D, W, or Y
9 - 18	COND(1)	Nuclide concentration (mCi/g)
19 - 20	blank	
21 - 40	Repeat above for second nuclide: NUCD(2), etc.	
41 - 60	for third nuclide	
61 - 80	for fourth nuclide	
81 -100	for fifth nuclide	

Note: Card Type 4 is repeated as many times as necessary to input all radionuclides present in the waste stream. The last nuclide field read must be blank. If the last radionuclide input is at the end of a line, a blank line must follow.

000016

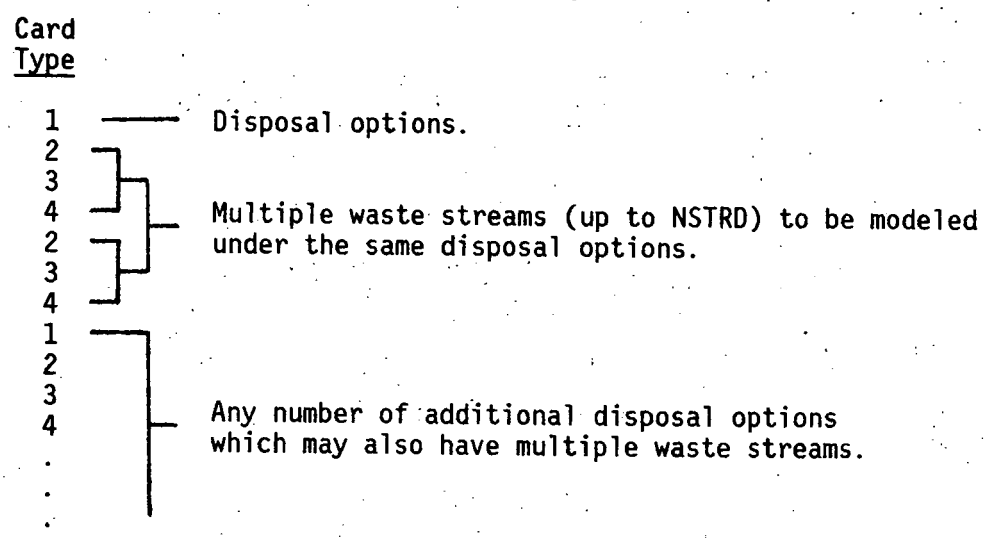

Figure 1. Structure of TAPE5

TABLE 5

DATA INPUT FORMAT FOR CARD TYPE 1, TAPE2.DAT

Card Type 1

Format (10E10.3)

PRC	TSC	DTTM	TTM(1)	TTM(2)	TTM(3)	DTPC	TPC(1)	TPC(2)	TPC(3)
1	10	20	30	40	50	60	70	80	90 100

Columns	Variable	Description	
1 - 10	PRC(IR, IQ)	Annual potential infiltration into the disposal cells (m/yr)	
11 - 20	TSC(IR, IQ)	Contact time fraction between waste and percolation (dimensionless)	
21 - 30	DTTM(IR, IQ)	Incremental groundwater travel time between sectors of the facility (yrs)	
31 - 40	TTM(IR, 1, IQ)	Intruder well	Groundwater travel times from the facility to each receptor (yrs)
41 - 50	TTM(IR, 2, IQ)	Population well	
51 - 60	TTM(IR, 3, IQ)	Surface water	
61 - 70	DTPC(IR, IQ)	Incremental Peclet number* between sectors of the facility (dimensionless)	
71 - 80	TPC(IR, 1, IQ)	Intruder well	Peclet numbers* from the facility to each receptor (dimensionless)
81 - 90	TPC(IR, 2, IQ)	Population well	
91 -100	TPC(IR, 3, IQ)	Surface water	

Note: IR is the region index, 1 - 3, and IQ is the facility index, 1 - 5.

See Figure 2 for the structure of TAPE2.DAT.

* Peclet numbers are not used by IMPACTS-BRC, but may be re-activated within the code.

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TABLE 6

DATA INPUT FORMAT FOR CARD TYPE 2, TAPE2.DAT

Card Type 2

Format (10E10.3)

FSC	FSA	QFC(1)	QFC(2)	QFC(3)	POP	POPE	POPW	TPOP	TDOZ
1 - 10	11 - 20	21 - 30	31 - 40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	91 - 100

Columns	Variable	Description
1 - 10	FSC(IR)	Soil-to-air transfer factor, intruder construction (dimensionless)
11 - 20	FSA(IR)	Soil-to-air transfer factor, intruder agriculture (dimensionless)
21 - 30	QFC(IR, 1)	Intruder well — Minimum dilution factors for each receptor (m^3/yr)
31 - 40	QFC(IR, 2)	Population well — Minimum dilution factors for each receptor (m^3/yr)
41 - 50	QFC(IR, 3)	Surface water — Minimum dilution factors for each receptor (m^3/yr)
51 - 60	POP(IR)	Population factor for airborne exposed waste, operations/intrusion (person-yr/m^3)
61 - 70	POPE(IR)	Population factor for airborne exposed waste, erosion (person-yr/m^3)
71 - 80	POPW(IR)	Site selection factor for waterborne exposed waste, erosion/intrusion (yr/m^3)
81 - 90	TPOP(IR)	Population density around transportation route (persons/mi^2)
91 -100	TDOZ(IR)	Distance dependent dose factor for transportation population exposure calculations (mi^2/ft^2)

Note: IR is the region index, 1 - 3.

TABLE 7

DATA INPUT FORMAT FOR CARD TYPE 3, TAPE2.DAT

Card Type 3

Format (10E10.3)

WVEL	AXOQ	EFAC	EERO	EREC	
1 10	20	30	40	50	

Columns	Variable	Description
1 - 10	WVEL(IR)	Average wind speed at the site (m/sec)
11 - 20	AXOQ(IR)	Accident atmospheric dispersion factor (yr/m^3)
21 - 30	EFAC(IR)	Dust mobilization rate for hazardous waste facility operations (g/m^2-sec)
31 - 40	EERO(IR)	Dust mobilization rate for erosion exposed waste (g/m^2-sec)
41 - 50	EREC(IR)	Dust mobilization rate for intruder exposed waste (g/m^2-sec)

Note: IR is the region index, 1 - 3.

000020

TABLE 8

DATA INPUT FORMAT FOR CARD TYPE 4, TAPE2.DAT

Card Type 4

Format (I5)

NRET	
1 5	

Columns	Variable	Index Values	Description
1 - 5	NRET(IR)	1 - 5	Retardation index for soils in the disposal site vicinity - values corresponding to 1 and 4 are input from TAPE1 for each nuclide, values corresponding to 2, 3, and 5 are calculated internally from 1 and 4.

Note: IR is the region index, 1 - 3.

TABLE 9

DATA INPUT FORMAT FOR CARD TYPE 5, TAPE2.DAT

Card Type 5

Format (10E10.3)

TDIS	TVEL	VINC	XOQI	EDFI	DEN1	VANN	XOQO	EDFO	DEN2
1 - 10	20	30	40	50	60	70	80	90	100

Columns	Variable	Description
1 - 10	TDIS(IQ)	Transportation distance to the facility (miles)
11 - 20	TVEL(IQ)	Transportation velocity to the facility (mi/hr)
21 - 30	VINC(IQ)	Annual volume of non-BRC waste incinerated (m^3/yr)
31 - 40	XOQI(IQ)	Offsite atmospheric dispersion, elevated release (yr/m^3)
41 - 50	EDFI(IQ)	Exposure duration factor, incineration (dimensionless)
51 - 60	DEN1(IQ)	Average density of waste during shipment and incineration (g/cm^3)
61 - 70	VANN(IQ)	Annual volume of non-BRC waste disposed (m^3/yr)
71 - 80	XOQO(IQ)	Offsite atmospheric dispersion, ground level release (yr/m^3)
81 - 90	EDFO(IQ)	Exposure duration factor, disposal facility operations (dimensionless)
91 -100	DEN2(IQ)	Average density of waste during disposal (g/cm^3)

Note: IQ is the facility index, 1 - 5.

000022

TABLE 10

DATA INPUT FORMAT FOR CARD TYPE 6, TAPE2.DAT

Card Type 6

Format (10E10.3)

TWI(1)	TWI(2)	TWI(3)	TWO(1)	TWO(2)	TWO(3)	ADAY(1)	ADAY(2)	ADAY(3)	RMIX
1 - 10	11 - 20	21 - 30	31 - 40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	91 - 100

Columns	Variable	Description	
1 - 10	TWI(IQ, 1)	Low	Waste to air transfer factors (dust loading levels) for incinerator operations (dimensionless)
11 - 20	TWI(IQ, 2)	Medium	
21 - 30	TWI(IQ, 3)	High	
31 - 40	TWO(IQ, 1)	Low	Waste to air transfer factors (dust loading levels) for disposal facility operations (dimensionless)
41 - 50	TWO(IQ, 2)	Medium	
51 - 60	TWO(IQ, 3)	High	
61 - 70	ADAY(IQ, 1)	*Offsite release / offsite release**	Daily exposed area from each (m^2)
71 - 80	ADAY(IQ, 2)	*Equipment operators / unpackaged waste**	
81 - 90	ADAY(IQ, 3)	*Other personnel / packaged waste**	
91 -100	RMIX(IQ)	Cover mixing efficiency (dimensionless)	

Note: IQ is the facility index, 1 - 5.

* Refers to sanitary landfills.
** Refers to hazardous waste landfills.

TABLE 11

DATA INPUT FORMAT FOR CARD TYPE 7, TAPE2.DAT

Card Type 7

Format (10E10.3)

EMP	EFF	SEFF	GERO	OSWR*	OSDL*	
1 10	20	30	40	50	60	

Columns	Variable	Description
1 - 10	EMP(IQ)	Waste emplacement efficiency (dimensionless)
11 - 20	EFF(IQ)	Volumetric disposal efficiency (m^3/m^2)
21 - 30	SEFF(IQ)	Surface utilization efficiency (dimensionless)
31 - 40	GERO(IQ)	Delay time for erosion (yrs)
41 - 50	OSWR(IQ)*	Onsite incinerator weight reduction factor (dimensionless, default = 2.0)
51 - 60	OSDL(IQ)*	Onsite operational dust loading (g/m^3)

Note: IQ is the facility index, 1 - 5.

* If these two variables are not user specified, default values are used.

000024

TABLE 12

DATA INPUT FORMAT FOR CARD TYPE 8, TAPE2.DAT

Card Type 8

Format (10E10.3)

DSP	PDS	WSP	STB	
1 10	20	30	40	

Columns	Variable	Description
1 - 10	DSP(I)	Distance to the center of the population ring (m)
11 - 20	PDS(I)	Population within the population ring (persons)
21 - 30	WSP(I)	Average wind speed for Stability Class A (m/sec)
31 - 40	STB(I)	Fraction of the year that wind is in Stability Class A (dimensionless)

Note: Card Type 8 is repeated 6 times (I = 1 - 6) to enter data for 6 population rings and Stability Classes A - F. This card is used when IDAT = 1 or 3. The supplied TAPE2.DAT does not contain this card.

TABLE 13

DATA INPUT FORMAT FOR CARD TYPE 9, TAPE2.DAT

Card Type 9

Format (10E10.3)

HYTI	HYTO	DISTI	DISTO	EDFID	EDFOD	

1 10 20 30 40 50 60

Columns	Variable	Description
1 - 10	HYTI	Incineration release height (m)
11 - 20	HYTO	Disposal operations release height (m)
21 - 30	DISTI	Distance to off-site individual, incineration (m)
31 - 40	DISTO	Distance to off-site individual, disposal operations (m)
41 - 50	EDFID	Exposure duration factor, off-site individual, incineration (dimensionless)
51 - 60	EDFOD	Exposure duration factor, off-site individual, disposal operations (dimensionless)

Note: This card is used when IDAT = 1 or 3. The supplied TAPE2.DAT does not contain this card.

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TABLE 14

DATA INPUT FORMAT FOR CARD TYPE 10, TAPE2.DAT

Card Type 10

Format (10E10.3)

FSC	FSA	QFC(1)	QFC(2)	QFC(3)	WVEL	AXOQ	EFAC	
1 10	20	30	40	50	60	70	80	

Columns	Variable	Description
1 - 10	FSC	Soil-to-air transfer factor, intruder construction (dimensionless)
11 - 20	FSA	Soil-to-air transfer factor, intruder agriculture (dimensionless)
21 - 30	QFC(1)	Intruder well — Minimum dilution factors for each receptor (m^3/yr)
31 - 40	QFC(2)	Population well — Minimum dilution factors for each receptor (m^3/yr)
41 - 50	QFC(3)	Surface water — Minimum dilution factors for each receptor (m^3/yr)
51 - 60	WVEL	Average wind speed at the site (m/sec)
61 - 70	AXOQ	Accident atmospheric dispersion factor (yr)
71 - 80	EFAC	Dust mobilization rate for hazardous waste facility operations (g/m^2-sec)

Note: This card is used when IDAT = 2 or 3. The supplied TAPE2.DAT contains these data for calculating impacts to the maximum individual.

Card Type			
1	-	IQ1	Northeast site (IR = 1)
1	-	IQ2	
1	-	IQ3	
1	-	IQ4	
1	-	IQ5	
2			
3			
4			
1	-	IQ1	Southeast site (IR = 2)
1	-	IQ2	
1	-	IQ3	
1	-	IQ4	
1	-	IQ5	
2			
3			
4			
1	-	IQ1	Southwest site (IR = 3)
1	-	IQ2	
1	-	IQ3	
1	-	IQ4	
1	-	IQ5	
2			
3			
4			
5, 6, 7		IQ1	Onsite incinerator/sanitary landfill
5, 6, 7		IQ2	Municipal incinerator/sanitary landfill
5, 6, 7		IQ3	Onsite incinerator/hazardous waste landfill II
5, 6, 7		IQ4	Hazardous waste incinerator/landfill I
5, 6, 7		IQ5	Hazardous waste incinerator/landfill II
			← Card Types 8 and 9 must be inserted here if IDAT = 1 or 3.
1, 10, 4			Non-default environmental parameters, used when IDAT = 2 or 3.

Figure 2. Structure of TAPE2.DAT.

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TABLE 15

RADIONUCLIDES CONSIDERED BY IMPACTS-BRC

Isotope	Default Sol.	Half-life (years)	Isotope	Default Sol.	Half-life (years)	Isotope	Default Sol.	Half-life (years)
H-3	*	12.3	Tc-99m	W	6.91E-4	AC-227	Y	21.6
C-14	*	5.730	Ru-103	Y	1.08E-1	Th-228	Y	1.19
Na-22	D	2.62	Ru-106	Y	1.01	Th-229	Y	7,340
P-32	W	3.91E-2	Ag-108m	Y	5	Th-230	Y	8.0E+4
P-33	W	6.68E-2	Ag-110m	Y	6.69E-1	Th-232	Y	1.41E+10
S-35	W	2.41E-1	Cd-109	Y	1.24	Pu-231	Y	3.25E+4
Cl-36	W	3.08E+5	Sn-113	W	3.15E-1	U-232	Y	72
Ca-45	W	4.52E-1	Sn-126	W	1.0E+5	U-233	Y	1.62E+5
Sc-46	Y	2.30E-1	Sb-124	W	1.65W-1	U-234	Y	2.47E+5
Cr-51	Y	7.62E-2	Sb-125	W	2.71	U-235	Y	7.1E+8
Mn-54	W	8.30E-1	I-125	D	1.65E-1	U-236	Y	2.39E+7
Fe-55	Y	2.60	I-129	D	1.17E+7	U-238	Y	4.51E+9
Fe-59	Y	1.25E-1	I-131	D	2.21E-2	Np-237	Y	2.14E+6
Co-57	Y	7.40E-1	Cs-134	D	2.046	Pu-236	Y	2.85
Co-58	Y	1.95E-1	Cs-135	D	3.0E+6	Pu-238	Y	86.4
Co-60	Y	5.26	Cs-136	D	3.75E-2	Pu-239	Y	2.44E+4
Ni-59	W	8.0E+4	Cs-137	D	30.0	Pu-240	Y	6,580
Ni-63	W	92	Ba-140	W	3.51E-2	Pu-241	Y	13.2
Zn-65	Y	6.71E-1	La-140	Y	4.59E-3	Pu-242	Y	3.79E+5
Se-75	W	3.30E-1	Ce-141	Y	8.90E-2	Pu-244	Y	7.6E+7
Rb-86	D	5.11E-2	Ce-144	Y	7.78E-1	Am-241	Y	458
Sr-85	Y	1.75E-1	Eu-152	W	12.7	Am-243	Y	7,950
Sr-89	Y	1.44E-1	Eu-154	W	16	Cm-242	Y	4.45E-1
Sr-90	Y	28.1	Yb-169	Y	8.71E-2	Cm-244	Y	17.6
Zr-95	Y	1.79E-1	Pb-210	W	20.4	Cm-243	Y	32
Nb-94	Y	2.0E+4	Po-210	W	3.79E-1	Cm-248	Y	4.75E+5
Nb-95	Y	9.59E-2	Rn-222	*	1.05E-2	Cf-252	Y	2.646
Mo-99	Y	7.61E-3	Ra-228	W	6.7			
Tc-99	W	2.12E+5	Ra-226	W	1,602			

Sol. = solubility class
* = no solubility class
D = days
W = weeks
Y = years

Element solubility classes are listed in Table 16.

TABLE 16

ELEMENTAL SOLUBILITY CLASSES CONSIDERED BY IMPACTS-BRC

Element	Solubility Class	Compounds
H	*	All compounds
C	*	All compounds
Na	D	All compounds
P	W	Some phosphates
	D	Most phosphorous compounds
S	W	Elemental sulphur
	D	Information not provided
Cl	W	Information not provided
	D	Information not provided
Ca	W	All compounds
Sc	Y	Information not provided
Cr	Y	Oxides and hydroxides
	D	All other compounds
Mn	W	Oxides, hydroxides, halides and nitrates
	D	All other compounds
Fe	W	Oxides, hydroxides and halides
	D	All other compounds
Co	Y	Oxides, hydroxides, halides and nitrates
	W	All other compounds
Ni	W	Oxides, hydroxides, halides, nitrates, and carbides
	D	All other compounds
Zn	Y	Oxides, hydroxides, phosphates and nitrates
	W	Halides and sulphides
	D	Sulphates
Se	W	Elemental selenium, oxides, and hydroxides
	D	All other compounds
Rb	D	All compounds
Sr	Y	Strontium titanate
	W	All other compounds
Zr	Y	Zirconium carbide
	W	Oxides, hydroxides, halides and nitrates
	D	All other compounds
Nb	Y	Oxides and hydroxides
	W	All other compounds
Mo	Y	Molybdenum, sulphide, oxides and hydroxides
	D	All other compounds
Tc	W	Oxides, hydroxides, halides and nitrates
	D	All other compounds
Ru	Y	Oxides and hydroxides
	W	Halides
	D	All other compounds
Cd	Y	Oxides and hydroxides
	W	Sulphides, halides and nitrates
	D	All other compounds

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TABLE 16 (Continued)

ELEMENTAL SOLUBILITY CLASSES CONSIDERED BY IMPACTS-BRC

Element	Solubility Class	Compounds
Ag	Y	Oxides and hydroxides
	W	Nitrates and sulphides
	D	Silver metal and all other compounds
Sn	W	Sulphides, oxides, hydroxides, halides, nitrates and stannic compounds
	D	All other compounds
Sb	W	Oxides, hydroxides, sulphides, sulphates, carbonates, nitrates, and halides
	D	All other compounds
I	D	All compounds
Cs	D	All compounds
Ba	D	All compounds
La	Y	Oxides, hydroxides and flourides
	W	All other compounds
Ce	Y	Oxides, hydroxides and fluorides
	W	All other compounds
Eu	Y	Oxides, hydroxides, carbides and fluorides
	W	All other compounds
Yb	Y	Oxides, hydroxides, carbides and fluorides
	W	All other compounds
Pb	D	All compounds
Po	W	Oxides, hydroxides and nitrates
	D	All other compounds
Rn	*	All compounds
Ra	W	All compounds
Ac	W	All compounds
Th	Y	Oxides and hydroxides
	W	All other compounds
Pa	W	All compounds
U	D	Most hexavalent uranium compounds
	W	Most tetravalent uranium compounds
	Y	UO_2 and U_3O_8
Np	W	All compounds
Pu	Y	Plutonium dioxide
	W	All other compounds
Am	W	All compounds
Cm	W	All compounds
Cf	Y	Oxides and hydroxides
	W	All other compounds

* = no solubility class
D = days
W = weeks
Y = years

TABLE 17

DATA INPUT FORMAT FOR CARD TYPE 1, TAPE1.DAT

Card Type 1

Format (A6, 1X, I1, A1, 10E9.2)

NUC		JJ	S	DCF3	FF(1)	FF(2)	FF(3)	FF(4)	FF(5)	AL	FMF	RET(1)	RET(4)
1 6	7	8	9	18	27	36	45	54	63	72	81	90	99

Columns	Variable	Description
1 - 6	NUC(N)	Nuclide name
7	blank	
8	JJ(N)	Number of solubility classes for the nuclide
9	S = SOLB(N)	Default solubility class for the nuclide
10 - 18	DCF3(N)	Ground contamination fundamental dose conversion factor (mrem/yr per pCi/m^3)
19 - 27	FF(N, 1)	Fundamental dose conversion factors (various units)
28 - 36	FF(N, 2)	
37 - 45	FF(N, 3)	
46 - 54	FF(N, 4)	
55 - 63	FF(N, 5)	
64 - 72	AL(N)	Decay constant (yrs^{-1})
73 - 81	FMF(N)	Waste-to-leachate partition ratio (dimensionless)
82 - 90	RET(N, 1)	Retardation coefficients (dimensionless)
91 - 99	RET(N, 4)	

Note: N is the nuclide index, 1 - 85.

000032

TABLE 18

DATA INPUT FORMAT FOR CARD TYPES 2, 3, 5, TAPE1.DAT

Card Types 2, 3, 5

Format (9X, 10E9.2)

	DCFn(1)	DCFn(2)	DCFn(3)	DCFn(4)	DCFn(5)	DCFn(6)	DCFn(7)	DCFn(8)	DCFn(9)	DCFn(10)
1 9	18	27	36	45	54	63	72	81	90	99

Columns	Card Type	Variable	Description
1 - 9	2, 3, 5	blank	
10 - 99	2	DCF4(N, 1-10*)	Ground surface contamination fundamental dose conversion factors (mrem/yr per pCi/m^2)
	3	DCF5(N, 1-10*)	Air immersion fundamental dose conversion factors (mrem/yr per pCi/m^3)
	5	DCF2(N, 1-10*)	Inhalation fundamental dose conversion factor (mrem/pCi)

Note: N is the nuclide index, 1 - 85.

* These indices refer to the following body organs:

1 - lung
2 - stomach wall
3 - large lower intestine wall
4 - total body
5 - kidneys
6 - liver
7 - red marrow
8 - bone surface
9 - thyroid
10 - ICRP total body dose

TABLE 19

DATA INPUT FORMAT FOR CARD TYPE 4, TAPE1.DAT

Card Type 4

Format (8X, A1, 10E9.2)

	S	DCF1(1)	DCF1(2)	DCF1(3)	DCF1(4)	DCF1(5)	DCF1(6)	DCF1(7)	DCF1(8)	DCF1(9)	DCF1(10)
1 8	9	18	27	36	45	54	63	72	81	90	99

Columns	Variable	Description
1 - 8	blank	
9	S = SOLT(N, JJ)	Solubility class
10 - 99	DCF1(N, JJ, 1-10*)	Ingestion fundamental dose conversion factors (mrem/pCi)

Note: Card Types 4 and 5 are repeated for each solubility class (JJ times) of the radionuclide.

Card Types 1 - 5 are repeated for each of the 85 (N = 1 - 85) radionuclides.

* For corresponding body organs, refer to Card Types 2, 3, 5.

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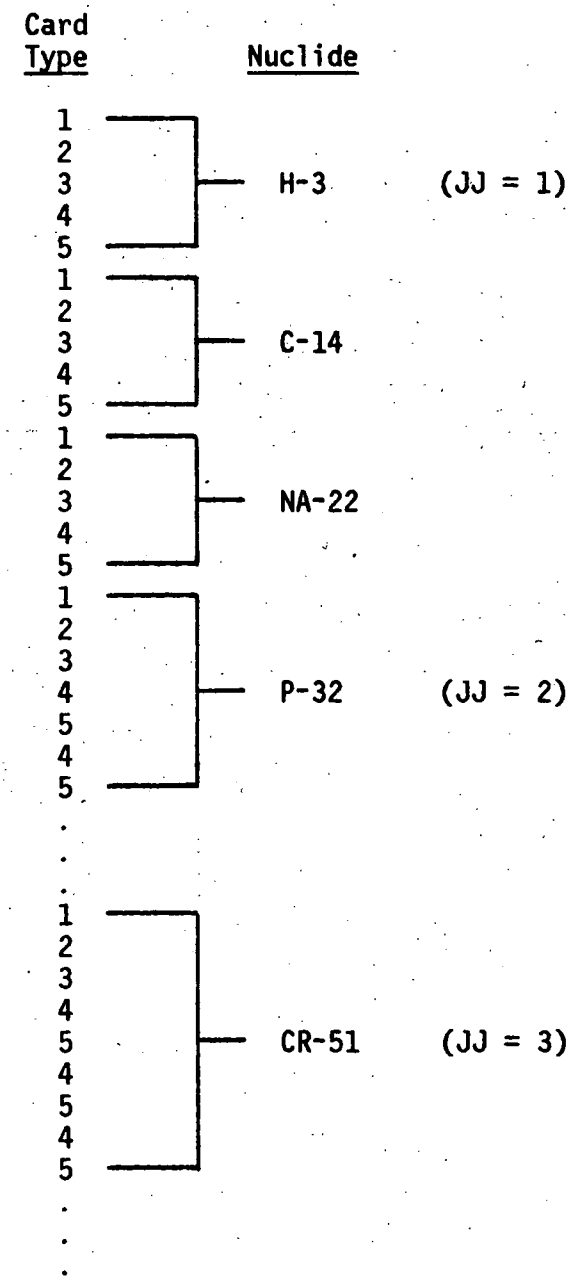

Figure 3. Structure of TAPE1.DAT.

4 DESCRIPTION OF OUTPUT DECKS

IMPACTS-BRC generates two output files containing results of the impact calculations. The contents of these files are described in the following sections. Appendices E and F contain examples of the output files, which are the results of the example problems discussed in section 6.

4.1 TAPE6.OUT

This output file receives the calculated doses for each pathway for the entire waste stream, indicating the total impacts. When multiple waste streams are modeled under the same disposal options, the impacts of each are presented, followed by their combined impacts.

For each set of disposal options, the facility chosen and a number of selected parameters are listed first. The following abbreviations are used for the parameters:

LIFE - disposal facility life (ILFE)
REGN - regional index (IR)
IPOP - facility environment index (IPOP)
OVFL - overflow index (IOFL)
DATA - disposal/treatment environment index (IDAT)
INST - institutional control period (IINS)
NSTR - number of waste streams (NSTRD)

Any non-generic parameters used in the modeling are listed next, using the same variable names defined for TAPE2.DAT. For each waste stream modeled under a set of options, the waste stream name, weight, density, and selected parameters are listed. These parameters are listed under the same variable names defined under TAPE1.DAT, with the exception of the word "PROCESS", which refers to the waste processing index (IP).

Following this information, the calculated radiological impacts for each of the scenarios (SCN) considered are presented. For recycling and transportation scenarios, only total body doses are calculated. For the remaining scenarios, impacts are calculated for nine body organs and the ICRP total body dose. Table 20 defines the impact scenarios and units of dose measurement that may appear in TAPE6.OUT. Appendix E contains the TAPE6.OUT output for the example problems discussed in section 6.

4.2 TAPE10.OUT

This output file receives ICRP doses for most pathways for each individual nuclide in the waste stream. Its purpose is to break down the total doses presented in TAPE6.OUT by nuclide, so that important nuclides contributing to total dose can be recognized. For some impact scenarios, doses in TAPE10.OUT are not normalized by the number of facilities, and therefore do not add up to the total doses presented in TAPE6.OUT. This is indicated on the output from TAPE10.OUT. Individual nuclide doses can be normalized for these scenarios by the method described under section 6.3. Appendix F contains the TAPE10.OUT output for the example problems discussed in section 6.

TABLE 20

DEFINITION OF TAPE6.OUT ABBREVIATIONS

Impact Scenario	Units*	Definition
Metal package recycle:		
MAXIND	a	impacts to maximum individual
POPULN	c	population impacts
Metal material recycle:		
MAXIND	a	impacts to maximum individual
POPULN	c	population impacts
Glass material recycle:		
MAXIND	a	impacts to maximum individual
POPULN	c	population impacts
Transportation:		
TR-MAX	a	impacts to maximum transport worker
TR-OCC	b	total impacts to transport workers
TR-POP	b	impacts to population along transport route
Intruder:		
INT-CO	a	intruder-construction scenario impacts
INT-AG	a	intruder-agriculture scenario impacts
Exposed waste:		
IN-AIR	b	intruder-initiated airborne impacts
ER-AIR	b	erosion-initiated airborne impacts
IN-WAT	a	intruder-initiated waterborne impacts
ER-WAT	a	erosion-initiated waterborne impacts
Incineration and operation:		
IC-POP	b	population impacts from incineration
IC-IND	a	off-site individual impacts from incineration
IC-WOR	b	total worker impacts at incinerator
IC-MWR	a	maximum worker impacts at incinerator
OP-IND	a	off-site individual impacts from disposal operations
OP-WOR	b	total worker impacts at disposal facility
OP-MWR	a	maximum worker impacts at disposal facility
Leachate accumulation:		
LA-OPS	a	operational leachate discharge impacts to individual
LA-PVF	a	leachate overflow impacts to individual
LA-AIR	b	population airborne impacts due to evaporator operations

*a = mrem/yr, b = person-mrem/yr, c = person-mrem/30 yrs.

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5 IMPLEMENTATION OF IMPACTS-BRC

5.1 Description of Supplied Computer Disk

A 5¼ inch floppy computer diskette containing IMPACTS-BRC is available from the National Energy Software Center (NESC), Argonne National Laboratory, 9700 South Cass Ave., Argonne, Illinois 60439. A listing of the directory of this disk should appear as follows:

```
 Volume in drive B has no label
 Directory of  B:

IMPACTSB FOR    14679   7-15-86   2:42p
IMPCOMM  FOR     1067   5-20-86  12:17p
READ1    FOR     3691   5-16-86   3:41p
READ2    FOR     9513   6-09-86   7:18a
READ5    FOR     9267   5-16-86   3:47p
UPTAKE   FOR     5249   6-09-86   7:19a
SPLICE   FOR     8857   5-16-86   3:50p
RECYCL   FOR    11727   6-09-86   7:19a
INCIMP   FOR    11973   5-16-86   3:58p
INTIMP   FOR     6232   7-14-86  11:41a
EXPWAS   FOR     7134   7-14-86  11:42a
OPSIMP   FOR    13858   7-14-86   2:55p
OVRFLO   FOR     6068   7-14-86  11:42a
GWATER   FOR     9102   7-14-86  11:43a
DIVVY    FOR    10743   5-19-86  12:31p
CHNS     FOR     4593   5-19-86  11:45a
CALI     FOR     2953   5-19-86  11:49a
CALE     FOR     2707   5-19-86  11:47a
UTILS    FOR     7463   5-19-86  11:51a
IMPACTSB EXE   105912   7-15-86   2:49p
TAPE1    DAT    59350   4-25-86  10:51a
TAPE2    DAT     3475   6-12-86   2:36p
EXAMPLE5 DAT     2759   5-19-86  12:03p
        23 File(s)     32768 bytes free
```

5.2 Backup and Working Copies

After verifying the contents of the supplied disk, it is suggested that a backup copy be created in case of subsequent damage to the original. It is also necessary to create a working disk containing the operating system (not supplied), the executable program file IMPACTSB.EXE, and data files TAPE1.DAT, TAPE2.DAT, and EXAMPLE5.DAT (a working subdirectory containing these four files should be created for harddisk systems). These four files must reside on the same disk (subdirectory) for the program to execute. Omitting the FORTRAN files from the working disk leaves storage space for the generated output files and any additional TAPE5 input files. Instructions for creating the backup and working copies are contained in Appendix G.

5.3 Execution of the Example Problems

IMPACTS-BRC can be executed when the working disk (subdirectory) is in the default drive, by entering the command "IMPACTSB, (name of TAPE5)" after the system prompt (do not include the quotation marks). Since the TAPE5 data for the example problems is contained in file EXAMPLE5.DAT on the supplied disk, the command "IMPACTSB, EXAMPLE5.DAT" entered at the system prompt will start the sample run.

Run time for the example problems should be about 5 minutes (longer if an 8087 math chip is not installed). If the program runs without error, the message "NORMAL TERMINATION" is displayed, followed by the system prompt. The program should run properly on the supplied data if the preceeding instructions are followed.

After the program run is completed, output files TAPE6.OUT and TAPE10.OUT should be printed. This can be done using the PRINT command (with a harddisk or DOS disk), or by engaging the printer with the Ctrl and PrtSc keys, then using the TYPE command. Since portions of the output are printed on 128 character lines, the printer should be set up to handle lines of this width before printing.

5.4 Program Verification

The printed output from execution of the example problems should be compared to the listings in Appendices E and F to verify proper program operation. The outputs should be identical.

5.5 Flow Chart for Implementation

STEP 1. Construct TAPE5

This step is required, unless a run is being repeated with no changes. A new TAPE5 can be created either by editing the existing file (EXAMPLE5.DAT) or by building a new file from scratch. This can be done using a file editing program such as EDLIN, supplied with IBM-DOS. If EXAMPLE5.DAT is to be edited, it is advisable to save a copy of the original for use in future program verifications. Because the file to be read as TAPE5 is designated in the run statement, these files can be given a name that reflects the nature of the data they contain, e.g., EXAMPLE5.DAT, OIL.DAT, TRASH.DAT.

STEP 2. Edit TAPE2.DAT

This step is usually not required. However, if IDAT is set equal to 1 or 3 in TAPE5, Card Types 8 and 9 must be included in TAPE2.DAT. Optionally (this option is encouraged), the default data supplied in TAPE2.DAT may also be edited to reflect specific circumstances. If TAPE2.DAT is edited, it is advisable to retain a copy of the original file.

STEP 3. Edit TAPE1.DAT

This step is optional. The user may elect to edit the default radionuclide data, such as decay rates and retardation coefficients, to reflect specific circumstances or to input data for alternative radionuclides. If TAPE1.DAT is to be edited, it is advisable to retain a copy of the original file.

STEP 4. Run IMPACTS-BRC

This step is required. Before running the program, any previous versions of TAPE6.OUT and TAPE10.OUT which need to be saved should be copied to another disk (or renamed in the subdirectory). Otherwise, they will be overwritten during program execution. It is also necessary to have enough space available on the working disk to store the generated output files.

To run the program, the working disk (subdirectory) containing the executable program file (IMPACTSB.EXE) and the data files (TAPE1.DAT, TAPE2.DAT, and TAPE5) must reside in the default drive. The program is executed by entering the command "IMPACTSB, (name of TAPE5)" at the system prompt. Run times for the program vary depending upon the number and size of the waste streams being considered, but typically are on the order of five minutes. If the program runs without error, the message "NORMAL TERMINATION" is displayed, followed by the system prompt.

Error messages will be displayed when the program does not run as expected. These errors are usually associated with incorrect input in TAPE5, or incorrect editing of the other two input tapes. If an error occurs, return to STEP 1 and use the original input files as templates to help detect input format errors. STEP 5 can also be performed to help diagnose errors.

STEP 5. Print output and input files

This step is required to obtain a hardcopy of the program run results. Since portions of the output are printed on 128 character lines, the printer should be set up to handle lines of this width before printing.

Files can be printed using the PRINT command (with harddisk or DOS disk), or by engaging the printer with the Ctrl and PrtScr keys, then using the TYPE command. Along with the output files, TAPE5 and any edited versions of TAPE1.DAT and TAPE2.DAT should be printed to verify correct input.

6 EXAMPLE PROBLEMS

Three example problems have been included in EXAMPLE5.DAT on the supplied diskette. These problems are presented to give the user a feel for actual applications of IMPACTS-BRC. The first two examples use the same TAPE5 input as the example problems given in Volume 1. The third problem was suggested by an actual petition received by NRC in request for BRC rulemaking.

6.1 Reactor Resins to Hazardous Waste Landfill

This example involves the disposal of pressurized water reactor secondary coolant system ion exchange resins at hazardous waste landfills. It is assumed that 80 MT of these reactor resins, having an average density of 1 gm/cm^3, are generated annually. This single waste stream (NSTRD=1) is to be disposed of in the Northeast (IR=1), using default environmental parameters (IDAT=0), at conservative performance hazardous waste landfills II (IQ=5). The disposal facilities are assumed to be located in rural areas (IPOP=1), have 20-year operational lifetimes (ILFE=20), and 30-year institutional control periods (IINS=30). Leachate accumulation impacts are calculated (IOFL=1).

The waste stream itself is moderately dispersible (ID=2), contains no activated metals (IA=1), and is packaged in metal containers (IK=1), 50% of which are recycled (IK2=50). The resins are not incinerated prior to disposal (the disposal only option is chosen, IP=1) therefore there are no processing facilities (IX3=0). Ten vehicles (IX1=10) shipping only resins (IX2=100) transport the waste to five disposal facilities (IX4=5). The waste is composed entirely of non-combustible material, and contains no metal or glass (IC's=0, 0, 0, 100). The waste stream contains 32 radionuclides, whose concentrations are given in units of μCi/g.

A summary of the results of this example problem are contained in Table 21. Impacts for most of the scenarios considered are fairly low. However, a significant individual dose (when compared to a maximum individual guideline of 1 mrem/yr) appears to be associated with waste transportation. The whole body impact to the maximum exposed transportation worker is calculated to be approximately 5 mrem/yr, due entirely to direct (external) gamma radiation.

The results of this problem are the same for both the BRC and De Minimis methodologies for most pathways. Leachate accumulation impacts, however, have increased in the BRC results, due to the more conservative contact times (TSC's) used (see Section 9.4). Groundwater impacts are also higher in the BRC results, due to the shorter groundwater travel times and lower retardation coefficients used (see Sections 9.2 and 9.3). Both of these pathways still have very low impacts.

Care should be taken in comparing groundwater migration and leachate accumulation impacts, since one or the other would probably occur, but not both. If, for example, a disposal facility is located in a humid area having highly impermeable soils, or is equipped with a functional liner, leachate accumulation impacts may be more likely. On the other hand, if a disposal facility is located in a humid area having moderately permeable soils and is not equipped with a liner, groundwater impacts may be more likely. For this problem, both groundwater impacts and leachate accumulation impacts are quite low.

TABLE 21

SUMMARY OF RADIOLOGICAL DOSES FOR
REACTOR RESINS TO HAZARDOUS WASTE LANDFILL EXAMPLE

Impact Scenarios	Units*	IMPACTS-BRC	DE MINIMIS
Metal Package Recycle:			
Maximum individual	a	5.7 E-4	5.7 E-4
Population	c	4.8 E+1	4.8 E+1
Transportation:			
Maximum worker	a	4.7 E+0	4.7 E+0
All workers	b	9.4 E+1	9.4 E+1
Population along route	b	6.4 E+2	6.4 E+2
Intruder:			
Construction scenario	a	1.2 E-2	1.2 E-2
Agriculture scenario	a	2.4 E-2	2.4 E-2
Exposed Waste:			
Intruder water	a	7.1 E-7	7.1 E-7
Intruder airborne	b	1.6 E-4	1.6 E-4
Erosion water	a	3.2 E-5	3.2 E-5
Erosion airborne	b	3.3 E-2	3.3 E-2
Disposal Facility Operation:			
Off-site individual	a	4.5 E-12	4.5 E-12
Off-site population	b	**	**
Maximum worker	a	2.8 E-1	2.8 E-1
All workers	b	4.8 E+1	4.8 E+1
Leachate Accumulation:			
Leachate treatment	a	2.6 E-4	6.2 E-7
Overflow	a	1.4 E-4	1.2 E-4
Evaporation	b	2.9 E-2	1.8 E-2
Ground Water:			
Intruder well	a	1.7 E-4	9.0 E-9
Population well	a	3.4 E-5	1.3 E-9
Surface water	a	6.4 E-7	3.5 E-11

*a = mrem/yr, b = person-mrem/yr, c = person-mrem/30 yrs.

**Offsite population exposures are not calculated for packaged waste disposed at hazardous waste landfills (see Volume 1, p. 5-30).

All doses are for the total body.

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IMPACTS-BRC calculated doses are the same or higher than those calculated by DeMinimis. This is a result of the increased conservatism of the IMPACTS-BRC methodology. These changes are discussed more fully in Part II of this report.

6.2 Trash and Soil to Municipal Incinerator and Sanitary Landfill

In this example, two waste streams (NSTRD=2) are considered under the same disposal scenario. The two streams, one combustible trash and the other "contaminated" soil, are to be disposed of in the Southeast (IR=2), using default environmental parameters (IDAT=0), at sanitary landfills (IQ=2). The disposal facilities are assumed to be located in urban areas (IPOP=2), have 20-year operational lifetimes (ILFE=20), and have negligible institutional control (IINS=0). Leachate accumulation impacts are calculated (IOFL=1).

The trash waste stream has an average density of 0.5 g/cm^3, and 100 MT/yr are assumed to be generated. The trash is moderately dispersable (ID=2) ordinary waste (IA=1) that is not packaged (IK1=0, IK2=0). The waste is sorted by Option 3 at the incinerator so that recyclable materials may be recovered (IP=5). Thirty-two vehicles, with 10% of their load being this trash, deliver the waste to four incinerators and the residue to 16 landfills (IX's=32, 10, 4, 16). The composition of the trash is 50% combustible, 20% metal, 20% glass, and 10% other materials (IC's=50, 20, 20, 10). This waste stream contains 32 radionuclides.

The "contaminated" soil waste stream has an average density of 1.6 g/cm^3 and is assumed to be generated at a rate of 500 MT/yr. It is highly dispersible (ID=3), composed entirely of dirt (IA=1, IC's=0, 0, 0, 100), and is not packaged (IK1=0, IK2=0). The soil is not incinerated (IP=1, IX3=0). It is transported by three vehicles (IX1=3) carrying only soil (IX2=100) to a single landfill (IX4=1). This waste stream contains 13 radionuclides which naturally occur in soils, with concentrations that are typically found in natural soils. The purpose of using natural radionuclides and concentrations is to test the conservatism of the program.

A summary of the doses calculated for each of these two waste streams and the total impacts are presented in Table 22. These results differ from those reported for a similar problem using De Minimis (Table 23). The differences are due in part to the more conservative assumptions used in IMPACTS-BRC, which affect leachate and groundwater impacts, but are also due to a change in disposal facility (from open dump to sanitary landfill), as open dump is not a disposal option available in IMPACTS-BRC. Population transportation impacts are affected by an increase in the default transportation distance to the sanitary landfill from 10 miles in De Minimis to 100 miles in IMPACTS-BRC.

Significant impacts (when compared to a maximum individual guideline of 1 mrem/yr) from the trash waste stream appear to be associated with glass material recycle and transportation. Maximum individual exposures for these scenarios are approximately 3 and 1 mrem/yr, respectively. Other scenarios had fairly low impacts.

There are no significant (1 mrem/yr) individual impacts associated with the "contaminated" soil waste stream, as would be expected from naturally occurring soil. Impacts from both the trash and soil waste streams are low enough that none of the total individual impacts calculated are greater than 1 mrem/yr.

TABLE 22

SUMMARY OF RADIOLOGICAL DOSES FOR TRASH AND SOIL TO MUNICIPAL INCINERATOR AND SANITARY LANDFILL--IMPACTS-BRC EXAMPLE

Impact Scenarios	Units*	Waste Stream: Trash	Cont. Soil	Total
Recycle:				
Metal - max. ind.	a	3.2 E-1		
Metal - population	c	2.2 E+4		
Glass - max. ind.	a	3.3 E+0		
Glass - population	c	9.5 E+3		
Transportation:				
Maximum worker	a	1.2 E+0	7.0 E-2	
All workers	b	7.3 E+1	4.2 E-1	
Population along route	b	4.8 E+2	2.7 E+0	
Intruder:				
Construction scenario	a	4.6 E-2	1.5 E-2	6.1 E-2
Agriculture scenario	a	1.3 E-1	1.6 E-1	3.0 E-1
Exposed Waste:				
Intruder water	a	1.8 E-6	5.8 E-6	7.6 E-6
Intruder airborne	b	2.9 E-3	1.6 E-3	4.5 E-3
Erosion water	a	3.5 E-6	6.9 E-4	7.0 E-4
Erosion airborne	b	1.1 E-3	3.5 E-3	4.6 E-3
Incinerator Operation:				
Off-site individual	a	8.7 E-5	- -	8.7 E-5
Off-site population	b	1.2 E+1	- -	1.2 E+1
Maximum worker	a	3.9 E-1	- -	3.9 E-1
All workers	b	5.8 E+1	- -	5.8 E+1
Disposal Facility Operation:				
Off-site individual	a	3.5 E-5	3.0 E-4	3.4 E-4
Off-site population	b	3.2 E-2	1.7 E-2	5.0 E-2
Maximum worker	a	9.5 E-2	3.0 E-2	1.3 E-1
All workers	b	1.5 E+0	3.0 E-2	1.6 E+0
Leachate Accumulation:				
Leachate treatment	a	1.4 E-5	5.6 E-3	5.6 E-3
Overflow	a	1.4 E-5	5.6 E-3	5.6 E-3
Evaporation	b	4.0 E-2	9.9 E-3	5.0 E-2
Ground Water:				
Intruder well	a	1.2 E-4	1.3 E-2	1.3 E-2
Population well	a	5.9 E-6	3.1 E-4	3.1 E-4
Surface water	a	4.7 E-8	1.8 E-6	1.8 E-6

*a = mrem/yr, b = person-mrem/yr, c = person-mrem/30 yrs.

All doses are for the total body.

Cont. = contaminated

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TABLE 23

SUMMARY OF RADIOLOGICAL DOSES FOR TRASH AND SOIL
TO MINICIPAL INCINERATOR AND OPEN DUMP--DE MINIMIS EXAMPLE

Impact Scenarios	Units*	Waste Stream: Trash	Cont. Soil	Total
Recycle:				
Metal - max. ind.	a	3.2 E-1		
Metal - population	c	2.2 E+4		
Glass - max. ind.	a	3.3 E+0		
Glass - population	c	9.5 E+3		
Transportation:				
Maximum worker	a	1.2 E+0	7.0 E-2	
All workers	b	7.3 E+1	4.2 E-1	
Population along route	b	4.8 E+1	2.7 E-1	
Intruder:				
Construction scenario	a	4.7 E-2	1.5 E-2	6.2 E-2
Agriculture scenario	a	2.0 E-1	1.8 E-1	3.8 E-1
Exposed Waste:				
Intruder water	a	2.7 E-6	8.6 E-6	1.1 E-5
Intruder airborne	b	4.4 E-3	2.4 E-3	6.8 E-3
Erosion water	a	1.2 E-5	6.9 E-4	7.1 E-4
Erosion airborne	b	2.8 E-3	3.5 E-3	6.3 E-3
Incinerator Operation:				
Off-site individual	a	8.7 E-5	- -	8.7 E-5
Off-site population	b	1.2 E+1	- -	1.2 E+1
Maximum worker	a	3.9 E-1	- -	3.9 E-1
All workers	b	5.8 E+1	- -	5.8 E+1
Disposal Facility Operation:				
Off-site individual	a	2.0 E-2	1.3 E-1	1.5 E-1
Off-site population	b	5.1 E+1	2.1 E+1	7.3 E+1
Maximum worker	a	1.8 E-1	5.6 E-2	2.4 E-1
All workers	b	2.9 E+0	5.6 E-2	3.0 E+0
Leachate Accumulation:				
Leachate treatment	a	3.5 E-7	1.5 E-4	1.5 E-4
Overflow	a	2.7 E-5	1.1 E-2	1.1 E-2
Evaporation	b	7.8 E-2	2.0 E-2	9.8 E-2
Ground Water:				
Intruder well	a	3.6 E-7	1.6 E-4	1.6 E-4
Population well	a	1.0 E-8	8.0 E-6	8.0 E-6
Surface water	a	5.2 E-10	4.7 E-8	4.7 E-8

*a = mrem/yr, b = person-mrem/yr, c = person-mrem/30 yrs.

All doses are for the total body.

6.3 Waste Oil to Onsite Incinerator and Sanitary Landfill

The following example is derived from a petition submitted to the NRC by the Edison Electric Institute and the Utility Nuclear Waste Management Group (EEI and UNWMG 1985). This petition is a request to allow waste oil from nuclear power plants to be treated and disposed of at facilities not licensed for LLW treatment or disposal. The results presented below are not necessarily related to the NRC's official finding on this petition; this problem is presented only to demonstrate the functioning of IMPACTS-BRC.

In this example, waste oil from a power plant is incinerated onsite with nonradiological waste, and the ashes are shipped to a sanitary landfill for disposal (IP=2, IQ=1). The petitioner indicates that the waste oil could also be burned in electric power boilers, which is not considered here. Only one waste stream is considered (NSTR=1) and the non-default site characteristics are used to calculate maximum individual exposures (IDAT=2). The region site specifier (IR=1) indicates that other parameters will be taken from the northeast dataset. The disposal facility is assumed to be located in an urban setting (IPOP=2) and leachate accumulation impacts are calculated (IOFL=1) for the disposal scenario. The disposal facility is assumed to operate for 20 years (ILFE=20) and to have a 5-year institutional control period (IINS=5).

The waste stream consists of oil contaminated during operations at nuclear power plants (EEI and UNWMG 1985). Based on information in the petition, the total volume of waste oil generated annually by all reactors in the U.S. is estimated to be 800 m^3. The density is assumed to be 1 gm/cm^3. The waste stream is slightly dispersable (ID=1), and is composed of combustible material containing no activated metals (IA=1) nor any contaminated metal or glass (IC's = 100, 0, 0, 0).

The waste oil is burned at 30 onsite incinerators (IX3=30) and transported to a single sanitary landfill (IX4=1), using 30 vehicles (IX1=30) containing only the ash from the onsite incinerator(IX2=100). Incineration is assumed to result in a volume reduction factor of 100 (OSWR=100.0). The ash is transported to the sanitary landfill in metal drums (IK1=1), half of which are recycled (IK2=50).

Concentrations for the 20 radionuclides in the waste oil are limit concentrations from the petition submitted to NRC (EEI and UNWMG, 1985). The petitioner developed the limit for each radionuclide assuming that it was the only radionuclide in the waste stream and that the resultant dose was 1 mrem/yr. Thus, the dose from a waste stream containing all 20 radionuclides at their limit concentrations is expected to be higher than 1 mrem/yr.

The results of the IMPACTS-BRC run for this example are summarized in Table 24. Unlike the two examples above, most of the results presented here are for the weighted whole body dose equivalent (ICRP 1978). The recycle and transportation impacts are for the whole body. The complete results are given in Appendices E and F.

Impacts for several pathways are relatively low. Assuming that 50 percent of the metal drums are recycled, maximum individual impacts from the recycle pathway are estimated to be less than 1 mrem/yr. The exposed waste impacts are

TABLE 24

SUMMARY OF ICRP DOSES FOR WASTE OIL TO ONSITE INCINERATOR AND SANITARY LANDFILL EXAMPLE

Impact Scenarios	Units*	IMPACTS-BRC
Metal Package Recycle**:		
Maximum individual	a	9.6 E-1
Population	c	3.8 E+3
Transportation**:		
Maximum worker	a	1.4 E+3
All workers	b	8.3 E+4
Population along route	b	2.0 E+6
Intruder:		
Construction scenario	a	1.1 E+1
Agriculture scenario	a	3.5 E+1
Exposed Waste:		
Intruder water	a	9.4 E-4
Intruder airborne	b	2.1 E-1
Erosion water	a	1.2 E-5
Erosion airborne	b	3.1 E-3
Incinerator Operation:		
Off-site individual	a	4.4 E+0
Off-site population	b	2.2 E+4
Maximum worker	a	6.9 E+2
All workers	b	5.7 E+5
Disposal Facility Operation:		
Off-site individual	a	9.6 E-2
Off-site population	b	1.6 E+1
Maximum worker	a	4.3 E+3
All workers	b	4.3 E+3
Leachate Accumulation:		
Leachate treatment	a	2.2 E+1
Overflow	a	1.5 E+0
Evaporation	b	4.7 E+0
Ground Water:		
Intruder well	a	9.7 E+0
Population well	a	6.6 E-1
Surface water	a	2.8 E-2

*a = mrem/yr, b = person-mrem/yr, c = person-mrem/30 yrs.

**These doses are for the total body.

All other doses are ICRP effective whole body doses.

also very low. The maximum offsite individual exposure from incineration of the waste oil is estimated to be about 4 mrem/yr. Except for the intruder well, groundwater pathway impacts are very low.

The above impacts are calculated assuming all the radionuclide concentrations in the waste oil are at the limit concentration. Expected concentrations were not used for this problem. Using the ratio method proposed by the petitioner, the sum of the ratios of the radionuclide concentration to the limit concentration for that radionuclide, must be less than 1. To determine if these individual limit concentrations are appropriate, the output from TAPE10.OUT must be used. TAPE10.OUT contains the ICRP doses for most pathways by radionuclide. However, due to the program structure of IMPACTS-BRC, some of these doses are not normalized by the number of treatment or disposal facilities. The pathway headings on TAPE10.OUT indicate which printed doses are not normalized.

To illustrate how the output is interpreted when the input concentrations are separate limit concentrations, the maximum offsite individual exposures from incineration are investigated. The ICRP dose for the entire waste stream incinerated at 30 facilities is 4.41 mrem/yr. The total non-normalized dose for this pathway on TAPE10.OUT is 132 mrem/yr, or 4.41 mrem/yr multiplied by 30. The dose for each nuclide on TAPE10.OUT should be divided by 30 to represent the dose from that radionuclide, assuming the waste is incinerated at 30 different facilities. For this pathway, it is observed that the doses for all but two radionuclides are less than 30 mrem/yr on TAPE10.OUT, corresponding to 1 mrem/yr for 30 facilities. The impacts for Ru-103 and Ru-106 are 49 mrem/yr and 37 mrem/yr, respectively, corresponding to maximum individual doses from incineration of waste oil of 1.6 mrem/yr and 1.2 mrem/yr, respectively.

If these limit concentrations were used with the petitioner's proposed ratio method to determine waste oil suitable for incineration, based on a 1 mrem/yr impact, only the limits for Ru-103 and Ru-106 require slight reductions. This conclusion is based, of course, on the validity of all other assumptions.

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PART II - MODIFICATIONS TO DE MINIMIS METHODOLOGY FOR BRC

7 MODIFICATIONS FOR IBM-PC COMPATIBILITY

IMPACTS-BRC is implemented in standard subset FORTRAN-77 using the IBM-PC FORTRAN Compiler Version 2.00. The operating system is IBM-DOS Version 2.10. The executable module will utilize the 8087 co-processor, if present.

7.1 I/O Modifications

The De Minimis version of IMPACTS specified the values of the NUC array in the main program, through a DATA statement. This array contains the names of the 85 nuclides considered by the model. For the current IBM-PC version of IMPACTS-BRC, these values are read in from TAPE1.DAT along with other nuclide-specific data. Changes are in the main program (IMPACTS), and the subroutine which reads in the nuclide specific data (READ1). The changes to READ1 also affect the structure of the TAPE1.DAT data file. Subroutine READ1 was originally a part of Subroutine UPTAKE.

Standard subset FORTRAN-77 and IBM-PC FORTRAN do not allow the values of an array which is contained in COMMON to be specified in a DATA statement. Also, the BLOCK DATA subprogram is not allowed. A previous IBM-PC version (not the De Minimis version) had specified the arrays below in a BLOCK DATA subprogram. A new subroutine, BLOCKD, has been added to IMPACTS-BRC which specifies the values of the following arrays:

NXUC(85)	- indicates nuclides for which daughter impacts are considered
ICH(8,10)	- nuclide decay chains
LCH(10)	- length of decay chains
FK(21)	- constant parameters for dose conversion factors
FRACT(85,3)	- fraction of nuclide released to air from incinerator, values for 85 nuclides at 3 types of incinerators

7.2 Compiler Metacommands

IBM-PC FORTRAN supports several compiler "metacommands" which can be used to optimize program performance. The "$STORAGE:2" metacommand is utilized in IMPACTS-BRC. This command was not included in the De Minimis version of the code. This command causes all integer and logical variables to occupy 2 bytes, instead of the default 4 bytes, significantly reducing the storage requirements for large integer arrays. Several of the subroutines in IMPACTS-BRC would not compile using the IBM-PC FORTRAN compiler without inclusion of this metacommand. This problem was detected in the second compile step, FOR2. This metacommand has no effect on program calculations as long as the integer absolute values are less than 32767. This metacommand is not a standard FORTRAN statement and may cause an error with other compilers. However, the executable module on the supplied disk will run regardless of the compiler brand normally used.

A previous IBM-PC version of IMPACTS-BRC used the "$LARGE" metacommmand to optimize storage space. This metacommand is not available in IBM-PC FORTRAN and has been commented out.

8 CALCULATIONAL MODIFICATIONS

8.1 Deletion of Groundwater Dispersion Calculation

The De Minimis version of IMPACTS included longitudinal dispersion in the groundwater transport calculations. This caused a spreading of radionuclide concentrations at the front and tail end of the release pulse. For the assumptions in IMPACTS-BRC, the release pulse is a square wave which is advected to the receptor locations. Dispersion is not included and there is no spreading of the front or tail end of the pulse. Several tests were run with and without dispersion and, for the example dispersivity values used in the De Minimis methodology (5 and 10 cm), the differences in long-term impacts were negligible. Dispersion is not included because the calculated doses are insensitive to it, and because the computational effort required is large. The FORTRAN commands, including 2 FUNCTION subprograms, are commented out of the program, although they can easily be re-activated, if desired. Also, the groundwater transport begins at the end of the operational period, not at the end of the institutional control period.

8.2 Nuclide-Specific Accounting

Although the ultimate interest in an application of IMPACTS-BRC is the total impact, it is often useful to evaluate the relative contributions of each of the various radionuclides in a given waste stream to the total impacts. Output commands to create a new file, TAPE10.OUT, have been added to several subroutines in IMPACTS-BRC. This file contains ICRP doses for most of the pathways for each radionuclide included in the waste stream. Operational impacts are not included because the program structure of subroutine OPSIMP is not readily amenable to nuclide-specific accounting. These doses are not normalized by the number of facilities, and thus do not necessarily add up to the total dose printed in TAPE6.OUT. However, the relative contributions of each radionuclide to the total dose are evident from this output. The data from TAPE10.OUT help determine important radionuclides in the waste stream. These doses can be normalized by dividing by the number of treatment or disposal facilities, as appropriate. The nuclide-specific doses are printed for each individual waste stream; cumulative doses are not printed on TAPE10.OUT.

Except for changes to Subroutine GWATER, the modifications are simple WRITE statements for the computed impacts. To print the time headings for the groundwater impacts, the array SCN has been added to the call statement in IMPACTSB, the main program, and to the subroutine statement in GWATER. This change also required addition of a dimension statement. In some other subroutines, temporary arrays have been added to store calculated terms for each radionuclide.

8.3 Changes in Facility Types (IQ)

The De Minimis methodology considered 5 facility types corresponding to values 1-5 of the decision index IQ. The facility types were: onsite generator; municipal incinerator and sanitary landfill; municipal incinerator and open dump; hazardous waste incinerator and landfill; and a second hazardous waste incinerator and landfill. The current IMPACTS-BRC program and input data on TAPE2.DAT correspond to 5 facility types but do not include onsite disposal or open dump disposal. The treatment and disposal facility types corresponding to

IQ=1 and 3 have been changed to onsite incineration and sanitary landfill, and onsite incineration and hazardous waste landfill, respectively. This modification has resulted in changes to several subroutines including READ2, INCIMP, and OPSIMP, and to IMPACTS, the main program. For onsite disposal, the TAPE2.DAT values for IQ=1 or 3 should be edited directly. The default values should be changed to values corresponding to the onsite disposal system.

The current IMPACTS-BRC treatment and disposal facility scenarios are listed in Table 25.

TABLE 25

TREATMENT AND DISPOSAL FACILITY TYPES

IQ	Treatment facility	Disposal facility
1	onsite incinerator	sanitary landfill
2	municipal incinerator	sanitary landfill
3	onsite incinerator	hazardous waste landfill II
4	hazardous waste incinerator	hazardous waste landfill I
5	hazardous waste incinerator	hazardous waste landfill II

The hazardous waste landfill specified by IQ=4 represents average performance and site environmental charactersitics. The landfill specified by IQ=5 represents more conservative assumptions about performance and environmental characteristics.

The De Minimis version of IMPACTS required non-default data to be input when the onsite disposal facility was used (IQ=1). These data were read from the end of TAPE2.DAT in Subroutine READ2. These data are not read at the end of TAPE2.DAT in IMPACTS-BRC; if non-default or site-specific data are to be used, the existing values in TAPE2.DAT should be directly changed. The values for IQ=1 or 3 should be changed if onsite disposal is simulated.

In the De Minimis version, two parameters were read only if non-default facility-specific data were input for the onsite incinerator. The first is OSWR, the waste weight reduction ratio for onsite incineration. The second is OSDL, the dust loading factor for operational impacts from onsite disposal. These two parameters have been added to the default dataset and are read for each of the 5 facility types. If these parameters are not included in the input file, the default values hardwired in the code are used. Thus, the parameters can be specified for both onsite incineration options (IQ=1 or 3), as well as for the offsite incineration options, if desired.

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9 MODIFICATIONS TO INPUT DECKS

Environmental and facility data for the IMPACTS-BRC code are supplied with the program. These data serve as default parameters for the BRC methodology. These values should be changed if more appropriate or realistic values are available. The supplied values are very conservative, but may be appropriate when the uncertainty in more realistic values is very high.

9.1 Environmental Parameters for Maximum Individual Impacts

The example data presented in the De Minimis NUREG/CR-3585 represent 3 regional sites and 5 facility types. A new set of environmental parameters has been developed for the BRC methodology which represents a very conservative (poor performance) site for waste disposal. This set of parameters is used to compute maximum individual impacts and is specified by the input parameter IDAT=2, non-default environmental data, and IR=1. The 3 regional site parameters, which have also been modified from the example in the De Minimis methodology, are used to compute critical group and general population impacts. The values are the most conservative values from the three sites in the De Minimis methodology. The minimum dilution factor for the intruder well is based on minimum requirements for a rural well supplying one person (Solley et al., 1983).

Table 26 indicates the environmental parameters used to calculate maximum individual exposures which are not discussed in following sections.

9.2 Groundwater Travel Times

The supplied groundwater travel times are shorter than the corresponding times presented as an example in the De Minimis methodology. This primarily reflects conservatism. The ranges of groundwater velocities used have been observed in actual field cases at LLW and other waste disposal facilities. Also, the groundwater pathway is assumed to occur at the end of the operational period, not after the institutional control period.

The travel time from the disposal unit to the receptor is the summation of the travel times in the unsaturated zone (above the water table) and in the saturated zone. For the NE and SE sites, the travel time through the unsaturated zone is assumed to be 1 year. This value is also used for the maximum individual exposure calculations. The travel time through the unsaturated zone at the SW site is conservatively assumed to be 10 years.

The groundwater velocities (not discharges) in the saturated zone, and resulting groundwater travel times are shown in Table 27. The distance between sectors is 34 m for the sanitary landfill and 91 m for the hazardous waste landfill. The distance to the intruder well, from the closest sector, is half this value. For the NE and SE sites, and for maximum individual calculations, the population well is 1 km away and the stream is 2 km away. The population well at the SW site is 3 km from the disposal units. As in the De Minimis methodology, impacts due to water supply from the stream are not considered for the SW site.

TABLE 26

ENVIRONMENTAL PARAMETERS USED FOR THE MAXIMUM INDIVIDUAL

Parameter	Definition	Value
PRC	Infiltrating percolation	0.18 m/yr
FSC	Soil-to-air trnsfr fctr (intru-const)	2.64E-10
FSA	Soil-to-air trnsfr fctr (intru-agri)	8.06E-11
QFC(1)	Minimum intruder well dilution factor	110
QFC(2)	Minimum population well dilution factor	2.0E+5
QFC(3)	Minimum stream dilution factor	4.5E+6
WVEL	Average wind velocity	6.67 m/sec
AXOQ	Accident X/Q	1.4E-10 yr/m^3
EFAC	Dust mobilization factor	7.95E-6

TABLE 27

GROUNDWATER TRAVEL TIMES

	Max individual	NE	SE	SW
Saturated zone velocity (m/yr)	20	1	5	10
Travel time between sectors (yr)				
sanitary landfill	1.7	34	6.8	3.4
hazardous waste landfill	1.7	91	18.2	9.1
Travel time to intruder well (yr)				
sanitary landfill	1.85	18	4.4	11.7
hazardous waste landfill	1.85	46.5	10.1	14.5
Travel time to population well (yr)				
sanitary landfill	25	500	100	300
hazardous waste landfill	25	500	100	300
Travel time to stream (yr)				
sanitary landfill	50	1000	200	
hazardous waste landfill	50	1000	200	

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9.3 Retardation Coefficients

The supplied retardation coefficients are lower than the example values presented in the De Minimis documentation, reflecting conservatism and potential disposal with mobilizing agents such as organics and other complexants. Table 28 indicates De Minimis methodology values, values calculated from draft EPA BRC rulemaking documents, and the values supplied in TAPE2:DAT.

9.4 Contact Time Fraction

The source term for groundwater contamination problems is not currently well understood. The concentration of radionuclides in leachate passing through the disposal unit varies widely in actual field situations. This variation is due, in part, to site-specific geochemical and moisture conditions, variation in waste packaging and processing prior to disposal, and different radionuclide inventories. In draft EPA technical reports to support standards for LLW management, the performance assessment model used includes five different methods for estimating the source term.

In the De Minimis methodology, source term concentrations were estimated using a ratio method based on actual data from the Maxey Flats and West Valley LLW sites. For a given radionuclide, the leachate concentration in a trench sump was divided by the average concentration of that radionuclide in the waste. An average ratio for each radionuclide was calculated from the ratios for several trenches. Because the trenches at Maxey Flats and West Valley were saturated with water, and the disposal units at a sanitary or hazardous waste landfill are not expected to be saturated, a correction factor was introduced to reduce the leachate concentration. This correction factor assumed that the transfer of radionuclide from the waste to the leachate was controlled by the extent of water saturation and the amount of time the percolating water was in contact with the waste. The resulting Contact Time Fractions reduced concentrations for the groundwater and leachate treatment pathways by a factor ranging from 3.6E-5 to 1.3E-2.

The Contact Time Fractions in the supplied TAPE2.DAT are all equal to unity. Thus, the average ratios determined from the sites are used to calculate leachate concentrations based solely on the average radionuclide concentrations in the waste. Data from some leaching experiments and field measurements indicate that leachate concentrations may not be directly affected by the contact time of the waste and water, or by the extent of water saturation (e.g. Siskind et al. 1986; Arora and Dayal 1983; Essington et al. 1986). Even with this assumption, the mass of a radionuclide leaving the disposal unit will be reduced at lower saturation because the volume of water percolating through the unit is lower. This conservative assumption, that the leachate concentration ratios are the same as Maxey Flats and West Valley data, is required because of the uncertainty in estimating the source term without knowledge of the site-specific leaching and waste composition.

The release fraction for C-14 used in the De Minimis methodology was determined in a manner different from that used for most of the other radionuclides, including H-3 and Co-60. The fraction for C-14 was determined using the leachate concentrations from the West Valley trench sumps and the trench inventories from the Maxey Flats site. The resulting ratio for C-14 was 5.76E-3, while the ratios for H-3, Co-60, and Am-241, using both concentrations and inventories

TABLE 28

MINIMUM RETARDATION COEFFICIENTS FOR SELECTED ELEMENTS

Element	BRC	De Minimis	EPA R*
H	1	1	1.05
C	1	10	1.05
P	1	43	-
S	1	9	-
Mn	10	43	766
Fe	1	630	7651
Ni	1	420	766
Co	1	420	205
Zn	1	9	-
Sr	1	9	103
Tc	1	2	1.17
Cd	1	9	-
I	1	2	1.05
Cs	1	85	1276
Ce	100	840	5611
Th	100	840	-
Pu	10	840	9181
Am	100	300	23971

* EPA R = 1.0 + 5.1 * (EPA's Kd)

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from Maxey Flats, were 1.15, 1.48E-2, and 4.11E-3, respectively. Given the typical geochemical behavior of C-14 relative to other radionuclides, it is unreasonable to assume that the C-14 release ratio is lower than the ratio for Co-60. Furthermore, it was assumed for the De Minimis methodology, and the BRC methodology, that the I-129 and Tc-99 ratios were one order of magnitude lower than the ratio for H-3. For consistency, the C-14 ratio for the BRC methodology is also assumed to be one order of magnitude lower than the H-3 value, or 0.115. This is a more conservative assumption and is geochemically more consistent with the other ratios used.

9.5 Peclet Numbers

Peclet numbers are not needed because they only affect the groundwater dispersion calculations, which have been dropped from IMPACTS-BRC. However, for consistency and ease of modification, IMPACTS-BRC still reads the Peclet number values from TAPE2.

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APPENDICES

A. IMPACTS-BRC FORTRAN SOURCE CODE LISTING

B. TAPE1.DAT - NUCLIDE-SPECIFIC DATA

C. TAPE2.DAT - ENVIRONMENTAL AND FACILITY PARAMETERS

D. EXAMPLE TAPE5 - OPTIONS AND WASTE STREAM CHARACTERISTICS

E. EXAMPLE TAPE6.OUT - TOTAL WASTE STREAM DOSES FOR ALL PATHWAYS

F. EXAMPLE TAPE10.OUT - ICRP DOSES BY NUCLIDE

G. INSTALLATION PROCEDURES

APPENDIX A

IMPACTS-BRC FORTRAN SOURCE CODE LISTING

```
CBRC                                                                    IMPB  10
$STORAGE:2                                                              IMPB  20
      PROGRAM IMPACTSB                                                  IMPB  30
C                                                                       IMPB  40
C***********************************************************************IMPB  50
C                                                                       IMPB  60
C   PROGRAM TITLE:  IMPACTS-BRC                          VERSION 1.0    IMPB  70
C                                                                       IMPB  80
C   DEVELOPED FOR:  U.S. NUCLEAR REGULATORY COMMISSION                  IMPB  90
C                   OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS    IMPB 100
C                   DIVISION OF WASTE MANAGEMENT                        IMPB 110
C                                                                       IMPB 120
C   DATE:  MAY 1986                                                     IMPB 130
C                                                                       IMPB 140
C   NRC CONTACT:  CHIEF, GEOTECHNICAL BRANCH    PHONE: (301) 492-7000   IMPB 150
C                 DIVISION OF WASTE MANAGEMENT                          IMPB 160
C                                                                       IMPB 170
C   CODE DEVELOPER:  DR. O.I. OZTUNALI, EBASCO SERVICES INC.            IMPB 180
C                    WITH MODIFICATIONS BY DANIEL J. GOODE, NRC         IMPB 190
C                                                                       IMPB 200
C   TITLES OF ASSOCIATED DOCUMENTATION AND NUREG NUMBERS:               IMPB 210
C                                                                       IMPB 220
C    OZTUNALI, O.I., AND G.W. ROLES, DE MINIMIS WASTE IMPACTS ANALYSIS  IMPB 230
C      METHODOLOGY, VOL 1, NUREG/CR-3585, 1984.                         IMPB 240
C                                                                       IMPB 250
C    FORSTROM, J.M., AND D.J. GOODE, DE MINIMIS WASTE IMPACTS ANALYSIS  IMPB 260
C      METHODOLOGY, VOL 2, IMPACTS-BRC USER'S GUIDE AND METHODOLOGY FOR IMPB 270
C      RADIOACTIVE WASTE BELOW REGULATORY CONCERN, NUREG/CR-3585, 1986. IMPB 280
C                                                                       IMPB 290
C   THIS PROGRAM WAS PREPARED FOR AN AGENCY OF THE UNITED STATES        IMPB 300
C   GOVERNMENT.  NEITHER THE UNITED STATES GOVERNMENT NOR ANY AGENCY    IMPB 310
C   THEREOF, NOR ANY OF THEIR EMPLOYEES, MAKES ANY WARRANTY, EXPRESSED  IMPB 320
C   OR IMPLIED, OR ASSUMES ANY LEGAL LIABILITY OR RESPONSIBILITY FOR    IMPB 330
C   ANY THIRD PARTY'S USE, OR THE RESULTS OF SUCH USE, OF ANY PORTION   IMPB 340
C   OF THIS PROGRAM OR REPRESENTS THAT ITS USE BY SUCH THIRD PARTY      IMPB 350
C   WOULD NOT INFRINGE PRIVATELY OWNED RIGHTS.                          IMPB 360
C                                                                       IMPB 370
C***********************************************************************IMPB 380
C                                                                       IMPB 390
C   THIS CODE REPRESENTS AN ANALYSIS METHODOLOGY FOR DETERMINING THE    IMPB 400
C   RADIOLOGICAL IMPACTS ASSOCIATED WITH THE DISPOSAL OF DE MINIMIS     IMPB 410
C   WASTE.  IT CALCULATES THE IMPACTS UNDER A NUMBER OF SCENARIOS,      IMPB 420
C   INCLUDING THOSE INVOLVED WITH: TRANSPORTATION OF THE WASTE;         IMPB 430
C   SORTING/INCINERATION/RECYCLE OF THE WASTE; AND FINAL TREATMENT/     IMPB 440
C   DISPOSAL CONSIDERATIONS.                                            IMPB 450
C                                                                       IMPB 460
C   THE INPUT/OUTPUT FILES ARE IDENTIFIED AS FOLLOWS:                   IMPB 470
C                                                                       IMPB 480
C     TAPE1= INPUT FILE CONTAINING THE BASIC DOSE CONVERSION FACTORS,   IMPB 490
C            NUCLIDE NAMES, GROUNDWATER RETARDATION COEFFICIENTS, ETC.  IMPB 500
C                                                                       IMPB 510
C     TAPE2= INPUT FILE CONTAINING THE DEFAULT ENVIRONMENTAL,           IMPB 520
C            TREATMENT, AND DISPOSAL PARAMETERS USED IN THIS ANALYSIS.  IMPB 530
C            ALSO CONTAINS NON-DEFAULT FACILITY AND ENVIRONMENT DATA.   IMPB 540
C                                                                       IMPB 550
C     TAPE5= INPUT FILE CONTAINING THE WASTE STREAM CHARACTERISTICS     IMPB 560
C            PERTAINING TO A SPECIFIC APPLICATION.  THIS FILE WILL      IMPB 570
C            MOST LIKELY CHANGE WITH EACH CASE UNDER CONSIDERATION.     IMPB 580
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C                                                                       IMPB 590
C     TAPE6= OUTPUT FILE CONTAINING THE MAIN RESULTS OF THE ANALYSIS    IMPB 600
C                                                                       IMPB 610
C     TAPE10= OUTPUT FILE CONTAINING ICRP DOSES FOR EACH NUCLIDE        IMPB 620
C             (MOST PATHWAYS)                                           IMPB 630
C                                                                       IMPB 640
C     MODIFICATIONS TO THE ORIGINAL IBM-PC VERSION ARE NOTED BY "CBRC"  IMPB 650
C                                                                       IMPB 660
C*********************************************************************  IMPB 670
C                                                                       IMPB 680
CBRC $LARGE                                                             IMPB 690
      CHARACTER ORG(10)*9,SCN(36)*6,FAS(5)*20,NUCT*6,SOLT*1             IMPB 700
$INCLUDE:'IMPCOMM.FOR'                                                  IMPB 710
      COMMON/CHYN/NXUC(85),ICH(8,10),LCH(10),ACT(8),BCT(8,2)/UPTK/FK(21)IMPB 720
      COMMON/DCFS/FF(85,5),DCF1(159,10),DCF2(159,10),DCF3(85),          IMPB 730
     +            DCF4(85,10),DCF5(85,10),NUCT(159),SOLT(159)           IMPB 740
      DIMENSION TYMD(16),BIMPT(10,65)                                   IMPB 750
      DATA ORG/'  LUNGS  ',' S.WALL  ',' LLI WALL',' T. BODY ',         IMPB 760
     .         ' KIDNEYS ','  LIVER  ',' RED MAR ','   BONE  ',         IMPB 770
     .         ' THYROID ','   ICRP  '/                                IMPB 780
      DATA SCN/'INT-CO','INT-AG','IN-AIR','ER-AIR','IN-WAT','ER-WAT',   IMPB 790
     .         'IC-POP','IC-IND','IC-WOR','IC-MWR','OP-POP','OP-IND',   IMPB 800
     .         'OP-WOR','OP-MWR','  20YR','  40YR','  60YR','  80YR',   IMPB 810
     .         ' 100YR',' 120YR',' 160YR',' 200YR',' 400YR',' 600YR',  IMPB 820
     .         ' 800YR',' 1K YR',' 2K YR',' 5K YR','10K YR','20K YR',  IMPB 830
     .         'TR-MAX','TR-OCC','TR-POP','LA-OPS','LA-OVF','LA-AIR'/   IMPB 840
CBRC    CHANGES TO FACILITY NAMES                                       IMPB 850
      DATA FAS/'ONSITE INC, S. LANDF','SANITARY LANDFILL   ',           IMPB 860
     .         'ONSITE INC, H. LANDF','HAZARDOUS WASTE I   ',           IMPB 870
     .         'HAZARDOUS WASTE II  '/                                  IMPB 880
      DATA TYMD/20.,40.,60.,80.,100.,120.,160.,200.,400.,600.,          IMPB 890
     .          800.,1000.,2000.,5000.,10000.,20000./                   IMPB 900
      DATA NTYM/16/                                                     IMPB 910
  101 FORMAT(8I3)                                                       IMPB 920
CBRC 102 FORMAT(1H1/2X,A20//2X'LIFE='I3,2X'OVFL='I3,2X'NSTR='I3/        IMPB 930
CBRC    MODIFY FIRST LINE BECAUSE HEADER ADDED BELOW                    IMPB 940
  102 FORMAT(//2X,A20//2X'LIFE='I3,2X'OVFL='I3,2X'NSTR='I3/             IMPB 950
     *       2X'REGN='I3,2X'DATA='I3/2X'IPOP='I3,2X'INST='I3)           IMPB 960
  103 FORMAT(1H1)                                                       IMPB 970
  104 FORMAT(/2X'TRANSPORTATION IMPACTS'10X,A6' ='1PE9.2' MREM/YR'      IMPB 980
     */34X,A6' ='E9.2' PERSON-MREM/YR'/34X,A6' ='E9.2' PERSON-MREM/YR') IMPB 990
CBRC */34X,A6' ='E9.2' MREM/YEAR'/34X,A6' ='E9.2' PERSON-MREM/YR')      IMPB1000
  106 FORMAT(1H1/2X'CUMULATIVE IMPACTS'/)                               IMPB1010
      DO 10 I=1,3                                                       IMPB1020
   10 FRACT(7,I)=FRACT(29,I)                                            IMPB1030
CBRC    THIS REPLACES BLOCK DATA SUBPROGRAM                             IMPB1040
      CALL BLOCKD                                                       IMPB1050
      CALL READ1                                                        IMPB1060
C                                                                       IMPB1070
C     START OF A GIVEN CASE - ONE FACILITY AND ANY NUMBER OF            IMPB1080
C     WASTE STREAMS WITH GIVEN CHARACTERISTICS                          IMPB1090
C                                                                       IMPB1100
CBRC    CHANGES TO OPEN STATEMENTS FOR NAMING TAPE5 AND CREATING TAPE6  IMPB1110
      OPEN(5,FILE=' ')                                                  IMPB1120
      OPEN(6,FILE='TAPE6.OUT',STATUS='NEW')                             IMPB1130
CBRC    TAPE10 IS USED FOR NUCLIDE SPECIFIC OUTPUT AND DEBUGGING        IMPB1140
      OPEN(10,FILE='TAPE10.OUT',STATUS='NEW')                           IMPB1150
CBRC    WRITE HEADER ON TAPES 6 AND 10                                  IMPB1160
      WRITE(6,1000)                                                     IMPB1170
      WRITE(10,1000)                                                    IMPB1180
 1000 FORMAT(1H1/'  IMPACTS-BRC',10X,'VERSION 1.0')                     IMPB1190
CBRC    END                                                             IMPB1200
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```
   20 READ(5,101,END=50) IR,IDAT,IQ,NSTRD,IPOP,ILFE,IINS,IOFL
      WRITE(6,102) FAS(IQ),ILFE,IOFL,NSTRD,IR,IDAT,IPOP,IINS
CBRC    WRITE SCENARIO HEADER ON TAPE10.OUT
      WRITE(10,1002) FAS(IQ)
 1002 FORMAT(//2X,A20)
CBRC    END
      CALL READ2
      CALL ZERO(BIMPT,650)
      DO 40 ISTRD=1,NSTRD
      CALL ZERO(BIMP,650)
      IF(ISTRD.NE.1)WRITE(6,103)
C
C     CALCULATE IMPACTS
C
      CALL READ5
CBRC    SAVE DISPOSAL/INCINERATION/SORTING OPTION
      INCIN=ISPC(1,5)
      CALL SPLICE
      CALL INTIMP
      CALL EXPWAS
      CALL OPSIMP
      IF(IOFL.NE.0)CALL OVRFLO
CBRC    ADD SCN TO GWATER CALL TO PRINT TIMES ON TAPE10
      CALL GWATER(NTYM,TYMD,SCN)
CBRC
C
C     NORMALIZE INDIVIDUAL IMPACTS WITH NUMBER OF FACILITIES
C
      CALL DIVVY(1,1,2)
      CALL DIVVY(1,5,6)
CBRC  CALL DIVVY(2,8,8)
CBRC  CALL DIVVY(2,10,10)
CBRC    NORMALIZE INCINERATOR IMPACTS ONLY IF INCINERATION OCCURS
      IF(INCIN.NE.1) CALL DIVVY(2,8,8)
      IF(INCIN.NE.1) CALL DIVVY(2,10,10)
CBRC    END
      CALL DIVVY(1,12,12)
      CALL DIVVY(1,14,14)
      CALL DIVVY(1,15,64)
C
      WRITE(6,104) (SCN(I+26),BAS(1,I),I=5,7)
      CALL PRNTE(ORG,SCN,BIMP)
      DO 30 I=1,10
      DO 30 J=1,65
   30 BIMPT(I,J)=BIMPT(I,J)+BIMP(I,J)
   40 CONTINUE
      IF(NSTRD.EQ.1)GO TO 20
      WRITE(6,106)
      CALL PRNTE(ORG,SCN,BIMPT)
      GO TO 20
C
C     END OF A GIVEN CASE, GO TO 20 FOR NEW CASE
C
   50 CLOSE (5)
      CLOSE (6)
CBRC    CLOSE TAPE10
      CLOSE(10)
      STOP 'NORMAL TERMINATION'
      END
```

```
      CHARACTER BASN*10,NUC*6,SOL*1,SOLB*1                              ICOM  10
      COMMON/BAST/BAS(2,92),BIMP(10,65),ISPC(2,15),PDCF(85,10,7)        ICOM  20
     +      /CHRC/BASN(2),NUC(85),SOL(85),SOLB(85)                      ICOM  30
     +      /DTNX/IR,IDAT,IQ,IPOP,ILFE,IINS,IOFL,NSTR                   ICOM  40
     +      /NUCS/AL(85),FMF(85),RET(85,5),FRACT(85,3),NUX(85)          ICOM  50
     +      /DRP1/FSC(3),FSA(3),PRC(3,5),TSC(3,5),QFC(3,3),             ICOM  60
     +            DTTM(3,5),TTM(3,3,5),DTPC(3,5),TPC(3,3,5),NRET(3)     ICOM  70
     +      /DRP2/TPOP(3),TDOZ(3),WVEL(3),EFAC(3),POP(3),               ICOM  80
     +            POPE(3),POPW(3),AXOQ(3),EERO(5),EREC(5)               ICOM  90
     +      /FACP/TDIS(5),TVEL(5),VINC(5),XOQI(5),EDFI(5),              ICOM 100
     +            DEN1(5),VANN(5),XOQO(5),EDFO(5),DEN2(5),              ICOM 110
     +            TWI(5,3),TWO(5,3),ADAY(5,3),RMIX(5),                  ICOM 120
     +            EMP(5),EFF(5),SEFF(5),GERO(5),OSWR                    ICOM 130


CBRC                                                                    RED1  10
$STORAGE:2                                                              RED1  20
      SUBROUTINE READ1                                                  RED1  30
C                                                                       RED1  40
C***********************************************************************RED1  50
C     THIS SUBROUTINE READS IN THE FUNDAMENTAL DCF FROM TAPE1.       *  RED1  60
C     UPTAKE USES THESE TO COMPUTE THE PDCFS AS NEEDED.              *  RED1  70
C***********************************************************************RED1  80
C                                                                       RED1  90
CBRC $LARGE                                                             RED1 100
      CHARACTER BASN*10,NUC*6,NUCT*6,SOL*1,SOLB*1,SOLT*1                RED1 110
      COMMON/CHRC/BASN(2),NUC(85),SOL(85),SOLB(85)                      RED1 120
     +      /NUCS/AL(85),FMF(85),RET(85,5),FRACT(85,3),NUX(85)          RED1 130
      COMMON/DCFS/FF(85,5),DCF1(159,10),DCF2(159,10),DCF3(85),          RED1 140
     +            DCF4(85,10),DCF5(85,10),NUCT(159),SOLT(159)           RED1 150
CBRC 101 FORMAT(A6,1X,I1,A1,12E9.2)                                     RED1 160
CBRC    NEW FORMAT TO DROP A1 AND A2 WHICH ARE NOT USED                 RED1 170
  101 FORMAT(A6,1X,I1,A1,10E9.2)                                        RED1 180
  102 FORMAT(9X,10E9.2)                                                 RED1 190
  103 FORMAT(8X,A1,10E9.2/9X,10E9.2)                                    RED1 200
      OPEN(1,FILE='TAPE1.DAT')                                          RED1 210
      INCT=0                                                            RED1 220
      DO 30 INUC=1,85                                                   RED1 230
      READ(1,101) NUC(INUC),JJ,SOLB(INUC),DCF3(INUC),(FF(INUC,I),I=1,5),RED1 240
     *            AL(INUC),FMF(INUC),RET(INUC,1),RET(INUC,4)            RED1 250
CBRC *           AL(INUC),FMF(INUC),RET(INUC,1),RET(INUC,4),A1,A2      RED1 260
      A2=RET(INUC,4)                                                    RED1 270
      A1=(A2/RET(INUC,1))**0.334                                        RED1 280
      RET(INUC,5)=A2*A1                                                 RED1 290
      RET(INUC,3)=A2/A1                                                 RED1 300
      RET(INUC,2)=RET(INUC,1)*A1                                        RED1 310
      READ(1,102) (DCF4(INUC,I),I=1,10),(DCF5(INUC,I),I=1,10)           RED1 320
      INCT=INCT+1                                                       RED1 330
      NUCT(INCT)=NUC(INUC)                                              RED1 340
      READ(1,103) SOLT(INCT),(DCF1(INCT,I),I=1,10),(DCF2(INCT,I),I=1,10)RED1 350
      IF(JJ.EQ.1)GO TO 30                                               RED1 360
      DO 20 IJ=2,JJ                                                     RED1 370
      INCT=INCT+1                                                       RED1 380
      NUCT(INCT)=NUC(INUC)                                              RED1 390
      READ(1,103) SOLT(INCT),(DCF1(INCT,I),I=1,10),(DCF2(INCT,I),I=1,10)RED1 400
   20 CONTINUE                                                          RED1 410
   30 CONTINUE                                                          RED1 420
      CLOSE (1)                                                         RED1 430
      RETURN                                                            RED1 440
      END                                                               RED1 450
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CBRC                                                                    RED2  10
$STORAGE:2                                                              RED2  20
      SUBROUTINE READ2                                                  RED2  30
C                                                                       RED2  40
C***********************************************************************RED2  50
C     THIS SUBROUTINE READS IN THE TREATMENT/DISPOSAL SITE            *RED2  60
C     ENVIRONMENTAL CHARACTERISTICS AND TREATMENT/DISPOSAL            *RED2  70
C     TECHNOLOGY CHARACTERISTICS FROM TAPE2.                          *RED2  80
C***********************************************************************RED2  90
C                                                                       RED2 100
CBRC $LARGE                                                             RED2 110
$INCLUDE:'IMPCOMM.FOR'                                                  RED2 120
      DIMENSION PDS(6),WSP(6),STB(6),DSP(6)                             RED2 130
  102 FORMAT(10E10.3)                                                   RED2 140
  104 FORMAT(15I5)                                                      RED2 150
  202 FORMAT(/2X'OPTIONAL XOQ PARAMS'/(2X,1P,4E10.3))                   RED2 160
  203 FORMAT(2X,1P,6E10.3)                                              RED2 170
  204 FORMAT(/2X'OPTIONAL ENVIRONMENTAL PARAMETERS'/2X'PRC ='1PE9.2,    RED2 180
     .       2X'TXC ='E9.2,2X'QFC ='3E9.2/2X'FSC ='E9.2,2X'DTTM='E9.2,  RED2 190
     .       2X'TTM ='3E9.2/2X'FSA ='E9.2,2X'DTPC='E9.2,2X'TPC ='3E9.2/ RED2 200
     .       2X'WVEL='E9.2,2X'AWOQ='E9.2,2X'EFAC='E9.2)                RED2 210
CBRC 205 FORMAT(/2X'OPTIONAL FACILITY PARAMETERS'/2X'VINC='1PE9.2,     RED2 220
CBRC .2X'VANN='E9.2,2X'ADAYS='3E9.2/2X'EMP ='E9.2,2X'EFF ='E9.2,       RED2 230
CBRC .2X'SEFF='E9.2,2X'DEN1='E9.2,2X'DEN2='E9.2/                       RED2 240
CBRC .2X'RMIX='E9.2,2X'GERO='E9.2,2X'OSWR='E9.2,2X'OSDL='E9.2)         RED2 250
CBRC .2X'RMIX='E9.2,2X'OSWR='E9.2,2X'OSDL='E9.2)                       RED2 260
C                                                                       RED2 270
C     READ DEFAULT SITE ENVIRONMENTAL PARAMETER VALUES                  RED2 280
C                                                                       RED2 290
      OPEN(2,FILE='TAPE2.DAT')                                          RED2 300
      DO 10 I=1,3                                                       RED2 310
      READ(2,102) (PRC(I,J),TSC(I,J),DTTM(I,J),(TTM(I,K,J),K=1,3),      RED2 320
     *            DTPC(I,J),(TPC(I,K,J),K=1,3),J=1,5)                   RED2 330
      READ(2,102) FSC(I),FSA(I),(QFC(I,J),J=1,3),POP(I),POPE(I),        RED2 340
     *            POPW(I),TPOP(I),TDOZ(I),WVEL(I),AXOQ(I),EFAC(I),      RED2 350
     *            EERO(I),EREC(I)                                       RED2 360
      READ(2,104) NRET(I)                                               RED2 370
   10 CONTINUE                                                          RED2 380
C                                                                       RED2 390
C     READ DEFAULT FACILITY PARAMETER VALUES                            RED2 400
C                                                                       RED2 410
      DO 12 I=1,5                                                       RED2 420
      READ(2,102) TDIS(I),TVEL(I),VINC(I),XOQI(I),EDFI(I),DEN1(I),      RED2 430
     *            VANN(I),XOQO(I),EDFO(I),DEN2(I),(TWI(I,J),J=1,3),     RED2 440
     *            (TWO(I,J),J=1,3),(ADAY(I,J),J=1,3),RMIX(I),           RED2 450
     *            EMP(I),EFF(I),SEFF(I),GERO(I),OSWR,OSDL               RED2 460
CBRC *            EMP(I),EFF(I),SEFF(I),GERO(I)                         RED2 470
CBRC    COMPUTE SPECIAL DUST LOADING IF OSDL INPUT (ORIGINALLY IQ=1)    RED2 480
      IF(OSDL.GT.0.) TWO(I,3)=OSDL*1.E-6/DEN2(I)                        RED2 490
   12 CONTINUE                                                          RED2 500
C                                                                       RED2 510
C     START READING OPTIONAL PARAMETER VALUES                           RED2 520
C                                                                       RED2 530
CBRC    IQ=1 DOES NOT REQUIRE NON-DEFAULT INPUT                         RED2 540
CBRC  IF(IQ.EQ.1.AND.IDAT.EQ.0)IDAT=2                                   RED2 550
CBRC  IF(IQ.EQ.1.AND.IDAT.EQ.1)IDAT=3                                   RED2 560
      IF(IDAT.EQ.0)GO TO 22                                             RED2 570
      IF(IDAT.EQ.2)GO TO 20                                             RED2 580
C                                                                       RED2 590
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C      SITE-SPECIFIC POP AND XOQ OPTION                                  RED2 600
C                                                                        RED2 610
      DO 14 I=1,6                                                        RED2 620
   14 READ(2,102) DSP(I),PDS(I),WSP(I),STB(I)                            RED2 630
      WRITE(6,202) (DSP(I),PDS(I),WSP(I),STB(I),I=1,6)                   RED2 640
      READ(2,102) HYTI,HYTO,DISTI,DISTO,EDFID,EDFOD                      RED2 650
      WRITE(6,203) HYTI,HYTO,DISTI,DISTO,EDFID,EDFOD                     RED2 660
      A1=0.                                                              RED2 670
      A2=0.                                                              RED2 680
      DO 16 I1=1,6                                                       RED2 690
      A1=A1+STB(I1)*XOQFC(HYTI,DISTI,WSP(I1),I1)                         RED2 700
      A2=A2+STB(I1)*XOQFC(HYTO,DISTO,WSP(I1),I1)                         RED2 710
   16 CONTINUE                                                           RED2 720
      XOQI(IQ)=A1                                                        RED2 730
      XOQO(IQ)=A2                                                        RED2 740
      EDFI(IQ)=EDFID                                                     RED2 750
      EDFO(IQ)=EDFOD                                                     RED2 760
      A1=0.                                                              RED2 770
      DO 18 I1=1,6                                                       RED2 780
      DO 18 I2=1,6                                                       RED2 790
      A1=A1+PDS(I1)*STB(I2)*XOQFC(HYTI,DSP(I1),WSP(I2),I2)               RED2 800
   18 CONTINUE                                                           RED2 810
      POP(IR)=A1                                                         RED2 820
      POPE(IR)=3.*A1                                                     RED2 830
   20 IF(IDAT.EQ.1)GO TO 22                                              RED2 840
C                                                                        RED2 850
C      SITE-SPECIFIC ENVIRONMENTAL PARAMETERS                            RED2 860
C                                                                        RED2 870
      READ(2,102) PRC(IR,IQ),TSC(IR,IQ),DTTM(IR,IQ),                     RED2 880
     +            (TTM(IR,J,IQ),J=1,3),DTPC(IR,IQ),(TPC(IR,J,IQ),J=1,3),RED2 890
     +     FSC(IR),FSA(IR),(QFC(IR,J),J=1,3),WVEL(IR),AXOQ(IR),EFAC(IR) RED2 900
      READ(2,104) NRET(IR)                                               RED2 910
      WRITE(6,204) PRC(IR,IQ),TSC(IR,IQ),(QFC(IR,J),J=1,3),              RED2 920
     *FSC(IR),DTTM(IR,IQ),(TTM(IR,J,IQ),J=1,3),FSA(IR),DTPC(IR,IQ),      RED2 930
     *(TPC(IR,J,IQ),J=1,3),WVEL(IR),AXOQ(IR),EFAC(IR)                    RED2 940
CBRC 22 IF(IQ.NE.1)GO TO 24                                              RED2 950
   22 CONTINUE                                                           RED2 960
C                                                                        RED2 970
C      SITE-SPECIFIC TREATMENT/DISPOSAL PARAMETERS                       RED2 980
C                                                                        RED2 990
CBRC    NOT USED IN IMPACTS-BRC                                          RED21000
CBRC  READ(2,102) VINC(1),VANN(1),(ADAY(1,J),J=1,3),EMP(1),EFF(1),       RED21010
CBRC +            SEFF(1),DEN1(1),DEN2(1),RMIX(1),GERO(1),OSWR,OSDL      RED21020
CBRC  TWO(1,3)=OSDL*1.E-6/DEN2(1)                                        RED21030
CBRC  WRITE(6,205)VINC(1),VANN(1),(ADAY(1,J),J=1,3),EMP(1),EFF(1),       RED21040
CBRC +            SEFF(1),DEN1(1),DEN2(1),RMIX(1),GERO(1),OSWR,OSDL      RED21050
CBRC                                                                     RED21060
   24 IF(IPOP.EQ.1.OR.IDAT.EQ.1.OR.IDAT.EQ.3)GO TO 28                    RED21070
C                                                                        RED21080
C      MODIFY POP FOR URBAN ENVIRONMENT                                  RED21090
C                                                                        RED21100
      DO 26 I=1,3                                                        RED21110
      POPE(I)=POPE(I)*10.                                                RED21120
   26 POP(I)=POP(I)*10.                                                  RED21130
   28 CLOSE (2)                                                          RED21140
      RETURN                                                             RED21150
      END                                                                RED21160
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CBRC                                                                    RED5  10
$STORAGE:2                                                              RED5  20
      SUBROUTINE READ5                                                  RED5  30
C                                                                       RED5  40
C***********************************************************************RED5  50
C     THIS SUBROUTINE READS IN THE WASTE STREAM CHARACTERISTICS      *  RED5  60
C     FROM TAPE5.  IT ALSO CALLS SUBROUTINE "UPTAKE" TO COMPUTE      *  RED5  70
C     THE PATHWAY DOSE CONVERSION FACTORS AND THEN CALCULATES THE    *  RED5  80
C     TRANSPORTATION EXPOSURES.                                      *  RED5  90
C***********************************************************************RED5 100
C                                                                       RED5 110
CBRC $LARGE                                                             RED5 120
      CHARACTER NUCD*6,SOLD*1,BLANK*6                                   RED5 130
$INCLUDE:'IMPCOMM.FOR'                                                  RED5 140
      DIMENSION NUCD(5),SOLD(5),COND(5)                                 RED5 150
      DATA BLANK/'      '/                                              RED5 160
  101 FORMAT(A10,3E10.3)                                                RED5 170
  102 FORMAT(15I5)                                                      RED5 180
  103 FORMAT(5(A6,1X,A1,E10.3,2X))                                      RED5 190
  104 FORMAT(/2X'WASTE: 'A10,2X'WEIGHT:'1PE9.2' MT  DENSITY:'           RED5 200
     *       E9.2' MT/M3'//2X'ID='I2,2X'IA='I2,2X'IK1='I2,2X            RED5 210
     *       'IK2='I3,2X'PROCESS='I2/2X'IXS='4I4/2X'ICS='4I4)           RED5 220
      NSTR=1                                                            RED5 230
      CALL ZERO(BAS,184)                                                RED5 240
      DO 10 I=1,85                                                      RED5 250
      SOL(I)=SOLB(I)                                                    RED5 260
   10 NUX(I)=0                                                          RED5 270
C                                                                       RED5 280
C     START READING WASTE STREAM CHARACTERISTICS                        RED5 290
C                                                                       RED5 300
      READ(5,101) BASN(1),BAS(1,1),BAS(1,2),BAS(1,3)                    RED5 310
      READ(5,102) (ISPC(1,J),J=1,15)                                    RED5 320
      WRITE(6,104) BASN(1),BAS(1,1),BAS(1,2),(ISPC(1,J),J=1,5),         RED5 330
     *             (ISPC(1,J),J=8,15)                                   RED5 340
CBRC    WRITE WASTE STREAM HEADER ON TAPE10                             RED5 350
      WRITE(10,1004) BASN(1)                                            RED5 360
 1004 FORMAT(//2X,A10)                                                  RED5 370
CBRC    END                                                             RED5 380
   12 READ(5,103,END=20) (NUCD(I),SOLD(I),COND(I),I=1,5)                RED5 390
      IF(NUCD(1).EQ.BLANK)GO TO 20                                      RED5 400
      DO 18 J=1,5                                                       RED5 410
      DO 14 I=1,85                                                      RED5 420
      IF(NUCD(J).EQ.NUC(I))GO TO 16                                     RED5 430
   14 CONTINUE                                                          RED5 440
      IF(NUCD(J).EQ.BLANK)GO TO 20                                      RED5 450
      STOP 'CANT FIND NUCLIDE NAME READ5'                               RED5 460
   16 NUX(I)=1                                                          RED5 470
      SOL(I)=SOLD(J)                                                    RED5 480
      BAS(1,I+7)=COND(J)                                                RED5 490
   18 CONTINUE                                                          RED5 500
      GO TO 12                                                          RED5 510
C                                                                       RED5 520
   20 CALL UPTAKE                                                       RED5 530
CBRC    IQ=1 NO LONGER REFERS TO ONSITE DISPOSAL                        RED5 540
CBRC  IF(IQ.EQ.1)RETURN                                                 RED5 550
C                                                                       RED5 560
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C       TRANSPORTATION SECTION                                          RED5 570
C                                                                       RED5 580
C       BAS(5) - MAXIMUM DRIVER IMPACTS                                 RED5 590
C       BAS(6) - TOTAL DRIVERS IMPACTS                                  RED5 600
C       BAS(7) - POPULATION IMPACTS                                     RED5 610
C                                                                       RED5 620
      A1=ISPC(1,9)/100.                                                 RED5 630
      DGA=0.                                                            RED5 640
      DO 22 I=1,85                                                      RED5 650
      IF(NUX(I).EQ.1)DGA=DGA+PDCF(I,4,5)*BAS(1,I+7)                     RED5 660
   22 CONTINUE                                                          RED5 670
      DGA=DGA*BAS(1,2)/(A1*BAS(1,2)+DEN1(IQ)*(1.-A1))                   RED5 680
CBRC    ADD FACTORS FOR NUCLIDE SPECIFIC ACCOUNTING                     RED5 690
      FAC=BAS(1,2)/(A1*BAS(1,2)+DEN1(IQ)*(1.-A1))                       RED5 700
      FAC3=A1                                                           RED5 710
CBRC    END                                                             RED5 720
      A3=BAS(1,1)/4.534                                                 RED5 730
      IF(ISPC(1,3).NE.0)A3=A3/0.75                                      RED5 740
      A4=A3/(ISPC(1,8)*A1)                                              RED5 750
      IF(IQ.GT.3)GO TO 24                                               RED5 760
      A2=(COFF(1.,2.)*2.+COFF(1.,4.)*0.5)/8760.                         RED5 770
      IF(A4.GT.750.)BAS(1,5)=DGA*A1*A2*1.6*750.                         RED5 780
      IF(A4.LE.750.)BAS(1,5)=DGA*A1*A2*1.6*A4                           RED5 790
CBRC    SAVE FACTOR FOR NUCLIDE-SPECIFIC CALCULATIONS                   RED5 800
      FAC2=750.                                                         RED5 810
      IF(A4.LE.750) FAC2=A4                                             RED5 820
CBRC    END                                                             RED5 830
      GO TO 26                                                          RED5 840
   24 A2=(COFF(1.,2.)*5.+COFF(1.,4.)*0.5)/8760.                         RED5 850
      IF(A4.GT.250.)BAS(1,5)=DGA*A1*A2*1.6*250.                         RED5 860
      IF(A4.LE.250.)BAS(1,5)=DGA*A1*A2*1.6*A4                           RED5 870
CBRC    SAVE FACTOR FOR NUCLIDE-SPECIFIC CALCULATIONS                   RED5 880
      FAC2=250.                                                         RED5 890
      IF(A4.LE.250.) FAC2=A4                                            RED5 900
CBRC    END                                                             RED5 910
   26 BAS(1,6)=2.*DGA*A2*1.6*A3                                         RED5 920
      A1=TPOP(IR)*TDIS(IQ)*TDOZ(IR)/TVEL(IQ)                            RED5 930
      BAS(1,7)=A1*100.*DGA*A3*1.6*COFF(1.,4.)/8760.                     RED5 940
CBRC    COMPUTE AND PRINT TRANSPORTATION IMPACTS BY NUCLIDE             RED5 950
      WRITE(10,7010)                                                    RED5 960
 7010 FORMAT(//2X,'TRANSPORTATION ICRP IMPACTS BY NUCLIDE (MREM/YR)'//  RED5 970
     *                    2X,'NUC    MAX INDIVIDUAL'/)                  RED5 980
      FAC4=FAC*FAC2*FAC3*A2*1.6                                         RED5 990
      TRNTOT=0.0                                                        RED51000
      DO 30 I=1,85                                                      RED51010
      IF(NUX(I).NE.1) GOTO 30                                           RED51020
      DOST=FAC4*PDCF(I,4,5)*BAS(1,I+7)                                  RED51030
      WRITE(10,7020) NUC(I),DOST                                        RED51040
 7020 FORMAT(2X,A6,4X,1PE12.3)                                          RED51050
      TRNTOT=TRNTOT+DOST                                                RED51060
   30 CONTINUE                                                          RED51070
      WRITE(10,7030) TRNTOT                                             RED51080
 7030 FORMAT(/2X,'TOTAL TRANSPORTATION IMPACTS =',                      RED51090
     *       1PE12.3)                                                   RED51100
CBRC    END                                                             RED51110
      RETURN                                                            RED51120
      END                                                               RED51130
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CBRC                                                                    UPTK  10
$STORAGE:2                                                              UPTK  20
      SUBROUTINE UPTAKE                                                 UPTK  30
C                                                                       UPTK  40
C***********************************************************************UPTK  50
C     THIS SUBROUTINE READS IN (TAPE1) THE FUNDAMENTAL DOSE           *UPTK  60
C     CONVERSION FACTORS AND RELATED NUCLIDE-SPECIFIC PARAMETERS      *UPTK  70
C     AND UPTAKE FACTORS, AND CALCULATES THE PATHWAY DOSE CONVERSION *UPTK  80
C     FACTORS USED IN DETERMINING THE IMPACTS IN THE REMAINDER OF     *UPTK  90
C     THIS CODE.  INCORPORATED ARE 85 RADIONUCLIDES, 10 BODY ORGANS   *UPTK 100
C     AND 7 MAJOR EXPOSURE PATHWAYS.  SEE APPENDIX D OF VOLUME 1.     *UPTK 110
C***********************************************************************UPTK 120
C                                                                       UPTK 130
CBRC $LARGE                                                             UPTK 140
      CHARACTER BASN*10,NUC*6,SOL*1,SOLB*1,IPA9*6,IPA1*6,IPA5*6,        UPTK 150
     *          NUCT*6,SOLT*1                                           UPTK 160
      COMMON/BAST/BASCOM(834),ISPC(2,15),PDCF(85,10,7)                  UPTK 170
     +       /CHRC/BASN(2),NUC(85),SOL(85),SOLB(85)                     UPTK 180
     +       /NUCS/AL(85),FMF(85),RET(85,5),FRACT(85,3),NUX(85)         UPTK 190
      COMMON/DCFS/FF(85,5),DCF1(159,10),DCF2(159,10),DCF3(85),          UPTK 200
     +            DCF4(85,10),DCF5(85,10),NUCT(159),SOLT(159)           UPTK 210
      COMMON/UPTK/V1,V2,S1,S2,Z,RI,R,CY,D,F2,F3,F5,F7,                  UPTK 220
     +            F8,F8P,F11,F13,F13P,F14,F15,F18                       UPTK 230
      DATA IPA9,IPA1,IPA5/'I-129 ','I-131 ','I-125 '/                   UPTK 240
      DO 80 INUC=1,85                                                   UPTK 250
      DO 10 IJ=1,159                                                    UPTK 260
      INCT=IJ                                                           UPTK 270
      IF(NUCT(INCT).EQ.NUC(INUC))GO TO 20                               UPTK 280
   10 CONTINUE                                                          UPTK 290
      STOP 'CANT FIND NUCLIDE NAME IN NUCT'                             UPTK 300
   20 IF(SOLT(INCT).EQ.SOL(INUC)) GO TO 50                              UPTK 310
      INCT=INCT+1                                                       UPTK 320
      IF(NUCT(INCT).NE.NUC(INUC))GO TO 40                               UPTK 330
      GO TO 20                                                          UPTK 340
   40 WRITE(6,101) NUC(INUC),SOL(INUC),NUCT(INCT),SOLT(INCT)            UPTK 350
  101 FORMAT(//2X,2(A6,2X,A1,2X))                                       UPTK 360
      STOP 'CANT FIND SOLUBILITIES FOR NUCT'                            UPTK 370
   50 PTP=F2+F3*(FF(INUC,2)*F5+FF(INUC,3)*F7*365.)                      UPTK 380
      PT=PTP*FF(INUC,1)                                                 UPTK 390
      FT=F8*FF(INUC,2)*F5+F8P*FF(INUC,3)*F7*365.+F11                    UPTK 400
      F12N=FF(INUC,4)*F13+FF(INUC,5)*F13P                               UPTK 410
      V=V1                                                              UPTK 420
      IF(NUC(INUC).EQ.IPA9)V=V2                                         UPTK 430
      IF(NUC(INUC).EQ.IPA1)V=V2                                         UPTK 440
      IF(NUC(INUC).EQ.IPA5)V=V2                                         UPTK 450
      D1=86400.*V/(S2*Z)                                                UPTK 460
      D2=86400.*R*V/S1                                                  UPTK 470
      W1=RI/(S2*Z)                                                      UPTK 480
      W2=R*RI/S1                                                        UPTK 490
      DO 70 IO=1,10                                                     UPTK 500
      A1=F18*(F14*(F15*DCF2(INCT,IO)+DCF5(INUC,IO))+DCF4(INUC,IO))      UPTK 510
      PDCF(INUC,IO,1)=F15*DCF2(INCT,IO)+DCF5(INUC,IO)+A1*D1             UPTK 520
      PDCF(INUC,IO,2)=F15*DCF2(INCT,IO)+DCF5(INUC,IO)+0.242*A1*D1       UPTK 530
      PDCF(INUC,IO,3)=PDCF(INUC,IO,1)+(D1*PT+(D2/CY)*PTP)*DCF1(INCT,IO) UPTK 540
      PDCF(INUC,IO,4)=(PT/D)*DCF1(INCT,IO)                              UPTK 550
      PDCF(INUC,IO,5)=DCF3(INUC)                                        UPTK 560
      PDCF(INUC,IO,6)=(W1*PT+(W2/CY)*PTP+FT/1000.)*DCF1(INCT,IO)+W1*A1  UPTK 570
      PDCF(INUC,IO,7)=PDCF(INUC,IO,6)+(F12N/1000.)*DCF1(INCT,IO)        UPTK 580
      DO 60 J=1,7                                                       UPTK 590
   60 PDCF(INUC,IO,J)=PDCF(INUC,IO,J)*1.E+12                            UPTK 600
   70 CONTINUE                                                          UPTK 610
   80 CONTINUE                                                          UPTK 620
      RETURN                                                            UPTK 630
      END                                                               UPTK 640
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CBRC                                                                    SPLC  10
$STORAGE:2                                                              SPLC  20
      SUBROUTINE SPLICE                                                 SPLC  30
C                                                                       SPLC  40
C***********************************************************************SPLC  50
C     THIS SUBROUTINE ACCOUNTS FOR THE POSSIBLE DIVISION OF A WASTE  *  SPLC  60
C     STREAM INTO SUB-STREAMS (MAXIMUM OF 3) BASED ON SELECTED WASTE *  SPLC  70
C     SORTING OPTIONS AT A MUNICIPAL WASTE INCINERATOR.  IT ALSO     *  SPLC  80
C     CALLS SUBROUTINES TO CALCULATE INCINERATION AND SORTING/       *  SPLC  90
C     RECOVERY IMPACTS, AND ANY IMPACTS ASSOCIATED WITH RECYCLED     *  SPLC 100
C***********************************************************************SPLC 110
C                                                                       SPLC 120
CBRC $LARGE                                                             SPLC 130
$INCLUDE:'IMPCOMM.FOR'                                                  SPLC 140
      ISTR=1                                                            SPLC 150
C                                                                       SPLC 160
C      DO METAL PACKAGE RECYCLING                                       SPLC 170
C                                                                       SPLC 180
      IF(ISPC(ISTR,3).NE.1.OR.ISPC(ISTR,4).EQ.0)GO TO 20                SPLC 190
      CALL RECYCL(ISTR,0.,0.,0.,1)                                      SPLC 200
   20 I1=IQ                                                             SPLC 210
      I2=ISPC(ISTR,5)                                                   SPLC 220
      IF(I2.EQ.1)RETURN                                                 SPLC 230
      I6=ISPC(ISTR,12)                                                  SPLC 240
      I7=ISPC(ISTR,13)                                                  SPLC 250
      I8=ISPC(ISTR,14)                                                  SPLC 260
      I9=ISPC(ISTR,15)                                                  SPLC 270
      IF(I2.GT.3)GO TO 30                                               SPLC 280
C                                                                       SPLC 290
C      SECTION BELOW FOR INCINERATE/DISPOSE AND SORTING OPTION 1        SPLC 300
C                                                                       SPLC 310
      CALL INCIMP(I1,I2,ISTR)                                           SPLC 320
      WRF=2.0                                                           SPLC 330
CBRC  IF(IQ.EQ.1) WRF=OSWR                                              SPLC 340
CBRC   USE OSWR FOR VOLUME REDUCTION IF INPUT (ORIGINALLY IQ=1)         SPLC 350
      IF(OSWR.GT.0.) WRF=OSWR                                           SPLC 360
      BAS(ISTR,1)=BAS(ISTR,1)/WRF                                       SPLC 370
      BAS(ISTR,2)=0.89                                                  SPLC 380
      BAS(ISTR,3)=BAS(ISTR,1)/BAS(ISTR,2)                               SPLC 390
      DO 24 J=8,92                                                      SPLC 400
   24 BAS(ISTR,J)=BAS(ISTR,J)*WRF                                       SPLC 410
      ISPC(ISTR,1)=3                                                    SPLC 420
      ISPC(ISTR,2)=1                                                    SPLC 430
      ISPC(ISTR,3)=0                                                    SPLC 440
      ISPC(ISTR,5)=1                                                    SPLC 450
      RETURN                                                            SPLC 460
C                                                                       SPLC 470
C      SECTION BELOW FOR SORTING OPTION 2                               SPLC 480
C                                                                       SPLC 490
   30 A1=(0.95*I6+0.05*I7+0.05*I8+0.10*I9)/100.                         SPLC 500
      A2=(0.05*I6+0.05*I7+0.10*I8+0.90*I9)/100.                         SPLC 510
      A3=BAS(ISTR,1)                                                    SPLC 520
      NSTR=NSTR+1                                                       SPLC 530
      DO 32 J=1,92                                                      SPLC 540
   32 BAS(NSTR,J)=BAS(ISTR,J)                                           SPLC 550
      DO 34 J=1,15                                                      SPLC 560
   34 ISPC(NSTR,J)=ISPC(ISTR,J)                                         SPLC 570
      BASN(NSTR)=BASN(ISTR)                                             SPLC 580
C                                                                       SPLC 590
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C       RESIDUE SECTION                                                 SPLC 600
C                                                                       SPLC 610
      BAS(ISTR,1)=BAS(ISTR,1)/9.40                                      SPLC 620
      BAS(ISTR,2)=.89                                                   SPLC 630
      BAS(ISTR,3)=BAS(ISTR,1)/BAS(ISTR,2)                               SPLC 640
      DO 36 J=8,92                                                      SPLC 650
   36 BAS(ISTR,J)=BAS(ISTR,J)*A1*9.40                                   SPLC 660
      CALL INCIMP(I1,I2,ISTR)                                           SPLC 670
      ISPC(ISTR,1)=3                                                    SPLC 680
      ISPC(ISTR,2)=1                                                    SPLC 690
      ISPC(ISTR,3)=0                                                    SPLC 700
      ISPC(ISTR,5)=1                                                    SPLC 710
      IF(I2.EQ.5) GO TO 40                                              SPLC 720
C                                                                       SPLC 730
C       DISCARD MATERIAL SECTION                                        SPLC 740
C                                                                       SPLC 750
      BAS(NSTR,1)=BAS(NSTR,1)*(1.-A1)                                   SPLC 760
      BAS(NSTR,2)=0.62                                                  SPLC 770
      BAS(NSTR,3)=BAS(NSTR,1)/BAS(NSTR,2)                               SPLC 780
      BAS(NSTR,6)=0.                                                    SPLC 790
      BAS(NSTR,7)=0.                                                    SPLC 800
      ISPC(NSTR,1)=1                                                    SPLC 810
      ISPC(NSTR,2)=2                                                    SPLC 820
      ISPC(NSTR,3)=0                                                    SPLC 830
      ISPC(NSTR,5)=1                                                    SPLC 840
      RETURN                                                            SPLC 850
C                                                                       SPLC 860
C       SECTION BELOW FOR SORTING OPTION 3                              SPLC 870
C                                                                       SPLC 880
   40 BAS(NSTR,1)=BAS(NSTR,1)*A2                                        SPLC 890
      BAS(NSTR,2)=0.84                                                  SPLC 900
      BAS(NSTR,3)=BAS(NSTR,1)/BAS(NSTR,2)                               SPLC 910
      BAS(NSTR,6)=0.                                                    SPLC 920
      BAS(NSTR,7)=0.                                                    SPLC 930
      ISPC(NSTR,1)=1                                                    SPLC 940
      ISPC(NSTR,2)=2                                                    SPLC 950
      ISPC(NSTR,3)=0                                                    SPLC 960
      ISPC(NSTR,5)=1                                                    SPLC 970
C                                                                       SPLC 980
C       RECYCLE OF SCRAP METAL AND GLASS                                SPLC 990
C                                                                       SPLC1000
      IF(I7.EQ.0.AND.I8.EQ.0)RETURN                                     SPLC1010
      A4=A3*(1.-A1-A2)                                                  SPLC1020
      A5=.9*I7+.85*I8                                                   SPLC1030
      WT1=.9*A4*I7/A5                                                   SPLC1040
      WT2=A4-WT1                                                        SPLC1050
      CALL RECYCL(ISTR,WT1,WT2,A3,2)                                    SPLC1060
      RETURN                                                            SPLC1070
      END                                                               SPLC1080
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CBRC                                                                    RECY  10
$STORAGE:2                                                              RECY  20
      SUBROUTINE RECYCL(ISTR,WT1,WT2,WTOT,NX)                           RECY  30
C                                                                       RECY  40
C*********************************************************************  RECY  50
C     THIS SUBROUTINE CALCULATES IMPACTS RESULTING FROM RECYCLE      *  RECY  60
C     OF CONTAMINATED MATERIALS.  THERE ARE AT PRESENT 3 RECYCLE     *  RECY  70
C     SCENARIOS CONSIDERED: RECYCLE OF METAL CONTAINERS; RECYCLE     *  RECY  80
C     OF THE METAL FRACTION OF THE WASTE STREAM COMPOSITION; AND     *  RECY  90
C     RECYCLE OF THE GLASS FRACTION.                                 *  RECY 100
C*********************************************************************  RECY 110
C                                                                       RECY 120
CBRC $LARGE                                                             RECY 130
$INCLUDE:'IMPCOMM.FOR'                                                  RECY 140
      DIMENSION RI(85),RP(85)                                           RECY 150
CBRC    ARRAY TO SAVE METAL RECYCLE IMPACTS                             RECY 160
      DIMENSION BRC3(85)                                                RECY 170
      DATA RI/2.13E-05,3.41E-07,7.15E-02,1.96E-03,2.85E-04,1.92E-04,    RECY 180
     +        8.17E-04,2.95E-04,6.57E-02,1.07E-01,2.20E-02,7.30E-07,    RECY 190
     +        2.60E-02,3.95E-03,1.80E-02,8.20E-02,1.53E-06,3.80E-06,    RECY 200
     +        1.40E-02,1.22E-02,2.03E-03,1.71E-02,1.15E-04,6.25E-04,    RECY 210
     +        5.60E-02,5.10E-02,1.83E-04,1.26E-03,4.63E-07,4.08E-03,    RECY 220
     +        8.50E-03,6.10E-03,4.80E-02,8.89E-02,8.98E-04,8.36E-03,    RECY 230
     +        6.50E-02,5.91E-02,3.51E-04,1.40E-03,9.80E-05,6.56E-04,    RECY 240
     +        4.60E-02,2.40E-04,7.02E-02,1.90E-02,8.81E-04,7.38E-02,    RECY 250
     +        5.47E-04,1.54E-03,1.91E-03,3.72E-02,1.01E-02,8.24E-03,    RECY 260
     +        1.13E-01,6.56E+00,2.59E-02,2.99E+00,1.34E+00,5.89E+00,    RECY 270
     +        8.92E-01,9.97E-02,8.54E-02,1.57E-01,1.13E-01,1.03E-01,    RECY 280
     +        8.80E-04,2.71E-03,9.57E-02,1.62E-03,9.17E-01,1.23E-01,    RECY 290
     +        1.17E-01,1.10E-01,1.10E-01,1.19E-06,1.04E-01,1.09E+00,    RECY 300
     +        9.00E-02,9.21E-01,1.30E-01,4.92E-01,1.24E-01,1.08E-01,    RECY 310
     +        4.58E-03/                                                 RECY 320
      DATA RP/2.95E+00,7.80E-01,1.23E+03,1.83E+01,2.66E+00,1.89E+00,    RECY 330
     .        2.26E+02,3.52E+00,2.77E+02,4.27E+00,1.31E+02,5.69E-01,    RECY 340
     .        6.93E+00,2.61E+01,1.00E+01,2.61E+03,4.66E+00,1.04E-01,    RECY 350
     .        6.52E+01,5.59E+01,1.89E+01,6.98E+01,6.39E-02,1.25E+02,    RECY 360
     .        2.48E+01,6.13E+03,1.71E+00,1.18E+01,1.87E+00,1.64E+01,    RECY 370
     .        2.22E+00,4.38E+01,1.46E+03,5.67E+02,8.42E+00,3.77E+01,    RECY 380
     .        7.81E+03,2.41E+02,1.45E+01,5.71E+00,1.18E+01,6.11E+00,    RECY 390
     .        6.01E+02,6.50E+01,2.82E+02,2.10E+03,8.21E+00,2.96E+02,    RECY 400
     .        5.08E+00,1.11E+01,2.70E+02,2.57E+03,4.05E+01,8.15E+00,    RECY 410
     .        4.21E-01,3.38E+02,3.97E+01,1.50E+03,1.35E+03,9.96E+02,    RECY 420
     .        1.38E+03,9.35E+00,8.00E+00,2.42E+02,9.25E+00,9.59E+00,    RECY 430
     .        6.24E+00,9.44E+02,8.95E+00,2.32E+02,1.54E+03,1.77E+00,    RECY 440
     .        9.81E+00,1.03E+01,1.03E+01,9.51E-04,9.68E+00,1.68E+03,    RECY 450
     .        1.36E+02,1.42E+03,3.67E-01,5.65E+02,6.94E+00,9.96E+00,    RECY 460
     .        1.02E+00/                                                 RECY 470
      DATA PAKF,FIND,FPOP,DISF/1.E-3,0.33,0.46,0.9738/,                 RECY 480
     *     WMET,WGLS/857.,90./                                          RECY 490
  101 FORMAT(/2X'METAL PACKAGE RECYCLE IMPACTS'3X'MAXIND ='             RECY 500
     *1PE9.2' MREM/YR'/34X'POPULN ='E9.2' PERSON-MREM/30YRS')           RECY 510
  102 FORMAT(/2X'METAL MATERIAL RECYCLE IMPACTS'2X'MAXIND ='            RECY 520
     *1PE9.2' MREM/YR'/34X'POPULN ='E9.2' PERSON-MREM/30YRS')           RECY 530
  103 FORMAT(/2X'GLASS MATERIAL RECYCLE IMPACTS'2X'MAXIND ='            RECY 540
     *1PE9.2' MREM/YR'/34X'POPULN ='E9.2' PERSON-MREM/30YRS')           RECY 550
      IF(NX.NE.1)GO TO 20                                               RECY 560
C                                                                       RECY 570
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C      METAL PACKAGE RECYCLE                                            RECY 580
C                                                                       RECY 590
      IP=ISPC(ISTR,5)                                                   RECY 600
      IF(IP.NE.1)FCORR=1./ISPC(ISTR,10)                                 RECY 610
      IF(IP.EQ.1)FCORR=1./ISPC(ISTR,11)                                 RECY 620
      A1=0.                                                             RECY 630
      A2=0.                                                             RECY 640
CBRC    PRINT HEADER FOR TAPE10 OUTPUT                                  RECY 650
      WRITE(10,7000)                                                    RECY 660
 7000 FORMAT(//2X,'METAL PACKAGE RECYCLE ICRP IMPACTS BY ',             RECY 670
     *       'NUCLIDE (MREM/YR)'//                                      RECY 680
     *       2X,'NUC          DOSIND'/)                                 RECY 690
      BRC1=0.01*ISPC(ISTR,4)*PAKF*BAS(ISTR,1)/0.0009*FIND*FCORR         RECY 700
      BRCTOT=0.0                                                        RECY 710
CBRC    END                                                             RECY 720
      DO 10 I=1,85                                                      RECY 730
      IF(NUX(I).EQ.0)GO TO 10                                           RECY 740
      A1=A1+BAS(ISTR,I+7)*RI(I)                                         RECY 750
      A2=A2+BAS(ISTR,I+7)*RP(I)                                         RECY 760
CBRC    PRINT IMPACT FOR EACH NUCLIDE                                   RECY 770
      BRC2=BRC1*BAS(ISTR,I+7)*RI(I)                                     RECY 780
      WRITE(10,7010) NUC(I),BRC2                                        RECY 790
 7010 FORMAT(2X,A6,3X,1PE12.3)                                          RECY 800
      BRCTOT=BRCTOT+BRC2                                                RECY 810
CBRC    END                                                             RECY 820
   10 CONTINUE                                                          RECY 830
CBRC    PRINT TOTAL IMPACT                                              RECY 840
      WRITE(10,7015) BRCTOT                                             RECY 850
 7015 FORMAT(/2X,'TOTAL RECYCLE IMPACT =',1PE12.3)                      RECY 860
CBRC    END                                                             RECY 870
      A3=0.01*ISPC(ISTR,4)*PAKF*BAS(ISTR,1)/0.0009                      RECY 880
      A1=FIND*FCORR*A3*A1                                               RECY 890
      A2=FPOP*A3*A2                                                     RECY 900
      WRITE(6,101) A1,A2                                                RECY 910
      RETURN                                                            RECY 920
C                                                                       RECY 930
C     METAL FRACTION RECYCLE                                            RECY 940
C                                                                       RECY 950
   20 A1=0.                                                             RECY 960
      A2=0.                                                             RECY 970
CBRC    PRINT HEADER FOR TAPE10 OUTPUT                                  RECY 980
      WRITE(10,7020)                                                    RECY 990
 7020 FORMAT(//2X,'METAL AND GLASS RECYCLE ICRP IMPACTS BY NUCLIDE'//   RECY1000
     *       2X,'****  IMPACTS ARE NOT NORMALIZED BY NUMBER OF ',       RECY1010
     *       'FACILITIES  ****'//                                       RECY1020
     *       2X,'   NUC      METAL IND     GLASS IND'/)                 RECY1030
      BRC1=FIND*WT1/(0.0009*ISPC(1,10))                                 RECY1040
CBRC    END                                                             RECY1050
      DO 30 I=1,85                                                      RECY1060
      IF(NUX(I).EQ.0)GO TO 30                                           RECY1070
      A1=A1+BAS(NSTR,I+7)*RI(I)                                         RECY1080
      A2=A2+BAS(NSTR,I+7)*RP(I)                                         RECY1090
CBRC    SAVE METAL RECYCLE IMPACT FOR THIS NUCLIDE                      RECY1100
      BRC3(I)=BRC1*BAS(NSTR,I+7)*RI(I)                                  RECY1110
   30 CONTINUE                                                          RECY1120
      A1=FIND*WT1*A1/(0.0009*ISPC(1,10))                                RECY1130
      A2=FPOP*WT1*A2/0.0009                                             RECY1140
      WRITE(6,102) A1,A2                                                RECY1150
C                                                                       RECY1160
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C     GLASS FRACTION RECYCLE                                            RECY1170
C                                                                       RECY1180
      FCORR=WT2/(ISPC(1,10)*WGLS)                                       RECY1190
      A1=0.                                                             RECY1200
      A3=0.                                                             RECY1210
CBRC    FACTOR FOR GLASS IMPACTS                                        RECY1220
      BRC1=FCORR*0.3*DISF*1.6*0.6936*0.0228                             RECY1230
      DO 40 I=1,85                                                      RECY1240
      IF(NUX(I).EQ.0)GO TO 40                                           RECY1250
      A1=A1+BAS(NSTR,I+7)*PDCF(I,4,5)                                   RECY1260
      Y=EXM(AL(I))                                                      RECY1270
      X=EXM(AL(I)*30.)                                                  RECY1280
      Z=1.0                                                             RECY1290
      IF(Y.NE.1.) Z=(1.-X)/(30.*(1.-Y))                                 RECY1300
      A3=A3+Z*BAS(NSTR,I+7)*PDCF(I,4,5)                                 RECY1310
CBRC    PRINT METAL AND GLASS IMPACTS BY NUCLIDE                        RECY1320
      BRC2=BRC1*BAS(NSTR,I+7)*PDCF(I,4,5)                               RECY1330
      WRITE(10,7030) NUC(I),BRC3(I),BRC2                                RECY1340
 7030 FORMAT(2X,A6,3X,1P2E12.3)                                         RECY1350
CBRC    END                                                             RECY1360
   40 CONTINUE                                                          RECY1370
      A2=0.3*DISF*1.6*.6936                                             RECY1380
      A1=FCORR*A2*A1*.0228                                              RECY1390
      A3=FCORR*A2*A3*ISPC(1,10)*52.                                     RECY1400
      WRITE(6,103) A1,A3                                                RECY1410
      RETURN                                                            RECY1420
      END                                                               RECY1430
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CBRC                                                                    INCI  10
$STORAGE:2                                                              INCI  20
      SUBROUTINE INCIMP(I1,I2,ISTR)                                     INCI  30
C                                                                       INCI  40
C***********************************************************************INCI  50
C     THIS SUBROUTINE CALCULATES THE IMPACTS ASSOCIATED WITH THE      *INCI  60
C     INCINERATION OF WASTE STREAMS.  IMPACTS ARE CALCULATED FOR      *INCI  70
C     BOTH FACILITY WORKERS AND MEMBERS OF THE SURROUNDING            *INCI  80
C     POPULATION.                                                     *INCI  90
C***********************************************************************INCI 100
C                                                                       INCI 110
CBRC $LARGE                                                             INCI 120
$INCLUDE:'IMPCOMM.FOR'                                                  INCI 130
      DIMENSION QT1(10),QT3(10),QT5(10)                                 INCI 140
CBRC    ADD DOSNUC ARRAY FOR NUCLIDE CALCULATIONS                       INCI 150
      DIMENSION DOSNUC(3,85)                                            INCI 160
C                                                                       INCI 170
C     BIMP(7) - OFFSITE POPULATION - INCINERATION IMPACTS               INCI 180
C     BIMP(8) - MAXIMUM INDIVIDUAL - INCINERATION IMPACTS               INCI 190
C     BIMP(9) - ALL WORKERS - INCINERATION IMPACTS                      INCI 200
C     BIMP(10) - MAXIMUM WORKER - INCINERATION IMPACTS                  INCI 210
C                                                                       INCI 220
      IF(I2.EQ.1)RETURN                                                 INCI 230
      I4=ISPC(ISTR,1)                                                   INCI 240
      FDS=1.0                                                           INCI 250
      IF(I4.LT.3)FDS=10.**(I4-3)                                        INCI 260
      I4=ISPC(ISTR,2)                                                   INCI 270
      FAC=1.0                                                           INCI 280
      IF(I4.GT.1)FAC=10.**(1-I4)                                        INCI 290
C                                                                       INCI 300
C      SUM THE GENERIC IMPACT CONSTANTS                                 INCI 310
C                                                                       INCI 320
      CALL ZERO(QT1,10)                                                 INCI 330
      CALL ZERO(QT3,10)                                                 INCI 340
      CALL ZERO(QT5,10)                                                 INCI 350
CBRC    CLEAR ARRAY OF NUCLIDE-SPECIFIC DOSES                           INCI 360
      CALL ZERO(DOSNUC,255)                                             INCI 370
      DO 14 J=1,85                                                      INCI 380
      IF(NUX(J).EQ.0)GO TO 14                                           INCI 390
      A1=FRACT(J,2)                                                     INCI 400
CBRC  IF(I1.EQ.1.OR.I1.GT.3)A1=FRACT(J,1)                               INCI 410
      IF(I1.EQ.1.OR.I1.EQ.3) A1=FRACT(J,1)                              INCI 420
      IF(I1.GT.3) A1=FRACT(J,3)                                         INCI 430
CBRC    END                                                             INCI 440
   10 DO 12 I=1,10                                                      INCI 450
      QT1(I)=QT1(I)+BAS(ISTR,J+7)*PDCF(J,I,1)                           INCI 460
      QT3(I)=QT3(I)+BAS(ISTR,J+7)*PDCF(J,I,3)*A1                        INCI 470
   12 QT5(I)=QT5(I)+BAS(ISTR,J+7)*PDCF(J,I,5)                           INCI 480
CBRC    RETAIN ICRP IMPACT FOR EACH NUCLIDE                             INCI 490
      BASNUC=BAS(ISTR,J+7)                                              INCI 500
      DOSNUC(1,J)=BASNUC*PDCF(J,10,1)                                   INCI 510
      DOSNUC(2,J)=BASNUC*PDCF(J,10,3)*A1                                INCI 520
      DOSNUC(3,J)=BASNUC*PDCF(J,10,5)                                   INCI 530
CBRC    END                                                             INCI 540
C                                                                       INCI 550
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C       SUBSTRACT AIRBORNE RELEASE FRACTION                              INCI 560
C                                                                        INCI 570
      BAS(ISTR,J+7)=BAS(ISTR,J+7)*(1.-A1)                                INCI 580
   14 CONTINUE                                                           INCI 590
CBRC    WRITE HEADER ON TAPE10                                           INCI 600
      WRITE(10,7000)                                                     INCI 610
 7000 FORMAT(//2X,'INCINERATION ICRP IMPACTS BY NUCLIDE (MREM/YR)'//     INCI 620
     *       2X,'****  IMPACTS NOT NORMALIZED BY NUMBER OF ',            INCI 630
     *       'PROCESSING FACILITIES  ****'//2X,                          INCI 640
     *'NUC      MAXIMUM OFF-SITE INDIVIDUAL '/)                          INCI 650
CBRC    END                                                              INCI 660
C                                                                        INCI 670
C       START OFF-SITE IMPACT CALCULATIONS                               INCI 680
C                                                                        INCI 690
      DO 20 I=1,10                                                       INCI 700
      A1=QT3(I)*BAS(ISTR,1)                                              INCI 710
      BIMP(I,7)=BIMP(I,7)+A1*POP(IR)                                     INCI 720
   20 BIMP(I,8)=BIMP(I,8)+A1*XOQI(I1)*EDFI(I1)                           INCI 730
CBRC    COMPUTE AND PRINT ICRP IMPACTS BY NUCLIDE                        INCI 740
      FACMAS=BAS(ISTR,1)*XOQI(I1)*EDFI(I1)                               INCI 750
      DOST=0.0                                                           INCI 760
      DO 21 J=1,85                                                       INCI 770
      IF(NUX(J).EQ.0) GOTO 21                                            INCI 780
      DOS8=DOSNUC(2,J)*FACMAS                                            INCI 790
      WRITE(10,7010) NUC(J),DOS8                                         INCI 800
 7010 FORMAT(2X,A6,4X,1PE10.3)                                           INCI 810
      DOST=DOST+DOS8                                                     INCI 820
   21 CONTINUE                                                           INCI 830
      WRITE(10,7015) DOST                                                INCI 840
 7015 FORMAT(/2X,'TOTAL NON-NORMALIZED INCINERATOR IMPACT =',1P1E12.3)   INCI 850
CBRC    END                                                              INCI 860
CBRC    WORKER IMPACTS ARE COMPUTED FOR ONSITE INCINERATION              INCI 870
CBRC  IF(I1.EQ.1)RETURN                                                  INCI 880
C                                                                        INCI 890
C       START WORKER IMPACT CALCULATIONS                                 INCI 900
C                                                                        INCI 910
      A1=0.237*BAS(ISTR,1)/VINC(I1)                                      INCI 920
      ADSL=A1*TWI(I1,1)*FDS                                              INCI 930
      ADSM=A1*TWI(I1,2)*FDS                                              INCI 940
      ADSHRH=A1*TWI(I1,3)                                                INCI 950
      ADSHML=A1*TWI(I1,3)*0.5*(1.+FDS)                                   INCI 960
      A1=A1*FAC*1.6/DEN1(I1)                                             INCI 970
      ADGL=A1*DOFF(30.)                                                  INCI 980
      ADGM=A1*DOFF(10.)                                                  INCI 990
      ADGH=A1*DOFF(1.)                                                   INCI1000
      DO 30 I=1,10                                                       INCI1010
      A1=QT1(I)*ADSL+QT5(I)*ADGL                                         INCI1020
      A2=QT1(I)*ADSL+QT5(I)*ADGM                                         INCI1030
      A3=QT1(I)*ADSM+QT5(I)*ADGM                                         INCI1040
      A4=QT1(I)*ADSM+QT5(I)*ADGH                                         INCI1050
      A5=QT1(I)*ADSHRH+QT5(I)*ADGH                                       INCI1060
      A6=QT1(I)*ADSHML+QT5(I)*ADGH                                       INCI1070
C                                                                        INCI1080
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C      SELECT THE MAXIMUM WORKER                                        INCI1090
C                                                                       INCI1100
      A7=AMAX1(A1,A2,A3,A4,A5,A6)                                       INCI1110
      IF(A7.GT.BIMP(I,10))BIMP(I,10)=A7                                 INCI1120
CBRC  GO TO (30,22,22,24,24),I1                                         INCI1130
      GO TO (22,22,24,24,24),I1                                         INCI1140
   22 DUM=2.*A1+2.*A2+8.*A3+6.*A4+4.*A5+8.*A6                           INCI1150
      IF(I2.EQ.3)DUM=DUM+2.*A3+A4                                       INCI1160
      IF(I2.EQ.4)DUM=DUM+3.*A3+A4+A6                                    INCI1170
      IF(I2.EQ.5)DUM=DUM+2.*A2+4.*A3+2.*A4+2.*A6                        INCI1180
      GO TO 26                                                          INCI1190
   24 DUM=6.*A1+2.*A2+4.*A3+2.*A4+2.*A5+2.*A6                           INCI1200
   26 BIMP(I,9)=BIMP(I,9)+DUM                                           INCI1210
   30 CONTINUE                                                          INCI1220
CBRC    ICRP IMPACTS BY NUCLIDE FOR WORKERS                             INCI1230
      WRITE(10,7020)                                                    INCI1240
 7020 FORMAT(//2X,'WORKER INCINERATION ICRP IMPACTS BY NUCLIDE ',       INCI1250
     *'(MREM/YR)'//2X,'****  IMPACTS ARE NOT NORMALIZED BY ',           INCI1260
     *       'NUMBER OF PROCESSING FACILITIES  ****'//                  INCI1270
     *       2X,'NUC  RESIDUE HANDLERS  MAINTENANCE'/)                  INCI1280
      A5T=0.0                                                           INCI1290
      A6T=0.0                                                           INCI1300
      DO 40 J=1,85                                                      INCI1310
      IF(NUX(J).EQ.0) GOTO 40                                           INCI1320
      D1=DOSNUC(1,J)                                                    INCI1330
      D3=DOSNUC(3,J)                                                    INCI1340
      A5=D1*ADSHRH+D3*ADGH                                              INCI1350
      A6=D1*ADSHML+D3*ADGH                                              INCI1360
      WRITE(10,7030) NUC(J),A5,A6                                       INCI1370
 7030 FORMAT(2X,A6,3X,1P2E12.3)                                         INCI1380
      A5T=A5T+A5                                                        INCI1390
      A6T=A6T+A6                                                        INCI1400
   40 CONTINUE                                                          INCI1410
      WRITE(10,7035) A5T,A6T                                            INCI1420
 7035 FORMAT(/2X,'TOTAL NON-NORMALIZED WORKER IMPACTS'/11X,1P2E12.3)    INCI1430
CBRC    END                                                             INCI1440
      RETURN                                                            INCI1450
      END                                                               INCI1460
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CBRC                                                                    INTI  10
$STORAGE:2                                                              INTI  20
      SUBROUTINE INTIMP                                                 INTI  30
C                                                                       INTI  40
C***********************************************************************INTI  50
C     THIS SUBROUTINE CALCULATES THE INADVERTANT INTRUDER IMPACTS     * INTI  60
C     FOR THE CONSTRUCTION AND AGRICULTURE SCENARIOS.                 * INTI  70
C***********************************************************************INTI  80
C                                                                       INTI  90
CBRC $LARGE                                                             INTI 100
$INCLUDE:'IMPCOMM.FOR'                                                  INTI 110
      DATA CONST/2.51E-5/                                               INTI 120
C                                                                       INTI 130
C     BIMP(1) - INTRUDER-CONSTRUCTION IMPACTS                           INTI 140
C     BIMP(2) - INTRUDER-AGRICULTURE IMPACTS                            INTI 150
C                                                                       INTI 160
CBRC    EACH STREAM HANDLED SEPARATELY                                  INTI 170
CBRC  DO 60 ISTR=1,NSTR                                                 INTI 180
      ISTR=1                                                            INTI 190
      FDS=EMP(IQ)*BAS(ISTR,1)/VANN(IQ)                                  INTI 200
CBRC  IF(IQ.EQ.1)FDS=FDS*SEFF(IQ)                                       INTI 210
      A9=1.0                                                            INTI 220
      IF(ISPC(ISTR,2).GT.1) A9=0.1                                      INTI 230
      GDEL=IINS                                                         INTI 240
CBRC    PRINT HEADER FOR TAPE10 FOR NUCLIDE IMPACT OUTPUT               INTI 250
      WRITE(10,7000)                                                    INTI 260
 7000 FORMAT(//2X,'INTRUDER ICRP IMPACTS BY NUCLIDE (MREM/YR)'//        INTI 270
     *       2X,'****  IMPACTS ARE NOT NORMALIZED BY NUMBER ',          INTI 280
     *       'OF DISPOSAL FACILITIES  ****'//                           INTI 290
     *       2X,'NUC      CONSTRUCTION  AGRICULTURE'/)                  INTI 300
      CONTOT=0.0                                                        INTI 310
      AGRTOT=0.0                                                        INTI 320
CBRC    END                                                             INTI 330
      DO 50 INUC=1,85                                                   INTI 340
      IF(NUX(INUC).EQ.0)GO TO 50                                        INTI 350
      A1=FDS*A9*BAS(ISTR,INUC+7)                                        INTI 360
      CALL CHNS(INUC,GDEL,IEN,IBG,NCH)                                  INTI 370
      DO 40 I=1,10                                                      INTI 380
      CALL CALI(INUC,I,C1,C2,C3,C4,IEN,IBG,NCH)                         INTI 390
      A2=C1                                                             INTI 400
      B5=RMIX(IQ)*A1*A2*0.27                                            INTI 410
      B2=A1*A2*0.057                                                    INTI 420
      B1=A1*FSC(IR)*C2                                                  INTI 430
      B3=RMIX(IQ)*A1*FSA(IR)*C3                                         INTI 440
      B4=RMIX(IQ)*0.5*A1*C4                                             INTI 450
      BIMP(I,1)=BIMP(I,1)+B1+B2                                         INTI 460
   40 BIMP(I,2)=BIMP(I,2)+B3+B4+B5                                      INTI 470
CBRC    PRINT ICRP (I=10) IMPACT FOR EACH NUCLIDE                       INTI 480
      CONINT=B1+B2                                                      INTI 490
      AGRINT=B3+B4+B5                                                   INTI 500
      WRITE(10,7010) NUC(INUC),CONINT,AGRINT                            INTI 510
 7010 FORMAT(2X,A6,3X,1P2E12.3)                                         INTI 520
      CONTOT=CONTOT+CONINT                                              INTI 530
      AGRTOT=AGRTOT+AGRINT                                              INTI 540
CBRC    END                                                             INTI 550
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   50 CONTINUE                                                          INTI 560
      A1=AL(57)*IINS                                                    INTI 570
      A2=AL(62)*IINS                                                    INTI 580
      RAD=BAS(ISTR,64)*EXM(A1)                                          INTI 590
      IF(A1.NE.A2)RAD=RAD+BAS(ISTR,69)*A1*(EXM(A1)-EXM(A2))/(A2-A1)     INTI 600
      RAD=RAD*FDS*CONST                                                 INTI 610
      DO 55 I=1,10                                                      INTI 620
   55 BIMP(I,2)=BIMP(I,2)+RAD*PDCF(56,I,2)                              INTI 630
CBRC    PRINT ICRP (I=10) IMPACT FOR RADON                              INTI 640
      AGRINT=RAD*PDCF(56,10,2)                                          INTI 650
      WRITE(10,7020) AGRINT                                             INTI 660
 7020 FORMAT(2X,'RADON',16X,1PE12.3)                                    INTI 670
      AGRTOT=AGRTOT+AGRINT                                              INTI 680
      WRITE(10,7025) CONTOT,AGRTOT                                      INTI 690
 7025 FORMAT(/2X,'TOTAL NON-NORMALIZED INTRUDER IMPACTS'/               INTI 700
     *       11X,1P2E12.3)                                              INTI 710
CBRC    END                                                             INTI 720
   60 CONTINUE                                                          INTI 730
C                                                                       INTI 740
      RETURN                                                            INTI 750
      END                                                               INTI 760
```

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CBRC                                                                    EXPW  10
$STORAGE:2                                                              EXPW  20
      SUBROUTINE EXPWAS                                                 EXPW  30
C                                                                       EXPW  40
C***********************************************************************EXPW  50
C     THIS SUBROUTINE CALCULATES THE IMPACTS FROM THE INTRUDER-      *  EXPW  60
C     INITIATED AND EROSION INITIATED EXPOSED WASTE SCENARIOS.       *  EXPW  70
C***********************************************************************EXPW  80
C                                                                       EXPW  90
CBRC $LARGE                                                             EXPW 100
$INCLUDE:'IMPCOMM.FOR'                                                  EXPW 110
      COMMON/CHYN/NXUC(85),ICH(8,10),LCH(10),ACT(8),BCT(8,2)            EXPW 120
C                                                                       EXPW 130
C     BIMP(3) - INTRUDER-AIR IMPACTS                                    EXPW 140
C     BIMP(4) - EROSION-AIR IMPACTS                                     EXPW 150
C     BIMP(5) - INTRUDER-WATER IMPACTS                                  EXPW 160
C     BIMP(6) - EROSION-WATER IMPACTS                                   EXPW 170
C                                                                       EXPW 180
      GREC=IINS                                                         EXPW 190
      GEROD=GERO(IQ)                                                    EXPW 200
      AREC=1.8E+3*RMIX(IQ)*EMP(IQ)                                      EXPW 210
CBRC  IF(IQ.EQ.1)AREC=AREC*SEFF(IQ)                                     EXPW 220
      AERO=ILFE*VANN(IQ)/(EMP(IQ)*EFF(IQ))                              EXPW 230
      FRA=19.75*EREC(IR)*POP(IR)*AREC                                   EXPW 240
      FEA=19.75*EERO(IR)*POPE(IR)*AERO                                  EXPW 250
      FRW=1.15E-4*POPW(IR)*AREC                                         EXPW 260
      FEW=1.15E-4*POPW(IR)*AERO                                         EXPW 270
CBRC    EACH STREAM HANDLED SEPARATELY                                  EXPW 280
CBRC 10 DO 40 ISTR=1,NSTR                                               EXPW 290
   10 ISTR=1                                                            EXPW 300
      I9=ISPC(ISTR,2)                                                   EXPW 310
      A9=1.0                                                            EXPW 320
      IF(I9.GT.1) A9=10.**(1-I9)                                        EXPW 330
      A2=BAS(ISTR,1)/VANN(IQ)                                           EXPW 340
CBRC    PRINT HEADER FOR TAPE10 OUTPUT                                  EXPW 350
      WRITE(10,7000)                                                    EXPW 360
 7000 FORMAT(//2X,'EXPOSED WASTE ICRP IMPACTS BY NUCLIDE (MREM/YR)'//   EXPW 370
     *       2X,'****  IMPACTS ARE NOT NORMALIZED BY NUMBER ',          EXPW 380
     *       'OF DISPOSAL FACILITIES  ****'//                           EXPW 390
     *       2X,'NUC     INTRUDER-AIR EROSION-AIR INTRUDER-WATER',      EXPW 400
     *       ' EROSION-WATER'/)                                         EXPW 410
      ARITOT=0.0                                                        EXPW 420
      ARETOT=0.0                                                        EXPW 430
      WTITOT=0.0                                                        EXPW 440
      WTETOT=0.0                                                        EXPW 450
CBRC    END                                                             EXPW 460
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      DO 30 INUC=1,85                                                   EXPW 470
      IF(NUX(INUC).EQ.0)GO TO 30                                        EXPW 480
      CALL CHNS(INUC,GREC,IEN,IBG,NCH)                                  EXPW 490
      DO 12 I=1,8                                                       EXPW 500
   12 BCT(I,1)=ACT(I)                                                   EXPW 510
      CALL CHNS(INUC,GEROD,IEN,IBG,NCH)                                 EXPW 520
      DO 14 I=1,8                                                       EXPW 530
   14 BCT(I,2)=ACT(I)                                                   EXPW 540
      A8=BAS(ISTR,INUC+7)                                               EXPW 550
      B1=FRA*A2*A8*A9                                                   EXPW 560
      B2=FEA*A2*A8                                                      EXPW 570
      B3=FRW*A2*A8*A9                                                   EXPW 580
      B4=FEW*A2*A8                                                      EXPW 590
      DO 25 IORG=1,10                                                   EXPW 600
      CALL CALE(INUC,IORG,C1,C2,C3,C4,IEN,IBG,NCH)                      EXPW 610
      BIMP(IORG,3)=BIMP(IORG,3)+B1*C1                                   EXPW 620
      BIMP(IORG,4)=BIMP(IORG,4)+B2*C2                                   EXPW 630
      BIMP(IORG,5)=BIMP(IORG,5)+B3*C3                                   EXPW 640
      BIMP(IORG,6)=BIMP(IORG,6)+B4*C4                                   EXPW 650
   25 CONTINUE                                                          EXPW 660
CBRC    PRINT ICRP (IORG=10) IMPACTS FOR EACH NUCLIDE                   EXPW 670
      AIRINT=B1*C1                                                      EXPW 680
      AIRERO=B2*C2                                                      EXPW 690
      WATINT=B3*C3                                                      EXPW 700
      WATERO=B4*C4                                                      EXPW 710
      WRITE(10,7010) NUC(INUC),AIRINT,AIRERO,WATINT,WATERO              EXPW 720
 7010 FORMAT(2X,A6,3X,1P4E12.3)                                         EXPW 730
      ARITOT=ARITOT+AIRINT                                              EXPW 740
      ARETOT=ARETOT+AIRERO                                              EXPW 750
      WTITOT=WTITOT+WATINT                                              EXPW 760
      WTETOT=WTETOT+WATERO                                              EXPW 770
CBRC    END                                                             EXPW 780
   30 CONTINUE                                                          EXPW 790
CBRC    PRINT TOTAL IMPACT                                              EXPW 800
      WRITE(10,7015) ARITOT,ARETOT,WTITOT,WTETOT                        EXPW 810
 7015 FORMAT(/2X,'TOTAL NON-NORMALIZED EXPOSED WASTE IMPACTS'/          EXPW 820
     *       11X,1P4E12.3)                                              EXPW 830
CBRC    END                                                             EXPW 840
   40 CONTINUE                                                          EXPW 850
      RETURN                                                            EXPW 860
      END                                                               EXPW 870
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CBRC                                                                    OPSI  10
$STORAGE:2                                                              OPSI  20
      SUBROUTINE OPSIMP                                                 OPSI  30
C                                                                       OPSI  40
C***********************************************************************OPSI  50
C     THIS SUBROUTINE CALCULATES THE ON-SITE AND OFF-SITE IMPACTS     *OPSI  60
C     ASSOCIATED WITH DISPOSAL OPERATIONS.                            *OPSI  70
C***********************************************************************OPSI  80
C                                                                       OPSI  90
CBRC $LARGE                                                             OPSI 100
$INCLUDE:'IMPCOMM.FOR'                                                  OPSI 110
C                                                                       OPSI 120
C     BIMP(11) - OFFSITE POPULATION - OPERATIONAL IMPACTS               OPSI 130
C     BIMP(12) - MAXIMUM OFFSITE INDIVIDUAL - OPERATIONAL IMPACTS       OPSI 140
C     BIMP(13) - ALL WORKERS - OPERATIONAL IMPACTS                      OPSI 150
C     BIMP(14) - MAXIMUM WORKER - OPERATIONAL IMPACTS                   OPSI 160
C                                                                       OPSI 170
      GO TO (20,20,30,30,30),IQ                                         OPSI 180
CBRC  GO TO (10,20,20,30,30),IQ                                         OPSI 190
C                                                                       OPSI 200
C      START CALCULATION OF OFF-SITE RELEASES FROM ON-SITE FACILITY     OPSI 210
CBRC    THIS SECTION NOT USED IN IMPACTS-BRC                            OPSI 220
C                                                                       OPSI 230
CBRC 10 DIAM=SQRT(ADAY(IQ,1)/3.1415927)                                 OPSI 240
CBRC  DO 16 ISTR=1,NSTR                                                 OPSI 250
CBRC  I5=ISPC(ISTR,1)                                                   OPSI 260
CBRC  FDS=1.                                                            OPSI 270
CBRC  IF(I5.LT.3)FDS=10.**(I5-3)                                        OPSI 280
CBRC  IF(IQ.EQ.3)FDS=(1.+FDS)/2.                                        OPSI 290
CBRC  A1=FDS*EMP(1)*0.237*TWO(1,3)*WVEL(IR)*2.*DIAM*3.                  OPSI 300
CBRC  A2=A1*BAS(ISTR,1)*3.15E+7/VANN(1)                                 OPSI 310
CBRC  DO 14 I=1,10                                                      OPSI 320
CBRC  A3=0.                                                             OPSI 330
CBRC  DO 12 J=1,85                                                      OPSI 340
CBRC  IF(NUX(J).EQ.1)A3=A3+BAS(ISTR,J+7)*PDCF(J,I,3)                    OPSI 350
CBRC 12 CONTINUE                                                        OPSI 360
CBRC  BIMP(I,11)=BIMP(I,11)+A2*A3*POP(IR)                               OPSI 370
CBRC 14 BIMP(I,12)=BIMP(I,12)+A2*A3*XOQO(IQ)*EDFO(IQ)                   OPSI 380
CBRC 16 CONTINUE                                                        OPSI 390
CBRC  RETURN                                                            OPSI 400
CBRC    END                                                             OPSI 410
C                                                                       OPSI 420
C      START MUNICIPAL WASTE FACILITY IMPACTS                           OPSI 430
C                                                                       OPSI 440
   20 DPOP=SQRT(ADAY(IQ,1)/3.1415927)                                   OPSI 450
      DEQP=SQRT(ADAY(IQ,2)/3.1415927)                                   OPSI 460
      DOTH=SQRT(ADAY(IQ,3)/3.1415927)                                   OPSI 470
CBRC    EACH STREAM HANDLED SEPARATELY                                  OPSI 480
CBRC  DO 26 ISTR=1,NSTR                                                 OPSI 490
      ISTR=1                                                            OPSI 500
      I5=ISPC(ISTR,1)                                                   OPSI 510
      FDS=1.                                                            OPSI 520
      IF(I5.LT.3)FDS=10.**(I5-3)                                        OPSI 530
      I9=ISPC(ISTR,2)                                                   OPSI 540
      FAC=1.                                                            OPSI 550
      IF(I9.GT.1)FAC=10.**(1-I9)                                        OPSI 560
      AS1=FDS*EMP(IQ)*0.237*BAS(ISTR,1)/VANN(IQ)                        OPSI 570
      AS2=AS1*TWO(IQ,3)*WVEL(IR)*2.*DPOP*9.45E+7                        OPSI 580
      AG1=AS1*(FAC/FDS)*1.6/DEN2(IQ)                                    OPSI 590
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      DO 24 I=1,10                                                      OPSI 600
      A1=0.                                                             OPSI 610
      A2=0.                                                             OPSI 620
      A3=0.                                                             OPSI 630
      A5=0.                                                             OPSI 640
      DO 22 J=1,85                                                      OPSI 650
      IF(NUX(J).EQ.0)GO TO 22                                           OPSI 660
      A1=A1+BAS(ISTR,J+7)*PDCF(J,I,1)                                   OPSI 670
      A2=A2+BAS(ISTR,J+7)*PDCF(J,I,3)*FRACT(J,3)                        OPSI 680
      A3=A3+BAS(ISTR,J+7)*PDCF(J,I,3)                                   OPSI 690
      A5=A5+BAS(ISTR,J+7)*PDCF(J,I,5)                                   OPSI 700
   22 CONTINUE                                                          OPSI 710
C                                                                       OPSI 720
C      OFF-SITE RELEASES                                                OPSI 730
C                                                                       OPSI 740
      BIMP(I,11)=BIMP(I,11)+AS2*A3*POP(IR)                              OPSI 750
CBRC  IF(IQ.EQ.3)BIMP(I,11)=BIMP(I,11)+BAS(ISTR,1)*A2*POP(IR)           OPSI 760
      BIMP(I,12)=BIMP(I,12)+AS2*A3*XOQO(IQ)*EDFO(IQ)                    OPSI 770
CBRC  IF(IQ.EQ.3)BIMP(I,12)=BIMP(I,12)+BAS(ISTR,1)*A2*XOQO(IQ)*.119     OPSI 780
C                                                                       OPSI 790
C      WORKER EXPOSURES                                                 OPSI 800
C                                                                       OPSI 810
      ADSL=AS1*TWO(IQ,1)                                                OPSI 820
      ADSM=AS1*TWO(IQ,2)                                                OPSI 830
      ADSH=AS1*TWO(IQ,3)                                                OPSI 840
      ADGL=AG1*DOFF(50.)*COFF(50.,DOTH)                                 OPSI 850
      ADGM=AG1*DOFF(30.)*COFF(30.,DOTH)                                 OPSI 860
      ADGH=AG1*DOFF( 1.)*COFF( 1.,DEQP)                                 OPSI 870
      ACOV=6.26E-2*AG1                                                  OPSI 880
CBRC  IF(IQ.EQ.3)ACOV=0.25*AG1*DEN2(IQ)/DEN2(2)                         OPSI 890
      B2=A1*ADSL+A5*(ADGM+ACOV)                                         OPSI 900
      B4=A1*ADSM+A5*(ADGM+ACOV)                                         OPSI 910
      B6=A1*ADSH+A5*(ADGH+ACOV)                                         OPSI 920
      B7=2.*B2+4.*B4+2.*B6                                              OPSI 930
CBRC  IF(IQ.EQ.2)B7=2.*B2+5.*B4+3.*B6                                   OPSI 940
CBRC    DISPOSAL WORKERS FOR SANITARY LANDFILL (IQ=1 OR 2)              OPSI 950
      IF(IQ.EQ.1.OR.IQ.EQ.2) B7=2.*B2+5.*B4+3.*B6                       OPSI 960
      BIMP(I,13)=BIMP(I,13)+B7/10.                                      OPSI 970
      BIMP(I,14)=BIMP(I,14)+B7/10.                                      OPSI 980
   24 CONTINUE                                                          OPSI 990
   26 CONTINUE                                                          OPSI1000
      RETURN                                                            OPSI1010
C                                                                       OPSI1020
C      START HAZARDOUS WASTE FACILITY IMPACTS                           OPSI1030
C                                                                       OPSI1040
   30 DPOP=SQRT(ADAY(IQ,1)/3.1415927)                                   OPSI1050
      DEQP=SQRT(ADAY(IQ,2)/3.1415927)                                   OPSI1060
      DOTH=SQRT(ADAY(IQ,3)/3.1415927)                                   OPSI1070
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CBRC    EACH STREAM HANDLED SEPARATELY                                  OPSI1080
CBRC  DO 38 ISTR=1,NSTR                                                 OPSI1090
      ISTR=1                                                            OPSI1100
      I5=ISPC(ISTR,1)                                                   OPSI1110
      FDS=1.                                                            OPSI1120
      IF(I5.LT.3)FDS=10.**(I5-3)                                        OPSI1130
      I9=ISPC(ISTR,2)                                                   OPSI1140
      FAC=1.                                                            OPSI1150
      IF(I9.GT.1)FAC=10.**(1-I9)                                        OPSI1160
      AS1=FDS*EMP(IQ)*0.237*BAS(ISTR,1)/VANN(IQ)                        OPSI1170
      AS2=AS1*EFAC(IR)*ADAY(IQ,2)*3.15E+1                               OPSI1180
      AS3=AS1*EFAC(IR)*ADAY(IQ,2)/(2.*DPOP*3.E+6*WVEL(IR)*DEN2(IQ))     OPSI1190
      AG1=AS1*(FAC/FDS)*1.6/DEN2(IQ)                                    OPSI1200
      AX1=BAS(ISTR,2)*2.6E-11*FDS*ISPC(ISTR,11)                         OPSI1210
      AX2=AX1*1.248*AXOQ(IR)                                            OPSI1220
      DO 36 I=1,10                                                      OPSI1230
      A1=0.                                                             OPSI1240
      A2=0.                                                             OPSI1250
      A3=0.                                                             OPSI1260
      A5=0.                                                             OPSI1270
      DO 32 J=1,85                                                      OPSI1280
      IF(NUX(J).EQ.0)GO TO 32                                           OPSI1290
      A1=A1+BAS(ISTR,J+7)*PDCF(J,I,1)                                   OPSI1300
      A2=A2+BAS(ISTR,J+7)*PDCF(J,I,2)                                   OPSI1310
      A3=A3+BAS(ISTR,J+7)*PDCF(J,I,3)                                   OPSI1320
      A5=A5+BAS(ISTR,J+7)*PDCF(J,I,5)                                   OPSI1330
   32 CONTINUE                                                          OPSI1340
      DIAM=DEQP                                                         OPSI1350
      IF(ISPC(ISTR,3).NE.0)DIAM=DOTH                                    OPSI1360
      ADGL=AG1*DOFF(50.)*COFF(50.,DIAM)                                 OPSI1370
      ADGM=AG1*DOFF(30.)*COFF(30.,DIAM)                                 OPSI1380
      ADGH=AG1*DOFF( 1.)*COFF( 1.,DIAM)                                 OPSI1390
      ACOV=2.49E-2*AG1                                                  OPSI1400
      IF(ISPC(ISTR,3).NE.0)GO TO 34                                     OPSI1410
C                                                                       OPSI1420
C      SECTION BELOW FOR UNPACKAGED WASTE                               OPSI1430
C                                                                       OPSI1440
      BIMP(I,11)=BIMP(I,11)+AS2*A3*POP(IR)                              OPSI1450
      BIMP(I,12)=BIMP(I,12)+AS2*A3*XOQO(IQ)*EDFO(IQ)                    OPSI1460
      ADSL=AS3                                                          OPSI1470
      B1=A1*ADSL+A5*(ADGL+ACOV)                                         OPSI1480
      B2=A1*ADSL+A5*(ADGM+ACOV)                                         OPSI1490
      B3=A1*ADSL+A5*(ADGH+ACOV)                                         OPSI1500
      B4=AMAX1(B1,B2,B3)                                                OPSI1510
      BIMP(I,13)=BIMP(I,13)+14.*B1+15.*B2+29.*B3                        OPSI1520
      BIMP(I,14)=BIMP(I,14)+B4                                          OPSI1530
      GO TO 36                                                          OPSI1540
C                                                                       OPSI1550
C      SECTION BELOW FOR PACKAGED WASTE                                 OPSI1560
C                                                                       OPSI1570
   34 BIMP(I,12)=BIMP(I,12)+AX2*A2                                      OPSI1580
      ADSL=AX1                                                          OPSI1590
      B1=A2*ADSL+A5*(ADGL+ACOV)                                         OPSI1600
      B2=A2*ADSL+A5*(ADGM+ACOV)                                         OPSI1610
      B3=A2*ADSL+A5*(ADGH+ACOV)                                         OPSI1620
      B4=AMAX1(B1,B2,B3)                                                OPSI1630
      BIMP(I,13)=BIMP(I,13)+14.*B1+15.*B2+29.*B3                        OPSI1640
      BIMP(I,14)=BIMP(I,14)+B4                                          OPSI1650
   36 CONTINUE                                                          OPSI1660
   38 CONTINUE                                                          OPSI1670
      RETURN                                                            OPSI1680
      END                                                               OPSI1690
```


000084

```
CBRC                                                                    OVRF  10
$STORAGE:2                                                              OVRF  20
      SUBROUTINE OVRFLO                                                 OVRF  30
C                                                                       OVRF  40
C*****************************************************************     OVRF  50
C     THIS ROUTINE CALCULATES AND PRINTS RADIOLOGICAL IMPACTS       *   OVRF  60
C     FOR THREE SCENARIOS WHICH MAY RESULT FROM LEACHATE ACCUMU-    *   OVRF  70
C     LATION AT A DISPOSAL FACILITY:                                *   OVRF  80
C     1) DURING OPERATION OF THE FACILITY, ACCUMULATING LEACHATE    *   OVRF  90
C        IS REMOVED, TREATED, AND RELEASED TO A NEARBY STREAM.      *   OVRF 100
C     2) AFTER CLOSURE, ACCUMULATING LEACHATE IS ALLOWED TO FILL    *   OVRF 110
C        UP THE DISPOSAL CELLS, OVERFLOW, AND REACH A NEARBY STREAM*   OVRF 120
C     3) AFTER CLOSURE, ACCUMULATING LEACHATE IS REMOVED AND        *   OVRF 130
C        PROCESSED THROUGH AN EVAPORATOR, THUS IMPACTING THE LOCAL *   OVRF 140
C        POPULATION.                                                *   OVRF 150
C*****************************************************************     OVRF 160
C                                                                       OVRF 170
CBRC $LARGE                                                             OVRF 180
$INCLUDE:'IMPCOMM.FOR'                                                  OVRF 190
      DIMENSION F1N(85),F2N(85)                                         OVRF 200
      DATA F1N/85*1./,F2N/85*1./                                        OVRF 210
      GDEL=IINS                                                         OVRF 220
      VTOT=ILFE*VANN(IQ)                                                OVRF 230
      VL=PRC(IR,IQ)*VTOT/(EMP(IQ)*EFF(IQ))                              OVRF 240
      A8=ISPC(1,11)*4.5E6                                               OVRF 250
CBRC    EACH STREAM HANDLED SEPARATELY                                  OVRF 260
CBRC  DO 30 ISTR=1,NSTR                                                 OVRF 270
      ISTR=1                                                            OVRF 280
      I9=ISPC(ISTR,2)                                                   OVRF 290
      A9=1.0                                                            OVRF 300
      IF(I9.GT.1) A9=0.1                                                OVRF 310
      A4=A9*BAS(ISTR,1)*VL/VANN(IQ)                                     OVRF 320
CBRC    PRINT HEADER FOR TAPE10 FOR NUCLIDE IMPACT OUTPUT               OVRF 330
      WRITE(10,7000)                                                    OVRF 340
 7000 FORMAT(//2X,'OVERFLOW ICRP IMPACTS BY NUCLIDE (MREM/YR)'//        OVRF 350
     *       2X,'****  IMPACTS ARE NOT NORMALIZED BY NUMBER OF ',       OVRF 360
     *       'DISPOSAL FACILITIES  ****'//                              OVRF 370
     *       2X,'NUC         TREATMENT    OVERFLOW  EVAPORATOR'/)       OVRF 380
      TRTOT=0.0                                                         OVRF 390
      OVRTOT=0.0                                                        OVRF 400
      EVPTOT=0.0                                                        OVRF 410
CBRC    END                                                             OVRF 420
      DO 20 INUC=1,85                                                   OVRF 430
      IF(NUX(INUC).EQ.0)GO TO 20                                        OVRF 440
      A7=1.                                                             OVRF 450
      A1=ILFE*(1.-EXM(AL(INUC)))                                        OVRF 460
      IF(A1.GT.0.)A7=(1.-EXM(AL(INUC)*ILFE))/A1                         OVRF 470
      A5=A4*A7*BAS(ISTR,INUC+7)*FMF(INUC)                               OVRF 480
      A6=A5*EXM(AL(INUC)*GDEL)                                          OVRF 490
      A1=A5*F1N(INUC)*TSC(IR,IQ)/A8                                     OVRF 500
      A2=A6*F2N(INUC)/A8                                                OVRF 510
      A3=A6*FRACT(INUC,2)*POP(IR)                                       OVRF 520
      DO 10 I=1,10                                                      OVRF 530
      BIMP(I,63)=BIMP(I,63)+A1*PDCF(INUC,I,7)                           OVRF 540
      BIMP(I,64)=BIMP(I,64)+A2*PDCF(INUC,I,7)                           OVRF 550
   10 BIMP(I,65)=BIMP(I,65)+A3*PDCF(INUC,I,3)                           OVRF 560
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```
CBRC    PRINT ICRP (I=10) IMPACTS FOR EACH NUCLIDE                      OVRF 570
      TREAT=A1*PDCF(INUC,10,7)                                          OVRF 580
      OVERF=A2*PDCF(INUC,10,7)                                          OVRF 590
      EVAPO=A3*PDCF(INUC,10,3)                                          OVRF 600
      WRITE(10,7010) NUC(INUC),TREAT,OVERF,EVAPO                        OVRF 610
 7010 FORMAT(2X,A6,3X,1P3E12.3)                                         OVRF 620
      TRTOT=TRTOT+TREAT                                                 OVRF 630
      OVRTOT=OVRTOT+OVERF                                               OVRF 640
      EVPTOT=EVPTOT+EVAPO                                               OVRF 650
CBRC    END                                                             OVRF 660
   20 CONTINUE                                                          OVRF 670
CBRC    PRINT TOTAL IMPACTS                                             OVRF 680
      WRITE(10,7015) TRTOT,OVRTOT,EVPTOT                                OVRF 690
 7015 FORMAT(/2X,'TOTAL NON-NORMALIZED OVERFLOW IMPACTS'/11X,1P3E12.3)  OVRF 700
CBRC    END                                                             OVRF 710
   30 CONTINUE                                                          OVRF 720
      RETURN                                                            OVRF 730
      END                                                               OVRF 740
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000086

```
CBRC    ADD SCN TO CALL                                                 GWTR  10
$STORAGE:2                                                              GWTR  20
      SUBROUTINE GWATER(NTYM,TYMD,SCN)                                  GWTR  30
C                                                                       GWTR  40
C*********************************************************************** GWTR  50
C     THIS SUBROUTINE CALCULATES THE IMPACTS RESULTING FROM           *  GWTR  60
C     GROUNDWATER MIGRATION OF RADIOACTIVITY TO THREE BIOTA ACCESS    *  GWTR  70
C     LOCATIONS (INTRUDER-WELL, POPULATION-WELL AND SURFACE WATER).   *  GWTR  80
C*********************************************************************** GWTR  90
C                                                                       GWTR 100
CBRC $LARGE                                                             GWTR 110
$INCLUDE:'IMPCOMM.FOR'                                                  GWTR 120
      DIMENSION TYMD(16),RES(16,3)                                      GWTR 130
CBRC    DIMENSION ARRAYS FOR TIMES AND NUCLIDE-SPECIFIC DOSES           GWTR 140
      CHARACTER SCN(36)*6                                               GWTR 150
      DIMENSION DOSNUC(16),DOSSUM(16,3)                                 GWTR 160
CBRC    END                                                             GWTR 170
CBRC  GDEL=IINS                                                         GWTR 180
CBRC    BEGIN GW TRANSPORT AT END OF FACILITY LIFE                      GWTR 190
      GDEL=0.0                                                          GWTR 200
      NSEC=10                                                           GWTR 210
      PERC=PRC(IR,IQ)*TSC(IR,IQ)                                        GWTR 220
      TVOL=ILFE*VANN(IQ)*PRC(IR,IQ)/(EMP(IQ)*EFF(IQ))                   GWTR 230
CBRC  IF(TVOL.LT.7700.)TVOL=7700.                                       GWTR 240
CBRC    USE LOWER MINIMUM INDIVIDUAL WATER PUMPAGE                      GWTR 250
      IF(TVOL.LT.110.) TVOL=110.                                        GWTR 260
      NPTH=3                                                            GWTR 270
      IF(IR.EQ.3)NPTH=2                                                 GWTR 280
CBRC    PRINT HEADER FOR GWATER OUTPUT ON TAPE10                        GWTR 290
      WRITE(10,7000) (SCN(IT),IT=15,30)                                 GWTR 300
 7000 FORMAT(//2X,'GROUNDWATER ICRP IMPACTS BY NUCLIDE (MREM/YR) AT ',  GWTR 310
     *'EACH TIME'/2X,'****  IMPACTS ARE NOT NORMALIZED BY NUMBER OF ',  GWTR 320
     *       'DISPOSAL FACILITIES  ****'//                              GWTR 330
     *       2X,'FIRST ROW IS INTRUDER WELL'/                           GWTR 340
     *       2X,'SECOND ROW IS POPULATION WELL'/                        GWTR 350
     *       2X,'THIRD ROW IS SURFACE WATER'//                          GWTR 360
     *       16(2X,A6)/)                                                GWTR 370
CBRC    END                                                             GWTR 380
CBRC    EACH STREAM HANDLED SEPARATELY                                  GWTR 390
CBRC  DO 90 ISTR=1,NSTR                                                 GWTR 400
      ISTR=1                                                            GWTR 410
      A9=1.0                                                            GWTR 420
      IF(ISPC(ISTR,2).GT.1)A9=0.1                                       GWTR 430
      I1=NRET(IR)-1                                                     GWTR 440
      TDUM=EMP(IQ)*EFF(IQ)*SEFF(IQ)/(PERC*A9)                           GWTR 450
      IF(I1.LE.0)I1=1                                                   GWTR 460
CBRC    ZERO SUMS                                                       GWTR 470
      CALL ZERO(DOSSUM,48)                                              GWTR 480
      DO 80 INUC=1,85                                                   GWTR 490
      IF(NUX(INUC).EQ.0)GO TO 80                                        GWTR 500
      IF(BAS(ISTR,INUC+7).LT.1.E-14)GO TO 80                            GWTR 510
      TDUR=TDUM/FMF(INUC)                                               GWTR 520
CBRC    PRINT NUCLIDE NAME                                              GWTR 530
      WRITE(10,7010) NUC(INUC)                                          GWTR 540
 7010 FORMAT(2X,A6)                                                     GWTR 550
CBRC    END                                                             GWTR 560
C                                                                       GWTR 570
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      CALL ZERO(RES,3*16)                                               GWTR 580
      DO 30 IPTH=1,3                                                    GWTR 590
      A1=RET(INUC,I1)*TTM(IR,IPTH,IQ)+GDEL                              GWTR 600
      DO 20 ITYM=1,NTYM                                                 GWTR 610
      TYM=TYMD(ITYM)                                                    GWTR 620
      A2=TYMD(ITYM)-TDUR                                                GWTR 630
      DO 10 ISEC=1,10                                                   GWTR 640
      B3=1.0/(A1+RET(INUC,I1)*(ISEC-1)*DTTM(IR,IQ))                     GWTR 650
CBRC  IF(TYM*1.1*B3.LT.1.0) GO TO 20                                    GWTR 660
CBRC    REPLACE DISPERSION CALCULATION WITH SQUARE WAVE                 GWTR 670
      IF(TYM*B3.LT.1.0) GOTO 20                                         GWTR 680
      BRKTHU=1.0/B3                                                     GWTR 690
      IF(TYM.GT.TDUR+BRKTHU) GOTO 20                                    GWTR 700
      A3=1.0                                                            GWTR 710
CBRC  B4=TPC(IR,IPTH,IQ)+(ISEC-1)*DTPC(IR,IQ)                           GWTR 720
CBRC  A3=0.5*ERFS(B3*TYM,B4)                                            GWTR 730
CBRC  IF(A2.GT.0.0)A3=A3-0.5*ERFS(B3*A2,B4)                             GWTR 740
CBRC  IF(A3.LT.0.0)A3=0.0                                               GWTR 750
CBRC    END                                                             GWTR 760
   10 RES(ITYM,IPTH)=RES(ITYM,IPTH)+A3                                  GWTR 770
   20 CONTINUE                                                          GWTR 780
   30 CONTINUE                                                          GWTR 790
C                                                                       GWTR 800
      B1=BAS(ISTR,1)*BAS(ISTR,INUC+7)/TDUR                              GWTR 810
      DO 70 IPTH=1,NPTH                                                 GWTR 820
      K=14+(IPTH-1)*16                                                  GWTR 830
      B2=B1/(QFC(IR,IPTH)*NSEC)                                         GWTR 840
      IF(TVOL.GT.QFC(IR,IPTH))B2=B2*QFC(IR,IPTH)/TVOL                   GWTR 850
      I2=6                                                              GWTR 860
      IF(IPTH.EQ.3)I2=7                                                 GWTR 870
      DO 60 ITYM=1,NTYM                                                 GWTR 880
      A3=EXM(AL(INUC)*TYMD(ITYM))                                       GWTR 890
      DO 50 I=1,10                                                      GWTR 900
      A4=A3*RES(ITYM,IPTH)*B2*PDCF(INUC,I,I2)                           GWTR 910
   50 BIMP(I,K+ITYM)=BIMP(I,K+ITYM)+A4                                  GWTR 920
CBRC    SAVE ONLY ICRP DOSE, I=10                                       GWTR 930
      DOSNUC(ITYM)=A4                                                   GWTR 940
      DOSSUM(ITYM,IPTH)=DOSSUM(ITYM,IPTH)+A4                            GWTR 950
CBRC    END                                                             GWTR 960
   60 CONTINUE                                                          GWTR 970
CBRC    PRINT ICRP DOSE FOR THIS NUCLIDE AT EACH TIME                   GWTR 980
      WRITE(10,7020) (DOSNUC(IT),IT=1,16)                               GWTR 990
 7020 FORMAT(1P16E8.1)                                                  GWTR1000
CBRC    END                                                             GWTR1010
   70 CONTINUE                                                          GWTR1020
   80 CONTINUE                                                          GWTR1030
CBRC    PRINT TOTAL IMPACTS                                             GWTR1040
      WRITE(10,7025) ((DOSSUM(IDS,JDS),IDS=1,16),JDS=1,3)               GWTR1050
 7025 FORMAT(/2X,'TOTAL NON-NORMALIZED GROUNDWATER IMPACTS'             GWTR1060
     *       3(/1P16E8.1))                                              GWTR1070
CBRC    END                                                             GWTR1080
   90 CONTINUE                                                          GWTR1090
      RETURN                                                            GWTR1100
      END                                                               GWTR1110
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000088

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CBRC                                                                    DIVY  10
$STORAGE:2                                                              DIVY  20
C*********************************************************************  DIVY  30
C                                                                       DIVY  40
      SUBROUTINE DIVVY(MODE,N1,N2)                                      DIVY  50
C                                                                       DIVY  60
C*********************************************************************  DIVY  70
C     THIS ROUTINE DIVIDES SELECTED IMPACTS BY EITHER THE NUMBER     *  DIVY  80
C     OF DISPOSAL FACILITIES OR BY THE NUMBER OF PROCESSING          *  DIVY  90
C     FACILITIES (DEPENDING ON THE VALUE OF MODE).                   *  DIVY 100
C*********************************************************************  DIVY 110
C                                                                       DIVY 120
      COMMON/BAST/BAS(2,92),BIMP(10,65),ISPC(2,15),PDCF(85,10,7)        DIVY 130
      IF(MODE.EQ.2)GO TO 20                                             DIVY 140
      IF(ISPC(1,11).EQ.0)WRITE(6,100)                                   DIVY 150
      ADIV=ISPC(1,11)                                                   DIVY 160
      IF(ADIV.EQ.0.) ADIV=1.                                            DIVY 170
      DO 10 I=1,10                                                      DIVY 180
      DO 10 J=N1,N2                                                     DIVY 190
   10 BIMP(I,J)=BIMP(I,J)/ADIV                                          DIVY 200
      RETURN                                                            DIVY 210
   20 IF(ISPC(1,10).EQ.0)WRITE(6,101)                                   DIVY 220
      ADIV=ISPC(1,10)                                                   DIVY 230
      IF(ADIV.EQ.0.) ADIV=1.                                            DIVY 240
      DO 30 I=1,10                                                      DIVY 250
      DO 30 J=N1,N2                                                     DIVY 260
   30 BIMP(I,J)=BIMP(I,J)/ADIV                                          DIVY 270
  100 FORMAT(//2X'**** NUMBER OF DISPOSAL FACILITIES   = 1 ****'//)     DIVY 280
  101 FORMAT(//2X'**** NUMBER OF PROCESSING FACILITIES = 1 ****'//)     DIVY 290
      RETURN                                                            DIVY 300
      END                                                               DIVY 310
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```
CBRC  BLOCK DATA                                                        DIVY 320
CBRC    CHANGE BLOCK DATA SUBPROGRAM TO SUBROUTINE BLOCKD               DIVY 330
CBRC*****************************************************************   DIVY 340
CBRC                                                                    DIVY 350
      SUBROUTINE BLOCKD                                                 DIVY 360
CBRC                                                                    DIVY 370
CBRC*****************************************************************   DIVY 380
CBRC                                                                    DIVY 390
      COMMON/CHYN/NXUC(85),ICH(8,10),LCH(10),ACT(8),BCT(8,2)            DIVY 400
     +      /NUCS/ALFR(595),FRACT(85,3),NUX(85)/UPTK/FK(21)             DIVY 410
      DIMENSION NXUC2(85),ICH2(8,10),LCH2(10),FK2(21),FRACT2(85,3)      DIVY 420
CBRC                                                                    DIVY 430
      DATA NXUC2/27*0,1,0,1,16*0,1,6*0,1,0,3*1,3*0,24*1/                DIVY 440
      DATA ICH2/85,84,78,75,69,63,58,60,83,75,69,63,58,60, 0, 0,        DIVY 450
     +         82,74,68,64,59, 0, 0, 0,81,73,67,62,57,56,54,55,         DIVY 460
     +         80,74,68,64,59, 0, 0, 0,76,79,71,66,61, 0, 0, 0,         DIVY 470
     +         77,70,67,62,57,56,54,55,72,65,60, 0, 0, 0, 0, 0,         DIVY 480
     +         28,30,29, 0, 0, 0, 0, 0,47,48, 0, 0, 0, 0, 0, 0/         DIVY 490
      DATA LCH2/8,6,5,8,5,5,8,3,3,2/                                    DIVY 500
      DATA FK2/8.E-4,.01,.0483,7.65E-4,240.,.0037,.25,1.,1600.,         DIVY 510
     +   190.,50.,95.,.3,50.,60.,370.,6.9,1.,8.5E-9,8000.,16./          DIVY 520
      DATA FRACT2/.9,.75,26*2.5E-3,4*.01,7*2.5E-3,3*.01,43*2.5E-3,      DIVY 530
     +           .9,.75,26*5.0E-3,4*.01,7*5.0E-3,3*.01,43*5.0E-3,       DIVY 540
     +           .9,.75,26*2.5E-3,4*.01,7*2.5E-3,3*.01,43*2.5E-3/       DIVY 550
CBRC +           .9,.75,26*.019,4*.038,7*.019,3*.038,43*.019/           DIVY 560
      DO 10 I=1,85                                                      DIVY 570
      NXUC(I)=NXUC2(I)                                                  DIVY 580
      DO 10 J=1,3                                                       DIVY 590
      FRACT(I,J)=FRACT2(I,J)                                            DIVY 600
   10 CONTINUE                                                          DIVY 610
CBRC                                                                    DIVY 620
      DO 20 I=1,10                                                      DIVY 630
      LCH(I)=LCH2(I)                                                    DIVY 640
      DO 20 J=1,8                                                       DIVY 650
      ICH(J,I)=ICH2(J,I)                                                DIVY 660
   20 CONTINUE                                                          DIVY 670
CBRC                                                                    DIVY 680
      DO 30 I=1,21                                                      DIVY 690
      FK(I)=FK2(I)                                                      DIVY 700
   30 CONTINUE                                                          DIVY 710
CBRC                                                                    DIVY 720
      RETURN                                                            DIVY 730
      END                                                               DIVY 740
C                                                                       DIVY 750
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000030

```
C*********************************************************************  DIVY 760
C                                                                       DIVY 770
      SUBROUTINE PRNTE(ORG,SCN,BI)                                      DIVY 780
C                                                                       DIVY 790
C*********************************************************************  DIVY 800
C     THIS ROUTINE PRINTS OUT MOST OF THE FINAL IMPACT RESULTS       *  DIVY 810
C     TO TAPE6.                                                      *  DIVY 820
C*********************************************************************  DIVY 830
C                                                                       DIVY 840
CBRC $LARGE                                                             DIVY 850
      CHARACTER ORG(10)*9,SCN(36)*6                                     DIVY 860
      DIMENSION BI(10,65)                                               DIVY 870
      WRITE(6,107)                                                      DIVY 880
      WRITE(6,105) ORG                                                  DIVY 890
      WRITE(6,103) (SCN(J),(BI(I,J),I=1,10),J=1,2)                      DIVY 900
      WRITE(6,108)                                                      DIVY 910
      WRITE(6,105) ORG                                                  DIVY 920
      WRITE(6,103) (SCN(J),(BI(I,J),I=1,10),J=3,6)                      DIVY 930
      WRITE(6,109)                                                      DIVY 940
      WRITE(6,105) ORG                                                  DIVY 950
      WRITE(6,103) (SCN(J),(BI(I,J),I=1,10),J=7,14)                     DIVY 960
      WRITE(6,114)                                                      DIVY 970
      WRITE(6,105) ORG                                                  DIVY 980
      WRITE(6,103) (SCN(J-29),(BI(I,J),I=1,10),J=63,65)                 DIVY 990
      WRITE(6,110)                                                      DIVY1000
      WRITE(6,111)                                                      DIVY1010
      WRITE(6,104) ORG                                                  DIVY1020
      WRITE(6,103) (SCN(J),(BI(I,J),I=1,10),J=15,30)                    DIVY1030
      WRITE(6,112)                                                      DIVY1040
      WRITE(6,104) ORG                                                  DIVY1050
      WRITE(6,103) (SCN(J-16),(BI(I,J),I=1,10),J=31,46)                 DIVY1060
      WRITE(6,113)                                                      DIVY1070
      WRITE(6,104) ORG                                                  DIVY1080
      WRITE(6,103) (SCN(J-32),(BI(I,J),I=1,10),J=47,62)                 DIVY1090
C                                                                       DIVY1100
  103 FORMAT(2X,A6,1P,10E9.2)                                           DIVY1110
  104 FORMAT(4X,'TIME',10A9)                                            DIVY1120
  105 FORMAT(4X,'SCN ',10A9)                                            DIVY1130
CBRC 107 FORMAT(/2X'INTRUDER IMPACTS:'/)                                DIVY1140
CBRC 108 FORMAT(/2X'EXPOSED WASTE IMPACTS:'/)                           DIVY1150
CBRC 109 FORMAT(/2X'INCINERATION AND OPERATIONAL IMPACTS:'/)            DIVY1160
CBRC 110 FORMAT(1H1/2X'GROUND WATER IMPACTS:')                          DIVY1170
  107 FORMAT(/2X'INTRUDER IMPACTS (MREM/YR):'/)                         DIVY1180
  108 FORMAT(/2X'EXPOSED WASTE IMPACTS (MREM/YR):'/)                    DIVY1190
  109 FORMAT(/2X'INCINERATION AND OPERATIONAL IMPACTS:',                DIVY1200
     *'   UNITS: IC-IND,IC-MWR,OP-IND,OP-MWR - (MREM/YR)'/              DIVY1210
     *49X,'IC-POP,IC-WOR,OP-POP,OP-WOR - (PERSON-MREM/YR)'/)            DIVY1220
  110 FORMAT(1H1/2X'GROUND WATER IMPACTS (MREM/YR):')                   DIVY1230
  111 FORMAT(/2X'INTRUDER-WELL')                                        DIVY1240
  112 FORMAT(/2X'POPULATION-WELL')                                      DIVY1250
  113 FORMAT(/2X'POPULATION-SURFACE WATER')                             DIVY1260
CBRC 114 FORMAT(/2X'LEACHATE ACCUMULATION IMPACTS:'/)                   DIVY1270
  114 FORMAT(/2X'LEACHATE ACCUMULATION IMPACTS (MREM/YR):'/)            DIVY1280
      RETURN                                                            DIVY1290
      END                                                               DIVY1300
C                                                                       DIVY1310
```

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CBRC                                                                    CHNS  10
$STORAGE:2                                                              CHNS  20
      SUBROUTINE CHNS(INUC,GDEL,IEN,IBG,NCH)                            CHNS  30
C                                                                       CHNS  40
C*********************************************************************  CHNS  50
C     THIS ROUTINE IS IDENTICAL IN LOGIC WITH THE ACTDR SUBROUTINE    *  CHNS  60
C     OF THE MILDOS CODE.  FIRST, THE CHAIN MEMBERS ARE DETERMINED,   *  CHNS  70
C     THEN THE ACTDR CALCULATIONS ARE APPLIED.  HOWEVER, HERE, DUE    *  CHNS  80
C     TO SUBSTRACTIONS BETWEEN A LARGE AND A SMALL NUMBER, DOUBLE     *  CHNS  90
C     PRECISION IS USED TO INCREASE THE ACCURACY OF THE RESULTS.      *  CHNS 100
C*********************************************************************  CHNS 110
C                                                                       CHNS 120
CBRC $LARGE                                                             CHNS 130
      COMMON/CHYN/NXUC(85),ICH(8,10),LCH(10),ACT(8),BCT(8,2)            CHNS 140
     +      /NUCS/AL(85),FMF(85),RET(85,5),FRACT(85,3),NUX(85)          CHNS 150
      REAL*8 Y,Z,DACT(8),HLM(8),EHLM(8)                                 CHNS 160
      CALL ZERO(ACT,8)                                                  CHNS 170
      IF(NXUC(INUC).NE.0)GO TO 12                                       CHNS 180
   10 ACT(1)=EXM(AL(INUC)*GDEL)                                         CHNS 190
      RETURN                                                            CHNS 200
   12 DO 16 NCH=1,10                                                    CHNS 210
      IEN=LCH(NCH)                                                      CHNS 220
      DO 14 IBG=1,IEN                                                   CHNS 230
      IF(INUC.EQ.ICH(IBG,NCH))GO TO 18                                  CHNS 240
   14 CONTINUE                                                          CHNS 250
   16 CONTINUE                                                          CHNS 260
      STOP 'CANT FIND NUCLIDE IN CHAINS'                                CHNS 270
   18 IF(IBG.EQ.IEN)GO TO 10                                            CHNS 280
      IEND=IEN-IBG+1                                                    CHNS 290
      DO 20 I=1,IEND                                                    CHNS 300
      J=ICH(IBG+I-1,NCH)                                                CHNS 310
      HLM(I)=AL(J)                                                      CHNS 320
      Y=HLM(I)*GDEL                                                     CHNS 330
      Z=0.                                                              CHNS 340
      IF(Y.LT.85.)Z=DEXP(-Y)                                            CHNS 350
   20 EHLM(I)=Z                                                         CHNS 360
      DACT(1)=EHLM(1)                                                   CHNS 370
      DO 60 I=2,IEND                                                    CHNS 380
      Y=1.0                                                             CHNS 390
      DO 30 J=2,I                                                       CHNS 400
   30 Y=Y*HLM(J)                                                        CHNS 410
      DACT(I)=0.                                                        CHNS 420
      DO 50 K=1,I                                                       CHNS 430
      Z=EHLM(K)                                                         CHNS 440
      DO 40 J=1,I                                                       CHNS 450
      IF(K.NE.J)Z=Z/(HLM(J)-HLM(K))                                     CHNS 460
   40 CONTINUE                                                          CHNS 470
      DACT(I)=DACT(I)+Z                                                 CHNS 480
   50 CONTINUE                                                          CHNS 490
      DACT(I)=DACT(I)*Y                                                 CHNS 500
      IF(DACT(I).LT.0.)DACT(I)=0.                                       CHNS 510
   60 CONTINUE                                                          CHNS 520
      DO 70 I=1,IEND                                                    CHNS 530
   70 ACT(I)=DACT(I)                                                    CHNS 540
      RETURN                                                            CHNS 550
      END                                                               CHNS 560
```


000092

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CBRC                                                                    CALI  10
$STORAGE:2                                                              CALI  20
      SUBROUTINE CALI(INUC,IP,C1,C2,C3,C4,IEN,IBG,NCH)                  CALI  30
C                                                                       CALI  40
C***********************************************************************CALI  50
C     THIS ROUTINE OBTAINS THE C1,C2,C3,C4 COEFFICIENTS USED IN      *  CALI  60
C     THE INTRUDER IMPACT CALCULATIONS.  IF INUC IS NOT A MEMBER     *  CALI  70
C     OF A CHAIN, THEN THE SECTION BEFORE STATEMENT 15 IS USED.      *  CALI  80
C     OTHERWISE THE SECTION AFTER STATEMENT 15 IS USED.              *  CALI  90
C***********************************************************************CALI 100
C                                                                       CALI 110
CBRC $LARGE                                                             CALI 120
      COMMON/BAST/BASCOM(834),ISPC(2,15),PDCF(85,10,7)                  CALI 130
     +      /CHYN/NXUC(85),ICH(8,10),LCH(10),ACT(8),BCT(8,2)           CALI 140
     +      /NUCS/AL(85),FMF(85),RET(85,5),FRACT(85,3),NUX(85)         CALI 150
      IF(NXUC(INUC).NE.0)GO TO 15                                       CALI 160
   10 A1=ACT(1)                                                         CALI 170
      C1=A1*PDCF(INUC,IP,5)                                             CALI 180
      C2=A1*PDCF(INUC,IP,2)                                             CALI 190
      C3=A1*PDCF(INUC,IP,3)                                             CALI 200
      C4=A1*PDCF(INUC,IP,4)*FMF(INUC)                                   CALI 210
      RETURN                                                            CALI 220
   15 IEND=IEN-IBG+1                                                    CALI 230
      C1=0.                                                             CALI 240
      C2=0.                                                             CALI 250
      C3=0.                                                             CALI 260
      C4=0.                                                             CALI 270
      DO 20 I=1,IEND                                                    CALI 280
      NN=ICH(IBG+I-1,NCH)                                               CALI 290
      C1=C1+ACT(I)*PDCF(NN,IP,5)                                        CALI 300
      C2=C2+ACT(I)*PDCF(NN,IP,2)                                        CALI 310
      C3=C3+ACT(I)*PDCF(NN,IP,3)                                        CALI 320
      C4=C4+ACT(I)*PDCF(NN,IP,4)*FMF(NN)                                CALI 330
   20 CONTINUE                                                          CALI 340
      RETURN                                                            CALI 350
      END                                                               CALI 360
```

```
CBRC                                                                    CALE  10
$STORAGE:2                                                              CALE  20
      SUBROUTINE CALE(INUC,IP,C1,C2,C3,C4,IEN,IBG,NCH)                  CALE  30
C                                                                       CALE  40
C*********************************************************************  CALE  50
C     THIS ROUTINE PERFORMS THE SAME FUNCTION AS SUBROUTINE "CALI",  *  CALE  60
C     ONLY NOW FOR SUBROUTINE "EXPWAS" RATHER THAN "INTIMP".  CHAIN  *  CALE  70
C     EFFECTS FOR INTRUDER- AND EROSION-INITIATED EXPOSED WASTE      *  CALE  80
C     SCENARIOS ARE CALCULATED IN THIS ROUTINE.                      *  CALE  90
C*********************************************************************  CALE 100
C                                                                       CALE 110
CBRC $LARGE                                                             CALE 120
      COMMON/BAST/BASCOM(834),ISPC(2,15),PDCF(85,10,7)                  CALE 130
     *      /CHYN/NXUC(85),ICH(8,10),LCH(10),ACT(8),BCT(8,2)            CALE 140
      IF(NXUC(INUC).NE.0)GO TO 15                                       CALE 150
      C1=BCT(1,1)*PDCF(INUC,IP,3)                                       CALE 160
      C2=BCT(1,2)*PDCF(INUC,IP,3)                                       CALE 170
      C3=BCT(1,1)*PDCF(INUC,IP,7)                                       CALE 180
      C4=BCT(1,2)*PDCF(INUC,IP,7)                                       CALE 190
      RETURN                                                            CALE 200
   15 IEND=IEN-IBG+1                                                    CALE 210
      C1=0.                                                             CALE 220
      C2=0.                                                             CALE 230
      C3=0.                                                             CALE 240
      C4=0.                                                             CALE 250
      DO 20 I=1,IEND                                                    CALE 260
      NN=ICH(IBG+I-1,NCH)                                               CALE 270
      C1=C1+BCT(I,1)*PDCF(NN,IP,3)                                      CALE 280
      C2=C2+BCT(I,2)*PDCF(NN,IP,3)                                      CALE 290
      C3=C3+BCT(I,1)*PDCF(NN,IP,7)                                      CALE 300
   20 C4=C4+BCT(I,2)*PDCF(NN,IP,7)                                      CALE 310
      RETURN                                                            CALE 320
      END                                                               CALE 330
```


000094

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CBRC                                                                    UTIL  10
$STORAGE:2                                                              UTIL  20
      SUBROUTINE ZERO(A,N)                                              UTIL  30
      DIMENSION A(N)                                                    UTIL  40
      DO 10 I=1,N                                                       UTIL  50
   10 A(I)=0.                                                           UTIL  60
      RETURN                                                            UTIL  70
      END                                                               UTIL  80
C                                                                       UTIL  90
CBRC    SUBPROGRAMS FOR GROUNDWATER DISPERSION CALCULATIONS NOT USED    UTIL 100
CBRC  FUNCTION ERFS(A1,A2)                                              UTIL 110
CBRC  A3=0.5*SQRT(A2/A1)                                                UTIL 120
CBRC  A4=A3*(1.-A1)                                                     UTIL 130
CBRC  A5=A3*(1.+A1)                                                     UTIL 140
CBRC  IF(A4.GT.0)GO TO 10                                               UTIL 150
CBRC  ERFS=2.+EXM(A4*A4)*(POLY(A5)-POLY(-A4))                           UTIL 160
CBRC  RETURN                                                            UTIL 170
CBRC 10 ERFS=EXM(A4*A4)*(POLY(A4)+POLY(A5))                             UTIL 180
CBRC  RETURN                                                            UTIL 190
CBRC  END                                                               UTIL 200
C                                                                       UTIL 210
CBRC  FUNCTION POLY(X1)                                                 UTIL 220
CBRC  DATA A1,A2,A3,A4,A5,P/.254829592,-.284496736,1.421413741,         UTIL 230
CBRC *                      -1.453152027,1.061405429,.3275911/          UTIL 240
CBRC  T1=1./(1.+P*X1)                                                   UTIL 250
CBRC  POLY=T1*(A1+T1*(A2+T1*(A3+T1*(A4+T1*A5))))                        UTIL 260
CBRC  RETURN                                                            UTIL 270
CBRC  END                                                               UTIL 280
C                                                                       UTIL 290
      FUNCTION EXM(A1)                                                  UTIL 300
      A2=0.0                                                            UTIL 310
      IF(A1.LT.85.)A2=EXP(-A1)                                          UTIL 320
      EXM=A2                                                            UTIL 330
      RETURN                                                            UTIL 340
      END                                                               UTIL 350
C                                                                       UTIL 360
      FUNCTION COFF(X,R)                                                UTIL 370
      DATA U/.0097/                                                     UTIL 380
      A1=E1(U*X)                                                        UTIL 390
      R1=SQRT(R*R+X*X)                                                  UTIL 400
      COFF=(A1-E1(U*R1))/A1                                             UTIL 410
      RETURN                                                            UTIL 420
      END                                                               UTIL 430
C                                                                       UTIL 440
      FUNCTION DOFF(X)                                                  UTIL 450
      DATA U/.0097/                                                     UTIL 460
      A1=1.+.95*U+.35*U*U                                               UTIL 470
      A2=EXM(U)*(1.-U*EXP(U)*E1(U))                                     UTIL 480
      Y=U*X                                                             UTIL 490
      DOFF=(1.+.95*Y+.35*Y*Y)*EXM(Y)*(1.-Y*EXP(Y)*E1(Y))/(A1*A2)        UTIL 500
      RETURN                                                            UTIL 510
      END                                                               UTIL 520
C                                                                       UTIL 530
```

```
      FUNCTION XOQFC(H,R,V,IS)                                          UTIL 540
      DIMENSION A(6),B(6),C(6)                                          UTIL 550
      DATA A/.2,.12,.08,.06,.03,.016/,B/2*0.,.0002,.0015,2*.0003/,      UTIL 560
     *     C/2*0.,2*.5,2*1./                                            UTIL 570
      SIGZ=A(IS)*R/((1.+B(IS)*R)**C(IS))                                UTIL 580
      XOQFC=2.032*EXP(-0.5*(H/SIGZ)*(H/SIGZ))/(V*R*SIGZ)                UTIL 590
      RETURN                                                            UTIL 600
      END                                                               UTIL 610
C                                                                       UTIL 620
      FUNCTION E1(X)                                                    UTIL 630
      DIMENSION A(5),AT(4),BT(4)                                        UTIL 640
      DATA A0,A/-.57721566,.99999193,-.24991055,.05519968,              UTIL 650
     +          -.00976004,.00107857/                                   UTIL 660
      DATA AT/8.5733287401,18.0590169730,8.6347608925,0.2677737343/     UTIL 670
      DATA BT/9.5733223454,25.6329561486,21.0996530827,3.9584969228/    UTIL 680
      IF(X.GT.0..AND.X.LE.1.) GO TO 10                                  UTIL 690
      IF(X.GT.1.) GO TO 30                                              UTIL 700
      STOP 'E1 ARGUMENT NEGATIVE'                                       UTIL 710
   10 E=0.                                                              UTIL 720
      XP=1.                                                             UTIL 730
      DO 20 I=1,5                                                       UTIL 740
      XP=XP*X                                                           UTIL 750
   20 E=E+A(I)*XP                                                       UTIL 760
      E1=(E+A0)-ALOG(X)                                                 UTIL 770
      RETURN                                                            UTIL 780
   30 ET=0.                                                             UTIL 790
      EB=0.                                                             UTIL 800
      XP=1.                                                             UTIL 810
      DO 40 I=1,4                                                       UTIL 820
      XP=XP*X                                                           UTIL 830
      IF(I.EQ.4) GO TO 50                                               UTIL 840
      J=4-I                                                             UTIL 850
      ET=ET+AT(J)*XP                                                    UTIL 860
   40 EB=EB+BT(J)*XP                                                    UTIL 870
   50 E=(XP+ET+AT(4))/(XP+EB+BT(4))                                     UTIL 880
      E1=E/(X*EXP(X))                                                   UTIL 890
      RETURN                                                            UTIL 900
      END                                                               UTIL 910
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000096

APPENDIX B

TAPE1.DAT - NUCLIDE SPECIFIC DATA

H-3	1*	.00E+00	4.80E+00	1.20E-02	1.40E-02	9.00E-01	9.00E-01	5.64E-02	1.15E+00	1.00E+00	1.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	*	8.36E-08	1.08E-07	1.43E-07	8.30E-08	8.56E-08	8.28E-08	8.26E-08	6.56E-08	8.28E-08	8.98E-08		
		1.25E-07	1.25E-07	1.33E-07	1.25E-07	1.29E-07	1.24E-07	1.24E-07	9.85E-08	1.24E-07	1.26E-07		
C-14	1*	.00E+00	5.50E+00	3.10E-02	1.50E-02	4.60E+03	9.10E+03	1.21E-04	0.103	1.0	1.00E+01		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	*	8.49E-07	1.21E-06	1.46E-06	1.92E-06	1.06E-06	1.23E-06	3.38E-06	7.05E-06	8.89E-07	1.54E-06		
		6.18E-09	7.35E-09	7.22E-09	1.41E-08	7.92E-09	8.88E-09	2.42E-08	5.08E-08	6.48E-09	1.09E-08		
NA-22	1D	1.34E-05	4.60E-03	8.30E-02	3.50E-02	1.00E+02	2.00E+02	2.65E-01	1.62E-04	1.0	7.20E+02		
		1.85E-04	1.70E-04	1.68E-04	1.97E-04	1.82E-04	1.73E-04	1.88E-04	2.06E-04	2.30E-04	1.90E-04		
		9.84E-03	9.10E-03	8.99E-03	1.05E-02	9.73E-03	9.25E-03	9.99E-03	1.10E-02	1.23E-02	1.01E-02		
	D	2.57E-05	1.04E-05	1.35E-05	1.36E-05	1.49E-05	1.40E-05	1.95E-05	2.50E-05	1.21E-05	1.86E-05		
		9.43E-06	6.22E-06	7.53E-06	9.16E-06	9.91E-06	9.45E-06	1.30E-05	1.67E-05	8.14E-06	1.14E-05		
P-32	2W	.00E+00	1.10E+00	5.70E-02	1.60E-02	1.00E+05	2.00E+04	1.77E+01	1.26E-03	1.0	3.60E+02	.00E+00	.00E+00
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	D	4.06E-06	3.00E-06	2.45E-05	4.70E-06	4.01E-06	4.02E-06	1.48E-05	2.70E-05	4.02E-06	7.51E-06		
		7.63E-06	5.01E-07	3.91E-06	3.56E-06	3.00E-06	3.01E-06	1.11E-05	2.02E-05	3.01E-06	5.21E-06		
	W	4.06E-06	3.00E-06	2.45E-05	4.70E-06	4.01E-06	4.02E-06	1.48E-05	2.70E-05	4.02E-06	7.51E-06		
		9.87E-05	1.28E-06	1.04E-05	3.87E-06	2.11E-06	2.11E-06	7.76E-06	1.42E-05	2.11E-06	1.56E-05		
P-33	2W	.00E+00	1.10E+00	5.70E-02	1.60E-02	1.00E+05	2.00E+04	1.04E+01	1.26E-03	1.0	3.60E+02	.00E+00	.00E+00
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	D	3.47E-07	6.73E-07	3.13E-06	1.11E-06	3.47E-07	3.47E-07	1.85E-06	4.88E-06	3.47E-07	9.18E-07		
		1.10E-06	3.08E-07	6.85E-07	7.95E-07	2.58E-07	2.58E-07	1.37E-06	3.64E-06	2.58E-07	6.33E-07		
	W	3.47E-07	6.73E-07	3.13E-06	1.11E-06	3.47E-07	3.47E-07	1.85E-06	4.88E-06	3.47E-07	9.18E-07		
		1.56E-05	3.29E-07	1.39E-06	3.27E-06	1.87E-07	1.87E-07	9.95E-07	2.65E-06	1.87E-07	2.32E-06		
S-35	2W	.00E+00	5.90E-01	1.00E-01	1.60E-02	7.50E+02	1.00E+02	2.88E+00	1.20E-02	1.0	4.20E+01	.00E+00	.00E+00
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	D	2.82E-07	4.92E-07	2.11E-06	4.47E-07	2.82E-07	2.82E-07	7.63E-11	2.82E-07	2.82E-07	4.48E-07		
		7.55E-07	2.43E-07	4.92E-07	3.37E-07	2.11E-07	2.11E-07	2.11E-07	2.11E-07	2.11E-07	3.02E-07		
	W	2.82E-07	4.92E-07	2.11E-06	4.47E-07	2.82E-07	2.82E-07	7.63E-11	2.82E-07	2.82E-07	4.48E-07		
		1.88E-05	2.66E-07	1.03E-06	3.52E-06	1.68E-07	1.68E-07	1.68E-07	1.68E-07	1.68E-07	2.48E-06		
CL-36	2W	.00E+00	5.00E+00	8.00E-02	1.70E-02	5.00E+01	1.00E+02	2.25E-06	1.15E-01	1.0	5.00E+00	.00E+00	.00E+00
		2.65E-13	6.85E-14	1.38E-13	3.36E-12	4.03E-16	3.26E-15	8.70E-14	4.29E-13	1.68E-13	1.62E-12		
		2.41E-12	6.22E-13	1.25E-12	3.05E-11	3.66E-15	2.96E-14	7.92E-13	3.92E-12	1.52E-12	1.47E-11		
	D	2.96E-06	4.11E-06	2.96E-06	3.06E-06	2.96E-06	2.96E-06	2.96E-06	2.96E-06	2.96E-06	3.03E-06		
		4.92E-06	2.04E-06	1.86E-06	2.41E-06	1.86E-06	1.86E-06	1.86E-06	1.86E-06	1.86E-06	2.24E-06		
	W	2.96E-06	4.11E-06	2.96E-06	3.06E-06	2.96E-06	2.96E-06	2.96E-06	2.96E-06	2.96E-06	3.03E-06		
		1.69E-04	2.46E-06	1.86E-06	3.12E-05	1.86E-06	1.86E-06	1.86E-06	1.86E-06	1.86E-06	2.19E-05		
CA-45	1W	6.42E-15	3.60E-02	7.20E-04	1.10E-02	4.00E+01	3.30E+02	1.53E+00	9.86E-03	1.0	7.30E+01	3.60E-10	1.20E-02
		2.08E-15	7.10E-16	1.14E-15	1.81E-14	2.86E-17	7.88E-17	6.96E-16	3.39E-15	2.02E-15	8.95E-15		
		7.92E-15	2.71E-15	4.37E-15	6.88E-14	1.09E-16	3.00E-16	2.65E-15	1.29E-14	7.70E-15	3.40E-14		
	W	1.98E-07	5.29E-07	1.04E-05	4.28E-06	1.98E-07	1.98E-07	1.28E-05	1.94E-05	1.98E-07	3.16E-06		
		3.58E-05	3.26E-07	5.11E-06	9.56E-06	1.66E-07	1.66E-06	1.08E-05	1.62E-05	1.66E-07	6.62E-06		
SC-46	1Y	1.24E-05	1.10E-03	1.60E-02	5.00E-06	2.00E+00	1.00E+03	3.01E+00	1.11E-04	9.00E+00	7.30E+01	2.01E+00	1.01E+00
		1.72E-04	1.59E-04	1.57E-04	1.83E-04	1.70E-04	1.61E-04	1.74E-04	1.86E-04	2.16E-04	1.76E-04		
		9.29E-03	8.62E-03	8.51E-03	9.88E-03	9.21E-03	8.73E-03	9.40E-03	1.01E-02	1.17E-02	9.55E-03		
	Y	1.80E-07	2.53E-06	3.85E-05	5.73E-06	1.05E-06	7.47E-07	1.49E-06	5.14E-07	2.85E-08	6.40E-06		
		1.71E-04	1.23E-05	1.95E-05	3.90E-05	6.66E-06	1.56E-05	8.18E-06	6.22E-06	7.47E-06	2.96E-05		
CR-51	3Y	1.85E-07	1.30E-02	9.20E-03	1.60E-03	2.00E+02	2.00E+03	9.10E+00	1.26E-03	10.0	3.60E+02	3.26E-02	3.20E-01
		2.90E-06	2.65E-06	2.60E-06	3.11E-06	2.78E-06	2.68E-06	2.99E-06	3.70E-06	3.68E-06	3.11E-06		
		1.35E-04	1.23E-04	1.21E-04	1.45E-04	1.29E-04	1.25E-04	1.39E-04	1.72E-04	1.71E-04	1.45E-04		
	D	1.62E-08	6.70E-08	9.18E-07	1.39E-07	3.14E-08	2.59E-08	4.63E-08	2.91E-08	1.37E-08	1.32E-07		
		1.41E-07	9.10E-08	2.19E-07	1.12E-07	8.18E-08	8.03E-08	9.92E-08	1.01E-07	6.73E-08	1.09E-07		
	W	1.62E-08	6.70E-08	9.18E-07	1.39E-07	3.14E-08	2.59E-08	4.63E-08	2.91E-08	1.37E-08	1.32E-07		
		1.39E-06	8.70E-08	4.18E-07	3.37E-07	4.96E-08	8.18E-08	6.92E-08	5.55E-08	4.07E-08	2.13E-07		
	Y	1.62E-08	6.70E-08	9.18E-07	1.39E-07	3.14E-08	2.59E-08	4.63E-08	2.91E-08	1.37E-08	1.32E-07		
		1.98E-06	9.47E-08	4.37E-07	4.43E-07	4.74E-08	9.51E-08	6.92E-08	5.14E-08	4.00E-08	2.64E-07		

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MN-54	2W	5.10E-06	1.20E-01	3.90E-04	3.30E-04	4.00E+02	9.00E+04	8.35E-01	1.26E-03	10.0	3.60E+02	8.35E-01	8.35E-01
		7.44E-05	6.89E-05	6.74E-05	7.93E-05	7.33E-05	6.96E-05	7.56E-05	8.19E-05	9.37E-05	7.93E-05		
		3.85E-03	3.57E-03	3.51E-03	4.11E-03	3.81E-03	3.61E-03	3.93E-03	4.26E-03	4.85E-03	4.11E-03		
	D	2.32E-06	1.44E-06	7.99E-06	1.23E-06	1.46E-06	3.68E-06	1.76E-06	1.36E-06	4.64E-07	3.01E-06		
		4.18E-06	3.15E-06	3.98E-06	4.10E-06	5.35E-06	1.70E-05	5.96E-06	5.86E-06	2.30E-06	5.69E-06		
	W	2.32E-06	1.44E-06	7.99E-06	1.23E-06	1.46E-06	3.68E-06	1.76E-06	1.36E-06	4.64E-07	3.01E-06		
		2.47E-05	4.20E-06	4.79E-06	3.66E-06	3.40E-06	9.17E-06	4.03E-06	3.44E-06	2.73E-06	7.16E-06		
FE-55	2Y	.00E+00	4.20E-04	1.90E-02	2.70E-04	1.00E+02	3.20E+03	2.67E-01	1.48E-02	1.0	5.40E+03	.00E+00	.00E+00
		1.26E-09	3.25E-10	6.56E-10	1.59E-08	1.91E-12	1.55E-11	4.15E-10	2.04E-09	7.96E-10	1.59E-08		
		6.52E-09	1.69E-09	3.39E-09	8.26E-08	9.89E-12	8.04E-11	2.14E-09	1.06E-08	4.15E-09	8.26E-08		
	W	7.10E-07	1.84E-08	7.08E-07	3.50E-07	6.44E-07	1.22E-06	6.41E-07	4.37E-07	6.32E-07	7.79E-07		
		3.20E-06	1.04E-08	3.64E-07	6.29E-07	1.09E-06	2.07E-06	1.08E-06	7.40E-07	1.07E-06	1.57E-06		
	Y	7.10E-07	1.84E-08	7.08E-07	3.50E-07	6.44E-07	1.22E-06	6.41E-07	4.37E-07	6.32E-07	7.79E-07		
		2.51E-05	1.28E-08	3.91E-07	6.09E-07	5.05E-07	9.58E-07	5.03E-07	3.43E-07	4.95E-07	3.96E-06		
FE-59	2Y	7.34E-06	4.20E-04	1.90E-02	2.70E-04	1.00E+02	3.20E+03	5.55E+00	1.48E-02	1.0	5.40E+03	1.19E+00	1.14E+00
		9.74E-05	9.00E-05	8.96E-05	1.04E-04	9.70E-05	9.19E-05	9.85E-05	1.05E-04	1.22E-04	1.04E-04		
		5.48E-03	5.07E-03	5.04E-03	5.81E-03	5.44E-03	5.19E-03	5.52E-03	5.89E-03	6.85E-03	5.81E-03		
	W	6.08E-06	3.33E-06	3.02E-05	2.94E-06	4.04E-06	5.65E-06	3.69E-06	3.09E-06	2.47E-06	7.56E-06		
		5.15E-05	5.28E-06	1.56E-05	5.51E-06	6.22E-06	1.00E-05	5.72E-06	5.07E-06	4.74E-06	1.34E-05		
	Y	6.08E-06	3.33E-06	3.02E-05	2.94E-06	4.04E-06	5.65E-06	3.69E-06	3.09E-06	2.47E-06	7.56E-06		
		8.29E-05	5.29E-06	1.50E-05	4.96E-06	4.07E-06	7.32E-06	4.18E-06	3.41E-06	3.58E-06	1.56E-05		
CO-57	2Y	5.61E-07	1.50E-02	9.70E-03	1.80E-03	5.00E+01	2.00E+02	9.37E-01	1.48E-02	1.0	3.60E+03	1.21E-01	1.14E-01
		1.15E-05	1.03E-05	9.93E-06	1.27E-05	1.05E-05	1.04E-05	1.00E-05	1.85E-05	1.60E-05	1.27E-05		
		5.11E-04	4.59E-04	4.44E-04	5.63E-04	4.70E-04	4.63E-04	4.48E-04	8.30E-04	7.19E-04	5.63E-04		
	W	2.98E-07	2.85E-07	4.56E-06	1.84E-07	2.12E-07	2.53E-07	3.57E-07	1.78E-07	1.10E-07	7.78E-07		
		1.49E-05	7.08E-07	2.45E-06	8.04E-07	6.26E-07	1.17E-06	1.03E-06	7.24E-07	5.26E-07	2.80E-06		
	Y	2.98E-07	2.85E-07	4.56E-06	1.84E-07	2.12E-07	2.53E-07	3.57E-07	1.78E-07	1.10E-07	7.78E-07		
		6.17E-05	2.01E-06	2.45E-06	2.25E-06	9.86E-07	2.62E-06	2.20E-06	1.67E-06	1.03E-06	9.60E-06		
CO-58	2Y	5.01E-06	1.50E-02	9.70E-03	1.80E-03	5.00E+01	2.00E+02	3.55E+00	1.48E-02	1.0	3.60E+03	8.21E-01	8.16E-01
		8.70E-05	8.04E-05	7.89E-05	9.26E-05	8.56E-05	8.15E-05	8.85E-05	9.70E-05	1.09E-04	9.26E-05		
		4.44E-03	4.11E-03	4.04E-03	4.74E-03	4.37E-03	4.19E-03	4.52E-03	4.96E-03	5.59E-03	4.74E-03		
	W	1.05E-06	1.35E-06	1.45E-05	7.65E-07	7.74E-07	7.73E-07	9.67E-07	4.58E-07	2.20E-07	3.10E-06		
		2.96E-05	3.22E-06	7.38E-06	2.65E-06	2.12E-06	3.99E-06	2.39E-06	1.78E-06	2.04E-06	6.77E-06		
	Y	1.05E-06	1.35E-06	1.45E-05	7.65E-07	7.74E-07	7.73E-07	9.67E-07	4.58E-07	2.20E-07	3.10E-06		
		5.92E-05	5.16E-06	7.40E-06	4.17E-06	2.81E-06	6.04E-06	3.44E-06	2.58E-06	3.24E-06	1.15E-05		
CO-60	2Y	1.55E-05	1.50E-02	9.70E-03	1.80E-03	5.00E+01	2.00E+02	1.32E-01	1.48E-02	1.0	3.60E+03	2.51E+00	1.25E+00
		2.02E-04	1.87E-04	1.86E-04	2.14E-04	2.01E-04	1.91E-04	2.04E-04	2.16E-04	2.52E-04	2.14E-04		
		1.15E-02	1.07E-02	1.06E-02	1.23E-02	1.15E-02	1.09E-02	1.16E-02	1.23E-02	1.44E-02	1.23E-02		
	W	8.62E-06	5.30E-06	4.02E-05	4.37E-06	5.67E-06	6.83E-06	5.42E-06	3.99E-06	3.10E-07	1.13E-05		
		1.30E-04	1.82E-05	2.78E-05	1.71E-05	1.87E-05	2.90E-05	1.75E-05	1.47E-05	1.44E-05	3.59E-05		
	Y	8.62E-06	5.30E-06	4.02E-05	4.37E-06	5.67E-06	6.83E-06	5.42E-06	3.99E-06	3.10E-07	1.13E-05		
		1.30E-03	1.00E-04	2.85E-05	8.20E-05	5.85E-05	1.20E-04	6.45E-05	5.08E-05	6.01E-05	2.41E-04		
NI-59	2W	.00E+00	2.10E-02	2.00E-03	1.00E-03	1.00E+02	1.00E+02	8.66E-06	1.48E-02	1.0	3.60E+03	.00E+00	.00E+00
		2.37E-09	6.11E-10	1.23E-09	3.00E-08	3.59E-12	2.91E-11	7.78E-10	3.85E-09	1.50E-09	3.00E-08		
		1.10E-08	2.83E-09	5.70E-09	1.39E-07	1.66E-11	1.35E-10	3.60E-09	1.78E-08	6.93E-09	1.39E-07		
	D	1.30E-07	1.52E-07	9.99E-07	2.10E-07	1.32E-07	1.32E-07	1.35E-07	1.34E-07	1.44E-07	2.10E-07		
		1.33E-06	1.27E-06	1.42E-06	1.32E-06	1.28E-06	1.28E-06	1.31E-06	1.30E-06	1.39E-06	1.32E-06		
	W	1.30E-07	1.52E-07	9.99E-07	2.10E-07	1.32E-07	1.32E-07	1.35E-07	1.34E-07	1.44E-07	2.10E-07		
		4.44E-06	3.92E-07	8.29E-07	9.19E-07	3.85E-07	3.85E-07	3.92E-07	3.89E-07	4.22E-07	9.19E-07		
NI-63	2W	.00E+00	2.10E-02	2.00E-03	1.00E-03	1.00E+02	1.00E+02	7.53E-03	1.48E-02	1.0	3.60E+03	.00E+00	.00E+00
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	D	3.15E-07	3.89E-07	3.40E-06	5.77E-07	3.15E-07	3.15E-07	3.15E-07	3.15E-07	3.15E-07	5.77E-07		
		3.23E-06	3.05E-06	3.52E-06	3.10E-06	3.05E-06	3.04E-06	3.04E-06	3.04E-06	3.04E-06	3.10E-06		
	W	3.15E-07	3.89E-07	3.40E-06	5.77E-07	3.15E-07	3.15E-07	3.15E-07	3.15E-07	3.15E-07	5.77E-07		
		1.14E-05	9.51E-07	2.49E-06	2.30E-06	9.18E-07	9.14E-07	9.14E-07	9.14E-07	9.14E-07	2.30E-06		
ZN-65	3Y	3.50E-06	1.10E-01	1.20E-01	1.00E-02	2.00E+03	1.00E+04	1.03E+00	1.48E-02	1.0	7.30E+01	5.66E-01	1.12E+00
		4.85E-05	4.48E-05	4.44E-05	5.15E-05	4.81E-05	4.56E-05	4.89E-05	5.26E-05	6.11E-05	5.15E-05		
		2.68E-03	2.48E-03	2.46E-03	2.85E-03	2.66E-03	2.53E-03	2.71E-03	2.90E-03	3.37E-03	2.85E-03		
	D	2.84E-05	1.05E-05	1.51E-05	1.26E-05	1.69E-05	1.67E-05	1.73E-05	1.58E-05	1.12E-05	1.93E-05		
		1.18E-05	1.14E-05	1.39E-05	1.40E-05	1.87E-05	1.86E-05	1.92E-05	1.77E-05	1.25E-05	1.88E-05		
	W	2.84E-05	1.05E-05	1.51E-05	1.26E-05	1.69E-05	1.67E-05	1.73E-05	1.58E-05	1.12E-05	1.93E-05		
		2.53E-05	9.32E-06	1.03E-05	1.05E-05	1.31E-05	1.42E-05	1.36E-05	1.23E-05	9.32E-06	1.56E-05		
	Y	2.84E-05	1.05E-05	1.51E-05	1.26E-05	1.69E-05	1.67E-05	1.73E-05	1.58E-04	1.12E-05	1.93E-05		
		7.65E-05	1.30E-05	8.41E-06	1.24E-05	1.29E-05	1.78E-05	1.39E-05	1.21E-05	1.09E-05	2.27E-05		

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SE-75	2W	1.99E-06	1.30E+00	1.50E-02	4.00E-03	1.70E+02	1.70E+02	2.10E+00	1.20E-02	9.00E+00	4.20E+01	3.74E-01	2.17E-01
		3.59E-05	3.26E-05	3.20E-05	3.89E-05	3.40E-05	3.30E-05	3.55E-05	5.00E-05	4.70E-05	3.74E-05		
		1.65E-03	1.50E-03	1.47E-03	1.78E-03	1.57E-03	1.52E-03	1.63E-03	2.29E-03	2.16E-03	1.71E-03		
	D	6.14E-06	8.07E-06	7.29E-06	1.02E-05	2.65E-05	2.12E-05	7.66E-06	6.29E-06	4.18E-06	9.62E-06		
		5.03E-06	5.88E-06	4.66E-06	7.62E-06	1.98E-05	1.59E-05	5.70E-06	4.70E-06	3.15E-06	7.22E-06		
	W	6.14E-06	8.07E-06	7.29E-06	1.02E-05	2.65E-05	2.12E-05	7.66E-06	6.29E-06	4.18E-06	9.62E-06		
		2.01E-05	5.96E-06	4.29E-06	9.68E-06	1.67E-05	1.43E-05	5.55E-06	4.55E-06	3.10E-06	8.47E-06		
RB-86	1D	5.84E-07	1.30E-01	1.10E-02	1.20E-02	2.00E+03	1.00E+03	1.36E+01	1.62E-04	1.0	7.20E+02	9.47E-02	1.08E+00
		7.96E-06	7.36E-06	7.29E-06	8.47E-06	7.92E-06	7.51E-06	8.07E-06	8.62E-06	1.00E-05	8.18E-06		
		4.37E-04	4.07E-04	4.00E-04	4.66E-04	4.37E-04	4.11E-04	4.44E-04	4.74E-04	5.51E-04	4.51E-04		
	D	1.74E-05	3.29E-06	6.46E-06	1.00E-05	1.69E-05	1.69E-05	1.68E-05	1.67E-05	1.67E-05	1.71E-05		
		7.68E-06	7.33E-07	1.26E-06	6.69E-06	1.11E-05	1.11E-05	1.10E-05	1.10E-05	1.10E-05	1.09E-05		
SR-85	2Y	3.10E-06	7.50E-02	5.90E-04	1.40E-03	3.00E+01	1.00E+02	3.96E+00	9.86E-03	1.0	7.30E+01	5.22E-01	5.19E-01
		4.59E-05	4.22E-05	4.11E-05	4.96E-05	4.48E-05	4.29E-05	4.70E-05	5.37E-05	5.70E-05	4.74E-05		
		2.23E-03	2.05E-03	2.00E-03	2.39E-03	2.17E-03	2.08E-03	2.28E-03	2.60E-03	2.77E-03	2.30E-03		
	D	7.62E-07	1.14E-06	5.55E-06	1.86E-06	9.40E-07	8.03E-07	2.21E-06	2.24E-06	7.59E-07	1.98E-06		
		1.72E-06	1.21E-06	2.15E-06	2.01E-06	1.36E-06	1.23E-06	3.40E-06	3.77E-06	1.34E-06	1.92E-06		
	Y	6.18E-08	6.44E-07	6.73E-06	1.23E-06	2.86E-07	2.05E-07	4.81E-07	2.11E-07	3.01E-08	1.49E-06		
		2.65E-05	2.44E-06	3.37E-06	6.38E-06	1.36E-06	2.85E-06	1.72E-06	1.30E-06	1.42E-06	5.03E-06		
SR-89	2Y	5.32E-11	7.50E-02	5.90E-04	1.40E-03	3.00E+01	1.00E+02	4.81E+00	9.86E-03	1.0	7.30E+01	8.67E-06	9.13E-01
		1.20E-08	1.11E-08	1.10E-08	1.28E-08	1.19E-08	1.13E-08	1.22E-08	1.31E-08	1.51E-08	1.28E-08		
		6.33E-07	5.89E-07	5.78E-07	6.74E-07	6.26E-07	5.96E-07	6.44E-07	6.96E-07	8.00E-07	6.74E-07		
	D	8.55E-07	2.49E-06	8.67E-05	1.80E-06	8.55E-07	8.55E-07	5.23E-06	1.08E-05	8.55E-07	8.87E-06		
		6.55E-06	3.95E-07	1.38E-05	3.89E-06	2.18E-06	2.18E-06	1.33E-05	2.74E-05	2.18E-06	5.73E-06		
	Y	4.28E-08	2.49E-06	1.10E-04	4.87E-07	4.28E-08	4.28E-08	2.61E-07	5.38E-07	4.27E-08	9.17E-06		
		3.10E-04	1.22E-06	5.26E-05	4.76E-06	4.35E-08	4.38E-08	2.64E-07	5.44E-07	4.35E-08	4.30E-05		
SR-90	2Y	1.92E-13	7.50E-02	5.90E-04	1.40E-03	3.00E+01	1.00E+02	2.47E-02	9.86E-03	1.0	7.30E+01	3.06E-08	2.19E+00
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	D	5.99E-06	8.76E-07	7.78E-05	9.45E-05	5.99E-06	5.71E-06	4.30E-04	8.60E-04	5.99E-06	8.75E-05		
		9.89E-06	1.97E-07	1.41E-05	2.40E-04	1.46E-05	1.46E-05	1.10E-03	2.20E-03	1.46E-05	2.10E-04		
	Y	3.00E-07	8.76E-07	9.60E-05	5.02E-06	3.00E-07	2.86E-07	2.15E-05	4.30E-05	3.00E-07	1.13E-05		
		8.50E-03	2.86E-05	8.90E-04	1.50E-04	3.65E-06	1.90E-05	1.20E-04	2.30E-04	3.65E-06	1.45E-03		
ZR-95	2Y	9.23E-06	7.70E-04	2.10E-02	3.00E-05	3.30E+00	6.70E+00	3.87E+00	9.86E-03	1.0	1.00E+04	1.52E+00	7.52E-01
		7.15E-05	6.61E-05	6.46E-05	7.66E-05	7.01E-05	6.66E-05	7.26E-05	8.09E-05	9.02E-05	7.66E-05		
		3.61E-03	3.34E-03	3.27E-03	3.86E-03	3.54E-03	3.37E-03	3.67E-03	4.09E-03	4.55E-03	3.86E-03		
	W	4.73E-07	1.31E-06	2.86E-05	5.45E-07	4.18E-07	2.95E-07	6.62E-07	3.30E-07	3.22E-08	3.75E-06		
		6.85E-05	3.98E-06	1.55E-05	4.74E-06	2.93E-06	4.68E-06	5.46E-06	7.77E-06	2.94E-06	1.34E-05		
	Y	4.73E-07	1.31E-06	2.86E-05	5.45E-07	4.18E-07	2.95E-07	6.62E-07	3.30E-07	3.22E-08	3.75E-06		
		1.30E-04	5.77E-06	1.59E-05	5.55E-06	3.02E-06	6.51E-06	3.88E-06	3.17E-06	3.55E-06	2.12E-05		
NB-94	2Y	9.50E-06	9.40E-03	2.50E-01	2.00E-02	3.00E+04	1.00E+02	3.47E-05	1.11E-02	1.0	1.00E+04	1.56E+00	7.88E-01
		1.40E-04	1.30E-04	1.27E-04	1.50E-04	1.38E-04	1.31E-04	1.43E-04	1.56E-04	1.77E-04	1.50E-04		
		7.22E-03	6.70E-03	6.56E-03	7.70E-03	7.11E-03	6.78E-03	7.33E-03	8.04E-03	9.11E-03	7.70E-03		
	W	6.36E-07	2.85E-06	4.63E-05	7.14E-06	2.57E-06	1.04E-06	2.73E-06	2.83E-06	4.55E-07	7.14E-06		
		1.55E-04	1.31E-05	3.07E-05	3.61E-05	2.56E-05	1.39E-05	2.36E-05	3.37E-05	9.73E-06	3.61E-05		
	Y	6.36E-07	2.85E-06	4.63E-05	7.14E-06	2.57E-06	1.04E-06	2.73E-06	2.83E-06	4.55E-07	7.14E-06		
		2.77E-03	1.18E-04	3.49E-05	4.14E-04	7.10E-05	1.45E-04	8.36E-05	7.29E-05	8.21E-05	4.14E-04		
NB-95	1Y	4.70E-06	9.40E-03	2.50E-01	2.00E-02	3.00E+04	1.00E+02	7.23E+00	1.11E-02	1.0	1.00E+04	7.73E-01	7.63E-01
		6.85E-05	6.33E-05	6.22E-05	7.30E-05	6.74E-05	6.41E-05	6.96E-05	7.59E-05	8.63E-05	7.30E-05		
		3.50E-03	3.24E-03	3.18E-03	3.74E-03	3.45E-03	3.28E-03	3.56E-03	3.89E-03	4.41E-03	3.74E-03		
	Y	5.23E-07	1.03E-06	1.46E-05	5.04E-07	4.99E-07	3.17E-07	6.74E-07	3.22E-07	4.71E-08	2.58E-06		
		3.10E-05	2.39E-06	7.17E-06	1.94E-06	1.30E-06	2.53E-06	1.61E-06	1.19E-06	1.35E-06	6.06E-06		
MO-99	2Y	8.62E-07	1.20E-01	6.80E-03	1.40E-03	1.00E+01	1.00E+01	9.11E+01	1.15E-01	2.00E+00	5.00E+00	1.42E-01	4.31E-01
		1.39E-05	1.29E-05	1.26E-05	1.49E-05	1.36E-05	1.30E-05	1.40E-05	1.62E-05	1.77E-05	1.49E-05		
		7.00E-04	6.44E-04	6.33E-04	7.48E-04	6.85E-04	6.52E-04	7.07E-04	8.07E-04	8.85E-04	7.48E-04		
	D	1.24E-06	2.00E-06	2.84E-06	1.18E-06	1.35E-05	2.27E-05	1.14E-06	1.84E-06	5.25E-07	3.20E-06		
		4.04E-06	4.50E-07	5.01E-07	7.88E-07	8.40E-06	1.41E-05	7.15E-07	1.15E-06	3.69E-07	2.30E-06		
	Y	1.76E-07	1.90E-06	5.00E-05	3.76E-07	7.88E-07	1.23E-06	2.51E-07	1.60E-07	1.36E-07	4.99E-06		
		1.89E-05	8.83E-07	2.05E-05	4.85E-07	4.26E-07	7.07E-07	1.79E-07	1.28E-07	1.78E-07	4.39E-06		
TC-99	2W	1.39E-14	1.10E+00	8.70E-03	9.90E-03	1.50E+01	5.00E+00	3.27E-06	1.15E-01	1.0	5.00E+00	5.83E-09	8.97E-02
		4.93E-11	4.30E-11	4.04E-11	5.52E-11	4.56E-11	4.44E-11	3.62E-11	8.63E-11	7.26E-11	5.52E-11		
		2.09E-09	1.82E-09	1.71E-09	2.34E-09	1.93E-09	1.89E-09	1.53E-09	3.65E-09	3.07E-09	2.34E-09		
	D	3.17E-07	9.30E-07	3.20E-06	2.14E-07	4.58E-07	6.28E-07	3.22E-07	4.10E-07	1.41E-05	1.02E-06		
		9.63E-07	4.90E-07	5.09E-07	1.69E-07	3.48E-07	4.77E-07	2.44E-07	3.11E-07	1.07E-05	7.08E-07		
	W	3.17E-07	9.30E-07	3.20E-06	2.14E-07	4.58E-07	6.28E-07	3.22E-07	4.10E-07	1.41E-05	1.02E-06		
		5.22E-05	5.70E-07	1.66E-06	8.87E-07	3.07E-07	4.21E-07	2.15E-07	2.75E-07	9.46E-06	7.25E-06		

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TC-99M	2W	5.89E-07	1.10E+00	8.70E-03	9.90E-03	1.50E+01	5.00E+00	1.00E+03	1.15E-01	1.0	5.00E+00	1.25E-01	1.40E-01
		1.20E-05	1.07E-05	1.05E-05	1.31E-05	1.10E-05	1.09E-05	1.09E-05	1.87E-05	1.65E-05	1.31E-05		
		5.37E-04	4.85E-04	4.70E-04	5.85E-04	4.96E-04	4.89E-04	4.93E-04	8.44E-04	7.41E-04	5.85E-04		
	D	4.38E-08	1.30E-07	8.84E-08	1.54E-08	2.45E-08	2.76E-08	2.61E-08	1.63E-08	2.19E-07	5.78E-08		
		8.54E-08	3.09E-08	1.67E-08	9.81E-09	1.25E-08	1.83E-08	1.45E-08	1.08E-08	1.33E-07	2.85E-08		
	W	4.38E-08	1.30E-07	8.84E-08	1.54E-08	2.45E-08	2.76E-08	2.61E-08	1.63E-08	2.19E-07	5.78E-08		
		1.82E-07	2.72E-08	1.35E-08	1.05E-08	8.36E-09	1.55E-08	1.25E-08	9.21E-09	5.72E-08	3.58E-08		
RU-103	1Y	2.77E-06	1.40E-03	4.00E-01	6.10E-07	1.00E+01	3.00E+02	6.42E+00	1.15E-01	1.0	5.00E+00	4.68E-01	5.04E-01
		4.37E-05	4.00E-05	3.93E-05	4.68E-05	4.23E-05	4.08E-05	4.45E-05	5.12E-05	5.41E-05	4.68E-05		
		2.11E-03	1.94E-03	1.90E-03	2.26E-03	2.05E-03	1.97E-03	2.16E-03	2.47E-03	2.62E-03	2.26E-03		
	Y	6.79E-07	1.01E-06	2.41E-05	5.29E-07	5.28E-07	4.67E-07	6.52E-07	3.96E-07	2.53E-07	3.11E-06		
		5.84E-05	1.85E-06	1.18E-05	1.98E-06	1.02E-06	1.92E-06	1.23E-06	9.25E-07	9.89E-07	9.40E-06		
RU-106	1Y	1.11E-06	1.40E-03	4.00E-01	6.10E-07	1.00E+01	3.00E+02	6.86E-01	1.15E-01	1.0	5.00E+00	1.85E-01	5.84E-01
		1.84E-05	1.70E-05	1.66E-05	1.97E-05	1.80E-05	1.72E-05	1.88E-05	2.11E-05	2.30E-05	1.97E-05		
		9.22E-04	8.52E-04	8.33E-04	9.85E-04	9.04E-04	8.63E-04	9.41E-04	1.06E-03	1.15E-03	9.85E-04		
	Y	8.51E-06	6.41E-06	2.60E-04	5.94E-06	8.25E-06	8.27E-06	8.31E-06	9.57E-06	8.06E-06	2.88E-05		
		3.80E-03	6.96E-06	1.40E-04	6.18E-05	8.95E-06	1.15E-05	9.37E-06	1.00E-05	9.19E-06	5.22E-04		
AG-108	3Y	8.81E-06	1.50E-01	1.90E-03	1.90E-02	2.30E+00	7.70E+02	1.39E-01	1.62E-04	1.0	7.20E+02	1.47E+00	5.77E-01
		1.46E-04	1.35E-04	1.32E-04	1.57E-04	1.43E-04	1.37E-04	1.49E-04	1.68E-04	1.84E-04	1.57E-04		
		7.26E-03	6.70E-03	6.55E-03	7.75E-03	7.08E-03	6.78E-03	7.41E-03	8.24E-03	9.10E-03	7.75E-03		
	D	2.23E-06	3.85E-06	2.84E-05	7.62E-06	3.92E-06	2.55E-05	2.45E-06	1.31E-06	4.81E-07	7.62E-06		
		2.22E-05	1.77E-05	1.05E-05	3.01E-05	3.04E-05	2.41E-04	1.14E-05	8.62E-06	4.59E-06	3.01E-05		
	W	2.23E-06	3.85E-06	2.84E-05	7.62E-06	3.92E-06	2.55E-05	2.45E-06	1.31E-06	4.81E-07	7.62E-06		
		1.01E-04	1.25E-05	1.63E-05	2.53E-05	1.29E-05	8.07E-05	8.33E-06	6.18E-06	5.51E-06	2.53E-05		
	Y	2.23E-06	3.85E-06	2.84E-05	7.62E-06	3.92E-06	2.55E-05	2.45E-06	1.31E-06	4.81E-07	7.62E-06		
		1.69E-03	1.15E-04	2.20E-05	2.83E-04	6.62E-05	1.82E-04	7.92E-05	6.22E-05	7.44E-05	2.83E-04		
AG-110	3Y	1.66E-05	1.50E-01	1.90E-03	1.90E-02	2.30E+00	7.70E+02	9.92E-01	1.62E-04	1.0	7.20E+02	2.72E+00	8.56E-01
		2.40E-04	2.22E-04	2.18E-04	2.55E-04	2.37E-04	2.25E-04	2.43E-04	2.64E-04	3.00E-04	2.55E-04		
		1.27E-02	1.18E-02	1.16E-02	1.35E-02	1.25E-02	1.19E-02	1.29E-02	1.40E-02	1.59E-02	1.35E-02		
	D	3.07E-06	5.55E-06	4.00E-05	1.08E-05	5.55E-06	3.19E-05	3.49E-06	1.82E-06	6.70E-07	1.08E-05		
		3.00E-05	2.41E-05	1.45E-05	3.96E-05	4.11E-05	3.00E-04	1.49E-05	1.13E-05	6.29E-06	3.96E-05		
	W	3.07E-06	5.55E-06	4.00E-05	1.08E-05	5.55E-06	3.19E-05	3.49E-06	1.82E-06	6.70E-07	1.08E-05		
		1.17E-04	1.68E-05	2.19E-05	3.09E-05	1.67E-05	9.47E-05	1.07E-05	7.88E-06	7.44E-06	3.09E-05		
	Y	3.07E-06	5.55E-06	4.00E-05	1.08E-05	5.55E-06	3.19E-05	3.49E-06	1.82E-06	6.70E-07	1.08E-05		
		4.44E-04	3.89E-05	2.20E-05	8.03E-05	2.29E-05	6.62E-05	2.49E-05	1.92E-05	2.36E-05	8.03E-05		
CD-109	3Y	2.27E-07	3.00E-01	5.30E-04	1.00E-03	2.00E+02	2.00E+03	5.59E-01	1.48E-02	1.0	7.30E+01	2.75E-02	2.59E-02
		3.02E-07	1.88E-07	1.83E-07	9.25E-07	4.03E-07	1.36E-07	1.04E-07	5.07E-07	6.11E-07	5.62E-07		
		3.57E-06	2.24E-06	2.16E-06	1.07E-05	4.88E-06	1.65E-06	1.23E-06	5.99E-06	7.25E-06	6.55E-06		
	D	1.17E-06	1.51E-06	1.71E-05	1.82E-05	1.51E-04	2.73E-05	1.37E-06	1.21E-06	1.02E-06	1.31E-05		
		1.24E-05	1.07E-05	1.24E-05	1.61E-04	1.46E-03	2.64E-04	1.28E-05	1.16E-05	9.84E-06	1.14E-04		
	W	1.17E-06	1.51E-06	1.71E-05	1.82E-05	1.51E-04	2.73E-05	1.37E-06	1.21E-06	1.02E-06	1.31E-05		
		5.40E-05	3.34E-06	1.09E-05	5.20E-05	4.22E-04	7.59E-06	3.77E-06	3.43E-06	2.83E-06	3.96E-05		
	Y	1.17E-06	1.51E-06	1.71E-05	1.82E-05	1.51E-04	2.73E-05	1.37E-06	1.21E-06	1.02E-06	1.31E-05		
		2.89E-04	1.54E-06	9.25E-06	6.39E-05	1.24E-04	2.32E-06	1.65E-06	1.46E-06	8.88E-07	4.51E-05		
SN-113	2W	1.48E-06	2.50E-03	8.00E-02	1.20E-03	3.00E+03	1.00E+03	2.20E+00	1.62E-04	8.50E+01	7.20E+02	2.56E-01	3.88E-01
		2.41E-05	2.20E-05	2.16E-05	2.66E-05	2.36E-05	2.22E-05	2.46E-05	2.98E-05	3.07E-05	2.66E-05		
		1.12E-03	1.03E-03	1.01E-03	1.22E-03	1.09E-03	1.04E-03	1.15E-03	1.38E-03	1.42E-03	1.22E-03		
	D	9.40E-08	5.29E-07	2.93E-05	3.08E-06	2.04E-07	1.61E-07	6.59E-07	8.66E-07	7.99E-08	3.08E-06		
		3.52E-06	1.82E-06	6.51E-06	4.00E-06	1.93E-06	1.79E-06	9.21E-06	1.87E-05	1.88E-06	4.00E-06		
	W	9.40E-08	5.29E-07	2.93E-05	3.08E-06	2.04E-07	1.61E-07	6.59E-07	8.66E-07	7.99E-08	3.08E-06		
		6.81E-05	1.57E-06	1.45E-05	1.07E-05	8.84E-07	1.46E-06	2.85E-06	4.88E-06	8.40E-07	1.07E-05		
SN-126	2W	1.18E-05	2.50E-03	8.00E-02	1.20E-03	3.00E+03	1.00E+03	6.60E-06	1.62E-04	8.50E+01	7.20E+02	1.99E+00	4.83E-01
		3.93E-04	3.63E-04	3.55E-04	4.20E-04	3.85E-04	3.67E-04	3.99E-04	4.50E-04	4.94E-04	4.20E-04		
		1.96E-02	1.82E-02	1.77E-02	2.10E-02	1.93E-02	1.84E-02	2.00E-02	2.25E-02	2.47E-02	2.10E-02		
	D	2.22E-06	5.92E-06	1.60E-04	1.95E-05	3.03E-06	2.53E-06	1.01E-05	1.87E-05	2.04E-06	1.95E-05		
		5.96E-05	4.51E-05	7.92E-05	8.66E-05	5.33E-05	4.74E-05	2.08E-04	4.37E-04	4.85E-05	8.66E-05		
	W	2.22E-06	5.92E-06	1.60E-04	1.95E-05	3.03E-06	2.53E-06	1.01E-05	1.87E-05	2.04E-06	1.95E-05		
		5.59E-04	2.22E-05	9.66E-05	9.95E-05	1.89E-05	2.27E-05	6.25E-05	1.23E-04	1.81E-05	9.95E-05		
SB-124	2W	1.11E-05	1.10E-02	4.00E-03	1.10E-04	1.00E+00	1.00E+01	4.20E+00	1.62E-04	9.00E+00	7.30E+01	1.81E+00	9.80E-01
		1.56E-04	1.44E-04	1.43E-04	1.66E-04	1.55E-04	1.47E-04	1.59E-04	1.71E-04	1.93E-04	1.66E-04		
		8.81E-03	8.15E-03	8.07E-03	9.37E-03	8.78E-03	8.33E-03	8.96E-03	9.59E-03	1.09E-02	9.37E-03		
	D	6.11E-07	3.92E-06	7.88E-05	9.81E-06	1.35E-06	2.42E-06	2.28E-06	2.96E-06	4.37E-07	9.81E-06		
		7.51E-06	2.95E-06	1.46E-05	5.55E-06	2.84E-06	9.32E-06	5.66E-06	1.26E-05	2.10E-06	5.55E-06		
	W	2.00E-07	3.50E-06	8.62E-05	1.01E-05	9.44E-07	8.07E-07	1.41E-06	6.99E-07	6.51E-08	1.01E-05		
		1.53E-04	5.77E-06	4.03E-05	2.52E-05	2.87E-06	6.51E-06	4.03E-06	4.59E-06	2.49E-06	2.52E-05		

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SB-125	2W	2.49E-06	1.10E-02	4.00E-03	1.10E-04	1.00E+00	1.00E+01	2.56E-01	1.62E-04	9.00E+00	7.30E+01	4.21E-01	4.88E-01
		3.91E-05	3.58E-05	3.49E-05	4.34E-05	3.90E-05	3.62E-05	3.92E-05	4.68E-05	5.01E-05	4.34E-05		
		1.87E-03	1.72E-03	1.68E-03	2.03E-03	1.84E-03	1.74E-03	1.89E-03	2.22E-03	2.37E-03	2.03E-03		
	D	2.23E-07	1.10E-06	2.14E-05	2.81E-06	4.18E-07	9.21E-07	8.36E-07	2.17E-06	1.71E-07	2.81E-06		
		2.36E-06	1.14E-06	4.26E-06	2.13E-06	1.12E-06	3.92E-06	2.40E-06	1.01E-05	8.44E-07	2.13E-06		
	W	5.03E-08	9.51E-07	2.33E-05	2.80E-06	2.43E-07	2.32E-07	4.48E-07	3.35E-07	2.06E-08	2.80E-06		
		8.03E-05	2.33E-06	1.24E-05	1.22E-05	1.24E-06	3.17E-06	1.98E-06	3.62E-06	1.20E-06	1.22E-05		
I-125	1D	3.14E-07	4.50E-03	7.00E-03	9.90E-03	1.50E+01	5.00E+00	4.20E+00	1.15E-01	1.0	5.00E+00	4.29E-02	2.93E-02
		1.09E-06	7.73E-07	6.77E-07	2.30E-06	1.87E-06	7.92E-07	4.00E-07	1.89E-06	2.26E-06	1.61E-06		
		2.45E-05	1.73E-05	1.51E-05	5.18E-05	4.18E-05	1.76E-05	8.92E-06	4.26E-05	5.07E-05	3.61E-05		
	D	1.51E-07	2.52E-07	1.10E-07	5.59E-05	1.00E-07	1.09E-07	2.52E-07	2.45E-07	1.27E-03	3.85E-05		
		4.40E-07	9.18E-08	6.88E-08	3.52E-05	6.33E-08	7.40E-08	1.63E-07	1.58E-07	7.99E-04	2.42E-05		
I-129	1D	1.61E-08	4.50E-03	7.00E-03	9.90E-03	1.50E+01	5.00E+00	5.92E-08	1.15E-01	1.0	5.00E+00	3.00E-03	4.00E-02
		1.07E-06	7.81E-07	6.70E-07	2.03E-06	1.77E-06	8.44E-07	4.04E-07	1.87E-06	2.17E-06	2.03E-06		
		2.06E-05	1.51E-05	1.30E-05	3.81E-05	3.39E-05	1.65E-05	7.81E-06	3.63E-05	4.15E-05	3.81E-05		
	D	8.21E-07	7.84E-08	6.70E-08	3.18E-06	7.02E-07	7.24E-07	9.42E-07	8.79E-07	7.80E-03	2.34E-04		
		7.88E-07	4.61E-08	4.28E-08	2.05E-06	4.49E-07	4.66E-07	6.05E-07	5.64E-07	5.00E-03	1.50E-04		
I-131	1D	2.16E-06	4.50E-03	7.00E-03	9.90E-03	1.50E+01	5.00E+00	3.14E+01	1.15E-01	1.0	5.00E+00	3.74E-01	3.78E-01
		3.57E-05	3.26E-05	3.19E-05	3.91E-05	3.50E-05	3.31E-05	3.62E-05	4.46E-05	4.55E-05	3.91E-05		
		1.67E-03	1.53E-03	1.50E-03	1.80E-03	1.62E-03	1.55E-03	1.71E-03	2.06E-03	2.12E-03	1.80E-03		
	D	3.69E-07	1.14E-07	5.32E-08	9.08E-07	2.15E-07	2.45E-07	2.94E-07	3.32E-07	1.80E-03	5.45E-05		
		2.40E-06	7.47E-08	3.41E-08	6.13E-07	1.47E-07	1.86E-07	2.02E-07	2.21E-07	1.10E-03	3.43E-05		
CS-134	1D	9.41E-06	5.00E-03	1.40E-02	7.10E-03	2.00E+03	1.00E+02	3.38E-01	1.62E-04	1.0	7.20E+02	1.56E+00	6.98E-01
		1.39E-04	1.28E-04	1.26E-04	1.48E-04	1.36E-04	1.30E-04	1.41E-04	1.56E-04	1.74E-04	1.48E-04		
		7.04E-03	6.52E-03	6.37E-03	7.52E-03	6.93E-03	6.59E-03	7.19E-03	7.93E-03	8.85E-03	7.52E-03		
	D	1.60E-04	4.99E-05	5.75E-05	6.84E-05	1.00E-04	1.00E-04	9.26E-05	8.86E-05	7.81E-05	1.12E-04		
		3.38E-05	3.26E-05	3.71E-05	4.55E-05	6.77E-05	6.99E-05	6.16E-05	5.89E-05	5.19E-05	6.55E-05		
CS-135	1D	.00E+00	5.00E-03	1.40E-02	7.10E-03	2.00E+03	1.00E+02	2.31E-07	1.62E-04	1.0	7.20E+02	.00E+00	.00E+00
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	D	1.12E-05	2.40E-07	5.35E-07	6.61E-06	1.12E-05	1.12E-05	1.12E-05	1.30E-05	1.13E-05	1.13E-05		
		6.40E-07	3.82E-08	8.51E-08	4.40E-06	7.47E-06	7.47E-06	7.47E-06	8.62E-06	7.48E-06	6.69E-06		
CS-136	1D	1.30E-05	5.00E-03	1.40E-02	7.10E-03	2.00E+03	1.00E+02	1.85E+01	1.62E-04	1.0	7.20E+02	2.15E+00	7.07E-01
		1.89E-04	1.74E-04	1.71E-04	2.01E-04	1.86E-04	1.77E-04	1.90E-04	2.12E-04	2.39E-04	2.01E-04		
		9.93E-03	9.19E-03	9.04E-03	1.06E-02	9.78E-03	9.30E-03	1.00E-02	1.11E-02	1.25E-02	1.06E-02		
	D	2.14E-05	8.44E-06	1.01E-05	9.05E-06	1.32E-05	1.36E-05	1.20E-05	1.08E-05	9.55E-06	1.41E-05		
		6.98E-06	4.97E-06	5.55E-06	6.00E-06	8.68E-06	9.03E-06	7.91E-06	7.15E-06	6.35E-06	8.39E-06		
CS-137	1D	3.39E-06	5.00E-03	1.40E-02	7.10E-03	2.00E+03	1.00E+02	2.31E-02	1.62E-04	1.0	7.20E+02	5.63E-01	6.62E-01
		5.37E-05	4.96E-05	4.85E-05	5.74E-05	5.26E-05	5.00E-05	5.44E-05	6.07E-05	6.74E-05	5.74E-05		
		2.69E-03	2.48E-03	2.43E-03	2.87E-03	2.63E-03	2.51E-03	2.74E-03	3.04E-03	3.37E-03	2.87E-03		
	D	1.00E-04	2.18E-05	2.59E-05	4.91E-05	7.73E-05	7.87E-05	7.38E-05	7.99E-05	6.72E-05	8.19E-05		
		1.62E-05	1.39E-05	1.60E-05	3.26E-06	5.13E-05	5.23E-05	4.91E-05	5.31E-05	4.47E-05	4.83E-05		
BA-140	1D	1.05E-06	1.30E-03	9.70E-05	3.50E-04	4.00E+00	2.00E+02	1.97E+01	1.11E-04	9.00E+00	7.30E+01	1.78E-01	2.93E-01
		1.70E-05	1.56E-05	1.52E-05	1.84E-05	1.66E-05	1.58E-05	1.72E-05	2.05E-05	2.15E-05	1.84E-05		
		8.15E-04	7.48E-04	7.30E-04	8.74E-04	7.93E-04	7.56E-04	8.26E-04	9.74E-04	1.02E-03	8.74E-04		
	D	9.18E-07	2.10E-06	9.95E-05	1.11E-06	6.05E-07	4.68E-07	1.34E-06	1.26E-06	3.97E-07	9.64E-06		
		9.74E-06	1.15E-06	1.78E-05	2.08E-06	1.46E-06	1.42E-06	3.61E-06	5.23E-06	1.97E-06	4.91E-06		
LA-140	1W	1.39E-05	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03	1.51E+02	1.11E-04	9.00E+00	7.30E+01	2.26E+00	1.10E+00
		1.89E-04	1.75E-04	1.74E-04	2.01E-04	1.89E-04	1.79E-04	1.92E-04	2.05E-04	2.33E-04	2.01E-04		
		1.09E-02	1.01E-02	1.00E-02	1.16E-02	1.09E-02	1.03E-02	1.11E-02	1.18E-02	1.34E-02	1.16E-02		
	W	9.39E-07	4.04E-06	6.58E-05	1.04E-06	8.10E-07	5.90E-07	1.02E-06	3.52E-07	2.27E-08	8.62E-06		
		2.01E-05	1.81E-06	2.11E-05	1.05E-06	1.63E-06	2.44E-06	8.52E-07	7.27E-07	2.87E-07	5.54E-06		
CE-141	3Y	3.70E-07	7.30E-04	1.20E-03	2.00E-05	1.00E+00	1.00E+03	7.79E+00	4.67E-04	10.0	7.20E+03	7.64E-02	1.19E-01
		7.04E-06	6.30E-06	6.11E-06	7.81E-06	6.70E-06	6.37E-06	6.33E-06	1.10E-05	9.81E-06	7.81E-06		
		3.11E-04	2.79E-04	2.72E-04	3.43E-04	2.93E-04	2.83E-04	2.83E-04	4.85E-04	4.30E-04	3.43E-04		
	Y	4.92E-08	8.22E-07	3.18E-05	1.72E-07	4.68E-08	4.11E-08	1.22E-07	3.98E-08	3.74E-10	2.89E-06		
		6.31E-05	5.96E-07	1.54E-05	1.15E-06	2.76E-07	8.59E-07	3.03E-07	2.99E-07	9.40E-08	9.26E-06		
	W	4.92E-08	8.22E-07	3.18E-05	1.72E-07	4.68E-08	4.11E-08	1.22E-07	3.98E-08	3.74E-10	2.89E-06		
		4.25E-05	5.78E-07	1.44E-05	1.36E-06	3.20E-06	1.09E-05	9.36E-07	2.32E-06	1.40E-07	7.64E-06		
	D	4.92E-08	8.22E-07	3.18E-05	1.72E-07	4.68E-08	4.11E-08	1.22E-07	3.98E-08	3.74E-10	2.89E-06		
		2.53E-06	5.56E-07	5.26E-06	3.27E-06	1.70E-05	5.81E-05	4.07E-06	1.19E-05	4.36E-07	6.54E-06		

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CE-144	3Y	2.70E-07	7.30E-04	1.20E-03	2.00E-05	1.00E+00	1.00E+03	8.91E-01	4.67E-04	10.0	7.20E+03	4.83E-02	1.90E-01
		4.89E-06	4.37E-06	4.22E-06	5.63E-06	5.18E-06	4.52E-06	4.31E-06	6.58E-06	6.74E-06	5.63E-06		
		2.46E-04	2.23E-04	2.18E-04	2.73E-04	2.52E-04	2.29E-04	2.29E-04	3.13E-04	3.24E-04	2.73E-04		
	Y	3.49E-08	2.05E-06	4.28E-05	3.03E-07	1.04E-07	7.59E-08	1.37E-07	1.47E-07	4.41E-09	2.09E-05		
		2.90E-03	4.65E-06	1.30E-04	4.68E-05	2.37E-05	8.13E-05	8.95E-06	1.47E-05	8.22E-07	3.96E-04		
	W	3.49E-08	2.05E-06	4.28E-05	3.03E-07	1.04E-07	7.59E-08	1.37E-07	1.47E-07	4.41E-09	2.09E-05		
		6.80E-04	3.65E-06	1.20E-04	5.11E-05	2.30E-04	8.10E-04	8.29E-05	1.40E-04	4.46E-06	1.75E-04		
	D	3.49E-08	2.05E-06	4.28E-05	3.03E-07	1.04E-07	7.59E-08	1.37E-07	1.47E-07	4.41E-09	2.09E-05		
		1.73E-05	3.00E-06	4.01E-05	1.70E-04	1.00E-03	3.40E-03	1.50E-04	6.10E-04	1.88E-05	3.45E-04		
EU-152	1W	6.20E-06	2.50E-03	4.80E-03	2.00E-05	2.50E+01	1.00E+03	5.46E-02	1.11E-04	9.00E+00	7.30E+01	1.03E+00	6.04E-01
		9.74E-05	8.93E-05	8.81E-05	1.04E-04	9.67E-05	9.11E-05	9.70E-05	1.11E-04	1.24E-04	1.04E-04		
		5.19E-03	4.78E-03	4.70E-03	5.52E-03	5.15E-03	4.85E-03	5.19E-03	5.81E-03	6.56E-03	5.52E-03		
	W	8.88E-07	2.38E-06	3.70E-05	6.48E-06	1.72E-06	1.11E-05	3.40E-06	7.73E-06	2.46E-07	6.48E-06		
		2.13E-04	7.36E-05	5.55E-05	2.21E-04	1.37E-04	1.28E-03	2.93E-04	8.88E-04	3.05E-05	2.21E-04		
EU-154	1W	6.91E-06	2.50E-03	4.80E-03	2.00E-05	2.50E+01	1.00E+03	4.33E-02	1.11E-04	9.00E+00	7.30E+01	1.14E+00	7.39E-01
		1.06E-04	9.81E-05	9.67E-05	1.14E-04	1.05E-04	9.96E-05	1.07E-04	1.19E-04	1.34E-04	1.14E-04		
		5.74E-03	5.30E-03	5.22E-03	6.11E-03	5.67E-03	5.37E-03	5.74E-03	6.37E-03	7.22E-03	6.11E-03		
	W	7.99E-07	3.03E-06	6.66E-05	9.55E-06	1.66E-06	1.37E-05	4.26E-06	1.65E-05	2.11E-07	9.55E-06		
		2.93E-04	6.66E-05	6.62E-11	2.86E-04	1.25E-04	1.58E-03	3.92E-04	1.94E-03	2.64E-05	2.86E-04		
YB-169	2Y	1.41E-06	2.50E-03	4.00E-03	5.00E-06	2.50E+01	1.00E+03	7.96E+00	1.11E-04	9.00E+00	7.30E+01	3.05E-01	9.27E-02
		2.78E-05	2.42E-05	2.28E-05	3.19E-05	2.73E-05	2.53E-05	2.20E-05	4.48E-05	4.03E-05	2.92E-05		
		1.13E-03	9.92E-04	9.44E-04	1.28E-03	1.10E-03	1.03E-03	9.36E-04	1.78E-03	1.61E-03	1.18E-03		
	W	1.80E-08	9.66E-07	2.63E-05	3.12E-06	1.81E-07	1.24E-07	6.14E-07	2.71E-07	1.36E-09	3.00E-06		
		3.45E-05	1.07E-06	1.18E-05	9.55E-06	9.32E-07	1.52E-06	3.74E-06	2.72E-05	3.05E-07	6.99E-06		
	Y	1.80E-08	9.66E-07	2.63E-05	3.12E-06	1.81E-07	1.24E-07	6.14E-07	2.71E-07	1.36E-09	3.00E-06		
		5.14E-05	1.29E-06	1.25E-05	1.11E-05	4.51E-07	1.21E-06	1.41E-06	2.33E-06	3.17E-07	8.07E-06		
PB-210	1W	1.03E-08	4.00E-03	7.10E-04	1.20E-04	1.00E+02	1.00E+02	3.40E-02	4.11E-03	8.40E+02	7.20E+03	1.96E-03	4.08E-02
		1.44E-07	1.11E-07	9.67E-08	2.56E-07	1.63E-07	1.23E-07	6.44E-08	2.64E-07	2.42E-07	2.56E-07		
		4.22E-06	3.35E-06	2.87E-06	5.93E-06	5.04E-06	3.78E-06	1.93E-06	7.81E-06	7.30E-06	5.93E-06		
	W	3.00E-04	1.95E-07	2.03E-05	1.70E-03	9.40E-04	1.40E-03	1.00E-03	9.60E-03	3.00E-04	7.77E-04		
		6.20E-03	1.20E-06	4.70E-05	3.50E-03	3.30E-03	3.10E-03	2.20E-03	2.00E-02	6.70E-04	2.60E-03		
PO-210	2W	1.09E-10	2.60E-04	4.00E-03	3.40E-04	5.00E+02	2.00E+04	1.83E+00	4.11E-03	9.00E+00	7.30E+01	1.25E-05	5.17E-02
		7.59E-10	7.04E-10	6.89E-10	8.11E-10	7.48E-10	7.11E-10	7.70E-10	8.41E-10	9.56E-10	8.11E-10		
		3.93E-08	3.63E-08	3.56E-08	4.19E-08	3.85E-08	3.67E-08	3.96E-08	4.33E-08	4.93E-08	4.19E-08		
	W	5.20E-04	4.54E-06	1.80E-04	4.10E-04	9.30E-03	1.60E-03	5.40E-04	2.40E-04	5.20E-04	2.04E-03		
		4.60E-02	2.22E-06	8.79E-05	1.30E-03	1.40E-02	2.50E-03	8.30E-04	3.70E-04	8.00E-04	8.76E-03		
	D	5.20E-04	4.54E-06	1.80E-04	4.10E-04	9.30E-03	1.60E-03	5.40E-04	2.40E-04	5.20E-04	2.04E-03		
		1.00E-03	7.22E-07	2.85E-05	2.10E-03	4.60E-02	8.00E-03	2.70E-03	1.20E-03	2.60E-03	9.95E-03		
RN-222	1*	9.51E-06	3.50E+00	2.00E-02	2.00E-02	1.00E+00	1.00E+00	6.60E+01	1.00E+00	1.00E+00	1.00E+00	1.56E+00	8.37E-01
		3.81E-04	3.52E-04	3.48E-04	4.05E-04	3.78E-04	3.59E-04	3.86E-04	4.21E-04	4.71E-04	4.05E-04		
		2.15E-02	1.99E-02	1.97E-02	2.28E-02	2.14E-02	2.02E-02	2.17E-02	2.36E-02	2.65E-02	2.28E-02		
	*	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		2.34E-06	1.55E-10	6.86E-12	3.39E-08	1.37E-08	1.35E-09	1.68E-09	1.03E-08	3.02E-10	2.83E-07		
RA-226	1W	3.16E-08	1.40E-02	5.10E-04	5.90E-04	5.00E+01	2.50E+02	4.33E-04	4.11E-03	3.00E+01	2.50E+02	6.16E-03	1.86E-01
		3.81E-04	3.52E-04	3.49E-04	4.05E-04	3.78E-04	3.59E-04	3.86E-04	4.22E-04	4.72E-04	4.05E-04		
		2.15E-02	1.99E-02	1.97E-02	2.28E-02	2.14E-02	2.03E-02	2.18E-02	2.36E-02	2.65E-02	2.28E-02		
	W	5.90E-04	5.37E-06	3.30E-04	3.40E-03	5.90E-04	5.90E-04	2.20E-03	2.00E-02	5.90E-04	1.38E-03		
		5.60E-02	3.81E-06	1.80E-04	4.70E-03	6.60E-04	6.60E-04	2.50E-03	2.30E-02	6.60E-04	8.51E-03		
RA-228	1W	4.31E-06	1.40E-02	5.10E-04	5.90E-04	5.00E+01	2.50E+02	1.03E-01	4.11E-03	3.00E+01	2.50E+02	7.10E-01	7.40E-01
		8.00E-05	7.41E-05	7.30E-05	8.56E-05	7.89E-05	7.48E-05	8.07E-05	8.96E-05	1.01E-04	8.56E-05		
		4.26E-03	3.93E-03	3.89E-03	4.52E-03	4.19E-03	4.00E-03	4.30E-03	4.74E-03	5.37E-03	4.52E-03		
	W	4.10E-04	2.34E-06	7.14E-05	1.70E-03	4.00E-04	4.00E-04	1.30E-03	9.80E-03	4.00E-04	7.89E-04		
		4.80E-03	9.58E-06	6.99E-05	2.50E-03	5.40E-04	7.50E-04	1.70E-03	1.40E-02	5.40E-04	1.80E-03		
AC-227	2Y	1.78E-06	2.50E-03	6.00E-02	2.00E-05	2.50E+01	1.00E+03	3.21E-02	4.11E-03	3.00E+02	2.50E+03	3.19E-01	2.83E-01
		4.09E-05	3.69E-05	3.59E-05	4.51E-05	3.93E-05	3.76E-05	3.89E-05	5.68E-05	5.43E-05	4.51E-05		
		1.86E-03	1.68E-03	1.64E-03	2.02E-03	1.78E-03	1.71E-03	1.79E-03	2.54E-03	2.45E-03	2.02E-03		
	Y	1.10E-04	3.73E-07	2.48E-05	1.30E-03	2.00E-03	1.60E-02	1.00E-02	1.00E-01	1.10E-04	5.52E-03		
		1.03E+00	7.31E-05	1.80E-03	1.01E-01	9.10E-02	6.94E-01	4.50E-01	4.47E+00	6.50E-03	5.20E-01		
	W	1.10E-04	3.73E-07	2.48E-05	1.30E-03	2.00E-03	1.60E-02	1.00E-02	1.00E-01	1.10E-04	5.52E-03		
		8.40E-02	3.55E-05	2.20E-04	1.62E-01	2.46E-01	1.91E+00	1.22E+00	1.22E+01	1.40E-02	6.81E-01		

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TH-228	2Y	8.62E-06	4.20E-03	2.00E-04	5.00E-06	3.00E+01	5.00E+02	3.63E-01	4.11E-03	100.0	7.20E+03	1.40E+00	9.62E-01
		3.00E-04	2.81E-04	2.78E-04	3.18E-04	3.04E-04	2.85E-04	3.05E-04	3.26E-04	3.61E-04	3.18E-04		
		1.91E-02	1.79E-02	1.78E-02	2.02E-02	1.94E-02	1.82E-02	1.95E-02	2.05E-02	2.29E-02	2.02E-02		
	Y	7.50E-06	4.91E-06	4.70E-04	3.80E-05	7.88E-06	2.34E-05	3.80E-04	4.10E-03	7.42E-06	2.10E-04		
		7.16E-01	9.23E-05	2.90E-03	1.90E-02	1.30E-03	2.50E-03	3.70E-02	4.01E-01	8.60E-04	1.34E-01		
	W	7.50E-06	4.91E-06	4.70E-04	3.80E-05	7.88E-06	2.34E-05	3.80E-04	4.10E-03	7.42E-06	2.10E-04		
		1.17E-01	2.20E-05	7.10E-04	2.20E-02	2.40E-03	1.20E-02	2.12E-01	2.31E+00	2.50E-03	1.13E-01		
TH-229	2Y	1.20E-06	4.20E-03	2.00E-04	5.00E-06	3.00E+01	5.00E+02	9.44E-05	4.11E-03	100.0	7.20E+03	2.12E-01	2.25E-01
		1.99E-04	1.82E-04	1.80E-04	2.13E-04	1.96E-04	1.86E-04	1.97E-04	2.30E-04	2.49E-04	2.13E-04		
		1.09E-02	1.00E-02	9.97E-03	1.17E-02	1.08E-02	1.03E-02	1.09E-02	1.25E-02	1.36E-02	1.17E-02		
	Y	1.01E-05	4.88E-06	2.10E-04	2.30E-04	9.44E-06	3.64E-05	2.60E-03	3.20E-02	9.39E-06	1.29E-03		
		1.23E+00	1.50E-04	1.40E-03	1.07E-01	4.70E-03	1.50E-02	6.59E-01	7.82E+00	4.20E-03	6.35E-01		
	W	1.01E-05	4.88E-06	2.10E-04	2.30E-04	9.44E-06	3.64E-05	2.60E-03	3.20E-02	9.39E-06	1.29E-03		
		1.16E-01	8.34E-05	3.90E-04	1.42E-01	4.40E-03	2.20E-02	1.59E+00	1.90E+01	4.30E-03	7.81E-01		
TH-230	2Y	1.07E-09	4.20E-03	2.00E-04	5.00E-06	3.00E+01	5.00E+02	8.66E-06	4.11E-03	100.0	7.20E+03	3.09E-04	7.54E-02
		3.85E-08	3.09E-08	2.97E-08	7.85E-08	3.26E-08	3.12E-08	2.59E-08	6.59E-08	5.48E-08	7.85E-08		
		1.41E-06	1.21E-06	1.13E-06	1.73E-06	1.33E-06	1.27E-06	1.02E-06	2.41E-06	2.07E-06	1.73E-06		
	Y	4.56E-06	4.03E-06	1.80E-04	9.24E-05	4.31E-06	2.18E-05	1.00E-03	1.60E-02	4.56E-06	6.29E-04		
		5.26E-01	2.67E-06	1.00E-04	3.80E-02	1.10E-03	5.50E-03	2.54E-01	3.98E+00	1.10E-03	2.59E-01		
	W	4.56E-06	4.03E-06	1.80E-04	9.24E-05	4.31E-06	2.18E-05	1.00E-03	1.60E-02	4.56E-06	6.29E-04		
		5.40E-02	2.74E-06	9.35E-05	5.60E-02	2.60E-03	1.30E-02	6.23E-01	9.78E+00	2.80E-03	3.78E-01		
TH-232	2Y	.00E+00	4.20E-03	2.00E-04	5.00E-06	3.00E+01	5.00E+02	4.92E-11	4.11E-03	100.0	7.20E+03	.00E+00	.00E+00
		1.96E-08	1.43E-08	1.41E-08	5.74E-08	1.48E-08	1.38E-08	1.13E-08	3.41E-08	2.74E-08	5.74E-08		
		5.96E-07	5.00E-07	4.63E-07	8.22E-07	5.63E-07	5.26E-07	3.93E-07	1.04E-06	8.93E-07	8.22E-07		
	Y	3.97E-06	3.47E-06	1.50E-04	9.63E-05	3.75E-06	1.88E-05	1.10E-03	1.80E-02	3.94E-06	6.92E-04		
		4.54E-01	7.64E-06	1.10E-04	3.80E-02	1.10E-03	4.90E-03	2.71E-01	4.53E+00	1.10E-03	2.66E-01		
	W	3.97E-06	3.47E-06	1.50E-04	9.63E-05	3.75E-06	1.88E-05	1.10E-03	1.80E-02	3.94E-06	6.92E-04		
		4.70E-02	8.75E-06	9.23E-05	5.90E-02	2.30E-03	1.10E-02	6.53E-01	1.10E+01	2.40E-03	4.16E-01		
PA-231	2Y	2.05E-07	2.50E-03	8.00E-02	5.00E-06	1.10E+01	1.10E+02	2.13E-05	4.11E-03	8.40E+02	7.20E+03	3.73E-02	1.39E-01
		2.77E-06	2.49E-06	2.44E-06	3.25E-06	2.66E-06	2.51E-06	2.73E-06	3.74E-06	3.62E-06	3.25E-06		
		1.25E-04	1.13E-04	1.11E-04	1.37E-04	1.20E-04	1.15E-04	1.25E-04	1.68E-04	1.63E-04	1.37E-04		
	Y	2.20E-04	4.70E-06	1.90E-04	2.10E-03	3.60E-03	2.80E-02	1.50E-02	1.78E-01	2.20E-04	9.55E-03		
		5.94E-01	2.50E-05	1.70E-04	1.38E-01	1.92E-01	1.49E+00	8.08E-01	9.36E+00	1.20E-02	6.59E-01		
	W	2.20E-04	4.70E-06	1.90E-04	2.10E-03	3.60E-03	2.80E-02	1.50E-02	1.78E-01	2.20E-04	9.55E-03		
		5.80E-02	3.91E-05	1.30E-04	2.61E-01	4.41E-01	3.43E+00	1.84E+00	2.16E+01	2.60E-02	1.16E+00		
U-232	3Y	8.32E-10	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01	9.63E-03	1.25E-04	8.40E+02	7.20E+03	2.04E-04	7.58E-02
		2.86E-08	2.04E-08	2.08E-08	9.07E-08	1.97E-08	1.87E-08	1.73E-08	4.81E-08	3.89E-08	9.07E-08		
		8.37E-07	7.07E-07	6.70E-07	1.19E-06	7.74E-07	7.30E-07	6.07E-07	1.41E-06	1.22E-06	1.19E-06		
	Y	1.30E-06	4.66E-06	2.00E-04	8.40E-05	1.30E-04	1.15E-06	7.10E-04	7.80E-03	1.21E-06	3.45E-04		
		8.87E-01	5.58E-05	1.10E-03	5.30E-02	5.80E-03	4.50E-03	8.80E-02	9.54E-01	1.80E-03	3.24E-01		
	W	3.24E-05	6.42E-06	2.00E-04	2.10E-03	3.30E-03	2.86E-05	1.80E-02	1.95E-01	3.02E-05	8.19E-03		
		6.70E-02	8.54E-06	1.30E-04	7.60E-03	9.70E-03	3.70E-04	5.70E-02	6.29E-01	1.90E-04	3.50E-02		
	D	3.24E-05	6.42E-06	2.00E-04	2.10E-03	3.30E-03	2.86E-05	1.80E-02	1.95E-01	3.02E-05	8.19E-03		
		1.10E-03	1.86E-05	5.12E-05	2.00E-02	3.20E-02	2.90E-04	1.72E-01	1.91E+00	3.00E-04	8.02E-02		
U-233	3Y	3.16E-10	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01	4.28E-06	1.25E-04	8.40E+02	7.20E+03	7.06E-05	8.01E-02
		2.27E-08	1.87E-08	1.86E-08	4.41E-08	1.83E-08	1.81E-08	1.77E-08	3.74E-08	3.11E-08	4.41E-08		
		8.89E-07	7.85E-07	7.59E-07	1.06E-06	8.07E-07	7.93E-07	7.44E-07	1.47E-06	1.26E-06	1.06E-06		
	Y	6.95E-07	4.18E-06	1.80E-04	2.40E-05	6.78E-05	6.06E-07	9.60E-06	1.40E-04	6.39E-07	2.53E-05		
		5.42E-01	3.86E-06	1.10E-04	1.70E-02	1.70E-03	1.55E-05	2.40E-04	3.60E-03	1.64E-05	1.12E-01		
	W	1.74E-05	5.51E-06	1.70E-04	5.80E-04	1.70E-03	1.51E-05	2.40E-04	3.50E-03	1.60E-05	2.61E-04		
		5.60E-02	6.20E-06	9.42E-05	2.60E-03	5.00E-03	4.44E-05	7.00E-04	1.00E-02	4.69E-05	7.80E-03		
	D	1.74E-05	5.51E-06	1.70E-04	5.80E-04	1.70E-03	1.51E-05	2.40E-04	3.50E-03	1.60E-05	2.61E-04		
		9.50E-04	1.42E-05	4.12E-05	5.70E-03	1.70E-02	1.50E-04	2.30E-03	3.50E-02	1.60E-04	2.54E-03		
U-234	3Y	4.89E-10	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01	2.81E-06	1.25E-04	8.40E+02	7.20E+03	1.19E-04	7.13E-02
		1.74E-08	1.11E-08	1.19E-08	7.07E-08	1.00E-08	9.33E-09	9.15E-09	2.95E-08	2.31E-08	7.07E-08		
		4.11E-07	3.37E-07	3.19E-07	6.78E-07	3.74E-07	3.46E-07	2.76E-07	7.11E-07	6.07E-07	6.78E-07		
	Y	6.87E-07	4.17E-06	1.80E-04	2.38E-05	6.69E-05	6.32E-07	9.34E-06	1.40E-04	6.32E-07	2.51E-05		
		5.36E-01	3.83E-06	1.10E-04	1.60E-02	1.70E-03	1.62E-05	2.40E-04	3.50E-03	1.61E-05	1.11E-01		
	W	1.72E-05	5.48E-06	1.70E-04	5.80E-04	1.70E-03	1.58E-05	2.30E-04	3.50E-03	1.58E-05	2.57E-04		
		5.50E-02	6.15E-06	9.41E-05	2.50E-03	4.90E-03	4.64E-05	6.80E-04	1.00E-02	4.63E-05	7.71E-03		
	D	1.72E-05	5.48E-06	1.70E-04	5.80E-04	1.70E-03	1.58E-05	2.30E-04	3.50E-03	1.58E-05	2.57E-04		
		9.40E-04	1.40E-05	4.10E-05	5.60E-03	1.60E-02	1.50E-04	2.30E-03	3.40E-02	1.50E-04	2.50E-03		

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U-235	3Y	7.46E-07	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01	9.76E-10	1.25E-04	8.40E+02	7.20E+03	1.47E-01	1.47E-01
		1.50E-05	1.35E-05	1.32E-05	1.70E-05	1.41E-05	1.37E-05	1.41E-05	2.26E-05	2.04E-05	1.70E-05		
		6.76E-04	6.07E-04	5.94E-04	7.37E-04	6.33E-04	6.16E-04	6.38E-04	1.01E-03	9.16E-04	7.37E-04		
	Y	7.44E-07	4.05E-06	1.90E-04	2.16E-05	6.05E-05	6.08E-07	7.38E-06	1.20E-04	5.80E-07	2.44E-05		
		4.84E-01	2.48E-05	2.50E-04	1.50E-02	1.50E-03	3.16E-05	1.90E-04	2.90E-03	2.07E-05	9.97E-02		
	W	1.62E-05	5.37E-06	1.80E-04	5.20E-04	1.50E-03	1.38E-05	1.80E-04	2.90E-03	1.45E-05	2.24E-04		
		5.00E-02	7.84E-06	1.10E-04	2.30E-03	4.40E-03	4.12E-05	5.30E-04	8.50E-03	4.28E-05	6.93E-03		
	D	1.62E-05	5.37E-06	1.80E-04	5.20E-04	1.50E-03	1.38E-05	1.80E-04	2.90E-03	1.45E-05	2.24E-04		
		8.50E-04	1.42E-05	4.36E-05	5.10E-03	1.50E-02	1.30E-04	1.80E-03	2.80E-02	1.40E-04	2.15E-03		
U-236	3Y	2.62E-10	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01	2.90E-08	1.25E-04	8.40E+02	7.20E+03	6.01E-05	6.14E-02
		1.40E-08	8.41E-09	9.19E-09	6.41E-08	6.85E-09	6.67E-09	6.52E-09	2.41E-08	1.81E-08	6.41E-08		
		2.99E-07	2.39E-07	2.21E-07	5.33E-07	2.61E-07	2.48E-07	1.72E-07	5.41E-07	4.48E-07	5.33E-07		
	Y	6.47E-07	3.92E-06	1.70E-04	2.24E-05	6.32E-05	5.95E-07	8.03E-06	1.30E-04	5.95E-07	2.35E-05		
		5.06E-01	3.83E-06	1.00E-04	1.60E-02	1.60E-03	1.55E-05	2.00E-04	3.20E-03	1.52E-05	1.04E-01		
	W	1.62E-05	5.16E-06	1.60E-04	5.40E-04	1.60E-03	1.49E-05	2.00E-04	3.10E-03	1.49E-05	2.37E-04		
		5.20E-02	6.47E-06	8.92E-05	2.40E-03	4.60E-03	4.43E-05	5.90E-04	9.20E-03	4.37E-05	7.26E-03		
	D	1.62E-05	5.16E-06	1.60E-04	5.40E-04	1.60E-03	1.49E-05	2.00E-04	3.10E-03	1.49E-05	2.37E-04		
		8.90E-04	1.55E-05	4.08E-05	5.30E-03	1.50E-02	1.50E-04	2.00E-03	3.10E-02	1.40E-04	2.30E-03		
U-238	3Y	6.55E-08	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01	1.54E-10	1.25E-04	8.40E+02	7.20E+03	1.51E-02	1.42E-01
		1.73E-04	1.60E-04	1.57E-04	1.85E-04	1.70E-04	1.62E-04	1.73E-04	1.98E-04	2.19E-04	1.85E-04		
		9.05E-03	8.33E-03	8.18E-03	9.65E-03	8.90E-03	8.45E-03	9.07E-03	1.03E-02	1.14E-02	9.65E-03		
	Y	6.14E-07	3.67E-06	1.70E-04	2.12E-05	5.96E-05	5.35E-07	7.65E-06	1.10E-04	5.63E-07	2.24E-05		
		4.80E-01	8.96E-06	2.80E-04	1.50E-02	1.50E-03	1.76E-05	2.00E-04	2.90E-03	1.59E-05	9.86E-02		
	W	1.53E-05	4.85E-06	1.60E-04	5.10E-04	1.50E-03	1.34E-05	1.90E-04	2.80E-03	1.41E-05	2.20E-04		
		4.90E-02	6.15E-06	1.10E-04	2.30E-03	4.40E-03	4.02E-05	5.60E-04	8.30E-03	4.16E-05	6.81E-03		
	D	1.53E-05	4.85E-06	1.60E-04	5.10E-04	1.50E-03	1.34E-05	1.90E-04	2.80E-03	1.41E-05	2.20E-04		
		8.30E-04	1.26E-05	3.81E-05	5.00E-03	1.50E-02	1.30E-04	1.90E-03	2.80E-02	1.40E-04	2.13E-03		
NP-237	2Y	1.10E-06	6.00E-02	2.00E-04	5.00E-06	1.00E+01	4.00E+02	3.24E-07	4.67E-04	3.00E+02	2.50E+03	2.18E-01	1.89E-01
		2.18E-05	1.96E-05	1.91E-05	2.43E-05	2.07E-05	1.99E-05	2.09E-05	3.04E-05	2.88E-05	2.43E-05		
		9.84E-04	8.91E-04	8.69E-04	1.07E-03	9.39E-04	9.05E-04	9.52E-04	1.36E-03	1.30E-03	1.07E-03		
	Y	1.20E-04	5.24E-06	2.00E-04	1.00E-03	2.10E-03	1.60E-02	6.10E-03	8.70E-02	1.20E-04	4.69E-03		
		5.69E-01	4.74E-05	1.80E-04	6.60E-02	1.02E-01	7.89E-01	3.00E-01	4.24E+00	5.80E-03	3.46E-01		
	W	1.20E-04	5.24E-06	2.00E-04	1.00E-03	2.10E-03	1.60E-02	6.10E-03	8.70E-02	1.20E-04	4.69E-03		
		5.90E-02	7.93E-05	1.60E-04	1.22E-01	2.51E-01	1.94E+00	7.43E-01	1.05E+01	1.40E-02	5.73E-01		
PU-236	2Y	1.46E-10	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02	2.43E-01	4.67E-04	10.0	7.20E+03	3.19E-05	7.21E-02
		1.59E-08	8.15E-09	9.70E-09	8.85E-08	4.96E-09	4.85E-09	6.33E-09	2.69E-08	2.01E-08	8.85E-08		
		2.10E-07	1.53E-07	1.46E-07	5.33E-07	1.64E-07	1.51E-07	1.06E-07	3.78E-07	3.10E-07	5.33E-07		
	Y	3.84E-07	4.96E-06	2.20E-04	4.48E-06	8.13E-06	6.28E-05	2.08E-05	2.40E-04	3.84E-07	3.31E-05		
		4.45E-01	3.45E-06	1.30E-04	1.20E-02	6.60E-03	5.00E-02	1.80E-02	2.09E-01	3.40E-04	7.95E-02		
	W	3.84E-07	4.96E-06	2.20E-04	4.48E-06	8.13E-06	6.28E-05	2.08E-05	2.40E-04	3.84E-07	3.31E-05		
		6.40E-02	2.90E-06	1.10E-04	1.50E-02	3.20E-02	2.47E-01	8.10E-02	9.42E-01	1.50E-03	6.59E-02		
PU-238	2Y	1.09E-10	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02	8.02E-03	4.67E-04	10.0	7.20E+03	2.64E-05	5.45E-02
		1.23E-08	5.67E-09	7.22E-09	7.67E-08	2.67E-09	2.64E-09	4.52E-09	2.05E-08	1.51E-08	7.67E-08		
		1.18E-07	7.85E-08	7.78E-08	3.96E-07	8.04E-08	7.15E-08	5.30E-08	2.09E-07	1.71E-07	3.96E-07		
	Y	3.23E-06	4.71E-06	2.10E-04	2.83E-05	5.72E-05	4.40E-04	1.70E-04	2.10E-03	3.23E-06	1.37E-04		
		6.08E-01	2.90E-06	1.20E-04	6.00E-02	9.00E-02	7.00E-01	2.61E-01	3.27E+00	5.10E-03	3.07E-01		
	W	3.23E-06	4.71E-06	2.10E-04	2.83E-05	5.72E-05	4.40E-04	1.70E-04	2.10E-03	3.23E-06	1.37E-04		
		6.40E-02	2.77E-06	1.10E-04	1.11E-01	2.30E-01	1.79E+00	6.71E-01	8.40E+00	1.30E-02	4.89E-01		
PU-239	2Y	.00E+00	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02	2.84E-05	4.67E-04	10.0	7.20E+03	.00E+00	.00E+00
		8.96E-09	6.04E-09	6.56E-09	3.38E-08	4.85E-09	4.85E-09	5.59E-09	1.47E-08	1.17E-08	3.38E-08		
		2.42E-07	2.07E-07	2.03E-07	3.65E-07	2.09E-07	2.05E-07	1.95E-07	4.00E-07	3.39E-07	3.65E-07		
	Y	3.63E-06	4.42E-06	2.00E-04	3.13E-05	6.33E-05	4.90E-04	1.90E-04	2.60E-03	3.63E-06	1.57E-04		
		5.80E-01	2.72E-06	1.10E-04	6.70E-02	1.03E-01	7.97E-01	3.03E-01	4.16E+00	5.80E-03	3.47E-01		
	W	3.63E-06	4.42E-06	2.00E-04	3.13E-05	6.33E-05	4.90E-04	1.90E-04	2.60E-03	3.63E-06	1.57E-04		
		6.00E-02	2.59E-06	1.00E-04	1.24E-01	2.55E-01	1.98E+00	7.56E-01	1.04E+01	1.50E-02	5.75E-01		
PU-240	2Y	1.32E-10	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02	1.05E-04	4.67E-04	10.0	7.20E+03	2.87E-05	5.45E-02
		1.20E-08	5.63E-09	7.07E-09	7.33E-08	2.87E-09	2.77E-09	4.44E-09	2.01E-08	1.49E-08	7.33E-08		
		1.21E-07	8.15E-08	8.00E-08	3.89E-07	8.63E-08	7.59E-08	5.44E-08	2.15E-07	1.78E-07	3.89E-07		
	Y	3.62E-06	4.42E-06	2.00E-04	3.13E-05	6.32E-05	4.90E-04	1.90E-04	2.60E-03	3.62E-06	1.57E-04		
		5.79E-01	2.74E-06	1.10E-04	6.70E-02	1.03E-01	7.95E-01	3.02E-01	4.15E+00	5.80E-03	3.46E-01		
	W	3.62E-06	4.42E-06	2.00E-04	3.13E-05	6.32E-05	4.90E-04	1.90E-04	2.60E-03	3.62E-06	1.57E-04		
		6.00E-02	2.62E-06	1.00E-04	6.70E-02	2.55E-01	1.97E+00	7.55E-01	1.04E+01	1.50E-02	5.74E-01		

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PU-241	2Y	1.37E-12	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02	5.25E-02	4.67E-04	10.0	7.20E+03	2.83E-07	1.49E-01
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
		.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		
	Y	7.51E-08	2.23E-08	9.92E-07	6.19E-07	1.23E-06	9.50E-06	3.86E-06	4.83E-05	7.49E-08	2.79E-06		
		1.10E-03	1.03E-07	6.88E-07	1.20E-03	2.20E-03	1.70E-02	6.80E-03	8.50E-02	1.60E-04	5.38E-03		
	W	7.51E-08	2.23E-08	9.92E-07	6.19E-07	1.23E-06	9.50E-06	3.86E-06	4.83E-05	7.49E-08	2.79E-06		
		1.54E-05	1.81E-07	6.23E-07	2.50E-03	4.90E-03	3.80E-02	1.60E-02	1.94E-01	3.00E-04	1.09E-02		
PU-242	2Y	1.29E-10	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02	1.83E-06	4.67E-04	10.0	7.20E+03	2.82E-05	5.53E-02
		1.01E-08	4.81E-09	6.00E-09	6.07E-08	2.50E-09	2.44E-09	3.78E-09	1.69E-08	1.26E-08	6.07E-08		
		1.07E-07	7.41E-08	7.22E-08	3.30E-07	7.78E-08	7.00E-08	5.00E-08	1.92E-07	1.58E-07	3.30E-07		
	Y	3.45E-06	4.21E-06	1.90E-04	2.98E-05	6.01E-05	4.70E-04	1.80E-04	2.60E-03	3.45E-06	1.53E-04		
		5.50E-01	2.75E-06	1.10E-04	6.30E-02	9.80E-02	7.57E-01	2.87E-01	4.19E+00	5.60E-03	3.36E-01		
	W	3.45E-06	4.21E-06	1.90E-04	2.98E-05	6.01E-05	4.70E-04	1.80E-04	2.60E-03	3.45E-06	1.53E-04		
		5.70E-02	2.71E-06	9.74E-05	1.18E-01	2.42E-01	1.88E+00	7.18E-01	1.05E+01	1.40E-02	5.64E-01		
PU-244	2Y	1.62E-06	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02	9.12E-09	4.67E-04	10.0	7.20E+03	2.69E-01	5.85E-01
		2.91E-05	2.68E-05	2.63E-05	3.16E-05	2.85E-05	2.72E-05	2.96E-05	3.32E-05	3.64E-05	3.16E-05		
		1.48E-03	1.37E-03	1.34E-03	1.58E-03	1.45E-03	1.39E-03	1.51E-03	1.68E-03	1.85E-03	1.58E-03		
	Y	3.71E-06	4.68E-06	3.00E-04	3.01E-05	6.00E-05	4.60E-04	1.70E-04	2.60E-03	3.44E-06	1.62E-04		
		5.48E-01	1.40E-04	6.50E-04	6.30E-02	9.70E-02	7.49E-01	2.71E-01	4.24E+00	5.50E-03	3.34E-01		
	W	3.71E-06	4.68E-06	3.00E-04	3.01E-05	6.00E-05	4.60E-04	1.70E-04	2.60E-03	3.44E-06	1.62E-04		
		5.60E-02	1.60E-04	3.00E-04	1.17E-01	2.40E-01	1.86E+00	6.76E-01	1.06E+01	1.40E-02	5.61E-01		
AM-241	2Y	7.65E-08	5.60E-03	3.90E-03	4.10E-07	2.50E+02	1.00E+03	1.51E-03	4.11E-03	100.	2.50E+03	2.14E-02	6.00E-02
		2.01E-06	1.64E-06	1.46E-06	2.66E-06	1.98E-06	1.78E-06	1.08E-06	3.70E-06	3.18E-06	2.66E-06		
		6.93E-05	5.70E-05	5.04E-05	8.41E-05	6.93E-05	6.22E-05	3.74E-05	1.27E-04	1.10E-04	8.41E-05		
	Y	1.20E-04	4.85E-06	2.10E-04	1.00E-03	2.20E-03	1.70E-02	6.40E-03	8.00E-02	1.20E-04	4.59E-03		
		6.15E-01	8.79E-06	1.30E-04	6.90E-02	1.06E-01	8.24E-01	3.12E-01	3.90E+00	6.00E-03	3.48E-01		
	W	1.20E-04	4.85E-06	2.10E-04	1.00E-03	2.20E-03	1.70E-02	6.40E-03	8.00E-02	1.20E-04	4.59E-03		
		6.40E-02	1.18E-05	1.10E-04	1.28E-01	2.63E-01	2.04E+00	7.77E-01	9.73E+00	1.50E-02	5.63E-01		
AM-243	2Y	9.41E-07	5.60E-03	3.90E-03	4.10E-07	2.50E+02	1.00E+03	8.72E-05	4.11E-03	100.	2.50E+03	2.19E-01	1.21E-01
		2.03E-05	1.79E-05	1.72E-05	2.30E-05	1.90E-05	1.84E-05	1.72E-05	3.20E-05	2.84E-05	2.30E-05		
		8.86E-04	7.86E-04	7.53E-04	9.77E-04	8.31E-04	8.04E-04	7.63E-04	1.38E-03	1.23E-03	9.77E-04		
	Y	1.30E-04	5.35E-06	2.20E-04	1.00E-03	2.20E-03	1.70E-02	6.40E-03	8.50E-02	1.30E-04	4.73E-03		
		5.95E-01	5.96E-05	3.70E-04	6.90E-02	1.07E-01	8.23E-01	3.13E-01	4.17E+00	6.10E-03	3.53E-01		
	W	1.30E-04	5.35E-06	2.20E-04	1.00E-03	2.20E-03	1.70E-02	6.40E-03	8.50E-02	1.30E-04	4.73E-03		
		6.10E-02	8.48E-05	1.90E-04	1.28E-01	2.63E-01	2.03E+00	7.77E-01	1.03E+01	1.50E-02	5.79E-01		
CM-242	2Y	4.81E-10	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03	1.56E+00	4.67E-04	3.00E+02	2.50E+03	1.09E-04	9.32E-02
		1.44E-08	6.70E-09	8.48E-09	8.52E-08	2.78E-09	2.82E-09	5.26E-09	2.39E-08	1.86E-08	8.52E-08		
		1.26E-07	8.19E-08	8.33E-08	4.48E-07	7.59E-08	7.00E-08	5.74E-08	2.22E-07	1.82E-07	4.48E-07		
	Y	2.72E-06	5.25E-06	2.30E-04	2.58E-05	5.72E-05	4.40E-04	1.40E-04	1.50E-03	2.72E-06	1.18E-04		
		1.72E-01	2.70E-06	1.20E-04	3.00E-03	7.50E-04	5.80E-03	2.00E-03	2.30E-02	4.95E-05	2.32E-02		
	W	2.72E-06	5.25E-06	2.30E-04	2.58E-05	5.72E-05	4.40E-04	1.40E-04	1.50E-03	2.72E-06	1.18E-04		
		5.50E-02	2.87E-06	1.10E-04	3.50E-03	6.20E-03	4.80E-02	1.50E-02	1.68E-01	3.00E-04	1.76E-02		
CM-243	2Y	5.55E-07	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03	2.17E-02	4.67E-04	3.00E+02	2.50E+03	1.17E-01	1.62E-01
		1.17E-05	1.05E-05	1.02E-05	1.31E-05	1.09E-05	1.06E-05	1.09E-05	1.74E-05	1.58E-05	1.31E-05		
		5.22E-04	4.70E-04	4.59E-04	5.70E-04	4.93E-04	4.78E-04	4.89E-04	7.74E-04	7.07E-04	5.70E-04		
	Y	8.30E-05	5.92E-06	2.50E-04	7.10E-04	1.50E-03	1.20E-02	4.20E-03	4.80E-02	8.22E-05	2.92E-03		
		6.27E-01	2.18E-05	1.50E-04	4.80E-02	6.80E-02	5.26E-01	1.90E-01	2.15E+00	3.70E-03	2.46E-01		
	W	8.30E-05	5.92E-06	2.50E-04	7.10E-04	1.50E-03	1.20E-02	4.20E-03	4.80E-02	8.22E-05	2.92E-03		
		6.80E-02	3.15E-05	1.40E-04	8.70E-02	1.82E-01	1.41E+00	5.13E-01	5.78E+00	1.00E-02	3.60E-01		
CM-244	2Y	5.94E-11	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03	3.94E-02	4.67E-04	3.00E+02	2.50E+03	1.29E-05	4.65E-02
		1.24E-08	5.63E-09	7.26E-09	7.56E-08	2.07E-09	2.12E-09	4.44E-09	2.06E-08	1.59E-08	7.56E-08		
		9.70E-08	5.96E-08	6.26E-08	3.81E-07	5.26E-08	4.78E-08	4.19E-08	1.69E-07	1.39E-07	3.81E-07		
	Y	6.40E-05	4.96E-06	2.20E-04	5.60E-04	1.20E-03	9.30E-03	3.30E-03	3.80E-02	6.40E-05	2.31E-03		
		6.07E-01	3.02E-06	1.30E-04	3.90E-02	5.20E-02	3.98E-01	1.41E-01	1.62E+00	2.70E-03	2.05E-01		
	W	6.40E-05	4.96E-06	2.20E-04	5.60E-04	1.20E-03	9.30E-03	3.30E-03	3.80E-02	6.40E-05	2.31E-03		
		6.70E-02	2.93E-06	1.10E-04	6.80E-02	1.45E-01	1.12E+00	3.99E-01	4.56E+00	7.70E-03	2.85E-01		

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CM-248	2Y	.00E+00	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03	1.47E-06	4.67E-04	3.00E+02	2.50E+03	.00E+00	.00E+00
		9.04E-09	4.19E-09	5.30E-09	5.37E-08	1.76E-09	1.75E-09	3.27E-09	1.50E-08	1.17E-08	5.37E-08		
		7.81E-08	5.00E-08	5.07E-08	2.81E-07	4.70E-08	4.26E-08	3.43E-08	1.37E-07	1.13E-07	2.81E-07		
	Y	5.80E-04	7.80E-05	1.10E-03	4.00E-03	8.10E-03	6.30E-02	6.10E-03	8.80E-02	4.80E-04	8.70E-03		
		2.22E+00	3.40E-03	1.80E-03	2.60E-01	4.01E-01	3.09E+00	2.97E-01	4.28E+00	2.40E-02	8.78E-01		
	W	5.80E-04	7.80E-05	1.10E-03	4.00E-03	8.10E-03	6.30E-02	6.10E-03	8.80E-02	4.80E-04	8.70E-03		
		2.32E-01	5.00E-03	3.20E-03	4.82E-01	9.86E-01	7.60E+00	7.36E-01	1.06E+01	5.80E-02	1.07E+00		
CF-252	2Y	1.36E-08	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03	2.62E-01	4.11E-03	3.00E+02	2.50E+03	1.09E-03	1.72E-02
		1.09E-08	5.41E-09	6.56E-09	5.89E-08	2.46E-09	2.42E-09	4.11E-09	1.81E-08	1.50E-08	5.89E-08		
		1.10E-07	7.41E-08	7.48E-08	3.47E-07	6.70E-08	6.37E-08	5.41E-08	1.91E-07	1.60E-07	3.47E-07		
	Y	3.28E-05	2.10E-05	5.70E-04	2.30E-04	5.20E-04	4.00E-03	6.50E-04	6.90E-03	2.51E-05	6.66E-04		
		8.71E-01	3.20E-04	3.40E-04	2.10E-02	1.20E-02	9.40E-02	1.50E-02	1.63E-01	6.80E-04	1.38E-01		
	W	3.28E-05	2.10E-05	5.70E-04	2.30E-04	5.20E-04	4.00E-03	6.50E-04	6.90E-03	2.51E-05	6.66E-04		
		1.30E-01	2.60E-04	4.00E-04	2.90E-02	6.10E-02	4.73E-01	7.70E-02	8.22E-01	3.00E-03	8.84E-02		

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APPENDIX C

TAPE2.DAT - ENVIRONMENTAL AND FACILITY PARAMETERS

7.400E-02	1.0	34.0	18.0	500.0	1000.0	0.0	0.0	0.0	0.0
7.400E-02	1.0	34.0	18.0	500.0	1000.0	0.0	0.0	0.0	0.0
0.074	1.0	91.0	46.5	500.0	1000.0	0.0	0.0	0.0	0.0
3.600E-02	1.0	4.550E+02	2.375E+02	2.500E+03	5.000E+03	0.0	0.0	0.0	0.0
7.400E-02	1.0	91.0	46.5	500.0	1000.0	0.0	0.0	0.0	0.0
9.180E-12	2.960E-11	7.700E+03	2.000E+05	4.500E+06	5.050E-10	1.510E-09	1.110E-07	2.280E+03	7.060E-05
4.610E+00	9.680E-11	5.530E-07	5.530E-07	2.030E-06					
1									
1.800E-01	1.0	6.8	4.4	100.0	200.0	0.0	0.0	0.0	0.0
1.800E-01	1.0	6.8	4.4	100.0	200.0	0.0	0.0	0.0	0.0
0.18	1.0	18.2	10.1	100.0	200.0	0.0	0.0	0.0	0.0
3.000E-02	1.0	7.280E+01	4.640E+01	4.000E+02	8.000E+02	0.0	0.0	0.0	0.0
1.800E-01	1.0	18.2	10.1	100.0	200.0	0.0	0.0	0.0	0.0
2.010E-11	3.180E-11	7.700E+03	2.000E+05	4.500E+06	1.750E-10	5.250E-10	1.110E-07	6.100E+02	7.060E-05
3.610E+00	1.400E-10	1.540E-08	1.540E-08	2.500E-06					
1									
1.000E-03	1.0	3.400E+00	11.7	300.0	0.0	0.0	0.0	0.0	0.0
1.000E-03	1.0	3.400E+00	11.7	300.0	0.0	0.0	0.0	0.0	0.0
1.000E-03	1.0	9.100E+00	14.5	300.0	0.0	0.0	0.0	0.0	0.0
1.000E-03	1.0	9.100E+00	2.800E+02	5.800E+02	8.800E+02	0.0	0.0	0.0	0.0
1.000E-03	1.0	9.100E+00	14.5	300.0	0.0	0.0	0.0	0.0	0.0
2.640E-10	8.060E-11	7.700E+03	2.000E+05	4.500E+05	1.330E-11	3.990E-11	0.000E+00	6.000E+01	3.920E-05
6.670E+00	4.110E-11	7.950E-06	7.950E-06	6.840E-05					
1									
1.000E+02	2.000E+01	2.54E+04	9.100E-11	3.330E-01	1.000E+00	2.960E+04	9.100E-11	3.330E-01	0.59
1.000E-10	2.000E-10	4.000E-10	1.7E-10	3.39E-10	6.78E-10	86.0	71.0	15.0	5.900E-01
0.8	7.31	1.000E+00	1.000E+03	100.0	5.0E-05				
100.0	2.000E+01	4.280E+05	1.600E-13	3.330E-01	2.700E-01	2.960E+04	9.100E-11	3.330E-01	5.900E-01
3.700E-10	7.410E-10	1.480E-09	1.700E-10	3.390E-10	6.780E-10	8.600E+01	7.100E+01	1.500E+01	5.900E-01
8.000E-01	7.310E+00	1.000E+00	1.000E+03						
1.000E+02	2.000E+01	2.540E+04	9.100E-11	3.330E-01	1.0	9.135E+04	9.100E-11	3.330E-01	1.0
1.000E-10	2.000E-10	4.000E-10	1.000E-10	2.000E-10	4.000E-10	3.840E+02	3.840E+02	1.710E+01	4.100E-01
0.75	4.37	0.9	1.000E+03	100.0	5.0E-05				
1.000E+02	3.500E+01	2.540E+04	1.600E-13	3.330E-01	1.000E+00	9.135E+04	9.100E-11	3.330E-01	1.000E+00
1.000E-10	2.000E-10	4.000E-10	1.000E-10	2.000E-10	4.000E-10	3.840E+02	3.840E+02	1.710E+02	4.100E-01
7.500E-01	4.370E+00	9.000E-01	1.000E+03						
1.000E+02	3.500E+01	2.540E+04	1.600E-13	3.330E-01	1.000E+00	9.135E+04	9.100E-11	3.330E-01	1.000E+00
1.000E-10	2.000E-10	4.000E-10	1.000E-10	2.000E-10	4.000E-10	3.840E+02	3.840E+02	1.710E+02	4.100E-01
7.500E-01	4.370E+00	9.000E-01	1.000E+03						
0.180	1.0	1.7	1.85	25.0	50.0	0.0	0.0	0.00	0.000
2.64E-10	8.06E-11	110.0	2.00E+05	4.50E+06	6.67	1.4E-10	7.95E-06		
1									

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APPENDIX D

EXAMPLE TAPE5 - OPTIONS AND WASTE STREAM CHARACTERISTICS

```
  1  0  5  1  1 20 30  1
SEC-RESINS      80.00        1.0      80.00
    2    1     1   50     1   -1    -1   10  100    0    5    0    0    0  100
H-3     *  1.15E-04  C-14    *  4.25E-06  CR-51   Y  1.33E-03  MN-54   W  2.36E-05  FE-55   Y  2.08E-05
FE-59   Y  6.62E-05  CO-58   Y  3.92E-05  CO-60   Y  4.03E-05  ZN-65   Y  9.12E-06  NI-59   W  2.49E-08
NI-63   W  7.66E-06  SR-90   Y  8.42E-06  NB-94   Y  7.86E-10  ZR-95   Y  2.69E-05  TC-99   W  3.58E-08
RU-103  Y  9.37E-05  AG-110  Y  5.88E-05  I-129   D  1.06E-07  CS-134  D  3.19E-04  CS-135  D  3.58E-08
CS-137  D  9.54E-04  CE-141  Y  1.33E-04  CE-144  Y  1.47E-04  PU-238  Y  7.29E-06  PU-239  Y  3.69E-06
PU-241  Y  1.61E-04  PU-242  Y  8.08E-09  AM-241  Y  8.54E-06  AM-243  Y  5.76E-07  CM-242  Y  1.61E-05
CM-243  Y  3.94E-09  CM-244  Y  4.42E-06                                                                  $
  2  0  2  2  2 20  0  1
TRASH           100.         0.5       200.
    2    1     0    0    5   -1    -1   32   10    4   16   50   20   20   10
H-3     *  1.15E-04  C-14    *  4.25E-06  CR-51   Y  1.33E-03  MN-54   W  2.36E-05  FE-55   Y  2.08E-05
FE-59   Y  6.62E-05  CO-58   Y  3.92E-05  CO-60   Y  4.03E-05  ZN-65   Y  9.12E-06  NI-59   W  2.49E-08
NI-63   W  7.66E-06  SR-90   Y  8.42E-06  NB-94   Y  7.86E-10  ZR-95   Y  2.69E-05  TC-99   W  3.58E-08
RU-103  Y  9.37E-05  AG-110  Y  5.88E-05  I-129   D  1.06E-07  CS-134  D  3.19E-04  CS-135  D  3.58E-08
CS-137  D  9.54E-04  CE-141  Y  1.33E-04  CE-144  Y  1.47E-04  PU-238  Y  7.29E-06  PU-239  Y  3.69E-06
PU-241  Y  1.61E-04  PU-242  Y  8.08E-09  AM-241  Y  8.54E-06  AM-243  Y  5.76E-07  CM-242  Y  1.61E-05
CM-243  Y  3.94E-09  CM-244  Y  4.42E-06                                                                  $
CON-DIRT        500.         1.6       312.5
    3    1     0    0    1   -1    -1    3  100    0    1    0    0    0  100
U-238   Y  5.95E-07  U-234   Y  5.95E-07  TH-230  Y  5.95E-07  RA-226  W  5.95E-07  RN-222  *  5.95E-07
PO-210  W  5.95E-07  PB-210  W  5.95E-07  U-235   Y  2.75E-08  PA-231  Y  2.75E-08  AC-227  Y  2.75E-08
TH-232  Y  9.81E-07  TH-228  Y  9.81E-07  RA-228  W  9.81E-07                                              $
  1  2  1  1  2 20  5  1
WASTE OIL       800.0        1.0       800.0
    1    1     1   50     2   -1    -1   30  100   30    1  100    0    0    0
AG-110  Y   2.4E-03  CE-141  Y   1.9E-01  CE-144  Y   6.5E-03  CO-58   Y   2.2E-02  CO-60   Y   3.9E-04
CR-51   Y   1.8E+00  CS-134  D   1.2E-03  CS-137  D   8.1E-04  FE-55   Y   2.6E-01  FE-59   Y   3.0E-02
MN-54   W   6.2E-03  NB-95   Y   6.1E-02  NI-63   W   2.1E-01  RB-86   D   8.8E-02  RU-103  Y   7.6E-02
RU-106  Y   5.9E-03  SR-89   Y   3.1E-02  SR-90   Y   7.1E-04  ZN-65   Y   1.0E-02  ZR-95   Y   3.4E-02
                                                                                                          $
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APPENDIX E

EXAMPLE TAPE6.OUT - TOTAL WASTE STREAM DOSES FOR ALL PATHWAYS

IMPACTS-BRC VERSION 1.0

HAZARDOUS WASTE II

LIFE= 20 OVFL= 1 NSTR= 1
REGN= 1 DATA= 0
IPOP= 1 INST= 30

WASTE: SEC-RESINS WEIGHT: 8.00E+01 MT DENSITY: 1.00E+00 MT/M3

ID= 2 IA= 1 IK1= 1 IK2= 50 PROCESS= 1
IXS= 10 100 0 5
ICS= 0 0 0 100

METAL PACKAGE RECYCLE IMPACTS MAXIND = 5.71E-04 MREM/YR
POPULN = 4.81E+01 PERSON-MREM/30YRS

TRANSPORTATION IMPACTS TR-MAX = 4.68E+00 MREM/YR
TR-OCC = 9.36E+01 PERSON-MREM/YR
TR-POP = 6.41E+02 PERSON-MREM/YR

INTRUDER IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
INT-CO	1.23E-02	1.22E-02	1.22E-02	1.22E-02	1.22E-02	1.24E-02	1.23E-02	1.31E-02	1.22E-02	1.23E-02
INT-AG	2.40E-02	2.38E-02	2.38E-02	2.38E-02	2.38E-02	2.41E-02	2.39E-02	2.52E-02	2.38E-02	2.39E-02

EXPOSED WASTE IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IN-AIR	1.16E-03	1.30E-05	1.93E-05	1.57E-04	2.48E-04	1.64E-03	6.44E-04	7.70E-03	5.89E-05	7.03E-04
ER-AIR	2.72E-01	6.18E-05	9.53E-04	3.33E-02	5.25E-02	4.07E-01	1.54E-01	2.03E+00	1.13E-02	1.69E-01
IN-WAT	1.21E-06	2.69E-07	3.55E-07	7.09E-07	1.18E-06	2.90E-06	1.62E-06	1.01E-05	8.30E-07	1.51E-06
ER-WAT	4.33E-06	7.90E-07	1.11E-05	3.23E-05	6.96E-05	5.34E-04	2.03E-04	2.54E-03	1.03E-05	1.46E-04

INCINERATION AND OPERATIONAL IMPACTS: UNITS: IC-IND,IC-MWR,OP-IND,OP-MWR - (MREM/YR)
IC-POP,IC-WOR,OP-POP,OP-WOR - (PERSON-MREM/YR)

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IC-POP	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
IC-IND	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
IC-WOR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
IC-MWR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
OP-POP	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
OP-IND	4.64E-11	1.43E-13	2.29E-13	4.50E-12	6.80E-12	5.09E-11	1.94E-11	2.42E-10	6.28E-13	2.27E-11
OP-WOR	1.48E+02	3.74E+01	3.76E+01	4.79E+01	5.34E+01	1.59E+02	8.36E+01	6.18E+02	3.86E+01	9.15E+01
OP-MWR	6.23E-01	2.40E-01	2.40E-01	2.76E-01	2.95E-01	6.60E-01	3.99E-01	2.24E+00	2.44E-01	4.26E-01

LEACHATE ACCUMULATION IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
LA-OPS	2.18E-04	1.65E-04	4.30E-04	2.57E-04	3.76E-04	1.65E-03	7.66E-04	7.18E-03	3.60E-04	6.28E-04
LA-OVF	7.77E-05	4.58E-05	8.07E-05	1.43E-04	2.41E-04	1.45E-03	6.15E-04	6.70E-03	2.46E-04	4.53E-04
LA-AIR	3.80E-02	2.63E-02	3.40E-02	2.85E-02	2.51E-02	5.01E-02	4.57E-02	1.88E-01	4.19E-02	3.71E-02

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GROUND WATER IMPACTS (MREM/YR):

INTRUDER-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	5.77E-05	5.21E-05	7.36E-05	7.15E-05	5.77E-05	6.15E-05	1.12E-04	1.98E-04	5.89E-04	8.78E-05
80YR	3.94E-05	3.77E-05	5.17E-05	5.74E-05	4.11E-05	4.51E-05	9.55E-05	1.82E-04	5.74E-04	7.00E-05
100YR	2.93E-05	3.05E-05	4.04E-05	4.99E-05	3.21E-05	3.62E-05	8.63E-05	1.73E-04	5.65E-04	6.02E-05
120YR	2.58E-05	2.96E-05	3.81E-05	4.79E-05	2.93E-05	3.33E-05	8.32E-05	1.69E-04	5.63E-04	5.71E-05
160YR	4.41E-05	5.71E-05	7.13E-05	9.16E-05	5.28E-05	6.07E-05	1.60E-04	3.29E-04	1.12E-03	1.08E-04
200YR	4.10E-05	5.61E-05	6.90E-05	8.96E-05	5.03E-05	5.81E-05	1.57E-04	3.25E-04	1.12E-03	1.05E-04
400YR	7.61E-05	1.08E-04	1.31E-04	1.72E-04	9.49E-05	1.10E-04	3.03E-04	6.31E-04	7.96E-05	1.38E-04
600YR	6.62E-08	5.39E-08	1.58E-06	2.56E-07	4.57E-07	3.37E-06	1.32E-06	1.78E-05	4.54E-08	1.12E-06
800YR	5.87E-08	4.54E-08	1.49E-06	2.42E-07	4.44E-07	3.31E-06	1.30E-06	1.75E-05	3.86E-08	1.09E-06
1K YR	5.69E-08	4.33E-08	1.47E-06	2.38E-07	4.39E-07	3.28E-06	1.29E-06	1.74E-05	3.71E-08	1.08E-06
2K YR	9.81E-08	6.95E-08	2.70E-06	4.34E-07	8.37E-07	6.37E-06	2.48E-06	3.37E-05	5.89E-08	2.07E-06
5K YR	1.10E-06	1.75E-07	7.37E-06	7.59E-06	1.65E-05	1.28E-04	4.82E-05	6.42E-04	9.88E-07	3.61E-05
10K YR	9.21E-07	2.55E-07	1.12E-05	5.88E-06	1.26E-05	9.75E-05	3.70E-05	4.95E-04	7.52E-07	2.82E-05
20K YR	2.65E-07	1.71E-07	7.72E-06	1.22E-06	2.47E-06	1.91E-05	7.40E-06	1.01E-04	1.45E-07	6.14E-06

POPULATION-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600YR	7.68E-06	1.09E-05	1.32E-05	1.74E-05	9.58E-06	1.11E-05	3.05E-05	6.35E-05	2.30E-04	2.05E-05
800YR	1.50E-05	2.13E-05	2.58E-05	3.40E-05	1.87E-05	2.17E-05	5.95E-05	1.24E-04	4.59E-04	4.04E-05
1K YR	1.49E-09	1.74E-09	1.78E-08	3.58E-09	2.09E-09	1.59E-09	2.16E-09	2.31E-09	1.59E-09	3.78E-09
2K YR	2.28E-09	2.61E-09	2.69E-08	5.49E-09	3.23E-09	2.43E-09	3.35E-09	3.59E-09	2.43E-09	5.83E-09
5K YR	9.05E-09	5.40E-09	2.44E-07	3.90E-08	7.86E-08	6.03E-07	2.34E-07	3.19E-06	5.27E-09	1.94E-07
10K YR	4.37E-08	2.80E-08	1.27E-06	2.01E-07	4.06E-07	3.14E-06	1.22E-06	1.66E-05	2.40E-08	1.01E-06
20K YR	5.47E-08	3.52E-08	1.59E-06	2.53E-07	5.09E-07	3.94E-06	1.53E-06	2.09E-05	3.00E-08	1.27E-06

POPULATION-SURFACE WATER

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
800YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1K YR	2.83E-07	4.02E-07	4.87E-07	6.40E-07	3.53E-07	4.09E-07	1.12E-06	2.34E-06	5.32E-06	6.62E-07
2K YR	2.81E-10	5.50E-10	8.19E-09	1.37E-09	6.14E-10	3.48E-10	6.43E-10	6.82E-10	2.61E-10	1.42E-09
5K YR	1.16E-10	2.49E-12	5.55E-12	6.85E-11	1.16E-10	1.16E-10	1.16E-10	1.35E-10	1.17E-10	1.17E-10
10K YR	4.46E-10	2.24E-10	1.00E-08	1.65E-09	3.32E-09	2.49E-08	9.72E-09	1.32E-07	3.01E-10	8.08E-09
20K YR	2.60E-09	1.67E-09	7.55E-08	1.20E-08	2.42E-08	1.87E-07	7.25E-08	9.90E-07	1.50E-09	6.01E-08

000114

SANITARY LANDFILL

LIFE= 20 OVFL= 1 NSTR= 2
REGN= 2 DATA= 0
IPOP= 2 INST= 0

WASTE: TRASH WEIGHT: 1.00E+02 MT DENSITY: 5.00E-01 MT/M3

ID= 2 IA= 1 IK1= 0 IK2= 0 PROCESS= 5
IXS= 32 10 4 16
ICS= 50 20 20 10

METAL MATERIAL RECYCLE IMPACTS MAXIND = 3.21E-01 MREM/YR
POPULN = 2.16E+04 PERSON-MREM/30YRS

GLASS MATERIAL RECYCLE IMPACTS MAXIND = 3.32E+00 MREM/YR
POPULN = 9.51E+03 PERSON-MREM/30YRS

TRANSPORTATION IMPACTS TR-MAX = 1.15E+00 MREM/YR
TR-OCC = 7.33E+01 PERSON-MREM/YR
TR-POP = 4.80E+02 PERSON-MREM/YR

INTRUDER IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
INT-CO	4.63E-02	4.60E-02	4.60E-02	4.61E-02	4.61E-02	4.63E-02	4.61E-02	4.73E-02	4.60E-02	4.62E-02
INT-AG	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.30E-01	1.29E-01	1.29E-01

EXPOSED WASTE IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IN-AIR	2.05E-02	6.48E-04	1.24E-03	2.92E-03	4.45E-03	2.37E-02	9.84E-03	1.06E-01	1.68E-03	1.12E-02
ER-AIR	9.29E-03	1.15E-06	3.13E-05	1.13E-03	1.79E-03	1.39E-02	5.26E-03	6.91E-02	3.84E-04	5.77E-03
IN-WAT	3.48E-06	9.22E-07	1.38E-06	1.76E-06	2.72E-06	4.16E-06	2.98E-06	9.88E-06	2.15E-06	3.18E-06
ER-WAT	4.45E-07	4.21E-08	1.17E-06	3.49E-06	7.61E-06	5.87E-05	2.22E-05	2.80E-04	1.10E-06	1.60E-05

INCINERATION AND OPERATIONAL IMPACTS: UNITS: IC-IND,IC-MWR,OP-IND,OP-MWR - (MREM/YR)
IC-POP,IC-WOR,OP-POP,OP-WOR - (PERSON-MREM/YR)

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IC-POP	7.34E+01	3.39E+00	6.50E+00	1.15E+01	1.67E+01	8.48E+01	3.64E+01	3.79E+02	7.23E+00	4.09E+01
IC-IND	5.59E-04	2.58E-05	4.95E-05	8.74E-05	1.27E-04	6.46E-04	2.77E-04	2.89E-03	5.50E-05	3.11E-04
IC-WOR	5.78E+01	5.77E+01	5.77E+01	5.77E+01	5.77E+01	5.78E+01	5.77E+01	5.80E+01	5.77E+01	5.77E+01
IC-MWR	3.96E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.96E-01	3.95E-01	4.02E-01	3.94E-01	3.95E-01
OP-POP	2.24E-01	7.09E-03	1.36E-02	3.20E-02	4.86E-02	2.59E-01	1.08E-01	1.16E+00	1.84E-02	1.23E-01
OP-IND	2.42E-04	7.67E-06	1.47E-05	3.46E-05	5.26E-05	2.80E-04	1.16E-04	1.26E-03	1.99E-05	1.33E-04
OP-WOR	1.49E+00	1.47E+00	1.47E+00	1.48E+00	1.48E+00	1.49E+00	1.48E+00	1.57E+00	1.47E+00	1.48E+00
OP-MWR	9.33E-02	9.21E-02	9.21E-02	9.22E-02	9.23E-02	9.34E-02	9.26E-02	9.84E-02	9.21E-02	9.27E-02

LEACHATE ACCUMULATION IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
LA-OPS	1.13E-05	4.70E-06	2.39E-05	1.36E-05	2.41E-05	1.31E-04	5.50E-05	5.90E-04	2.31E-05	4.45E-05
LA-OVF	1.13E-05	4.70E-06	2.39E-05	1.36E-05	2.41E-05	1.31E-04	5.50E-05	5.90E-04	2.31E-05	4.45E-05
LA-AIR	8.83E-02	3.67E-02	5.34E-02	4.02E-02	4.15E-02	1.20E-01	7.36E-02	4.79E-01	9.30E-02	7.22E-02

000115

6381

GROUND WATER IMPACTS (MREM/YR):

INTRUDER-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	1.36E-04	6.97E-05	1.34E-04	9.88E-05	1.16E-04	1.18E-04	1.42E-04	1.87E-04	9.79E-04	1.59E-04
40YR	1.42E-04	5.45E-05	1.12E-04	1.04E-04	1.18E-04	1.23E-04	1.68E-04	2.56E-04	1.85E-03	1.91E-04
60YR	1.43E-04	6.39E-05	1.21E-04	1.19E-04	1.23E-04	1.33E-04	1.96E-04	3.35E-04	2.73E-03	2.27E-04
80YR	1.10E-04	5.91E-05	1.03E-04	1.06E-04	9.90E-05	1.09E-04	1.77E-04	3.22E-04	3.00E-03	2.10E-04
100YR	7.95E-05	5.17E-05	8.35E-05	9.03E-05	7.52E-05	8.41E-05	1.52E-04	2.91E-04	2.98E-03	1.83E-04
120YR	6.03E-05	4.69E-05	7.24E-05	8.02E-05	6.05E-05	7.17E-05	1.37E-04	2.86E-04	2.97E-03	1.67E-04
160YR	4.05E-05	4.19E-05	5.93E-05	6.94E-05	4.49E-05	5.52E-05	1.20E-04	2.63E-04	2.96E-03	1.50E-04
200YR	3.25E-05	3.98E-05	5.47E-05	6.51E-05	3.89E-05	5.07E-05	1.14E-04	2.65E-04	2.95E-03	1.43E-04
400YR	2.58E-07	1.76E-07	5.31E-06	8.64E-07	1.60E-06	1.17E-05	4.61E-06	6.16E-05	1.69E-07	3.88E-06
600YR	5.03E-06	3.66E-07	1.50E-05	3.95E-05	8.67E-05	6.69E-04	2.52E-04	3.19E-03	4.82E-06	1.82E-04
800YR	3.97E-06	3.27E-07	1.37E-05	3.09E-05	6.76E-05	5.23E-04	1.97E-04	2.50E-03	3.77E-06	1.43E-04
1K YR	3.17E-06	2.91E-07	1.22E-05	2.44E-05	5.34E-05	4.12E-04	1.55E-04	1.98E-03	2.99E-06	1.13E-04
2K YR	3.60E-06	3.14E-07	1.27E-05	2.71E-05	5.94E-05	4.59E-04	1.73E-04	2.24E-03	3.42E-06	1.27E-04
5K YR	3.62E-06	3.11E-07	1.20E-05	2.64E-05	5.79E-05	4.47E-04	1.68E-04	2.24E-03	3.46E-06	1.25E-04
10K YR	1.91E-07	1.24E-07	5.59E-06	8.86E-07	1.79E-06	1.38E-05	5.36E-06	7.33E-05	1.04E-07	4.44E-06
20K YR	1.45E-07	9.31E-08	4.21E-06	6.68E-07	1.35E-06	1.04E-05	4.04E-06	5.52E-05	7.92E-08	3.35E-06

POPULATION-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	7.31E-07	4.80E-07	7.60E-07	8.28E-07	6.88E-07	7.44E-07	1.38E-06	2.50E-06	2.72E-05	1.67E-06
120YR	1.65E-06	1.29E-06	1.92E-06	2.19E-06	1.64E-06	1.80E-06	3.68E-06	6.98E-06	8.12E-05	4.52E-06
160YR	3.31E-06	3.43E-06	4.67E-06	5.66E-06	3.62E-06	4.08E-06	9.66E-06	1.93E-05	2.42E-04	1.21E-05
200YR	2.95E-06	3.62E-06	4.70E-06	5.88E-06	3.45E-06	3.95E-06	1.01E-05	2.07E-05	2.69E-04	1.28E-05
400YR	2.38E-06	3.38E-06	4.13E-06	5.37E-06	2.97E-06	3.44E-06	9.45E-06	1.97E-05	2.49E-06	4.31E-06
600YR	1.44E-09	1.69E-09	1.57E-08	2.92E-09	1.67E-09	1.47E-09	1.70E-09	1.76E-09	1.46E-09	3.01E-09
800YR	7.44E-10	8.77E-10	8.72E-09	1.71E-09	9.84E-10	7.84E-10	1.01E-09	1.07E-09	7.82E-10	1.79E-09
1K YR	2.82E-09	2.15E-09	7.29E-08	1.18E-08	2.18E-08	1.63E-07	6.38E-08	8.63E-07	1.84E-09	5.37E-08
2K YR	2.22E-08	1.47E-08	6.45E-07	1.02E-07	2.05E-07	1.58E-06	6.13E-07	8.37E-06	1.23E-08	5.09E-07
5K YR	2.01E-08	1.30E-08	5.86E-07	9.30E-08	1.87E-07	1.45E-06	5.62E-07	7.69E-06	1.09E-08	4.66E-07
10K YR	4.58E-08	1.27E-08	5.56E-07	2.92E-07	6.27E-07	4.84E-06	1.84E-06	2.46E-05	3.74E-08	1.40E-06
20K YR	1.32E-08	8.48E-09	3.83E-07	6.08E-08	1.23E-07	9.48E-07	3.68E-07	5.03E-06	7.22E-09	3.05E-07

POPULATION-SURFACE WATER

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200YR	2.57E-08	2.85E-08	3.62E-08	4.65E-08	2.89E-08	3.27E-08	8.01E-08	1.62E-07	1.23E-06	7.60E-08
400YR	1.86E-07	2.63E-07	3.23E-07	4.21E-07	2.32E-07	2.68E-07	7.33E-07	1.53E-06	1.22E-05	6.96E-07
600YR	1.19E-10	1.94E-10	2.54E-09	4.28E-10	2.02E-10	1.35E-10	2.09E-10	2.19E-10	1.12E-10	4.42E-10
800YR	7.88E-11	1.50E-10	2.16E-09	3.61E-10	1.62E-10	9.58E-11	1.70E-10	1.79E-10	7.39E-11	3.73E-10
1K YR	7.10E-11	1.40E-10	2.06E-09	3.45E-10	1.54E-10	8.79E-11	1.61E-10	1.71E-10	6.61E-11	3.57E-10
2K YR	1.67E-10	1.99E-10	5.00E-09	8.09E-10	1.11E-09	7.57E-09	3.06E-09	3.99E-08	1.18E-10	2.75E-09
5K YR	9.42E-10	6.15E-10	2.78E-08	4.42E-09	8.91E-09	6.87E-08	2.67E-08	3.65E-07	5.37E-10	2.21E-08
10K YR	8.22E-10	5.34E-10	2.41E-08	3.84E-09	7.73E-09	5.97E-08	2.32E-08	3.17E-07	4.70E-10	1.92E-08
20K YR	1.47E-09	4.42E-10	1.96E-08	9.24E-09	1.98E-08	1.53E-07	5.80E-08	7.77E-07	1.19E-09	4.45E-08

000116

WASTE: CON-DIRT WEIGHT: 5.00E+02 MT DENSITY: 1.60E+00 MT/M3

ID= 3 IA= 1 IK1= 0 IK2= 0 PROCESS= 1
IXS= 3 100 0 1
ICS= 0 0 0 100

TRANSPORTATION IMPACTS

TR-MAX = 6.95E-02 MREM/YR
TR-OCC = 4.17E-01 PERSON-MREM/YR
TR-POP = 2.73E+00 PERSON-MREM/YR

INTRUDER IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
INT-CO	1.90E-02	1.42E-02	1.42E-02	1.45E-02	1.43E-02	1.44E-02	1.53E-02	3.08E-02	1.42E-02	1.58E-02
INT-AG	1.64E-01	1.47E-01	1.46E-01	1.64E-01	1.56E-01	1.50E-01	1.59E-01	1.86E-01	1.84E-01	1.66E-01

EXPOSED WASTE IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IN-AIR	2.19E-02	9.85E-06	1.57E-04	1.60E-03	9.21E-04	1.27E-03	5.55E-03	8.26E-02	1.71E-04	7.65E-03
ER-AIR	4.82E-02	2.17E-05	3.46E-04	3.51E-03	2.03E-03	2.80E-03	1.22E-02	1.82E-01	3.76E-04	1.69E-02
IN-WAT	2.49E-06	8.30E-08	1.64E-06	5.82E-06	2.99E-05	8.92E-06	7.73E-06	6.82E-05	2.49E-06	1.01E-05
ER-WAT	2.97E-04	9.88E-06	1.95E-04	6.94E-04	3.56E-03	1.06E-03	9.21E-04	8.13E-03	2.97E-04	1.20E-03

INCINERATION AND OPERATIONAL IMPACTS: UNITS: IC-IND,IC-MWR,OP-IND,OP-MWR - (MREM/YR)
IC-POP,IC-WOR,OP-POP,OP-WOR - (PERSON-MREM/YR)

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IC-POP	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
IC-IND	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
IC-WOR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
IC-MWR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
OP-POP	2.39E-01	1.08E-04	1.72E-03	1.74E-02	1.01E-02	1.39E-02	6.07E-02	9.03E-01	1.87E-03	8.37E-02
OP-IND	4.14E-03	1.87E-06	2.98E-05	3.02E-04	1.74E-04	2.41E-04	1.05E-03	1.56E-02	3.23E-05	1.45E-03
OP-WOR	5.13E-02	2.85E-02	2.85E-02	2.97E-02	2.87E-02	2.93E-02	3.36E-02	1.08E-01	2.85E-02	3.60E-02
OP-MWR	5.13E-02	2.85E-02	2.85E-02	2.97E-02	2.87E-02	2.93E-02	3.36E-02	1.08E-01	2.85E-02	3.60E-02

LEACHATE ACCUMULATION IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
LA-OPS	1.36E-03	2.74E-04	1.09E-03	5.62E-03	4.60E-03	5.89E-03	7.89E-03	8.78E-02	1.41E-03	5.58E-03
LA-OVF	1.36E-03	2.74E-04	1.09E-03	5.62E-03	4.60E-03	5.89E-03	7.89E-03	8.78E-02	1.41E-03	5.58E-03
LA-AIR	8.67E-02	2.03E-04	7.23E-04	9.91E-03	2.56E-03	9.37E-03	4.52E-02	6.95E-01	1.10E-03	4.53E-02

000117

6381

GROUND WATER IMPACTS (MREM/YR):

INTRUDER-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	7.71E-36	6.73E-38	2.67E-36	6.08E-36	1.38E-34	2.37E-35	8.01E-36	3.56E-36	7.71E-36	3.03E-35
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160YR	4.99E-04	2.62E-05	2.87E-04	2.76E-03	4.99E-04	4.97E-04	1.80E-03	1.61E-02	5.04E-04	1.14E-03
200YR	4.90E-04	2.57E-05	2.82E-04	2.72E-03	4.90E-04	4.89E-04	1.76E-03	1.59E-02	4.96E-04	1.12E-03
400YR	9.00E-04	4.72E-05	5.18E-04	4.98E-03	8.99E-04	8.97E-04	3.24E-03	2.91E-02	9.09E-04	2.05E-03
600YR	1.25E-03	7.31E-05	1.07E-03	7.06E-03	1.25E-03	1.28E-03	6.80E-03	7.81E-02	1.26E-03	4.30E-03
800YR	1.53E-03	8.76E-05	1.23E-03	8.59E-03	1.52E-03	1.55E-03	7.79E-03	8.70E-02	1.54E-03	4.92E-03
1K YR	1.75E-03	9.92E-05	1.35E-03	9.81E-03	1.74E-03	1.77E-03	8.59E-03	9.42E-02	1.76E-03	5.43E-03
2K YR	2.29E-03	1.42E-04	2.36E-03	1.31E-02	2.27E-03	2.37E-03	1.51E-02	1.87E-01	2.30E-03	9.54E-03
5K YR	7.40E-04	8.93E-05	2.84E-03	5.06E-03	1.04E-03	3.73E-03	1.99E-02	3.01E-01	7.07E-04	1.26E-02
10K YR	4.10E-05	1.92E-06	5.32E-05	3.82E-04	6.57E-04	5.05E-03	2.71E-03	3.21E-02	4.07E-05	1.73E-03
20K YR	1.57E-06	1.58E-06	2.80E-05	4.61E-06	1.08E-05	1.08E-06	2.36E-06	2.05E-05	1.43E-06	4.88E-06

POPULATION-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
800YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
2K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
5K YR	5.59E-05	2.94E-06	3.22E-05	3.10E-04	5.59E-05	5.57E-05	2.01E-04	1.81E-03	5.65E-05	1.27E-04
10K YR	7.74E-06	1.05E-06	3.51E-05	5.41E-05	7.18E-06	1.03E-05	2.31E-04	3.59E-03	7.30E-06	1.46E-04
20K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

POPULATION-SURFACE WATER

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
800YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
2K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
5K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
10K YR	3.24E-07	1.53E-08	1.86E-07	1.80E-06	3.24E-07	3.23E-07	1.17E-06	1.05E-05	3.27E-07	7.40E-07
20K YR	6.31E-08	3.62E-08	1.58E-06	9.42E-07	3.90E-08	1.96E-07	1.06E-05	1.72E-04	4.11E-08	6.65E-06

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CUMULATIVE IMPACTS

INTRUDER IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
INT-CO	6.53E-02	6.03E-02	6.03E-02	6.05E-02	6.04E-02	6.07E-02	6.14E-02	7.82E-02	6.03E-02	6.20E-02
INT-AG	2.93E-01	2.76E-01	2.75E-01	2.93E-01	2.84E-01	2.79E-01	2.88E-01	3.16E-01	3.12E-01	2.94E-01

EXPOSED WASTE IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IN-AIR	4.23E-02	6.58E-04	1.40E-03	4.52E-03	5.37E-03	2.49E-02	1.54E-02	1.89E-01	1.85E-03	1.89E-02
ER-AIR	5.74E-02	2.28E-05	3.77E-04	4.64E-03	3.82E-03	1.67E-02	1.75E-02	2.51E-01	7.59E-04	2.26E-02
IN-WAT	5.97E-06	1.00E-06	3.02E-06	7.58E-06	3.26E-05	1.31E-05	1.07E-05	7.81E-05	4.64E-06	1.32E-05
ER-WAT	2.98E-04	9.93E-06	1.97E-04	6.97E-04	3.57E-03	1.12E-03	9.43E-04	8.41E-03	2.98E-04	1.22E-03

INCINERATION AND OPERATIONAL IMPACTS: UNITS: IC-IND,IC-MWR,OP-IND,OP-MWR - (MREM/YR)
IC-POP,IC-WOR,OP-POP,OP-WOR - (PERSON-MREM/YR)

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IC-POP	7.34E+01	3.39E+00	6.50E+00	1.15E+01	1.67E+01	8.48E+01	3.64E+01	3.79E+02	7.23E+00	4.09E+01
IC-IND	5.59E-04	2.58E-05	4.95E-05	8.74E-05	1.27E-04	6.46E-04	2.77E-04	2.89E-03	5.50E-05	3.11E-04
IC-WOR	5.78E+01	5.77E+01	5.77E+01	5.77E+01	5.77E+01	5.78E+01	5.77E+01	5.80E+01	5.77E+01	5.77E+01
IC-MWR	3.96E-01	3.94E-01	3.94E-01	3.94E-01	3.94E-01	3.96E-01	3.95E-01	4.02E-01	3.94E-01	3.95E-01
OP-POP	4.63E-01	7.20E-03	1.53E-02	4.94E-02	5.87E-02	2.73E-01	1.68E-01	2.07E+00	2.02E-02	2.06E-01
OP-IND	4.39E-03	9.54E-06	4.44E-05	3.37E-04	2.27E-04	5.21E-04	1.17E-03	1.69E-02	5.22E-05	1.58E-03
OP-WOR	1.54E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.52E+00	1.52E+00	1.68E+00	1.50E+00	1.52E+00
OP-MWR	1.45E-01	1.21E-01	1.21E-01	1.22E-01	1.21E-01	1.23E-01	1.26E-01	2.06E-01	1.21E-01	1.29E-01

LEACHATE ACCUMULATION IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
LA-OPS	1.37E-03	2.78E-04	1.11E-03	5.64E-03	4.63E-03	6.02E-03	7.94E-03	8.84E-02	1.43E-03	5.62E-03
LA-OVF	1.37E-03	2.78E-04	1.11E-03	5.64E-03	4.63E-03	6.02E-03	7.94E-03	8.84E-02	1.43E-03	5.62E-03
LA-AIR	1.75E-01	3.69E-02	5.41E-02	5.01E-02	4.40E-02	1.29E-01	1.19E-01	1.17E+00	9.41E-02	1.17E-01

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GROUND WATER IMPACTS (MREM/YR):

INTRUDER-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	1.36E-04	6.97E-05	1.34E-04	9.88E-05	1.16E-04	1.18E-04	1.42E-04	1.87E-04	9.79E-04	1.59E-04
40YR	1.42E-04	5.45E-05	1.12E-04	1.04E-04	1.18E-04	1.23E-04	1.68E-04	2.56E-04	1.85E-03	1.91E-04
60YR	1.43E-04	6.39E-05	1.21E-04	1.19E-04	1.23E-04	1.33E-04	1.96E-04	3.35E-04	2.73E-03	2.27E-04
80YR	1.10E-04	5.91E-05	1.03E-04	1.06E-04	9.90E-05	1.09E-04	1.77E-04	3.22E-04	3.00E-03	2.10E-04
100YR	7.95E-05	5.17E-05	8.35E-05	9.03E-05	7.52E-05	8.41E-05	1.52E-04	2.91E-04	2.98E-03	1.83E-04
120YR	6.03E-05	4.69E-05	7.24E-05	8.02E-05	6.05E-05	7.17E-05	1.37E-04	2.86E-04	2.97E-03	1.67E-04
160YR	5.39E-04	6.81E-05	3.47E-04	2.83E-03	5.43E-04	5.53E-04	1.92E-03	1.64E-02	3.46E-03	1.29E-03
200YR	5.23E-04	6.56E-05	3.37E-04	2.78E-03	5.29E-04	5.40E-04	1.88E-03	1.61E-02	3.45E-03	1.26E-03
400YR	9.00E-04	4.74E-05	5.23E-04	4.98E-03	9.00E-04	9.08E-04	3.24E-03	2.91E-02	9.09E-04	2.05E-03
600YR	1.26E-03	7.35E-05	1.08E-03	7.10E-03	1.33E-03	1.95E-03	7.05E-03	8.13E-02	1.26E-03	4.48E-03
800YR	1.53E-03	8.79E-05	1.24E-03	8.62E-03	1.59E-03	2.07E-03	7.99E-03	8.95E-02	1.54E-03	5.07E-03
1K YR	1.75E-03	9.95E-05	1.37E-03	9.84E-03	1.79E-03	2.18E-03	8.74E-03	9.61E-02	1.77E-03	5.54E-03
2K YR	2.30E-03	1.43E-04	2.37E-03	1.31E-02	2.33E-03	2.83E-03	1.53E-02	1.89E-01	2.31E-03	9.67E-03
5K YR	7.44E-04	8.96E-05	2.85E-03	5.09E-03	1.10E-03	4.17E-03	2.01E-02	3.03E-01	7.10E-04	1.27E-02
10K YR	4.12E-05	2.04E-06	5.88E-05	3.83E-04	6.59E-04	5.07E-03	2.71E-03	3.22E-02	4.08E-05	1.73E-03
20K YR	1.72E-06	1.67E-06	3.23E-05	5.28E-06	1.21E-05	1.15E-05	6.40E-06	7.57E-05	1.51E-06	8.23E-06

POPULATION-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	7.31E-07	4.80E-07	7.60E-07	8.28E-07	6.88E-07	7.44E-07	1.38E-06	2.50E-06	2.72E-05	1.67E-06
120YR	1.65E-06	1.29E-06	1.92E-06	2.19E-06	1.64E-06	1.80E-06	3.68E-06	6.98E-06	8.12E-05	4.52E-06
160YR	3.31E-06	3.43E-06	4.67E-06	5.66E-06	3.62E-06	4.08E-06	9.66E-06	1.93E-05	2.42E-04	1.21E-05
200YR	2.95E-06	3.62E-06	4.70E-06	5.88E-06	3.45E-06	3.95E-06	1.01E-05	2.07E-05	2.69E-04	1.28E-05
400YR	2.38E-06	3.38E-06	4.13E-06	5.37E-06	2.97E-06	3.44E-06	9.45E-06	1.97E-05	2.49E-06	4.31E-06
600YR	1.44E-09	1.69E-09	1.57E-08	2.92E-09	1.67E-09	1.47E-09	1.70E-09	1.76E-09	1.46E-09	3.01E-09
800YR	7.44E-10	8.77E-10	8.72E-09	1.71E-09	9.84E-10	7.84E-10	1.01E-09	1.07E-09	7.82E-10	1.79E-09
1K YR	2.82E-09	2.15E-09	7.29E-08	1.18E-08	2.18E-08	1.63E-07	6.38E-08	8.63E-07	1.84E-09	5.37E-08
2K YR	2.22E-08	1.47E-08	6.45E-07	1.02E-07	2.05E-07	1.58E-06	6.13E-07	8.37E-06	1.23E-08	5.09E-07
5K YR	5.59E-05	2.95E-06	3.28E-05	3.10E-04	5.61E-05	5.72E-05	2.02E-04	1.82E-03	5.65E-05	1.28E-04
10K YR	7.79E-06	1.07E-06	3.56E-05	5.44E-05	7.81E-06	1.51E-05	2.33E-04	3.61E-03	7.34E-06	1.47E-04
20K YR	1.32E-08	8.48E-09	3.83E-07	6.08E-08	1.23E-07	9.48E-07	3.68E-07	5.03E-06	7.22E-09	3.05E-07

POPULATION-SURFACE WATER

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200YR	2.57E-08	2.85E-08	3.62E-08	4.65E-08	2.89E-08	3.27E-08	8.01E-08	1.62E-07	1.23E-06	7.60E-08
400YR	1.86E-07	2.63E-07	3.23E-07	4.21E-07	2.32E-07	2.68E-07	7.33E-07	1.53E-06	1.22E-05	6.96E-07
600YR	1.19E-10	1.94E-10	2.54E-09	4.28E-10	2.02E-10	1.35E-10	2.09E-10	2.19E-10	1.12E-10	4.42E-10
800YR	7.88E-11	1.50E-10	2.16E-09	3.61E-10	1.62E-10	9.58E-11	1.70E-10	1.79E-10	7.39E-11	3.73E-10
1K YR	7.10E-11	1.40E-10	2.06E-09	3.45E-10	1.54E-10	8.79E-11	1.61E-10	1.71E-10	6.61E-11	3.57E-10
2K YR	1.67E-10	1.99E-10	5.00E-09	8.09E-10	1.11E-09	7.57E-09	3.06E-09	3.99E-08	1.18E-10	2.75E-09
5K YR	9.42E-10	6.15E-10	2.78E-08	4.42E-09	8.91E-09	6.87E-08	2.67E-08	3.65E-07	5.37E-10	2.21E-08
10K YR	3.25E-07	1.59E-08	2.10E-07	1.81E-06	3.31E-07	3.83E-07	1.19E-06	1.08E-05	3.27E-07	7.59E-07
20K YR	6.46E-08	3.67E-08	1.60E-06	9.51E-07	5.88E-08	3.49E-07	1.06E-05	1.72E-04	4.23E-08	6.69E-06

000120

ONSITE INC, S. LANDF

LIFE= 20 OVFL= 1 NSTR= 1
REGN= 1 DATA= 2
IPOP= 2 INST= 5

OPTIONAL ENVIRONMENTAL PARAMETERS
PRC = 1.80E-01 TXC = 1.00E+00 QFC = 1.10E+02 2.00E+05 4.50E+06
FSC = 2.64E-10 DTTM= 1.70E+00 TTM = 1.85E+00 2.50E+01 5.00E+01
FSA = 8.06E-11 DTPC= .00E+00 TPC = .00E+00 .00E+00 .00E+00
WVEL= 6.67E+00 AWOQ= 1.40E-10 EFAC= 7.95E-06

WASTE: WASTE OIL WEIGHT: 8.00E+02 MT DENSITY: 1.00E+00 MT/M3

ID= 1 IA= 1 IK1= 1 IK2= 50 PROCESS= 2
IXS= 30 100 30 1
ICS= 100 0 0 0

METAL PACKAGE RECYCLE IMPACTS MAXIND = 9.64E-01 MREM/YR
POPULN = 3.83E+03 PERSON-MREM/30YRS

TRANSPORTATION IMPACTS TR-MAX = 1.39E+03 MREM/YR
TR-OCC = 8.33E+04 PERSON-MREM/YR
TR-POP = 2.04E+06 PERSON-MREM/YR

INTRUDER IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
INT-CO	1.14E+01	1.09E+01	1.09E+01	1.09E+01	1.09E+01	1.09E+01	1.09E+01	1.09E+01	1.09E+01	1.10E+01
INT-AG	3.06E+01	3.05E+01	3.08E+01	3.05E+01	3.05E+01	3.05E+01	3.05E+01	3.05E+01	3.05E+01	3.05E+01

EXPOSED WASTE IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IN-AIR	5.03E-01	5.97E-02	5.22E-01	1.11E-01	1.03E-01	1.24E-01	1.08E-01	1.24E-01	9.61E-02	2.05E-01
ER-AIR	5.82E-03	1.87E-03	1.39E-02	3.13E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03	1.57E-03	3.13E-03
IN-WAT	9.29E-04	3.21E-04	2.13E-03	5.88E-04	7.29E-04	8.54E-04	7.25E-04	8.28E-04	6.50E-04	9.41E-04
ER-WAT	6.42E-06	7.93E-06	6.93E-05	1.18E-05	6.42E-06	6.42E-06	6.42E-06	6.42E-06	6.42E-06	1.18E-05

INCINERATION AND OPERATIONAL IMPACTS: UNITS: IC-IND,IC-MWR,OP-IND,OP-MWR - (MREM/YR)
IC-POP,IC-WOR,OP-POP,OP-WOR - (PERSON-MREM/YR)

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
IC-POP	2.36E+04	7.27E+03	1.23E+05	7.43E+03	8.22E+03	8.34E+03	8.71E+03	1.30E+04	7.60E+03	2.21E+04
IC-IND	4.71E+00	1.45E+00	2.46E+01	1.49E+00	1.64E+00	1.67E+00	1.74E+00	2.61E+00	1.52E+00	4.41E+00
IC-WOR	5.71E+05	5.71E+05	5.71E+05	5.71E+05	5.71E+05	5.71E+05	5.71E+05	5.71E+05	5.71E+05	5.71E+05
IC-MWR	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02	6.89E+02
OP-POP	2.01E+01	5.78E+00	6.49E+01	7.03E+00	7.93E+00	8.26E+00	8.26E+00	1.47E+01	7.52E+00	1.60E+01
OP-IND	1.21E-01	3.47E-02	3.89E-01	4.22E-02	4.76E-02	4.95E-02	4.96E-02	8.83E-02	4.51E-02	9.61E-02
OP-WOR	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03
OP-MWR	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03	4.25E+03

LEACHATE ACCUMULATION IMPACTS (MREM/YR):

SCN	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
LA-OPS	8.44E+00	7.29E+00	1.55E+02	6.57E+00	7.27E+00	7.49E+00	7.82E+00	1.48E+01	6.14E+00	2.19E+01
LA-OVF	7.96E-01	7.08E-01	8.50E+00	1.09E+00	7.67E-01	9.00E-01	8.21E-01	8.88E-01	7.57E-01	1.46E+00
LA-AIR	1.11E+01	1.61E+00	2.14E+01	2.66E+00	1.65E+00	1.83E+00	1.81E+00	2.00E+00	1.64E+00	4.68E+00

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GROUND WATER IMPACTS (MREM/YR):

INTRUDER-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	5.24E+00	6.26E+00	5.67E+01	9.42E+00	5.20E+00	5.29E+00	5.75E+00	6.28E+00	5.19E+00	9.69E+00
40YR	4.35E+00	5.33E+00	4.79E+01	7.97E+00	4.34E+00	4.34E+00	4.67E+00	5.02E+00	4.33E+00	8.09E+00
60YR	3.73E+00	4.58E+00	4.08E+01	6.83E+00	3.72E+00	3.72E+00	3.92E+00	4.13E+00	3.72E+00	6.90E+00
80YR	3.20E+00	3.93E+00	3.49E+01	5.86E+00	3.19E+00	3.19E+00	3.32E+00	3.45E+00	3.19E+00	5.90E+00
100YR	2.75E+00	3.38E+00	2.99E+01	5.03E+00	2.74E+00	2.74E+00	2.82E+00	2.90E+00	2.74E+00	5.06E+00
120YR	2.36E+00	2.91E+00	2.56E+01	4.32E+00	2.36E+00	2.36E+00	2.40E+00	2.45E+00	2.36E+00	4.34E+00
160YR	1.74E+00	2.15E+00	1.89E+01	3.19E+00	1.74E+00	1.74E+00	1.76E+00	1.78E+00	1.74E+00	3.20E+00
200YR	1.29E+00	1.59E+00	1.39E+01	2.36E+00	1.29E+00	1.29E+00	1.29E+00	1.30E+00	1.29E+00	2.36E+00
400YR	2.86E-01	3.53E-01	3.08E+00	5.23E-01	2.86E-01	2.86E-01	2.86E-01	2.86E-01	2.86E-01	5.23E-01
600YR	6.33E-02	7.82E-02	6.84E-01	1.16E-01	6.33E-02	6.33E-02	6.33E-02	6.33E-02	6.33E-02	1.16E-01
800YR	1.40E-02	1.73E-02	1.52E-01	2.57E-02	1.40E-02	1.40E-02	1.40E-02	1.40E-02	1.40E-02	2.57E-02
1K YR	3.12E-03	3.85E-03	3.36E-02	5.71E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	5.71E-03
2K YR	1.67E-06	2.07E-06	1.80E-05	3.06E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	3.06E-06
5K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
10K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
20K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

POPULATION-WELL

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	3.57E-01	4.37E-01	3.93E+00	6.54E-01	3.56E-01	3.56E-01	3.83E-01	4.11E-01	3.55E-01	6.63E-01
60YR	3.40E-01	4.17E-01	3.72E+00	6.22E-01	3.39E-01	3.39E-01	3.58E-01	3.77E-01	3.39E-01	6.29E-01
80YR	2.91E-01	3.58E-01	3.18E+00	5.34E-01	2.91E-01	2.91E-01	3.02E-01	3.14E-01	2.91E-01	5.38E-01
100YR	2.50E-01	3.08E-01	2.72E+00	4.58E-01	2.50E-01	2.50E-01	2.57E-01	2.64E-01	2.50E-01	4.61E-01
120YR	2.15E-01	2.65E-01	2.33E+00	3.94E-01	2.15E-01	2.15E-01	2.19E-01	2.23E-01	2.15E-01	3.95E-01
160YR	1.59E-01	1.96E-01	1.72E+00	2.91E-01	1.59E-01	1.59E-01	1.60E-01	1.62E-01	1.59E-01	2.91E-01
200YR	1.17E-01	1.45E-01	1.27E+00	2.15E-01	1.17E-01	1.17E-01	1.18E-01	1.19E-01	1.17E-01	2.15E-01
400YR	2.60E-02	3.21E-02	2.81E-01	4.77E-02	2.60E-02	2.60E-02	2.60E-02	2.60E-02	2.60E-02	4.77E-02
600YR	5.77E-03	7.13E-03	6.23E-02	1.06E-02	5.77E-03	5.77E-03	5.77E-03	5.77E-03	5.77E-03	1.06E-02
800YR	1.28E-03	1.58E-03	1.38E-02	2.34E-03	1.28E-03	1.28E-03	1.28E-03	1.28E-03	1.28E-03	2.34E-03
1K YR	2.84E-04	3.51E-04	3.06E-03	5.20E-04	2.84E-04	2.84E-04	2.84E-04	2.84E-04	2.84E-04	5.20E-04
2K YR	1.52E-07	1.88E-07	1.64E-06	2.79E-07	1.52E-07	1.52E-07	1.52E-07	1.52E-07	1.52E-07	2.79E-07
5K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
10K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
20K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

POPULATION-SURFACE WATER

TIME	LUNGS	S.WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60YR	1.08E-02	1.31E-02	1.17E-01	1.96E-02	1.08E-02	1.08E-02	1.13E-02	1.18E-02	1.07E-02	1.99E-02
80YR	1.54E-02	1.88E-02	1.66E-01	2.80E-02	1.54E-02	1.54E-02	1.59E-02	1.65E-02	1.53E-02	2.83E-02
100YR	1.32E-02	1.62E-02	1.42E-01	2.41E-02	1.32E-02	1.32E-02	1.35E-02	1.38E-02	1.32E-02	2.42E-02
120YR	1.13E-02	1.39E-02	1.22E-01	2.07E-02	1.13E-02	1.13E-02	1.15E-02	1.17E-02	1.13E-02	2.08E-02
160YR	8.35E-03	1.03E-02	9.01E-02	1.53E-02	8.34E-03	8.34E-03	8.41E-03	8.49E-03	8.34E-03	1.53E-02
200YR	6.16E-03	7.60E-03	6.65E-02	1.13E-02	6.16E-03	6.16E-03	6.19E-03	6.22E-03	6.16E-03	1.13E-02
400YR	1.36E-03	1.68E-03	1.47E-02	2.50E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03	2.50E-03
600YR	3.03E-04	3.74E-04	3.27E-03	5.54E-04	3.03E-04	3.03E-04	3.03E-04	3.03E-04	3.03E-04	5.54E-04
800YR	6.71E-05	8.29E-05	7.24E-04	1.23E-04	6.71E-05	6.71E-05	6.71E-05	6.71E-05	6.71E-05	1.23E-04
1K YR	1.49E-05	1.84E-05	1.61E-04	2.73E-05	1.49E-05	1.49E-05	1.49E-05	1.49E-05	1.49E-05	2.73E-05
2K YR	7.99E-09	9.86E-09	8.62E-08	1.46E-08	7.99E-09	7.99E-09	7.99E-09	7.99E-09	7.99E-09	1.46E-08
5K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
10K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
20K YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

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APPENDIX F

EXAMPLE TAPE10.OUT - ICRP DOSES BY NUCLIDE

1

IMPACTS-BRC VERSION 1.0

HAZARDOUS WASTE II

SEC-RESINS

TRANSPORTATION ICRP IMPACTS BY NUCLIDE (MREM/YR)

NUC	MAX INDIVIDUAL
H-3	.000E+00
C-14	.000E+00
CR-51	1.210E-01
MN-54	5.921E-02
FE-55	.000E+00
FE-59	2.390E-01
CO-58	9.662E-02
CO-60	3.073E-01
NI-59	.000E+00
NI-63	.000E+00
ZN-65	1.570E-02
SR-90	7.953E-10
ZR-95	1.221E-01
NB-94	3.673E-06
TC-99	2.448E-13
RU-103	1.277E-01
AG-110	4.802E-01
I-129	8.396E-07
CS-134	1.477E+00
CS-135	.000E+00
CS-137	1.591E+00
CE-141	2.421E-02
CE-144	1.953E-02
PU-238	3.909E-07
PU-239	.000E+00
PU-241	1.085E-07
PU-242	5.128E-10
AM-241	3.214E-04
AM-243	2.666E-04
CM-242	3.810E-06
CM-243	1.076E-06
CM-244	1.292E-07

TOTAL TRANSPORTATION IMPACTS = 4.681E+00

000124

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METAL PACKAGE RECYCLE ICRP IMPACTS BY NUCLIDE (MREM/YR)

NUC	DOSIND
H-3	7.185E-09
C-14	4.251E-12
CR-51	4.174E-04
MN-54	1.523E-06
FE-55	4.454E-11
FE-59	5.049E-06
CO-58	2.070E-06
CO-60	9.693E-06
NI-59	1.118E-13
NI-63	8.538E-11
ZN-65	3.745E-07
SR-90	1.544E-08
ZR-95	4.419E-06
NB-94	1.176E-10
TC-99	4.862E-14
RU-103	2.336E-06
AG-110	1.533E-05
I-129	3.047E-11
CS-134	4.304E-05
CS-135	2.520E-11
CS-137	5.317E-05
CE-141	2.134E-07
CE-144	6.640E-07
PU-238	2.502E-06
PU-239	1.191E-06
PU-241	5.620E-10
PU-242	2.465E-09
AM-241	2.255E-06
AM-243	1.556E-06
CM-242	6.139E-06
CM-243	5.686E-09
CM-244	1.608E-06

TOTAL RECYCLE IMPACT = 5.706E-04

000125

INTRUDER ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	CONSTRUCTION	AGRICULTURE
H-3	1.287E-10	2.859E-04
C-14	2.226E-12	1.304E-04
CR-51	.000E+00	.000E+00
MN-54	5.953E-14	1.156E-13
FE-55	1.321E-12	6.868E-12
FE-59	.000E+00	.000E+00
CO-58	.000E+00	.000E+00
CO-60	4.458E-04	8.659E-04
NI-59	1.110E-12	3.264E-11
NI-63	6.780E-10	2.191E-08
ZN-65	4.547E-17	8.906E-17
SR-90	2.807E-07	9.649E-07
ZR-95	.000E+00	.000E+00
NB-94	2.793E-07	5.425E-07
TC-99	1.254E-11	1.111E-07
RU-103	.000E+00	.000E+00
AG-110	4.347E-15	8.443E-15
I-129	6.468E-08	6.714E-07
CS-134	4.436E-06	8.616E-06
CS-135	1.155E-11	3.660E-10
CS-137	6.055E-02	1.176E-01
CE-141	.000E+00	.000E+00
CE-144	3.665E-15	7.119E-15
PU-238	8.490E-05	1.127E-04
PU-239	6.171E-05	8.191E-05
PU-241	7.880E-05	1.270E-04
PU-242	1.310E-07	1.739E-07
AM-241	1.604E-04	2.641E-04
AM-243	3.003E-05	5.497E-05
CM-242	9.689E-07	1.286E-06
CM-243	6.712E-08	1.186E-07
CM-244	1.354E-05	1.968E-05
RADON		.000E+00

TOTAL NON-NORMALIZED INTRUDER IMPACTS

	6.143E-02	1.196E-01

000126

6381

EXPOSED WASTE ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	INTRUDER-AIR	EROSION-AIR	INTRUDER-WATER	EROSION-WATER
H-3	1.329E-08	1.897E-29	4.475E-10	7.843E-31
C-14	6.518E-08	4.755E-05	3.872E-09	3.468E-06
CR-51	.000E+00	.000E+00	.000E+00	.000E+00
MN-54	2.368E-18	.000E+00	6.144E-19	.000E+00
FE-55	7.480E-12	.000E+00	3.249E-13	.000E+00
FE-59	.000E+00	.000E+00	.000E+00	.000E+00
CO-58	.000E+00	.000E+00	.000E+00	.000E+00
CO-60	3.196E-08	.000E+00	6.373E-10	.000E+00
NI-59	5.686E-12	4.625E-09	1.693E-13	1.691E-10
NI-63	3.697E-09	2.041E-09	1.132E-10	7.670E-11
ZN-65	2.306E-20	.000E+00	1.785E-21	.000E+00
SR-90	4.914E-07	1.585E-14	1.356E-09	5.373E-17
ZR-95	.000E+00	.000E+00	.000E+00	.000E+00
NB-94	6.211E-11	4.926E-08	8.475E-12	8.253E-09
TC-99	9.935E-11	8.124E-08	2.798E-12	2.809E-09
RU-103	.000E+00	.000E+00	.000E+00	.000E+00
AG-110	2.435E-19	.000E+00	7.303E-21	.000E+00
I-129	3.049E-07	2.501E-04	9.083E-10	9.147E-07
CS-134	1.646E-09	.000E+00	1.788E-10	.000E+00
CS-135	4.406E-10	3.613E-07	5.024E-11	5.058E-08
CS-137	4.418E-05	6.729E-12	4.907E-06	9.176E-13
CE-141	.000E+00	.000E+00	.000E+00	.000E+00
CE-144	1.658E-17	.000E+00	2.445E-19	.000E+00
PU-238	1.387E-04	6.617E-05	2.123E-08	1.232E-08
PU-239	1.008E-04	8.048E-02	1.565E-08	1.533E-05
PU-241	1.237E-04	2.655E-02	7.256E-07	2.150E-04
PU-242	2.140E-07	1.752E-04	3.342E-11	3.360E-08
AM-241	2.506E-04	4.756E-02	1.653E-06	3.851E-04
AM-243	1.794E-05	1.386E-02	1.199E-07	1.111E-04
CM-242	1.583E-06	7.541E-07	2.423E-10	1.404E-10
CM-243	4.379E-08	1.126E-07	1.936E-10	2.145E-11
CM-244	2.415E-05	2.379E-04	1.011E-07	4.545E-08
TOTAL NON-NORMALIZED EXPOSED WASTE IMPACTS	7.029E-04	1.692E-01	7.552E-06	7.310E-04

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OVERFLOW ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	TREATMENT	OVERFLOW	EVAPORATOR
H-3	4.472E-04	8.235E-05	1.576E-02
C-14	1.038E-04	1.034E-04	9.349E-03
CR-51	2.861E-07	.000E+00	.000E+00
MN-54	1.343E-06	1.774E-17	2.449E-18
FE-55	7.977E-07	2.649E-10	2.185E-10
FE-59	8.468E-06	.000E+00	.000E+00
CO-58	2.288E-06	.000E+00	.000E+00
CO-60	4.820E-05	9.189E-07	1.651E-06
NI-59	6.517E-10	6.516E-10	7.837E-10
NI-63	5.078E-07	4.051E-07	4.739E-07
ZN-65	1.401E-05	5.330E-19	2.467E-19
SR-90	5.817E-06	2.773E-06	3.597E-05
ZR-95	1.031E-06	.000E+00	.000E+00
NB-94	2.443E-08	2.441E-08	6.407E-09
TC-99	8.326E-08	8.325E-08	2.118E-07
RU-103	1.282E-04	.000E+00	.000E+00
AG-110	2.051E-07	2.440E-20	2.914E-20
I-129	2.710E-05	2.710E-05	6.517E-04
CS-134	3.317E-05	1.309E-09	4.316E-10
CS-135	2.059E-09	2.059E-09	6.468E-10
CS-137	3.341E-04	1.671E-04	5.388E-05
CE-141	8.660E-08	.000E+00	.000E+00
CE-144	1.020E-06	2.511E-18	6.101E-18
PU-238	3.036E-06	2.386E-06	5.584E-04
PU-239	1.899E-06	1.898E-06	4.380E-04
PU-241	9.338E-07	1.933E-07	3.901E-05
PU-242	4.011E-09	4.010E-09	9.198E-07
AM-241	1.819E-03	1.738E-03	9.437E-03
AM-243	1.281E-04	1.278E-04	6.841E-04
CM-242	4.704E-07	2.226E-27	3.979E-26
CM-243	3.690E-08	1.924E-08	1.556E-07
CM-244	2.817E-05	8.638E-06	7.327E-05
TOTAL NON-NORMALIZED OVERFLOW IMPACTS	3.139E-03	2.263E-03	3.709E-02

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GROUNDWATER ICRP IMPACTS BY NUCLIDE (MREM/YR) AT EACH TIME
**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

FIRST ROW IS INTRUDER WELL
SECOND ROW IS POPULATION WELL
THIRD ROW IS SURFACE WATER

	20YR	40YR	60YR	80YR	100YR	120YR	160YR	200YR	400YR	600YR	800YR	1K YR	2K YR	5K YR	10K YR	20K YR
H-3																
	.0E+00	.0E+00	7.5E-05	2.4E-05	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-30	.0E+00	.0E+00	.0E+00	.0E+00
C-14																
	.0E+00	.0E+00	1.8E-04	1.8E-04	1.8E-04	1.8E-04	3.5E-04	3.5E-04	6.9E-04	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	6.9E-05	1.4E-04	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.6E-06	.0E+00	.0E+00	.0E+00	.0E+00
CR-51																
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
MN-54																
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
FE-55																
	.0E+00	.0E+00	7.6E-13	3.6E-15	1.7E-17	8.3E-20	3.8E-24	8.8E-29	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
FE-59																
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CO-58																
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CO-60																
	.0E+00	.0E+00	1.3E-07	9.6E-09	6.9E-10	4.9E-11	5.0E-13	2.5E-15	1.7E-26	1.0E-37	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	6.1E-39	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
NI-59																
	.0E+00	.0E+00	1.7E-09	1.7E-09	1.7E-09	1.7E-09	3.3E-09	3.3E-09	6.7E-09	1.2E-08	1.5E-08	1.7E-08	1.6E-08	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	6.9E-10	1.4E-09	2.1E-09	3.4E-09	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-11	1.8E-10	.0E+00	.0E+00	.0E+00
NI-63																
	.0E+00	.0E+00	8.9E-07	7.7E-07	6.6E-07	5.7E-07	8.4E-07	6.2E-07	2.8E-07	1.1E-07	3.0E-08	7.5E-09	4.0E-12	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	6.3E-09	2.8E-09	9.3E-10	8.3E-13	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.1E-12	4.4E-14	.0E+00	.0E+00	.0E+00
ZN-65																
	.0E+00	.0E+00	3.5E-31	4.0E-40	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00

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SR-90															
.0E+00	.0E+00	4.7E-06	2.9E-06	1.7E-06	1.1E-06	7.9E-07	3.0E-07	4.2E-09	5.3E-11	4.9E-13	3.9E-15	7.3E-26	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	3.1E-12	4.5E-14	4.8E-16	1.5E-26	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	3.8E-18	7.1E-28	.0E+00	.0E+00	.0E+00
ZR-95															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
NB-94															
.0E+00	.0E+00	1.1E-08	1.1E-08	1.1E-08	1.1E-08	2.2E-08	2.2E-08	4.5E-08	7.7E-08	9.9E-08	1.1E-07	1.1E-07	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.6E-09	9.1E-09	1.3E-08	2.2E-08	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	6.6E-10	6.3E-09	.0E+00	.0E+00	.0E+00
TC-99															
.0E+00	.0E+00	2.5E-07	2.5E-07	2.5E-07	2.5E-07	5.0E-07	5.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-07	2.1E-07	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-09	.0E+00	.0E+00	.0E+00	.0E+00
RU-103															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
AG-110															
.0E+00	.0E+00	1.1E-31	2.5E-40	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
I-129															
.0E+00	.0E+00	8.1E-05	8.1E-05	8.1E-05	8.1E-05	1.6E-04	1.6E-04	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-05	6.7E-05	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-07	.0E+00	.0E+00	.0E+00	.0E+00
CS-134															
.0E+00	.0E+00	2.9E-13	3.4E-16	3.9E-19	4.5E-22	1.2E-27	1.6E-33	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CS-135															
.0E+00	.0E+00	2.0E-09	2.0E-09	2.0E-09	2.0E-09	3.9E-09	3.9E-09	7.9E-09	1.4E-08	1.8E-08	2.0E-08	2.0E-08	2.0E-08	2.0E-08	2.0E-08
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.1E-10	1.6E-09	2.4E-09	4.1E-09	4.1E-09	4.0E-09	4.0E-09
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	5.9E-11	5.9E-10	5.9E-10	5.9E-10	5.8E-10
CS-137															
.0E+00	.0E+00	9.8E-05	6.2E-05	3.9E-05	2.5E-05	2.0E-05	7.8E-06	1.5E-07	2.6E-09	3.3E-11	3.7E-13	3.4E-23	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.6E-10	3.1E-12	4.5E-14	7.0E-24	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-15	9.9E-25	.0E+00	.0E+00	.0E+00
CE-141															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CE-144															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
PU-238															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	7.6E-08	1.5E-08	3.1E-09	2.0E-12	1.8E-22	1.4E-39	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	7.4E-24	1.7E-40	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-42	.0E+00

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PU-239															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	5.3E-06	5.3E-06	5.2E-06	1.0E-05	2.3E-05	4.1E-05	3.1E-05
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	9.6E-07	5.0E-06	6.3E-06
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.0E-08	3.0E-07
PU-241															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.7E-20	2.4E-24	6.6E-29	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
PU-242															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-08	1.1E-08	1.1E-08	2.3E-08	5.7E-08	1.1E-07	1.1E-07
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-09	1.4E-08	2.3E-08
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-10	1.1E-09
AM-241															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-06	9.6E-10	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
AM-243															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.6E-04	1.0E-04	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CM-242															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CM-243															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CM-244															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
TOTAL NON-NORMALIZED GROUNDWATER IMPACTS															
.0E+00	.0E+00	4.4E-04	3.5E-04	3.0E-04	2.9E-04	5.4E-04	5.2E-04	6.9E-04	5.6E-06	5.5E-06	5.4E-06	1.0E-05	1.8E-04	1.4E-04	3.1E-05
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-04	2.0E-04	1.9E-08	2.9E-08	9.7E-07	5.0E-06	6.3E-06
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-06	7.1E-09	5.9E-10	4.0E-08	3.0E-07

000134

SANITARY LANDFILL

TRASH

TRANSPORTATION ICRP IMPACTS BY NUCLIDE (MREM/YR)

NUC	MAX INDIVIDUAL
H-3	.000E+00
C-14	.000E+00
CR-51	2.961E-02
MN-54	1.449E-02
FE-55	.000E+00
FE-59	5.848E-02
CO-58	2.364E-02
CO-60	7.518E-02
NI-59	.000E+00
NI-63	.000E+00
ZN-65	3.842E-03
SR-90	1.946E-10
ZR-95	2.988E-02
NB-94	8.986E-07
TC-99	5.989E-14
RU-103	3.124E-02
AG-110	1.175E-01
I-129	2.054E-07
CS-134	3.613E-01
CS-135	.000E+00
CS-137	3.892E-01
CE-141	5.922E-03
CE-144	4.777E-03
PU-238	9.563E-08
PU-239	.000E+00
PU-241	2.655E-08
PU-242	1.254E-10
AM-241	7.862E-05
AM-243	6.523E-05
CM-242	9.320E-07
CM-243	2.632E-07
CM-244	3.160E-08

TOTAL TRANSPORTATION IMPACTS = 1.145E+00

000132

6381

INCINERATION ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS NOT NORMALIZED BY NUMBER OF PROCESSING FACILITIES ****

NUC	MAXIMUM OFF-SITE INDIVIDUAL
H-3	1.780E-05
C-14	1.345E-05
CR-51	5.833E-07
MN-54	2.457E-07
FE-55	3.087E-08
FE-59	1.353E-06
CO-58	4.913E-07
CO-60	2.298E-06
NI-59	7.796E-12
NI-63	6.353E-09
ZN-65	8.308E-07
SR-90	1.413E-06
ZR-95	3.706E-07
NB-94	8.522E-11
TC-99	2.724E-10
RU-103	6.777E-06
AG-110	2.806E-06
I-129	8.359E-07
CS-134	5.717E-05
CS-135	6.039E-10
CS-137	1.211E-04
CE-141	5.799E-07
CE-144	9.231E-06
PU-238	2.418E-04
PU-239	1.383E-04
PU-241	9.364E-05
PU-242	2.933E-07
AM-241	3.594E-04
AM-243	2.464E-05
CM-242	4.195E-05
CM-243	1.149E-07
CM-244	1.069E-04

TOTAL NON-NORMALIZED INCINERATOR IMPACT = 1.245E-03

000133

WORKER INCINERATION ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF PROCESSING FACILITIES ****

NUC	RESIDUE HANDLERS	MAINTENANCE
H-3	4.798E-09	2.639E-09
C-14	1.534E-11	8.436E-12
CR-51	4.077E-02	4.077E-02
MN-54	1.995E-02	1.995E-02
FE-55	2.736E-08	1.505E-08
FE-59	8.052E-02	8.052E-02
CO-58	3.255E-02	3.254E-02
CO-60	1.035E-01	1.035E-01
NI-59	7.763E-12	4.270E-12
NI-63	5.833E-09	3.208E-09
ZN-65	5.290E-03	5.290E-03
SR-90	4.043E-06	2.224E-06
ZR-95	4.114E-02	4.114E-02
NB-94	1.238E-06	1.237E-06
TC-99	8.602E-11	4.735E-11
RU-103	4.301E-02	4.301E-02
AG-110	1.618E-01	1.618E-01
I-129	2.887E-07	2.861E-07
CS-134	4.974E-01	4.974E-01
CS-135	7.930E-11	4.362E-11
CS-137	5.359E-01	5.359E-01
CE-141	8.155E-03	8.155E-03
CE-144	6.597E-03	6.588E-03
PU-238	7.412E-04	4.077E-04
PU-239	4.240E-04	2.332E-04
PU-241	2.868E-04	1.578E-04
PU-242	8.991E-07	4.946E-07
AM-241	1.092E-03	6.495E-04
AM-243	1.571E-04	1.268E-04
CM-242	1.250E-04	6.931E-05
CM-243	6.833E-07	5.389E-07
CM-244	3.001E-04	1.651E-04
TOTAL NON-NORMALIZED WORKER IMPACTS	1.580E+00	1.578E+00

000434

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METAL AND GLASS RECYCLE ICRP IMPACTS BY NUCLIDE

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF FACILITIES ****

NUC	METAL IND	GLASS IND
H-3	4.042E-06	.000E+00
C-14	2.391E-09	.000E+00
CR-51	2.348E-01	8.589E-02
MN-54	8.567E-04	4.201E-02
FE-55	2.505E-08	.000E+00
FE-59	2.840E-03	1.696E-01
CO-58	1.164E-03	6.855E-02
CO-60	5.453E-03	2.180E-01
NI-59	6.286E-11	.000E+00
NI-63	4.803E-08	.000E+00
ZN-65	2.107E-04	1.114E-02
SR-90	8.683E-06	5.643E-10
ZR-95	2.486E-03	8.667E-02
NB-94	6.614E-08	2.606E-06
TC-99	2.735E-11	1.737E-13
RU-103	1.314E-03	9.060E-02
AG-110	8.625E-03	3.407E-01
I-129	1.714E-08	5.957E-07
CS-134	2.421E-02	1.048E+00
CS-135	1.418E-08	.000E+00
CS-137	2.991E-02	1.129E+00
CE-141	1.200E-04	1.718E-02
CE-144	3.735E-04	1.385E-02
PU-238	1.407E-03	2.774E-07
PU-239	6.697E-04	.000E+00
PU-241	3.161E-07	7.699E-08
PU-242	1.387E-06	3.638E-10
AM-241	1.268E-03	2.280E-04
AM-243	8.753E-04	1.892E-04
CM-242	3.453E-03	2.703E-06
CM-243	3.198E-06	7.633E-07
CM-244	9.043E-04	9.165E-08

000435

INTRUDER ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	CONSTRUCTION	AGRICULTURE
H-3	3.180E-10	4.643E-04
C-14	2.542E-12	9.787E-05
CR-51	1.905E-02	5.323E-02
MN-54	9.317E-03	2.604E-02
FE-55	1.800E-08	6.558E-08
FE-59	3.761E-02	1.051E-01
CO-58	1.520E-02	4.249E-02
CO-60	4.836E-02	1.351E-01
NI-59	5.027E-12	9.818E-11
NI-63	3.847E-09	8.253E-08
ZN-65	2.471E-03	6.965E-03
SR-90	2.666E-06	6.208E-06
ZR-95	1.922E-02	5.371E-02
NB-94	5.781E-07	1.616E-06
TC-99	5.643E-11	3.288E-07
RU-103	1.999E-02	5.590E-02
AG-110	7.556E-02	2.112E-01
I-129	1.350E-07	2.042E-06
CS-134	2.324E-01	6.495E-01
CS-135	5.230E-11	1.168E-09
CS-137	2.504E-01	6.999E-01
CE-141	3.810E-03	1.065E-02
CE-144	3.085E-03	8.604E-03
PU-238	4.888E-04	4.581E-04
PU-239	2.796E-04	2.620E-04
PU-241	1.892E-04	1.774E-04
PU-242	5.929E-07	5.558E-07
AM-241	6.996E-04	8.692E-04
AM-243	8.636E-05	1.672E-04
CM-242	8.217E-05	8.124E-05
CM-243	3.809E-07	6.914E-07
CM-244	1.979E-04	2.032E-04
RADON		.000E+00
TOTAL NON-NORMALIZED INTRUDER IMPACTS	7.384E-01	2.061E+00

000136

638 IIA

EXPOSED WASTE ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	INTRUDER-AIR	EROSION-AIR	INTRUDER-WATER	EROSION-WATER
H-3	9.207E-08	6.497E-32	7.267E-10	2.775E-32
C-14	2.087E-07	4.072E-07	2.906E-09	3.067E-07
CR-51	5.403E-06	.000E+00	5.206E-08	.000E+00
MN-54	2.276E-06	.000E+00	1.384E-07	.000E+00
FE-55	2.860E-07	.000E+00	2.910E-09	.000E+00
FE-59	1.253E-05	.000E+00	1.307E-07	.000E+00
CO-58	4.551E-06	.000E+00	3.443E-08	.000E+00
CO-60	2.129E-05	.000E+00	9.947E-08	.000E+00
NI-59	7.222E-11	1.576E-10	5.039E-13	5.952E-11
NI-63	5.885E-08	6.955E-11	4.222E-10	2.700E-11
ZN-65	7.696E-06	.000E+00	1.396E-07	.000E+00
SR-90	1.309E-05	5.403E-16	8.467E-09	1.891E-17
ZR-95	3.433E-06	.000E+00	2.348E-08	.000E+00
NB-94	7.894E-10	1.679E-09	2.524E-11	2.905E-09
TC-99	1.255E-09	2.755E-09	8.283E-12	9.837E-10
RU-103	3.123E-05	.000E+00	2.540E-07	.000E+00
AG-110	2.600E-05	.000E+00	1.827E-07	.000E+00
I-129	3.852E-06	8.481E-06	2.689E-09	3.204E-07
CS-134	5.295E-04	.000E+00	1.348E-05	.000E+00
CS-135	5.594E-09	1.232E-08	1.495E-10	1.781E-08
CS-137	1.122E-03	2.293E-13	2.919E-05	3.230E-13
CE-141	5.371E-06	.000E+00	4.251E-08	.000E+00
CE-144	8.551E-05	.000E+00	2.954E-07	.000E+00
PU-238	2.240E-03	2.255E-06	8.035E-08	4.337E-09
PU-239	1.282E-03	2.743E-03	4.660E-08	5.397E-06
PU-241	8.674E-04	9.049E-04	3.608E-08	7.568E-05
PU-242	2.717E-06	5.972E-06	9.944E-11	1.183E-08
AM-241	3.330E-03	1.621E-03	5.147E-06	1.356E-04
AM-243	2.282E-04	4.723E-04	3.578E-07	3.910E-05
CM-242	3.886E-04	2.570E-08	1.825E-07	4.941E-11
CM-243	1.065E-06	3.838E-09	1.105E-09	7.552E-12
CM-244	9.906E-04	8.108E-06	9.801E-07	1.600E-08
TOTAL NON-NORMALIZED EXPOSED WASTE IMPACTS	1.120E-02	5.766E-03	5.092E-05	2.564E-04

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OVERFLOW ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	TREATMENT	OVERFLOW	EVAPORATOR
H-3	1.203E-05	1.203E-05	2.553E-02
C-14	6.975E-06	6.975E-06	6.995E-03
CR-51	7.655E-08	7.655E-08	7.393E-07
MN-54	3.593E-07	3.593E-07	5.501E-07
FE-55	2.134E-07	2.134E-07	1.952E-06
FE-59	2.266E-06	2.266E-06	2.022E-05
CO-58	6.121E-07	6.121E-07	7.530E-06
CO-60	1.290E-05	1.290E-05	2.570E-04
NI-59	1.744E-10	1.744E-10	2.326E-09
NI-63	1.359E-07	1.359E-07	1.763E-06
ZN-65	3.749E-06	3.749E-06	1.924E-05
SR-90	1.556E-06	1.556E-06	2.239E-04
ZR-95	2.759E-07	2.759E-07	3.754E-06
NB-94	6.538E-09	6.538E-09	1.903E-08
TC-99	2.217E-08	2.217E-08	6.254E-07
RU-103	3.413E-05	3.413E-05	7.813E-04
AG-110	5.487E-08	5.487E-08	7.269E-07
I-129	7.216E-06	7.216E-06	1.924E-03
CS-134	8.875E-06	8.875E-06	3.244E-05
CS-135	5.509E-10	5.509E-10	1.919E-09
CS-137	8.941E-05	8.941E-05	3.197E-04
CE-141	2.317E-08	2.317E-08	2.725E-07
CE-144	2.729E-07	2.729E-07	7.353E-06
PU-238	8.123E-07	8.123E-07	2.107E-03
PU-239	5.082E-07	5.082E-07	1.301E-03
PU-241	2.499E-07	2.499E-07	5.591E-04
PU-242	1.073E-09	1.073E-09	2.729E-06
AM-241	4.867E-04	4.867E-04	2.930E-02
AM-243	3.429E-05	3.429E-05	2.035E-03
CM-242	1.259E-07	1.259E-07	2.495E-05
CM-243	9.873E-09	9.873E-09	8.856E-07
CM-244	7.537E-06	7.537E-06	7.090E-04
TOTAL NON-NORMALIZED OVERFLOW IMPACTS			
	7.113E-04	7.113E-04	7.216E-02

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GROUNDWATER ICRP IMPACTS BY NUCLIDE (MREM/YR) AT EACH TIME
**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

FIRST ROW IS INTRUDER WELL
SECOND ROW IS POPULATION WELL
THIRD ROW IS SURFACE WATER

	20YR	40YR	60YR	80YR	100YR	120YR	160YR	200YR	400YR	600YR	800YR	1K YR	2K YR	5K YR	10K YR	20K YR
H-3																
	3.7E-04	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-07	1.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-11	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
C-14																
	2.4E-04	4.7E-04	7.1E-04	7.8E-04	7.8E-04	7.8E-04	7.8E-04	7.7E-04	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	7.1E-06	2.1E-05	6.4E-05	7.0E-05	6.9E-05	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-07	5.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CR-51																
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
MN-54																
	.0E+00	.0E+00	1.7E-27	9.7E-35	5.4E-42	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
FE-55																
	1.7E-07	1.6E-09	1.2E-11	6.3E-14	3.0E-16	1.5E-18	3.3E-23	7.7E-28	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-18	4.0E-20	2.7E-24	7.0E-29	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	5.2E-31	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
FE-59																
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CO-58																
	9.9E-35	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CO-60																
	1.4E-04	2.0E-05	2.1E-06	1.7E-07	1.2E-08	8.6E-10	4.4E-12	2.2E-14	7.6E-26	2.6E-37	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-10	2.3E-11	3.6E-13	2.0E-15	6.9E-27	2.4E-38	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	9.4E-18	3.2E-28	1.1E-39	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
NI-59																
	8.8E-09	1.8E-08	2.6E-08	2.9E-08	2.9E-08	2.9E-08	2.9E-08	2.9E-08	2.9E-08	2.9E-08	2.9E-08	2.9E-08	2.9E-08	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	2.7E-10	8.0E-10	2.4E-09	2.7E-09	2.7E-09	2.6E-09	2.6E-09	2.6E-09	2.6E-09	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-11	1.4E-10	1.4E-10	1.4E-10	1.4E-10	1.4E-10	.0E+00	.0E+00	.0E+00
NI-63																
	6.3E-06	1.1E-05	1.4E-05	1.3E-05	1.2E-05	9.9E-06	7.3E-06	5.4E-06	1.2E-06	2.7E-07	5.9E-08	1.3E-08	7.0E-12	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-07	2.7E-07	6.0E-07	4.9E-07	1.1E-07	2.4E-08	5.4E-09	1.2E-09	6.4E-13	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.6E-09	5.7E-09	1.3E-09	2.8E-10	6.3E-11	3.4E-14	.0E+00	.0E+00	.0E+00
ZN-65																
	1.4E-12	3.3E-21	5.6E-30	7.0E-39	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
SR-90																
	6.6E-05	8.1E-05	7.4E-05	5.0E-05	3.0E-05	1.9E-05	6.9E-06	2.6E-06	1.8E-08	1.3E-10	9.4E-13	6.8E-15	1.3E-25	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-07	5.1E-07	5.7E-07	2.3E-07	1.7E-09	1.2E-11	8.6E-14	6.2E-16	1.2E-26	.0E+00	.0E+00	.0E+00
	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-09	8.0E-11	5.7E-13	4.1E-15	2.9E-17	5.5E-28	.0E+00	.0E+00	.0E+00

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ZR-95															
7.8E-38	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
NB-94															
5.9E-08	1.2E-07	1.8E-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	1.8E-07	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	1.8E-09	5.4E-09	1.6E-08	1.8E-08	1.8E-08	1.8E-08	1.7E-08	1.7E-08	1.7E-08	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	5.2E-10	5.2E-09	5.1E-09	5.1E-09	5.1E-09	4.9E-09	.0E+00	.0E+00	.0E+00
TC-99															
1.3E-06	2.6E-06	3.9E-06	4.4E-06	4.4E-06	4.4E-06	4.4E-06	4.4E-06	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	4.0E-08	1.2E-07	3.6E-07	4.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-09	1.8E-08	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
RU-103															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
AG-110															
9.4E-14	4.5E-22	1.7E-30	4.4E-39	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
I-129															
4.2E-04	8.4E-04	1.3E-03	1.4E-03	1.4E-03	1.4E-03	1.4E-03	1.4E-03	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	1.3E-05	3.8E-05	1.1E-04	1.3E-04	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	5.8E-07	5.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CS-134															
1.1E-06	2.6E-09	4.5E-12	5.9E-15	6.8E-18	7.9E-21	1.1E-26	1.4E-32	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	6.2E-20	2.1E-22	8.7E-28	1.3E-33	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-35	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CS-135															
1.0E-08	2.1E-08	3.1E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08	3.4E-08
.0E+00	.0E+00	.0E+00	.0E+00	3.1E-10	9.4E-10	2.8E-09	3.1E-09	3.1E-09	3.1E-09	3.1E-09	3.1E-09	3.1E-09	3.1E-09	3.1E-09	3.1E-09
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.5E-11	4.5E-10	4.5E-10	4.5E-10	4.5E-10	4.5E-10	4.5E-10	4.5E-10	4.5E-10
CS-137															
1.3E-03	1.6E-03	1.5E-03	1.1E-03	6.8E-04	4.3E-04	1.7E-04	6.8E-05	6.7E-07	6.6E-09	6.5E-11	6.4E-13	5.9E-23	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	6.2E-06	1.2E-05	1.4E-05	6.2E-06	6.1E-08	6.0E-10	5.9E-12	5.8E-14	5.4E-24	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.7E-08	8.6E-09	8.4E-11	8.3E-13	8.2E-15	7.6E-25	.0E+00	.0E+00	.0E+00
CE-141															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CE-144															
.0E+00	.0E+00	3.1E-28	5.7E-36	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
PU-238															
.0E+00	.0E+00	1.0E-05	8.5E-06	7.3E-06	1.2E-05	9.0E-06	9.8E-06	3.9E-06	1.2E-06	2.7E-07	5.3E-08	1.8E-11	6.2E-22	2.4E-39	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.9E-10	1.6E-12	5.7E-23	2.2E-40	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	7.6E-15	2.7E-24	1.0E-41	.0E+00
PU-239															
.0E+00	.0E+00	9.4E-06	9.4E-06	9.4E-06	1.9E-05	1.9E-05	2.8E-05	5.6E-05	8.3E-05	9.2E-05	9.1E-05	8.9E-05	8.2E-05	7.1E-05	5.3E-05
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.3E-07	8.1E-06	7.4E-06	6.5E-06	4.9E-06
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	3.8E-08	3.5E-07	3.1E-07	2.3E-07
PU-241															
.0E+00	.0E+00	3.1E-07	1.1E-07	3.8E-08	2.7E-08	3.3E-09	6.0E-10	3.3E-14	1.4E-18	4.2E-23	1.2E-27	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-29	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
PU-242															
.0E+00	.0E+00	2.0E-08	2.0E-08	2.0E-08	4.0E-08	4.0E-08	6.0E-08	1.2E-07	1.8E-07	2.0E-07	2.0E-07	2.0E-07	2.0E-07	2.0E-07	1.9E-07
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-09	1.8E-08	1.8E-08	1.8E-08	1.8E-08
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.6E-11	8.6E-10	8.5E-10	8.4E-10

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AM-241																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-03	1.8E-03	1.3E-03	8.8E-04	2.2E-05	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.5E-10	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	3.0E-18
AM-243																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.0E-04	3.9E-04	3.8E-04	1.1E-03	1.9E-03	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.6E-05	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.8E-07
CM-242																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CM-243																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.6E-26	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CM-244																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	9.8E-39	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
TOTAL NON-NORMALIZED GROUNDWATER IMPACTS																
2.5E-03	3.1E-03	3.6E-03	3.4E-03	2.9E-03	2.7E-03	2.4E-03	2.3E-03	6.2E-05	2.9E-03	2.3E-03	1.8E-03	2.0E-03	2.0E-03	7.1E-05	5.4E-05
.0E+00	.0E+00	.0E+00	.0E+00	2.7E-05	7.2E-05	1.9E-04	2.1E-04	6.9E-05	4.8E-08	2.9E-08	8.6E-07	8.1E-06	7.5E-06	2.2E-05	4.9E-06
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-06	1.1E-05	7.1E-09	6.0E-09	5.7E-09	4.4E-08	3.5E-07	3.1E-07	7.1E-07

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CON-DIRT

TRANSPORTATION ICRP IMPACTS BY NUCLIDE (MREM/YR)

NUC	MAX INDIVIDUAL
PB-210	2.305E-05
PO-210	2.439E-07
RN-222	2.128E-02
RA-226	7.072E-05
RA-228	1.590E-02
AC-227	1.841E-04
TH-228	3.181E-02
TH-230	2.395E-06
TH-232	.000E+00
PA-231	2.120E-05
U-234	1.094E-06
U-235	7.716E-05
U-238	1.466E-04

TOTAL TRANSPORTATION IMPACTS = 6.952E-02

INTRUDER ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	CONSTRUCTION	AGRICULTURE
PB-210	8.082E-06	2.818E-05
PO-210	1.138E-05	3.462E-05
RN-222	4.359E-03	1.218E-02
RA-226	2.558E-05	8.894E-05
RA-228	3.261E-03	9.141E-03
AC-227	6.878E-05	1.428E-04
TH-228	6.799E-03	1.848E-02
TH-230	3.354E-04	3.235E-04
TH-232	5.670E-04	5.467E-04
PA-231	4.372E-05	6.634E-05
U-234	1.437E-04	1.349E-04
U-235	2.176E-05	4.974E-05
U-238	1.575E-04	2.033E-04
RADON		1.242E-01
TOTAL NON-NORMALIZED INTRUDER IMPACTS	1.580E-02	1.656E-01

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EXPOSED WASTE ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	INTRUDER-AIR	EROSION-AIR	INTRUDER-WATER	EROSION-WATER
PB-210	5.531E-05	8.443E-19	4.146E-07	1.375E-18
PO-210	1.653E-04	.000E+00	6.200E-06	.000E+00
RN-222	1.818E-06	4.352E-22	1.423E-08	7.085E-22
RA-226	1.244E-04	4.994E-04	7.323E-07	5.755E-04
RA-228	8.632E-05	.000E+00	6.818E-07	.000E+00
AC-227	1.740E-04	4.389E-18	3.047E-07	4.160E-19
TH-228	1.324E-03	.000E+00	1.983E-07	.000E+00
TH-230	1.561E-03	3.670E-03	3.264E-07	3.387E-04
TH-232	2.647E-03	8.933E-03	5.920E-07	1.754E-04
PA-231	2.464E-04	9.063E-04	5.717E-07	1.022E-04
U-234	6.565E-04	1.472E-03	1.174E-08	3.085E-06
U-235	2.726E-05	7.929E-05	5.540E-10	2.243E-06
U-238	5.840E-04	1.290E-03	1.698E-08	2.028E-06

TOTAL NON-NORMALIZED EXPOSED WASTE IMPACTS

7.653E-03	1.685E-02	1.006E-05	1.199E-03

OVERFLOW ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	TREATMENT	OVERFLOW	EVAPORATOR
PB-210	4.696E-04	4.696E-04	3.644E-04
PO-210	5.666E-04	5.666E-04	8.787E-05
RN-222	2.657E-04	2.657E-04	1.975E-04
RA-226	1.119E-03	1.119E-03	1.106E-03
RA-228	4.664E-04	4.664E-04	3.435E-04
AC-227	3.506E-04	3.506E-04	1.164E-03
TH-228	4.994E-05	4.994E-05	1.940E-03
TH-230	5.019E-04	5.019E-04	1.396E-02
TH-232	9.084E-04	9.084E-04	2.362E-02
PA-231	8.781E-04	8.781E-04	2.201E-03
U-234	5.496E-07	5.496E-07	1.788E-04
U-235	2.586E-08	2.586E-08	7.401E-06
U-238	7.922E-07	7.922E-07	1.586E-04

TOTAL NON-NORMALIZED OVERFLOW IMPACTS

5.578E-03	5.578E-03	4.533E-02

GROUNDWATER ICRP IMPACTS BY NUCLIDE (MREM/YR) AT EACH TIME
**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

FIRST ROW IS INTRUDER WELL
SECOND ROW IS POPULATION WELL
THIRD ROW IS SURFACE WATER

20YR	40YR	60YR	80YR	100YR	120YR	160YR	200YR	400YR	600YR	800YR	1K YR	2K YR	5K YR	10K YR	20K YR
PB-210															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00

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PO-210															
.0E+00	3.0E-35	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
RN-222															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
RA-226															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	1.1E-03	2.0E-03	2.8E-03	3.4E-03	3.9E-03	5.1E-03	1.4E-03	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-04	1.5E-05	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	[illegible]	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	7.4E-07	.0E+00
RA-228															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	7.9E-11	1.3E-12	2.9E-21	4.9E-30	7.4E-39	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
AC-227															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	6.8E-32	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
TH-228															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
TH-230															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	5.2E-04	5.2E-04	5.2E-04	1.6E-03	3.5E-03	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-05	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-06
TH-232															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	9.6E-04	9.6E-04	9.6E-04	2.9E-03	6.7E-03	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.7E-05	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.5E-06
PA-231															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	9.6E-04	1.7E-03	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
U-234															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	6.6E-07	1.3E-06	1.9E-06
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
U-235															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	3.1E-08	6.3E-08	9.4E-08
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
U-238															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	9.7E-07	1.9E-06	2.9E-06
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
TOTAL NON-NORMALIZED GROUNDWATER IMPACTS															
.0E+00	3.0E-35	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	1.1E-03	2.0E-03	4.3E-03	4.9E-03	5.4E-03	9.5E-03	1.3E-02	1.7E-03	4.9E-06
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-04	1.5E-04	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	7.4E-07	6.6E-06

ONSITE INC, S. LANDF

WASTE OIL

TRANSPORTATION ICRP IMPACTS BY NUCLIDE (MREM/YR)

NUC	MAX INDIVIDUAL
CR-51	2.672E+02
MN-54	2.537E+01
FE-55	.000E+00
FE-59	1.767E+02
CO-58	8.844E+01
CO-60	4.851E+00
NI-63	.000E+00
ZN-65	2.808E+01
RB-86	4.124E+01
SR-89	1.323E-03
SR-90	1.094E-07
ZR-95	2.518E+02
NB-95	2.300E+02
RU-103	1.689E+02
RU-106	5.255E+00
AG-110	3.197E+01
CS-134	9.061E+00
CS-137	2.203E+00
CE-141	5.641E+01
CE-144	1.408E+00

TOTAL TRANSPORTATION IMPACTS = 1.389E+03

METAL PACKAGE RECYCLE ICRP IMPACTS BY NUCLIDE (MREM/YR)

NUC	DOSIND
CR-51	9.416E-01
MN-54	6.668E-04
FE-55	9.279E-07
FE-59	3.813E-03
CO-58	1.936E-03
CO-60	1.563E-04
NI-63	3.901E-06
ZN-65	6.844E-04
RB-86	8.734E-04
SR-89	1.743E-05
SR-90	2.169E-06
ZR-95	9.308E-03
NB-95	5.457E-05
RU-103	3.158E-03
RU-106	1.760E-04
AG-110	1.043E-03
CS-134	2.699E-04
CS-137	7.524E-05
CE-141	5.081E-04
CE-144	4.894E-05

TOTAL RECYCLE IMPACT = 9.644E-01

000145

INCINERATION ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS NOT NORMALIZED BY NUMBER OF PROCESSING FACILITIES ****

NUC	MAXIMUM OFF-SITE INDIVIDUAL
CR-51	3.556E+00
MN-54	2.908E-01
FE-55	1.739E+00
FE-59	2.763E+00
CO-58	1.242E+00
CO-60	1.002E-01
NI-63	7.846E-01
ZN-65	4.104E+00
RB-86	1.215E+01
SR-89	1.980E+00
SR-90	5.368E-01
ZR-95	2.110E+00
NB-95	6.943E+00
RU-103	4.953E+01
RU-106	3.699E+01
AG-110	5.160E-01
CS-134	9.688E-01
CS-137	4.632E-01
CE-141	3.732E+00
CE-144	1.839E+00

TOTAL NON-NORMALIZED INCINERATOR IMPACT = 1.323E+02

WORKER INCINERATION ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF PROCESSING FACILITIES ****

NUC	RESIDUE HANDLERS	MAINTENANCE
CR-51	3.977E+03	3.977E+03
MN-54	3.777E+02	3.777E+02
FE-55	2.467E-02	1.246E-02
FE-59	2.630E+03	2.630E+03
CO-58	1.316E+03	1.316E+03
CO-60	7.220E+01	7.220E+01
NI-63	1.154E-02	5.827E-03
ZN-65	4.180E+02	4.180E+02
RB-86	6.138E+02	6.138E+02
SR-89	5.155E-02	3.578E-02
SR-90	2.459E-02	1.242E-02
ZR-95	3.748E+03	3.748E+03
NB-95	3.424E+03	3.424E+03
RU-103	2.514E+03	2.514E+03
RU-106	7.829E+01	7.825E+01
AG-110	4.758E+02	4.758E+02
CS-134	1.349E+02	1.349E+02
CS-137	3.280E+01	3.280E+01
CE-141	8.397E+02	8.396E+02
CE-144	2.102E+01	2.099E+01
TOTAL NON-NORMALIZED WORKER IMPACTS	2.067E+04	2.067E+04

000146

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INTRUDER ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	CONSTRUCTION	AGRICULTURE
CR-51	7.109E-18	1.986E-17
MN-54	5.978E-01	1.670E+00
FE-55	1.235E-02	8.113E-03
FE-59	2.404E-10	6.717E-10
CO-58	2.650E-06	7.406E-06
CO-60	3.844E+00	1.074E+01
NI-63	2.119E-02	4.235E-02
ZN-65	2.496E-01	7.037E-01
RB-86	1.857E-28	5.194E-28
SR-89	2.253E-12	7.424E-12
SR-90	4.145E-02	1.221E-02
ZR-95	1.523E-06	4.257E-06
NB-95	7.038E-14	1.967E-13
RU-103	2.944E-12	8.232E-12
RU-106	2.633E-01	7.356E-01
AG-110	3.436E-01	9.600E-01
CS-134	2.562E+00	7.162E+00
CS-137	3.009E+00	8.412E+00
CE-141	1.050E-15	2.933E-15
CE-144	2.644E-02	7.043E-02
RADON		.000E+00
TOTAL NON-NORMALIZED INTRUDER IMPACTS	1.097E+01	3.051E+01

EXPOSED WASTE ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	INTRUDER-AIR	EROSION-AIR	INTRUDER-WATER	EROSION-WATER
CR-51	4.724E-21	.000E+00	1.943E-23	.000E+00
MN-54	3.421E-04	.000E+00	8.876E-06	.000E+00
FE-55	3.501E-02	.000E+00	1.520E-04	.000E+00
FE-59	1.877E-13	.000E+00	8.351E-16	.000E+00
CO-58	1.859E-09	.000E+00	6.001E-12	.000E+00
CO-60	3.963E-03	.000E+00	7.901E-06	.000E+00
NI-63	5.782E-02	3.128E-03	1.770E-04	1.176E-05
ZN-65	1.821E-03	.000E+00	1.410E-05	.000E+00
RB-86	2.732E-30	.000E+00	2.864E-32	.000E+00
SR-89	5.440E-12	.000E+00	1.442E-14	.000E+00
SR-90	3.630E-02	7.473E-11	1.002E-05	2.533E-14
ZR-95	6.376E-10	.000E+00	1.861E-12	.000E+00
NB-95	1.061E-16	.000E+00	2.266E-18	.000E+00
RU-103	1.078E-14	.000E+00	3.739E-17	.000E+00
RU-106	2.275E-02	.000E+00	6.858E-05	.000E+00
AG-110	2.769E-04	.000E+00	8.303E-07	.000E+00
CS-134	1.368E-02	.000E+00	1.486E-04	.000E+00
CS-137	3.158E-02	3.194E-10	3.507E-04	4.355E-12
CE-141	3.467E-18	.000E+00	1.171E-20	.000E+00
CE-144	1.635E-03	.000E+00	2.411E-06	.000E+00
TOTAL NON-NORMALIZED EXPOSED WASTE IMPACTS	2.052E-01	3.128E-03	9.411E-04	1.176E-05

000147

OVERFLOW ICRP IMPACTS BY NUCLIDE (MREM/YR)

**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

NUC	TREATMENT	OVERFLOW	EVAPORATOR
CR-51	2.632E-02	4.571E-22	7.962E-22
MN-54	2.399E-02	3.688E-04	1.018E-04
FE-55	6.780E-01	1.784E-01	2.943E-01
FE-59	2.609E-01	2.316E-13	3.729E-13
CO-58	8.729E-02	1.707E-09	3.788E-09
CO-60	3.172E-02	1.639E-02	5.890E-02
NI-63	9.465E-01	9.115E-01	2.133E+00
ZN-65	1.044E+00	6.057E-03	5.606E-03
RB-86	2.949E-02	8.661E-32	6.067E-32
SR-89	7.453E-02	2.676E-12	7.232E-12
SR-90	3.335E-02	2.948E-02	7.649E-01
ZR-95	8.860E-02	3.498E-10	8.586E-10
NB-95	2.354E+00	4.699E-16	1.576E-16
RU-103	7.017E+00	8.041E-14	3.320E-13
RU-106	9.158E+00	2.966E-01	1.409E+00
AG-110	5.691E-04	3.991E-06	9.535E-06
CS-134	8.483E-03	1.565E-03	1.032E-03
CS-137	1.929E-02	1.719E-02	1.108E-02
CE-141	8.411E-03	1.021E-19	2.166E-19
CE-144	3.067E-03	3.564E-05	1.731E-04
TOTAL NON-NORMALIZED OVERFLOW IMPACTS	2.189E+01	1.458E+00	4.678E+00

GROUNDWATER ICRP IMPACTS BY NUCLIDE (MREM/YR) AT EACH TIME
**** IMPACTS ARE NOT NORMALIZED BY NUMBER OF DISPOSAL FACILITIES ****

FIRST ROW IS INTRUDER WELL
SECOND ROW IS POPULATION WELL
THIRD ROW IS SURFACE WATER

20YR	40YR	60YR	80YR	100YR	120YR	160YR	200YR	400YR	600YR	800YR	1K YR	2K YR	5K YR	10K YR	20K YR
CR-51															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
MN-54															
2.3E-09	2.6E-16	2.2E-23	1.6E-30	1.1E-37	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
FE-55															
1.1E-01	5.5E-04	2.6E-06	1.3E-08	6.0E-11	2.9E-13	6.6E-18	1.5E-22	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	4.5E-05	2.4E-07	1.1E-09	5.5E-12	2.6E-14	6.0E-19	1.4E-23	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	1.1E-08	8.4E-11	4.1E-13	1.9E-15	4.5E-20	1.0E-24	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
FE-59															
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CO-58															
3.0E-30	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00

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CO-60																
7.1E-02	5.1E-03	3.6E-04	2.6E-05	1.8E-06	1.3E-07	6.7E-10	3.4E-12	1.2E-23	4.0E-35	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	4.2E-04	3.3E-05	2.4E-06	1.7E-07	1.2E-08	6.1E-11	3.1E-13	1.1E-24	3.6E-36	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	9.2E-07	1.1E-07	7.8E-09	5.6E-10	2.8E-12	1.4E-14	5.0E-26	1.7E-37	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
NI-63																
9.1E+00	7.9E+00	6.8E+00	5.8E+00	5.0E+00	4.3E+00	3.2E+00	2.4E+00	5.2E-01	1.2E-01	2.6E-02	5.7E-03	3.1E-06	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	6.5E-01	6.2E-01	5.3E-01	4.6E-01	3.9E-01	2.9E-01	2.1E-01	4.8E-02	1.1E-02	2.3E-03	5.2E-04	2.8E-07	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	1.9E-02	2.8E-02	2.4E-02	2.1E-02	1.5E-02	1.1E-02	2.5E-03	5.5E-04	1.2E-04	2.7E-05	1.5E-08	.0E+00	.0E+00	.0E+00	.0E+00
ZN-65																
8.4E-08	9.5E-17	1.1E-25	1.2E-34	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	7.8E-18	9.8E-27	1.1E-35	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	5.8E-28	1.1E-36	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
RB-86																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
SR-89																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
SR-90																
2.9E-01	1.8E-01	1.1E-01	6.7E-02	4.1E-02	2.5E-02	9.3E-03	3.5E-03	2.5E-05	1.8E-07	1.3E-09	9.0E-12	1.7E-22	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	1.5E-02	1.0E-02	6.1E-03	3.7E-03	2.3E-03	8.5E-04	3.1E-04	2.3E-06	1.6E-08	1.2E-10	8.2E-13	1.5E-23	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	2.8E-04	2.9E-04	1.8E-04	1.1E-04	4.0E-05	1.5E-05	1.1E-07	7.6E-10	5.5E-12	3.9E-14	7.3E-25	.0E+00	.0E+00	.0E+00	.0E+00
ZR-95																
5.2E-33	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
NB-95																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
RU-103																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
RU-106																
1.2E-03	1.3E-09	1.5E-15	1.6E-21	1.8E-27	2.0E-33	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	1.1E-10	1.4E-16	1.5E-22	1.6E-28	1.8E-34	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	3.6E-18	6.7E-24	7.3E-30	8.1E-36	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
AG-110																
2.0E-10	4.9E-19	1.2E-27	2.9E-36	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	4.0E-20	1.1E-28	2.6E-37	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	3.0E-30	1.2E-38	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CS-134																
2.2E-04	2.6E-07	3.0E-10	3.5E-13	4.1E-16	4.7E-19	6.3E-25	8.5E-31	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	2.1E-08	2.7E-11	3.2E-14	3.7E-17	4.3E-20	5.8E-26	7.7E-32	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	2.3E-12	4.4E-15	5.1E-18	5.9E-21	7.9E-27	1.1E-32	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CS-137																
5.8E-02	3.7E-02	2.3E-02	1.5E-02	9.2E-03	5.8E-03	2.3E-03	9.1E-04	9.0E-06	8.9E-08	8.7E-10	8.6E-12	8.0E-22	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	3.0E-03	2.1E-03	1.3E-03	8.4E-04	5.3E-04	2.1E-04	8.3E-05	8.2E-07	8.1E-09	8.0E-11	7.8E-13	7.3E-23	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	1.8E-04	1.9E-04	1.2E-04	7.4E-05	3.0E-05	1.2E-05	1.2E-07	1.1E-09	1.1E-11	1.1E-13	1.0E-23	.0E+00	.0E+00	.0E+00	.0E+00
CE-141																
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
CE-144																
6.6E-10	2.4E-17	6.6E-25	1.6E-32	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
TOTAL NON-NORMALIZED GROUNDWATER IMPACTS																
9.7E+00	8.1E+00	6.9E+00	5.9E+00	5.1E+00	4.3E+00	3.2E+00	2.4E+00	5.2E-01	1.2E-01	2.6E-02	5.7E-03	3.1E-06	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	6.6E-01	6.3E-01	5.4E-01	4.6E-01	4.0E-01	2.9E-01	2.2E-01	4.8E-02	1.1E-02	2.3E-03	5.2E-04	2.8E-07	.0E+00	.0E+00	.0E+00	.0E+00
.0E+00	.0E+00	2.0E-02	2.8E-02	2.4E-02	2.1E-02	1.5E-02	1.1E-02	2.5E-03	5.5E-04	1.2E-04	2.7E-05	1.5E-08	.0E+00	.0E+00	.0E+00	.0E+00

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APPENDIX G

INSTALLATION PROCEDURES

Backup Copy

It is advisable to duplicate the supplied diskette and to keep the orginal as a backup copy. This can be accomplished on a dual drive personal computer (PC) by using the following procedure:

1. Start the PC with the DOS diskette in drive A.

2. Insert a blank diskette that will become the duplicate diskette into drive B.

3. At the A> prompt type:

   FORMAT B:

   This will format the duplicate diskette.

   When the diskette in drive B is formatted, a message will appear on the screen saying FORMAT COMPLETE, and # bytes (on diskette and available).

4. Remove the DOS diskette from drive A and insert the original diskette, with write protect tab in place, into drive A.

5. Leave the newly formatted diskette in drive B.

6. At the A> prompt type:

   COPY *.* B:

   This will copy all the files from the original diskette to the duplicate diskette. The names of the files will appear on the screen as each file is copied. When the A> prompt appears on the screen, the copying is complete.

7. Be sure the red light is out on both drives, then remove the original diskette from drive A and put it away for safe keeping.

Working Diskette

To execute IMPACTS-BRC, it is necessary to create a bootable working diskette containing DOS, the executable program file, and the input data files. The FORTRAN files are omitted from the working diskette to leave storage space for the generated output files. The working disk is created by continuing from step 7:

8. Remove the new duplicate diskette from drive B.

9. Insert the DOS diskette into drive A.

10. Insert a blank diskette that will become the working disk into drive B.

11. At the A> prompt type:

    FORMAT B:/S

    This will format the working diskette and install DOS so that the disk will be bootable.

12. Remove the DOS diskette from drive A and insert the duplicate diskette. Leave the newly formatted working diskette in drive B.

13. At the A> prompt type:

    COPY IMPACTSB.EXE B:

    This will copy the executable program file to the working diskette. When the A> prompt appears on the screen again, type:

    COPY *.DAT B:

    This will copy the 3 data files TAPE1.DAT, TAPE2.DAT, and EXAMPLE5.DAT, to the working diskette. The names of each file will appear on the screen as it is copied. When the A> prompt reappears on the screen, copying is complete.

By removing the duplicate disk from drive A and moving the working disk from drive B to A, the example probelems for IMPACTS-BRC can now be executed according to the directions given in section 5.3.

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NRC FORM 335 (2-84) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

SEE INSTRUCTIONS ON THE REVERSE.

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VOLUME 2
IMPACTS-BRC USER'S GUIDE AND METHODOLOGY FOR RADIOACTIVE WASTES BELOW REGULATORY CONCERN

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This is an NRC staff report published as Volume 2 of a contractor report.

13. ABSTRACT (200 words or less)

This report describes the methodology and computer program used by NRC to evaluate radiological impacts associated with petitions to have specific slightly contaminated radioactive waste streams designated as "below regulatory concern." These wastes could be treated and disposed of at facilities which are not licensed for low-level radioactive waste management.

The IMPACTS-BRC computer program is implemented on IBM-PC microcomputers using the FORTRAN programming language. Radiological impacts (doses) are estimated for several pathways including direct gamma radiation exposure, worker inhalation and exposure, offsite atmospheric and water releases, and intruder exposures. Annual impacts are calculated for the maximum individual, critical groups, and general population. The treatment and disposal options include onsite incineration, incineration at municipal and hazardous waste facilities, and disposal at sanitary landfills and hazardous waste landfills. Modifications to the program (from Volume 1) are primarily for microcomputer compatibility and to provide information needed to evaluate the petitions.

Default environmental and facility parameters are developed representing conservative assumptions about site selection and operational procedures. In particular, the parameters of the groundwater pathway model are modified to represent more conservative assumptions than the original model (Volume 1).

14. DOCUMENT ANALYSIS – a. KEYWORDS/DESCRIPTORS

Below Regulatory Concern (BRC)
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Low-level Radioactive Waste
Impact Analysis Code

b. IDENTIFIERS/OPEN-ENDED TERMS

15. AVAILABILITY STATEMENT

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16. SECURITY CLASSIFICATION

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