NUREG/CR-4370
Vol. 2

Update of Part 61 Impacts Analysis Methodology

Codes and Example Problems

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Envirosphere Company

Prepared for
U.S. Nuclear Regulatory Commission

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Manuscript Completed: November 1985
Date Published: January 1986

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NRC FIN D1013

ABSTRACT

Under contract to the U. S. Nuclear Regulatory Commission, the Envirosphere Company has expanded and updated the impacts analysis methodology used during the development of the 10 CFR Part 61 rule to allow improved consideration of the costs and impacts of treatment and disposal of low-level waste that is close to or exceeds Class C concentrations. The original impacts analysis methodology is described in the report "Data Base for Radioactive Waste Management" (NUREG/CR-1759), which was prepared under contract to NRC by Dames and Moore.

The modifications described in this report principally include: (1) an update of the low-level radioactive waste source term, (2) consideration of additional alternative disposal technologies, (3) expansion of the methodology used to calculate disposal costs, (4) consideration of an additional exposure pathway involving direct human contact with disposed waste due to a hypothetical drilling scenario, and (5) use of updated health physics analysis procedures (ICRP-30).

Volume 1 of this report describes the calculational algorithms of the updated analysis methodology, while Volume 2 describes the computer codes written to implement the updated analysis methodology plus provides some example problems. The computer codes are written for operation on an IBM personal computer, and are available from the Radiation Shielding Information Center at Oak Ridge National Laboratory.

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1.0 INTRODUCTION

The purpose of the second volume of this report is to present the data files and the algorithms (codes) prepared to implement the updated Part 61 analysis methodology presented in the first volume, as well as to present several example problems. The original Part 61 analysis methodology was created to aid in development of the Part 61 rule. It was developed with a specific purpose in mind: comparative analysis of various options on land disposal of radioactive waste in view of the wastes expected to be generated in the near-future, alternative waste processing and disposal technologies, and past disposal experience.

Compared to the original Part 61 analysis methodology, this updated version:

- o Considers the radiological, physical, and chemical characteristics of low-level waste in more precise detail, giving special emphasis to wastes that are close to or exceed Class C concentrations as defined in 10 CFR Part 61;
- o Considers a larger number of potential near-surface disposal methods that might be suitable for such waste; these disposal methods include shallow land trench disposal plus a number of alternatives such as concrete structures;
- o Updates where applicable the scenarios and models used to calculate radionuclide transport through the environment and determine potential radionuclide impacts when contacted, inhaled, or ingested by humans; and
- o Updates where applicable the models used to determine economic and other impacts on licensees.

An introduction to the codes and example problems is presented in this Chapter 1.0. Section 1.1 presents a background on the development of the codes, Section 1.2 outlines the general approach, and Section 1.3 presents a brief summary of the report contents.

1.1 Background

The background on the development of the codes is dominated by the need to repeatedly perform comparatively fast and accurate assessments of impacts from the management and near-surface disposal of radioactive waste. The calculation of these impacts must take into account a large data base involving an extremely wide range of variability in waste characteristics, available waste processing alternatives, disposal site environments, and disposal technologies. The analysis methodology codes should also enable identification of specific values of parameters that can be controlled and/or specified through technological or administrative action so as to assure the near-surface disposal of radioactive waste in accordance with the goals of waste management and disposal (Refs. 1-4).

The alternatives to be considered result from the variation of parameter values associated with four major aspects of radioactive waste management and disposal. These aspects are (1) waste form characteristics; (2) waste processing options; (3) facility environment characteristics; and (4) disposal technology properties. The available alternatives within the framework of these four aspects are astronomical. Each aspect, however, can be transformed into a data base, albeit a very large data base, in accordance with certain rules and "decision indices." The decision indices used in this work have been discussed in Volume 1 of this report. The data bases are summarized in Chapter 3.0 of this volume.

The data bases considered in the original Part 61 analysis methodology were comparatively small due to time and budgetary constraints. This work considers a much larger variation of alternatives. In addition, it addresses several specific concerns such as decisions on the management and disposal of high activity/small volume wastes, e.g., sealed sources.

1.2 General Approach

The general approach taken in the updated Part 61 analysis methodology is very similar to that taken for the original Part 61 analysis methodology as described in reference 1 and heavily modified for the final Part 61 EIS (Ref. 3). The calculational methodology is structured as a number of computer codes, and the selection of a particular code depends upon the type of information desired.

In developing the revised codes, a very important consideration was the need to consider the depth to which site-specific considerations would enter the calculations. A generic type of analysis implies a less detailed set of input and calculational requirements than a site-specific type of analysis, where the greater availability of real site-specific data would justify a more complete analysis. It was furthermore recognized that the main use of the revised methodology would be for regulatory analyses, in which case the comparative differences between two alternatives are more important than actual calculated numbers. It was finally recognized that to maximize the usefulness of the calculational methodology, there was a need to maintain a high degree of flexibility in the methodology.

As a result, a two-pronged approach was taken in the updated methodology. First, the methodology makes heavy use of a reference radioactive waste source term and processing techniques, a reference set of site environments, and a reference set of alternative disposal technologies. Second, the computer codes are constructed so that the user can readily modify or add to the reference waste source term, treatment and disposal site environments, and disposal technologies.

The radioactive waste source term consists of approximately 150 individual waste streams which are characterized on a volume, physical, chemical, and individual radionuclide basis. Volumes for these waste streams are considered as a function of 4 regions comprising the contiguous United States. Several alternative waste processing operations are also considered. Within each region a reference site is assumed which has environmental characteristics representative of the region. Finally, a number of alternative near-surface disposal technologies and operating practices are assumed.

1.3 Report Contents

There are four chapters in this report. Chapter 2.0 is in many ways another introductory chapter, but is useful for understanding and using the calculational methodology.

Section 2.1 summarizes the data bases used in the calculations. Sections 2.2 and 2.3 present overviews of the two major codes developed in this report, namely CLASIFY and IMPACTS. They briefly outline the data bases used, control files required, and other necessary user input information. Finally, Section 2.4 details the minor codes developed for this report, namely, INVERSE, INTRUDE, VOLUMES, and ECONOMY.

Chapter 3.0 contains a detailed discussion of the data files used by the codes including how the information is stored, manipulated, and retrieved. These files include (1) basic data base files used by the codes including information on concentration limitations, fundamental dose conversion factors, waste and disposal technology characteristics, and reference facility environmental properties, (2) control files used to organize and manipulate the basic data files, and (3) output files produced by the codes. Finally, Chapter 4.0 presents a summary of the example problems used to illustrate the use of the codes.

The report includes four appendices. Appendix A presents an extensive glossary of the parameters used in the codes. Appendix B presents the code listings which have been extensively annotated. This appendix details the algorithms and mechanics of the codes. Appendix C presents the data file listings, and Appendix D presents the example problems and output.

CHAPTER 1.0 REFERENCES

(1) Oztunali, O.I., et.al., "Data Base for Radioactive Waste Management," Three Volumes, Prepared by Dames & Moore for U.S. Nuclear Regulatory Commission, USNRC Report NUREG/CR-1759, November 1981.

(2) U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, "Draft Environmental Impact Statement on 10 CFR Part 61: Licensing Requirements for Land Disposal of Radioactive Waste," USNRC Report NUREG-0782, September 1981.

(3) U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, "Final Environmental Impact Statement on 10 CFR Part 61: Licensing Requirements for Land Disposal of Radioactive Waste," USNRC Report NUREG-0945, November 1982.

(4) U.S. Nuclear Regulatory Commission, "10 CFR Parts 2, 19, 20, 21, 30, 40, 51, 61, 70, 73, and 170: Licensing Requirements for Land Disposal of Radioactive Waste, Final Regulation," Federal Register, 47 FR 57446, December 27, 1982.

2.0 OVERVIEW OF THE CODES

This chapter presents an overview of the data files and codes that implement the algorithhms of the updated Part 61 impacts analysis methodology.

For convenience, the analysis methodology is structured around two major and four minor computer codes that use a number of common data files. The data files address four major components: projected waste volumes and characteristics, waste processing options, environmental properties of potential waste treatment and/or disposal locations, and alternative disposal technologies. The information contained in the data files is a combination of generic data and user supplied information.

The major codes, called CLASIFY and IMPACTS, address the forward problem. Given the alternatives for the above four components, IMPACTS calculates various impact measures, such as radiological impacts to individuals and populations, resulting from the implementation of the combination of alternatives.

The four minor codes are called INVERSE, ECONOMY, INTRUDE, and VOLUMES. The INVERSE code addresses the reverse problem, i.e., given the last two of the above four components, it calculates maximum acceptable radionuclide activity or concentration limits for disposal by a particular method. The INTRUDE code is similar to IMPACTS and analyzes radiological impacts to an inadvertant intruder as a function of time. The ECONOMY code calculates per unit waste volume costs associated with disposal operations given annual volumes of waste disposed in six waste classes, as well as some other impact measures such as operational exposures and land use. Finally, the VOLUMES code calculates and updates region and waste stream dependent annual volume projections. These last two codes were written to reduce the complexity of the IMPACTS code.

Figure 2.1 presents an overview diagram of the codes, input data and control files, and output files.

As shown, there appears to be a complex interrelationship between these components. This is not the case. INVERSE merely calculates radionuclide concentration and/or activity limitations using minor variations of the algorithms contained in IMPACTS.* The user may optionally program the radionuclide limitations calculated by INVERSE into CLASIFY. VOLUMES

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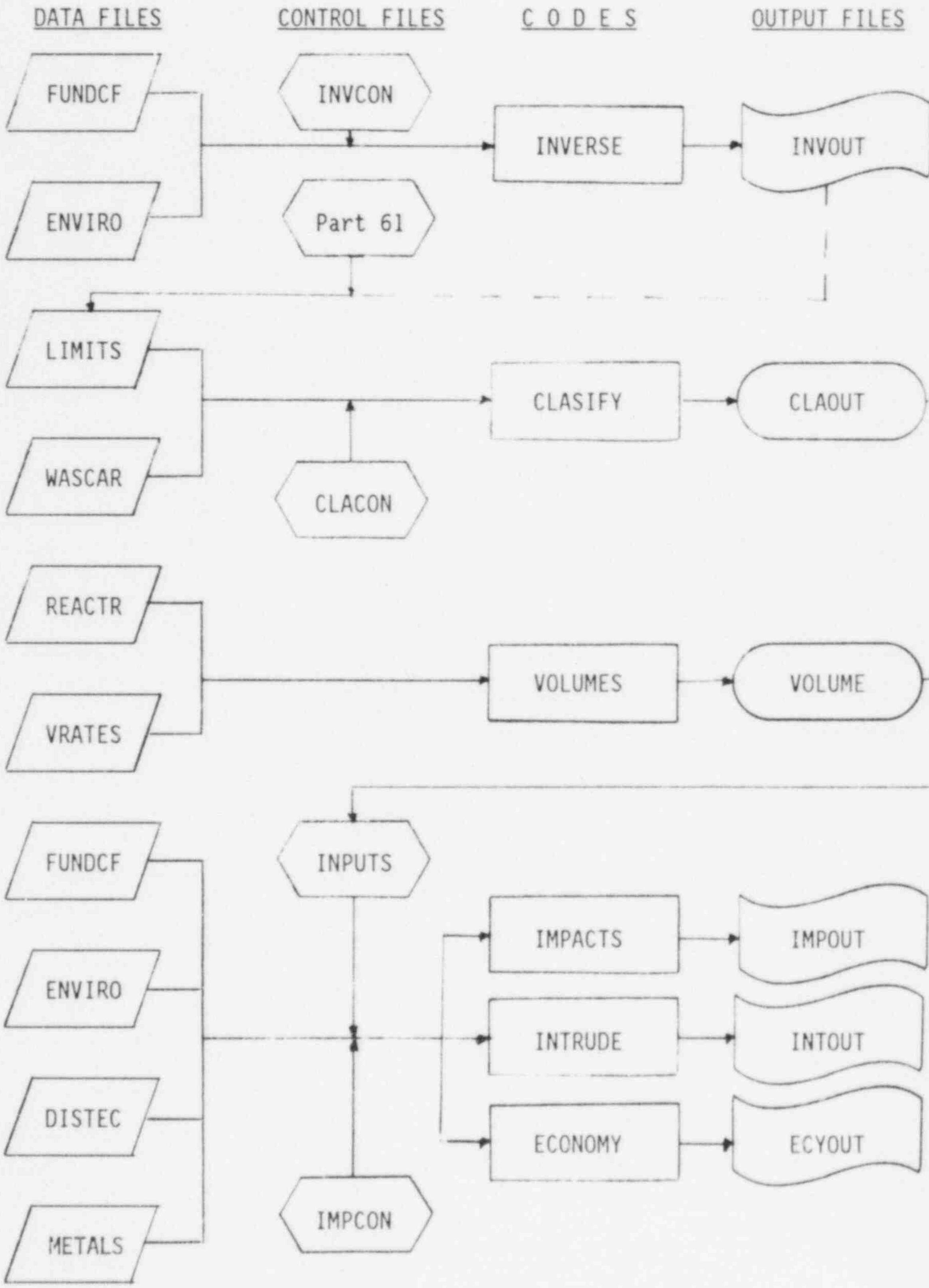
* Simply speaking, INVERSE solves equations of the form C=D/IP, where C is the concentration (Ci/m^3), D is a dose rate (mrem/year), I is an interaction factor which relates the concentration in waste to the concentration at a biota access location (dimensionless), and P is a pathway dose conversion factor (mrem/year per Ci/m^3). Given a limit D, a corresponding limit for C can be determined. IMPACTS, however, solves equations of the form D=CIP. This equation can be used to determine the resulting dose rates from disposal of wastes with given concentrations.

FIGURE 2.1 . Schematic Relationships of Files and Codes



generates NRC Region dependent annual waste volume projections for all the waste streams. Finally, IMPACTS, ECONOMY, and INTRUDE use these files to calculate the impact measures considered in this report.

This overview chapter is separated into four sections. The first section summarizes the data files used by the codes to characterize different available options, e.g., waste characteristics, processing and disposal options, and disposal site environmental properties. Sections 2.2 and 2.3 describe the general purpose and the overall approach of CLASIFY and IMPACTS. Finally, Section 2.4 describes the general purpose and the overall approach of the minor codes.

2.1 Summary of the Data Files

To operate the analysis methodology computer codes, the code user must provide information on radioactive waste streams and their physical, chemical, and radiological properties. The user must also specify certain waste transport parameters as well as the waste processing and/or disposal methodologies including the site environments in which processing/disposal takes place. This section summarizes these information requirements.

2.1.1 Waste Stream Characteristics and Processing Options

The original Part 61 analysis methodology considered 23 radionuclides that could be present in the waste. This work considers 100 radionuclide and solubility combinations. These are presented in Table 2-1.

The number of waste streams considered has been increased from a total of 37 to approximately 150. Routine waste streams generated in relatively large volumes (35 of the original 37 waste streams) have been kept. This report considers three additional types of wastes: (1) routine wastes of small volumes and relatively high concentrations (e.g., waste from sealed source manufacturers), (2) wastes that depend on formulation and implementation of certain decisions (e.g., reprocessing of spent-fuel, and decommissioning through dismantlement of nuclear power plants, and (3) other wastes (e.g., waste from the West Valley Demonstration Project). The waste streams considered are presented in Table 2-2.

Management of all the waste processing and other alternatives for each of 150 waste streams is kept within reasonable bounds by use of "waste spectra." Each waste spectrum denotes the collective volume and other properties of all the waste streams after they have been processed by a set of selected waste treatment options. Each waste spectrum corresponds to a general level of waste performance (structural stability, resistance to wind mobilization, resistance to leaching, etc.) that can be achieved by establishing operational and/or administrative requirements. The five waste spectra considered in this report are summarized in Table 2-3.

This report describes waste characteristics using integer indices. Waste stream specific indices, including the waste processing and the waste form behavior indices, have been kept generally similar to those defined in the original Part 61 analysis methodology. However, several of the indices

TABLE 2-1 . Radionuclides Considered

Nuclide	Solubilities	Half-Life (Years)	Nuclide	Solubilities	Half-Life (Years)
H-3	*[1]	1.23E+01[2]	Th-228	W,Y	1.91E+00
C-14	*	5.73E+03	Th-229	W,Y	7.34E+03
Na-22	D	2.62E+00	Th-230	W,Y	8.00E+04
Cl-36	D,W	3.08E+05	Th-232	W,Y	1.41E+10
Fe-55	W,Y	2.60E+00	Pa-231	W,Y	3.25E+04
Co-60	W,Y	5.26E+00	U-232	D,W,Y	7.20E+01
Ni-59	D,W	8.00E+04	U-233	D,W,Y	1.62E+05
Ni-63	D,W	9.20E+01	U-234	D,W,Y	2.47E+05
Sr-90	D,Y	2.81E+01	U-235	D,W,Y	7.10E+08
Nb-94	W,Y	2.00E+04	U-236	D,W,Y	2.39E+07
Tc-99	D,W	2.12E+05	U-238	D,W,Y	4.51E+09
Ru-106	Y	1.01E+00	Np-237	W,Y	2.14E+06
Ag-108m	D,W,Y	1.27E+02	Pu-236	W,Y	2.85E+00
Cd-109	D,W,Y	1.24E+00	Pu-238	W,Y	8.64E+01
Sn-126	D,W	1.05E+05	Pu-239	W,Y	2.44E+04
Sb-125	D,W	2.71E+00	Pu-240	W,Y	6.58E+03
I-129	D	1.17E+07	Pu-241	W,Y	1.32E+01
Cs-134	D	2.05E+00	Pu-242	W,Y	3.79E+05
Cs-135	D	3.00E+06	Pu-244	W,Y	7.60E+07
Cs-137	D	3.00E+01	Am-241	W,Y	4.58E+02
Eu-152	W	1.27E+01	Am-243	W,Y	7.95E+03
Eu-154	W	1.60E+01	Cm-242	W,Y	4.45E-01
Pb-210	W	2.04E+01	Cm-243	W,Y	3.20E+01
Rn-222	*	1.05E-02	Cm-244	W,Y	1.76E+01
Ra-226	W	1.60E+03	Cm-248	W,Y	4.70E+05
Ra-228	W	6.70E+00	Cf-252	W,Y	2.65E+00
Ac-227	W,Y	2.16E+01			

(1) Solubility: * - Not applicable, D - Day, W - Week, Y - Year
(2) Exponential Notation: $1.23E+01 = 1.23 \times 10^1$
(3) Radiation types: a - Alpha, b - Beta, g - Gamma

have been expanded and are used for more decisions, and several have been redefined. In addition, densities of the individual waste streams have been included in the data base. The waste processing indices are defined in Table 2-4 and the waste form behavior indices are defined in Table 2-5.

The values of the waste processing parameter indices and the densities assumed for the five spectra described in Table 2-3 are presented in Table 2-6, and the index values assumed for the five waste spectra described in Table 2-3 are presented in Table 2-7.

TABLE 2-2 . Waste Groups and Streams

I. Nuclear Power Plants	Symbol	No.
PWR ion-exchange resins	P-IXRESIN	1
PWR concentrated liquids	P-CONCLIQ	2
PWR filter sludges	P-FSLUDGE	3
PWR cartridge filters	P-FCARTRG	4
BWR ion-exchange resins	B-IXRESIN	5
BWR concentrated liquids	B-CONCLIQ	6
BWR filter sludges	B-FSLUDGE	7
PWR combustible trash	P-COTRASH	8
PWR noncombustible trash	P-NCTRASH	9
BWR combustible trash	B-COTRASH	10
BWR noncombustible trash	B-NCTRASH	11
LWR nonfuel reactor core components	L-NFRCOMP	12
LWR decontamination waste	L-DECONRS	13
II. Other Nuclear Fuel Cycle Facilities		
Fuel fabrication process waste	F-PROCESS	14
Fuel fabrication combustible trash	F-COTRASH	15
Fuel fabrication noncomb trash	F-NCTRASH	16
UF6 conversion process waste	U-PROCESS	17
Pu facility decontamination waste	L-PUDECON	18
Waste from hot cell burnup studies	L-BURNUPS	19
III. Institutional Waste		
Combustible trash (LF)[a]	I-COTRASH	20
Combustible trash (SF)[b]	I+COTRASH	21
Absorbed liquids (LF)	I-ABSLIQD	22
Absorbed liquids (SF)	I+ABSLIQD	23
Liquid scintillation vial waste (LF)	I-LIQSCVL	24
Liquid scintillation vial waste (SF)	I+LIQSCVL	25
Biological waste (LF)	I-BIOWAST	26
Biological waste (SF)	I+BIOWAST	27
IV. Industrial Waste		
Source and SNM trash (LF)	N-SSTRASH	28
Source and SNM trash (SF)	N+SSTRASH	29
Source and SNM waste	N-SSWASTE	30
Low activity trash (LF)	N-LOTRASH	31
Low activity trash (SF)	N+LOTRASH	32
Low activity waste	N-LOWASTE	33
Large Radioisotope Manufacturers		
High-activity production trash	N-ISOPROD	34
Low-activity production trash	N-ISOTRSH	35
Large sealed source manufacturers	N-SORMFG1	36
	N-SORMFG2	37
	N-SORMFG3	38
	N-SORMFG4	39

IV. Industrial Waste (cont'd)	Symbol	No.
Large Tritium and C-14 Manufacturers		
Compactible trash	N-NECOTRA	40
Absorbed organic liquids	N-NEABLIQ	41
Solidified aqueous liquids	N-NESOLIQ	42
Rejected product vials	N-NEVIALS	43
Non-compactible glass	N-NENCGLS	44
Non-compactible wood and metal	N-NEWOTAL	45
Tritium gas	N-NETRGAS	46
Absorbed tritiated liquid	N-NETRILI	47
Absorbed C-14 liquids	N-NECARLI	48
Laboratory trash	N-MWTRASH	49
Absorbed organic liquids	N-MWABLIQ	50
Solidified aqueous liquids	N-MWSOLIQ	51
Miscellaneous waste	N-MWWASTE	52
Small Tritium Manufacturers		
Tritium in paint or as plating	N-TRIPLAT	53
Gaseous tritium	N-TRITGAS	54
High-activity scintillation liquids	N-TRISCNT	55
Tritium in aqueous liquid	N-TRILIQD	56
Miscellaneous trash	N-TRITRSH	57
Tritium cont./absorbed in metal	N-TRIFOIL	58
High activity waste	N-HIGHACT	59
Sealed sources and devices		
Tritium sources	N-TRITSOR	60
Carbon-14 sources	N-CARBSOR	61
Cobalt-60 sources	N-COBLSOR	62
Nickel-63 sources	N-NICKSOR	63
Strontium-90 sources	N-STROSOR	64
Cesium-137 sources	N-CESISOR	65
Plutonium-238 sources	N-PLU8SOR	66
Plutonium-239 sources	N-PLU9SOR	67
Americium-241 sources	N-AMERSOR	68
Pu-238 neutron sources	N-PUBESOR	69
Am-241 neutron sources	N-AMBESOR	70
V. Other Non-Fuel Cycle Waste		
Radium sources		
Medical needles	N-RANEEDS	71
Medical cells	N-RACELLS	72
Medical plaques	N-RAPLAQU	73
Medical nasopharyngeal applicators	N-RANPAPP	74
Radium-beryllium neutron sources	N-RABESOR	75
Miscellaneous non-medical sources	N-RAMISCL	76
Radium ion-exchange resins	N-RARESIN	77
Navy dry waste	M-NAVYDRY	78
Navy wet waste	M-NAVYWET	79

TABLE 2-2 . Waste Groups and Streams (cont'd)

VI. Non-Routine Waste	Symbol	No.
Uranium Fuel Processing		
High-level liquid waste	R-HLLWFRP	80
Fuel assembly hardware	R-FUEHARD	81
Hulls from chop/leach process	R-HULLFRP	82
Intermediate-level liquid waste	R-ILLWFRP	83
Silica gel	R-SILIGEL	84
Main plant high-activity comp trash	R-MPCOTRH	85
Main plant low-activity comp trash	R-MPCOTRL	86
Main plant noncompressible trash	R-MPNCTRA	87
Degraded extractant	R-DEGREXT	88
Main plant ion-exchange resins	R-MPRESIN	89
Storage basin resin and filter sludge	R-SBRESIN	90
Storage basin concentrated liquids	R-SBCOLIQ	91
Storage basin compressible trash	R-SBCOTRA	92
Storage basin noncompressible trash	R-SBNCTRA	93
UF_6 conv flourinator residues	R-UFFINES	94
UF_6 conv K_2UO_4 mud	R-UFK2MUD	95
UF_6 conv compressible trash	R-UFCOTRA	96
UF_6 conv noncompressible trash	R-UFNCTRA	97
PuO_2 conv compressible trash	R-PUCOTRA	98
PuO_2 conv noncompressible trash	R-PUNCTRA	99
Mixed Oxide Fuel Fabrication		
Compressible trash	R-MOXCOTR	100
Noncompressible trash	R-MOXNCTR	101
Proc & scrap recovery solutions	R-MOXSOLN	102
Nuclear Power Plant Decommissioning		
PWR activated core shroud	P-DECORES	103
PWR activated reactor internals	P-DEACINT	104
PWR activated reactor vessel	P-DEACVES	105
PWR activated concrete	P-DEACTCO	106
PWR contaminated metals	P-DECONME	107
PWR contaminated concrete	P-DECONCO	108
PWR combustible/compactible trash	P-DETRASH	109
PWR chelated ion-exchange resins	P-DERESIN	110
PWR filter cartridges	P-DEFILCR	111
PWR evaporator bottoms	P-DEEVAPB	112
BWR activated core shroud	B-DECORES	113
BWR activated reactor internals	B-DEACINT	114
BWR activated reactor vessel	B-DEACVES	115
Nuclear Power Plant Decommissioning (cont'd)		
BWR activated concrete	B-DEACTCO	116
BWR contaminated metals	B-DECONME	117
BWR contaminated concrete	B-DECONCO	118
BWR combustible/compactible trash	B-DETRASH	119
BWR chelated ion-exchange resins	B-DERESIN	120
BWR evaporator bottoms	B-DEEVAPB	121
West Valley Demonstration Project		
Thorex high-level waste	W-THORHLW	122
Purex high-level waste	W-PUREHLW	123
Trash from existing systems	W-COTRASH	124
Miscellaneous dry solids	W-NCSOLID	125
LLWTF sludge and resins	W-LLWTFRE	126
FRS filter precoat and resins	W-FRSRESN	127
RTS liquid waste	W-FRSLIQD	128
RTS filter backwash and resins	W-RTSRESN	129
Trash, low TRU content	W-LTTRASH	130
Trash, high TRU content	W-HTTRASH	131
Equipment and hardware, low TRU	W-LTEQUIP	132
Equipment and hardware, high TRU	W-HTEQUIP	133
PD liquid waste	W-PDWLIQD	134
Vitrification Waste		
Supernate	W-VITSUPR	135
Sludge wash	W-VITWASH	136
Scrub condensate	W-VITSCRB	137
Melter feed overheads	W-VITMELT	138
Fractionator condensate	W-VITFRAC	139
Zeolite slurry	W-VITZEOL	140
Decontamination & Decommission		
Fuel storage racks	W-DDRACKS	141
Low TRU rubble	W-DDLTRUB	142
High TRU rubble	W-DDHTRUB	143
Low TRU liquids	W-DDLTLQD	144
High TRU liquids	W-DDHTLQD	145
Resins	W-DDRESIN	146
VII. Other Waste		
Spent nuclear power plant fuel	L-SPENTFU	147
Power plant fuel assembly hardware	L-FUEHARD	148

Note : a - Large Facility; b - Small Facility.

TABLE 2-3 . Summary Description of Waste Spectra

Waste Spectrum 1. This waste spectrum represents a continuation of past or existing waste management practices, and presents waste characteristics projected to result without requirements for waste stability. Some waste streams such as LWR concentrated liquids are solidified using solidification scenario A, although the process control programs for the waste forms are only oriented toward meeting a free standing solid requirement rather than a structural stability requirement. Fuel cycle compressible trash waste streams are compacted, as is trash from large institutional facilities. Ion-exchange resins and filter media are shipped to disposal facilities in a dewatered form. Activated metals are packaged into containers with the interstitial spaces in the container either left as voids or filled with compressible waste forms. This results in an unstable waste form.

Waste Spectrum 2. This waste spectum is similar to waste spectrum 1, although three changes are especially significant. First, liquids which were originally solidified in waste spectrum 1 are again solidified using solidification scenario A. However, solidification is generally performed using a process control program that is in accordance with the NRC Technical Position on Waste Form, or by some other method that complies with 10 CFR Section 61.56. Second, ion-exchange resins and filter sludges are solidified rather than being disposed in a dewatered form. Third, activated metal wastes are disposed in a stable manner by filling interstitial spaces within waste containers with an inert low compressible material such as sand. Sealed sources are stabilized by solidification within a drum.

Waste Spectrum 3. This waste spectrum is very similar to waste spectrum 2 except that an improved solidification media is assumed to be used (solidification scenario B) and increased compaction is performed on compressible waste. Liquids generated by large facilities are also generally subjected to increased volume reduction. The solidification process control program is generally such that the solidified waste form meets the Part 61 stability requirements. Compaction at large facilities is assumed to be generally accomplished using improved compactor/shredders. Compressible waste from a number of small facilities -- particularly small institutional and industrial facilities -- are generally compacted at a centralized operation assumed to be operated as an adjunct to the disposal facility.

Waste Spectrum 4. This waste spectrum is devised assuming extreme volume reduction. All wastes amenable to evaporation or incineration with fluidized bed technology (e.g., LWR process wastes) are calcined and then solidified using solidification scenario C. Institutional and industrial waste streams at large facilities are incinerated using a pathological incinerator, while several institutional and industrial waste streams are shipped to a large fluidized bed incinerator assumed to be located at the disposal facility. Several noncompactable and contaminated metal waste streams are also shipped to the disposal facilities where they are compacted using a large hydraulic press.

Waste Spectrum 5. This waste spectrum incorporates for most waste streams high integrity containers (HICs) to achieve a stable waste form. Relative to waste spectrum 1, most waste streams (other than activated metals) which had previously been in an unstable form are stabilized using HICs. Activated metals are stabilized by filling interstitial voids in a waste container with a noncompressible material. Concentrated aqueous liquids are solidified assuming solidification scenario A procedures and a process control program compatible with the NRC Technical Position on Waste Form. Wastes from tritium and carbon-14 manufacturing facilities are also placed into HICs, as are sealed sources.

TABLE 2-4 . Waste Processing Parameters Indices

Symbol	Property	Optional Values
IPK	Packaging Index	Record number of file containing distribution
IPR	Processing Index	0 = No volume reduction 1 = Regular compaction 2 = Improved compaction 3 = Hydraulic press 4 = Evaporation 5 = Pathological incineration 6 = Small calciner 7 = Large calciner
ISL	Solidification Index	0 = Unsolidified waste form 1 = Solidification scenario A 2 = Solidification scenario B 3 = Solidification scenario C 4 = High integrity container (HIC) packaging 5 = Stabilization by another means
ILC	Processing Location	0 = No processing 1 = Processing at the generator 2 = Processing at the disposal facility
IEN	Processing Environment	0 = No incineration 1 = Urban environment 2 = Rural environment
IRE	Processing Radiation Environment	1 = High facility background radiation environment 2 = Low facility background radiation environment

TABLE 2-5 . Waste Form Behavior Indices

Symbol	Property	Optional Values
I4	Accidents	
	First Digit: ISC Scatter	3 = Near zero 2 = Slight to moderate 1 = Moderate 0 = Severe
	Second Digit: IFL Flammability	3 = Non-flammable 2 = Low flammability 1 = Burns if heat supplied 0 = Flammable
I5	Dispersibility	3 = Near zero 2 = Slight to moderate 1 = Moderate 0 = Severe
I6	Leachability Index	1 = Unsolidified waste form 2 = Solidification scenario A 3 = Solidification scenario B 4 = Solidification scenario C
I7	Chemical Content	0 = No chelating agents or organic chemicals 1 = Chelating agents or organic chemicals likely present
I8	Stability	0 = Structurally unstable waste 1 = Solidified waste 2 = Structurally stable solidified waste 3 = Stabilized using high-integrity containers 4 = Stabilized by other means
I9	Activated Metal	0 = Non-activated metal waste 0 < Activated metal waste
I10	Sources	0 = Non-source waste 0 < Source waste

TABLE 2-6 . Waste Spectrum Dependent Values of Waste Processing Indices

Waste Stream		Waste Spectrum 1				Waste Spectrum 2				Waste Spectrum 3				Waste Spectrum 4				Waste Spectrum 5			
Name	No.	I1	VRF	VIF	Dens	I1	VRF	VIF	Dens	I1	VRF	VIF	Dens	I1	VRF	VIF	Dens	I1	VRF	VIF	Dens
P-IXRESIN	1	1200001	1.00	1.00	.9	1201101	1.00	1.40	1.7	1202101	1.00	2.00	1.2	763121	18.	2.00	1.2	1204001	1.00	1.00	.9
P-CONCLIQ	2	1201101	1.00	1.40	1.7	1201101	1.00	1.40	1.7	1242101	6.00	2.00	1.2	1263121	8.00	2.00	1.2	1201101	1.00	1.40	1.7
P-FSLUDGE	3	1200001	1.00	1.00	.9	1201101	1.00	1.40	1.7	1202101	1.00	2.00	1.2	763121	5.00	2.00	1.2	1204001	1.00	1.00	.9
P-FCARTRG	4	700001	1.00	1.00	1.3	701101	1.00	1.00	1.7	702101	1.00	1.00	1.2	703101	1.00	1.00	1.2	704101	1.00	1.00	1.3
B-IXRESIN	5	1200001	1.00	1.00	.9	1201101	1.00	1.40	1.7	1202101	1.00	2.00	1.2	763121	18.	2.00	1.2	1204001	1.00	1.00	.9
B-CONCLIQ	6	1201101	1.00	1.40	1.7	1201101	1.00	1.40	1.7	1242101	2.40	2.00	1.2	1263121	6.40	2.00	1.2	1201101	1.00	1.40	1.7
B-FSLUDGE	7	1200001	1.00	1.00	.9	1201101	1.00	1.40	1.7	1202101	1.00	2.00	1.2	763121	5.00	2.00	1.2	1204001	1.00	1.00	.9
P-COTRASH	8	1410101	3.00	1.00	.4	1410101	3.00	1.00	.4	1420101	6.00	1.00	.8	763121	80.	2.00	1.2	1414101	3.00	1.00	.4
P-NCTRASH	9	1500001	1.00	1.00	.4	1500001	1.00	1.00	.4	1500001	1.00	1.00	.4	1530201	6.00	1.00	2.4	1504001	1.00	1.00	.4
B-COTRASH	10	1310101	2.00	1.00	.3	1310101	2.00	1.00	.3	1320101	6.00	1.00	.8	763121	80.	2.00	1.2	1314101	2.00	1.00	.3
B-NCTRASH	11	1500001	1.00	1.00	.4	1500001	1.00	1.00	.4	1500001	1.00	1.00	.4	1530201	6.00	1.00	2.4	1504001	1.00	1.00	.4
L-NFRCOMP	12	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8
L-DECONRS	13	1200001	1.00	1.00	.9	1201101	1.00	1.40	1.7	1202101	1.00	2.00	1.2	763121	18.	2.00	1.2	1204001	1.00	1.00	.9
F-PROCESS	14	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	704002	1.00	1.00	1.0
F-COTRASH	15	710102	1.50	1.00	.2	710102	1.50	1.00	.2	720102	6.00	1.00	.8	763122	40.	2.00	1.2	714102	1.50	1.00	.2
F-NCTRASH	16	500002	1.00	1.00	.4	500002	1.00	1.00	.4	500002	1.00	1.00	.4	530202	6.00	1.00	2.4	504002	1.00	1.00	.4
U-PROCESS	17	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	704002	1.00	1.00	1.0
L-PUDECON	18	500002	1.00	1.00	1.6	500002	1.00	1.00	1.6	500002	1.00	1.00	1.6	500002	1.00	1.00	1.6	504002	1.00	1.00	1.6
L-BURNUPS	19	701101	1.00	1.00	1.7	701101	1.00	1.00	1.7	702101	1.00	1.43	1.4	703101	1.00	1.43	1.4	704001	1.00	1.00	1.7
I-COTRASH	20	710102	2.00	1.00	.3	710102	2.00	1.00	.3	720102	6.00	1.00	.8	753112	20.	2.00	1.2	714102	2.00	1.00	.3
I+COTRASH	21	700002	1.00	1.00	.1	700002	1.00	1.00	.1	720202	6.00	1.00	.8	773222	80.	2.00	1.2	704002	1.00	1.00	.1
I-ABSLIQD	22	700002	1.00	3.00	1.0	700002	1.00	3.00	1.0	700002	1.00	3.00	1.0	753112	100.	2.00	1.2	704002	1.00	3.00	1.0
I+ABSLIQD	23	700002	1.00	3.00	1.0	700002	1.00	3.00	1.0	700002	1.00	3.00	1.0	700002	1.00	3.00	1.0	704002	1.00	3.00	1.0
I-LIQSCVL	24	700002	1.00	3.00	.9	700002	1.00	3.00	.9	710102	1.28	3.00	.9	753112	4.52	2.00	1.2	704002	1.00	3.00	.9
I+LIQSCVL	25	700002	1.00	3.00	.9	700002	1.00	3.00	.9	710202	1.28	3.00	.9	710202	1.28	3.00	.9	704002	1.00	3.00	.9
I-BIOWAST	26	700002	1.00	1.92	1.1	700002	1.00	1.92	1.1	700002	1.00	1.92	1.1	753112	15.	2.00	1.2	704002	1.00	1.92	1.1
I+BIOWAST	27	700002	1.00	1.92	1.1	700002	1.00	1.92	1.1	700002	1.00	1.92	1.1	700002	1.00	1.92	1.1	704002	1.00	1.92	1.1
N-SSTRASH	28	710102	1.50	1.00	.2	710102	1.50	1.00	.2	720102	5.00	1.00	.6	753112	10.	2.00	1.2	714102	1.50	1.00	.2
N+SSTRASH	29	700002	1.00	1.00	.1	700002	1.00	1.00	.1	720202	5.00	1.00	.6	773222	40.	2.00	1.2	704002	1.00	1.00	.1
N-SSWASTE	30	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	704002	1.00	1.00	1.0
N-LOTRASH	31	710102	2.00	1.00	.3	710102	2.00	1.00	.3	720102	6.00	1.00	.8	753112	20.	2.00	1.2	714102	2.00	1.00	.3
N+LOTRASH	32	700002	1.00	1.00	.1	700002	1.00	1.00	.1	720202	6.00	1.00	.8	773222	80.	2.00	1.2	704002	1.00	1.00	.1
N-LOWASTE	33	700002	1.00	1.00	.5	700002	1.00	1.00	.5	700002	1.00	1.00	.5	700002	1.00	1.00	.5	704002	1.00	1.00	.5
N-ISOPROD	34	701001	1.00	1.00	1.7	701101	1.00	1.00	1.7	702101	1.00	1.43	1.2	703101	1.00	1.43	1.2	704001	1.00	1.00	1.7
N-ISOTRSH	35	500001	1.00	1.00	.6	500001	1.00	1.00	.6	500001	1.00	1.00	.6	530201	6.00	1.00	2.4	504001	1.00	1.00	.6
N-SORMFG1	36	700002	1.00	1.00	2.0	700002	1.00	1.00	2.0	700002	1.00	1.00	2.0	700002	1.00	1.00	2.0	704002	1.00	1.00	2.0
N-SORMFG2	37	1100001	1.00	1.00	.4	1100001	1.00	1.00	.4	1100001	1.00	1.00	.4	1100001	1.00	1.00	.4	1104001	1.00	1.00	.4
N-SORMFG3	38	700001	1.00	2.00	.4	700001	1.00	2.00	.4	700001	1.00	2.00	.4	700001	1.00	2.00	.4	704001	1.00	2.00	.4
N-SORMFG4	39	500002	1.00	1.00	.4	500002	1.00	1.00	.4	500002	1.00	1.00	.4	530202	6.00	1.00	2.4	504002	1.00	1.00	.4
N-NECOTRA	40	710102	2.00	1.00	.3	710102	2.00	1.00	.3	720102	6.00	1.00	.8	753112	20.	2.00	1.2	714102	2.00	1.00	.3
N-NEABLIQ	41	700002	1.00	4.10	.9	700002	1.00	4.10	.9	700002	1.00	4.10	.9	700002	1.00	4.10	.9	704002	1.00	4.10	.9
N-NESOLIQ	42	701102	1.00	1.40	1.7	701102	1.00	1.40	1.7	702102	1.00	2.00	1.2	703102	1.00	2.00	1.2	701102	1.00	1.40	1.7
N-NEVIALS	43	700002	1.00	3.00	1.0	700002	1.00	3.00	1.0	700002	1.00	3.00	1.0	700002	1.00	3.00	1.0	704002	1.00	3.00	1.0
N-NENCGLS	44	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	704002	1.00	1.00	1.0
N-NEWOTAL	45	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	704002	1.00	1.00	1.0
N-NETRGAS	46	704002	1.00	5.35	.0	704002	1.00	5.35	.0	704002	1.00	5.35	.0	704002	1.00	5.35	.0	704002	1.00	5.35	.0
N-NETRILI	47	704002	1.00	5.35	.9	704002	1.00	5.35	.9	704002	1.00	5.35	.9	704002	1.00	5.35	.9	704002	1.00	5.35	.9
N-NECARLI	48	704002	1.00	5.35	.9	704002	1.00	5.35	.9	704002	1.00	5.35	.9	704002	1.00	5.35	.9	704002	1.00	5.35	.9
N-MWTRASH	49	700002	1.00	1.00	.4	700002	1.00	1.00	.4	700002	1.00	1.00	.4	700002	1.00	1.00	.4	704002	1.00	1.00	.4

TABLE 2-6 . Waste Spectrum Dependent Values of Waste Processing Indices (continued)

Waste Stream Name	No.	Waste Spectrum 1 II	VRF	VIF	Dens	Waste Spectrum 2 II	VRF	VIF	Dens	Waste Spectrum 3 II	VRF	VIF	Dens	Waste Spectrum 4 II	VRF	VIF	Dens	Waste Spectrum 5 II	VRF	VIF	Dens
N-MWABLIQ	50	700002	1.00	5.50	1.0	700002	1.00	5.50	1.0	700002	1.00	5.50	1.0	700002	1.00	5.50	1.0	704002	1.00	5.50	1.0
N-MWSOLIQ	51	701102	1.00	1.40	1.7	701102	1.00	1.40	1.7	702102	1.00	2.00	1.2	703102	1.00	2.00	1.2	701102	1.00	1.40	1.7
N-MWWASTE	52	700002	1.00	1.00	.4	700002	1.00	1.00	.4	700002	1.00	1.00	.4	700002	1.00	1.00	.4	704002	1.00	1.00	.4
N-TRIPLAT	53	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	700002	1.00	1.00	1.0	704002	1.00	1.00	1.0
N-TRITGAS	54	700002	1.00	1.00	.0	700002	1.00	1.00	.0	700002	1.00	1.00	.0	700002	1.00	1.00	.0	704002	1.00	1.00	.0
N-TRISCNT	55	700002	1.00	3.00	.9	700002	1.00	3.00	.9	710102	1.28	3.00	.9	753112	4.52	2.00	1.2	704002	1.00	3.00	.9
N-TRILIQD	56	700002	1.00	3.00	1.0	701102	1.00	1.40	1.7	702102	1.00	2.00	1.2	753112	100.	2.00	1.2	704002	1.00	3.00	1.0
N-TRITRSH	57	700002	1.00	1.00	.1	700002	1.00	1.00	.1	700002	1.00	1.00	.1	730202	6.00	1.00	.8	704002	1.00	1.00	.1
N-TRIFOIL	58	700002	1.00	1.00	.4	700002	1.00	1.00	.4	700002	1.00	1.00	.4	730202	6.00	1.00	2.4	704002	1.00	1.00	.4
N-HIGHACT	59	700002	1.00	1.00	7.8	705102	1.00	1.00	7.8	705102	1.00	1.00	7.8	705102	1.00	1.00	7.8	705102	1.00	1.00	7.8
N-TRITSOR	60	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-CARBSOR	61	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-COBLSOR	62	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-NICKSOR	63	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-STROSOR	64	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-CESISOR	65	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-PLU8SOR	66	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-PLU9SOR	67	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-AMERSOR	68	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-PUBESOR	69	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-AMBESOR	70	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-RANEEDS	71	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-RACELLS	72	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-RAPLAQU	73	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-RANPAPP	74	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-RABESOR	75	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-RAMISCL	76	700002	1.00	1.00	.4	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	701102	1.00	1.00	1.7	704002	1.00	1.00	1.0
N-RARESIN	77	800002	1.00	1.00	.9	801102	1.00	1.40	1.7	802102	1.00	2.00	1.2	873112	18.	2.00	1.2	804002	1.00	1.00	.9
M-NAVYWET	78	701101	1.00	1.00	.4	701101	1.00	1.00	.4	702101	1.00	1.00	.4	763111	8.00	2.00	2.4	701101	1.00	1.00	.4
M-NAVYDRY	79	700001	1.00	1.00	1.7	700001	1.00	1.00	1.7	700001	1.00	1.00	1.2	730201	6.00	1.00	1.2	704001	1.00	1.00	1.7
R-HLLWFRP	80	1201101	1.00	1.40	1.7	1201101	1.00	1.40	1.7	1242101	6.00	2.00	1.2	1263121	8.00	2.00	1.2	1201101	1.00	1.40	1.7
R-FUEHARD	81	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8
R-HULLFRP	82	800001	1.00	1.00	1.0	805101	1.00	1.00	1.0	805101	1.00	1.00	1.0	805101	1.00	1.00	1.0	805101	1.00	1.00	1.0
R-ILLWFRP	83	801101	1.00	1.40	1.7	801101	1.00	1.40	1.7	842101	6.00	2.00	1.2	763121	8.00	2.00	1.2	801101	1.00	1.40	1.7
R-SILIGEL	84	700001	1.00	1.00	.8	700001	1.00	1.00	.8	700001	1.00	1.00	.8	700001	1.00	1.00	.8	704001	1.00	1.00	.8
R-MPCOTRH	85	710101	3.00	1.00	.4	710101	3.00	1.00	.4	720101	6.00	1.00	.8	763121	80.	2.00	1.2	714101	3.00	1.00	.4
R-MPCOTRL	86	710101	3.00	1.00	.4	710101	3.00	1.00	.4	720101	6.00	1.00	.8	763121	80.	2.00	1.2	714101	3.00	1.00	.4
R-MPNCTRA	87	500001	1.00	1.00	.4	500001	1.00	1.00	.4	500001	1.00	1.00	.4	530201	6.00	1.00	2.4	504001	1.00	1.00	.4
R-DEGREXT	88	700101	1.00	3.00	.8	700101	1.00	3.00	.8	700101	1.00	3.00	.8	763121	4.50	2.00	1.2	704101	1.00	3.00	.8
R-MPRESIN	89	900001	1.00	1.00	.9	901101	1.00	1.40	1.7	902101	1.00	2.00	1.2	763121	18.	2.00	1.2	904001	1.00	1.00	.9
R-SBRESIN	90	900001	1.00	1.00	.9	901101	1.00	1.40	1.7	902101	1.00	2.00	1.2	763121	18.	2.00	1.2	904001	1.00	1.00	.9
R-SBCOLIQ	91	901101	1.00	1.40	1.7	901101	1.00	1.40	1.7	942101	6.00	2.00	1.2	763121	8.00	2.00	1.2	901101	1.00	1.40	1.7
R-SBCOTRA	92	710101	3.00	1.00	.4	710101	3.00	1.00	.4	720101	6.00	1.00	.8	763121	80.	2.00	1.2	714101	3.00	1.00	.4
R-SBNCTRA	93	500001	1.00	1.00	.4	500001	1.00	1.00	.4	500001	1.00	1.00	2.4	530201	6.00	1.00	2.4	504001	1.00	1.00	2.4
R-UFFINES	94	700001	1.00	1.00	1.5	700001	1.00	1.00	1.5	700001	1.00	1.00	1.5	700001	1.00	1.00	1.5	704001	1.00	1.00	1.5
R-UFK2MUD	95	700001	1.00	1.00	1.2	700001	1.00	1.00	1.2	700001	1.00	1.00	1.2	700001	1.00	1.00	1.2	704001	1.00	1.00	1.2
R-UFCOTRA	96	710101	3.00	1.00	.4	710101	3.00	1.00	.4	720101	6.00	1.00	.8	763121	80.	2.00	1.2	714101	3.00	1.00	.4
R-UFNCTRA	97	500001	1.00	1.00	.4	500001	1.00	1.00	.4	500001	1.00	1.00	.4	530201	6.00	1.00	2.4	504001	1.00	1.00	.4
R-PUCOTRA	98	710101	3.00	1.00	.4	710101	3.00	1.00	.4	720101	6.00	1.00	.8	763121	80.	2.00	1.2	714101	3.00	1.00	.4

TABLE 2-6 . Waste Spectrum Dependent Values of Waste Processing Indices (continued)

Waste Stream		Waste Spectrum 1				Waste Spectrum 2				Waste Spectrum 3				Waste Spectrum 4				Waste Spectrum 5			
Name	No.	I1	VRF	VIF	Dens	I1	VRF	VIF	Dens	I1	VRF	VIF	Dens	I1	VRF	VIF	Dens	I1	VRF	VIF	Dens
R-PUNCTRA	99	500001	1.00	1.00	.4	500001	1.00	1.00	.4	500001	1.00	1.00	.4	530201	6.00	1.00	2.4	504001	1.00	1.00	.4
R-MOXCOTR	100	710102	3.00	1.00	.4	710102	3.00	1.00	.4	720102	6.00	1.00	.8	763122	80.	2.00	1.2	714102	3.00	1.00	.4
R-MOXMCTR	101	500002	1.00	1.00	.4	500002	1.00	1.00	.4	500002	1.00	1.00	.4	530202	6.00	1.00	2.4	504002	1.00	1.00	.4
R-MOXSOLN	102	701102	1.00	1.40	1.7	701102	1.00	1.40	1.7	742102	6.00	2.00	1.2	763122	8.00	2.00	1.2	701102	1.00	1.40	1.7
P-DECORES	103	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8
P-DEACINT	104	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8
P-DEACVES	105	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8
P-DEACTCO	106	500001	1.00	1.00	4.5	500001	1.00	1.00	4.5	500001	1.00	1.00	4.5	500001	1.00	1.00	4.5	504001	1.00	1.00	4.5
P-DECONME	107	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	504001	1.00	1.00	2.0
P-DECONCO	108	500001	1.00	1.00	3.0	500001	1.00	1.00	3.0	500001	1.00	1.00	3.0	500001	1.00	1.00	3.0	504001	1.00	1.00	3.0
P-DETRASH	109	710101	3.00	1.00	.4	710101	3.00	1.00	.4	720101	6.00	1.00	.8	763121	80.	2.00	1.2	714101	3.00	1.00	.4
P-DERESIN	110	900001	1.00	1.00	.9	901101	1.00	1.40	1.7	902101	1.00	2.00	1.2	763121	18.	2.00	1.2	904001	1.00	1.00	.9
P-DEFILCR	111	700001	1.00	1.00	1.3	701101	1.00	1.00	1.7	702101	1.00	1.00	1.2	703101	1.00	1.00	1.2	704001	1.00	1.00	1.3
P-DEEVAPB	112	901101	1.00	1.40	1.7	901101	1.00	1.40	1.7	942101	6.00	2.00	1.2	763121	8.00	2.00	1.2	901101	1.00	1.40	1.7
B-DECORES	113	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8
B-DEACINT	114	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8
B-DEACVES	115	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8
B-DEACTCO	116	500001	1.00	1.00	4.5	500001	1.00	1.00	4.5	500001	1.00	1.00	4.5	500001	1.00	1.00	4.5	504001	1.00	1.00	4.5
B-DECONME	117	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	504001	1.00	1.00	2.0
B-DECONCO	118	500001	1.00	1.00	3.0	500001	1.00	1.00	3.0	500001	1.00	1.00	3.0	500001	1.00	1.00	3.0	504001	1.00	1.00	3.0
B-DETRASH	119	710101	3.00	1.00	.4	710101	3.00	1.00	.4	720101	6.00	1.00	.8	763121	80.	2.00	1.2	714101	3.00	1.00	.4
B-DERESIN	120	900001	1.00	1.00	.9	901101	1.00	1.40	1.7	902101	1.00	2.00	1.2	763121	18.	2.00	1.2	904001	1.00	1.00	.9
B-DEEVAPB	121	901101	1.00	1.40	1.7	901101	1.00	1.40	1.7	942101	2.40	2.00	1.2	963121	6.40	2.00	1.2	901101	1.00	1.40	1.7
W-THORHLW	122	1201101	1.00	1.40	1.7	1201101	1.00	1.40	1.7	1242101	6.00	2.00	1.2	763121	8.00	2.00	1.2	1201101	1.00	1.40	1.7
W-PUREHLW	123	1201101	1.00	1.40	1.7	1201101	1.00	1.40	1.7	1242101	6.00	2.00	1.2	763121	8.00	2.00	1.2	1201101	1.00	1.40	1.7
W-COTRASH	124	510101	3.00	1.00	.4	510101	3.00	1.00	.4	520101	6.00	1.00	.8	763121	80.	2.00	1.2	514101	3.00	1.00	.4
W-NCSOLID	125	500001	1.00	1.00	.4	500001	1.00	1.00	.4	500001	1.00	1.00	.4	530101	6.00	1.00	2.4	504001	1.00	1.00	.4
W-LLWTFRE	126	700001	1.00	1.00	.9	701101	1.00	1.40	1.7	702101	1.00	2.00	1.2	763121	5.00	2.00	1.2	704001	1.00	1.00	.9
W-FRSRESN	127	800001	1.00	1.00	.9	801101	1.00	1.40	1.7	802101	1.00	2.00	1.2	863121	5.00	2.00	1.2	804001	1.00	1.00	.9
W-FRSLIQD	128	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-RTSRESN	129	700001	1.00	1.00	.9	701101	1.00	1.40	1.7	702101	1.00	2.00	1.2	763121	5.00	2.00	1.2	704001	1.00	1.00	.9
W-LTTRASH	130	510101	3.00	1.00	.4	510101	3.00	1.00	.4	520101	6.00	1.00	.8	763121	80.	2.00	1.2	514101	3.00	1.00	.4
W-HTTRASH	131	510101	3.00	1.00	.4	510101	3.00	1.00	.4	520101	6.00	1.00	.8	763121	80.	2.00	1.2	514101	3.00	1.00	.4
W-LTEQUIP	132	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	504001	1.00	1.00	2.0
W-HTEQUIP	133	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	504001	1.00	1.00	2.0
W-PDWLIQD	134	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-VITSUPR	135	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-VITWASH	136	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-VITSCRB	137	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-VITMELT	138	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-VITFRAC	139	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-VITZEOL	140	700001	1.00	1.00	1.0	701101	1.00	1.40	1.7	702101	1.00	2.00	1.2	763121	8.00	2.00	1.2	704001	1.00	1.00	1.0
W-DDRACKS	141	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	504001	1.00	1.00	2.0
W-DDLTRUB	142	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	504001	1.00	1.00	2.0
W-DDHTRUB	143	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	500001	1.00	1.00	2.0	504001	1.00	1.00	2.0
W-DDLTLQD	144	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-DDHTLQD	145	701101	1.00	1.40	1.7	701101	1.00	1.40	1.7	742101	6.00	2.00	1.2	763121	8.00	2.00	1.2	701101	1.00	1.40	1.7
W-DDRESIN	146	700001	1.00	1.00	.9	701101	1.00	1.40	1.7	702101	1.00	2.00	1.2	763121	18.	2.00	1.2	704001	1.00	1.00	.9
L-SPENTFU	147	800001	2.00	1.00	8.0	805101	2.00	1.00	8.0	805101	2.00	1.00	8.0	805101	2.00	1.00	8.0	805101	2.00	1.00	8.0
L-FUEHARD	148	800001	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8	805101	1.00	1.00	7.8

TABLE 2-7 . Waste Spectrum Dependent Values of Waste Form Behavior Indices

Waste Stream		Waste Spectrum 1							Waste Spectrum 2							Waste Spectrum 3							Waste Spectrum 4							Waste Spectrum 5						
Name	No.	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10
P-IXRESIN	1	11	1	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	11	1	1	0	3	0	0
P-CONCLIQ	2	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
P-FSLUDGE	3	02	0	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	02	0	1	0	3	0	0
P-FCARTRG	4	21	1	1	0	0	0	0	33	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	31	1	1	0	3	0	0
B-IXRESIN	5	11	1	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	11	1	1	0	3	0	0
B-CONCLIQ	6	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
B-FSLUDGE	7	02	0	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	02	0	1	0	3	0	0
P-COTRASH	8	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
P-NCTRASH	9	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	3	4	0	0	0	0	11	1	1	0	3	0	0
B-COTRASH	10	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
B-NCTRASH	11	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	3	4	0	0	0	0	11	1	1	0	3	0	0
L-NFRCOMP	12	33	3	1	0	0	1	0	33	3	1	0	4	1	0	33	3	1	0	4	1	0	33	3	1	0	4	1	0	33	3	1	0	4	1	0
L-DECONRS	13	11	1	1	1	0	0	0	23	2	2	1	2	0	0	31	3	3	1	2	0	0	32	3	4	0	2	0	0	11	1	1	1	3	0	0
F-PROCESS	14	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	3	0	0
F-COTRASH	15	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
F-NCTRASH	16	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
U-PROCESS	17	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	3	0	0
L-PUDECON	18	11	1	1	1	0	0	0	11	1	1	1	0	0	0	11	1	1	1	0	0	0	11	1	1	1	0	0	0	11	1	1	1	3	0	0
L-BURNUPS	19	12	1	2	0	1	0	0	12	1	2	0	1	0	0	11	1	3	0	1	0	0	21	1	4	0	1	0	0	12	1	2	0	3	0	0
I-COTRASH	20	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
I+COTRASH	21	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
I-ABSLIQD	22	01	0	1	1	0	0	0	01	0	1	1	0	0	0	01	0	1	1	0	0	0	32	3	4	0	2	0	0	01	0	1	1	3	0	0
I+ABSLIQD	23	01	0	1	1	0	0	0	01	0	1	1	0	0	0	01	0	1	1	0	0	0	01	0	1	1	0	0	0	01	0	1	1	3	0	0
I-LIQSCVL	24	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	32	3	4	0	2	0	0	00	0	1	1	3	0	0
I+LIQSCVL	25	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	3	0	0
I-BIOWAST	26	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	0	0	0	32	3	4	0	2	0	0	11	0	1	1	3	0	0
I+BIOWAST	27	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	3	0	0
N-SSTRASH	28	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	32	3	4	0	2	0	0	11	1	1	0	3	0	0
N+SSTRASH	29	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	32	3	4	0	2	0	0	11	1	1	0	3	0	0
N-SSWASTE	30	13	0	1	0	0	0	0	13	0	1	0	0	0	0	13	0	1	0	0	0	0	13	0	1	0	0	0	0	13	0	1	0	3	0	0
N-LOTRASH	31	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
N+LOTRASH	32	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
N-LOWASTE	33	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	3	0	0
N-ISOPROD	34	11	1	2	0	1	0	0	11	1	2	0	1	0	0	21	2	3	0	1	0	0	31	2	4	0	1	0	0	11	1	2	0	3	0	0
N-ISOTRSH	35	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	3	0	0
N-SORMFG1	36	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
N-SORMFG2	37	11	1	1	1	0	0	0	11	1	1	1	0	0	0	11	1	1	1	0	0	0	11	1	1	1	0	0	0	11	1	1	1	3	0	0
N-SORMFG3	38	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
N-SORMFG4	39	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
N-NECOTRA	40	10	1	1	1	0	0	0	10	1	1	1	0	0	0	10	1	1	1	0	0	0	32	3	4	0	2	0	0	10	1	1	1	3	0	0
N-NEABLIQ	41	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	10	0	1	1	3	0	0
N-NESOLIQ	42	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
N-NEVIALS	43	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	3	0	0
N-NEMCGLS	44	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	3	0	0
N-NEWOTAL	45	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	0	0	0	11	0	1	1	3	0	0
N-NETRGAS	46	13	0	1	0	3	0	0	13	0	1	0	3	0	0	13	0	1	0	3	0	0	13	0	1	0	3	0	0	13	0	1	0	3	0	0
N-NETRILI	47	20	0	1	1	3	0	0	20	0	1	1	3	0	0	20	0	1	1	3	0	0	20	0	1	1	3	0	0	20	0	1	1	3	0	0
N-NECARLI	48	20	0	1	1	3	0	0	20	0	1	1	3	0	0	20	0	1	1	3	0	0	20	0	1	1	3	0	0	20	0	1	1	3	0	0
N-MWTRASH	49	10	1	1	1	0	0	0	10	1	1	1	0	0	0	10	1	1	1	0	0	0	10	1	1	1	0	0	0	10	1	1	1	3	0	0

TABLE 2-7 . Waste Spectrum Dependent Values of Waste Form Behavior Indices (continued)

Waste Stream		Waste Spectrum 1							Waste Spectrum 2							Waste Spectrum 3							Waste Spectrum 4							Waste Spectrum 5						
Name	No.	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10
N-MWABLIQ	50	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	3	0	0
N-MWSOLIQ	51	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
N-MWWASTE	52	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	0	0	0	10	0	1	1	3	0	0
N-TRIPLAT	53	32	0	1	0	0	0	0	32	0	1	0	0	0	0	32	0	1	0	0	0	0	32	0	1	0	0	0	0	32	0	1	0	3	0	0
N-TRITGAS	54	01	0	1	0	0	0	0	01	0	1	0	0	0	0	01	0	1	0	0	0	0	01	0	1	0	0	0	0	01	0	1	0	3	0	0
N-TRISCNT	55	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	31	3	4	1	2	0	0	00	0	1	1	3	0	0
N-TRILIQD	56	01	0	1	1	0	0	0	23	2	2	1	2	0	0	31	3	3	1	2	0	0	31	3	4	1	2	0	0	01	0	1	1	3	0	0
N-TRITRSH	57	10	0	1	0	0	0	0	10	0	1	0	0	0	0	10	0	1	0	0	0	0	10	0	1	0	0	0	0	10	0	1	0	3	0	0
N-TRIFOIL	58	32	0	1	0	0	0	0	32	0	1	0	0	0	0	32	0	1	0	0	0	0	32	0	1	0	0	0	0	32	0	1	0	3	0	0
N-HIGHACT	59	33	3	1	0	0	2	0	33	3	1	0	4	2	0	33	3	1	0	4	2	0	33	3	1	0	4	2	0	33	3	1	0	4	2	0
N-TRITSOR	60	13	1	1	0	0	0	1	33	1	1	0	2	0	1	33	1	1	0	2	0	1	33	1	1	0	2	0	1	23	1	1	0	3	0	1
N-CARBSOR	61	13	1	1	0	0	0	2	33	1	1	0	2	0	2	33	1	1	0	2	0	2	33	1	1	0	2	0	2	23	1	1	0	3	0	2
N-COBLSOR	62	13	1	1	0	0	0	3	33	1	1	0	2	0	3	33	1	1	0	2	0	3	33	1	1	0	2	0	3	23	1	1	0	3	0	3
N-NICKSOR	63	13	1	1	0	0	0	4	33	1	1	0	2	0	4	33	1	1	0	2	0	4	33	1	1	0	2	0	4	23	1	1	0	3	0	4
N-STROSOR	64	13	1	1	0	0	0	5	33	1	1	0	2	0	5	33	1	1	0	2	0	5	33	1	1	0	2	0	5	23	1	1	0	3	0	5
N-CESISOR	65	13	1	1	0	0	0	6	33	1	1	0	2	0	6	33	1	1	0	2	0	6	33	1	1	0	2	0	6	23	1	1	0	3	0	6
N-PLU8SOR	66	13	1	1	0	0	0	7	33	1	1	0	2	0	7	33	1	1	0	2	0	7	33	1	1	0	2	0	7	23	1	1	0	3	0	7
N-PLU9SOR	67	13	1	1	0	0	0	8	33	1	1	0	2	0	8	33	1	1	0	2	0	8	33	1	1	0	2	0	8	23	1	1	0	3	0	8
N-AMERSOR	68	13	1	1	0	0	0	9	33	1	1	0	2	0	9	33	1	1	0	2	0	9	33	1	1	0	2	0	9	23	1	1	0	3	0	9
N-PUBESOR	69	13	1	1	0	0	0	10	33	1	1	0	2	0	10	33	1	1	0	2	0	10	33	1	1	0	2	0	10	23	1	1	0	3	0	10
N-AMBESOR	70	13	1	1	0	0	0	11	33	1	1	0	2	0	11	33	1	1	0	2	0	11	33	1	1	0	2	0	11	23	1	1	0	3	0	11
N-RANEEDS	71	13	1	1	0	0	0	12	33	1	1	0	2	0	12	33	1	1	0	2	0	12	33	1	1	0	2	0	12	23	1	1	0	3	0	12
N-RACELLS	72	13	1	1	0	0	0	13	33	1	1	0	2	0	13	33	1	1	0	2	0	13	33	1	1	0	2	0	13	23	1	1	0	3	0	13
N-RAPLAQU	73	13	1	1	0	0	0	14	33	1	1	0	2	0	14	33	1	1	0	2	0	14	33	1	1	0	2	0	14	23	1	1	0	3	0	14
N-RANPAPP	74	13	1	1	0	0	0	15	33	1	1	0	2	0	15	33	1	1	0	2	0	15	33	1	1	0	2	0	15	23	1	1	0	3	0	15
N-RABESOR	75	13	0	1	0	0	0	16	33	0	1	0	2	0	16	33	0	1	0	2	0	16	33	0	1	0	2	0	16	23	0	1	0	3	0	16
N-RAMISCL	76	13	0	1	0	0	0	17	33	0	1	0	2	0	17	33	0	1	0	2	0	17	33	0	1	0	2	0	17	23	0	1	0	3	0	17
N-RARESIN	77	11	1	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	11	1	1	0	3	0	0
M-NAVYWET	78	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	2	2	0	2	0	0
M-NAVYDRY	79	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	3	0	0
R-HLLWFRP	80	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
R-FUEHARD	81	33	3	1	0	0	3	0	33	3	1	0	4	3	0	33	3	1	0	4	3	0	33	3	1	0	4	3	0	33	3	1	0	4	3	0
R-HULLFRP	82	33	3	1	0	0	4	0	33	3	1	0	4	4	0	33	3	1	0	4	4	0	33	3	1	0	4	4	0	33	3	1	0	4	4	0
R-ILLWFRP	83	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
R-SILIGEL	84	00	0	1	0	0	0	0	00	0	1	0	0	0	0	00	0	1	0	0	0	0	00	0	1	0	0	0	0	00	0	1	0	3	0	0
R-MPCOTRH	85	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
R-MPCOTRL	86	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
R-MPNCTRA	87	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
R-DEGREXT	88	00	0	1	1	0	0	0	00	0	1	1	0	0	0	00	0	1	1	0	0	0	32	3	4	0	2	0	0	00	0	1	1	3	0	0
R-MPRESIN	89	11	1	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	11	1	1	0	3	0	0
R-SBRESIN	90	11	1	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	11	1	1	0	3	0	0
R-SBCOLIQ	91	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
R-SBCOTRA	92	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
R-SBNCTRA	93	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
R-UFFINES	94	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	3	0	0
R-UFK2MUD	95	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	0	0	0	03	0	1	0	3	0	0
R-UFCOTRA	96	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
R-UFNCTRA	97	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
R-PUCOTRA	98	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0

TABLE 2-7 . Waste Spectrum Dependent Values of Waste Form Behavior Indices (continued)

Waste Stream		Waste Spectrum 1							Waste Spectrum 2							Waste Spectrum 3							Waste Spectrum 4							Waste Spectrum 5						
Name	No.	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10	I4	I5	I6	I7	I8	I9	I10
R-PUNCTRA	99	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
R-MOXCOTR	100	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
R-MOXNCTR	101	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
R-MOXSOLN	102	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
P-DECORES	103	33	3	1	0	0	5	0	33	3	1	0	4	5	0	33	3	1	0	4	5	0	33	3	1	0	4	5	0	33	3	1	0	4	5	0
P-DEACINT	104	33	3	1	0	0	6	0	33	3	1	0	4	6	0	33	3	1	0	4	6	0	33	3	1	0	4	6	0	33	3	1	0	4	6	0
P-DEACVES	105	33	3	1	0	0	7	0	33	3	1	0	4	7	0	33	3	1	0	4	7	0	33	3	1	0	4	7	0	33	3	1	0	4	7	0
P-DEACTCO	106	23	1	1	0	0	0	0	23	1	1	0	0	0	0	23	1	1	0	0	0	0	23	1	1	0	0	0	0	23	1	1	0	3	0	0
P-DECONME	107	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
P-DECONCO	108	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
P-DETRASH	109	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
P-DERESIN	110	11	1	1	1	0	0	0	23	2	2	1	2	0	0	31	3	3	1	2	0	0	32	3	4	0	2	0	0	11	1	1	1	3	0	0
P-DEFILCR	111	21	1	1	0	0	0	0	33	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	31	1	1	0	3	0	0
P-DEEVAPB	112	23	1	2	1	1	0	0	23	2	2	1	2	0	0	31	3	3	1	2	0	0	32	3	4	0	2	0	0	23	2	2	0	2	0	0
B-DECORES	113	33	3	1	0	0	8	0	33	3	1	0	4	8	0	33	3	1	0	4	8	0	33	3	1	0	4	8	0	33	3	1	0	4	8	0
B-DEACINT	114	33	3	1	0	0	9	0	33	3	1	0	4	9	0	33	3	1	0	4	9	0	33	3	1	0	4	9	0	33	3	1	0	4	9	0
B-DEACVES	115	33	3	1	0	0	10	0	33	3	1	0	4	10	0	33	3	1	0	4	10	0	33	3	1	0	4	10	0	33	3	1	0	4	10	0
B-DEACTCO	116	23	1	1	0	0	0	0	23	1	1	0	0	0	0	23	1	1	0	0	0	0	23	1	1	0	0	0	0	23	1	1	0	3	0	0
B-DECONME	117	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
B-DECONCO	118	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
B-DETRASH	119	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	32	3	4	0	2	0	0	10	1	1	0	3	0	0
B-DERESIN	120	11	1	1	1	0	0	0	21	2	2	1	2	0	0	31	3	3	1	2	0	0	32	3	4	0	2	0	0	11	1	1	1	3	0	0
B-DEEVAPB	121	23	1	2	1	1	0	0	23	2	2	1	2	0	0	31	3	3	1	2	0	0	32	3	4	0	2	0	0	23	2	2	1	2	0	0
W-THORHLW	122	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	2	2	0	2	0	0
W-PUREHLW	123	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	2	2	0	2	0	0
W-COTRASH	124	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	31	3	4	0	2	0	0	10	1	1	0	3	0	0
W-NCSOLID	125	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	0	0	0	11	1	1	0	3	0	0
W-LLWTFRE	126	11	0	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	11	0	1	0	3	0	0
W-FRSRESN	127	11	0	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	11	0	1	0	3	0	0
W-FRSLIQD	128	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	1	2	0	2	0	0
W-RTSRESN	129	11	0	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	11	0	1	0	3	0	0
W-LTTRASH	130	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	31	3	4	0	2	0	0	10	1	1	0	3	0	0
W-HTTRASH	131	10	1	1	0	0	0	0	10	1	1	0	0	0	0	10	1	1	0	0	0	0	31	3	4	0	2	0	0	10	1	1	0	3	0	0
W-LTEQUIP	132	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
W-HTEQUIP	133	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
W-PDWLIQD	134	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	1	2	0	2	0	0
W-VITSUPR	135	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	1	2	0	2	0	0
W-VITWASH	136	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	1	2	0	2	0	0
W-VITSCRB	137	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	1	2	0	2	0	0
W-VITMELT	138	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	1	2	0	2	0	0
W-VITFRAC	139	23	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	23	1	2	0	2	0	0
W-VITZEOL	140	33	1	2	0	1	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	13	1	2	0	3	0	0
W-DDRACKS	141	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
W-DDLTRUB	142	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
W-DDHTRUB	143	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	0	0	0	12	1	1	0	3	0	0
W-DDLTLQD	144	23	1	2	1	1	0	0	23	2	2	1	2	0	0	31	3	3	1	2	0	0	31	3	4	0	2	0	0	23	1	2	1	2	0	0
W-DDHTLQD	145	23	1	2	1	1	0	0	23	2	2	1	2	0	0	31	3	3	1	2	0	0	31	3	4	0	2	0	0	23	1	2	1	2	0	0
W-DDRESIN	146	11	1	1	0	0	0	0	23	2	2	0	2	0	0	31	3	3	0	2	0	0	31	3	4	0	2	0	0	11	1	1	0	3	0	0
L-SPENTFU	147	33	3	1	0	0	0	0	33	3	1	0	4	0	0	33	3	1	0	4	0	0	33	3	1	0	4	0	0	33	3	1	0	4	0	0
L-FUEHARD	148	33	3	1	0	0	11	0	33	3	1	0	4	11	0	33	3	1	0	4	11	0	33	3	1	0	4	11	0	33	3	1	0	4	11	0

Processing impacts are calculated in a manner similar to the original Part 61 analysis methodology. Unit processing costs and labor hours assumed are presented in Table 2-8. Finally, several additional waste stream specific indices defined in this work are summarized in Table 2-9.

TABLE 2-8 . Summary of Processing Unit Impact Rates

Process	Costs (1980 $)	Costs (1984 $)	Labor (hours)	Units
Compaction				
Regular	335	412	15	Per m^3
Improved	503	619	15	of
Hydraulic Press	1006	1237	15	Input
Evaporation	690	849	4.42	Per m^3 of Input
Incineration				
Pathological	2060	2534	8	Per m^3
Small Calciner	1938	2348	6.12	of
Large Calciner	1039	1278	5.35	Input
Solidification*				
Scenario A	1282	1577	4	Per m^3
Scenario B	2445	3007	4	of
Scenario C	3056	3759	4	Output

* Costs for producing a structurally stable waste form are assumed to be 20% higher.

2.1.2 Reference Environments

The four reference site environments defined in the original Part 61 analysis methodology have been retained in the same format with some changes. Qualitative descriptions of these reference environments are given in Table 2-10.

Environmental parameter values of these reference environments are provided in Table 2-11, and the values of several of the parameters used by the codes are presented in Table 2-12. Finally, several other decision indices including general facility, scheduling, and cost indices, have been formulated for this report. These are defined in Table 2-13.

2.1.3 Transportation

The basic approach adopted in the original Part 61 analysis methodology for the calculation of transportation related impact measures has also

TABLE 2-9 . Other Waste Stream Specific Indices

Symbol	Property	Optional Values
Name	Waste Stream	Given in Table 2-2
IRI	Generating Region	1 = Northeast 2 = Southeast 3 = Midwest 4 = Southwest
IBLG	Years of backlog	Any value as long as IBEG-IBLG > 1980
FVOLI	Volume Fraction	Fraction of the waste volume generated in region IRI and shipped to facility in region IR
NDXS	Classification Index	0 = Do not consider waste stream 1 = Normal waste stream 2 = Normal waste stream, can be stabilized only through disposal technology -1 = Special classification test can be applied -2 = Special classification test can be applied, and the waste stream can be stabilized only through disposal technology
NDST	Distribution Index	0 = Waste does not have a distribution >0 = Waste has a distribution

TABLE 2-10 . Qualitative Description of Reference Site Environments

Region Index	Site Name	General Environment	Population Density	Soil Permeability
1	Northeast	Humid	High	Low
2	Southeast	Humid	Moderate	Moderate
3	Midwest	Humid	Low	Low
4	Southwest	Semi-Arid	Low	High

TABLE 2-11 . Summary of Reference Treatment and Disposal Facility Site Environmental Properties

Environmental property	Reference Sites* NE(1)	SE(2)	MW(3)	SW(4)
Mean average temperature ^{o}C (^{o}F)	$8^{o}C$ ($46^{o}F$)	$17^{o}C$ ($63^{o}F$)	$11^{o}C$ ($51^{o}F$)	$14^{o}C$ ($57^{o}F$)
Average wind speed m/sec (mph)	4.61 (10.3)	3.61 (8.1)	4.72 (10.6)	6.67 (15.5)
No. of days per year having at least 0.01 in precipitation	146	115	110	65
Average annual precipitation mm (in)	1,034 (41)	1,168 (46)	777 (30.5)	485 (19)
Average annual natural percolation into groundwater system, mm(in)	75 (2.9)	180 (7.1)	50 (2.0)	1 (.04)
Precipitation-evaporation (PE) index of site vicinity	136	91	93	21
Average silt content of site soils (%)	65	50	85	65
Average cation exchange capacity (meq/100g)	15	10	12	5
Travel time (yrs), waste to water table	0	10	70	276
Groundwater speed (m/yr)	0.1	1.25	0.66	10

* The numbers in parentheses denote values for the region index, IR, which are used in the codes to specify environmental parameters for each of the reference sites (e.g., if IR = 1, then environmental parameters assumed for the northeast site are used in the calculations).

TABLE 2-12 . Values of Environmental Parameters

Parameter*	Northeast	Southeast	Midwest	Southwest
Transportation				
TDP (miles/feet)^2	7.060E-05	7.060E-05	7.060E-05	3.920E-05
TDO (miles/feet)^2	9.570E-07	9.570E-07	9.570E-07	9.570E-07
TPO (people/mile^2)	2280.	610.	790.	60.
VEL (miles/hour)	50.	50.	50.	50.
Intruder and Other Scenarios				
FSC (dimensionless)	9.180E-12	2.010E-11	2.510E-11	2.640E-10
FSA (dimensionless)	2.960E-11	3.180E-11	3.280E-11	8.060E-11
AXOQ (year/m^3)	9.680E-11	1.400E-10	6.210E-11	4.110E-11
FXOQ (year/m^3)	1.830E-09	1.830E-09	1.830E-09	1.830E-09
POP (people-year/m^3)	5.050E-10	1.750E-10	1.930E-10	1.330E-11
POPE (people-year/m^3)	1.515E-09	5.250E-10	5.790E-10	3.990E-11
POPW (people-year/m^3)	1.110E-07	1.110E-07	1.110E-07	0.0
EERO (g/m^2-sec)	5.530E-07	1.540E-08	2.050E-06	7.950E-06
EINT (g/m^2-sec)	2.030E-06	2.500E-06	4.490E-06	6.840E-06
Groundwater Scenarios				
PRC1 (mm)	74.	180.	50.	1.
PRC2 (mm)	36.	30.	25.	1.
TSC1 (dimensionless)	2.660E-03	6.470E-03	1.800E-03	3.600E-05
TSC2 (dimensionless)	1.290E-03	1.080E-03	9.000E-04	3.600E-05
QFC1 (m^3)	7700.	7700.	7700.	7700.
QFC2 (m^3)	7700.	7700.	7700.	7700.
QFC3 (m^3)	2.000E+05	2.000E+05	2.000E+05	2.000E+05
QFC4 (m^3)	4.500E+05	4.500E+05	4.500E+05	NA**
UVEL (m/year)	0.1	0.2	0.1	0.1
UTCK (m)	0.	2.	7.	28.
SVEL (m/year)	0.1	1.25	0.66	10.
DSUR (m)	1000.	1000.	2000.	NA
DISP (m)	0.05	0.05	0.05	0.05
Pathway Factors				
RI (m^3/m^2-day)	6.800E-04	6.800E-04	1.100E-03	2.700E-03
F3 (kg/day)	25.	36.	22.	36.

* See Appendix A or Section 3.1.2 for definitions.
** NA : Not Applicable

TABLE 2-13 . General Facility and Schedule Indices

General Facility Indices		Optional Values
IR	Region Index	1 = Northeast; 2 = Southeast 3 = Midwest ; 4 = Southwest
IOFL	Overflow Index	0 = Do Not Consider Scenarios 1 = Consider Scenarios
IBUF	Disposal Facility Buffer Zone Index	0 = Standard Buffer Zone 1 = Larger Buffer Zone
NBRN	Barnwell Index	0 = Do Not Use Special Classification Tests 1 = Use Special Classification Tests.
NBES	Scenario Index	0 = Do Not Take Credit In Impact Scenarios For Some of The Waste Form Properties 1 = Take Credit For All Waste Form Properties
Scheduling Indices		
IBEG	First Year of Operations	Greater than 1980
IEND	Last Year of Operations	Less than or equal 2030
ICLS	Closure Period	A few years
IOBS	Observation Period	Five to ten years
IINS	Active Institutional Control Period	About 100 years

been adopted in this report with some improvements. These have been detailed in Chapter 3 of Volume 1. Some of the parameters associated with transportation impact calculations have been detailed in Table 2-12. Several of the other assumed parameters for transportation impacts are presented in Table 2-14.

2.1.4 Disposal Technologies

This component of the data base underwent a drastic change from the original Part 61 analysis methodology. The revised analysis methodology permits the use of up to six different disposal technologies at the same location. The number six has been selected based on the potential number

TABLE 2-14 . Disposal Cask Days, Interregional and Intraregional Shipment Distances in Miles and Rest Stops (in Parantheses) for Transportation Exposure Calculations

Generating Region	Disposal Region	Cask Days	Affected Region 1	2	3	4
1	1	2	300(1)	-	-	-
	2	8	500(2)	500(2)	-	-
	3	8	500(2)	-	500(2)	-
	4	20	500(2)	-	1000(2)	1500(3)
2	1	8	500(2)	500(2)	-	-
	2	3	-	400(1)	-	-
	3	8	-	500(2)	500(2)	-
	4	20	-	500(2)	1000(2)	1500(3)
3	1	8	500(2)	-	500(2)	-
	2	8	-	500(2)	500(2)	-
	3	5	-	-	1000(2)	-
	4	14	-	-	1000(2)	1500(3)
4	1	20	500(2)	-	1000(2)	1500(3)
	2	20	-	500(2)	1000(2)	1500(3)
	3	14	-	-	1000(2)	1500(3)
	4	8	-	-	-	1500(3)

of different classes of waste that could be disposed at the same facility. These classes of waste are Class A, Stable-Class A, Class B, Class C, Class D1 (routine wastes: Groups I through V in Table 2-2), and Class D2 (non-routine wastes: Groups VI and VII in Table 2-2). For each problem, six disposal technologies are selected based on the disposal concepts and operational options summarized in Table 2-15.

The operational options summarized in Table 2-15 (i.e., cover, compaction, backfill, and emplacement) are relatively independent of the disposal technology, e.g., one could use random emplacement in a concrete trench; however, it would likely not be cost effective. Thus, the major variation in disposal technology relates to the variation of the disposal concepts and size. However, environmental properties of the disposal location also affects the disposal technology, e.g., a deep trench may not be a viable option in a humid environment. Moreover, a disposal technology is also characterized by the manner in which it is used in conjunction with disposal technologies for other classes of wastes. In order to manage the multitude of alternatives, a set of disposal technology indices have been defined in this report. These indices are presented in Table 2-16.

TABLE 2-15 . Disposal Technology Options Considered

Options	Regular Concepts Large Trench	Small Trench	Unlined Auger	Slit Trench	Concrete Concepts Trench	Slit Trench	Modular Repackaged
Location							
Humid	X	X	X	X	X	X	X
Arid	X	X	X	X	X	X	X
Cover							
Reference	X	X	X	X	X	X	X
Improved	X	X	X	X	X	X	X
Compaction							
Regular	X	X	X	X	X	X	X
Moderate	X	X	X	X	X	X	X
Extreme	X	X		X			
Backfill							
Soil	X	X	X	X	X	X	X
Sand	X	X	X	X	X	X	X
Grout	X	X	X	X	X	X	X
Emplacement							
Random	X	X					
Stacked	X	X	X	X	X	X	X

As can be seen from Table 2-16, the operational options in Table 2-15 are defined through the indices denoted by IC, IX, IB, and IE. An additional operational option has been defined and is denoted by IS. Interrelationships of the disposal technologies are managed through the IU and IT indices. The last index, ID, refers to the specific disposal technology and triggers four disposal technology parameter values that have been defined in this report to describe each disposal technology. These four parameters are described below.

EFF (volumetric disposal efficiency in meters) is given as the volume of disposal space available in a disposal cell (in m^3) divided by the surface area (in m^2) of the disposal cell. The surface area of the disposal cell is defined to be the horizontal plane that is in contact with the waste and closest to the ground surface. SEF (dimensionless surface disposal efficiency) denotes the ratio of the surface area occupied by the disposal cells (surface area defined as in EFF above) to the surface area of the disposal cells plus the surface area around and between the disposal cells that have not been utilized for disposal. DPT is the disposal cell depth in meters, and denotes the depth of the top of the disposal cell below the top of the final disposal cell cover. Finally, DTK is the disposal cell thickness (in meters), which denotes the maximum height to which waste can be placed in the disposal cell.

TABLE 2-16 . Disposal Technology Indices

Symbol	Property	Optional Values
IU	Utilization Index	1 through 6. Gives the number of the lowest class of waste that the waste is disposed with.
ID	Disposal Technology	Record number of file containing the properties EFF,SEF,DPT,DTK
IT	Topmost Waste	1 through 6. Gives the number of the topmost waste class above the waste class considered.
IC	Cover Index	0 = Waste is disposed underneath another class of waste 1 = Regular cover 2 = Improved cover
IE	Emplacement Index	1 = Random disposal 2 = Stacked disposal
IB	Backfill Index	1 = Natural soils 2 = Imported sand or gravel 3 = Grout
IX	Compaction Index	1 = Regular 2 = Improved 3 = Extreme
IS	Chemical Segregation Index	0 = No segregation 1 = Segregation of waste with chelating agents and/or chemicals

Finally, the disposal technologies used in this report and the values of the four parameters described above are summarized in Table 2-17.

2.2 CLASIFY

This code must always be used before an IMPACTS run. It classifies the waste streams into the three waste classes defined in 10 CFR Part 61 (A, B, and C), as well as a new hypothetical waste class (D) developed for this report. In so doing, CLASIFY considers the physical and radiological characteristics of the waste streams as well as the waste processing options. It also prepares the waste stream specific information in a format suitable for processing by the IMPACTS code.

TABLE 2-17 . Disposal Technology Parameter Values

Disposal Technology	ID	EFF	SEF	DPT	DTK
Ref. Trench, Humid	1	6.23	.88	2	6.70
Small Trench, Humid	2	3.88	.69	2	4.70
Large Trench, Arid	3	11.40	.88	2	13.00
Small Trench, Arid	4	5.25	.69	2	7.00
Slit Trench, Humid	5	4.73	.47	2	4.70
Slit Trench, Arid	6	4.82	.47	2	5.00
Unlined Auger, Humid	7	4.70	.079	2	4.70
Unlined Auger, Arid	8	29.00	.079	2	29.00
Concrete Trench, Humid	9	5.70	.44	2	5.70
Concrete Trench, Arid	10	5.70	.44	2	5.70
Con. Slit Trench, Humid	11	5.70	.17	2	5.70
Con. Slit Trench, Arid	12	5.70	.17	2	5.70
Repack, Humid	13	6.75	.68	2	6.75
Repack, Arid	14	6.75	.68	2	6.75

From a systems point of view, CLASIFY combines the multitude of alternatives represented by two different data files (WASCAR.DAT and LIMITS.DAT), in a manner specified by a third file (CLACON.DAT) into a single output file (CLAOUT.DAT) for use by IMPACTS.

CLASIFY always uses a unit magnitude for each waste stream considered, and allocates the waste stream into fractions if it has a concentration or activity distribution. A unit volume (1 m^3) is considered for a routine or activated metal waste stream, while a single source is considered for a source waste stream. A brief discussion of the input data and code mechanics is presented below.

2.2.1 Input Data

As stated, there are three files that provide input data to this code: LIMITS.DAT, WASCAR.DAT, and CLACON.DAT. These are summarized below.

LIMITS.DAT contains 100 records of information with each record representing a specific radionuclide/solubility combination (see Table 2-1). Each record provides data on the radionuclide name and solubility, plus the radionuclide concentration and activity limitations for four classes of waste (A, B, C, and D) - that is, four concentration limits and four activity limits are specified for each radionuclide. (Concentration limits are used for routine or activated metal waste streams while activity limits are used for source waste streams.) Area concentration limits in units of Ci/m^2 are also specified. Some of the radionuclides are listed in Tables 1 and 2 of 10 CFR Part 61.55 and are specifically used to determine the classification status of wastes. These are identified and characterized by the NCLX index. Optional values of the NCLX index are given in Table 2-18.

TABLE 2-18 . Definition of NCLX Index Values

NCLX Value	Part 61 Table	Comments	Example
0	None	Nuclide not in Tables	U-238
1	1	Limit in nCi/g	Pu-239
2	1	No metal extension	I-129
3	1	Metal extension	C-14
4	2	No metal extension	Cs-137
5	2	Metal extension	Ni-59
6	2	Half-life < 5 years	Fe-55

The LIMITS.DAT file is partly fixed (concentration limits given in Part 61 tables) and partly created by the code user, possibly using results from INVERSE runs (see below).

WASCAR.DAT may contain as many records as the code user specifies. Each record represents a specific waste stream, and provides waste stream specific information including:

- o waste stream name;
- o radionuclides present in the waste stream and their concentrations or activities, as applicable;
- o waste processing options considered for the waste stream which are expressed through the integer decision indices, ISPC, given in Tables 2-4 through 2-7;
- o waste stream density as a function of waste spectrum;
- o total activity or concentration of the radionuclides considered and the total activity or concentration contained in the waste stream;
- o total activity or concentration distribution of the waste stream, if any;
- o whether the waste stream is to be classified using Part 61 procedures or different, usually more stringent, procedures; and
- o other waste stream specific information.

CLACON.DAT file stands for CLAsify CONtrol file and is the most important, albeit the smallest, of the files used by CLASIFY. This file specifies the manner in which the waste streams given in WASCAR.DAT are to be considered and whether the six disposal technologies to be considered in IMPACTS can stabilize the waste streams. This provides the user the option to use disposal technology to achieve waste stability rather than waste processing or packaging. It may also contain overriding information for many of the waste stream specific characteristics read from WASCAR.DAT.

2.2.2 Function and Output

As stated, this code combines the multitude of alternatives presented by two data files into a single file for use by the IMPACTS code. This is the major reason for CLASIFY -- that is, consolidating an almost unmanageable number of alternatives into a problem which can be addressed. Another reason for CLASIFY is that it permits rapid performance of cost/impact analyses as part of any regulatory decision to establish new waste classes (i.e., Class D or classes for source waste streams); CLASIFY permits experimentation with alternative limits for source waste streams as well as Class D streams.

A diagram of the classification test procedure used in CLASIFY is given in Figure 2.2. As shown, the procedure involves testing for Classes A through C for all waste spectra before starting to test for suitability for Class D disposal.

Output of CLASIFY is called CLAOUT.DAT. This file is structured in a manner similar to WASCAR.DAT -- that is, each record contains information pertaining to a single waste stream. However, in addition to the information retrieved from WASCAR.DAT and passed through (such as the names and concentrations of the radionuclides present and waste stream densities), it contains information on the waste class, the fraction of the waste stream volume in that class, modified raddionuclide concentrations or activities if the waste stream has a concentration or activity distribution, waste form behavior indices, and waste processing indices.

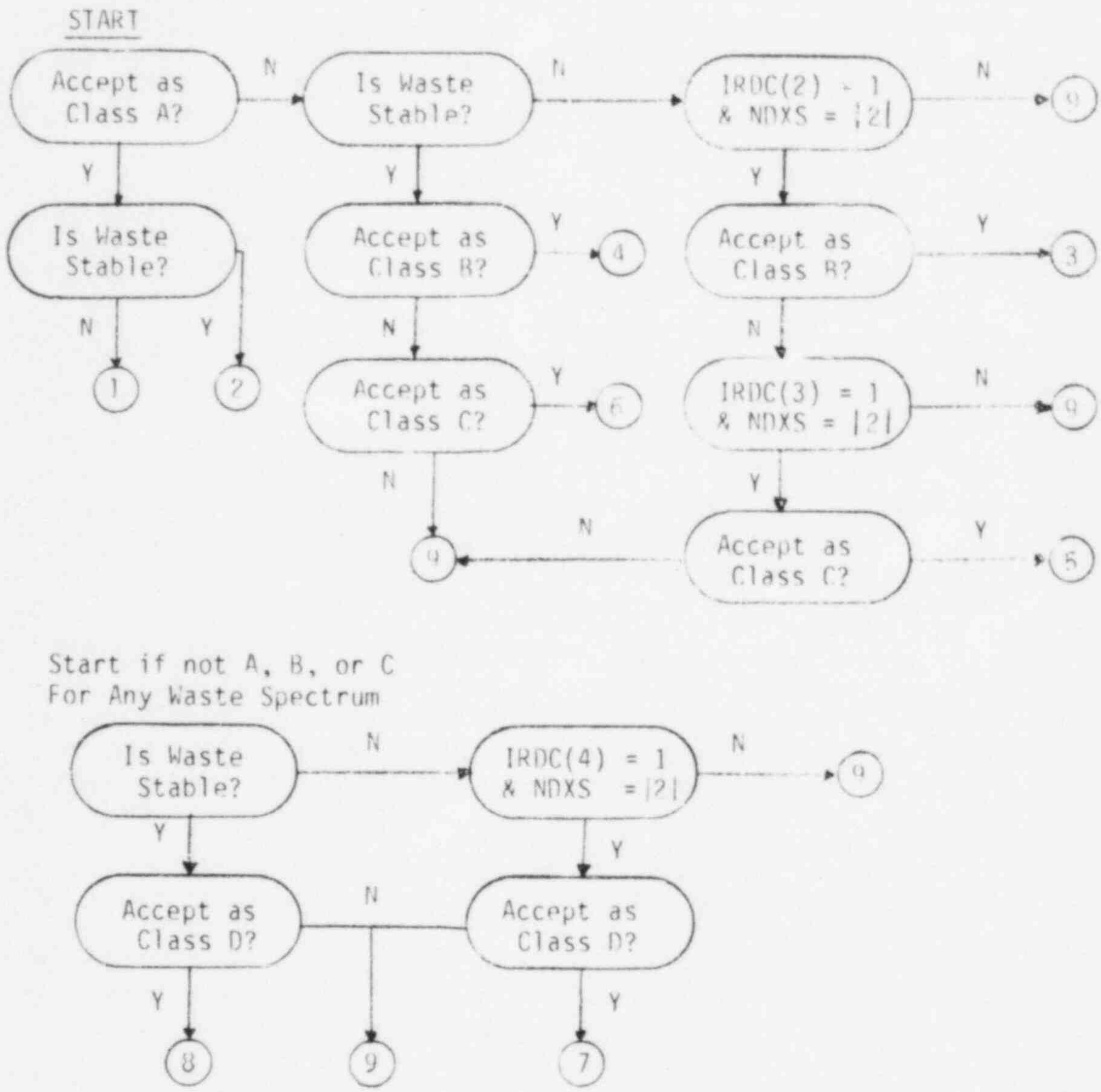
2.3 IMPACTS

Based on input from CLASIFY, IMPACTS is used to determine most disposal facility radiological impacts for a given combination of (1) waste streams and processing options, (2) disposal technology alternatives, and (3) disposal site environmental settings. These impacts include groundwater migration and overflow impacts, intrusion and exposed waste impacts, and exposures from potential operational accidents. Other impact measures (waste processing and transportation costs, and public and occupational exposures; and short- and long-term waste disposal costs, occupational exposures, and land use) are considered in the code ECONOMY (see below).

2.3.1 Input Data

In addition to the CLAOUT.DAT file provided by the code CLASIFY, IMPACTS uses six other data files: IMPCON.DAT, DISTEC.DAT, ENVIRO.DAT, FUNDCF.DAT, and VOLUME.DAT. These files are considered below.

IMPCON.DAT, which stands for <u>IMP</u>acts <u>CON</u>trol file, specifies the problem to be considered, i.e., it reads most of the decision indices including the general facility, schedule, and cost indices, and the disposal configuration. It also may contain overriding information on some of the disposal technology characteristics (retrieved from DISTEC.DAT) and environmental characteristics (retrived from ENVIRO.DAT).



1 : Class A, unstable
2 : Class A, waste form or packaging stable
3 : Class B, stabilized through disposal facility
4 : Class B, waste form or packaging stable
5 : Class C, stabilized through disposal facility
6 : Class C, waste form or packaging stable
7 : Class D, stabilized through disposal facility
8 : Class D, waste form or packaging stable
9 : Waste spectrum must be changed and the testing procedure restarted.

FIGURE 2.2 . Waste Classification Test Procedure

DISTEC.DAT may contain as many records as the code user specifies. Each record represents a specific disposal technology (see Table 2-15), and access of a specific record is triggered by the disposal technology index (ID) (see Table 2-16). Each record contains the disposal technology parameters EFF, SEF, DPT, and DTK (see Table 2-17), as well as the parameters required to calculate costs and occupational exposures (see Appendix C of Volume 1).

ENVIRO.DAT may also contain as many records as the code user specifies. Each record represents a different set of environmental properties, and access of a specific record is triggered by the IR index (see Table 2-13). In this report, the number of records have been kept to 4 reference environmental settings. Region dependent uptake factors and pathway parameters (see Appendix D, Volume 1) are also included in this file.

FUNDCF.DAT contains 100 records with each record representing a specific radionuclide. Each record contains information on fundamental dose conversion factors, retardation coefficients, radionuclide partition ratios, etc. The information retrieved from this file can not be altered by any other input. If the code user wishes to use a different set of values, the file itself must be altered.

Finally, VOLUME.DAT may also contain as many records as the code user specifies. Each record represents a specific waste stream, and access of a given record is triggered by the waste stream name (see Table 2-9). Each record gives the projected volumes (or number of waste sources) to be generated between the years 1981 and 2030, inclusive, for the four waste generating regions considered in this report. This file is generated by the code VOLUMES discussed in Section 2.4.3.

2.3.2 Function and Output

As stated, the function of this code is to calculate and present most of the impact measures considered in this report. The output of IMPACTS is primarily as hard-copy, i.e., printed computer output.

2.4 Other Codes

These minor codes consist of INVERSE, INTRUDE, VOLUMES, and ECONOMY. The first two codes perform some specific functions. The latter two were written primarily to reduce the complexity of the IMPACTS code, and help to isolate the uncertainties in parameter values.

2.4.1 INVERSE

Based on a given set of dose limitation criteria, disposal site environmental characteristics, and specific disposal technology information, this code determines the maximum allowable limits for disposal of wastes. That is, this code calculates the maximum radionuclide concentrations or activities (as applicable) allowable in a specific waste stream in combination with a specific disposal technology located at a specific environmental setting. INVERSE requires individual dose limitation criteria to be specified in order to produce the limiting concentrations.

Its output may be used to specify the radionuclide concentration and activity limits contained in the file LIMITS.DAT (see above). A number of possible exposure pathways are considered, including several inadvertant intruder scenarios.

This code uses four data files: FUNDCF.DAT, DISTEC.DAT, ENVIRO.DAT, and INVCON.DAT. The first three of these files have been explained above. INVCON.DAT stands for INVerse CONtrol file, and contains the dose limitation criteria, the disposal technology to be considered, the environmental setting in which the disposal site is located, and the stability index, I8, for the hypothetical waste stream.

2.4.2 INTRUDE

Based on physical/chemical/radiological characteristics of waste streams, this code calculates time dependent impacts from inadvertant intruder scenarios. It is very similar to the code IMPACTS in that it uses most of the same data files, and calculates radiation exposures. However, INTRUDE calculates only radiological impacts associated with the intruder initiated scenarios (see Section 4.2, Volume 1) as a function of time. It does not calculate the other impact measures. This code is designed to enable assessment of the short- and long-term implications of different combinations of waste streams disposed at the same location.

2.4.3 VOLUMES

Based on waste stream specific volume generation rates (which may depend on power generation rate or be a constant value) and regional distributions of generator facilities, this code projects and updates waste stream specific annual volumes. The rationale for this code was examined previously, i.e., it isolates the uncertainties that are associated with performance of waste stream volume projections, and reduces the complexity of the IMPACTS code. This code can be repeatedly run to update these projections (presuming there has been a change in the data files used) without affecting the remaining codes.

It uses two input files, called VRATES.DAT and REACTR.DAT, and produces the VOLUME.DAT file. The VRATES.DAT file contains the basic generation rates for the waste streams, including their rates of increase. The REACTR.DAT file contains all the reactors either operating or projected to operate within the time period of interest (1981 to 2030): their names, electrical and thermal power generation rates, locations, and start-up and projected decommissioning dates.

2.4.4 ECONOMY

This code calculates disposal costs per unit volume of waste based on information input on (1) annual waste stream volumes to be disposed, and

(2) specific disposal technology combinations. It also calculates waste processing and transportation costs, radiological impacts, and occupational exposures; disposal facility occupational exposures; and land use. This code is primarily designed to reduce the complexity of the IMPACTS code, and isolate some of the uncertainties associated with disposal technology construction costs and procedures. It is identical with the code IMPACTS at the front end, e.g., it uses all of the same input files: CLAOUT.DAT, IMPCON.DAT, DISTEC.DAT, ENVIRO.DAT, FUNDCF.DAT, and VOLUME.DAT; however, a considerable amount of the information contained in the above files is ignored. It uses one additional file called WASPAC.DAT (see below). It calculates the disposal technology costs using information obtained from Appendix C, Volume 1.

WASPAC.DAT may contain as many records as the code user specifies. Each record represents a specific waste package distribution among a set of reference waste packages, and access of a specific record is triggered by the IPK index (see Table 2-4). Assumed sets of values for WASPAC.DAT are presented in Table 2-19.

TABLE 2-19 . Waste Package Characteristics and Generic Distributions (percents)

Property	Large Boxes	Small Boxes	Drums	Small Liners	Large Liners
Volume (m^3)	3.62	.453	.212	1.42	4.81
Distributions					
IPK = 1	0	0	69	15	16
IPK = 2	23	8	69	0	0
IPK = 3	0	3	97	0	0
IPK = 4	50	0	50	0	0
IPK = 5	100	0	0	0	0
IPK = 6	0	100	0	0	0
IPK = 7	0	0	100	0	0
IPK = 8	0	0	0	100	0
IPK = 9	0	0	0	0	100
IPK = 10	0	0	50	0	50
IPK = 11	0	90	10	0	0
IPK = 12	0	0	15	15	70
IPK = 13	28	16	56	0	0
IPK = 14	10	5	85	0	0
IPK = 15	70	30	0	0	0
Costs ($ 1984)					
Regular	500	250	25	4000	5000
HICs	6000	4000	350	4000	5000

3.0 DATA FILES

This chapter discusses the format and contents of the data files used by the codes prepared in this work. Most of the information contained in these data files has been presented in Section 2.1.

As can be seen from Figure 2.1, there are three different types of data files. These include eight basic data files consisting of FUNDCF, ENVIRO, LIMITS, WASCAR, WASPAC, DISTEC, VRATES, and REACTR; four control files consisting of INVCON, CLACON, IMPCON, and INPUTS (the last file is partially a control and partially an input file); and six output files consisting of CLAOUT, VOLUME, INVOUT, IMPOUT, INTOUT, and ECYOUT. (For brevity, extensions of these data files, i.e., the ".DAT" at the end of each name, have been omitted.) A fifth "control file" is 10 CFR Part 61. These three types of data files are discussed in the following sections.

3.1 Basic Data Files

There are eight files in this category. These are examined below.

3.1.1 FUNDCF File

Used By : IMPACTS, INVERSE, INTRUDE
Created By : User

This file contains two groups of data: (1) information on radionuclide specific dose conversion factors and other information such as the release fractions resulting from waste processing, and (2) information on radionuclide chains. These are considered below.

First Group

The first group contains 100 records with each record representing a specific radionuclide and solubility combination. The data retrieved from this file can not be altered by any other input. If the code user wishes to use a different set of values, the file itself must be altered.

Each record of this file is composed of six lines and contains information on fundamental dose conversion factors, retardation coefficients, pathway uptake coefficients, radionuclide partition ratios, etc. The following statements and formats are used to read this file (the index IN stands for the record/radionuclide):

```
101 FORMAT(A8,1X,3E9.2,18X,4E9.2)
102 FORMAT(9X,10E9.2)
    DO 40 IN=1,100
    READ(1,101) NUC(IN),AL(IN),FMF(IN),DCF3D,EAVG,(FRACT(IN,I),I=1,3)
    READ(1,102) (DCF1(I),I=1,10),(DCF2(I),I=1,10)
    READ(1,102) (DCF4(I),I=1,10),(DCF5(I),I=1,10)
    READ(1,102) (RET(IN,I),I=1,5),(FF(I),I=1,5)
```

```
C
C     Various calculations including PDCF calculations
C
   40 CONTINUE
```

The first line of each record contains the following information:

- NUC - Radionuclide Name/Solubility (alpha-numeric)
- AL - Half-life (in years)
- FMF - Waste/Leachate Radionuclide Partition Ratio
- DCF3D - Total Body Direct Radiation (Volume) Fundamental Dose Conversion Factor (mrem/year per pCi/m^3)
- EAVG - Average Energy (MeV) per Gamma Emitted (E_n)
- FRACT(3) - Fractions Released for Three Processing or Accident Scenarios

The parameter NUC contains eight characters and represents radionuclide name and solubility, e.g., (H-3 *), (CS-137 D), (PU-239 Y). The half-life, AL, is converted to a decay constant (in $years^{-1}$) upon input. FMF is the radionuclide specific partition ratios discussed in Chapter 4, Volume 1. DCF3D is the total body direct radiation (volume) fundamental dose conversion factor (see Appendix D, Volume 1); the organ specific fundamental DCF3 is calculated from DCF3D based upon the input values of DCF4 (see below). EAVG is used to calculate the linear gamma attenuation coefficients for water and soil, UWT(1) and UWT(2), using two subroutines called FUWT and FUSN, respectively (see Appendix A). Finally, FRACT contains radionuclide specific release fractions due to a processing operation or accident that involves releases into the air. FRACT(1) denotes fractions of the radionuclide contents released from a pathological incinerator, FRACT(2) denotes fractions of the radionuclide contents released from a calciner, and FRACT(3) denotes fractions of the radionuclide contents released due to an accidental fire.

The second and third lines of each record (read in the second READ statement) contain inhalation (DCF1) and ingestion (DCF2) fundamental dose conversion factors, respectively. Similarly, the fourth and the fifth lines of each record (read in the third READ statement) contain direct radiation (area) (DCF4) and direct radiation (air) (DCF5) fundamental dose conversion factors, respectively. Each of these fundamental dose conversion factors has a dimension of 10 since ten organs are considered in this work. These organs are lung, stomach wall, lower-large intestine wall, total body, kidneys, liver, red bone marrow, bone, thyriod, and whole body equivalent as calculated using ICRP weighting factors (see Appendix D, Volume 1).

The organ specific DCF4 is used to calculate organ specific DCF3 from the total body DCF3D using the following equation:

DCF3(I) = DCF3D x (DCF4(I)/DCF4(4))

where I stands for the organ and DCF4(4) is the total body direct radiation (area) dose conversion factor. Use of the direct radiation (area) fundamental DCF appears to be more appropriate than the direct radiation (air) fundamental DCF to perform this calculation. The fundamental dose conversion factors (DCF1, DCF2, DCF3, DCF4, and DCF5) are immediately used to calculate pathway dose conversion factors (PDCFs).

Finally, the last line of each record contains the five retardation coefficients, RET (see Table 4-7, Vol.1), and the five uptake factors, FF (see Appendix D, Vol.1). Retardation coefficients are retained in memory since all may be used. However, in a manner similar to the fundamental dose conversion factors, the uptake factors (FF) are immediately used in the PDCF calculation.

Second Group

The second group contains information on the decay chain relationships of the radionuclides. The following statements and formats are used to read this group:

```
103 FORMAT(15I3)
    READ(1,103) (LCH(I),(ICH(J,I),J=1,8),I=1,57)
```

where the parameters are as follows:

LCH(I) : Length of the Ith chain
ICH(J,I) : Jth member of the Ith chain

In this report, the radionuclide/solubility combinations are ordered so that only those combinations with numbers 44 (RN-222 *) and above are progenitors of radionuclide chains. By convention, ICH(1,I) is the radionuclide/solubility number (I+43); ICH(2,I) is the radionuclide/solubility number of the first daughter; ICH(3,I) is the radionuclide/solubility number of the second daughter, etc. Again, by convention, this sequence continues until the last member of the chain which is denoted by LCH(I), i.e., the radionuclide/solubility number of the last member of the chain is ICH(LCH(I),I).

3.1.2 ENVIRO File

Used By : IMPACTS, INVERSE, INTRUDE
Created By : User

This file may contain as many records as the code user specifies. Each record represents a different set of environmental parameters, and includes the parameter values given in Table 2-13. In this report, the number of records have been kept to 4 reference environmental settings. Region dependent uptake pathway parameters (see Appendix D, Volume 1) as well as the processing radiation environment are also included in this file.

Each record of this file is composed of nine lines read using three statements. After the region specific information, there is some additional information. The following statements and formats are used to read each record of this file:

```
  101 FORMAT(8E10.3)
  102 FORMAT(I5,3E10.3)
      DO 10 I=1,4
      READ(2,101) TDP(I),TDO(I),TPO(I),VEL(I),(CSK(I,J),J=1,4),
     +            ((DIS(I,J,K),STP(I,J,K),K=1,4),J=1,4)
C
C     The following information within the DO 10 loop is read only if the
C     region index IR is equal to I.  However, the value of POPE is read
C     for all regions (see below), since it is used in calculation of
C     waste processing impacts.
C
      READ(2,101) FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,
     +            (PRC(J),J=1,2),(TSC(J),J=1,2),(QFC(J),J=1,4),
     +            UVEL,UTCK,SVEL,DSUR,DISP,(TSCP(J),J=1,2),TSCW
      READ(2,102) NRET
   10 CONTINUE
      READ(2,102) (RI(I),F3(I),I=1,4)
      READ(2,101) RADF
```

where (I) stands for the facility region. The first read statement inputs the first five lines of each record which contain parameters associated with transportation. These parameters are as follows:

TDP	-	Transportation factor TDOZ for population exposures during transportation in units of $(\text{miles/feet})^2$;
TDO	-	Transportation factor TDZ for population exposures during vehicle stopovers in units of $(\text{miles/feet})^2$;
TPO	-	Population density along the route (people/mile^2)
VEL	-	Vehicle speed in miles/hour;
CSK(I,J)	-	Rental cask-days for a trip from the Jth to Ith region
DIS(I,J,K)	-	Distances in miles in the Kth region for a trip from the Jth to Ith region.
STP(I,J,K)	-	Number of truck stops in the Kth region for a trip from the Jth to Ith region.

The region dependent values for the first four parameters (TDP, TDO, TPO, and VEL) are presented in Table 2-12, while values for the last three parameters (CSK, DIS, and STP) are presented in Table 2-14.

The first portion of the second read statement (sixth line of each record) inputs the environmental parameters associated with the intruder, exposed waste, and operational scenarios. These parameters are as follows:

FSC	-	Intruder-construction scenario site selection factor (dimensionless)
FSA	-	Intruder-agriculture scenario site selection factor (dimensionless)

AXOQ - Single-container accident (X/Q) factor (year/m^3)
FXOQ - Accidental fire (X/Q) factor (year/m^3)
POPE - Population factor (people-year/m^3) for air transport portion of the exposed waste scenario
POPW - Population factor (people-year/m^3) for water transport portion of the exposed waste scenario
EERO - Dust mobilization factor (g/m^2-sec) for erosion initiated exposed waste scenario
EINT - Dust mobilization factor (g/m^2-sec) for intruder initiated exposed waste scenario

The region dependent values for all of these parameters are presented in Table 2-12. As stated, only the parameters for the region of concern are read. POPE is an exception since it is needed in the calculation of waste processing impacts. (The parameter that is actually needed is POP which is one-third of the value of POPE.) The present subroutine, called READE, assumes that the first four records in the file corresponds to Regions 1 through 4 for the value of POPE. If the data base is changed, this would have to be modified accordingly.

The second portion of the second read statement (seventh and eighth lines) inputs the environmental parameters associated with the groundwater scenarios (see Table 2-12 for region dependent values). These parameters are as follows:

PRC(J) - Percolation (in m) for the IRth region; J=1 is regular cover, J=2 is improved cover.
TSC(J) - Regular contact time fraction for the IRth region; J=1 is regular cover, J=2 is improved cover.
QFC(J) - Dilution factor (m^3) for the IRth region and Jth biota access location
UVEL - Unsaturated zone water speed in m/year
UTCK - Unsaturated zone thickness in m
SVEL - Saturated zone water speed in m/year
DSUR - Distance from the center of the facility to the nearest downgradient surface water location (in m)
DISP - Dispersivity of the saturated zone (in m)
TSCP(J) - Moisture content contact time fraction for the IRth region; J=1 is regular cover, J=2 is improved cover.
TSCW - Parameter with a value between 0 and 1 used to determine the contact time to be used between the values of TSC(J) and TSCP(J); its value indicates the fraction of the regular contact time to be used, i.e.,

TSC(J) = TSCW * TSC(J) + (1.0 - TSCW) * TSCP(J)

The last statement (ninth line of each record) within the DO 10 loop reads NRET, which is the default retardation coefficient set to be used for the disposal environment considered.

After the DO 10 loop, the following parameters are read for all regions:

RI - Irrigation rate (m^3/m^2-day)
F3 - Consumption of plants by animals (kg/day)

The final information read from this file is the generic radiation environments assumed for waste processing locations, i.e., the radiation levels RADF in mR/hr corresponding to the index IRE (see Table 2-4). It is read after all the region specific information is input.

3.1.3 LIMITS File

Used By : CLASIFY
Created By : INVERSE and Part 61

This file contains 100 records of information with each record representing a specific radionuclide/solubility combination. Each record provides data on the radionuclide name and solubility, the radionuclide concentration and activity limitations for four classes of waste (A, B, C, and D) (four concentration limits and four activity limits are specified), plus the area concentration limits. The following statements and format are used to read each record of this file:

```
101 FORMAT(A8,10X,I3,8E10.3)
    DO 10 I=1,100
    READ(1,101) NUC(I),NCLX(I),(CLST(I,J),J=1,8),ARL(I)
 10 CONTINUE
```

where NUC is the nuclide name/solubility (alpha-numeric); NCLX is the decision index; CLST(I,1 through 4) denotes the concentration limits for nuclide (I) for Classes A, B, C, and D, respectively; and CLST(I,5) through CLST(I,8) denotes the total activity limits for nuclide (I) for Classes A, B, C, and D, respectively. Finally, ARL(I) denotes the area concentration limits for the Ith radionuclide.

Radionuclide concentration limits are stored in units of Ci/m^3, except for transuranics and Ra-226 which are stored in units of nCi/g (identified by an NCLX index equal to 1). Activity limits are stored in units of Ci. Finally, the area concentration limits are stored in units of Ci/m^2.

The limits CLST(I,1) through CLST(I,3) are determined by the radionuclide concentration limits specified in 10 CFR Part 61. The remaining limits may be specified by the code user. The index NCLX is assigned to each radionuclide to assist in the decisions on classifications. Some of the radionuclides are listed in Tables 1 and 2 of 10 CFR Part 61.55 and are specifically used to determine the classification status of wastes. Optional values of the NCLX index are given in Table 2-18.

3.1.4 WASCAR File

Used By : CLASIFY
Created By : User

This file may also contain as many records as the code user specifies. Each record represents a specific waste stream, and provides information including the waste stream name, the radionuclides present in the waste stream and their concentrations or activities (as applicable), the waste processing options applicable, the total concentration or activity distribution of the waste stream (if any), whether the waste stream may be classified using only Part 61 procedures or by using different, usually more stringent, procedures, and other waste stream specific information. The following statements and formats are used to read each record of this file:

```
  102 FORMAT(A10,2I4,E9.2)
  103 FORMAT(10X,I7,2I6,I3,6I2,E9.2)
  104 FORMAT(8X,4(A8,E9.2,1X))
  105 FORMAT(7X,8E9.2)
      ICOUNT=0
      DO 40 ISTR=1,200
      READ(1,102,END=45) BASN(ISTR),NDXS(ISTR),NDST,BAS(ISTR,4)
      READ(1,103) ((ISPC(K,ISTR,J),J=1,10),DENS(K,ISTR),K=1,5)
      IF(NDST.EQ.0)GO TO 25
      ICOUNT=ICOUNT+1
      READ(3,105) ((DIST(K,I,ICOUNT),I=1,16),K=1,3)
   25 READ(1,104) (NUCD(I),COND(I),I=1,4)
C
C     Storing of concentrations in appropriate locations of
C     BAS array, various other calculations, plus tests
C     to determine if all the radionuclides have been read.
C
      GO TO 25
   40 CONTINUE
   45 CONTINUE
```

As can be seen, there are four major groups of information contained in this file: (1) general information, (2) waste processing spectra, (3) total activity distributions, and (4) radionuclide activity or concentrations. These are considered below.

<u>First Read Statement</u>

This statement inputs the following general information:

BASN - Waste stream name; 10 character alphanumeric

NDXS - Waste stream type as follows:
- 0 : Do not include the waste stream
- 1 : Include the waste stream normally
- 2 : Waste stream can be stabilized through disposal technology
- -1 and -2 indicate the same as 1 and 2, but also denote special classification procedures may be applicable.

NDST - Waste stream concentration or activity distribution number
- 0 : Denotes waste stream is not distributed;
- >0 : Denotes waste stream is distributed.

BAS(4) - Total activity or concentration of the radionuclides present in the waste stream and considered in this report, i.e., the "net" concentration or activity (see below).

BASN is the 10 character waste stream name presented in Table 2-2. The file WASCAR may contain these waste streams in any order the user wishes. This waste stream name is used to identify the waste stream in all the codes, and to access waste stream specific information such as generated waste stream volumes from the file VOLUME (see below).

The index NDXS denotes the general character of the waste stream. A value of zero indicates the waste stream is to be excluded from a particular run. An absolute value of 1 or 2 respectively denotes whether the waste stream cannot or can be stabilized through disposal technology. An activated metal waste stream of highly irregular shape could possibly be unsuitable for stabilization through disposal technology. Finally, a nega-negative value indicates a waste stream for which a modified classification test may be used depending upon the integer value assigned to the general facility index NBRN. If NDXS<0 and NBRN=1, then the waste stream is required to be stabilized if it contains any radionuclide(s) having a half-life exceeding 5 years and in concentrations equal to or exceeding 1 Ci/m^3. Otherwise, the waste stream is required to be stabilized for disposal if it contains concentrations exceeding Class A limits as specified in Section 61.55 of 10 CFR Part 61.

The distribution number, NDST, is used to denote that the waste stream has a concentration or activity distribution, and is used to calculate the index ICOUNT (see below) which is stored in BAS(2). The value BAS(1) is always set equal to unity in the beginning, i.e., 1 m^3 of waste or 1 source as applicable. Finally, BAS(4) contains the total "net" concentration or activity (as applicable) of the radionuclides considered in this work (see below).

Second Read Statement

The second portion of each record represents a specific waste processing alternative, and provides the waste stream specific ISPC indices for the waste stream, plus the density of the final product. The following are read using the second read statement:

ISPC(K,ISTR,J) - Waste stream specific decision indices,
K - Denotes one of five generic waste spectra,
ISTR - Waste stream index,
J - Denotes decision index number.
DENS(K,ISTR) - Density of the waste stream (in g/cm^3).

The values of these parameters are presented in Tables 2-5 and 2-7.

Third Read Statement

The third portion of each record contains information on the total concentration (or activity) distribution, if any. However, before this record can be discussed, some background is useful.

It was recognized in the draft EIS and the accompanying data base documents that in practice there exists a wide variation in the average total concentration of almost all of the waste streams shipped for disposal. This variation results from many factors including different waste management practices by the waste generator, different ages and designs of waste generating facilities, and so forth. The significance of this distribution is the fact that some portion of the waste (at the lower end) may be acceptable for disposal as Class A waste, some portion of the waste may be acceptable as Class B waste, another portion of the waste may be acceptable as Class C waste, etc. Consequently, one of the more desirable changes to the impact analysis methodology appeared to be the capability to consider an arbitrary variation in the total concentration of individual waste streams.

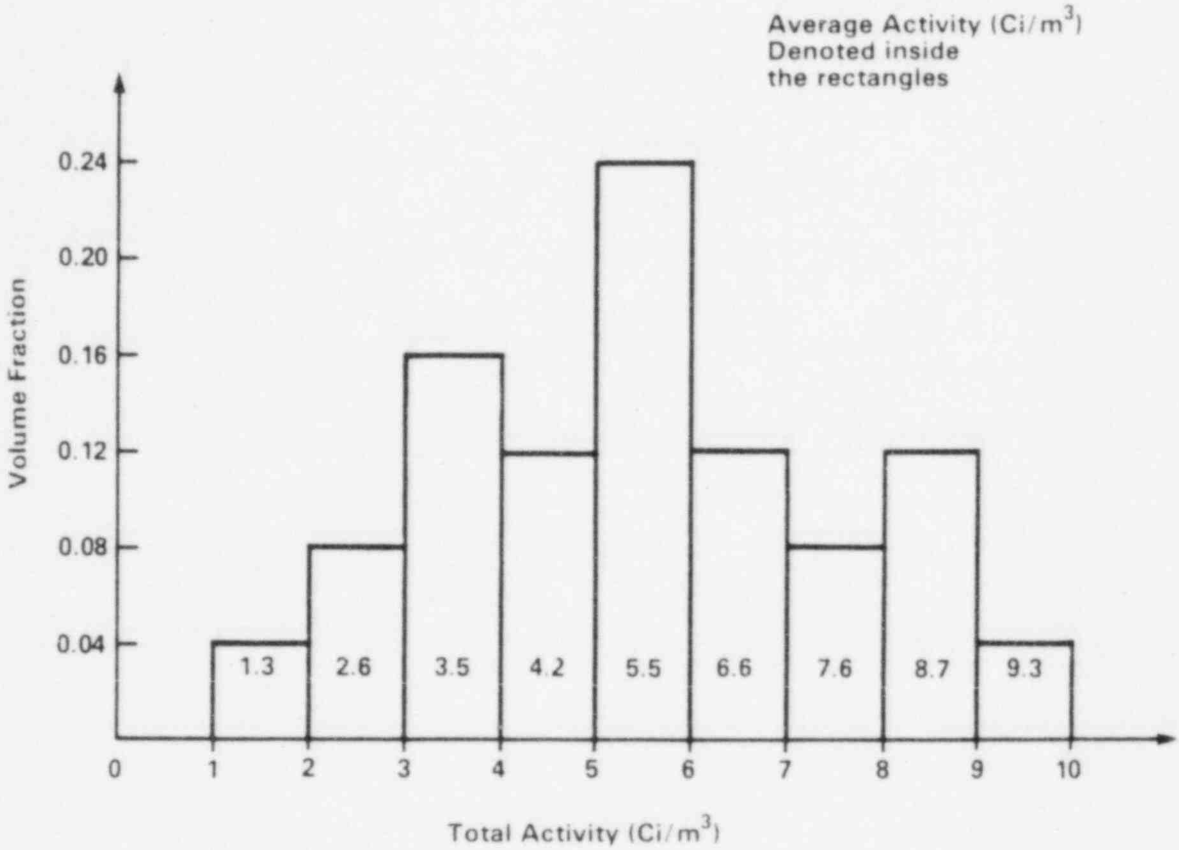
To illustrate the data needed to determine concentration distributions, as well as to illustrate how the concentration distributions are stored and used in the codes, a hypothetical example distribution is presented in Figure 3.1. For this hypothetical example, data are assumed to have been collected which show that the gross concentration of the waste stream ranges from 1 to 10 Ci/m^3. Based upon this data, the range of possible concentration has been divided into 10 increments, e.g., 1-2 Ci/m^3, 2-3 Ci/m^3, etc. For each increment the fraction of the total waste volume which has an concentration falling within the increment is determined, as well as the average concentration of the waste within the increment. For example, 24% of the waste is shown to fall within an increment of between 5 and 6 Ci/m^3 and have an average concentration of 5.5 Ci/m^3.

Based upon this data, three one-dimensional arrays are specified which contain the following information:

(1) The array CL, which contains for each increment the upper value of the concentration within the increment;
(2) The array PV, which contains for each increment the <u>cumulative</u> fraction of the waste which have concentrations less than the upper value of the particular increment; and
(3) The array AA, which contains for each increment the average concentration across the cumulative fraction of waste defined by the array PV.

These three arrays, and the values assigned to the arrays according to the example, are also shown in Figure 3.1.

The fact that the concentration of some of the waste streams is given as a distribution rather than an average over the stream complicates the waste classification test procedure. This results from the likelihood that a certain fraction of a distributed waste stream may be determined to be Class A, another fraction may be determined to be Class B, and so forth. Moreover, each time that a fraction of a waste stream is classified, the concentration distribution across the remaining fraction must be recalculated. Details of this recalculation are given in the final Part 61 EIS.



<u>ARRAYS</u>

CL	0	1	2	3	4	5	6	7	8	9	10
PV	0	0	.04	.12	.28	.40	.64	.76	.84	.96	1.0
AA	0	0	1.3	2.17	2.93	3.31	4.13	4.52	4.81	5.30	5.46

Figure A.9. Example Total Activity Distribution

The third section of each record of WASCAR contains the three arrays mentioned above. The distribution is accessed if the index NDST is not equal to zero. The following are read with the third read statement:

DIST(1,ICOUNT,J) - redefined array CL, denotes the upper limit of the concentration (in Ci/m^3) or total activity (in Ci), as applicable;
DIST(2,ICOUNT,J) - redefined array PV, denotes the cumulative fraction of the volume with concentration or activity below the value given in DIST(1); and
DIST(3,ICOUNT,J) - redefined array AA, denotes the average concentration or activity contained in the fraction of the volume given by DIST(2).

Since the number of distributions is less than the number of waste streams, the index ICOUNT is incremented each time a new distribution is read and the value ICOUNT is stored in BAS(2).

Fourth Read Statement

The final section of each record contains the radionuclide concentrations or activities. Since there may be as many as 100 radionuclide/solubility combinations for each waste stream, this section is repeated as many times as necessary.

The fourth read statement inputs the dummy radionuclide names, NUCD, and its concentration and/or activity (as applicable), COND, in bunches of four. Each NUCD is compared to NUC (read earlier from FUNDCF) and used to determine the appropriate location in the BAS array in which the COND value should be stored.

One final aspect of WASCAR file to be discussed is the ratio of the total "gross" concentration (all the radionuclides present in the waste stream including those not considered in this report) vs the "net" concentration (only the radionuclides considered in this report). This ratio affects the concentration or activity distributions (if any) for the waste stream. Distributions are based on the gross concentration in the waste stream. Thus, the distributions (if any) must be corrected. The concentration or activity of radionuclides not being considered is given as the last radionuclide without a label. The code reads this value and corrects the distributions accordingly.

3.1.5 WASPAC File

Used By : IMPACTS, ECONOMY
Created By : User

This file contains the only other waste stream specific information not contained in WASCAR. It may also contain as many records as the code user specifies. Each record represents a specific waste package distribution among a set of reference waste packages, and is triggered by the IPK index (the first digit of the waste processing parameters index, I1). The following statement and format are used to read each record of this file:

```
101 FORMAT(7I4)
    DO 10 I=1,20
    READ(1,101,END=15) (IPKQ(J,I),J=1,7)
 10 CONTINUE
 15 CONTINUE
```

where J denotes the package type, and I corresponds to IPK. The current code can accommodate up to 20 of these package distributions (see Table 2-19). This number can be changed as needed.

3.1.6 <u>DISTEC</u> File

Used By : IMPACTS, ECONOMY
Created By : User

This file may also contain as many records as the code user specifies. Currently, it contains the information presented in Table 2-17. Each record represents a specific disposal technology, and access of a given record is triggered by the ID index. Each record contains the reference disposal technology parameters EFF, SEF, DPT, and DTK, as well as the empty volume and surface dimensions of the disposal cell. The following statements and format are used to read each record of this file from the code IMPACTS:

```
101 FORMAT(20X,4E10.3)
    DO 10 I=1,6
    ID=IDQ(I)
    READ(1,101,REC=ID) EFFQ(I),SEFQ(I),DPTQ(I),DTKQ(I),
   *                   VOLE(I),ACSQ(I),ALEN(I),WIDT(I)
 10 CONTINUE
```

where I denotes the waste class in question, IDQ contains the disposal technology index for the waste class (input earlier from the IMPCON.DAT file), and EFFQ, SEFQ, DPTQ, and DTKQ stand for the reference disposal technology parameters (see Table 2-17). VOLE (m^3) is the empty volume of the disposal cell, ACSQ is the surface area of the disposal cell (m^2), ALEN is its length (m), and WIDT is its width (m).

3.1.9 <u>REACTR</u> File

Used By : VOLUMES
Created By : User

This file contains information pertaining to the nuclear power reactors either operating or projected to operate within the time period of interest (1981 to 2030). This information includes their names, electrical and thermal power generation rates, locations, and start-up and projected decommissioning dates (as accurately as can be ascertained at this time). The reason for inputting both the electrical and thermal power rating of each reactor is because the electrical power rating is used to calculate waste volumes generated during operations, and the thermal power rating is used to calculate waste volumes generated during decommissioning (see

Appendix A, Volume 1). The following statements and format are used to read information from this file:

```
  100 FORMAT(22X,I2,4X,I2,4I5)
      DO 10 I=1,150
      READ(7,100,END=15) IREG(I),ITYP(I),IMWE(I),IMWTH(I),
     *                   ICY(I),IDY(I)
   10 CONTINUE
   15 CONTINUE
```

The variables read from each record are as follows:

IREG - NRC region in which the reactor is located
ITYP - Type of reactor; the following types are available:
  1 : PWR - Fresh Water Site
  2 : PWR - Salt Water Site
  3 : BWR - Fresh Water Site; Deep Bed Demineralizers
  3 : BWR - Fresh Water Site; Filter Demineralizers
  5 : BWR - Salt Water Site
IMWE - Rated electrical power in MW(e)
IMWTH - Rated thermal power in MW(th)
ICY - Year of first operation (actual or projected)
IDY - Year of decommissioning (actual or projected)

A few examples of individual records of this file are presented below:

```
Maine Yankee       ME 1 PWR 2  825 2630 1972 2012
Vermont Yankee     VT 1 BWR 4  514 1593 1972 2012
Surry 1            VA 2 PWR 2  822 2441 1972 2012
Turkey Point 3     FL 2 PWR 2  693 2200 1972 2012
Point Beach 2      WI 3 PWR 1  497 1518 1972 2012
Quad-Cities 1      IL 3 BWR 4 1040 2511 1972 2012
```

3.1.8 VRATES File

Used By : VOLUMES
Created By : User

This file contains basic generation rates for the waste streams, their rates of increase if applicable, regional distributions, etc. Different subroutines are used to calculate the volumes from different types of waste generators. Consequently, the read statements differ. The following presents a few representative read statements from this file.

For institutional wastes, there are two types of projections. The first type of waste projection involves a base rate of generation, and a constant rate of increase for each additional year. For these waste streams, the following is read:

```
      READ (5,100) NAME, BASE, RATE, (FRAC(I),I=1,4)
  100 FORMAT (A9,6X,2E10.0,4F5.0)
```

where

NAME - waste stream name,
BASE - volume generated in base year (taken to be 1981) (m^3/year),
RATE - annual increase in waste (m^3/year),
FRAC - fraction of waste generated in each NRC region
(NRC Regions 4 & 5 combined).

The second type of institutional waste projection starts at a base rate of generation, increases to a peak level of generation, and then stays at that peak level for the remainder of the period of concern. For these institutional waste streams the following is read:

```
 15 READ (5,110) NAME, (BASE(I),I=1,4), IYRB, IYRE, (FRAC(I),I=1,4)
110 FORMAT (A9,6X,4E8.0,I4,1X,I4,1X,4F5.0)
```

where:

NAME - waste stream name,
BASE - volume generated in first four years (m^3/year),
(data for the last year are used for all later years),
IYRB - first year of BASE data,
IYRE - last year of BASE data,
FRAC - fraction of waste in each NRC region (4 & 5 combined).

The second example is for wastes from uranium recycle: processing of spent-fuel and fabrication of mixed-oxide assemblies. For these waste streams, the generation rate per plant is specified; however, the user must input the number of plants for each region, i.e., when these waste streams are included in the projections, the code requests information on the number of plants, start-up dates, and regions in which they are located. The following information is read for these waste streams from the VRATES file:

```
 12 READ (5,120) NAME, BASE
120 FORMAT (A9,6X,E10.0)
```

where

NAME - waste stream name,
BASE - waste generation rate per plant (m^3/year).

The final example concerns the waste generated from the West Valley Demonstration Project. The only input for these waste streams are the years in which they are generated. The following is read for these waste streams:

```
    READ (5,100) NAME, (VOL(J),JB(J),JE(J),J=1,3)
100 FORMAT (A9,6X,3(E10.0,I4,1X,I4,1X))
```

where

NAME - waste stream name,
VOL - volume of waste generated (m^3/year),

JB - starting year of generation,
JE - last year of generation.

Three sets of base volumes and start and end dates are read because some of the waste streams have up to three different generation rates for different periods.

3.2 Control Files

There are four control files plus a pseudo-file. These files are examined below.

3.2.1 INVCON File

Used By : INVERSE
Created By : User

This file stands for INVerse CONtrol file, and contains the dose limitation criteria, the disposal technology to be considered, the generic region in which the disposal site is located, and the waste form behavior indices for the hypothetical waste stream. The code then calculates either concentrations or total activities (depending on the value of index ISPC(10)) that would result in the specified dose limitation criteria for all the 100 radionuclides considered from fifteen intruder scenarios (five distinct scenarios consisting of drilling, drilling-agriculture, discovery, construction, and agriculture, at three different times), two exposed waste scenarios, two leachate accumulation scenarios, and four groundwater scenarios. The following are the read statements and formats of this file:

```
101 FORMAT(10I5)
105 FORMAT(10E8.1)
 20 READ(5,101) IR,IBUF,IOFL,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS
    READ(5,101) IU,ID,IT,IC,IE,IB,IX,IS
    READ(5,101) (ISPC(I),I=1,10)
    READ(5,105) DCL,DLCW
    READ(5,105) VOLUME,SECTOR,BUFFER,SORDEN
    READ(5,105) EFF,SEF,DPT,DTK,EMP
    IF(ISPC(9).GT.0) READ(5,105) FACT
    IF(ISPC(10).GT.0)READ(5,105) FSOR
```

The first read statement inputs the general facility and schedule indices (see Table 2-13). The value for NBRN is not used in INVERSE; it is not applicable. The second read statement inputs the disposal technology indices (see Table 2-16). The third read statement inputs the waste stream specific indices (see Table 2-5), of which only the last 6 have meaning in INVERSE. As stated above, the last value in the third read statement (i.e., ISPC(10)) is significant in that it specifies whether concentration (if it is zero) or activity (if it is nonzero) limitations are to be calculated.

The fourth statement reads two dose limitation criteria, DLC and DLCW. DLC is used for the intruder scenarios discussed above, plus the two exposed waste and two leachate accumulation scenarios. DLCW is used for the four groundwater migration scenarios. Dose limitation criteria are in units of mrem/yr and are given for a single organ: total body equivalent as calculated using ICRP-26 and ICRP-30 weighting factors.

The next statement reads the total waste volume disposed in the facility (VOLUME in units of m^3), one-tenth the distance of the longer section of the disposal facility (SECTOR in units of m), the buffer length between the disposal area and the facility fence (BUFFER in units of m), and the maximum source density to be considered (SORDEN in units of number/m^3). All these parameters, except BUFFER, are calculated internally in IMPACTS using the actual waste volumes and disposal technologies. In INVERSE, they must be input by the user.

The sixth statement reads the disposal technology associated parameters, EFF, SEF, DPT, DTK, and EMP. It could have been possible to read these parameters from the DISTEC file using the value of ID read previously. However, direct input of these parameters affords more flexibillity.

Finally, the last two read statements are executed only if the waste stream is an activated metal waste stream (ISPC(9)>0) or a source waste stream (ISPC(10)>0). They read the properties discussed in Section 4.1.3 of Volume 1 associated with the indices I9 and I10.

3.2.2 CLACON File

Used By : CLASIFY
Created By : User

This file stands for CLAsify CONtrol file and is the most important, albeit the smallest, of the files used by CLASIFY. This file specifies the manner in which the waste streams given in WASCAR file are to be considered, i.e., whether one or more of the six disposal technologies to be considered in IMPACTS can stabilize the waste streams. It may also contain overriding information for many of the waste stream specific characteristics read from the WASCAR file (e.g., whether to include a specific waste stream in the analysis, whether to encapsulate the waste stream in a high integrity container, etc.).

There are two major groups of information contained in this file. The first group is mandatory information for CLASIFY execution. This information is read using the following statements and formats:

```
101 FORMAT(3A20)
102 FORMAT(25I3)
103 FORMAT(8E10.3)
    READ(5,101) TITLE
    READ(5,102) NSTR,NLST,NNDX,NHIC,NORD,NBRN
    READ(5,102) (IRDC(I),I=1,4)
    READ(5,102) (IORDD(I),I=1,5)
```

```
      DO 12 I=1,NSTR
      ISPEC(I)=1
      IHIC(I)=0
      NDXS(I)=1
      DO 12 J=1,5
   12 IORD(J,I)=IORDD(J)
```

This group of information is closely linked to the manner in which CLASIFY classifies the waste streams. The following discussion in conjunction with Figure 2.2 will be useful.

As can be seen in Figure 2.2, the waste spectrum is changed upon failure of a given waste stream to meet the concentration or activity limits for a particular waste class. The order in which the waste spectra is considered for a given waste stream is waste stream specific, and is stored in array IORD. This order is kept track of during calculations through the waste stream specific array ISPEC, i.e., the waste spectrum considered is IORD(ISPEC(ISTR),ISTR). A generic order in which the waste spectra are to be considered is input through the array IORDD, and IORD is set equal to IORDD in the beginning. However, the user may wish to consider the waste spectra for some waste streams in a different order. Thus, a provision for accomplishing this is made through the index NORD.

A second point to be noted from Figure 2.2 is the importance of the ability of a disposal technology for a certain class of waste to structurally stabilize the waste. If a waste is structurally unstable for all its waste spectra, then only the disposal technology can provide structural stability. This property is expressed through the array IRDC.

A final point in conjunction with the above section of CLACON is the IHIC array. This array permits the user to package any waste stream in a high integrity container over and above that afforded by its waste spectra.

The symbols stand for the following:

- TITLE - Title of the problem (alphanumeric) up to 40 characters;
- NSTR - Maximum number of waste streams that this version of CLASIFY is dimensioned for (see below);
- NLST - Denotes the classification limits for Class D wastes. 0 denotes those given in the LIMITS file are to be used; and 1 denotes classification limits are to be input from the CLACON file (see below).
- NNDX - Number of waste streams for which NDXS value is other than that indicated in the CLAOUT file.
- NHIC - Number of waste streams which are packaged in high integrity containers (HICs). This index designates waste streams packaged in HICs in addition to those designated to be packaged in HICS through the stability index ISPC(8).
- NORD - Number of waste streams for which the order of the waste spectra is different than default order IORDD.
- NBRN - Whether waste classification is to be performed normally (a value of 0) or using more stringent procedures (a non-zero value).

IRDC - Waste disposal technology index for the four waste classes; Class A, B, C, and D correspond to IRDC(1), IRDC(2), IRDC(3), and IRDC(4), respectively, with values as follows:
  0 - Do not include this waste class;
  1 - For waste classification, disposal technology cannot provide stability to the waste stream in this class.
  2 - For waste classification, disposal technology can provide structural stability to the waste streams in this class.

IHIC - Waste stream specific array indicating whether the waste is packaged in a high-integrity container (a value of non-zero) or not (a value of zero).

ISPEC - Current waste spectrum. It is always unity at the beginning of the code execution.

IORD - Waste stream specific order in which the waste processing spectra are to be considered.

IORDD - The default order in which the waste spectra are to be considered for all waste streams.

NSTR is used for calculational convenience. Normally, there are 148 waste streams; however, several waste streams have distributions and after classification may be split into more than one waste stream (usually there are twice as many classified waste streams as there are input waste streams). This necessitates additional storage space. For execution time optimization, NSTR is kept as low as possible.

As briefly discussed above, the last three variables, ISPEC, IORDD, and IORD are closely interrelated. Five waste processing spectra are considered for each waste stream during classification. The default values for the order in which these waste spectra are to be considered are given in the array IORDD. This array is stored in the waste stream specific array IORD in the beginning of the program. ISPEC is an array that keeps track of which waste spectrum is currently being considered. For example, assume that IORDD(1) through IORDD(5) have the values 2, 3, 5, 1, and 4, respectively. (ISPEC would have the values 1 through 5 in this case.) This default order is stored in the array IORD for all the waste streams. Thus, unless another order is specified through the NORD index (see below), the first waste spectrum to be considered for this waste stream is No.2 followed by No.3, etc.

The second group of information contained in this file is optional, i.e., it depends on the values of NLST, NNDX, NHIC, and NORD. If these indices are zero, than the appropriate section of the read statements are skipped. The following statements and format are used to read this second section:

```
      IF(NLST.NE.0)READ(5,103) (CLST(4,J),J=1,100),(CLST(8,J),J=1,100)
      IF(NNDX.EQ.0)GO TO 16
  104 FORMAT(A10,5I3)
      DO 14 I=1,NNDX
      READ(5,104) NAME,K
      J=ORDER(NAME)
   14 NDXS(J)=K
   16 IF(NHIC.EQ.0)GO TO 20
```

```
      DO 18 I=1,NHIC
      READ(5,104) NAME,K
      J=ORDER(NAME)
   18 IHIC(J)=K
   20 IF(NORD.EQ.0)GO TO 26
      DO 24 I=1,NORD
      READ(5,104) NAME,(NORDD(J),J=1,5)
      K=ORDER(NAME)
      DO 22 J=1,5
   22 IORD(J,K)=NORDD(J)
   24 CONTINUE
   26 CLOSE (5)
```

These read statements are self-explanatory. The only explanation required is the calling of function subroutine ORDER. This statement returns the waste stream index based upon the previously read WASCAR data, i.e., BASN.

3.2.3 IMPCON File

Used By : IMPACTS, ECONOMY, INTRUDE
Created By : User

This file, which stands for IMPacts CONtrol file, specifies the problem to be considered including the general facility and schedule indices, and the disposal configuration. It could also contain overriding information on some of the disposal technology and/or environmental characteristics; however, its current version does not provide this option. The same input file is used by the codes ECONOMY and INTRUDE as well as IMPACTS. The format of the file is discussed below for the IMPACTS code. The following statements and format are used in the IMPACTS code to read information from this file:

```
  101 FORMAT(2A20)
  103 FORMAT(10I5)
      READ(1,101) TITLE
      READ(1,103) IR,IBUF,IOFL,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS
      READ(1,103) INDEX
      DO 20 I=1,6
      READ(1,103) IUQ(I),IDQ(I),ITQ(I),ICQ(I),IEQ(I),IBQ(I),IXQ(I),ISQ(I)
   20 CONTINUE
```

These statements are rather straightforward. The first read statement reads a 40 character alphanumeric title for the problem. The second read statement reads the general facility and schedule indices for the problem. The next statement reads the array INDEX which is used to recalculate disposal technology parameters (see below). Finally, the last read statement in the DO loop reads the disposal technology configuration for the six different waste classes.

The six dimensional array INDEX denotes which waste classes are disposed together. INDEX(1) through INDEX(6) denote this property of Class A through Class D2 wastes, respectively. Its value is 1 if the waste class is disposed in a segregated manner from other waste classes, its value is 2 if the waste class is disposed with an adjacent waste class, and its value is 3 if the waste class is disposed with two adjacent waste classes. The values of INDEX for the example disposal technology configuration given in Table 2-17 of Volume 1 are as follows: 1, 4, 4, 4, 4, 1.

3.2.4 INPUTS File

Used By : IMPACTS, ECONOMY, INTRUDE
Created By : User

This file is both a control and an input data file. It is a control file, in that it controls the manner in which the classified waste stream information obtained from CLAOUT file (see below) and the projected waste volumes obtained from VOLUME file (see above) are integrated. However, it is an input file in that it is specified entirely by the code user.

This file contains two major portions. The first portion contains a listing of the waste stream names in the order that the projected waste stream volumes are stored in the VOLUME file. This order is the same as that presented in Table 2-2. This portion is read using the following statement and format:

```
  101 FORMAT(10A10)
      READ(1,101) (BASNB(I),I=1,148)
```

where BASNB stands for the waste stream names. These are used to obtain the record number of VOLUME file in which the waste volume projections are contained.

The second portion may contain as many records as the user specifies. Each record contains a waste stream name, the region in which it is generated, the number of years the waste stream has been backlogged, and the fraction of the volume the user wishes to dispose at the disposal facility under consideration. Each line contains four sets of values, and the following statement and format are used to read this portion:

```
  104 FORMAT(5(A10,I2,E8.1))
      READ(1,104,END=300) (BASNI(I),IREGI(I),IBLGI(I),FVOLI(I),I=1,5)
```

where BASNI is the waste stream name such as P-COTRASH or L-SPENTFU, IREGI is the NRC region in which it is generated, IBLGI is the number of years the waste stream has been backlogged, and FVOLI is the fraction of the waste stream volume shipped to the disposal facility. This information controls the merging of the classified waste stream information given in the CLAOUT file and the region dependent annual volume/number information given in the VOLUME file (see below).

3.2.5 Part 61 File

This "file" consists of the two tables in Section 61.55 of 10 CFR Part 61 that specify the limiting radionuclide concentrations for waste classes A, B, and C. These limitations are used to determine the first three concentrations in the array CLST, i.e, CLST(I,1) through CLST(I,3) where I stands for the radionuclide (see above LIMITS file).

3.3 Output Files

There are six output files. These are examined below.

3.3.1 CLAOUT File

Used By : IMPACTS, ECONOMY, INTRUDE
Created By : CLASIFY

This file is an output file that is used as an input file by three other codes. It contains the integrated information after classification that was contained in the files WASCAR and LIMITS. The following statements and formats are used to read information from this file:

```
  102 FORMAT(A10,I7,2I6,I3,8I2/10X,3E10.3)
  103 FORMAT(8X,4(A8,E9.2,1X))
      I=0
   20 I=I+1
      READ(2,102,END=35) BASN(I),(ISPC(I,J),J=1,10),ICL,
     *                   (BAS(I,J),J=2,4)
   25 READ(2,103) (NUCD(J),COND(J),J=1,4)
C
C     Various calculations and tests to determine
C     if all the radionuclides have been input
C
      GO TO 25
   30 GO TO 20
   35 CONTINUE
```

where most of the variables are as specified above. The only item of note is that BAS(ISTR,2), when input, contains the classified fractions of the waste stream. Disposed waste stream volumes calculated using BAS(ISTR,2) and the waste stream volumes contained in the VOLUME file are stored in BAS(ISTR,1).

3.3.2 VOLUME File

Used By : IMPACTS, ECONOMY, INTRUDE
Created By : VOLUMES

In a manner similar to the CLAOUT file, this file is also an output file that is used for input by three codes. It is the largest of the files used by the codes. It may also contain as many records as the code user specifies. Each record contains, for a specific waste stream, the projected volumes (or number of sources) to be generated between the years 1981 and 2030, inclusive, for the four regions considered in this report. The waste streams are considered in the same order as that listed in Table 2-2.

The following statement is used to read from and/or write to this file:

```
READ(8,REC=IREC) NAME,VL
```

where VL is an array dimensioned VL(4,50), and IREC is the waste stream number determined through matching the waste stream name NAME with a given list of waste streams, BASNB (see INPUTS file). The first index of VL denotes the NRC region in which the waste is generated (NRC Regions 4 and 5 are combined). The second index is the year in which the waste is generated. That is, VL(I,J) denotes the volume (in m^3) or number, as applicable, of the waste stream generated in the year 1980+J in region I. The read/write statements are in binary format.

3.3.3 Other Output Files

These files consist of INVOUT, IMPOUT, INTOUT, and ECYOUT files. They are created by the codes INVERSE, IMPACTS, INTRUDE, and ECONOMY, respectively. All are hard-copy (printout) files that are used by the user. Examples of their formats are given in Chapter 4.0.

4.0 EXAMPLE PROBLEMS

This chapter briefly illustrates the operation of the computer codes by presenting a series of example problems. In presenting these example problems, no recommendations are made as to the desirability of any changes to existing laws and regulations. Such decisions should be made based on a much more extensive series of analyses. Rather, the example problems are presented in order to assist the code user in the use of the updated analysis methodology.

This chapter is organized into 7 principal sections. Section 4.1 presents input data and output on the INVERSE code. The remaining 4 sections respectively present input data and output for the CLASIFY, IMPACTS, INTRUDE, and ECONOMY codes. The last three codes require a file prepared through operation of an additional code, VOLUMES, which is discussed in Section 4.6. A utility code, SACAL, is briefly discussed in Section 4.7.

4.1 INVERSE Example

This example problem illustrates use of the INVERSE code to determine activity limits for sealed sources.

Input Data

A disposal facility is assumed which is located in the southeast region and uses standard shallow land burial trenches. The facility is assumed to operate for 30 years and over this time period accept 500,000 m^3 of waste. Sector and buffer zone widths are both assumed to be 100 m, a minimum level of compaction is assumed along with a "regular" cover, and ordinary soil is used as a backfill. The closure period is assumed to be 1 year, the observation period 5 years, and the institutional control period 100 years. A dose limitation criteria of 500 mrem/yr (whole body equivalent) is assumed for all scenarios except groundwater scenarios, for which a dose limitation criteria of 4 mrem/yr is assumed.

The sealed source density within the disposal facility is conservatively assumed to be 0.015 sources/m^3. No credit is taken for any reduction in dispersibility or solubility ($f_{SD} = f_{SL} = 1.0$). The sources are also assumed not to have been packaged in any sort of high integrity sealed source container, and so no credit is taken for any delay time provided by packaging ($f_{SC} = 1$). Finally, no credit is taken for any packaging technique that could attenuate gamma radiation from the sources ($f_{SG} = 1.0$).

The input file for this INVERSE example is summarized in Table 4-1 (also see Section 3.2.1). The information provided in this table is identical to that printed at the beginning of each computer output listing.

This first block of data lists the general facility and schedule indices, while the second block of data lists the disposal technology indices. These two blocks of data are input in the indicated order to most of the

TABLE 4-1 . Input Data for INVERSE Example

```
 IR  =  2  OVFL=  0  IBUF=  1  NBRN=  0  NBES=  1
 IBEG= 1991  IEND= 2020  ICLS=    1
 IOBS=    5  INST=  100  ILFE=   30

 IU=  1  ID=  1  IT=  1  IC=  1
 IE=  1  IB=  1  IX=  1  IS=  0

 ISPC INDICES:   1   1   1   0   0   0   0   0   0   1

 DLC = 500.0 MREM/YR      DLCW =   4.0 MREM/YR

 VOLS= 5.00E+05  SECT= 1.00E+02  BUFF= 1.00E+02  SORD= 1.50E-02

 EFF = 6.23E+00  SEF = 1.00E+00  DPT = 2.00E+00  DTK = 2.00E+00
SOURCE WASTE STREAM

 GDEL= 1.00E+00  DISP= 1.00E+00  SOLS= 1.00E+00  GAMM= 1.00E+00
```

other codes; however, INVERSE is comparatively limited in the extent of the calculations performed, and so some of the integer indices input to INVERSE are ignored. This is true for the overflow (IOFL), buffer zone (IBUF), and Barnwell (NBRN) indices. This is also true for the utilization (IU) and topmost waste (IT) indices. The ID index is merely used to denote whether the disposal facility is constructed of reinforced concrete. Most of the parameters determined by the ID index (e.g., EFF, SEF) are read in separately by the code user, as is the buffer zone width.

The next block of data is the selected ISPC (waste form behavior) indices, of which only the last 5 index values have any meaning in the calculations.

Following a summary of the selected dose limitation criteria for the problem, two blocks of data are printed which list certain disposal facility parameter values. These include the total waste volume (VOLS, in m^3), the sector width (SECT, in m), the buffer zone width (BUFF, in m), the source density (SORD, in m^{-3}), the volumetric disposal efficiency (EFF, in m), the surface disposal efficiency (SEF), the disposal cell depth (DPT, in m), and the disposal cell thickness (DPT, in m).

For source and activated metal waste streams, an additional block of data is printed. This information includes the delay time (GDEL) provided by waste form or packaging prior to full onset of the scenario, the air dispersibility fraction (DISP), the water dispersibility fraction (SOLS), and the self-shielding factor (GAMM).

Output

The results are listed in Table 4-2 for all scenarios considered in INVERSE and for three radionuclides of concern: Sr-90 (D), Cs-137 (D), and Pu-238 (W), where the letters in parentheses refer to the solubility class. The results are listed in units of Ci.

For several scenarios, activity limitations are given for three time periods following the end of disposal operations, and these are so indicated in the table. They respectively denote: (1) ICLS + IOBS + IINS years (IINS is 100 years in this case), (2) ICLS + IOBS + 500 years, and (3) ICLS + IOBS + 1000 years. The limits are calculated assuming that all waste is disposed within approximately 5 meters of the earth's surface. Any adjustment in limits from preferential waste placement (e.g., from layering stable waste at the bottom of the disposal cell) may be considered by the code user. Note that specifying DPT greater than 5 m will cause the intruder-construction and intruder-agriculture limits to be raised by a factor of 10. EMP is not considered in the INVERSE code for the drilling scenario (and subsequent drilling-agriculture scenario).

It should also be noted that the activity limits for the two leachate accumulation and four groundwater scenarios represent averages for the entire disposal facility. Care needs to be taken in interpreting these averages for individual waste containers, different disposal methods, and different site environments.

TABLE 4-2 . Condensed Results for INVERSE Example (Ci)

		Radionuclides		
Scenario	Symbol	Sr-90 D	Cs-137 D	Pu-239 W
Intruder-Drilling	IN-DR1	*	7.39E+02	*
	IN-DR2	*	*	*
	IN-DR3	*	*	*
Drilling-Agriculture	IN-DA1	*	3.52E+02	*
	IN-DA2	*	*	*
	IN-DA3	*	*	*
Intruder-Construction	IN-CO1	1.35E+04	2.05E+00	9.92E-01
	IN-CO2	*	2.12E+04	2.44E+01
	IN-CO3	*	*	1.07E+03
Intruder-Discovery	IN-DI1	*	1.71E+02	8.27E+01
	IN-DI2	*	*	7.04E+03
	IN-DI3	*	*	8.91E+04
Intruder-Agriculture	IN-AG1	4.19E+02	1.70E+00	2.45E+00
	IN-AG2	*	1.75E+04	6.04E+01
	IN-AG3	*	*	2.60E+03
Exposed Waste (intruder)	EX-INT	*	1.07E+05	1.49E+05
Exposed Waste (erosion)	EX-ERO	*	*	7.11E+05
Leachate Accumulation (operations)	LA-OPS	8.12E+01	8.45E+02	9.48E+02
Leachate Accumulation (overflow)	LA-OVF	1.02E-01	6.01E-01	1.07E+00
Intruder Well	INT-WL	*	*	*
Boundary Well	BOU-WL	*	*	*
Population Well	POP-WL	*	*	*
Surface Water Access	POP-SW	*	*	*

* No Effective Limit (Exceeds 1.00×10^6 Ci)

It should finally be noted that the limits calculated in the intruder-agriculture scenarios for radium-226 do not include any contribution from possible Rn-222 accumulation within dwellings. Limits for this impact pathway are determined separately using equations 4-58 through 4-61 in Volume 1 of this report. However, the waste emplacement efficiency (EMP) is considered to convert from soil concentration limits to average waste container limits. In addition, attenuation through soil is considered. Limits are raised (impacts reduced) by the following factor, f:

$$f = \exp \left[-t \sqrt{\lambda/D_s} \right]$$

where λ is the Rn-222 decay constant, D_s is the effective diffusion coefficient through soil (taken to be 2.2E-6 m^2/sec - see Volume 1), and t is the thickness of the soil layer (m) between the basement floor and the source of the radium. Limits are calculated for several values of t.

4.2 CLASIFY Example

<u>Input Data</u>

The principal input data requirements for this example problem consist of the radionuclide-specific classification limits for the LIMITS data file. The assumed limits are summarized in Tables 4-3, 4-4, and 4-5. In Table 4-3, all limits are given in units of Ci/m^3 except for alpha-emmiting transuranic radionuclides having half-lives exceeding 5 years. These are given in units of nCi/g, as are Pu-241, Cm-242, and Ra-226. Limits are given in units of Ci for Table 4-4 and Ci/m^2 for Table 4-5.

For regular and activated metal wastes, Class A, B, and C limits were obtained from 10 CFR Part 61. For Radium-226, however, limits were estimated using the INVERSE code assuming a shallow land burial facility identical to that used in the INVERSE example of Section 4.1. The only difference was that limits were determined for regular wastes rather than for sources. Since this is only an example problem, Class D limits were determined in a rather arbitrary manner. First, the existing Part 61 Class C limits were multiplied by 10 and compared with limits calculated for the two intruder-drilling scenarios using the above INVERSE run. The smallest limit was assumed for the Class D LIMITS.DAT file values.

For sources, a somewhat similar approach was used. For waste Classes A, B, and C, an equivalent activity limit was assumed by multiplying the volume concentration limits (e.g., H-3, C-14) by the volume of a 55-gallon drum (0.21 m^3). Mass concentration limits (e.g., for transuranic radionuclides) were converted to equivalent activities by assuming an overall density within the drum of 1.7 g/cm^3. Class A, B, and C limits for Ra-226 sources were determined using the INVERSE runs of Section 4.1.

For Class D waste, the calculated Part 61 Class C activity limits were multiplied by a factor of 10 and compared with limits for the intruder-drilling scenarios using the Section 4.1 INVERSE run. The smallest limit was then used for Class D values in the LIMITS.DAT file.

TABLE 4-3. Concentration Limits (Ci/m^3) Assumed for CLASIFY Example

Radionuclide	Class A	Class B	Class C	Class D
Section 61.55 Table 1 Limits:				
C-14	0.8	-	8	80
Ni-59	2.2	-	22	220
Nb-94	0.002	-	0.02	0.2
Tc-99	0.3	-	3	30
I-129	0.008	-	0.08	0.8
alpha TRU*	10	-	100	1000
Pu-241*	350	-	3500	35000
Cm-242*	2000		20000	2.0E+5
Ra-226*	2	-	20	200
Section 61.55 Table 2 Limits:				
< 5 yrs	700	-	-	-
H-3	40	-	-	-
Co-60	700	-	-	-
Ni-63	3.5	70	700	7000
Sr-90	0.04	150	7000	70000
Cs-137	1	44	4600	11000

*In units of nCi/g.

TABLE 4-4. Activity Limits (Ci) Assumed for CLASIFY Example

Radionuclide	Class A	Class B	Class C	Class D
Section 61.55 Table 1 Limits:				
C-14	0.2	-	2	20
Ni-59	0.5	-	5	50
Nb-94	0.0004	-	0.004	0.04
Tc-99	0.06	-	0.6	6
I-129	0.002	-	0.02	0.2
alpha TRU	0.004	-	0.04	0.4
Pu-241	0.1	-	1	10
Cm-242	0.7	-	7	70
Ra-226	0.003	-	0.03	0.3
Section 61.55 Table 2 Limits:				
< 5 yrs	150	-	-	-
H-3	8	-	-	-
Co-60	150	-	-	-
Ni-63	0.7	15	150	1500
Sr-90	0.008	32	1500	15000
Cs-137	0.2	9	740	740

TABLE 4-5. Area Concentration Limits (Ci/m^2) Assumed for CLASIFY Example

Radionuclide	Limit	Radionuclide	Limit
H-3	*	Tc-99	*
C-14	*	I-129	*
Co-60	*	Cs-137	5500
Ni-59	*	Ra-226	2300
Ni-63	*	alpha TRU	19000**
Sr-90	*	Pu-241	*
Nb-94	130	Cm-242	*

* No limit.
** Limit calculated for Np-237 is used for all transuranics.

Area concentration limits were estimated by dividing the concentration limits determined using the INVERSE drilling scenarios by 2 m. In most cases the resulting area concentration limits were much too large to have any influence on the results.

Other parameters and parameter values assumed for this example are listed below (See Section 3.2.2 for a description of the parameters.) Note that the CLASIFY code is the only code for which the NBRN index is meaningful.

NSTR	NLST	NNDX	NHIC	NORD	NBRN
250	0	0	0	0	0

IRDC: 1, 1, 1, 1
IORDD: 1, 2, 3, 4, 5

The output from CLASIFY is normally quite large, and so only a single printed page from the CLAOUT file is illustrated in Table 4-6. This particular CLASIFY run has divided the original 148 waste streams into 248 waste streams (several waste streams are given as volume or activity distributions), and has classified them accordingly.

For each waste stream listed in Table A-6, the first line gives the waste stream name, the waste processing parameters index (I1), the volume reduction factor index, and the volume increase factor index. For the P-IXRESIN waste stream, these indices are respectively, 1200001, 100, and 100. The waste form indices are then listed on the same line (11 110000 for P-IXRESIN), plus the NDXS index (-2 for P-IXRESIN) and the IMOD index.

TABLE 4-6 . Sample Output from CLASIFY Run

```
P-IXRESIN 1200001  100  100 11 1 1 0 0 0 0-2 1
         9.000E-01 6.049E-01 1.000E+00  .000E+00 2.360E-01
      1 H-3     * 1.88E-02 C-14    * 6.89E-04 FE-55  Y 1.65E-02 CO-60  Y 3.18E-02
      1 NI-59  W 1.97E-05 NI-63   W 6.06E-03 SR-90  D 1.37E-03 NB-94  Y 6.24E-07
      1 TC-99  D 5.81E-06 I-129   D 1.72E-05 CS-135 D 5.81E-06 CS-137 D 1.55E-01
      1 U-235  Y 3.34E-07 U-238   Y 2.62E-06 NP-237 W 6.40E-11 PU-238 Y 1.83E-04
      1 PU-239 Y 1.29E-04 PU-241 Y 5.60E-03 PU-242 Y 2.82E-07 AM-241 W 1.32E-04
      1 AM-243 W 8.88E-06 CM-243 W 7.01E-08 CM-244 W 9.73E-05                  $
P-CONCLIQ 1201101  100  140 23 1 2 0 1 0 0-2 1
         1.700E+00 1.359E+00 2.000E+00  .000E+00 3.112E-01
      2 H-3     * 9.84E-03 C-14    * 3.62E-04 FE-55  Y 6.47E-02 CO-60  Y 1.26E-01
      2 NI-59  W 7.73E-05 NI-63   W 2.39E-02 SR-90  D 7.18E-04 NB-94  Y 2.45E-06
      2 TC-99  D 3.06E-06 I-129   D 9.02E-06 CS-135 D 3.06E-06 CS-137 D 8.14E-02
      2 U-235  Y 1.76E-07 U-238   Y 1.38E-06 NP-237 W 3.37E-11 PU-238 Y 1.46E-04
      2 PU-239 Y 9.43E-05 PU-241 Y 4.11E-03 PU-242 Y 2.07E-07 AM-241 W 8.54E-05
      2 AM-243 W 5.77E-06 CM-243 W 3.34E-08 CM-244 W 5.47E-05                  $
P-FSLUDGE 1200001  100  100  2 0 1 0 0 0 0-2 1
         9.000E-01 8.442E-01 3.000E+00  .000E+00 1.090E+00
      3 H-3     * 2.67E-03 C-14    * 9.86E-05 FE-55  Y 3.20E-01 CO-60  Y 6.20E-01
      3 NI-59  W 3.83E-04 NI-63   W 1.18E-01 SR-90  D 1.95E-04 NB-94  Y 1.21E-05
      3 TC-99  D 8.29E-07 I-129   D 2.45E-06 CS-135 D 8.29E-07 CS-137 D 2.21E-02
      3 U-235  Y 1.51E-07 U-238   Y 1.19E-06 NP-237 W 2.90E-11 PU-238 Y 4.92E-05
      3 PU-239 Y 1.60E-04 PU-241 Y 6.97E-03 PU-242 Y 3.51E-07 AM-241 W 2.73E-04
      3 AM-243 W 1.84E-05 CM-243 W 3.20E-07 CM-244 W 1.82E-04                  $
P-FCARTRG  700001  100  100 21 1 1 0 0 0 0-2 1
         1.300E+00 1.000E+00  .000E+00  .000E+00 4.481E+00
      4 H-3     * 2.77E-03 C-14    * 1.02E-04 FE-55  Y 1.34E+00 CO-60  Y 2.58E+00
      4 NI-59  W 1.59E-03 NI-63   W 4.91E-01 SR-90  D 2.02E-04 NB-94  Y 5.03E-05
      4 TC-99  D 8.62E-07 I-129   D 2.55E-06 CS-135 D 8.62E-07 CS-137 D 2.30E-02
      4 U-235  Y 8.77E-07 U-238   Y 6.91E-06 NP-237 W 1.69E-10 PU-238 Y 6.05E-04
      4 PU-239 Y 9.15E-04 PU-241 Y 4.00E-02 PU-242 Y 2.01E-06 AM-241 W 3.95E-04
      4 AM-243 W 2.65E-05 CM-243 W 4.65E-07 CM-244 W 2.65E-04                  $
B-IXRESIN 1200001  100  100 11 1 1 0 0 0 0-2 1
         9.000E-01 5.880E-01 4.000E+00  .000E+00 6.010E-01
      5 H-3     * 2.49E-03 C-14    * 1.55E-04 FE-55  Y 1.23E-01 CO-60  Y 2.06E-01
      5 NI-59  W 1.27E-04 NI-63   W 2.79E-03 SR-90  D 4.72E-04 NB-94  Y 4.01E-06
      5 TC-99  D 9.93E-06 I-129   D 2.65E-05 CS-135 D 9.93E-06 CS-137 D 2.65E-01
      5 U-235  Y 6.91E-09 U-238   Y 5.45E-08 NP-237 W 1.32E-12 PU-238 Y 1.08E-05
      5 PU-239 Y 6.93E-06 PU-241 Y 3.37E-04 PU-242 Y 1.51E-08 AM-241 W 3.00E-06
      5 AM-243 W 2.04E-07 CM-243 W 3.50E-09 CM-244 W 2.36E-06                  $
B-CONCLIQ 1201101  100  140 23 1 2 0 1 0 0-2 1
         1.700E+00 1.284E+00 5.000E+00  .000E+00 3.241E-01
      6 H-3     * 7.29E-04 C-14    * 4.56E-05 FE-55  Y 8.89E-02 CO-60  Y 1.48E-01
      6 NI-59  W 9.15E-05 NI-63   W 2.01E-03 SR-90  D 1.38E-04 NB-94  Y 2.90E-06
      6 TC-99  D 2.92E-06 I-129   D 7.77E-06 CS-135 D 2.92E-06 CS-137 D 7.77E-02
      6 U-235  Y 4.04E-08 U-238   Y 3.16E-07 NP-237 W 7.73E-12 PU-238 Y 2.32E-04
      6 PU-239 Y 1.10E-04 PU-241 Y 5.38E-03 PU-242 Y 2.29E-07 AM-241 W 1.40E-04
      6 AM-243 W 9.45E-06 CM-243 W 3.03E-07 CM-244 W 2.39E-04                  $
B-FSLUDGE 1200001  100  100  2 0 1 0 0 0 0-2 1
         9.000E-01 6.852E-01 6.000E+00  .000E+00 9.210E-01
      7 H-3     * 2.22E-03 C-14    * 1.37E-04 FE-55  Y 2.53E-01 CO-60  Y 4.24E-01
      7 NI-59  W 2.61E-04 NI-63   W 5.70E-03 SR-90  D 4.16E-04 NB-94  Y 8.25E-06
      7 TC-99  D 8.79E-06 I-129   D 2.33E-05 CS-135 D 8.79E-06 CS-137 D 2.33E-01
      7 U-235  Y 5.83E-08 U-238   Y 4.58E-07 NP-237 W 1.12E-11 PU-238 Y 8.18E-05
      7 PU-239 Y 4.14E-05 PU-241 Y 2.02E-03 PU-242 Y 9.10E-08 AM-241 W 2.74E-05
      7 AM-243 W 1.84E-06 CM-243 W 5.21E-08 CM-244 W 3.93E-05                  $
P-COTRASH 1410101  300  100 10 1 1 0 0 0 0 2 1
         4.000E-01 3.333E-01 7.000E+00  .000E+00 1.650E-01
      8 H-3     * 2.20E-03 C-14    * 8.10E-05 FE-55  Y 4.32E-02 CO-60  Y 8.34E-02
      8 NI-59  W 5.16E-05 NI-63   W 1.59E-02 SR-90  D 1.60E-04 NB-94  Y 1.63E-06
```

The IMOD index is important in that it indicates the classification status of the waste stream. Optional values of this index are given in Table 4-7 (also see Figure 2.2).

TABLE 4-7. IMOD Index Values

IMOD	Explanation
0	Unacceptable for disposal
1	Class A, unstable
2	Class A, waste form or packaging stable
3	Class B, stabilized at disp. facility
4	Class B, waste form or packaging stable
5	Class C, stabilized at disp. facility
6	Class C, waste form or packaging stable
7	Class D, stabilized at disp. facility
8	Class D, waste form or packaging stable

The second line for each waste stream gives the assumed density (g/cm^3), the volume (or number) fraction, the distribution identification number, a reserved parameter (not used), and the total gross concentration or activity of the waste stream. The volume (or number) fraction is the fraction of the original waste stream that has been classified into the particular waste class. (Since any waste volume increase or reduction is included the volume fraction can be a number greater than unity.) The total concentration or activity is the sum of all individual radionuclides or activities listed in the next lines.

The waste stream radionuclides are listed four to a line. Each line begins with the waste stream identification number, and then lists the radionuclide, solubility class, and concentration (or activity for source waste streams).

A summary of the classification status of all waste streams is listed in Table 4-8 along with supplementary other information (the volume fraction, density, and identification number).

4.3 IMPACTS Example

This example problem illustrates the IMPACTS code through the use of the same example disposal technology configuration as that described in Section 2.2.3.1 of Volume 1. The following is a general description of the assumed disposal technology configuration, which is assumed to be located in the southwest region (IR=4).

- Unstable Class A waste is segregated from other waste classes and is disposed in a random emplacement mode in shallow trenches. The trenches are backfilled with natural soil, extreme compaction measures are used, and regular covers are installed.

TABLE 4-8 . Summary of Classification Status of Waste Streams

CLASS A WASTE WITH IRDC = 1

NAME	VOLUME	DENSITY	STR
P-IXRESIN	6.05E-01	9.00E-01	1
P-CONCLIQ	1.36E+00	1.70E+00	2
P-FSLUDGE	8.44E-01	9.00E-01	3
P-FCARTRG	1.00E+00	1.30E+00	4
B-IXRESIN	5.88E-01	9.00E-01	5
B-CONCLIQ	1.28E+00	1.70E+00	6
B-FSLUDGE	6.85E-01	9.00E-01	7
P-COTRASH	3.33E-01	4.00E-01	8
P-NCTRASH	9.87E-01	4.00E-01	9
B-COTRASH	5.00E-01	3.00E-01	10
B-NCTRASH	1.00E+00	4.00E-01	11
L-NFRCOMP	9.43E-01	7.80E+00	12
L-DECONRS	1.40E+00	1.70E+00	13
F-PROCESS	1.00E+00	1.00E+00	14
F-COTRASH	6.67E-01	2.00E-01	15
F-NCTRASH	1.00E+00	4.00E-01	16
U-PROCESS	1.00E+00	1.00E+00	17
I-COTRASH	5.00E-01	3.00E-01	20
I+COTRASH	1.00E+00	1.00E-01	21
I-ABSLIQD	3.00E+00	1.00E+00	22
I+ABSLIQD	3.00E+00	1.00E+00	23
I-LIQSCVL	3.00E+00	9.00E-01	24
I+LIQSCVL	3.00E+00	9.00E-01	25
I-BIOWAST	1.92E+00	1.10E+00	26
I+BIOWAST	1.92E+00	1.10E+00	27
N-SSTRASH	6.67E-01	2.00E-01	28
N+SSTRASH	1.00E+00	1.00E-01	29
N-SSWASTE	1.00E+00	1.00E+00	30
N-LOTRASH	5.00E-01	3.00E-01	31
N+LOTRASH	1.00E+00	1.00E-01	32
N-LOWASTE	1.00E+00	5.00E-01	33
N-ISOTRSH	1.00E+00	6.00E-01	35
N-SORMFG1	1.14E-02	2.00E+00	36
N-SORMFG2	9.90E-01	4.00E-01	37
N-SORMFG4	1.00E+00	4.00E-01	39
N-NECOTRA	5.00E-01	3.00E-01	40
N-NEABLIQ	4.10E+00	9.00E-01	41
N-NESOLIQ	1.40E+00	1.70E+00	42
N-NEVIALS	3.00E+00	1.00E+00	43
N-NENCGLS	1.00E+00	1.00E+00	44
N-NEWOTAL	1.00E+00	1.00E+00	45
N-MWTRASH	1.00E+00	4.00E-01	49
N-TRIPLAT	7.25E-01	1.00E+00	53
N-TRITGAS	3.00E-02	1.00E-03	54
N-TRISCNT	1.91E+00	9.00E-01	55
N-TRILIQD	2.04E+00	1.00E+00	56
N-TRITRSH	7.79E-01	1.00E-01	57
N-TRIFOIL	1.23E-01	4.00E-01	58
N-HIGHACT	1.00E+00	7.80E+00	59
N-TRITSOR	8.68E-01	4.00E-01	60
N-CARBSOR	1.00E+00	4.00E-01	61
N-COBLSOR	6.22E-01	4.00E-01	62
N-NICKSOR	1.00E+00	4.00E-01	63
N-STROSOR	5.28E-02	4.00E-01	64
N-CESISOR	2.78E-01	4.00E-01	65
N-AMERSOR	1.40E-05	4.00E-01	68
N-RACELLS	1.80E-05	4.00E-01	72
N-RAPLAQU	1.80E-04	4.00E-01	73
N-RAMISCL	4.63E-01	4.00E-01	76
M-NAVYDRY	1.00E+00	4.00E-01	78
M-NAVYWET	9.42E-01	1.70E+00	79
R-MPCOTRI	3.33E-01	4.00E-01	86
R-SBCOTRA	3.33E-01	4.00E-01	92
R-SBNCTRA	1.00E+00	4.00E-01	93
R-UFK2MUD	1.00E+00	1.20E+00	95
R-UFCOTRA	3.33E-01	4.00E-01	96
R-UFNCTRA	1.00E+00	4.00E-01	[illegible]
P-DEACINT	4.45E-01	[illegible]	104
P-DEACVES	8.31E-01	7.80E+00	105
P-DEACTCO	1.00E+00	4.50E+00	106
P-DECONME	1.00E+00	2.00E+00	107
P-DECONCO	1.00E+00	3.00E+00	108
P-DETRASH	3.33E-01	4.00E-01	109
B-DEACINT	2.15E-01	7.80E+00	114
B-DEACVES	1.00E+00	7.80E+00	115
B-DEACTCO	1.00E+00	4.50E+00	116
B-DECONME	1.00E+00	2.00E+00	117
B-DECONCO	1.00E+00	3.00E+00	118
B-DETRASH	3.33E-01	4.00E-01	119
W-COTRASH	3.33E-01	4.00E-01	124
W-NCSOLID	1.00E+00	4.00E-01	125
W-LLWTFRE	1.00E+00	9.00E-01	126
W-FRSRESN	4.33E-03	9.00E-01	127
W-RTSRESN	5.71E-02	9.00E-01	129
W-LTTRASH	1.40E-01	4.00E-01	130
W-HTTRASH	1.49E-02	4.00E-01	131
W-LTEQUIP	1.48E-03	2.00E+00	132
W-HTEQUIP	3.65E-04	2.00E+00	133
W-VITFRAC	1.40E+00	1.70E+00	139
W-DDRACKS	1.48E-01	2.00E+00	141
W-DDLTRUB	9.15E-01	2.00E+00	142
W-DDHTRUB	2.09E-02	2.00E+00	143
W-DDHTLQD	6.47E-05	1.70E+00	145
P-IXRESIN	1.05E-01	1.70E+00	149
P-FSLUDGE	1.26E-01	1.70E+00	151
B-IXRESIN	8.40E-02	1.70E+00	152
B-FSLUDGE	3.71E-02	1.70E+00	154
N-TRISCNT	3.94E-02	1.20E+00	161
W-FRSRESN	2.43E-03	1.70E+00	180
W-RTSRESN	3.20E-02	1.70E+00	181

CLASS B WASTE WITH IRDC = 1

NAME	VOLUME	DENSITY	STR
N-ISOPROD	1.00E+00	1.70E+00	34
N-NETRGAS	5.35E+00	1.00E-03	46
N-NETRILI	5.35E+00	9.00E-01	47
N-MWSOLIQ	1.40E+00	1.70E+00	51
R-SBRESIN	1.40E+00	1.70E+00	90
R-SBCOLIQ	1.40E+00	1.70E+00	91
B-DERESIN	1.40E+00	1.70E+00	120
W-FRSLIQD	1.40E+00	1.70E+00	128
W-VITSUPR	1.40E+00	1.70E+00	135
W-VITZEOL	1.40E+00	1.70E+00	140
P-CONCLIQ	2.34E-02	1.70E+00	150
B-CONCLIQ	2.57E-02	1.70E+00	153
L-NFRCOMP	5.33E-02	7.80E+00	156
N-SORMFG2	4.73E-03	4.00E-01	158
N-TRIPLAT	2.75E-01	1.00E+00	159
N-TRITGAS	9.70E-01	1.00E-03	160
N-TRILIQD	4.50E-01	1.70E+00	162
N-TRITRSH	2.21E-01	1.00E-01	163
N-TRIFOIL	8.77E-01	4.00E-01	164
N-TRITSOR	1.32E-01	1.70E+00	165
N-COBLSOR	3.78E-01	1.70E+00	166
N-STROSOR	9.17E-01	1.70E+00	167
N-CESISOR	4.72E-01	1.70E+00	168
M-NAVYWET	2.66E-02	1.70E+00	176
P-DEACINT	5.03E-01	7.80E+00	177
P-DEACVES	1.69E-01	7.80E+00	178
B-DEACINT	6.13E-01	7.80E+00	179
W-LTTRASH	9.81E-03	1.20E+00	182
W-LTEQUIP	1.56E-01	2.00E+00	184
W-HTEQUIP	3.74E-03	2.00E+00	185
W-DDRACKS	8.52E-01	2.00E+00	186
W-DDLTRUB	8.46E-02	2.00E+00	187
W-DDHTLQD	2.08E-02	1.70E+00	189
P-IXRESIN	1.87E-01	1.70E+00	190
P-FSLUDGE	4.64E-03	1.70E+00	192
B-IXRESIN	4.74E-01	1.70E+00	193
B-FSLUDGE	3.73E-01	1.70E+00	195
N-TRISCNT	1.22E-01	1.20E+00	199
W-FRSRESN	9.25E-01	1.70E+00	211
W-RTSRESN	1.29E+00	1.70E+00	212

CLASS C WASTE WITH IRDC = 1

NAME	VOLUME	DENSITY	STR
N-SORMFG3	2.00E+00	4.00E-01	38
N-MWABLIQ	5.50E+00	1.00E+00	50
N-PLU8SOR	1.48E-05	1.70E+00	66
N-RANEEDS	3.00E-05	1.70E+00	71
N-RARESIN	1.40E+00	1.70E+00	77
B-DEEVAPB	1.40E+00	1.70E+00	121
W-POWLIQD	1.40E+00	1.70E+00	134
W-VITSCRB	1.40E+00	1.70E+00	137
W-VITMELT	1.40E+00	1.70E+00	138
P-NCTRASH	1.26E-02	4.00E-01	155
N-SORMFG1	1.08E-01	2.00E+00	157
N-AMERSOR	1.26E-04	1.70E+00	170
N-RACELLS	1.62E-04	1.70E+00	173
N-RAPLAQU	1.62E-03	1.70E+00	174
N-RAMISCL	2.88E-01	1.70E+00	175
W-HTTRASH	1.39E-03	1.20E+00	183
W-DDHTRUB	1.89E-01	2.00E+00	188
P-CONCLIQ	1.58E-02	1.70E+00	191
B-CONCLIQ	9.01E-02	1.70E+00	194
L-NFRCOMP	3.32E-03	7.80E+00	196
N-SORMFG3	5.17E-03	4.00E-01	198
N-STROSOR	3.02E-02	1.70E+00	200
N-CESISOR	1.70E-01	1.70E+00	201
M-NAVYWET	3.18E-02	1.70E+00	208
P-DEACINT	5.24E-02	7.80E+00	209
B-DEACINT	1.72E-01	7.80E+00	210
W-LTTRASH	4.72E-03	1.20E+00	213
W-HTTRASH	1.15E-01	4.00E-01	214
W-LTEQUIP	7.59E-01	2.00E+00	215
W-HTEQUIP	3.69E-02	2.00E+00	216
W-DDHTLQD	1.88E-01	1.70E+00	218
P-IXRESIN	2.14E-01	1.70E+00	219
P-FSLUDGE	7.88E-02	1.70E+00	221
B-IXRESIN	1.87E-02	1.70E+00	222
B-FSLUDGE	3.01E-02	1.70E+00	223
W-FRSRESN	4.67E-01	1.70E+00	231
P-IXRESIN	9.99E-04	1.20E+00	237
P-FSLUDGE	1.06E-03	1.20E+00	238
B-FSLUDGE	2.12E-04	1.20E+00	239

CLASS D WASTE WITH IRDC = 1

NAME	VOLUME	DENSITY	STR
L-PUDECON	1.00E+00	1.60E+00	18
N-NECARLI	5.35E+00	9.00E-01	48
N-MWWASTE	1.00E+00	4.00E-01	52
N-PUBESOR	1.33E-05	1.70E+00	69
R-FUEHARD	1.00E+00	7.80E+00	81
R-SILIGEL	1.00E+00	8.00E-01	84
R-MPCOTRH	3.33E-01	4.00E-01	85
R-MPNCTRA	1.00E+00	4.00E-01	87
R-UFFINES	1.00E+00	1.50E+00	94
P-DECORES	1.00E+00	7.80E+00	103
P-DEFILCR	1.00E+00	1.70E+00	111
P-DEEVAPB	1.40E+00	1.70E+00	112
B-DECORES	1.00E+00	7.80E+00	113
W-VITWASH	1.40E+00	1.70E+00	136
W-DDLTLQD	1.40E+00	1.70E+00	144
W-DDRESIN	1.40E+00	1.70E+00	146
L-FUEHARD	1.00E+00	7.80E+00	148
N-PLU8SOR	1.33E-04	1.70E+00	169
N-RANEEDS	5.95E-04	1.70E+00	172
N-SORMFG1	4.85E-01	2.00E+00	197
N-AMERSOR	1.26E-03	1.70E+00	203
N-RACELLS	1.62E-03	1.70E+00	205
N-RAPLAQU	5.53E-03	1.70E+00	206
N-RAMISCL	4.88E-02	1.70E+00	207
W-DDHTRUB	6.93E-01	2.00E+00	217
P-CONCLIQ	1.33E-03	1.70E+00	220
L-NFRCOMP	1.55E-04	7.80E+00	224
W-HTTRASH	6.82E-03	1.20E+00	232
W-LTEQUIP	8.35E-02	2.00E+00	233
W-HTEQUIP	2.54E-01	2.00E+00	234
W-DDHTLQD	8.62E-01	1.70E+00	236
W-HTTRASH	5.36E-02	4.00E-01	240
P-IXRESIN	4.51E-02	1.70E+00	243
P-FSLUDGE	7.95E-03	1.70E+00	244
B-FSLUDGE	7.47E-04	1.70E+00	245
P-IXRESIN	1.39E-04	1.20E+00	247

UNACCEPTABLE WASTE STREAMS

NAME	VOLUME	DENSITY	STR
L-BURNUPS	1.00E+00	1.70E+00	19
N-PLU9SOR	1.00E+00	1.00E+00	67
N-AMBESOR	1.00E+00	1.00E+00	70
N-RANPAPP	1.00E+00	1.00E+00	74
N-RABESOR	1.00E+00	1.00E+00	75
R-HLLWFRP	1.40E+00	1.70E+00	80
R-HULLFRP	1.00E+00	1.00E+00	82
R-ILLWFRP	1.40E+00	1.70E+00	83
R-DEGREXT	3.00E+00	8.00E-01	88
R-MPRESIN	1.00E+00	9.00E-01	89
R-PUCOTRA	3.33E-01	4.00E-01	98
R-PUNCTRA	1.00E+00	4.00E-01	99
R-MOXCOTR	3.33E-01	4.00E-01	100
R-MOXNCTR	1.00E+00	4.00E-01	101
R-MOXSOLN	1.40E+00	1.70E+00	102
P-DERESIN	1.00E+00	9.00E-01	110
W-THORHLW	1.40E+00	1.70E+00	122
W-PUREHLW	1.40E+00	1.70E+00	123
L-SPENTFU	5.00E-01	8.00E+00	147
N-PUBESOR	1.00E+00	1.00E+00	171
N-PLU8SOR	1.00E+00	1.00E+00	202
N-RANEEDS	9.99E-01	1.00E+00	204
N-SORMFG1	3.96E-01	2.00E+00	225
N-CESISOR	8.07E-02	1.00E+00	226
N-AMERSOR	9.99E-01	1.00E+00	227
N-RACELLS	9.98E-01	1.00E+00	228
N-RAPLAQU	9.93E-01	1.00E+00	229
N-RAMISCL	2.00E-01	1.00E+00	230
W-DDHTRUB	9.75E-02	2.00E+00	235
W-HTEQUIP	7.05E-01	2.00E+00	241
W-DDHTLQD	3.29E-01	1.70E+00	242
W-HTTRASH	4.02E-02	4.00E-01	246
P-IXRESIN	7.55E-04	9.00E-01	248

- Stable Class A waste is disposed in separate deep trenches together with Classes B, C, and D1 wastes in a random emplacement mode. These trenches are backfilled with sand, moderate compaction measures are implemented, and improved trench caps are installed. Class C waste is disposed so that at least 5 m of soil or lower activity waste separates the waste from the earth's surface, while Class D waste is disposed so that at least 10 m of soil or lower activity waste separates the waste from the earth's surface.

- Class D2 waste is disposed in a stacked emplacement mode in separate concrete trenches which are grouted. A regular cover is installed.

In addition, segregation of wastes containing chelating agents and/or organic chemicals is implemented.

Input Data

The basic input data for this example problem is illustrated in Table 4-9.

General facility information is illustrated first. The disposal facility is assumed to be operated for 30 years starting in 1991. A 1-year closure period, 5-year observation period, and 100-year institutional control period are assumed. A small (100 ft) buffer zone is also assumed. Given the location in an arid environment, overflow is not considered. In determining impacts, no credit is generally taken for waste form to reduce leachability and dispersibility over the long-term (NBES=0). Credit is naturally taken, however, for the corrosion resistant properties of activated metals and for the effects of packaging when waste is placed into a high integrity container.

The combination indices are listed next, which signify that Class A unstable waste is disposed separately, Class A stable, B, C, and D1 wastes are disposed together, and Class D2 waste is disposed separately.

In terms of minimum depth requirements, DMIN is taken to be 2 m for all waste classes except Class C and D. These are taken to be 5 m and 10 m, respectively.

The code has a built-in interactive test routine for minimum depths. When a minimum depth criterion is not satisfied, the code gives the user three options on the computer screen. The first option is to stop the running of the code, the second option is to preclude disposal of the particular class of waste, and the third option is to modify the minimum depth requirement to 2 m (see the Output Section). In this particular example, DMIN criterion is not satisfied for Class D2 waste. DMIN is purposely assumed to be 2 m for this class (option 3), however, to illustrate impacts from disposal of the waste at shallower depths.

The disposal technology indices are listed next for each waste class. Also listed is data from the DISTEC file (see Section 3.1.6). The disposal technology parameters EFF, SEF, DPT, and DTK are given as reference

TABLE 4-9 . Input Data for IMPACTS Example

```
IMPACTS RUN OF REGION 4 + SOURCES
IR  =  4  OVFL=  0  IBUF=  0  NBRN=  0  NBES=  0
ICLS=    1  IOBS=    5  IINS=  100
IBEG= 1991  IEND= 2020  ILFE=   30

COMBINATION INDICES ARE:     1   4   4   4   4   1

MINIMUM DEPTHS ARE:     2.0   2.0   2.0   5.0  10.0  10.0

DISPOSAL CONFIGURATION

 NO ID IU IT IC IE IB IX IS    EFF        SEF        DPT        DTK        VOLE       AREA
  1  4  1  1  1  1  1  3  1 5.25E+00 6.90E-01 2.00E+00 7.00E+00 3.53E+03 6.00E+02
  2  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  3  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  4  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  5  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  6 10  6  6  1  2  3  1  1 5.70E+00 4.40E-01 2.00E+00 5.70E+00 5.03E+03 8.60E+02

INPUTS STREAMS: NAME, REGN, BKLG, FRAC - OLD NSTR =  215
P-IXRESIN  4 0 1.00 P-CONCLIQ  4 0 1.00 P-FSLUDGE  4 0 1.00 P-FCARTRG  4 0 1.00
B-IXRESIN  4 0 1.00 B-CONCLIQ  4 0 1.00 B-FSLUDGE  4 0 1.00 P-COTRASH  4 0 1.00
P-NCTRASH  4 0 1.00 B-COTRASH  4 0 1.00 B-NCTRASH  4 0 1.00 L-NFRCOMP  4 0 1.00
L-DECONRS  4 0 1.00 F-PROCESS  4 0 1.00 F-COTRASH  4 0 1.00 F-NCTRASH  4 0 1.00
U-PROCESS  4 0 1.00 L-PUDECON  4 0 1.00 L-BURNUPS  4 0 1.00 I-COTRASH  4 0 1.00
I+COTRASH  4 0 1.00 I-ABSLIQD  4 0 1.00 I+ABSLIQD  4 0 1.00 I-LIQSCVL  4 0 1.00
I+LIQSCVL  4 0 1.00 I-BIOWAST  4 0 1.00 I+BIOWAST  4 0 1.00 N-SSTRASH  4 0 1.00
N+SSTRASH  4 0 1.00 N-SSWASTE  4 0 1.00 N-LOTRASH  4 0 1.00 N+LOTRASH  4 0 1.00
N-LOWASTE  4 0 1.00 N-ISOPROD  4 0 1.00 N-ISOTRSH  4 0 1.00 N-SORMFG1  4 0 1.00
N-SORMFG2  4 0 1.00 N-SORMFG3  4 0 1.00 N-SORMFG4  4 0 1.00 N-NECOTRA  4 0 1.00
N-NEABLIQ  4 0 1.00 N-NESOLIQ  4 0 1.00 N-NEVIALS  4 0 1.00 N-NENCGLS  4 0 1.00
N-NEWOTAL  4 0 1.00 N-NETRGAS  4 0 1.00 N-NETRILI  4 0 1.00 N-NECARLI  4 0 1.00
N-MWTRASH  4 0 1.00 N-MWABLIQ  4 0 1.00 N-MWSOLIQ  4 0 1.00 N-MWWASTE  4 0 1.00
N-TRIPLAT  4 0 1.00 N-TRITGAS  4 0 1.00 N-TRISCNT  4 0 1.00 N-TRILIQD  4 0 1.00
N-TRITRSH  4 0 1.00 N-TRIFOIL  4 0 1.00 N-HIGHACT  4 0 1.00 N-TRITSOR  4 0 1.00
N-CARBSOR  4 0 1.00 N-COBLSOR  4 0 1.00 N-NICKSOR  4 0 1.00 N-STROSOR  4 0 1.00
N-CESISOR  4 0 1.00 N-PLU8SOR  4 0 1.00 N-PLU9SOR  4 0 1.00 N-AMERSOR  4 0 1.00
N-PUBESOR  4 0 1.00 N-AMBESOR  4 0 1.00 N-RANEEDS  4 0 1.00 N-RACELLS  4 0 1.00
N-RAPLAQU  4 0 1.00 N-RANPAPP  4 0 1.00 N-RABESOR  4 0 1.00 N-RAMISCL  4 0 1.00
N-CARBSOR  1 0 1.00 N-COBLSOR  1 0 1.00 N-NICKSOR  1 0 1.00 N-STROSOR  1 0 1.00
N-CESISOR  1 0 1.00 N-PLU8SOR  1 0 1.00 N-PLU9SOR  1 0 1.00 N-AMERSOR  1 0 1.00
N-PUBESOR  1 0 1.00 N-AMBESOR  1 0 1.00 N-RANEEDS  1 0 1.00 N-RACELLS  1 0 1.00
N-RAPLAQU  1 0 1.00 N-RANPAPP  1 0 1.00 N-RABESOR  1 0 1.00 N-RAMISCL  1 0 1.00
N-CARBSOR  2 0 1.00 N-COBLSOR  2 0 1.00 N-NICKSOR  2 0 1.00 N-STROSOR  2 0 1.00
N-CESISOR  2 0 1.00 N-PLU8SOR  2 0 1.00 N-PLU9SOR  2 0 1.00 N-AMERSOR  2 0 1.00
N-PUBESOR  2 0 1.00 N-AMBESOR  2 0 1.00 N-RANEEDS  2 0 1.00 N-RACELLS  2 0 1.00
N-RAPLAQU  2 0 1.00 N-RANPAPP  2 0 1.00 N-RABESOR  2 0 1.00 N-RAMISCL  2 0 1.00
N-CARBSOR  3 0 1.00 N-COBLSOR  3 0 1.00 N-NICKSOR  3 0 1.00 N-STROSOR  3 0 1.00
N-CESISOR  3 0 1.00 N-PLU8SOR  3 0 1.00 N-PLU9SOR  3 0 1.00 N-AMERSOR  3 0 1.00
N-PUBESOR  3 0 1.00 N-AMBESOR  3 0 1.00 N-RANEEDS  3 0 1.00 N-RACELLS  3 0 1.00
N-RAPLAQU  3 0 1.00 N-RANPAPP  3 0 1.00 N-RABESOR  3 0 1.00 N-RAMISCL  3 0 1.00
N-RARESIN  4 0 1.00 M-NAVYWET  4 0 1.00 M-NAVYDRY  4 0 1.00 P-DECORES  4 0 1.00
P-DEACINT  4 0 1.00 P-DEACVES  4 0 1.00 P-DEACTCO  4 0 1.00 P-DECONME  4 0 1.00
P-DECONCO  4 0 1.00 P-DETRASH  4 0 1.00 P-DERESIN  4 0 1.00 P-DEFILCR  4 0 1.00
P-DEEVAPB  4 0 1.00 B-DECORES  4 0 1.00 B-DEACINT  4 0 1.00 B-DEACVES  4 0 1.00
B-DEACTCO  4 0 1.00 B-DECONME  4 0 1.00 B-DECONCO  4 0 1.00 B-DETRASH  4 0 1.00
B-DERESIN  4 0 1.00 B-DEEVAPB  4 0 1.00 N-TRITSOR  1 0 1.00 N-TRITSOR  2 0 1.00
N-TRITSOR  3 0 1.00            0 0  .00            0 0  .00            0 0  .00
```

values, as are the empty volumes (VOLE, in m^3) and surface areas (AREA, in m^2) of the individual disposal cells. Consideration of area concentration limits and minimum depth requirements will generally cause their recalculation within the code.

Finally, information from the INPUTS file is listed. For this example problem, the waste disposal facility is assumed to accept all waste generated in the western region plus all sealed source waste streams from all other regions. No nuclear fuel reprocessing or mixed oxide fuel fabrication is assumed. Wastes from the West Valley Demonstration Project are generated in the northeast region and are thus specifically excluded.

The information from INPUTS is provided as follows. Each waste stream name is included along with the generating region, the number of backlog years, and the fraction of the waste volume (or number) generated in the region that is actually shipped to the disposal facility. The total number of waste streams is also listed, which is 215 for this case. Waste streams which exceed Class D limits are excluded from this list.

Output

The output is illustrated in Tables 4-10 through 4-12. The information in Table 4-10 is included in each run for the code user's information. The first block of information refers to the above mentioned test routine for DMIN. As indicated, DMIN criterion for Class D2 is not satisfied. Three options are given, and the option selected on the screen is specified. The second block of information, under "recalculated parameters," lists for each of the six waste classes a number of intermediate disposal parameter values. These have been calculated based on the procedures discussed in Chapter 5 of Volume 1, and upon consideration of area concentration limits and minimum disposal depth requirements. As noted in Chapter 5, Volume 1, for different waste classes disposed in the same disposal cell, each waste class is modeled as occupying a specific strata. This is noticable in the DPT and DTK values for waste classes A (stable), B, C, and D1, which have all been disposed in the same disposal trench. For example, the Class C strata is modeled as being 5.25 m thick and located 9.41 m below the surface of the earth.

TSUM is for the code user's information, and indicates how close the disposal combination comes to requiring construction of additional disposal cells to meet the area concentration or disposal depth limitations. For this example, there was no need for such additional construction. AREA is the total surface area of the disposal cells, DISN is the number of reference disposal cells that would be required, and VBAK is the calculated plug backfill volume (m^3).

The next block of data provides the total volume of waste disposed at the facility, plus the volume in each of the 6 waste classes. Waste volumes are in units of m^3.

The final block of data actually covers a number of pages, and so only a portion is illustrated. Information on each waste stream input from the

TABLE 4-10 . Intermediate Calculations and Other Information for IMPACTS Example

*** DEPTH PROBLEM ***
CLASS: D2 DMIN: 10.0 ID: 10 DPT: 2.0 DTK: 5.7

OPTIONS FOLLOW
STOP : 1
DO NOT CONSIDER CLASS: 2
MODIFY DMIN TO 2M : 3
SELECT FROM ABOVE :

OPTION 3 HAS BEEN SELECTED, PROGRAM CONTINUING

RECALCULATED PARAMETERS

NO	EFF	SEF	DPT	DTK	TSUM	AREA	DISN	VBAK
1	5.25E+00	6.90E-01	2.00E+00	7.00E+00	5.29E+00	3.79E+05	6.32E+02	3.68E+05
2	1.14E+01	8.80E-01	2.01E+00	1.21E+00	2.87E-01	8.58E+02	1.59E-01	7.97E+03
3	1.14E+01	8.80E-01	3.22E+00	6.18E+00	8.26E+00	4.08E+03	7.55E-01	.00E+00
4	1.14E+01	8.80E-01	9.41E+00	5.25E+00	1.33E+01	3.03E+03	5.62E-01	.00E+00
5	1.14E+01	8.80E-01	1.47E+01	3.43E-01	1.05E+01	1.85E+02	3.43E-02	.00E+00
6	5.70E+00	4.40E-01	2.00E+00	5.70E+00	2.54E+00	1.99E+02	2.31E-01	.00E+00

NEW WASTE STREAM DATA - NSTR = 127

A = 9.32E+05 SA = 4.80E+03 B = 2.28E+04
C = 1.70E+04 D1 = 1.03E+03 D2 = 8.51E+02 TOTAL= 9.79E+05

NAME,VOLM,NET CON/ACT,IMOD,MODE,ISPC INDXS

P-IXRESIN	1.16E+04	2.36E-01	1	11	1200001	100	100	11	1	1	0	0	0	0
P-CONCLIQ	9.83E+04	3.11E-01	1	11	1201101	100	140	23	1	2	0	1	0	0
P-FCARTRG	4.38E+03	4.48E+00	1	11	700001	100	100	21	1	1	0	0	0	0
B-IXRESIN	8.21E+03	6.01E-01	1	11	1200001	100	100	11	1	1	0	0	0	0
B-CONCLIQ	8.00E+04	3.24E-01	1	11	1201101	100	140	23	1	2	0	1	0	0
B-FSLUDGE	1.23E+04	9.21E-01	1	11	1200001	100	100	2	0	1	0	0	0	0
P-COTRASH	2.98E+04	1.65E-01	1	11	1410101	300	100	10	1	1	0	0	0	0
P-NCTRASH	1.00E+05	3.31E-01	1	11	1500001	100	100	11	1	1	0	0	0	0
B-COTRASH	4.20E+04	3.95E-02	1	11	1310101	200	100	10	1	1	0	0	0	0
B-NCTRASH	3.27E+04	8.52E-02	1	11	1500001	100	100	11	1	1	0	0	0	0
L-NFRCOMP	1.87E+04	7.30E+00	1	21	800001	100	100	33	3	1	0	0	[illegible]	0
L-DECONRS	9.28E+02	1.67E+01	2	11	1201101	100	140	23	2	2	1	2	0	0
F-PROCESS	2.54E+04	1.08E-04	1	11	700002	100	100	3	0	1	0	0	0	0
F-COTRASH	5.11E+04	8.37E-06	1	11	710102	150	100	10	1	1	0	0	0	0
F-NCTRASH	1.36E+04	5.33E-06	1	11	500002	100	100	11	1	1	0	0	0	0
U-PROCESS	1.52E+04	3.80E-04	1	11	700002	100	100	3	0	1	0	0	0	0
I-COTRASH	2.70E+04	2.26E-01	1	11	710102	200	100	10	1	1	0	0	0	0
I+COTRASH	5.39E+04	1.13E-01	1	11	700002	100	100	10	1	1	0	0	0	0
I-ABSLIQD	6.36E+03	6.65E-02	1	11	700002	100	300	1	0	1	1	0	0	0
I+ABSLIQD	6.36E+03	6.65E-02	1	11	700002	100	300	1	0	1	1	0	0	0
I-LIQSCVL	3.38E+03	3.20E-03	1	11	700002	100	300	0	0	1	1	0	0	0
I+LIQSCVL	3.38E+03	3.20E-03	1	11	700002	100	300	0	0	1	1	0	0	0
I-BIOWAST	2.17E+03	1.07E-01	1	11	700002	100	192	11	0	1	1	0	0	0
I+BIOWAST	2.17E+03	1.07E-01	1	11	700002	100	192	11	0	1	1	0	0	0
N-SSTRASH	4.59E+04	1.67E-05	1	11	710102	150	100	11	1	1	0	0	0	0
N+SSTRASH	6.88E+04	1.12E-05	1	11	700002	100	100	11	1	1	0	0	0	0
N-SSWASTE	2.43E+04	2.17E-04	1	11	700002	100	100	13	0	1	0	0	0	0
N-LOTRASH	9.72E+03	7.05E-02	1	11	710102	200	100	10	1	1	0	0	0	0
N+LOTRASH	1.94E+04	3.53E-02	1	11	700002	100	100	10	1	1	0	0	0	0

INPUTS file is combined with information from the VOLUMES and CLASIFY files. The result is a listing of each waste stream (plus parameter values) considered in the calculations. A waste stream input from the INPUTS file, for example, would be deleted from the list if there were no waste volumes generated in the specified region. This is the case for the N-SORMFG1 waste stream, which is only generated in the northeast region. This example problem does not consider delivery of this waste stream from the northeast region to the western region .

In any case, each line lists the waste stream name, the processed volume (m^3) (or numbers of source waste streams), the radionuclide concentration (or activity) within the waste stream, the IMOD index value, the MODE index value (11 for P-IXRESIN), and the waste processing and behavior indices. This group of indices includes the I1 index (1200001 for P-IXRESIN), the volume reduction and increase indices (both equal to 100 for P-IXRESIN) and the waste form behavior indices (I4 through I10).

The MODE index is an index internally created by the MEURGE subroutine of the IMPACTS code, and consisting of two integers. Meanings of optional integer parameters are as follows:

Value	First Integer	Second Integer
1	Regular waste	Regular disposal
2	Activated metal	Grouted disposal
3	Source waste	Reinforced concrete (RC)
4		Grouted RC disposal

Calculated impacts are listed for 9 organs plus whole body equivalent in the following groups: intruder scenarios, exposed waste scenarios, leachate accumulation scenarios, operational disposal facility accidents, and groundwater scenarios. The calculated impacts require several pages to print, and only a single page of output is printed as an illustration of intruder impacts (Table 4-11), along with a single page of output illustrating boundary well groundwater impacts (Table 4-12). Specific impact scenarios are denoted in the output listings by the abbreviations listed in Table 4-13.

For each impact scenario the volume-weighted contribution from each waste class is printed, along with the "total" impacts. However, care needs to be taken in interpreting these impacts for some scenarios, since frequently impacts which may be calculated for particular areas in the disposal facility are mutually exclusive. This is the case for all intruder scenarios, plus intruder-initiated exposed waste scenarios.

In the example problem being considered, there is assumed to be three basic types of disposal cells used. Class A (unstable) is disposed in one

TABLE 4-11 . Illustration of Intruder Impacts (mrem/yr) for IMPACTS Example

SCENARIO = IN-DIS

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	4.12E+01	2.50E+01	2.45E+01	3.07E+01	2.93E+01	5.19E+01	3.55E+01	1.36E+02	3.41E+01	3.70E+01
B	1.72E+02	1.51E+02	1.48E+02	1.77E+02	1.63E+02	2.04E+02	1.73E+02	2.76E+02	2.06E+02	1.78E+02
C	4.28E+01	3.32E+01	3.25E+01	3.96E+01	3.72E+01	5.61E+01	4.24E+01	1.17E+02	4.51E+01	4.31E+01
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	1.37E+03	8.86E+02	8.67E+02	1.10E+03	1.06E+03	2.05E+03	1.34E+03	5.80E+03	1.21E+03	1.35E+03
TOTAL	6.15E+00	4.99E+00	4.88E+00	5.90E+00	5.50E+00	7.75E+00	6.11E+00	1.42E+01	6.79E+00	6.23E+00

SCENARIO = IN-CO1

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	3.22E+02	1.55E+02	1.51E+02	1.99E+02	1.95E+02	4.29E+02	2.61E+02	1.37E+03	2.12E+02	2.72E+02
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	3.06E+02	1.47E+02	1.44E+02	1.89E+02	1.86E+02	4.09E+02	2.49E+02	1.31E+03	2.02E+02	2.59E+02

SCENARIO = IN-CO2

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	1.04E+02	4.89E-01	4.95E-01	1.35E+01	2.10E+01	1.59E+02	6.07E+01	7.98E+02	1.88E+00	6.61E+01
SA	7.11E+02	1.30E+00	1.39E+00	9.19E+01	1.45E+02	1.11E+03	4.24E+02	5.70E+03	1.02E+01	4.61E+02
B	4.30E+02	2.13E+01	2.10E+01	9.36E+01	1.41E+02	9.35E+02	3.70E+02	4.53E+03	3.69E+01	3.59E+02
C	4.09E+02	7.15E+01	7.10E+01	1.42E+02	1.76E+02	8.37E+02	3.70E+02	3.85E+03	9.39E+01	3.57E+02
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	2.08E+04	1.60E+03	1.57E+03	5.32E+03	7.72E+03	4.83E+04	1.95E+04	2.32E+05	2.53E+03	1.85E+04
TOTAL	1.38E+02	3.60E+00	3.57E+00	2.26E+01	3.37E+01	2.35E+02	9.18E+01	1.16E+03	6.53E+00	9.58E+01

SCENARIO = IN-CO3

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	8.77E+01	4.36E-01	4.42E-01	1.09E+01	1.66E+01	1.25E+02	4.78E+01	6.37E+02	1.54E+00	5.36E+01
SA	6.55E+02	9.74E-01	1.06E+00	8.12E+01	1.27E+02	9.72E+02	3.70E+02	5.03E+03	8.65E+00	4.11E+02
B	3.38E+02	2.51E+01	2.46E+01	7.63E+01	1.06E+02	6.38E+02	2.60E+02	3.11E+03	3.96E+01	2.63E+02
C	3.15E+02	5.82E+01	5.78E+01	1.07E+02	1.28E+02	5.61E+02	2.56E+02	2.59E+03	7.55E+01	2.55E+02
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	1.68E+04	2.30E+03	2.25E+03	4.97E+03	6.39E+03	3.29E+04	1.41E+04	1.56E+05	3.36E+03	1.40E+04
TOTAL	1.15E+02	4.01E+00	3.96E+00	1.87E+01	2.66E+01	1.77E+02	7.01E+01	8.84E+02	6.66E+00	7.57E+01

SCENARIO = IN-AG1

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	2.11E+02	1.84E+02	1.80E+02	2.14E+02	1.97E+02	2.44E+02	2.09E+02	3.23E+02	2.50E+02	2.15E+02
SA	7.74E-04	7.15E-04	7.00E-04	8.28E-04	7.58E-04	8.73E-04	7.85E-04	8.75E-04	9.71E-04	8.06E-04
B	2.38E-02	2.20E-02	2.15E-02	2.55E-02	2.33E-02	2.69E-02	2.42E-02	2.69E-02	2.99E-02	2.48E-02
C	9.07E-01	7.76E-01	7.69E-01	8.96E-01	8.33E-01	8.00E-01	8.55E-01	9.40E-01	9.55E-01	8.69E-01
D1	3.72E-02	3.44E-02	3.36E-02	3.98E-02	3.64E-02	4.20E-02	3.77E-02	4.21E-02	4.67E-02	3.88E-02
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	2.01E+02	1.75E+02	1.71E+02	2.04E+02	1.88E+02	2.32E+02	1.99E+02	3.08E+02	2.38E+02	2.05E+02

SCENARIO = IN-AG2

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	8.67E+00	7.50E-01	7.95E-01	2.02E+00	2.44E+00	1.37E+01	5.95E+00	6.65E+01	1.29E+00	6.11E+00
SA	5.60E+01	1.75E+00	1.97E+00	9.29E+00	1.31E+01	8.93E+01	3.54E+01	4.51E+02	6.18E+00	3.79E+01
B	7.23E+01	3.88E+01	3.88E+01	5.59E+01	5.02E+01	1.15E+02	7.26E+01	4.27E+02	6.98E+01	7.32E+01
C	1.20E+02	8.66E+01	8.62E+01	1.07E+02	1.02E+02	1.52E+02	1.21E+02	4.28E+02	1.11E+02	1.20E+02
D1	7.22E-06	6.15E-06	6.11E-06	7.11E-06	6.61E-06	6.29E-06	6.78E-06	7.45E-06	7.53E-06	6.89E-06
D2	5.08E+03	3.41E+03	3.38E+03	4.41E+03	4.07E+03	7.29E+03	5.27E+03	2.35E+04	4.67E+03	5.23E+03
TOTAL	1.67E+01	6.09E+00	6.10E+00	8.96E+00	8.85E+00	2.51E+01	1.42E+01	1.03E+02	8.87E+00	1.43E+01

TABLE 4-12 . Illustration of Groundwater Impacts (mrem/yr) for IMPACTS Example

CLASS = D1

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	9.27E-15	1.20E-14	1.59E-14	9.21E-15	9.50E-15	9.19E-15	9.16E-15	7.28E-15	9.19E-15	9.96E-15
40 YR	2.12E-11	1.45E-11	4.32E-11	6.62E-11	2.18E-11	2.30E-11	2.27E-11	2.47E-11	1.49E-07	4.47E-09
60 YR	2.39E-11	1.63E-11	4.85E-11	7.44E-11	2.45E-11	2.59E-11	2.54E-11	2.77E-11	1.67E-07	5.02E-09
80 YR	1.81E-10	2.23E-10	3.27E-10	4.51E-10	2.16E-10	2.46E-10	5.84E-10	1.17E-09	3.32E-07	1.02E-08
100 YR	1.98E-10	2.46E-10	3.55E-10	4.88E-10	2.36E-10	2.69E-10	6.48E-10	1.30E-09	3.34E-07	1.03E-08
120 YR	2.21E-10	2.62E-10	4.02E-10	5.61E-10	2.60E-10	2.94E-10	6.72E-10	1.33E-09	4.98E-07	1.53E-08
160 YR	3.91E-10	4.86E-10	7.02E-10	9.65E-10	4.67E-10	5.32E-10	1.28E-09	2.57E-09	6.65E-07	2.05E-08
200 YR	4.15E-10	5.04E-10	7.51E-10	1.04E-09	4.92E-10	5.59E-10	1.31E-09	2.60E-09	8.32E-07	2.55E-08
400 YR	9.58E-10	1.19E-09	1.72E-09	2.37E-09	1.14E-09	1.30E-09	3.12E-09	6.26E-09	1.67E-06	5.14E-08
600 YR	1.23E-09	1.57E-09	2.19E-09	2.98E-09	1.48E-09	1.69E-09	4.19E-09	8.50E-09	1.67E-06	5.20E-08
800 YR	1.61E-09	2.12E-09	2.85E-09	3.86E-09	1.96E-09	2.25E-09	5.73E-09	1.17E-08	1.67E-06	5.27E-08
1K YR	1.59E-09	2.08E-09	2.80E-09	3.79E-09	1.93E-09	2.21E-09	5.62E-09	1.15E-08	1.67E-06	5.27E-08
5K YR	1.07E-09	1.34E-09	1.90E-09	2.62E-09	1.28E-09	1.46E-09	3.56E-09	7.17E-09	1.67E-06	5.17E-08
10K YR	6.90E-10	8.05E-10	1.25E-09	1.77E-09	8.09E-10	9.13E-10	2.06E-09	4.04E-09	1.67E-06	5.10E-08
20K YR	3.71E-10	3.47E-10	6.88E-10	1.05E-09	4.09E-10	4.49E-10	7.90E-10	1.40E-09	1.67E-06	5.04E-08

CLASS = D2

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	4.71E-17	6.08E-17	8.06E-17	4.68E-17	4.82E-17	4.67E-17	4.65E-17	3.70E-17	4.67E-17	5.06E-17
40 YR	1.50E-12	1.22E-12	3.07E-12	4.20E-12	1.54E-12	1.63E-12	1.58E-12	1.71E-12	8.96E-09	2.70E-10
60 YR	2.30E-12	1.82E-12	4.8[illegible]E-12	6.63E-12	2.37E-12	2.52E-12	2.44E-12	2.65E-12	1.43E-08	4.31E-10
80 YR	4.26E-12	4.24E-12	8.30E-12	1.12E-11	4.66E-12	5.08E-12	8.08E-12	1.36E-11	1.80E-08	5.42E-10
100 YR	5.71E-12	5.40E-12	1.14E-11	1.55E-11	6.18E-12	6.73E-12	1.00E-11	1.64E-11	2.69E-08	8.10E-10
120 YR	6.09E-12	5.82E-12	1.20E-11	1.63E-11	6.57E-12	7.13E-12	1.04E-11	1.68E-11	2.80E-08	8.46E-10
160 YR	1.00E-11	9.77E-12	1.98E-11	2.69E-11	1.09E-11	1.19E-11	1.85E-11	3.08E-11	4.46E-08	1.35E-09
200 YR	1.16E-11	1.11E-11	2.30E-11	3.13E-11	1.25E-11	1.36E-11	2.02E-11	3.27E-11	5.38E-08	1.62E-09
400 YR	2.18E-11	2.19E-11	4.23E-11	5.72E-11	2.39E-11	2.61E-11	4.22E-11	7.20E-11	8.98E-08	2.71E-09
600 YR	2.42E-11	2.54E-11	4.65E-11	6.28E-11	2.69E-11	2.97E-11	5.20E-11	9.24E-11	8.98E-08	2.72E-09
800 YR	2.78E-11	3.04E-11	5.25E-11	7.07E-11	3.13E-11	3.48E-11	6.61E-11	1.22E-10	8.98E-08	2.72E-09
1K YR	2.75E-11	3.00E-11	5.21E-11	7.01E-11	3.10E-11	3.44E-11	6.50E-11	1.19E-10	8.98E-08	2.72E-09
5K YR	2.27E-11	2.32E-11	4.36E-11	5.94E-11	2.50E-11	2.74E-11	4.62E-11	8.02E-11	8.97E-08	2.71E-09
10K YR	1.92E-11	1.81E-11	3.72E-11	5.16E-11	2.07E-11	2.24E-11	3.24E-11	5.16E-11	8.97E-08	2.71E-09
20K YR	1.62E-11	1.36E-11	3.13E-11	4.49E-11	1.69E-11	1.80E-11	2.07E-11	2.74E-11	8.96E-08	2.70E-09

CLASS = TOTAL

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	7.44E-10	9.61E-10	1.27E-09	7.39E-10	7.62E-10	7.37E-10	7.35E-10	5.84E-10	7.37E-10	7.99E-10
40 YR	2.79E-07	1.98E-07	5.85E-07	8.60E-07	2.87E-07	3.05E-07	2.98E-07	3.24E-07	1.92E-03	5.79E-05
60 YR	3.13E-07	2.22E-07	6.57E-07	9.66E-07	3.22E-07	3.42E-07	3.34E-07	3.64E-07	2.16E-03	6.50E-05
80 YR	1.22E-05	1.69E-05	2.12E-05	2.81E-05	1.51E-05	1.74E-05	4.67E-05	9.67E-05	4.30E-03	1.50E-04
100 YR	1.36E-05	1.89E-05	2.36E-05	3.12E-05	1.68E-05	1.94E-05	5.22E-05	1.08E-04	4.34E-03	1.53E-04
120 YR	1.39E-05	1.91E-05	2.42E-05	3.21E-05	1.71E-05	1.97E-05	5.24E-05	1.08E-04	6.46E-03	2.17E-04
160 YR	2.68E-05	3.73E-05	4.65E-05	6.16E-05	3.31E-05	3.83E-05	1.03E-04	2.13E-04	8.63E-03	3.05E-04
200 YR	2.72E-05	3.76E-05	4.73E-05	6.27E-05	3.36E-05	3.88E-05	1.04E-04	2.14E-04	1.08E-02	3.70E-04
400 YR	6.53E-05	9.08E-05	1.13E-04	1.50E-04	8.08E-05	9.35E-05	2.51E-04	5.20E-04	2.16E-02	7.61E-04
600 YR	8.85E-05	1.24E-04	1.53E-04	2.03E-04	1.10E-04	1.27E-04	3.43E-04	7.13E-04	2.17E-02	8.05E-04
800 YR	1.22E-04	1.71E-04	2.11E-04	2.78E-04	1.51E-04	1.75E-04	4.76E-04	9.89E-04	2.17E-02	8.65E-04
1K YR	1.19E-04	1.68E-04	2.06E-04	2.72E-04	1.48E-04	1.72E-04	4.66E-04	9.68E-04	2.17E-02	8.61E-04
5K YR	7.47E-05	1.04E-04	1.30E-04	1.72E-04	9.26E-05	1.07E-04	2.88E-04	5.98E-04	2.17E-02	7.80E-04

TABLE 4-13 . List of Scenario Abbreviations for IMPACTS Code

Intruder scenarios:
IN-DRI: Intruder-drilling scenario at IINS years (mrem/yr)
IN-DIS: Intruder-discovery scenario at IINS years (mrem/yr)
IN-CO1: Intruder-construction scenario at IINS years (mrem/yr)
IN-CO2: Intruder-construction scenario at 500 years (mrem/yr)
IN-CO3: Intruder-construction scenario at 1000 years (mrem/yr)
IN-AG1: Intruder-agriculture scenario at IINS years (mrem/yr)
IN-AG2: Intruder-agriculture scenario at 500 years (mrem/yr)
IN-AG3: Intruder-agriculture acenario at 1000 years (mrem/yr)

Exposed waste scenarios:
EX-INA: Intruder initiated airborne impacts at IINS yrs (person-mrem/yr)
EX-INW: Intruder initiated waterborne impacts at IINS yrs (mrem/yr)
EX-ERA: Erosion initiated airborne impacts at 2000 yrs (person-mrem/yr)
EX-ERW: Erosion initiated waterborne impacts at 2000 yrs (mrem/yr)

Leachate Accumulation Scenarios:
LA-OPS: Release to surface water during last year of operation (mrem/yr)
LA-OVF: Overflow to surface water during institutional control (mrem/yr)
LA-EVP: Evaporator release during institutional control (person-mrem/yr)

Operational accidents:
OP-SCF: Single container accident, off site impacts (mrem/yr)
OP-SCW: Single container accient, impacts to worker (mrem/yr)
OP-FYR: Accidental fire, offsite impacts (mrem/yr)

cell, Classes A (stable), B, C, and D1 in another cell, and Class D2 in a third. An intruder could possibly contact one disposal cell but not all three. So while the "total" impacts give a relative indication of the overall hazard of the particular disposal configuration being considered, they are not an indication of the actual impacts to a single intruder. In addition, an intruder potentially contacting Class A (stable) waste would also contact Class B, C, and D1 waste as well. The impacts to an intruder contacting the waste in this disposal would be given by the volume-weighted average for all of these 4 waste classes.

As an example, consider total body equivalent (ICRP) impacts for the intruder-construction scenario at 500 years (IN-CO2). Hypothetical volume-weighted impacts across all 4 waste classes disposed together would actually be about 361 mrem/yr. It may also be noted that the dusting conditions at the site are conservatively high, and that no credit is taken for waste form to resist airborne dispersion over the long-term. This is especially conservative for the southwest site since one would expect a low rate of waste degradation in a semi-arid environment.

It should also be reiterated that the Class D2 impacts do not represent impacts from uniform implementation of the Class D disposal procedures discussed in Volume 1, Chapter 5. The 10 m depth criterion has been deliberately ignored in this example to provide a comparative level of impacts. It should also be noted that the longevity of the reinforced concrete disposal technique is probably considerably longer than the assumed 500 years. The authors, however, are not at this time in a position to numerically predict this longevity.

For the erosion-initiated exposed waste scenarios, along with the groundwater scenarios and leachate accumulation scenarios, the entire disposal facility contributes to the impacts calculated. "Total" impacts more truely represent the sum of the contribution from each waste class.

It should finally be emphasized that the impacts associated with the three operational accident scenarios do not represent the actual hazard potential of real disposal sites. Rather, the calculations are meant to provide a relative measure of the possible improvements in operational safety resulting from different waste processing procedures. Each waste stream is subjected to the accident scenario, and then the impacts for each waste stream are volume averaged over the appropriate class; impacts from each waste class are then volume averaged over the total waste volume. For this example, 104 waste streams contribute to the calculations, and there would be actually considerably less than 104 operational accidents per year.

4.4 INTRUDE Example

For this example, the assumptions on waste streams, general facility parameters, and disposal technology configuration that were used for the above IMPACTS example are also used for this example problem.

Input Data

The input data files used for this example are the same as those used in Section 4.3 for the IMPACTS example.

Output

The first portion of the output is identical with that of IMPACTS. Output that is code specific consists of several pages of computer output; a single page is illustrated as Table 4-14. This particular example illustrates time-dependent impacts from disposal of Class A waste, although the code also calculates impacts for the other 5 waste classes plus "total" impacts. Impacts for each waste class are calculated by weighting the impacts from each waste stream in the class by the total waste volume in each class, while total impacts represent volume-weighted impacts over all waste classes.

Again, some care needs to be taken in interpreting the example results. While the total impacts give a relative indication of the overall hazard of the particular disposal configuration being considered, they are not an indication of the actual impacts to a single intruder. An intruder could possibly contact one of three alternative types of disposal cells: cells containing Class A (unstable) waste; cells containing Class A (stable), Class B, Class C, and Class D1 waste; or cells containing Class D2 waste. Impacts associated with the second of the above three types of disposal cells would be represented by the volume-weighted average over all 4 waste classes in the disposal cell.

Most importantly, the INTRUDE code is meant as a tool to provide an indication of the potential time-dependent nature of the hazard, absent the imposition of certain disposal criteria. In the INTRUDE code, there is no time-dependent credit taken for the ability of engineered disposal methods or segregated disposal of unstable waste to preclude the onset of particular intruder scenario. Such considerations, however, are programmed into the IMPACTS code. For example, impacts from intruder-construction scenario are provided at 100 years for segregated stable waste even though the scenario would actually be precluded by the intruder-discovery scenario. Impacts from all intruder scenarios are also calculated during the institutional control period, even though these impacts would actually again be precluded.

The only credits taken in the INTRUDE code are (1) those pertaining to disposal depth, and (2) those pertaining to waste form and packaging. Impacts are calculated according to the disposal depth determined for each waste class (DPT) according to the procedures presented in Chapter 5 of Volume 1. For example, the intruder-agriculture impacts are reduced by a factor of 10 for waste disposed at a depth between 5 m and 10 m. Credits pertaining to waste form are those associated with the ISPC indices, subject to modification using the NBES index.

TABLE 4-14 . Illustration of Impacts (mrem/yr) for INTRUDE Example

IMPACTS OF CLASS A
VOLS= 9.32E+05 AREA= 3.79E+05
DPT = 2.00E+00 DTK = 7.00E+00
TSUM= 5.29E+00 DISN= 6.32E+02

SCENARIO: DRILLING

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.85E-01	2.62E-01	2.61E-01	3.02E-01	2.83E-01	2.72E-01	2.88E-01	3.06E-01	3.56E-01	2.92E-01
20 YRS	2.93E-02	2.70E-02	2.67E-02	3.11E-02	2.90E-02	2.95E-02	2.96E-02	3.19E-02	3.66E-02	3.02E-02
60 YRS	4.07E-03	3.76E-03	3.68E-03	4.35E-03	3.99E-03	4.57E-03	4.13E-03	4.59E-03	5.10E-03	4.24E-03
100 YRS	1.58E-03	1.46E-03	1.43E-03	1.69E-03	1.54E-03	1.78E-03	1.60E-03	1.78E-03	1.98E-03	1.64E-03
200 YRS	1.61E-04	1.48E-04	1.45E-04	1.72E-04	1.57E-04	1.80E-04	1.63E-04	1.82E-04	2.02E-04	1.67E-04
300 YRS	1.99E-05	1.84E-05	1.80E-05	2.13E-05	1.95E-05	2.16E-05	2.02E-05	2.24E-05	2.50E-05	2.07E-05
500 YRS	4.53E-06	4.20E-06	4.10E-06	4.83E-06	4.46E-06	4.26E-06	4.58E-06	5.05E-06	5.71E-06	4.66E-06
1K YRS	4.35E-06	4.04E-06	3.94E-06	4.64E-06	4.29E-06	4.07E-06	4.40E-06	4.84E-06	5.48E-06	4.48E-06
2K YRS	4.20E-06	3.90E-06	3.81E-06	4.47E-06	4.14E-06	3.93E-06	4.25E-06	4.66E-06	5.28E-06	4.32E-06
5K YRS	3.94E-06	3.66E-06	3.57E-06	4.20E-06	3.88E-06	3.69E-06	4.00E-06	4.37E-06	4.96E-06	4.05E-06

SCENARIO: DISCOVERY

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.14E+02	1.95E+02	1.94E+02	2.25E+02	2.11E+02	2.08E+02	2.16E+02	2.46E+02	2.65E+02	2.19E+02
20 YRS	2.96E+01	2.53E+01	2.50E+01	2.95E+01	2.76E+01	3.18E+01	2.91E+01	4.71E+01	3.44E+01	2.98E+01
60 YRS	7.14E+00	4.75E+00	4.65E+00	5.75E+00	5.44E+00	8.91E+00	6.40E+00	2.12E+01	6.47E+00	6.62E+00
100 YRS	3.86E+00	1.86E+00	1.82E+00	2.38E+00	2.34E+00	5.15E+00	3.13E+00	1.65E+01	2.54E+00	3.27E+00
200 YRS	1.78E+00	1.90E-01	1.86E-01	4.20E-01	5.21E-01	2.71E+00	1.15E+00	1.25E+01	2.77E-01	1.22E+00
300 YRS	1.44E+00	2.42E-02	2.39E-02	2.08E-01	3.12E-01	2.25E+00	8.68E-01	1.11E+01	5.00E-02	9.34E-01
500 YRS	1.25E+00	5.87E-03	5.94E-03	1.62E-01	2.52E-01	1.91E+00	7.28E-01	9.58E+00	2.26E-02	7.93E-01
1K YRS	1.05E+00	5.23E-03	5.30E-03	1.31E-01	1.99E-01	1.50E+00	5.74E-01	7.65E+00	1.85E-02	6.43E-01
2K YRS	9.13E-01	4.85E-03	4.92E-03	1.08E-01	1.61E-01	1.21E+00	4.63E-01	6.26E+00	1.57E-02	5.35E-01
5K YRS	8.18E-01	4.39E-03	4.46E-03	9.44E-02	1.39E-01	1.04E+00	4.01E-01	5.43E+00	1.38E-02	4.69E-01

SCENARIO: CONSTRCTN

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	1.79E+04	1.63E+04	1.62E+04	1.88E+04	1.76E+04	1.73E+04	1.80E+04	2.05E+04	2.21E+04	1.83E+04
20 YRS	2.47E+03	2.11E+03	2.08E+03	2.46E+03	2.30E+03	2.65E+03	2.43E+03	3.92E+03	2.87E+03	2.48E+03
60 YRS	5.95E+02	3.96E+02	3.87E+02	4.79E+02	4.53E+02	7.43E+02	5.33E+02	1.76E+03	5.39E+02	5.52E+02
100 YRS	3.22E+02	1.55E+02	1.51E+02	1.99E+02	1.95E+02	4.29E+02	2.61E+02	1.37E+03	2.12E+02	2.72E+02
200 YRS	1.48E+02	1.58E+01	1.55E+01	3.50E+01	4.34E+01	2.26E+02	9.56E+01	1.04E+03	2.31E+01	1.02E+02
300 YRS	1.20E+02	2.02E+00	1.99E+00	1.74E+01	2.60E+01	1.87E+02	7.24E+01	9.26E+02	4.16E+00	7.79E+01
500 YRS	1.04E+02	4.89E-01	4.95E-01	1.35E+01	2.10E+01	1.59E+02	6.07E+01	7.98E+02	1.88E+00	6.61E+01
1K YRS	8.77E+01	4.36E-01	4.42E-01	1.09E+01	1.66E+01	1.25E+02	4.78E+01	6.37E+02	1.54E+00	5.36E+01
2K YRS	7.61E+01	4.04E-01	4.10E-01	9.00E+00	1.34E+01	1.01E+02	3.86E+01	5.21E+02	1.31E+00	4.46E+01
5K YRS	6.82E+01	3.66E-01	3.72E-01	7.87E+00	1.16E+01	8.70E+01	3.34E+01	4.53E+02	1.15E+00	3.91E+01

SCENARIO: AGRICULTR

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.64E+04	2.43E+04	2.41E+04	2.79E+04	2.62E+04	2.53E+04	2.66E+04	2.84E+04	3.29E+04	2.71E+04
20 YRS	3.16E+03	2.90E+03	2.88E+03	3.35E+03	3.11E+03	3.23E+03	3.19E+03	3.55E+03	3.93E+03	3.26E+03
60 YRS	5.24E+02	4.72E+02	4.63E+02	5.48E+02	5.03E+02	5.96E+02	5.27E+02	6.83E+02	6.41E+02	5.41E+02
100 YRS	2.11E+02	1.84E+02	1.80E+02	2.14E+02	1.97E+02	2.44E+02	2.09E+02	3.23E+02	2.50E+02	2.15E+02
200 YRS	3.05E+01	1.89E+01	1.86E+01	2.34E+01	2.22E+01	3.99E+01	2.74E+01	1.08E+02	2.60E+01	2.81E+01
300 YRS	1.17E+01	2.56E+00	2.58E+00	4.31E+00	4.66E+00	1.82E+01	8.80E+00	7.96E+01	3.79E+00	9.00E+00
500 YRS	8.67E+00	7.50E-01	7.95E-01	2.02E+00	2.44E+00	1.37E+01	5.95E+00	6.65E+01	1.29E+00	6.11E+00
1K YRS	7.34E+00	6.78E-01	7.17E-01	1.69E+00	1.98E+00	1.06E+01	4.74E+00	5.22E+01	1.15E+00	4.96E+00
2K YRS	6.40E+00	6.21E-01	6.57E-01	1.44E+00	1.64E+00	8.42E+00	3.86E+00	4.18E+01	1.05E+00	4.13E+00
5K YRS	5.71E+00	5.34E-01	5.60E-01	1.23E+00	1.41E+00	7.20E+00	3.28E+00	3.59E+01	9.47E-01	3.59E+00

4.5 ECONOMY Example

For this example problem, the assumptions on general facility parameters, disposal technology configuration, and waste stream input that were used for the above IMPACTS example are also used for this example.

Input Data

The input data files for this example problem are essentially the same as those used in Section 4.3 for the IMPACTS example. Additional assumptions, however, must be made on certain economic parameters. These assumptions are listed below.

Parameter	Explanation	Value
f_p	Preoperational period inflation rate	0.04
f_o	Operational period inflation rate	0.04
f_c	Closure period inflation rate	0.05
f_s	Observation period inflation rate	0.05
j	Institutional control inflation rate	0.06
i	Interest rate from sinking fund	0.08
d	Discount rate	0.15
T	Tax rate	0.50
sc	Surety fraction for closure surety bond	0.01
si	Surety fraction for institutional control period surety bond	0.01
ci	Investment tax credit rate	0.08
h	Adjustment rate for discount year	0.04

The calculations are assumed to be discounted to 1986 (See Section C.6.4 of Volume 1, Appendix C). Finally, the base closure and surveillance period costs as calculated using the assumptions presented in Chapter 6.0 and Appendix C.5 of Volume 1, are adopted without alteration. For the institutional control period the calculated costs, which have already been modified to the new discount year, are further modified by adding a lump sum value of $500,000 in 1986 dollars every 25 years. This could potentially represent an allowance for some major periodic contingency such as a major maintenance activity.

Output

The first portion of the ECONOMY output is also identical with that of IMPACTS. Output that is code specific is divided into three major segments: (1) processing and transportation related impacts; (2) estimated costs; and (3) time value of money calculations. These segments are represented in Tables 4-15, 4-16, and 4-17, respectively.

TABLE 4-15 . ECONOMY Example I

TOTAL INCIN/POP (P-MREM) - REGION = 1

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

TOTAL INCIN/POP (P-MREM) - REGION = 2

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

TOTAL INCIN/POP (P-MREM) - REGION = 3

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

TOTAL INCIN/POP (P-MREM) - REGION = 4

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	3.50E+00	4.37E+00	5.65E+00	3.48E+00	3.59E+00	3.47E+00	3.46E+00	2.75E+00	3.47E+00	3.73E+00
B	1.99E+01	2.49E+01	3.21E+01	1.98E+01	2.04E+01	1.97E+01	1.97E+01	1.56E+01	1.97E+01	2.12E+01
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	2.34E+01	2.92E+01	3.78E+01	2.33E+01	2.40E+01	2.32E+01	2.32E+01	1.84E+01	2.32E+01	2.49E+01

TOTAL TRANS POP (P-MREM)

CLASS	IRI= 1	IRI= 2	IRI= 3	IRI= 4
A	1.13E+04	3.02E+03	2.35E+04	5.32E+06
SA	.00E+00	.00E+00	.00E+00	6.64E+04
B	5.65E+04	1.51E+04	1.17E+05	3.96E+05
C	4.84E+03	1.30E+03	1.01E+04	2.45E+05
D1	2.70E-01	7.23E-02	5.61E-01	4.34E+04
D2	.00E+00	.00E+00	.00E+00	1.99E+04

TABLE 4-16 . ECONOMY Example II

ANNUAL IMPACTS	A	SA	B	C	D1	D2	TOTAL
PRCS COSTS ($)	2.92E+07	2.73E+05	1.31E+06	1.10E+06	4.09E+04	8.90E+04	3.21E+07
PRCS ODOSE-PMR	4.14E+04	1.09E+02	4.34E+02	2.09E+02	2.65E+00	6.95E+01	4.22E+04
LOAD ODOSE-PMR	1.29E+04	1.98E+02	1.17E+03	7.20E+02	9.79E+01	5.62E+01	1.51E+04
TRAN ODOSE-PMR	1.51E+06	1.92E+04	1.16E+05	7.12E+04	1.26E+04	5.75E+03	1.73E+06
TRAN COSTS ($)	1.45E+07	2.13E+05	1.37E+06	8.53E+05	1.56E+05	7.33E+04	1.72E+07
SHIP ODOSE-PMR	1.18E+04	1.47E+02	8.77E+02	5.44E+02	9.62E+01	4.40E+01	1.35E+04
EMPL ODOSE-PMR	1.13E+04	1.69E+02	1.00E+03	6.46E+02	8.66E+01	6.18E+01	1.33E+04

AREAS OF THE FACILITY (M**2)
DISPOSAL= 9.23E+05
ADMINIST= 3.68E+04
BUFFER = 1.24E+05
CONTINGY= 3.14E+05

WORKERS

LABEL	NUMBER	LABEL	NUMBER	LABEL	NUMBER
RADTECH	13.292	QA TECH	5.455	HE OPS	6.725
SKILLED	7.520	LABORER	9.411	SURVEYR	.048
AD NBGD	13.000	AD BGD	16.000	GUARDS	6.000

EQUIPMENT

LABEL	NUMBER	LABEL	NUMBER	LABEL	NUMBER
BULLDOZ	1.139	FE LOAD	.662	DMP TRU	2.666
PAN SCR	.474	MOTOR G	.226	BACKHOE	.000
40-TN C	4.547	100-TN	3.855	S-FRKLI	5.669
L-FRKLI	2.835	H2O TRU	.000	AUGER R	.000
STEMMER	.000	PAVING	.000	TANDEM	.000
COMPACT	.173	H. TAMP	.000	CEM TRU	.067
CEM BCK	.000	CEM PUA	.000	PICKUP	4.000
4WD TRU	4.000	SEDAN	2.000	YARD TR	2.000
FLATBED	2.000	ACCESSO	.000	FARM TR	.000

DISPOSAL CONFIGURATION - ANNUAL VALUES

NO	EFF	SEF	DPT	DTK	TSUM	AREA	DISN	VBAK
1	5.25E+00	6.90E-01	2.00E+00	7.00E+00	5.29E+00	1.26E+04	2.11E+01	1.23E+04
2	1.14E+01	8.80E-01	2.01E+00	1.21E+00	2.87E-01	2.86E+01	5.30E-03	2.66E+02
3	1.14E+01	8.80E-01	3.22E+00	6.18E+00	8.26E+00	1.36E+02	2.52E-02	.00E+00
4	1.14E+01	8.80E-01	9.41E+00	5.25E+00	1.33E+01	1.01E+02	1.87E-02	.00E+00
5	1.14E+01	8.80E-01	1.47E+01	3.43E-01	1.05E+01	6.17E+00	1.14E-03	.00E+00
6	5.70E+00	4.40E-01	2.00E+00	5.70E+00	2.54E+00	6.64E+00	7.71E-03	.00E+00

PREOPERATIONAL COSTS

ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
LAND COSTS	1.38E+02	1.38E+01	1.38E+01	1.38E+01	5.11E+02
LICENSING COSTS	1.15E+03	1.96E+03	4.57E+02	1.11E+03	3.50E+02
ADMINISTRATION	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02
STARTUP OVERHD	.00E+00	.00E+00	.00E+00	.00E+00	1.16E+03
HEAVY EQPT PURC	.00E+00	.00E+00	.00E+00	.00E+00	3.77E+03
LIGHT EQPT PURC	.00E+00	.00E+00	.00E+00	.00E+00	2.50E+02
LAND DEVELPMNT	.00E+00	1.13E+02	.00E+00	1.13E+02	9.05E+02
BUILDINGS COSTS	.00E+00	.00E+00	.00E+00	.00E+00	2.23E+03
UTILITIES	.00E+00	.00E+00	.00E+00	.00E+00	2.00E+02
ENG & DESIGN	.00E+00	1.13E+01	.00E+00	1.13E+01	3.33E+02
CONTINGENCY	3.87E+02	5.48E+02	2.23E+02	3.79E+02	2.07E+03
TOTALS	2.32E+03	3.29E+03	1.34E+03	2.27E+03	1.24E+04

OPERATIONAL COSTS

ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8
SALARIES + OH	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03
DIS CELL MATRS	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01
ENV MONITORING	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02
PER TRN & MON	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02
HEAVY EQPT OPS	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02
QA AND CONTROL	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00
CONSTANT COSTS	1.53E+03	1.53E+03	1.53E+03	1.53E+03	1.73E+03	1.53E+03	1.53E+03	1.53E+03
HEAVY EQPT REPL	.00E+00	.00E+00	.00E+00	.00E+00	1.24E+02	.00E+00	.00E+00	.00E+00
LIGHT EQPT REPL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
MAINTENANCE	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01
CONTINGENCY	9.80E+02	9.80E+02	9.80E+02	9.80E+02	1.05E+03	9.80E+02	9.80E+02	9.80E+02
TOTALS	5.88E+03	5.88E+03	5.88E+03	5.88E+03	6.27E+03	5.88E+03	5.88E+03	5.88E+03

TABLE 4-17 . ECONOMY Example III

```
CLO/OBS/INS COSTS
ITEM               COSTS
SALARIES         4.45E+02
EQPT EXPENSES    5.24E+01
OTHER COSTS      1.54E+03
SALARIES         6.94E+01
ENV&PER MONITRG  3.82E+02
EQPT EXPENSES    1.29E+02
OTHER COSTS      7.40E+02
VARIABLE COSTS   6.96E+02
OTHER COSTS      3.96E+02

ENTER AND/OR CONFIRM ECONOMIC PARAMETERS
DISCOUNT RATE =  .15
TAX RATE      =  .50
INTEREST RATE =  .08
F-SUB-PREOPS  =  .04
F-SUB-OPERTNS =  .04
F-SUB-CLOSURE =  .05
F-SUB-SURVEIL =  .05
F-SUB-INSTIT  =  .06
SURETY/CLOSUR =  .01
SURETY/INSTIT =  .01
ITC RATE      =  .08
ADJUSTMNT FAC =  .04

ALL COSTS ARE BEING DISCOUNTED TO 1986

CLOSURE PERIOD= 1 CALCULATED COSTS= 2.20E+03
OPTION SELECTED: 0=CALCULATED, 1=OVERRIDE - 0

SURVEIL PERIOD= 5 CALCULATED COSTS= 1.43E+03
OPTION SELECTED: 0=CALCULATED, 1=OVERRIDE - 0

INSTITU PERIOD= 100 CALCULATED COSTS= 1.18E+03
OPT SELCTD: 0=CALC, 1=LUMP SUM, 2=OVERRIDE - 1
 $ 5.00E+02 HAS BEEN ADDED TO YEAR  25
 $ 5.00E+02 HAS BEEN ADDED TO YEAR  50
 $ 5.00E+02 HAS BEEN ADDED TO YEAR  75

   PVPOE     PVPOC     PVOE      PVOC      PVCC      PVSC
  4.88E+03  6.28E+03  1.74E+04  1.66E+03  2.98E+01  7.41E+01

   PVSBC     PVSBI     PVDB      PVDE      PVICP     PVICO
  6.23E+01  8.85E+02  1.65E+02  1.23E+03  5.02E+02  1.46E+02

   PVITC     PVR       USC       UC1       UCA
  6.48E+02  8.87E+04  4.83E-02  3.30E-01  6.41E-01
```

Processing and transportation related impacts shown in Table 4-15 include (1) population impacts due to incineration of waste; (2) population impacts due to transportation of the waste; and (3) several other impacts such as processing and transportation costs and occupational exposures, loading occupational exposures at the generator, and routine occupational exposures at the disposal facility due to vehicle check in and out, and waste emplacement. These impact measures are valid only for comparison purposes, and should not be considered to be representative.

Disposal costs presented in Table 4-16 are presented in several portions. The first portion details the estimated facility areas, and worker and equipment requirements for the facility. As can be seen, this facility with an average annual disposed waste volume of about 32,600 m^3 requires an area of about 350 acres, and a total number of about 72 people. The second portion details estimated costs as a function of years and items during the preoperational period. The third portion presents estimated operational costs as a function of items and years. The facility has an annual operational budget of about $5,900,000, except for those years when heavy or light equipment has to be replaced. The last portion presents the costs for closure, surveillance, and institutional control periods calculated using the algorithms presented in Volume 1.

The last segment of the ECONOMY output shown in Table 4-17 consists of the time value of money calculations performed using the above costs. As can be seen, the program first asks for verification of various economic parameters. Any modifications to the base year is considered next, followed by modifications to closure, observation, and institutional costs. This is followed by a printout of the time value of money parameters detailed in Appendix C of Volume 1. The most directly meaningful of these parameters are the last three values: USC which is the waste volume surcharge necessary for institutional control period ($\$48/m^3$); UC1 which is the 1986 present value of the unit volume cost necessary to recover all expenses and costs ($\$378/m^3=\$330+\$48$); and UCA which is a more representative average unit volume cost ($\$689/m^3=\$641+\$48$).

4.6 VOLUMES Code

Based on input from two data files -- VRATES.DAT and REACTR.DAT -- VOLUMES calculates radioactive waste stream volumes as a function of time. These volumes are "untreated" or "as-generated" volumes -- i.e., volumes prior to processing techniques such as compaction or solidification. Output from the VOLUMES code is stored in the VOLUME.DAT file (in binary format) for use by other programs.

The program is controlled in a interactive mode. Operation of the code presents the user with the screen menu shown on the next page.

The option SEE presents the user with a screen request for the "record number of data to be displayed." This refers to the identification number corresponding to a particular waste stream, where the waste streams are stored in the order presented in Table 2-2 of this report volume. Entering

```
Select option:  SEE - to review the data file, or
                FCY - update fuel cycle facilities, i.e.,
                      power plants plus decommissioning,
                      other fuel cycle facilities and spent fuel
                INS - institutional facils,
                IND - industrial facils,
                REP - reprocessing/mox fabrication,
                WST - WVDP waste,
                END - to terminate the program
```

the appropriate record number results in a screen display of as-generated waste stream volume projections for the years 1981 through 2025. Volumes are presented for each of the four IR regions considered (northeast, scutheast, midwest, and west). The screen also requests whether the user wishes a hard copy to be printed to Tape 6 (VOLUME.OUT). This allows the code user the option to have the summarized waste stream

data to be written out on paper. The screen then prompts the user with a request for another record number. A response of zero (or any number greater than 148) returns the user to the main menu. An example output of SEE is included as Table 4-18.

Other responses to the menu include FCY, INS, IND, REP, and WST. These options allow the user to update the waste volumes for specific types of generating facilities. Changes to assumed base generation rates must be made by altering either the REACTR or the VRATES or both data files. Following these changes, the VOLUMES code must be run to determine annual volumes for the waste streams. Time is saved, however, through the use of the menu format. For example, if only institutional waste stream volume generation assumptions are changed, there is no need to run VOLUMES to update reactor waste projections.

A response of FCY to the menu prompt updates volume projections for waste streams from nuclear fuel cycle activities. This update is performed in the subroutine FCYCL, and each time FCYCL is accessed, summary information on reactor generating capacity is printed to Tape 6 (VOLUME.OUT). Two types of summaries are printed, both of which require several pages of output. The first, illustrated in Table 4-19, lists the projected electrical generating capacity (WMe) from 1981 to the year 2030 for each of the 5 NRC regions. The second, illustrated in Table 4-20, lists the projected thermal capacity (MWt) lost due to reactor decommissioning for each of the 5 NRC regions. Years considered are 1981 through 2030.

A response of "REP" permits the user to update waste volumes associated with fuel reprocessing and mixed oxide fuel fabrication. The screen returns with the following prompts:

TABLE 4-18 . Example Output from SEE Option of VOLUMES

WASTE STREAM NAME : B-IXRESIN NUMBER : 5

1	8.6E+02	8.6E+02	8.6E+02	8.6E+02	1.3E+03	1.6E+03	1.9E+03	1.9E+03	2.1E+03	2.1E+03
	2.1E+03	2.1E+03	2.1E+03	2.1E+03	2.1E+03	2.1E+03	2.1E+03	2.1E+03	2.1E+03	2.1E+03
	2.2E+03	2.2E+03	2.2E+03	2.2E+03	2.2E+03	2.2E+03	2.2E+03	2.2E+03	2.2E+03	2.2E+03
	2.2E+03	2.2E+03	2.0E+03	1.8E+03	1.5E+03	1.5E+03	1.5E+03	1.4E+03	1.4E+03	1.4E+03
	1.4E+03	1.4E+03	1.4E+03	1.4E+03	9.7E+02	6.0E+02	3.2E+02	3.2E+02	1.1E+02	1.1E+02
2	7.5E+01	7.5E+01	2.7E+02	4.6E+02	8.3E+02	8.3E+02	8.8E+02	8.8E+02	1.1E+03	1.1E+03
	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03
	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03
	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03	1.1E+03
	1.1E+03	1.1E+03	8.8E+02	6.9E+02	3.1E+02	3.1E+02	2.6E+02	2.6E+02	.0E+00	.0E+00
3	8.6E+01	1.4E+02	1.4E+02	1.9E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02
	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02
	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.5E+02	2.4E+02	2.4E+02	2.4E+02	2.4E+02
	1.6E+02	1.6E+02	1.6E+02	1.6E+02	1.6E+02	1.6E+02	1.6E+02	1.6E+02	1.6E+02	1.6E+02
	1.6E+02	1.1E+02	1.1E+02	5.9E+01	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
4	1.7E+02	1.7E+02	1.7E+02	3.6E+02	4.1E+02	4.6E+02	4.6E+02	4.6E+02	4.6E+02	5.2E+02
	5.2E+02	5.2E+02	5.2E+02	5.2E+02	5.2E+02	5.2E+02	5.2E+02	5.2E+02	5.2E+02	5.1E+02
	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	5.1E+02	4.8E+02
	4.8E+02	4.0E+02	4.0E+02	3.5E+02	3.5E+02	3.5E+02	3.5E+02	3.5E+02	3.5E+02	3.5E+02
	3.5E+02	3.5E+02	3.5E+02	1.6E+02	1.0E+02	5.9E+01	5.9E+01	5.9E+01	5.9E+01	.0E+00

TABLE 4-19 . Illustration of VOLUMES Output: Projected Electrical Generating Capacity (MWe)

Annual Assumed Electrical Generating Capacity (MWe)
From Year 1981 To Year 2030

Year	Type	Region 1	Region 2	Region 3	Region 4	Region 5	Total
1981	PWR-F	2222	9161	8534	2219	2048	24184
	PWR-S	7478	4657	0	0	436	12571
	BWR-FDB	1441	0	1760	0	0	3201
	BWR-FFD	2644	4765	2661	778	0	10848
	BWR-S	1975	1642	0	0	50	3667
	Total	15760	20225	12955	2997	2534	54471
1982	PWR-F	2222	10309	8534	2219	2048	25332
	PWR-S	7478	4657	0	0	436	12571
	BWR-FDB	1441	0	2838	0	0	4279
	BWR-FFD	2644	4765	2661	778	0	10848
	BWR-S	1975	1642	0	0	50	3667
	Total	15760	21373	14033	2997	2534	56697
1983	PWR-F	2222	10309	8534	2219	2048	25332
	PWR-S	7478	5467	0	0	1536	14481
	BWR-FDB	1441	0	2838	0	0	4279
	BWR-FFD	3694	4765	2661	778	0	11898
	BWR-S	1975	1642	0	0	50	3667
	Total	16810	22183	14033	2997	3634	59657
1984	PWR-F	2222	12389	8534	2219	2048	27412
	PWR-S	7478	5467	0	0	2636	15581
	BWR-FDB	1441	0	3916	0	0	5357
	BWR-FFD	3694	4765	2661	778	1100	12998
	BWR-S	1975	1642	0	0	50	3667
	Total	16810	24263	15111	2997	5834	65015
1985	PWR-F	2222	15824	10774	4480	3318	36618
	PWR-S	7478	5467	0	0	4826	17771
	BWR-FDB	1441	2184	5121	0	0	8746
	BWR-FFD	5809	4765	3754	778	1100	16206
	BWR-S	2794	1642	0	0	50	4486
	Total	19744	29882	19649	5258	9294	83827
1986	PWR-F	3824	16724	13014	5591	4588	43741
	PWR-S	9834	5467	0	0	4826	20127
	BWR-FDB	1441	2184	5121	0	0	8746
	BWR-FFD	6909	4765	4687	778	1100	18239
	BWR-S	3861	1642	0	0	50	5553
	Total	25869	30782	22822	6369	10564	96406

TABLE 4-20 . Illustration of VOLUMES Output: Thermal Capacity Lost (MWth) Due to Decommissioning

Generating Capacity (MWth) Lost During 1981 to 2030
Assuming A Decommissioning Period of Four Years

Year	Type	Region 1	Region 2	Region 3	Region 4	Region 5	Total
2011	PWR	1520	2200	4048	0	0	7768
	BWR	5791	0	7424	0	0	13215
	Total	7311	2200	11472	0	0	20983
2012	PWR	4150	6841	5566	0	0	16557
	BWR	7384	0	12446	0	0	19830
	Total	11534	6841	18012	0	0	36387
2013	PWR	6003	16618	13716	1500	0	37837
	BWR	6897	3293	12446	0	0	22636
	Total	12900	19911	26162	1500	0	60473
2014	PWR	13938	16986	15498	4068	2772	53262
	BWR	12613	9022	12434	2381	0	36450
	Total	26551	26008	27932	6449	2772	89712
2015	PWR	16638	16986	16218	4068	6183	60093
	BWR	12613	11458	6680	2381	0	33132
	Total	29251	28444	22898	6449	6183	93225
2016	PWR	23031	15045	14700	4068	6183	63027
	BWR	11020	17187	1658	2381	0	32246
	Total	34051	32232	16358	6449	6183	95273
2017	PWR	19658	10464	9322	2568	6183	48195
	BWR	7727	13894	1658	2381	0	25660
	Total	27385	24358	10980	4949	6183	73855
2018	PWR	11723	10671	9413	0	3411	35218
	BWR	0	10601	0	0	0	10601
	Total	11723	21272	9413	0	3411	45819
2019	PWR	11795	10671	6163	0	0	28629
	BWR	0	8165	0	0	0	8165
	Total	11795	18836	6163	0	0	36794
2020	PWR	2772	10746	6163	2815	0	22496
	BWR	0	2436	0	0	0	2436
	Total	2772	13182	6163	2815	0	24932

```
SPECIFY NUMBER OF REP PLANTS
SPECIFY START YEAR

SPECIFY NUMBER OF MOX PLANTS
SPECIFY START YEAR
```

The user provides a response for each of the four regions in 4I4 format. As an example, assume that a reprocessing plant and a MOX fuel fabrication facility open in the northeast region in 1992, and that one each of these two plants open in the western region in 2009. The correct response to the screen prompts would resemble the following:

```
   1   0   0   1
1992   0   02009

   1   0   0   1
1992   0   02009
```

4.7 SACAL Code

The SACAL code is a utility program used to calculate the radionuclide-specific self-absorption factor (f_{AG}) for activated metals waste streams (see Section 4.1.3 of Volume 1). It calculates a ratio ϕ_s/ϕ_a, where ϕ_s is the shielded gamma flux and ϕ_s is the gamma flux through air. It is run in an interactive format, and determines the self-shielding factor for four different source geometries: plate, disk, sphere, and cylinder. For each geometry specified, the self-shielding factor is determined for 6 materials: aluminum, iron, lead, U-238, water, and concrete.

By means of screen prompts, the program requests the user to input the source geometry and the gamma energy (in MeV) to be considered. The code then asks the user whether the densities of the 6 materials (plus air) are to be altered from reference values. The user then enters the dimensions of the source geometry plus the distance from the source to the receptor. For example, the length, width, depth, and distance are input for a sphere, while the radius and distance are input for a sphere. The self-shielding factors for the 6 materials considered are then printed to the screen. An example SACAL output is included as Table 4-21.

The self-shielding factors are determined using the relationships described in the Rockwell manual (Rockwell, T. H., ed., "Reactor Shielding Design Manual," TID-7004, 1956) plus parameter values given in the Radiation Health Handbook (U. S. Department of Health, Education, and Welfare, "Radiological Health Handbook," Revised Edition, January 1970).

TABLE 4-21 . Example SACAL Output

```
CALCULATION OF  Ús/Úa
---------------------

SPHERE SOURCE
  REFERENCED FROM THE SURFACE
  RADIUS (cm) =  70.00
DISTANCE (cm) = 1.000E+02
ENERGY  (MeV) = 7.900E-01


    Úal / Úair  = 9.230E-02
    Úir / Úair  = 2.613E-02
    Úld / Úair  = 4.629E-03
    Úur / Úair  = 2.109E-04
    Úwt / Úair  = 1.712E-01
    Úcc / Úair  = 1.034E-01


DO YOU WISH ANOTHER SPHERE CALCULATION? -
```

APPENDIX A

GLOSSARY

APPENDIX A : GLOSSARY

This appendix presents an alphabetical listing of most of the important variables and symbols used in the codes prepared in this work. Their brief definitions, references, dependency, usage, etc. are also provided. Information on other variables can be found in Section 2.0 of Volume 1, and Chapter 3.0 of Volume 2.

AL(100)	: Radionuclide Decay Constants (1/year)
FMF(100)	: Partition Ratios (dimensionless)
UWT(100,2)	: Gamma Attenuation Through 2' of Water and 2' of Soil (dimensionless)
RET(100,5)	: Radionuclide Retardation Coefficients (dimensionless)
FRACT(100,3)	: Release Fractions (dimensionless)

Nature	: Radionuclide Specific
Location	: Common Block NUCS
Used By	: CLASIFY, IMPACTS, INVERSE, INTRUDE
Created By	: User
Read From	: FUNDCF
Read By	: Subroutine READS/CLASIFY, and READF/IMPACTS

All these parameters are radionuclide specific and are read from the file FUNDCF. Thus, they have been grouped in common block NUCS. Radionuclide decay constants AL (see Table 2-1) are read in as half-lives in years, and except for the code CLASIFY, immediately converted to decay constants. Partition ratios FMF (see Table 4-7, Volume 1) are discussed in Volume 1.

The array UWT contains the linear attenuation factors used in the intruder scenarios. UWT(I,1) contains the linear attenuation factors for 2' of water for radionuclide I used in the intruder drilling scenario, and UWT(I,2) contains the linear attenuation factors for 2' of soil used in the drilling agriculture scenario. It is calculated based upon the input average energy per gamma emitted, EAVG, (called EN below) for each radionuclide, using the following subroutine:

```
      FUNCTION FUWT(EN,II)
      DIMENSION ENE(17),UWT(17,2)
      DATA ENE/.01,.015,.02,.03,.04,.06,.08,.1,.15,.2,.3,.4,.6,.8,1.,1.5,
     * 2./,UWT/5.18,1.58,.775,.370,.267,.206,.184,.171,.151,.137,.119,
     * .106,.0896,.0786,.0707,.0575,.0494,19.,5.73,2.49,.859,.463,.252,
     * .194,.169,.140,.126,.108,.0959,.0808,.0707,.0636,.0518,.0447/
      DO 10 I=1,17
      IF(EN.LT.ENE(I))GO TO 20
   10 CONTINUE
      I=18
   20 IF(I.NE.1)GO TO 30
      A1=(UWT(2,II)-UWT(1,II))/(ENE(2)-ENE(1))
      FUWT=UWT(1,II)+A1*(EN-ENE(1))
```

```
      RETURN
   30 IF(I.GT.17)GO TO 40
      A1=(UWT(I,II)-UWT(I-1,II))/(ENE(I)-ENE(I-1))
      FUWT=UWT(I-1,II)+A1*(EN-ENE(I-1))
      RETURN
   40 A1=(UWT(17,II)-UWT(16,II))/(ENE(17)-ENE(16))
      FUWT=UWT(17,II)-A1*(ENE(17)-EN)
      RETURN
      END
```

The relationship between energy and linear attenuation coefficients, i.e., the values of UWT (in units of cm^{-1}) and ENE (in units of MeV) in the above subroutine, has been obtained from the Radiation Health Handbook.

The array RET (Table 4-10, Volume 1) contains the retardation coefficients used in this report. The array FRACT (Chapter 3.0, Volume 1) contains radionuclide specific release fractions due to a processing operation or accident that involves releases into the air. FRACT(I,1), FRACT(I,2), and FRACT(I,3) are radionuclide-specific and denote the fractions released into the air from a pathological incinerator, from a calciner, and due to an accidental fire, respectively.

ARL(100)	: Area Concentration Limits (Ci/m^2)
Nature	: Radionuclide Specific
Location	: Common Block NUCS
Used By	: IMPACTS, INVERSE, INTRUDE, ECONOMY
Created By	: User
Read From	: LIMITS
Read By	: Subroutine READF

The array ARL contains the area concentration limits used in this report.

AXOQ : See FSA.

BAS(NSTR,104)	: Basic Data Array
Nature	: Waste Stream and Radionuclide Specific
Location	: Common Block BAST
Used By	: CLASIFY, IMPACTS, INTRUDE, ECONOMY
Created By	: User
Read From	: WASCAR, CLAOUT
Read By	: Subroutines READS in CLASIFY, subroutine MEURGE in IMPACTS, INTRUDE, and ECONOMY

This array contains the basic waste stream specific information. NSTR denotes the total number of waste streams considered. The second dimension of the array is always 104. The first four elements of the second dimension stands for different things at various points in the codes;

BAS(NSTR,1) - Usually denotes the volume of the waste stream (m^3); it is fractional volume in CLASIFY, and total volume disposed in IMPACTS, INTRUDE, and ECONOMY

BAS(NSTR,2) - Various items, e.g., in CLASIFY it contains the waste stream distribution number (see DIST below), in IMPACTS it contains the ratio of the volume reduction and increase factors.

BAS(NSTR,3) - Density of the waste stream (g/cm^3); however, sometimes it is not used, e.g., in CLASIFY.

BAS(NSTR,4) - Net concentration or activity of the waste stream.

The last 100 elements of the second dimension of BAS contains radionuclide concentrations or activities corresponding to the radionuclides specified in NUC (see below). BAS(NSTR,4) is the sum over all these 100 values.

BASN(NSTR)	: Waste Stream Name; 10 character alphanumeric
Nature	: Waste Stream Specific
Location	: Common Block BAST
Used By	: CLASIFY, IMPACTS, INTRUDE, ECONOMY
Created By	: User
Read From	: WASCAR, CLAOUT
Read By	: Subroutine READS in CLASIFY, and subroutine MEURGE in IMPACTS, INTRUDE, and ECONOMY

This array contains the names of the waste streams that will be classified for this particular problem set. It is read from the file WASCAR by CLASIFY, and stored in CLAOUT as the waste streams are classified. NSTR denotes the original number of waste streams; however, since the same waste stream may be classified in different disposal classes (due to activity or concentration distributions), the value of NSTR may increaase. BASN is subsequently read by another subroutine (MEURGE), and matched against the waste volumes generated (see BASNB below).

BASNB(150)	: Waste Stream Name; 10 character alphanumeric
Nature	: Waste Stream Specific
Location	: Temporary Variable
Used By	: IMPACTS, INTRUDE, ECONOMY
Created By	: User
Read From	: INPUTS
Read By	: Subroutine MEURGE in IMPACTS, INTRUDE, and ECONOMY

This array contains the "basic" waste stream names in the order in which they are presented in Table 2-2. This order also corresponds to the order in which the generated waste stream volumes are stored in file VOLUME.

BASNI(6)	: Waste Stream Name; 10 character alphanumeric
IREGI(6)	: Generating Region Number for Waste Stream BASNI
IBLGI(6)	: Number of Backlog Years for Waste Stream BASNI
FVOLI(6)	: Volume or Number Fraction of Waste Stream BASNI Shipped to the Disposal Facility

Nature : Waste Stream Specific
Location : Temporary Variables
Used By : IMPACTS, INTRUDE, ECONOMY
Created By : User
Read From : INPUTS
Read By : Subroutine MEURGE in IMPACTS, INTRUDE, and ECONOMY

These temporary variables are used to input the waste streams that will be shipped to the disposal facility being considered. They are read in bunches of six. The name BASNI is first matched with BASN (previously read from CLAOUT), thus obtaining the previously classified waste stream volume/number fractions, density, spectral indices, and class. Next it is matched with BASNB, thus obtaining the generated waste volumes/numbers in a specific region given by IREGI. Waste volumes/numbers generated for IBLGI years prior to the start of disposal facility operations are added to the first year's volume/number shipped. Finally, it is assumed that only the volume/number fraction given by FVOLI is shipped to the disposal facility being considered.

CLST(8,100) : Classification Limits (Ci/m^3 or Ci)
Nature : Radionuclide Specific
Location : Common Block NUCS
Used By : CLASIFY
Created By : User
Read From : LIMITS
Read By : Subroutine READS

This array contains the classification limits. CLST(1 through 4,I) denotes classification limits for radionuclide I for regular waste streams in units of Ci/m^3, and CLST(5 through 8,I) denotes classification limits for radionuclide I for source waste streams in units of Ci.

CSK(I,J) : See TDP(4).

COND(4) : See NUCD(4).

DCF1(10) : Ingestion Fundamental Dose Conversion Factor (mrem/pCi)
DCF2(10) : Inhalation Fundamental Dose Conversion Factor (mrem/pCi)
DCF3(10) : Direct Gamma (volume) Fundamental Dose Conversion Factor (mrem/year per pCi/m^3)
DCF4(10) : Direct Gamma (area) Fundamental Dose Conversion Factor (mrem/year per pCi/m^2)
DCF5(10) : Direct Gamma (air) Fundamental Dose Conversion Factor (mrem/year per pCi/m^3)
Nature : Radionuclide and Organ Specific
Location : Temporary Variables
Used By : IMPACTS, INVERSE, INTRUDE, ECONOMY
Created By : User
Read From : FUNDCF

Read By : Subroutine READF
Reference : Appendix D, Volume 1

These five temporary variables are read and used immediately to calculate the PDCF array. The only item of note is that only the total body value is read for DCF3, i.e., DCF3D, from which the organ specific DCF3 is calculated based upon the array DCF4. The organs considered in this work are (in order) lung, stomach wall, lower-large intestine wall, total body, kidneys, liver, red bone marrow, bone, thyroid, and ICRP equivalent total body.

DENS(5,NSTR) : See ISPC(NSTR,10).

DIS(I,J,K) : See TDP(4).

DISP : See PRC(2).

DIST(3,16,ND) : Distribution Array.
Nature : Waste Stream Specific
Location : Common Block BAST
Used By : CLASIFY
Created By : User
Read From : WASCAR
Read By : READS

This array contains the distribution arrays discussed in Section 3.1.4 of Volume 2. The last index, henceforth referred to as ND, is set to a number as large as necessary to accommodate all the distributionns. There are 16 increments for each distribution. DIST(1,I) denotes the upper limit of the concentration (in Ci/m^3) or total activity (in Ci), as applicable, of the Ith increment; DIST(2,I,ND) denotes the cumulative fraction of the volume with concentration or activity below the value given in DIST(1,I); and DIST(3,I) denotes the average concentration or activity contained in the fraction of the volume given by DIST(2).

DPT : See EFF.

DSUR : See PRC(2).

DTK : See EFF.

DTTM : See PRC(2).

DTPC : See PRC(2).

EAVG : Average Radionuclide Gamma Emission Energy (MeV)
Nature : Radionuclide Specific
Location : Temporary Variable

Used By : IMPACTS, INVERSE, INTRUDE
Created By : User
Read From : FUNDCF
Read By : Subroutine READF
Reference : See UWT(100).

This parameter represents the average emission energy per gamma, i.e., the total gamma energy emitted per disintegration divided by the total number of gammas emitted.

EERO : See FSA.

EFFQ(6) : Volumetric Disposal Efficiency (in m^3/m^2).
SEFQ(6) : Surface Disposal Efficiency (dimensionless).
DPTQ(6) : Depth to the Top of the Waste (in m).
DTKQ(6) : Thickness of the waste (in m).

Nature : Disposal Technology Specific
Location : Common Block DTEC
Used By : INVERSE, IMPACTS, INTRUDE, ECONOMY
Created By : User
Read From : INVCON.DAT File For CLASIFY, DISTEC.DAT File For IMPACTS, INTRUDE, and ECONOMY.
Read By : Various Places, Usually the Main Code.
Reference : Table 2-17, Volume 2

The disposal technology parameters are initially read from the DISTEC.DAT file and stored in these arrays. However, when making calculations on a specific waste class, the appropriate values are calculated and transferred to EFF, SEF, DPT, and DTK, respectively.

EINT : See FSA.

FF(5) : Uptake factors (see below for units)
Nature : Radionuclide Specific
Location : Temporary Variables
Used By : IMPACTS, INVERSE, INTRUDE
Created By : User
Read From : FUNDCF
Read By : Subroutine READF
Reference : Appendix D, Volume 1

These temporary parameters contain he five radionuclide specific uptake factors, namely, FF(1) is the dimensionless soil-to-plant uptake factor, FF(2) is the feed- and water-to-meat transfer factor (day/kg), FF(3) is the feed- and water-to-milk transfer factor (day/liters), and FF(4) and FF(5) are the water-to-freshwater fish and water-to-freshwater seafood transfer factors (l/kg), respectively. This array is used immediately upon reading to calculate the PDCFs.

FMF(100) : See AL(100).

FRACT(100,3) : See AL(100).

FSA	: Intruder-agriculture scenario site selection factor (dimensionless)
FSC	: Intruder-construction scenario site selection factor (dimensionless)
AXOQ	: Single container accident atmospheric dispersion (X/Q) factor (year/m^3)
FXOQ	: Accidental fire atmospheric dispersion (X/Q) factor (year/m^3)
POPE	: Population factor (people-yr/m^3) for air transport portion of the exposed waste scenario
POPW	: Population factor (people-yr/m^3) for water transport portion of the exposed waste scenario
EERO	: Dust mobilization factor (m/year) for erosion initiated exposed waste scenario
EINT	: Dust mobilization factor (m/year) for intruder initiated exposed waste scenario
POP(4)	: Population factor (people-yr/m^3) for waste incineration
NRET	: Retardation coefficient set to be used.

Nature	: Region Specific
Location	: Common Block ENVI
Used By	: IMPACTS, INVERSE, INTRUDE
Created By	: User
Read From	: ENVIRO
Read By	: Subroutine READE
Reference	: Table 2-12.

All these parameters address the calculation of radiological impacts resulting from inadvertant intruder scenarios. Thus, they have been grouped in the common block ENVI.

FSC : See FSA.

FVOLI(6) : See BASNI(6)

FXOQ : See FSA.

GDEL,GINS,GERO, GDELA, GDELS : These are dummy variables denoting various times, e.g., delay time, institutional control time, erosion time.

IBLGI(6) : See BASNI(6)

IMOD(NSTR) : See ISPC(NSTR,10)

IREGI(6) : See BASNI(6)

ISPC(NSTR,10) : Waste Stream Decision Indices
IMOD(NSTR) : Waste Class
MODE(NSTR) : Mode of the Waste Stream (see below)
DENS(5,NSTR) : The density (in g/cm^3) of the product.

Nature : Waste Stream Specific
Location : Common Block BAST
Used By : CLASIFY, IMPACTS, INTRUDE, ECONOMY
Created By : User
Read From : WASCAR, CLAOUT
Read By : Subroutine READS in CLASIFY, and subroutine MEURGE in IMPACTS, INTRUDE, and ECONOMY

ISPC complements the information provided in the BAS matrix, and contains waste stream specific decision indices. In CLASIFY, a three dimensional form of ISPC is used, i.e., ISPC(5,NSTR,10), where the first index refers to the waste spectrum. In IMPACTS, INTRUDE, and ECONOMY, it is used in the form ISPC(NSTR,10) where, in a manner similar to the BAS matrix, the first index refers to the specific waste stream considered. The second index refers to the following:

Index	Description
1	Waste Packaging Index
2	Volume Reduction Factor
3	Volume Increase Factor
4	Accident Index
5	Dispersibility Index
6	Leachability Index
7	Chemical Content Index
8	Stability Index
9	Activated Metal Index
10	Source Waste Index

Alternative values of these indices are presented in Tables 2-5 and 2-7.

The array IMOD indicates whether the waste is Unstable Class A, Stable Class A, Class B, Class C, Class D1, or Class D2, respectively. These are calculated based on the classification values read from CLAOUT.DAT. Alternative values of IMOD are as follows:

IMOD	Explanation
0	Unacceptable for disposal
1	Class A, unstable
2	Class A, waste form or packaging stable
3	Class B, stabilized through disposal technology
4	Class B, waste form or packaging stable
5	Class C, stabilized through disposal technology
6	Class C, waste form or packaging stable
7	Class D, stabilized through disposal technology
8	Class D, waste form or packaging stable

MODE contains a two digit decision index calculated internally. The first digit of this array, I1, contains the following information:

I1 = 1 : Regular Waste
I1 = 2 : Activated Metal Waste
I1 = 3 : Source Waste Stream

The second index of MODE, I2, contains the following information:

I2 = 1 : Regular Disposal
I2 = 2 : Grouted Disposal
I2 = 3 : Reinforced Concrete Cell
I2 = 4 : Grouted/Reinforced Concrete Cell

Use of the array MODE saves execution time during calculation of impacts from the post disposal scenarios.

Finally, the DENS(K,NSTR) array contains the waste stream density (in g/cm^3) of the product of the Kth waste spectrum.

<u>NUC(100)</u> : Radionuclide Names and Solubilities; 8 character Alphanumeric.
<u>Nature</u> : Radionuclide Specific
<u>Location</u> : Common Block CHRC
<u>Used By</u> : CLASIFY, IMPACTS, INVERSE, INTRUDE
<u>Created By</u> : User
<u>Read From</u> : FUNDCF
<u>Read By</u> : Subroutine READF
<u>Reference</u> : Table 2-1

This array contains the radionuclide name/solubility combinations used throughout the codes.

<u>NUCD(4)</u> : Radionuclide Name
<u>COND(4)</u> : Radionuclide Concentration or Activity

<u>Nature</u> : Radionuclide Specific
<u>Location</u> : Temporary Variables
<u>Used By</u> : CLASIFY, IMPACTS, INTRUDE, ECONOMY
<u>Created By</u> : User
<u>Read From</u> : WASCAR and CLAOUT
<u>Read By</u> : Subroutine READS/CLASIFY, and MEURGE/IMPACTS

These two dummy variables are used to read and store appropriately the radionuclide names/solubilities and concentrations or activities, as applicable, of the waste streams.

PDCF(100,10,8) : Pathway Dose Conversion Factors
(mrem/year per Ci/m^3 or mrem/year per Ci/m^2)
Nature : Radionuclide, Organ, and Pathway Specific
Location : Common Block DCFS
Used By : IMPACTS, INVERSE, INTRUDE
Created By : Subroutine READF
Reference : Appendix D, Volume 1

This matrix contains the pathway dose conversion factors that are calculated in subroutine READF from fundamental dose conversion factors (see DCF1 through DCF5) and other generic pathway data (such as FF). The first index is the radionuclide index. The second index is the organ index corresponding to the following: lung, stomach wall, large lower intestine (LLI) wall, total body, kidneys, liver, red marrow, bone surface, thyroid, and ICRP total body dose equivalent. The third index refers to the pathways discussed in Appendix D.

POP(4) : See FSA.

POPE : See FSA.

POPW : See FSA.

PRC(2) : Percolation (in m); PRC(1) is for regular cover, PRC(2) is for improved cover.
TSC(2) : Contact time fraction (dimensionless). Initially, it contains values based on percolation speed; TSC(1) is for regular cover, TSC(2) is for improved cover. Final contact time fractions based on TSC and TSCP (see below) are calculated and stored in this array.
QFC(4) : Dilution factor (m^3) for the Jth biota access location
UTTM : Unsaturated zone travel time (years)
DTTM : Saturated zone travel time (years) between centers of two adjacent disposal facility sectors
DTPC : Peclet number between centers of two adjacent disposal facility sectors
TTM(4) : Saturated zone travel time (years) from the center of the sector closest to the discharge location to the discharge location
TPC(4) : Peclet number from the center of the sector closest to the discharge location to the discharge location
DSUR : Distance from the center of the facility to the nearest downstream surface water location (in m)
SVEL : Saturated zone water speed in m/year
DISP : Dispersivity of the saturated zone (in m)

Nature : Region Specific
Location : Common Block ENVG
Used By : IMPACTS, INVERSE
Created By : User
Read From : ENVIRO

Read By : Subroutine READE
Reference : Table 2-12.

All these parameters address the calculation of individual and population radiological impacts resulting from groundwater scenarios. Thus, they have been grouped in the common block ENVG. The parameters PRC, TSC, QFC, UTTM, DSUR, SVEL, and DISP are read from the file ENVIRO (see Table 2-12). The remaining parameters are calculated internally using the actual dimensions of the disposal facility. One additional temporary array is TSCP(2) which contains the contact time fraction (dimensionless) based on moisture content; TSCP(1) is for a regular cover, TSCP(2) is for an improved cover. Based on another parameter between 0 and 1 input by the uuser, TSCW, the final contact tme fraction is calculated and stored in the TSC array as follows:

```
TSC(I)=TSCW*TSC(I)+(1-TSCW)*TSCP(I)
```

QFC(4) : See PRC(2).

RADF(8) : Processing Radiation Environment (mrads/hr)
Nature : Problem Specific
Location : Common Block RECL
Used By : ECONOMY
Created By : User
Read From : ENVIRO
Read By : Subroutine READE
Reference : Table 2-12.

RET(100,5) : See AL(100).

SEF : See EFF.

STP(I,J,K) : See TDP(4).

SVEL : See PRC(2).

TDP(4) : Transportation factor for population exposures $(mi/ft)^2$
TDO(4) : Transportation factor for occupational exposures $(mi/ft)^2$;
TPO(4) : Population density along the route $(people/mi^2)$
VEL(4) : Vehicle speed in mi/hr;
CSK(I,J) : Rental cask-days for a trip from the Jth to Ith region
DIS(I,J,K) : Distances in miles in the Kth region for a trip from the Jth to Ith region.
STP(I,J,K) : Truck stops in the Kth region for a trip from the Jth to Ith region.

Nature : Region Specific
Location : Common Block ENVT
Used By : ECONOMY
Created By : User
Read From : ENVIRO
Read By : Subroutine MEURGE
Reference : Tables 2-12 and 2-14.

All these parameters address the calculation of occupational and population radiological impacts resulting from transportation of waste to the disposal facility. Thus, they have been grouped in the common block ENVT.

TPC(4) : See PRC(2).

TTM(4) : See PRC(2).

TSC(2) : See PRC(2).

UTTM : See PRC(2).

UWT(100,2) : See AL(100).

APPENDIX B

ANNOTATED CODES

TABLE OF CONTENTS

B.1 VOLUMES Code

```
      PROGRAM VOLUMES
C-----------------------------------------------------------------------
C THIS PROGRAM CALCULATES AS GENERATED VOLUMES OF THE WASTE STREAMS
C CONTAINED IN WASCAR.DAT.  ADDITIONAL INFORMATION CAN BE FOUND IN
C VOLUME 2 OF NUREG/CR-4370.  THIS PROGRAM USES TWO INPUT FILES
C PLUS THE COMPUTER TERMINAL:
C
C   (1) VRATES.DAT - CONTAINS SPECIFIC GENERATING CHARACTERISTICS
C   (2) REACTR.DAT - CONTAINS INFORMATION ON NUCLEAR POWER REACTORS
C
C ITS RESULTS ARE OUTPUT INTO TWO FILES:
C
C   (1) VOLUME.DAT - CONTAINS ANNUAL GENERATED VOLUMES FOR FOUR REGIONS
C   (2) VOLUME.OUT - CONTAINS ADDITIONAL INFORMATION SUCH AS ELECTRICAL
C                    POWER GENERATED, THERMAL POWER LOST, PRINTOUTS OF
C                    INDIVIDUAL RECORDS, ETC.
C
C VOLUME.DAT FILE MUST EXIST IN THE OUTPUT DEVICE (DISK) FOR EACH RUN.
C HOWEVER, VOLUME.OUT IS RECREATED FOR EACH NEW RUN. THUS, THERE MUST
C NOT BE A FILE WITH THIS NAME AT THE TIME OF PROGRAM EXECUTION.
C
C THE PROGRAM IS WRITTEN FOR AN IBM PERSONAL COMPUTER OR A COMPATIBLE
C COMPUTER SUCH AS COMPAQ.  THE PROGRAM IS COMPILED AND EXECUTED USING
C MICROSOFT FORTRAN77 VERSION 3.30.  THE FILES AND SIZES ARE AS FOLLOWS:
C
C   (1) VOLUMES.EXE (EXECUTABLE DECK) -  65K BYTES
C   (2) VRATES.DAT                    -   7K   "
C   (3) REACTR DAT                    -   7K   "
C   (4) VOLUME.DAT                    - 120K   "
C   (5) VOLUME.OUT                    -  50K   "
C
C AUTHORS AND COGNIZANT INDIVIDUALS ARE:
C
C O. I. OZTUNALI  - (212) 839-3235
C ENVIROSPHERE COMPANY, TWO WORLD TRADE CENTER, NY, NY, 10048
C
C G. W. ROLES     - (301) 427-4791
C USNRC, 7915 EASTERN AVE, SILVER SPRING, MD 20910
C-----------------------------------------------------------------------
$DEBUG
$NOFLOATCALLS
      CHARACTER NAME*10, DUM*3
      COMMON/OUT/VOLUME(4,50),NAME/REACTOR/IPWR(6,6,50)
      OPEN(5,FILE='VRATES.DAT')
      OPEN(6,FILE='VOLUME.OUT',STATUS='NEW')
      OPEN(7,FILE='REACTR.DAT')
      OPEN(8,FILE='VOLUME.DAT',ACCESS='DIRECT',RECL=810)
C ASK FOR A DECISION ON WHAT THE PROGRAM IS TO DO.
   10 WRITE (*,120)
      READ (*,'(A3)') DUM
```

```
      IF(DUM.EQ.'FCY')CALL FCYCL
      IF(DUM.EQ.'INS')CALL INSTI
      IF(DUM.EQ.'IND')CALL INDUS
      IF(DUM.EQ.'REP')CALL PRFAB
      IF(DUM.EQ.'WST')CALL WVDPW
      IF(DUM.EQ.'SEE')CALL SEE
      IF(DUM.EQ.'END')STOP
      GO TO 10
  120 FORMAT (//' Select option: SEE - to review the data file, or'/16X
     +'FCY - update fuel cycle facilities, i.e.'/22X'power plants plus '
     +'decommissioning'/22X'other fuel cycle facilities and spentfuel,'/
     +16X'INS - institutional facils,'/16X'IND - industrial facils,'/
     +16X'REP - reprocessing/mox fabrication,'/16X'WST - WVDP waste,'/
     +16X'END - to terminate the program:'\)
      END
C----------------------------------------------------------------------
      SUBROUTINE FCYCL
C----------------------------------------------------------------------
C FCYCL COMPUTES/UPDATES INFORMATION ON WASTE STREAMS ASSOCIATED WITH
C THE NUCLEAR FUEL CYCLE, E.G., REACTORS, UF6 AND FUEL FABRICATION
C FACILITIES AND DECOMMISSIONING WASTE STREAMS.  THE VRATES OR REACTR
C DATA FILES OR BOTH WILL HAVE BEEN PRESUMABLY ALTERED PRIOR TO ITS USE.
C----------------------------------------------------------------------
      CHARACTER RETYP(8)*7,DNAM(19)*10,NAME*10
      COMMON/OUT/VOLUME(4,50),NAME/REACT/IPWR(6,6,50)
      COMMON/DECOM/FRAC(4,19),PWRD(4,50,19),BASED(19)
      DIMENSION IREG(150),ITYP(150),IMWE(150),IMWT(150),ICY(150),
     *IDY(150),IDT(3,6,50),BASE(3),FRAC1(4),FRAC2(3,2),START(4)
      DATA RETYP/'PWR-F  ', 'PWR-S  ', 'BWR-FDB', 'BWR-FFD',
     1          'BWR-S  ', ' Total ', '  PWR  ', '  BWR  '/
      DO 10 I=1,6
      DO 10 J=1,6
      DO 10 K=1,50
   10 IPWR(I,J,K)=0
C READ REACTR.DAT FILE
      DO 15 I=1,150
      READ(7,201,END=20) IREG(I),ITYP(I),IMWE(I),IMWT(I),ICY(I),IDY(I)
  201 FORMAT (22X,I2,4X,I2,4I5)
   15 CONTINUE
      STOP 'TOO MANY REACTORS'
   20 NREACT=I-1
C DO 35 LOOP CALCULATES THE ELECTRICAL POWER GENERATED BY REACTOR TYPE,
C ITYP, IN NRC REGION IREG (IREG GOES FROM 1 TO 5 IN THIS SECTION).
      DO 35 IDATE=1981,2030
      J1=IDATE-1980
      IF(MOD(J1,6).EQ.1)WRITE(6,202)
  202 FORMAT (1H1/////15X,'Annual Assumed Electrical Generating Cap',
     1       'acity (MWe)'/27X'From Year 1981 To Year 2030'//11X,
     2       68('-')/3X,'Year    Type    Region 1  Region 2  Region',
     3       ' 3  Region 4  Region 5      Total'/3X,76('-')/)
```

```
      DO 25 I=1,NREACT
      IF(IDATE.LT.ICY(I).OR.IDATE.GE.IDY(I))GO TO 25
      J=ITYP(I)
      K=IREG(I)
      IPWR(J,K,J1)=IPWR(J,K,J1)+IMWE(I)
      IPWR(J,6,J1)=IPWR(J,6,J1)+IMWE(I)
   25 CONTINUE
      DO 30 I=1,6
      DO 30 J=1,5
   30 IPWR(6,I,J1)=IPWR(6,I,J1)+IPWR(J,I,J1)
      WRITE(6,203) IDATE,(RETYP(M),(IPWR(M,I,J1),I=1,6),M=1,6)
  203 FORMAT(3X,I4,3X,A7,5(2X,I8),4X,I8/10X,A7,5(2X,I8),4X,I8/10X,A7,
     1      5(2X,I8),4X,I8/10X,A7,5(2X,I8),4X,I8/10X,A7,5(2X,I8),4X,
     2     I8/9X,8('-'),5(2X,8('-')),4X,8('=')/10X,A7,5(2X,I8),4X,I8/)
   35 CONTINUE
C DO 60 LOOP CALCULATES THE VOLUMES OF THE PROCESS WASTE STREAMS, TRASH,
C NON-FUEL REACTOR CORE COMPONENTS, AND DECONTAMINATION WASTE.
      REWIND 5
      DO 60 J=1,13
      CALL ZERO(VOLUME,200)
      READ(5,204) NAME,(BASE(I),I=1,3)
  204 FORMAT (A10,5X,5E10.0)
      JJ=1+(J/5)-(J/8)+(J/12)
      DO 55 I=1,50
      DO 55 K=1,4
      GO TO (40,45,50), JJ
   40 A2=IPWR(K,1,I)
      A1=IPWR(K,2,I)
      IF(K.EQ.4)A2=A2+IPWR(5,1,I)
      IF(K.EQ.4)A1=A1+IPWR(5,2,I)
      VOLUME(K,I)=BASE(1)*A2+BASE(2)*A1
      GO TO 55
   45 A2=IPWR(K,3,I)
      A1=IPWR(K,4,I)
      A3=IPWR(K,5,I)
      IF(K.EQ.4)A2=A2+IPWR(5,3,I)
      IF(K.EQ.4)A1=A1+IPWR(5,4,I)
      IF(K.EQ.4)A3=A3+IPWR(5,5,I)
      VOLUME(K,I)=BASE(1)*A2+BASE(2)*A1+BASE(3)*A3
      GO TO 55
   50 A2=IPWR(K,6,I)
      IF(K.EQ.4)A2=A2+IPWR(5,6,I)
      IF(J.EQ.12)VOLUME(K,I)=BASE(1)*A2
      IF(J.EQ.12)GO TO 55
      A2=IPWR(K,1,I)+IPWR(K,2,I)
      IF(K.EQ.4)A2=A2+IPWR(5,1,I)+IPWR(5,2,I)
      A3=IPWR(K,3,I)+IPWR(K,4,I)+IPWR(K,5,I)
      IF(K.EQ.4) A3=A3+IPWR(5,3,I)+IPWR(5,4,I)+IPWR(5,5,I)
      VOLUME(K,I)=BASE(1)*A2+BASE(2)*A3
   55 CONTINUE
```

```
   60 CALL WRITIT(J)
C DO 70 LOOP CALCULATES THE NEXT FOUR WASTE STREAM VOLUMES.
      DO 70 I=14,17
      READ (5,205) NAME, BASE(1), RATE, FRAC1
  205 FORMAT (A10,5X,2E10.0,4F5.0,I4,1X,E10.0,I4)
      CALL ZERO(VOLUME,200)
      DO 65 J=1,50
      DO 65 K=1,4
   65 VOLUME(K,J)=BASE(1)*IPWR(6,6,J)*FRAC1(K)
   70 CALL WRITIT(I)
C L-PUDECON SECTION
      CALL ZERO(VOLUME,200)
      READ(5,205) NAME
      VOLUME(4,5)=10.6
      DO 75 K=7,9
   75 VOLUME(2,K)=70.7
      CALL WRITIT(18)
C L-BURNUPS SECTION
      READ (5,205) NAME, BASE(1), RATE, FRAC1, IYRS, BAS1
      CALL ZERO(VOLUME,200)
      J1=IYRS-1980+1
      DO 90 K=1,4
      VOLUME(K,J1-1)=FRAC1(K)*BAS1
      DO 85 J=J1,50
      VOLUME(K,J)=FRAC1(K)*BASE(1)
   85 CONTINUE
   90 CONTINUE
      CALL WRITIT(19)
C THE NEXT SECTION CALCULATES THERMAL POWER LOST DUE TO REACTOR DECOMM.
      CALL SKIP(102)
      DO 100 I=1,19
      READ(5,204) DNAM(I),BASED(I),(FRAC(K,I),K=1,4)
  100 CONTINUE
      CALL ZERO(PWRD,3800)
      DO 125 IDATE=1981,2030
      J1=IDATE-1980
      IF(MOD(J1,10).EQ.1)WRITE(6,206)
  206 FORMAT (1H1///21X'Generating Capacity (MWth) Lost During 1981 to'
     1  ' 2030'/23X'Assuming A Decommissioning Period of Four Years'//
     2   11X,68('-')/3X'Year    Type    Region 1  Region 2  '
     3  'Region 3  Region 4  Region 5      Total'/3X,76('-')/)
      DO 115 I=1,NREACT
      IF(IDY(I).NE.IDATE) GO TO 115
      IF(IMWT(I).LE.10) GO TO 115
      POW2=IMWT(I)*IMWT(I)
      POW3=IMWT(I)*POW2
      J2=J1-1
      DO 110 J=1,4
      IF((IDATE+J-1).GT.2030) GO TO 110
      J2=J2+1
```

```
      K=IREG(I)
      KK=1+ITYP(I)/3
      IDT(KK,K,J2)=IDT(KK,K,J2)+IMWT(I)
      IF(K.EQ.5)K=4
      LUP=1+10*(KK/2)
      LEND=10+9*(KK/2)
      DO 105 L=LUP,LEND
      PWRD(K,J2,L)=PWRD(K,J2,L)+FRAC(1,L)+FRAC(2,L)*IMWT(I)+
     +              FRAC(3,L)*POW2+FRAC(4,L)*POW3
  105 CONTINUE
  110 CONTINUE
  115 CONTINUE
C SUM THERMAL POWER LOST
      DO 120 K=1,5
      IDT(1,6,J1)=IDT(1,6,J1)+IDT(1,K,J1)
      IDT(2,6,J1)=IDT(2,6,J1)+IDT(2,K,J1)
      IDT(3,K,J1)=IDT(1,K,J1)+IDT(2,K,J1)
      IDT(3,6,J1)=IDT(3,6,J1)+IDT(3,K,J1)
  120 CONTINUE
      WRITE(6,207) IDATE, RETYP(7), (IDT(1,M,J1),M=1,6), RETYP(8),
     1               (IDT(2,M,J1),M=1,6), RETYP(6), (IDT(3,M,J1),M=1,6)
  207 FORMAT (3X,I4,3X,A7,5(2X,I8),4X,I8/10X,A7,5(2X,I8),4X,I8/9X,
     1       8('-'),5(2X,8('-')),4X,8('=')/10X,A7,5(2X,I8),4X,I8/)
  125 CONTINUE
C DO 135 LOOP CALCULATES DECOMMISSIONING VOLUMES AND STORES THEM.
      DO 135 I=1,19
      NAME=DNAM(I)
      DO 130 J=1,50
      DO 130 K=1,4
      VOLUME(K,J)=PWRD(K,J,I)*BASED(I)
  130 CONTINUE
      CALL WRITIT(102+I)
  135 CONTINUE
C SPENT FUEL AND HARDWARE SECTION
      CALL SKIP(146)
      DO 155 IS=1,2
      READ (5,208) NAME, PWRR, BWRR, FRAC1
  208 FORMAT (A10,5X,6E10.3)
      CALL ZERO(VOLUME,200)
      DO 150 K=1,4
      VOLUME(K,1)=FRAC1(K)
      DO 145 I=1,50
      A2=IPWR(K,1,I)+IPWR(K,2,I)
      A1=IPWR(K,3,I)+IPWR(K,4,I)+IPWR(K,5,I)
      IF(K.NE.4)GO TO 140
      A2=A2+IPWR(5,1,I)+IPWR(5,2,I)
      A1=A1+IPWR(5,3,I)+IPWR(5,4,I)+IPWR(5,5,I)
  140 VOLUME(K,I)=VOLUME(K,I)+PWRR*A2+BWRR*A1
  145 CONTINUE
  150 CONTINUE
```

```
  155 CALL WRITIT(146+IS)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE INSTI
C-----------------------------------------------------------------------
C INSTI CALCULATES INSTITUTIONAL WASTE STREAM VOLUMES: STREAMS 20-27
C-----------------------------------------------------------------------
      CHARACTER NAME*10
      COMMON/OUT/VOLUME(4,50),NAME
      DIMENSION FRAC(4), BASE(4)
C FIRST DO COMBUSTIBLE TRASH AND ABSORBED LIQUIDS
      CALL SKIP(19)
      DO 15 I=20,23
      READ (5,100) NAME, BASE(1), RATE, FRAC
  100 FORMAT (A10,5X,2E10.0,4F5.0)
      DO 10 J=1,50
      IF(J.LE.20)A2=BASE(1)+RATE*J
      DO 10 K=1,4
      VOLUME(K,J)=FRAC(K)*A2
   10 CONTINUE
   15 CALL WRITIT(I)
C NEXT DO LIQUID SCINTILLATION VIALS AND BIOLOGICAL WASTE
      DO 25 I=24,27
      READ (5,110) NAME, BASE, IYRB, IYRE, FRAC
  110 FORMAT (A10,13X,4E8.0,I4,1X,I4,1X,4F5.0)
      DO 20 J=1,50
      JJ=J
      IF(JJ.GT.4)JJ=4
      DO 20 K=1,4
      VOLUME(K,J)=BASE(JJ)*FRAC(K)
   20 CONTINUE
   25 CALL WRITIT(I)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE INDUS
C-----------------------------------------------------------------------
C INDUS CALCULATES INDUSTRIAL WASTE STREAM VOLUMES: STREAMS 28-79
C-----------------------------------------------------------------------
      CHARACTER NAME*10
      COMMON/OUT/VOLUME(4,50),NAME
      DIMENSION FRAC(4)
      CALL SKIP(27)
      DO 40 I=28,79
      CALL ZERO(VOLUME,200)
      READ (5,203) NAME,BASE,RATE,FRAC
  203 FORMAT (A10,5X,2E10.0,4F5.0)
      J1=1
      IF(I.NE.36)GO TO 30
```

```
      VOLUME(1,4)=7.1
      J1=5
   30 IF(I.EQ.77)J1=10
      DO 35 J=J1,50
      IF(J.LE.20)A2=BASE+RATE*J
      DO 35 K=1,4
   35 VOLUME(K,J)=FRAC(K)*A2
   40 CALL WRITIT(I)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE PRFAB
C-----------------------------------------------------------------------
C PRFAB CALCULATES WASTE STREAM VOLUMES ASSOCIATED WITH NUCLEAR FUEL
C REPROCESSING AND MIXED OXIDE FUEL FABRICATION: STREAMS 80-102
C-----------------------------------------------------------------------
      CHARACTER NAME*10
      COMMON/OUT/VOLUME(4,50),NAME
      DIMENSION NPLT(4),IYRS(4)
      CALL SKIP(79)
  100 FORMAT (A10,5X,E10.0)
  101 FORMAT(2X'SPECIFY NUMBER OF REP PLANTS (4I4 FORMAT)'\)
  102 FORMAT(2X'SPECIFY NUMBER OF MOX PLANTS (4I4 FORMAT)'\)
  103 FORMAT(2X'SPECIFY START YEAR (4I4 FORMAT)'\)
  104 FORMAT(4I4)
      WRITE(*,101)
      READ(*,104) NPLT
      WRITE(*,103)
      READ(*,104) IYRS
      DO 20 I=80,99
      READ (5,100) NAME, BASE
      CALL ZERO(VOLUME,200)
      DO 10 K=1,4
      J1=IYRS(K)-1980
      DO 10 J=J1,50
   10 VOLUME(K,J)=BASE*NPLT(K)
   20 CALL WRITIT(I)
      WRITE(*,102)
      READ(*,104) NPLT
      WRITE(*,103)
      READ(*,104) IYRS
      DO 40 I=100,103
      READ (5,100) NAME, BASE
      CALL ZERO(VOLUME,200)
      DO 30 K=1,4
      J1=IYRS(K)-1980
      DO 30 J=J1,50
   30 VOLUME(K,J)=BASE*NPLT(K)
   40 CALL WRITIT(I)
      RETURN
      END
```

```
C------------------------------------------------------------------------
      SUBROUTINE WVDPW
C------------------------------------------------------------------------
C WVDPW CALCULATES WASTE VOLUMES FROM THE WEST VALLEY DEMONST. PROJECT
C------------------------------------------------------------------------
      CHARACTER NAME*10
      COMMON/OUT/VOLUME(4,50),NAME
      DIMENSION VOL(3),JB(3),JE(3)
      CALL SKIP(121)
      DO 30 I=122,146
      CALL ZERO(VOLUME,200)
      READ (5,100) NAME, (VOL(J),JB(J),JE(J),J=1,3)
  100 FORMAT (A10,5X,3(E10.0,I4,1X,I4,1X))
      DO 15 J=1,3
      IF(JB(J).EQ.0)GO TO 20
      DO 10 K=1,50
      KBEG=K+1980
      IF(KBEG.LT.JB(J))GO TO 10
      IF(KBEG.GT.JE(J))GO TO 15
      VOLUME(1,K)=VOL(J)
   10 CONTINUE
   15 CONTINUE
   20 CALL WRITIT(I)
   30 CONTINUE
      RETURN
      END
C------------------------------------------------------------------------
      SUBROUTINE SEE
C------------------------------------------------------------------------
C SEE PERMITS PERUSAL OF ANY RECORD OF VOLUME.DAT.  IT PRINTS ANNUAL
C VOLUMES GENERATED FOR FOUR REGIONS (NRC REGIONS 4 AND 5 COMBINED)
C BETWEEN THE YEARS 1981 TO 2025.
C------------------------------------------------------------------------
      CHARACTER NAME*10,DUM*1
      COMMON/OUT/VOLUME(4,50),NAME
   10 WRITE(*,100)
      READ(*,*) IREC
      IF(IREC.LE.0.OR.IREC.GT.150)RETURN
      READ(8,REC=IREC) NAME,VOLUME
      CALL PRNT(0,IREC)
      WRITE(*,120)
      READ(*,'(A1)') DUM
      IF(DUM.EQ.'y'.OR.DUM.EQ.'Y')CALL PRNT(6,IREC)
      GO TO 10
  100 FORMAT(/' Enter record number of data to be displayed:'\)
  120 FORMAT(/' Do you want a hard copy in Tape 6 - Y or N ? '\)
      END
C------------------------------------------------------------------------
      SUBROUTINE PRNT(LP,IREC)
C------------------------------------------------------------------------
```

```
C PRNT IS A UTILITY SUBROUTINE CALLED BY THE SUBROUTINE SEE.
C-------------------------------------------------------------------
      CHARACTER NAME*10
      COMMON/OUT/VOLUME(4,50),NAME
      WRITE(LP,100) NAME,IREC
      DO 10 I=1,4
      IF(LP.EQ.0)WRITE(LP,110) I,(VOLUME(I,J),J=1,45)
      IF(LP.NE.0)WRITE(LP,111) I,(VOLUME(I,J),J=1,50)
   10 CONTINUE
  100 FORMAT (/' .WASTE STREAM NAME : 'A10'  NUMBER :'I4)
  110 FORMAT(2X,I4,1P,9E8.1/(6X,9E8.1))
  111 FORMAT(2X,I4,1P,10E8.1/(6X,10E8.1))
      END
C-------------------------------------------------------------------
C THE THREE SUBROUTINES THAT FOLLOW ARE UTILITY SUBROUTINES: WRITIT
C OUTPUTS UPDATED VOLUMES INTO RECORD NO. IREC; SKIP SKIPS THE FIRST
C NREC RECORDS OF THE VRATES FILE; AND ZERO SETS AN ARRAY EQUAL TO ZERO.
C-------------------------------------------------------------------
      SUBROUTINE WRITIT(IREC)
      CHARACTER NAME*10
      COMMON/OUT/VOLUME(4,50),NAME
      WRITE(8,REC=IREC) NAME,VOLUME
      RETURN
      END
C
      SUBROUTINE SKIP(NREC)
      REWIND 5
      DO 10 I=1,NREC
      READ (5,'(9X,I1)') J
   10 CONTINUE
      RETURN
      END
C
      SUBROUTINE ZERO(A,N)
      DIMENSION A(N)
      DO 10 I=1,N
   10 A(I)=0.
      RETURN
      END
```

B.2 Common Block Files CLACOM.FOR, INVCOM.FOR, IMPCOM.FOR

```
C-----------------------------------------------------------------------
C THE FOLLOWING THREE FORTRAN FILES ARE USED IN THE CODES TO STAND FOR
C COMMON BLOCKS.  THEY CAN BE AND ARE INCLUDED AT ANY POINT IN THE
C PROGRAMS THROUGH THE USE OF AN "$INCLUDE:" METACOMMAND. THE FIRST
C FILE IS USED IN CLASIFY, THE SECOND FILE IS USED IN INVERSE, AND
C THE THIRD FILE IS USED IN INTRUDE, IMPACTS, AND ECONOMY.
C-----------------------------------------------------------------------
C CLACOM.FOR FILE
C-----------------------------------------------------------------------
      CHARACTER BASN*10,NUC*8
      COMMON/BAST/BAS(250,104),ISPC(5,250,10),DIST(3,16,80),DEN(5,250)
     .      /CHRC/BASN(250),NUC(100)/NUCS/AL(100),NCLX(100),CLST(8,100)
     .      /NTGR/NDXS(250),IORD(5,250),IHIC(250),IMOD(250),ISPEC(250)
     .      /INDX/IRDC(4),NSTR,NBRN
C-----------------------------------------------------------------------
C INVCOM.FOR FILE
C-----------------------------------------------------------------------
      CHARACTER NUC*8
      COMMON/CHRC/NUC(100)/BAST/BAS(4),DMY(100,23),ISPC(10)
     +/DCFS/PDCF(100,10,8)/INVP/VOLUME,SECTOR,BUFFER,SORDEN
     +/NUCS/AL(100).FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
     +/FACI/IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS,ILFE
     +/DTNX/IU,ID,IT,IC,IE,IB,IX,IS/DTEC/EFF,SEF,DPT,DTK,EMP(3)
     +/ENVT/TDP(4),TDO(4),TPO(4),VEL(4),CSK(4,4),DIS(4,4,4),STP(4,4,4)
     +/ENVI/FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,POP(4),NRET
     +/ENVG/PRC(2),TSC(2),QFC(4),UTTM,DTTM,DTPC,TTM(4),TPC(4)
C-----------------------------------------------------------------------
C IMPCOM.FOR FILE
C-----------------------------------------------------------------------
      CHARACTER BASN*10,NUC*8
      COMMON/CHRC/BASN(249),NUC(100)/DCFS/PDCF(100,10,8)
     +/BAST/BAS(249,104),BIMP(7,10,60),ISPC(249,10),IMOD(249),MODE(249)
     +/NUCS/AL(100),FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
     +/FACI/IR,IOFL,IBUF,NBRN,NBES.IBEG,IEND,ICLS,IOBS,IINS,ILFE
     +/DTEC/EMP,EFF,SEF,DPT,DTK,EMPQ(3),EFFQ(6),SEFQ(6),DPTQ(6),DTKQ(6)
     +/DTNX/ID,IU,IT,IC,IE,IB,IX,IS,IDQ(6),IUQ(6),ITQ(6),ICQ(6),IEQ(6),
     + IBQ(6),IXQ(6),ISQ(6)/FTEC/DMIN(6),VOLE(6),ACSQ(6),ALEN(6),
     + WIDT(6),DISN(7),VOLS(7),AREA(7),VBAK(7),TSUM(7),RADF(8)
     +/ENVT/TDP(4),TDO(4),TPO(4),VEL(4),CSK(4,4),DIS(4,4,5),STP(4,4,5)
     +/ENVI/FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,POP(4),NRET/ENVG/
     + PRC(2),TSC(2),QFC(4),UTTM,DTTM,DTPC,TTM(4),TPC(4),DSUR,SVEL,DISP
```

B.3 INVERSE Code

```
      PROGRAM INVERSE
C-----------------------------------------------------------------------
C THIS PROGRAM OBTAINS RADIONUCLIDE CONCENTRATION OR ACTIVITY LIMITS
C USING THE ALGORITHMS OUTLINED IN VOLUME 1 OF NUREG/CR-4370.  IT USES
C THE FOLLOWING FILES:
C
C   (1) INVCON.DAT - INPUT COMMAND FILE
C   (2) FUNDCF.DAT - FUNDAMENTAL DOSE CONVERSION FACTORS AND OTHER
C                    RADIONUCLIDE SPECIFIC DATA.
C   (3) ENVIRO.DAT - ENVIRONMENTAL CHARACTERISTICS OF DISPOSAL SITES
C
C ITS RESULTS ARE OUTPUT INTO A FILE CALLED INVOUT.DAT CONTAINING THE
C RADIONUCLIDE CLASSIFICATION LIMITS.  THIS FILE IS RECREATED FOR EACH
C RUN. THUS, THERE MUST NOT BE A FILE WITH THIS NAME DURING EXECUTION
C
C THE PROGRAM IS WRITTEN FOR AN IBM PERSONAL COMPUTER OR A COMPATIBLE
C COMPUTER SUCH AS COMPAQ. THE PROGRAM IS COMPILED AND EXECUTED USING
C MICROSOFT FORTRAN77 VERSION 3.30.
C
C AUTHORS AND COGNIZANT INDIVIDUALS ARE:
C
C O. I. OZTUNALI  - (212) 839-3235
C ENVIROSPHERE COMPANY, TWO WORLD TRADE CENTER, NY, NY, 10048
C
C G. W. ROLES     - (301) 427-4791
C USNRC, 7915 EASTERN AVE, SILVER SPRING, MD 20910
C-----------------------------------------------------------------------
$DEBUG
$NOFLOATCALLS
      CHARACTER SCN(23)*6
$INCLUDE:'INVCOM.FOR'
      COMMON/ACTS/F12(4)/SORS/F23(4)/CALS/ZZ1(50)
     +       /CHYN/ICH(8,57),LCH(57),ACT(8)/UPTK/FK(27)
      DIMENSION TYMD(16),RNC(8)
      DATA TYMD/20.,40.,60.,80.,100.,120.,160.,200.,400.,600.,
     .          800.,1000.,2000.,5000.,10000.,20000./
      DATA SCN/'IN-DR1','IN-DR2','IN-DR3','IN-DA1','IN-DA2','IN-DA3',
     .         'IN-CO1','IN-CO2','IN-CO3','IN-DI1','IN-DI2','IN-DI3',
     .         'IN-AG1','IN-AG2','IN-AG3','EX-INT','EX-ERO','LA-OPS',
     .         'LA-OVF','INT-WL','BOU-WL','POP-WL','POP-SW'/
  101 FORMAT(5I3,5I5)
  102 FORMAT(1H1/2X'IR  ='I3,2X'OVFL='I3,2X'IBUF='I3,2X'NBRN='I3,
     *          2X'NBES='I3/2X'IBEG='I5,2X'IEND='I5,2X'ICLS='I5/
     *          2X'IOBS='I5,2X'INST='I5,2X'ILFE='I5)
  103 FORMAT(10I3)
  104 FORMAT(/2X'IU='I3,2X'ID='I3,2X'IT='I3,2X'IC='I3/
     *        2X'IE='I3,2X'IB='I3,2X'IX='I3,2X'IS='I3)
  105 FORMAT(/2X'ISPC INDICES:'10I4)
  106 FORMAT(10E8.1)
  107 FORMAT(/2X'DLC ='F6.1' MREM/YR      DLCW ='F6.1' MREM/YR')
```

```
  108 FORMAT(/2X'VOLS='1PE9.2'  SECT='E9.2'  BUFF='E9.2'  SORD='E9.2/)
  109 FORMAT(2X'EFF ='1PE9.2,2X'SEF ='E9.2,2X'DPT ='E9.2,2X'DTK ='E9.2/)
  110 FORMAT(/2X'GDEL='1PE9.2'  DISP='E9.2'  SOLS='E9.2'  GAMM='E9.2)
  111 FORMAT(/2X'MINIMUMS'2X,12(A6,3X))
  112 FORMAT(2X,A8,1P,8E9.2)
  113 FORMAT(2X,A8,1P,7E9.2)
  114 FORMAT(/2X'LIMITS DUE TO RADON AT 0 THRU 7 M COVER ATTENUATION')
      OPEN(5,FILE='INVCON.DAT')
      OPEN(6,FILE='INVOUT.DAT',STATUS='NEW')
   10 READ(5,101,END=50) IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS
      ILFE=IEND-IBEG+1
      WRITE(6,102) IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS,ILFE
      READ(5,103) IU,ID,IT,IC,IE,IB,IX,IS
      WRITE(6,104) IU,ID,IT,IC,IE,IB,IX,IS
      READ(5,103) ISPC
      WRITE(6,105) ISPC
      READ(5,106) DLC,DLCW
      WRITE(6,107) DLC,DLCW
      READ(5,106) VOLUME,SECTOR,BUFFER,SORDEN
      WRITE(6,108) VOLUME,SECTOR,BUFFER,SORDEN
      READ(5,106) EFF,SEF,DPT,DTK,EMP
      WRITE(6,109) EFF,SEF,DPT,DTK
      IF(ISPC(9).EQ.0)GO TO 15
      READ(5,106) F12
      WRITE(6,*) ' ACTIVATED METAL STREAM'
      WRITE(6,110) F12
   15 IF(ISPC(10).EQ.0)GO TO 20
      READ(5,106) F23
      WRITE(6,*) ' SOURCE WASTE STREAM'
      WRITE(6,110) F23
C INPUT ENVIRONMENTAL (READE) AND RADIONUCLIDE SPECIFIC (FUNDCF) DATA
   20 CALL READE(IR)
      CALL READF(IR)
      CALL ZERO(DMY,2300)
C START CALLING THE LIMITING SCENARIOS
      CALL INTINV(DLC)
      CALL EXPWAS(DLC)
      CALL OVRFLO(DLC)
      CALL GWATER(DLCW,TYMD)
C MODIFY ALL LIMITS GREATER THAN 1.E6 TO READ 0.
      DO 30 I=1,100
      DO 25 J=1,23
      IF(DMY(I,J).GT.1.E6)DMY(I,J)=0.
   25 CONTINUE
   30 CONTINUE
C START OUTPUT OF THE LIMITS
      WRITE(6,111) (SCN(I),I=1,8)
      WRITE(6,112) (NUC(I),(DMY(I,J),J=1,8),I=1,100)
      WRITE(6,111) (SCN(I),I=9,16)
      WRITE(6,112) (NUC(I),(DMY(I,J),J=9,16),I=1,100)
```

```
      WRITE(6,111) (SCN(I),I=17,23)
      WRITE(6,113) (NUC(I),(DMY(I,J),J=17,23),I=1,100)
C CALCULATE AND OUTPUT RADIUM LIMITS BASED ON RADON
      CALL ZERO(RNC,8)
      C1=EMP(IE)*EXM(AL(45)*(ICLS+IOBS+IINS))*1.03E-6*PDCF(44,10,2)
      DO 35 I=1,8
      DENOM=C1*EXM(0.977*(I-1))
      IF(DENOM.GT.1.E-12)RNC(I)=DLC/DENOM
   35 CONTINUE
      WRITE(6,114)
      WRITE(6,112) NUC(45),(RNC(I),I=1,8)
      GO TO 10
   50 CLOSE (5)
      CLOSE (6)
      STOP 'NORMAL TERMINATION'
      END
C-----------------------------------------------------------------------
      SUBROUTINE READE(IR)
C-----------------------------------------------------------------------
C READE INPUTS ENVIRONMENTAL INFORMATION FROM THE FILE ENVIRO.DAT
C-----------------------------------------------------------------------
      COMMON/INVP/VOLUME,SECTOR,BUFFER,SORDEN/UPTK/FK(27)
     +/ENVT/TDP(4),TDO(4),TPO(4),VEL(4),CSK(4,4),DIS(4,4,4),STP(4,4,4)
     +/ENVI/FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,POP(4),NRET
     +/ENVG/PRC(2),TSC(2),QFC(4),UTTM,DTTM,DTPC,TTM(4),TPC(4)
      DIMENSION DUM(4),T1(2)
  101 FORMAT(8E10.3)
  102 FORMAT(I5)
      OPEN(2,FILE='ENVIRO.DAT')
      DO 50 I=1,4
      READ(2,101) TDP(I),TDO(I),TPO(I),VEL(I),(CSK(I,J),J=1,4),
     +            ((DIS(I,J,K),STP(I,J,K),K=1,4),J=1,4)
      IF(I.NE.IR) GO TO 30
      READ(2,101) FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,
     +            (PRC(J),J=1,2),(TSC(J),J=1,2),(QFC(J),J=1,4),
     +            UVEL,UTCK,SVEL,DSUR,DISP,(T1(J),J=1,2),TSCW
      READ(2,102) NRET
      FSC=FSC/0.057
      UTTM=UTCK/UVEL
      TTM(1)=0.5*SECTOR
      TTM(2)=0.5*SECTOR+BUFFER
      TTM(3)=0.5*DSUR
      TTM(4)=DSUR
      DO 10 J=1,4
      TPC(J)=TTM(J)/DISP
   10 TTM(J)=TTM(J)/SVEL
      DTTM=SECTOR/SVEL
      DTPC=SECTOR/DISP
      POP(I)=POPE/3.
      DO 20 J=1,2
```

```
   20 TSC(J)=TSCW*TSC(J)+(1.-TSCW)*T1(J)
      GO TO 50
   30 READ(2,101) DUM,A1
      POP(I)=A1/3.
      READ(2,101) A1
      READ(2,101) A1
      READ(2,102) J
   50 CONTINUE
C FINALLY READ PATHWAY UPTAKE DATA
      READ(2,101) FK
      CLOSE(2)
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE READF(IR)
C-----------------------------------------------------------------
C READF INPUTS RADIONUCLIDE INFORMATION FROM THE FILE FUNDCF.DAT
C AND CALCULATES THE PATHWAY DOSE CONVERSION FACTORS
C-----------------------------------------------------------------
      CHARACTER NUC*8
      COMMON/CHRC/NUC(100)/DCFS/PDCF(100,10,8)/NUCS/AL(100),
     + FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)/UPTK/V1,V2,S1,S2,
     + Z,RI(4),R,CY,D,F2,F3(4),F5,F7,F8,F8P,F11,F13,F13P,F14,F15,F18
      COMMON/CHYN/ICH(8,57),LCH(57),ACT(8)
      DIMENSION DCF1(10),DCF2(10),DCF3(10),DCF4(10),DCF5(10),FF(5)
  101 FORMAT(A8,1X,3E9.2,18X,4E9.2)
  102 FORMAT(9X,10E9.2)
  103 FORMAT(3(I2,8I3))
      OPEN(1,FILE='FUNDCF.DAT')
      AL2=ALOG(2.)
C START PROCESSING THE RADIONUCLIDES
      DO 40 IN=1,100
      READ(1,101) NUC(IN),AL(IN),FMF(IN),DCF3D,EAVG,(FRACT(IN,I),I=1,3)
      READ(1,102) (DCF1(I),I=1,10),(DCF2(I),I=1,10)
      READ(1,102) (DCF4(I),I=1,10),(DCF5(I),I=1,10)
      READ(1,102) (RET(IN,I),I=1,5),(FF(I),I=1,5)
      AL(IN)=AL2/AL(IN)
      A1=FUWT(EAVG,1)*60.96
      UWT(IN,1)=EXM(A1)*(1.+0.95*A1+0.35*A1*A1)
      A1=1.6*FUWT(EAVG,2)*60.96
      UWT(IN,2)=EXM(A1)*(1.+0.95*A1+0.35*A1*A1)
      DO 10 I=1,10
      A1=1.
      IF(DCF4(4).GT.0.)A1=DCF4(I)/DCF4(4)
   10 DCF3(I)=DCF3D*A1
      PTP=F2+F3(IR)*(FF(2)*F5+FF(3)*F7*365.)
      PT=PTP*FF(1)
      FT=F8*FF(2)*F5+F8P*FF(3)*F7*365.+F11
      F12N=FF(4)*F13+FF(5)*F13P
      V=V1
```

```
      IF(IN.EQ.31)V=V2
      D1=86400.*V/(S2*Z)
      D2=86400.*R*V/S1
      W1=RI(IR)/(S2*Z)
      W2=R*RI(IR)/S1
      DO 30 IO=1,10
      A1=F18*(F14*(F15*DCF2(IO)+DCF5(IO))+DCF4(IO))
      PDCF(IN,IO,1)=F15*DCF2(IO)+DCF5(IO)+A1*D1
      PDCF(IN,IO,2)=F15*DCF2(IO)+DCF5(IO)+0.242*A1*D1
      PDCF(IN,IO,3)=PDCF(IN,IO,1)+(D1*PT+(D2/CY)*PTP)*DCF1(IO)
      PDCF(IN,IO,4)=(PT/D)*DCF1(IO)
      PDCF(IN,IO,5)=DCF3(IO)
      PDCF(IN,IO,6)=(W1*PT+(W2/CY)*PTP+FT/1000)*DCF1(IO)+W1*A1
      PDCF(IN,IO,7)=PDCF(IN,IO,6)+(F12N/1000)*DCF1(IO)
      PDCF(IN,IO,8)=DCF4(IO)
      DO 20 J=1,8
   20 PDCF(IN,IO,J)=PDCF(IN,IO,J)*1.E+12
   30 CONTINUE
   40 CONTINUE
C FINALLY READ THE RADIONUCLIDE CHAIN INFORMATION
      READ(1,103) (LCH(I),(ICH(J,I),J=1,8),I=1,57)
      CLOSE(1)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE INTINV(DLC)
C-----------------------------------------------------------------------
C INTINV CALCULATES LIMITS ASSOCIATED WITH INTRUDER SCENARIOS. FIVE
C SCENARIOS ARE CONSIDERED: DRILLING, DRILLING-AGRICULTURE, DISCOVERY,
C CONSTRUCTION, AND AGRICULTURE. THESE SCENARIOS ARE CONSIDERED AT THREE
C DIFFERENT TIMES: ICLS+IOBS+IINS, ICLS+IOBS+500, ICLS+IOBS+1000.
C HOWEVER, ONLY THE RESULTS FOR ICLS+IOBS+IINS ARE MEANINGFUL FOR THE
C FIRST THREE SCENARIOS.
C-----------------------------------------------------------------------
$INCLUDE:'INVCOM.FOR'
      COMMON/CALS/Z2(10),Z3(10),Z4(10),Z5(10),Z8(10)
      I5=ISPC(5)
      I6=ISPC(6)
      I7=ISPC(7)
      I9=ISPC(9)
      I10=ISPC(10)
      I1=1
      IF(I9.GT.0)I1=2
      IF(I10.GT.0)I1=3
      IF(I1.EQ.2)GDELA=FACTS(GDEL,I9,1)
      IF(I1.EQ.3)GDELS=FSORS(GDEL,I10,1)
      FD=EMP(IE)*SEF
      F1=DTK*9.39E-07
      IF(I1.EQ.3)F1=2.9E-05
      F3=DTK*1.11E-6
```

```
      IF(I1.EQ.3)F3=3.43E-5
      F2=FD*0.057
      IF(DPT.GE.5.)F2=F2*0.1
      F4=F2*0.25/0.057
      IF(I1.EQ.3)F4=F4*1.02
C START TIME LOOP
      DO 80 ITYM=1,3
      IF(ITYM.EQ.1)GDEL=ICLS+IOBS+IINS
      IF(ITYM.EQ.2)GDEL=ICLS+IOBS+500.
      IF(ITYM.EQ.3)GDEL=ICLS+IOBS+1000.
      A5=1.
      A6=1.
      A9=1.
      IF(I1.NE.1.OR.NBES.EQ.0)GO TO 10
      IF(I5.GT.0)A5=10.**(-I5)
      IF(I6.EQ.2)A6=1./30.
      IF(I6.EQ.3)A6=1./160.
      IF(I6.EQ.4)A6=1./400.
      IF(IS.EQ.0.OR.I7.EQ.1)A6=A6*4.
      IF(I6.EQ.1)A6=1.
      GO TO 20
   10 IF(I1.EQ.2)A5=FACTS(GDEL,I9,2)
      IF(I1.EQ.3)A5=FSORS(GDEL,I10,2)*SORDEN/FD
      IF(I1.EQ.2)A6=FACTS(GDEL,I9,3)
      IF(I1.EQ.3)A6=FSORS(GDEL,I10,3)*SORDEN/FD
      IF(I1.EQ.2)A9=FACTS(GDEL,I9,4)
      IF(I1.EQ.3)A9=FSORS(GDEL,I10,4)*SORDEN/FD
   20 A1=F2*A5*FSC
      A3=F2*A9
      IF(I3.EQ.3)A4=FSORS(GDEL,I10,4)*2.19E-4
      B1=F4*A5*FSA
      B2=F4*A6*0.5
      B3=F4*A9*0.27
      B4=B3*0.132
      IF(I1.EQ.2)B3=B3*A5
      IF(I1.EQ.2)B4=B4*(1.-A5)
C START NUCLIDE LOOP
      DO 70 INUC=1,100
      CALL CHNS(INUC,GDEL)
      CALL CALI(INUC)
      IF(I1.EQ.1)GO TO 30
      IF(I1.EQ.2.AND.GDEL.LT.GDELA)GO TO 40
      IF(I1.EQ.3.AND.GDEL.LT.GDELS)GO TO 40
C DRILLING AND DRILLING-AGRICULTURE
   30 DENOM=F1*UWT(INUC,1)*Z5(10)
      IF(DENOM.GT.1.E-20)DMY(INUC,ITYM)=DLC/DENOM
      DENOM=F3*UWT(INUC,2)*Z5(10)
      IF(DENOM.GT.1.E-20)DMY(INUC,ITYM+3)=DLC/DENOM
C DISCOVERY AND CONSTRUCTION
   40 DENOM=A1*Z2(10)+A3*Z5(10)
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```
      IF(I1.EQ.3)DENOM=DENOM+A4*Z8(10)
      IF(DENOM.GT.1.E-20)DMY(INUC,ITYM+6)=DLC/DENOM
      DMY(INUC,ITYM+9)=DMY(INUC,ITYM+6)/1.2E-2
C AGRICULTURE
      IF(I1.EQ.3)GO TO 50
      DENOM=B1*Z3(10)+B2*Z4(10)+B3*Z5(10)
      IF(I1.EQ.2)DENOM=DENOM+B4*Z8(10)
      GO TO 60
   50 IF(GDEL.LT.GDELS)DENOM=B4*Z8(10)
      IF(GDEL.GE.GDELS)DENOM=B1*Z3(10)+B2*Z4(10)+B3*Z5(10)
   60 IF(DENOM.GT.1.E-20)DMY(INUC,ITYM+12)=DLC/DENOM
   70 CONTINUE
   80 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE EXPWAS(DLC)
C-----------------------------------------------------------------------
C EXPWAS CALCULATES LIMITS ASSOCIATED WITH EXPOSED WASTE SCENARIOS.
C TWO SCENARIOS ARE CONSIDERED: INTRUDER-WATER AND EROSION-WATER.
C-----------------------------------------------------------------------
$INCLUDE:'INVCOM.FOR'
      COMMON/CALS/Z3(10),Z7(40)
      IF(DPT.GE.5.)RETURN
      I6=ISPC(6)
      I9=ISPC(9)
      I10=ISPC(10)
      I1=1
      IF(I9.GT.0)I1=2
      IF(I10.GT.0)I1=3
      GREC=ICLS+IOBS+IINS
      GERO=2000.
      IF(I1.EQ.2)GDELA=FACTS(GDEL,I9,1)
      IF(I1.EQ.3)GDELS=FSORS(GDEL,I10,1)
      A6=1.
      IF(I1.NE.1.OR.NBES.EQ.0)GO TO 10
      IF(I6.EQ.2)A6=1./30.
      IF(I6.EQ.3)A6=1./160.
      IF(I6.EQ.4)A6=1./400.
      IF(IS.EQ.0.OR.ISPC(7).EQ.1)A6=A6*4.
      IF(I6.EQ.1)A6=1.
      GO TO 20
   10 IF(I1.EQ.2)A6=FACTS(GDEL,I9,3)
      IF(I1.EQ.3)A6=FSORS(GDEL,I10,3)
   20 FRW=1.15E-4*POPW*1.8E+3*0.25*EMP(IE)*A6
      FEW=1.15E-4*POPW*VOLUME/(EMP(IE)*EFF*SEF)
      A2=1.
      IF(I1.EQ.3)A2=SORDEN
      IF(I1.EQ.2.AND.GREC.LT.GDELA)GO TO 50
      IF(I1.EQ.3.AND.GREC.LT.GDELS)GO TO 50
```

```
C DO INTRUDER-WATER SCENARIO FIRST
      DO 40 INUC=1,100
      CALL CHNS(INUC,GREC)
      CALL CALE(INUC)
      B3=FRW*A2*Z7(10)
      IF(B3.GT.1.E-20)DMY(INUC,16)=DLC/B3
   40 CONTINUE
   50 IF(I1.EQ.2.AND.GERO.LT.GDELA)GERO=GDELA
      IF(I1.EQ.3.AND.GERO.LT.GDELS)GERO=GDELS
C DO EROSION-WATER SCENARIO NEXT
      DO 70 INUC=1,100
      CALL CHNS(INUC,GERO)
      CALL CALE(INUC)
      B3=FEW*A2*Z7(10)
      IF(B3.GT.1.E-20)DMY(INUC,17)=DLC/B3
   70 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE OVRFLO(DLC)
C-----------------------------------------------------------------
C OVRFLO CALCULATES LIMITS ASSOCIATED WITH TWO LEACHATE ACCUMULATION
C SCENARIOS: OPERATIONAL RELEASES TO SURFACE WATERS AND OVERFLOW.
C-----------------------------------------------------------------
$INCLUDE:'INVCOM.FOR'
      GDEL=ICLS+IOBS
      I9=ISPC(9)
      I10=ISPC(10)
      I1=1
      IF(I9.GT.0)I1=2
      IF(I10.GT.0)I1=3
      IF(I1.EQ.2)GDELA=FACTS(GDEL,I9,1)
      IF(I1.EQ.3)GDELS=FSORS(GDEL,I10,1)
      IF(I1.EQ.2.AND.GDEL.LT.GDELA)RETURN
      IF(I1.EQ.3.AND.GDEL.LT.GDELS)RETURN
      A6=1.
      IF(I1.NE.1.OR.NBES.EQ.0)GO TO 10
      IF(I6.EQ.2)A6=1./30.
      IF(I6.EQ.3)A6=1./160.
      IF(I6.EQ.4)A6=1./400.
      IF(IS.EQ.0.OR.ISPC(7).EQ.1)A6=A6*4.
      IF(I6.EQ.1)A6=1.
      GO TO 20
   10 IF(I1.EQ.2)A6=FACTS(GDEL,I9,3)
      IF(I1.EQ.3)A6=FSORS(GDEL,I10,3)
   20 VL=PRC(1)*VOLUME/(EMP(IE)*EFF)
      A4=A6*VL/4.5E6
      DO 40 INUC=1,100
      A7=1.
      A1=ILFE*(1.-EXM(AL(INUC)))
```

```
      IF(A1.GT.1.E-20)A7=(1.-EXM(AL(INUC)*ILFE))/A1
      A5=A4*A7*FMF(INUC)
      A6=A5*EXM(AL(INUC)*GDEL)
      A2=A5*TSC(2)*PDCF(INUC,10,7)
      IF(A2.NE.0.)DMY(INUC,18)=DLC/A2
      A2=A6*PDCF(INUC,10,7)
      IF(A2.NE.0.)DMY(INUC,19)=DLC/A2
   40 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE GWATER(DLC,TYMD)
C-----------------------------------------------------------------------
C GWATER CALCULATES LIMITS ASSOCIATED WITH FOUR GROUNDWATER SCENARIOS:
C INTRUDER-WELL, BOUNDARY-WELL, POPULATION-WELL, AND SURFACE WATER.
C INCREASED INFILTRATION AFTER ICLS+IOBS+IINS YEARS IS ASSUMED TO TAKE
C PLACE IF NOPT=1; IF NOPT=0, THIS OPTION IS NOT EXERCISED.
C-----------------------------------------------------------------------
$INCLUDE:'INVCOM.FOR'
      DIMENSION RES(16,4),TYMD(16),DMYD(16,4)
      DATA NOPT/1/,NSEC/10/
      I6=ISPC(6)
      I9=ISPC(9)
      I10=ISPC(10)
      I1=1
      IF(I9.GT.0)I1=2
      IF(I10.GT.0)I1=3
      GINS=ICLS+IOBS+IINS
C GDEL=300 YEARS FOR HICS AND APPROPRIATE DELAY TIME FOR SOURCES.
      GDEL=ICLS+IOBS
      IF(ISPC(8).EQ.3)GDEL=300.
C PERCOLATION SECTION WHICH CALCULATES PERCOLATION UNDER TWO CASES:
C PERC - NORMAL CASE, AND PERC2 - INCLUDES INTRUDER DISTURBED SURFACE
      PRC1=PRC(1)*TSC(1)
      PRC2=PRC(2)*TSC(2)
      IF(IB.GT.1)PRC1=0.1*PRC1
      IF(IB.GT.1)PRC2=0.1*PRC2
      IF(IC.NE.2)PERC=PRC1
      IF(IC.EQ.2)PERC=PRC2
      IF(IU.NE.1.OR.IX.EQ.3)GO TO 10
      IF(IX.EQ.1)PERC=4.*PRC1
      IF(IC.NE.2.AND.IX.EQ.2)PERC=2.25*PRC1
      IF(IC.EQ.2.AND.IX.EQ.2)PERC=4.*PRC2
   10 NX=0
      IF(PERC.LT.PRC1)NX=1
      PERC2=3.6*PERC+0.1*PRC1
C DILUTION VOLUME UPPER LIMIT
      TVOL=VOLUME*PRC(1)/(EMP(IE)*EFF)
      IF(TVOL.LT.7700.)TVOL=7700.
C LEACHABILITY MODIFIERS
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      A6=1.
      IF(I1.NE.1.OR.NBES.EQ.0)GO TO 15
      IF(I6.EQ.2)A6=1./30.
      IF(I6.EQ.3)A6=1./160.
      IF(I6.EQ.4)A6=1./400.
      IF(IS.EQ.0.OR.ISPC(7).EQ.1)A6=A6*4.
      IF(I6.EQ.1)A6=1.
      GO TO 20
   15 IF(I1.EQ.2)A6=FACTS(GDEL,I9,3)
      IF(I1.EQ.3)A6=FSORS(GDEL,I10,3)
C SURFACE WATER SCENARIO IS NOT CONSIDERED FOR WESTERN REGION (IR=4).
   20 NPTH=4
      IF(IR.EQ.4)NPTH=3
      I2=NRET
      IF(IS.EQ.0.OR.ISPC(7).EQ.1)I2=I2-1
      IF(I2.LE.0)I2=1
      TDUM=EMP(IE)*EFF*SEF/(PERC*A6)
C RADIONUCLIDE LOOP IS THE OUTER LOOP
      DO 80 INUC=1,100
      TDUR=TDUM/FMF(INUC)
      IF(I1.EQ.2)TDUR=TDUM
C FIRST SECTION (UP TO STATEMENT 50) CONSIDERS NORMAL RELEASES
      C1=TDUR
      IF(NX.EQ.0.OR.NOPT.EQ.0)GO TO 40
      IF(C1.LT.GINS)C1=GINS
   40 CALL RTIJ(RES,GDEL,C1,0.,TYMD,INUC,NPTH,I2)
      B1=EXM(AL(INUC)*RET(INUC,I2)*UTTM)*VOLUME/TDUR
      DO 50 IPTH=1,NPTH
      B2=B1/(QFC(IPTH)*NSEC)
      IF(TVOL.GT.QFC(IPTH))B2=B2*QFC(IPTH)/TVOL
      I3=6
      IF(IPTH.EQ.4)I3=7
      DO 45 ITYM=1,16
      A3=EXM(AL(INUC)*TYMD(ITYM))*RES(ITYM,IPTH)
      DMYD(ITYM,IPTH)=A3*B2*PDCF(INUC,10,I3)
   45 CONTINUE
   50 CONTINUE
      IF(NX.EQ.0.OR.TDUR.LT.GINS.OR.NOPT.EQ.0)GO TO 65
C THIS SECTION (UP TO STATEMENT 60) CONSIDERS INCREASED RELEASES
      T1=GINS
      T2=T1+PERC*(TDUR-T1)/PERC2
      CALL RTIJ(RES,GDEL,T2,T1,TYMD,INUC,NPTH,I2)
      B1=B1*PERC2/PERC
      DO 60 IPTH=1,NPTH
      B2=B1/(QFC(IPTH)*NSEC)
      IF(TVOL.GT.QFC(IPTH))B2=B2*QFC(IPTH)/TVOL
      I3=6
      IF(IPTH.EQ.4)I3=7
      DO 55 ITYM=1,16
      A3=EXM(AL(INUC)*TYMD(ITYM))*RES(ITYM,IPTH)
```

```
   55 DMYD(ITYM,IPTH)=DMYD(ITYM,IPTH)+A3*B2*PDCF(INUC,10,I3)
   60 CONTINUE
C THIS SECTION SELECTS THE HIGHEST CALCULATED DOSE, AND OBTAINS LIMITS
   65 DO 75 IPTH=1,NPTH
      A6=0.
      DO 70 ITYM=1,16
      IF(A6.LT.DMYD(ITYM,IPTH))A6=DMYD(ITYM,IPTH)
   70 CONTINUE
      IF(A6.GT.1.E-20)DMY(INUC,19+IPTH)=DLC/A6
   75 CONTINUE
   80 CONTINUE
      RETURN
      END
C----------------------------------------------------------------------
      SUBROUTINE RTIJ(RES,GDEL,TDUR,TMIN,TYMD,INUC,NPTH,I1)
C----------------------------------------------------------------------
C RTIJ CALCULATES R-SUB-TIJ FOR GIVEN PARAMETERS
C----------------------------------------------------------------------
      COMMON/ENVG/PTQ(8),UTTM,DTTM,DTPC,TTM(4),TPC(4)
     +       /NUCS/AL(100),FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
      DIMENSION RES(16,4),TYMD(16)
      CALL ZERO(RES,4*16)
      DO 30 IPTH=1,NPTH
      A1=RET(INUC,I1)*TTM(IPTH)+GDEL
      DO 20 ITYM=1,16
      TYM=TYMD(ITYM)-TMIN
      A2=TYMD(ITYM)-TDUR
      DO 10 ISEC=1,10
      B3=1.0/(A1+RET(INUC,I1)*(ISEC-1)*DTTM)
      IF(TYM*1.1*B3.LT.1.0) GO TO 20
      B4=TPC(IPTH)+(ISEC-1)*DTPC
      A3=0.5*ERFS(B3*TYM,B4)
      IF(A2.GT.0.0)A3=A3-0.5*ERFS(B3*A2,B4)
      IF(A3.LT.0.0)A3=0.0
   10 RES(ITYM,IPTH)=RES(ITYM,IPTH)+A3
   20 CONTINUE
   30 CONTINUE
      RETURN
      END
C----------------------------------------------------------------------
      SUBROUTINE CHNS(INUC,GDEL)
C----------------------------------------------------------------------
C CHNS CALCULATES THE DAUGHTER PRODUCTS OF INUC AND STORES THEM IN ACT
C----------------------------------------------------------------------
      COMMON/CHYN/ICH(8,57),LCH(57),ACT(8)
     +       /NUCS/AL(100),FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
      REAL*8 Y,Z,DACT(8),HLM(8),EHLM(8)
      CALL ZERO(ACT,8)
      IF(INUC.GT.43)GO TO 10
      ACT(1)=EXM(AL(INUC)*GDEL)
```

```
      RETURN
   10 NCH=INUC-43
      IEN=LCH(NCH)
      DO 20 I=1,IEN
      J=ICH(I,NCH)
      HLM(I)=AL(J)
      Y=HLM(I)*GDEL
      Z=0.
      IF(Y.LT.85.)Z=DEXP(-Y)
   20 EHLM(I)=Z
      DACT(1)=EHLM(1)
      DO 60 I=2,IEN
      Y=1.0
      DO 30 J=2,I
   30 Y=Y*HLM(J)
      DACT(I)=0.
      DO 50 K=1,I
      Z=EHLM(K)
      DO 40 J=1,I
      IF(K.NE.J)Z=Z/(HLM(J)-HLM(K))
   40 CONTINUE
      DACT(I)=DACT(I)+Z
   50 CONTINUE
      DACT(I)=DACT(I)*Y
      IF(DACT(I).LT.0.)DACT(I)=0.
   60 CONTINUE
      DO 70 I=1,IEN
   70 ACT(I)=DACT(I)
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE CALI(INUC)
C-----------------------------------------------------------------
C CALI CALCULATES PDCF'S WEIGHTED WITH DAUGHTERS FOR INTINV
C-----------------------------------------------------------------
      COMMON/CALS/C2(10),C3(10),C4(10),C5(10),C8(10)
     +       /DCFS/PDCF(100,10,8)/CHYN/ICH(8,57),LCH(57),ACT(8)
     +       /NUCS/AL(100),FMF(100),UWT(100,2),RET(100,5),FRACT(100.3)
      IF(INUC.GT.43)GO TO 20
      A1=ACT(1)
      DO 10 IP=1,10
      C2(IP)=A1*PDCF(INUC,IP,2)
      C3(IP)=A1*PDCF(INUC,IP,3)
      C4(IP)=A1*PDCF(INUC,IP,4)*FMF(INUC)
      C5(IP)=A1*PDCF(INUC,IP,5)
   10 C8(IP)=A1*PDCF(INUC,IP,8)
      RETURN
   20 NCH=INUC-43
      IEN=LCH(NCH)
      CALL ZERO(C2,50)
```

```
      DO 40 I=1,IEN
      NN=ICH(I,NCH)
      DO 30 IP=1,10
      C2(IP)=C2(IP)+ACT(I)*PDCF(NN,IP,2)
      C3(IP)=C3(IP)+ACT(I)*PDCF(NN,IP,3)
      C4(IP)=C4(IP)+ACT(I)*PDCF(NN,IP,4)*FMF(NN)
      C5(IP)=C5(IP)+ACT(I)*PDCF(NN,IP,5)
   30 C8(IP)=C8(IP)+ACT(I)*PDCF(NN,IP,8)
   40 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE CALE(INUC)
C-----------------------------------------------------------------------
C CALE CALCULATES PDCF'S WEIGHTED WITH DAUGHTERS FOR EXPWAS
C-----------------------------------------------------------------------
      COMMON/DCFS/PDCF(100,10,8)/CHYN/ICH(8,57),LCH(57),ACT(8)
     +      /CALS/C3(10),C7(40)
      IF(INUC.GT.43)GO TO 20
      A1=ACT(1)
      DO 10 IP=1,10
      C3(IP)=A1*PDCF(INUC,IP,3)
   10 C7(IP)=A1*PDCF(INUC,IP,7)
      RETURN
   20 NCH=INUC-43
      IEN=LCH(NCH)
      CALL ZERO(C3,20)
      DO 40 I=1,IEN
      NN=ICH(I,NCH)
      DO 30 IP=1,10
      C3(IP)=C3(IP)+ACT(I)*PDCF(NN,IP,3)
   30 C7(IP)=C7(IP)+ACT(I)*PDCF(NN,IP,7)
   40 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      FUNCTION FUWT(EN,II)
C-----------------------------------------------------------------------
C FUWT CALCULATES THE RADIONUCLIDE-SPECIFIC GAMMA ATTENUATION
C COEFFICIENTS (CM**2/G) FOR WATER (II=1) AND SOIL (II=2).
C-----------------------------------------------------------------------
      DIMENSION ENE(17),UWT(17,2)
      DATA ENE/.01,.015,.02,.03,.04,.06,.08,.1,.15,.2,.3,.4,.6,.8,1.,1.5
     * ,2./,UWT/5.18,1.58,.775,.370,.267,.206,.184,.171,.151,.137,.119,
     * .106,.0896,.0786,.0707,.0575,.0494,19.0,5.73,2.49,.859,.463,.252,
     * .194,.169,.140,.126,.108,.0959,.0808,.0707,.0636,.0518,.0447/
      DO 10 I=1,17
      IF(EN.LT.ENE(I))GO TO 20
   10 CONTINUE
      I=18
```

```
   20 IF(I.NE.1)GO TO 30
      A1=(UWT(2,II)-UWT(1,II))/(ENE(2)-ENE(1))
      FUWT=UWT(1,II)+A1*(EN-ENE(1))
      RETURN
   30 IF(I.GT.17)GO TO 40
      A1=(UWT(I,II)-UWT(I-1,II))/(ENE(I)-ENE(I-1))
      FUWT=UWT(I-1,II)+A1*(EN-ENE(I-1))
      RETURN
   40 A1=(UWT(17,II)-UWT(16,II))/(ENE(17)-ENE(16))
      FUWT=UWT(17,II)-A1*(ENE(17)-EN)
      RETURN
      END
C
      FUNCTION FACTS(GDEL,II,NX)
C----------------------------------------------------------------------
C FACTS (AND FSORS THAT FOLLOWS) RETURN WASTE STREAM SPECIFIC PATHWAY
C "REDUCTION" FACTORS FOR ACTIVATED METAL (AND SOURCE) WASTE STREAMS
C----------------------------------------------------------------------
      COMMON/ACTS/FAC,FAD,FAW,FAG
      A1=GDEL/FAC
      IF(A1.GT.1.)A1=1.
      IF(NX.EQ.1)A2=FAC
      IF(NX.EQ.2)A2=FAD*A1
      IF(NX.EQ.3)A2=FAW*A1
      IF(NX.EQ.4)A2=FAG+A1*(1.-FAG)
      FACTS=A2
      RETURN
      END
C
      FUNCTION FSORS(GDEL,II,NX)
      COMMON/SORS/FSS,FSD,FSW,FSG
      A1=GDEL/FSS
      IF(A1.GT.1.)A1=1.
      IF(NX.EQ.1)A2=FSS
      IF(NX.EQ.2)A2=FSD
      IF(NX.EQ.3)A2=FSW
      IF(NX.EQ.4)A2=FSG+A1*(1.-FSG)
      FSORS=A2
      RETURN
      END
C
      SUBROUTINE ZERO(A,N)
      DIMENSION A(N)
      DO 10 I=1,N
   10 A(I)=0.
      RETURN
      END
C
      FUNCTION ERFS(A1,A2)
      A3=0.5*SQRT(A2/A1)
```

```
      A4=A3*(1.-A1)
      A5=A3*(1.+A1)
      IF(A4.GT.0)GO TO 10
      ERFS=2.+EXM(A4*A4)*(POLY(A5)-POLY(-A4))
      RETURN
   10 ERFS=EXM(A4*A4)*(POLY(A4)+POLY(A5))
      RETURN
      END
C
      FUNCTION POLY(X1)
      DATA A1,A2,A3,A4,A5,P/.254829592,-.284496736,1.421413741,
     *                      -1.453152027,1.061405429,.3275911/
      T1=1./(1.+P*X1)
      POLY=T1*(A1+T1*(A2+T1*(A3+T1*(A4+T1*A5))))
      RETURN
      END
C
      FUNCTION EXM(A1)
      A2=0.0
      IF(A1.LT.85.)A2=EXP(-A1)
      EXM=A2
      RETURN
      END
```

B.4 CLASIFY Code

```
      PROGRAM CLASIFY
C---------------------------------------------------------------------
C THIS PROGRAM CLASSIFIES WASTE STREAMS CONTAINED IN WASCAR.DAT
C ACCORDING TO FIGURE 2.2 OF VOLUME 2 OF NUREG/CR-4370.  IT USES
C THE FOLLOWING FILES:
C
C   (1) CLACON.DAT - INPUT COMMAND FILE
C   (2) WASCAR.DAT - WASTE STREAM CONCENTRATIONS OR ACTIVITIES,
C                    DISTRIBUTIONS (IF ANY), AND WASTE SPECTRA
C   (3) LIMITS.DAT - RADIONUCLIDE CLASSIFICATION LIMITS
C   (4) CLASIFY.OUT- SUMMARY PRINTOUT FOR USERS
C   (5) CLAOUT.DAT - CLASSIFIED WASTE STREAM DATA (OUTPUT OF CLASIFY)
C
C ITS RESULTS ARE OUTPUT INTO CLAOUT.DAT AND CLASIFY.OUT. THESE FILES
C ARE RECREATED FOR EACH NEW RUN. THUS, THERE MUST NOT BE FILES WITH
C THESE NAMES AT THE TIME OF PROGRAM EXECUTION.
C
C THE PROGRAM IS WRITTEN FOR AN IBM PERSONAL COMPUTER OR A COMPATIBLE
C COMPUTER SUCH AS COMPAQ. THE PROGRAM IS COMPILED AND EXECUTED USING
C MICROSOFT FORTRAN77 VERSION 3.30.
C
C AUTHORS AND COGNIZANT INDIVIDUALS ARE:
C
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C ENVIROSPHERE COMPANY, TWO WORLD TRADE CENTER, NY, NY, 10048
C
C G. W. ROLES     - (301) 427-4791
C USNRC, 7915 EASTERN AVE, SILVER SPRING, MD 20910
C---------------------------------------------------------------------
$DEBUG
$NOFLOATCALLS
      CHARACTER NOTE*30,CLAS*1
$INCLUDE:'CLACOM.FOR'
      DIMENSION CLAS(4),IORDD(5),NORDD(5)
      DATA CLAS/'A','B','C','D'/
  101 FORMAT(A30)
  102 FORMAT(25I3)
  103 FORMAT(8E10.3)
  201 FORMAT(1H1/2X'PROBLEM SUMMARY FOR 'A30/2X,5I3)
  202 FORMAT(//4X'CLASS 'A1' WASTE WITH IRDC ='I2//4X'NAME'6X'VOLUME  '
     .'DENSITY   STR MOD DXS SPC'8X'ISPC INDICES'/2X,79('-'))
  203 FORMAT(2X,A10,1P,E9.2,3I5)
  204 FORMAT(//4X'UNACCEPTABLE WASTE STREAMS'//4X'NAME'6X'VOLUME  '
     .'DENSITY   STR MOD DXS SPC'8X'ISPC INDICES'/2X,79('-'))
  205 FORMAT(A10,I7,2I5,I3,8I2/10X,1P,5E10.3)
C OPEN AND READ THE CONTROL FILE CLACON.DAT
      OPEN(5,FILE='CLACON.DAT')
      READ(5,101) NOTE
      READ(5,102) NSTR,NLST,NNDX,NHIC,NORD,NBRN
      READ(5,102) (IRDC(I),I=1,4)
```

CLASIFY

```
C IRDC = 0 - EXCLUDE WASTE CLASS; 1 - DISPOSAL TECHNOLOGY (DT) CANNOT
C BE COUNTED ON TO STABILIZE WASTE; 2 - DT CAN STABILIZE WASTE
      READ(5,102) (IORDD(I),I=1,5)
C LIMITS.DAT AND WASCAR.DAT ARE READ USING THE READS SUBROUTINE
      CALL READS
C INITIALIZE PARAMETERS
      DO 12 I=1,NSTR
      ISPEC(I)=1
      IHIC(I)=0
      DO 12 J=1,5
   12 IORD(J,I)=IORDD(J)
C THIS SECTION FOR OVERRIDE INFORMATION
      IF(NLST.NE.0)READ(5,103) (CLST(4,J),J=1,100),(CLST(8,J),J=1,100)
      IF(NNDX.EQ.0)GO TO 16
      DO 14 I=1,NNDX
      READ(5,102) J,K
   14 NDXS(J)=K
   16 IF(NHIC.EQ.0)GO TO 20
      DO 18 I=1,NHIC
      READ(5,102) J,K
   18 IHIC(J)=K
   20 IF(NORD.EQ.0)GO TO 26
      DO 24 I=1,NORD
      READ(5,102) K,(NORDD(J),J=1,5)
      DO 22 J=1,5
   22 IORD(J,K)=NORDD(J)
   24 CONTINUE
C END OF OVERRIDE INFORMATION, CLOSE CLACON.DAT
   26 CLOSE (5)
      DO 28 ISTR=1,NSTR
      DO 28 J=1,5
      IF(IHIC(ISTR).NE.0)ISPC(J,ISTR,8)=3
   28 CONTINUE
      OPEN(8,FILE='CLAOUT.DAT',STATUS='NEW')
C BEGINNING OF THE MAIN CLASSIFY LOOP
      ISTR=0
   30 ISTR=ISTR+1
      IF(ISTR.GT.NSTR) GO TO 32
      CALL CLASSF(ISTR)
      IF(IMOD(ISTR).EQ.0)GO TO 30
      IDR=ISPEC(ISTR)
      ISP=IORD(IDR,ISTR)
      WRITE(8,205) BASN(ISTR),(ISPC(ISP,ISTR,J),J=1,10),NDXS(ISTR),
     *              IMOD(ISTR),DEN(ISP,ISTR),(BAS(ISTR,J),J=1,4)
      CALL CLARAD(ISTR)
      GO TO 30
C END OF THE MAIN LOOP
   32 CLOSE (8)
C PREPARE SUMMARY TABLE
      OPEN(6,FILE='CLASIFY.OUT',STATUS='NEW')
```

```
      WRITE(6,201) NOTE,IORDD
      DO 36 IRDCI=1,4
      WRITE(6,202) CLAS(IRDCI),IRDC(IRDCI)
      IF(IRDC(IRDCI).EQ.0)GO TO 36
      DO 34 ISTR=1,NSTR
      I1=(1+IMOD(ISTR))/2
      IF(I1.EQ.IRDCI)CALL WRT(6,ISTR)
   34 CONTINUE
   36 CONTINUE
      WRITE(6,204)
      DO 38 ISTR=1,NSTR
      IF(IMOD(ISTR).EQ.0)CALL WRT(6,ISTR)
   38 CONTINUE
      CLOSE (6)
      STOP
      END
C-------------------------------------------------------------------
      SUBROUTINE READS
C-------------------------------------------------------------------
C READS INPUTS DATA FROM THE LIMITS.DAT AND WASCAR.DAT FILES AND
C RENORMALIZES CONCENTRATIONS OR ACTIVITIES (AS APPLICABLE)
C AS PER DISTRIBUTIONS (IF NECESSARY)
C-------------------------------------------------------------------
      CHARACTER NUCD*8,TST*1
$INCLUDE:'CLACOM.FOR'
      DIMENSION NUCD(4),COND(4),ISD(5)
  101 FORMAT(A8,E9.2,I2,8E8.1)
  102 FORMAT(A10,2I4,E9.2)
  103 FORMAT(10X,I7,2I6,I3,6I2,E9.2)
  104 FORMAT(7X,4(1X,A8,E9.2),A1)
  105 FORMAT(7X,8E9.2)
      OPEN(1,FILE='LIMITS.DAT')
      DO 10 I=1,100
   10 READ(1,101) NUC(I),AL(I),NCLX(I),(CLST(J,I),J=1,8)
      CLOSE (1)
C NDXS : 0 - DO NOT INCLUDE; 1 - NORMAL WASTE STREAM; 2 - CAN BE
C          STABILIZED THROUGH DISPOSAL TECHNOLOGY. NEGATIVES DENOTE
C          SPECIAL CLASSIFICATION SCHEME (NBRN) CAN BE CONSIDERED
C          FOR THE WASTE STREAM
C NDST - DISTRIBUTION NUMBER
C BAS1 - VOLUME - 1.0 M3; BAS2 = NDST (IF ANY) ; BAS3 - NOT USED
C BAS4 - TOTAL NET CONCENTRATION (CI/M**3) OR ACTIVITY (CI)
      DO 15 I=1,NSTR
      BAS(I,1)=1.
      DO 15 J=2,104
   15 BAS(I,J)=0.
      OPEN(1,FILE='WASCAR.DAT')
      ISTR=0
      ICOUNT=0
   25 ISTR=ISTR+1
```

```
      IF(ISTR.GT.NSTR)STOP 'TOO MANY WASTE STREAMS'
      READ(1,102,END=60) BASN(ISTR),NDXS(ISTR),NDST,BAS(ISTR,4)
      READ(1,103) ((ISPC(K,ISTR,J),J=1,10),DEN(K,ISTR),K=1,5)
C THIS SECTION IS FOR DISTRIBUTIONS
      IF(NDST.EQ.0)GO TO 40
      ICOUNT=ICOUNT+1
      IF(ICOUNT.GT.80)STOP 'DISTRIBUTION NUMBER EXCEEDS DIMENSION'
      BAS(ISTR,2)=ICOUNT
      READ(1,105) ((DIST(K,I,ICOUNT),I=1,16),K=1,3)
C START READING THE RADIONUCLIDES AND CONCENTRATIONS
   40 READ(1,104) (NUCD(I),COND(I),I=1,4),TST
      DO 55 J=1,4
      IF(NUCD(J).EQ.' ')GO TO 25
      DO 45 I=1,100
      IF(NUCD(J).EQ.NUC(I))GO TO 50
   45 CONTINUE
      STOP 'CANNOT FIND NUCLIDE IN READS'
   50 BAS(ISTR,4+I)=COND(J)
   55 CONTINUE
      IF(TST.EQ.'$')GO TO 25
      GO TO 40
   60 NSTR=ISTR-1
      CLOSE (1)
C CALCULATE NET CONCENTRATIONS OR ACTIVITIES (A1), STORE THEM IN BAS4,
C AND MODIFY DISTRIBUTIONS (IF ANY) TO CONFORM TO NET CONCENTRATIONS
C OR ACTIVITIES.
      DO 80 ISTR=1,NSTR
      A1=0.
      DO 70 I=5,104
   70 A1=A1+BAS(ISTR,I)
      BAS(ISTR,4)=A1
      IJK=BAS(ISTR,2)+0.1
      IF(IJK.EQ.0)GO TO 80
      A2=A1/DIST(3,16,IJK)
      DO 75 I=1,16
      DIST(1,I,IJK)=DIST(1,I,IJK)*A2
   75 DIST(3,I,IJK)=DIST(3,I,IJK)*A2
   80 CONTINUE
      RETURN
      END
C-------------------------------------------------------------------
      SUBROUTINE CLASSF(ISTR)
C-------------------------------------------------------------------
C THIS IS THE MAIN SUBROUTINE OF THE CLASIFY PROGRAM
C-------------------------------------------------------------------
$INCLUDE:'CLACOM.FOR'
      IF(NDXS(ISTR).EQ.0)GO TO 60
      IDR=1
      ISP=IORD(IDR,ISTR)
      NSTRB=NSTR
```

```
      CALL JUGLEF(ISTR,IDR)
C TEST FOR CLASSES A, B, AND C
   10 ISP=IORD(IDR,ISTR)
      I8=ISPC(ISP,ISTR,8)
      CALL LISTS(ISTR,IDR,1,NX)
      IF(NX.EQ.1)GO TO 21
      IF(I8.GT.1)GO TO 20
C UNSTABLE WASTE SECTION
      IF(IABS(NDXS(ISTR)).NE.2) GO TO 29
      IF(IRDC(2).EQ.2)CALL LISTS(ISTR,IDR,2,NX)
      IF(NX.EQ.1)GO TO 23
      IF(IRDC(3).EQ.2)CALL LISTS(ISTR,IDR,3,NX)
      IF(NX) 29,29,25
C STABLE WASTE SECTION
   20 IF(IRDC(2).NE.0)CALL LISTS(ISTR,IDR,2,NX)
      IF(NX.EQ.1)GO TO 24
      IF(IRDC(3).NE.0)CALL LISTS(ISTR,IDR,3,NX)
      IF(NX) 29,29,26
C WASTE CLASSIFICATION SECTION; SETS IMOD INDEX
   21 IMOD(ISTR)=1
      IF(I8.GT.1)IMOD(ISTR)=2
      GO TO 30
   23 IMOD(ISTR)=3
      GO TO 30
   24 IMOD(ISTR)=4
      GO TO 30
   25 IMOD(ISTR)=5
      GO TO 30
   26 IMOD(ISTR)=6
      GO TO 30
   29 IF(IDR.EQ.5) GO TO 40
C IF IDR IS NOT 5, UNDO THE LAST SPECTRUM, DO THE NEW SPECTRUM
      CALL JUGLEB(ISTR,IDR)
      IDR=IDR+1
      CALL JUGLEF(ISTR,IDR)
      GO TO 10
C UNDO SPECTRUM OF ANY NEW WASTE STREAM
   30 IF(NSTR.NE.NSTRB)CALL JUGLEB(NSTR,IDR)
      ISPEC(ISTR)=IDR
      RETURN
C CLASS D SECTION, UNDO THE LAST SPECTRUM, DO THE FIRST SPECTRUM
   40 CALL JUGLEB(ISTR,IDR)
      IDR=1
      CALL JUGLEF(ISTR,IDR)
   42 ISP=IORD(IDR,ISTR)
      I8=ISPC(ISP,ISTR,8)
      IF(I8.GT.1)GO TO 44
      IF(IABS(NDXS(ISTR)).NE.2) GO TO 49
      IF(IRDC(4).EQ.2)CALL LISTS(ISTR,IDR,4,NX)
      IF(NX) 49,49,47
```

```
   44 IF(IRDC(4).NE.0)CALL LISTS(ISTR,IDR,4,NX)
      IF(NX) 49,49,48
   47 IMOD(ISTR)=7
      GO TO 50
   48 IMOD(ISTR)=8
      GO TO 50
   49 IF(IDR.EQ.5)GO TO 60
C IF IDR IS NOT 5, UNDO THE LAST SPECTRUM, DO THE NEW SPECTRUM
      CALL JUGLEB(ISTR,IDR)
      IDR=IDR+1
      CALL JUGLEF(ISTR,IDR)
      GO TO 42
   50 IF(NSTR.NE.NSTRB)CALL JUGLEB(NSTR,IDR)
      ISPEC(ISTR)=IDR
      RETURN
   60 IMOD(ISTR)=0
      ISPEC(ISTR)=IDR
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE LISTS(ISTR,IDR,NQ,NX)
C-----------------------------------------------------------------------
C BASED ON THE DECISION INDEX NQ (1 - CLASS A, 2 - CLASS B, 3 - CLASS
C C, 4 - CLASS D), LISTS OBTAINS THE APPLICABLE SUMS-OF-FRACTIONS FOR
C THE C WASTE STREAM, ISTR, WASTE SPECTRUM ORDER, IDR.  IT RETURNS THE
C NX INDEX SIGNIFYING WHETHER THE WASTE STREAM IS ACCEPTABLE (NX=1),
C OR NOT ACCEPTABLE (NX=0).
C-----------------------------------------------------------------------
$INCLUDE:'CLACOM.FOR'
      NX=0
      INDEX=0
      ISP=IORD(IDR,ISTR)
      I9=ISPC(ISP,ISTR,9)
      I10=ISPC(ISP,ISTR,10)
      DENS=DEN(ISP,ISTR)
      IF(NBRN.NE.0.AND.NQ.EQ.1.AND.NDXS(ISTR).LT.0.AND.I10.EQ.0)INDEX=1
      NQQ=NQ
C NQQ IS MODIFIED (4 IS ADDED) IF IT IS A SOURCE WASTE STREAM.
      IF(I10.EQ.0)GO TO 10
      DENS=1.
      NQQ=NQ+4
C OBTAIN SUMS FOR TESTING; A1 AND A2 CONTAIN THE SUMS-OF-FRACTIONS FOR
C TABLE 1 AND TABLE 2 OF SECTION 61.55 OF 10 CFR PART 61, RESPECTIVELY.
   10 IF(INDEX.EQ.0)CALL SUMS(A1,A2,DENS,ISTR,NQQ,I9)
      IF(INDEX.EQ.1)CALL BARN(A1,A2,DENS,ISTR,NQQ)
      IJK=BAS(ISTR,2)+0.1
      IF(IJK.GT.0)GO TO 15
C IF THE WASTE STREAM IS NOT DISTRIBUTED, TEST IMMEDIATELY AND RETURN
      IF(A1.LE.1.0.AND.A2.LE.1.0)NX=1
      RETURN
```

```
C BEGINNING OF THE DISTRIBUTED WASTE STREAM SECTION
   15 IF(A1.LT.A2)A1=A2
      A2=BAS(ISTR,4)
      IF(A1.LE.0..OR.A2.LE.0.)STOP 'A1 OR A2 IS NEGATIVE OR ZERO'
      A3=A2/A1
      DO 20 I=2,16
      IF(A3.LT.DIST(1,I,IJK)) GO TO 25
   20 CONTINUE
C THERE IS NO LEFTOVER WASTE STREAM, I.E., THE ENTIRE WASTE STREAM
C VOLUME IS ACCEPTABLE IN THE CATEGORY BEING CONSIDERED.
      NX=1
      A1=1.
      A5=DIST(3,16,IJK)
      GO TO 45
   25 A4=(A3-DIST(1,I-1,IJK))/(DIST(1,I,IJK)-DIST(1,I-1,IJK))
      A1=DIST(2,I-1,IJK)+A4*(DIST(2,I,IJK)-DIST(2,I-1,IJK))
      IF(A1.LT.1.E-5) RETURN
      IF(A1.GT.0.9999) GO TO 40
      NSTR=NSTR+1
      BASN(NSTR)=BASN(ISTR)
      BAS(NSTR,1)=BAS(ISTR,1)*(1.-A1)
      DO 30 J=2,104
   30 BAS(NSTR,J)=BAS(ISTR,J)
      DO 35 K=1,5
      DEN(K,NSTR)=DEN(K,ISTR)
      IORD(K,NSTR)=IORD(K,ISTR)
      DO 35 J=1,10
   35 ISPC(K,NSTR,J)=ISPC(K,ISTR,J)
      ISPEC(NSTR)=IDR
      NDXS(NSTR)=NDXS(ISTR)
   40 A5=DIST(3,I-1,IJK)+A4*(DIST(3,I,IJK)-DIST(3,I-1,IJK))
   45 A6=A5*A1
      A7=A5/A2
      BAS(ISTR,1)=BAS(ISTR,1)*A1
      BAS(ISTR,4)=A5
      DO 50 J=5,104
   50 BAS(ISTR,J)=BAS(ISTR,J)*A7
      IF(NX.EQ.1)RETURN
C THERE IS A LEFTOVER WASTE STREAM; MODIFY DISTRIBUTIONS
      DO 55 J=I,16
      A7=DIST(2,J,IJK)*DIST(3,J,IJK)-A6
      A8=DIST(2,J,IJK)-A1
      DIST(2,J,IJK)=A8
   55 DIST(3,J,IJK)=A7/A8
      DO 60 J=2,I
      DIST(2,J-1,IJK)=0.
   60 DIST(3,J-1,IJK)=0.
      DIST(1,I-1,IJK)=A3
      DO 65 J=1,16
   65 DIST(2,J,IJK)=DIST(2,J,IJK)/DIST(2,16,IJK)
```

```
      NX=1
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE SUMS(A1,A2,DENS,ISTR,NQ,I9)
C-----------------------------------------------------------------------
C THIS ROUTINE PROVIDES SUMS-OF-FRACTIONS BASED ON 10 CFR PART 61;
C A1 AND A2 ARE THE SUMS-OF-FRACTIONS FOR TABLE 1 AND TABLE 2,
C RESPECTIVELY, OF SECTION 61.55.
C-----------------------------------------------------------------------
$INCLUDE:'CLACOM.FOR'
      A1=0.
      A2=0.
      DO 50 I=1,100
      IF(NCLX(I).EQ.0)GO TO 50
      A3=BAS(ISTR,I+4)/CLST(NQ,I)
      J=NCLX(I)+1
C I9 MUST BE NONZERO TO TAKE CREDIT FOR ACTIVATED METAL LIMITS
      IF(I9.EQ.0)GO TO 10
      IF(J.EQ.4.OR.J.EQ.6)A3=A3/10.
   10 GO TO (50,20,30,30,40,40,40),J
   20 A3=A3*1.E+3/DENS
   30 A1=A1+A3
      GO TO 50
   40 A2=A2+A3
   50 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE BARN(A1,A2,DENS,ISTR,NQ)
C-----------------------------------------------------------------------
C THIS SUBROUTINE RETURNS THE MAXIMUM RADIONUCLIDE CONCENTRATION (A2)
C WITHIN THE WASTE STREAM, ISTR. RADIONUCLIDES HAVING HALF-LIVES
C GREATER THEN 5 YEARS ARE IGNORED. DENS AND NQ ARE NOT USED.
C-----------------------------------------------------------------------
$INCLUDE:'CLACOM.FOR'
      A1=0.
      A2=0.
      DO 10 I=1,100
      IF(AL(I).LE.5.0)GO TO 10
      IF(A2.LT.BAS(ISTR,I+4))A2=BAS(ISTR,I+4)
   10 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE JUGLEF(ISTR,IDR)
C-----------------------------------------------------------------------
C JUGLEF CALCULATES MODIFIED CHARACTERISTICS OF THE WASTE STREAM,
C ISTR, FOR A NEW WASTE SPECTRUM GIVEN BY SPECTRUM ORDER, IDR, FROM
C THE CHARACTERISTICS OF THE AS-GENERATED WASTE.
```

```
C-----------------------------------------------------------------------
$INCLUDE:'CLACOM.FOR'
      DIMENSION DEC(2,2)
      DATA DEC/.9,.75,.9,.25/
C DO THE NEW SPECTRUM CHANGE
      ISP=IORD(IDR,ISTR)
      A1=ISPC(ISP,ISTR,2)
      A1=A1/ISPC(ISP,ISTR,3)
      BAS(ISTR,1)=BAS(ISTR,1)/A1
      DO 10 I=4,104
   10 BAS(ISTR,I)=BAS(ISTR,I)*A1
      IJK=BAS(ISTR,2)+0.1
      IF(IJK.EQ.0)GO TO 30
C MODIFY DISTRIBUTIONS (IF ANY)
      DO 20 I=1,16
      DIST(1,I,IJK)=DIST(1,I,IJK)*A1
   20 DIST(3,I,IJK)=DIST(3,I,IJK)*A1
   30 I=ISPC(ISP,ISTR,1)/10000
      J=I/10
      IP=I-J*10
      IF(IP.LT.5)RETURN
C ADJUST H-3 AND C-14 CONCENTRATIONS FOR INCINERATION LOSS
      J=2
      IF(IP.EQ.5)J=1
      A2=DEC(1,J)*BAS(ISTR,5)+DEC(2,J)*BAS(ISTR,6)
      BAS(ISTR,5)=(1.-DEC(1,J))*BAS(ISTR,5)
      BAS(ISTR,6)=(1.-DEC(2,J))*BAS(ISTR,6)
      A1=(BAS(ISTR,4)-A2)/BAS(ISTR,4)
      BAS(ISTR,4)=BAS(ISTR,4)*A1
      IJK=BAS(ISTR,2)+0.1
      IF(IJK.EQ.0)RETURN
      DO 40 I=1,16
      DIST(1,I,IJK)=DIST(1,I,IJK)*A1
   40 DIST(3,I,IJK)=DIST(3,I,IJK)*A1
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE JUGLEB(ISTR,IDR)
C-----------------------------------------------------------------------
C JUGLEB CALCULATES THE CHARACTERISTICS OF THE AS-GENERATED WASTE
C STREAM, I.E., IT UNDOES THE CALCULATIONS OF JUGLEF.
C-----------------------------------------------------------------------
$INCLUDE:'CLACOM.FOR'
      DIMENSION DEC(2,2)
      DATA DEC/.9,.75,.9,.25/
C UNDO THE LAST SPECTRUM CHANGE
      ISP=IORD(IDR,ISTR)
      A1=ISPC(ISP,ISTR,2)
      A1=A1/ISPC(ISP,ISTR,3)
      BAS(ISTR,1)=BAS(ISTR,1)*A1
```

```
      DO 10 I=3,104
   10 BAS(ISTR,I)=BAS(ISTR,I)/A1
      IJK=BAS(ISTR,2)+0.1
      IF(IJK.EQ.0)GO TO 30
C MODIFY DISTRIBUTIONS (IF ANY)
      DO 20 I=1,16
      DIST(1,I,IJK)=DIST(1,I,IJK)/A1
   20 DIST(3,I,IJK)=DIST(3,I,IJK)/A1
   30 I=ISPC(ISP,ISTR,1)/10000
      J=I/10
      IP=I-J*10
      IF(IP.LT.5)RETURN
C ADJUST H-3 AND C-14 CONCENTRATIONS FOR INCINERATION LOSS
      J=2
      IF(IP.EQ.5) J=1
      A2=BAS(ISTR,5)/(1./DEC(1,J)-1.)+BAS(ISTR,6)/(1./DEC(2,J)-1.)
      BAS(ISTR,5)=BAS(ISTR,5)/(1.-DEC(1,J))
      BAS(ISTR,6)=BAS(ISTR,6)/(1.-DEC(2,J))
      A1=(BAS(ISTR,4)+A2)/BAS(ISTR,4)
      BAS(ISTR,4)=BAS(ISTR,4)*A1
      IJK=BAS(ISTR,2)+0.1
      IF(IJK.EQ.0)RETURN
      DO 40 I=1,16
      DIST(1,I,IJK)=DIST(1,I,IJK)*A1
   40 DIST(3,I,IJK)=DIST(3,I,IJK)*A1
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE CLARAD(ISTR)
C-----------------------------------------------------------------------
C CLARAD WRITES CONCENTRATIONS OR ACTIVITIES OF THE CLASSIFIED
C WASTE STREAMS INTO THE CLAOUT.DAT FILE.
C-----------------------------------------------------------------------
      CHARACTER NUCD(4)*8
$INCLUDE:'CLACOM.FOR'
      DIMENSION COND(4)
      J1=0
      DO 10 K=5,104
      IF(BAS(ISTR,K).GT.1.E-20)J1=J1+1
   10 CONTINUE
      IF(J1.EQ.0)STOP 'WEIRD THINGS ARE GOING ON'
      J2=J1/4
      J3=J1-J2*4
      K=4
      IF(J2.EQ.0)GO TO 40
      J4=0
      J5=0
      DO 20 K=5,104
      IF(BAS(ISTR,K).LE.1.E-20)GO TO 20
      J4=J4+1
```

```
      NUCD(J4)=NUC(K-4)
      COND(J4)=BAS(ISTR,K)
      IF(J4.LT.4)GO TO 20
      J4=0
      J5=J5+1
      IF(J5.EQ.J2)GO TO 30
      WRITE(8,101) ISTR,(NUCD(I),COND(I),I=1,4)
   20 CONTINUE
      GO TO 40
   30 IF(J3.NE.0)WRITE(8,101) ISTR,(NUCD(I),COND(I),I=1,4)
      IF(J3.EQ.0)WRITE(8,102) ISTR,(NUCD(I),COND(I),I=1,4)
   40 IF(J3.EQ.0)RETURN
      I1=K+I
      J4=0
      DO 50 K=I1,104
      IF(BAS(ISTR,K).LE.1.E-20)GO TO 50
      J4=J4+1
      NUCD(J4)=NUC(K-4)
      COND(J4)=BAS(ISTR,K)
      IF(J4.EQ.4)STOP 'WEIRD THINGS ARE GOING ON HERE TOO'
   50 CONTINUE
      IF(J4.EQ.0)STOP 'WEIRD THINGS ARE GOING ON HERE AS WELL'
      IF(J4.EQ.1)WRITE(8,103) ISTR, NUCD(1),COND(1)
      IF(J4.EQ.2)WRITE(8,104) ISTR,(NUCD(I),COND(I),I=1,2)
      IF(J4.EQ.3)WRITE(8,105) ISTR,(NUCD(I),COND(I),I=1,3)
  101 FORMAT(I7,4(1X,A8,1PE9.2))
  102 FORMAT(I7,4(1X,A8,1PE9.2),'$')
  103 FORMAT(I7,1(1X,A8,1PE9.2),54X'$')
  104 FORMAT(I7,2(1X,A8,1PE9.2),36X'$')
  105 FORMAT(I7,3(1X,A8,1PE9.2),18X'$')
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE WRT(IFL,ISTR)
C-----------------------------------------------------------------
C THIS SUBROUTINE WRITES THE SUMMARY FILE INFORMATION FOR ISTR.
C-----------------------------------------------------------------
$INCLUDE:'CLACOM.FOR'
      IDR=ISPEC(ISTR)
      ISP=IORD(IDR,ISTR)
      WRITE(IFL,203) BASN(ISTR),BAS(ISTR,1),DEN(ISP,ISTR),ISTR,
     *      IMOD(ISTR),NDXS(ISTR),ISP,(ISPC(ISP,ISTR,J),J=1,10)
  203 FORMAT(2X,A10,1P,2E9.2,4I4,I8,2I5,I3,6I2)
      RETURN
      END
```

B.5 IMPACTS Code

```
      PROGRAM IMPACTS
C-----------------------------------------------------------------------
C THIS PROGRAM CALCULATES POST DISPOSAL IMPACTS USING THE UPDATED
C METHODOLOGY CONTAINED IN NUREG/CR-4370. IT USES THE FOLLOWING FILES:
C
C   (1) IMPCON.DAT - INPUT COMMAND FILE
C   (2) FUNDCF.DAT - FUNDAMENTAL DOSE CONVERSION FACTORS AND OTHER
C                    RADIONUCLIDE SPECIFIC INFORMATION.
C   (3) ENVIRO.DAT - ENVIRONMENTAL PARAMETERS
C   (4) INPUTS.DAT - WASTE STREAMS TO BE CONSIDERED
C   (5) CLAOUT.DAT - CLASSIFIED WASTE STREAM DATA (OUTPUT OF CLASIFY)
C   (6) DISTEC.DAT - DISPOSAL TECHNOLOGY INFORMATION
C   (7) LIMITS.DAT - RADIONUCLIDE LIMITS (AREA CONCENTRATIONS USED HERE)
C   (8) VOLUME.DAT - REGION SPECIFIC ANNUAL WASTE STREAM VOLUMES
C   (9) METALS.DAT - ACTIVATED METALS INFORMATION, AND
C  (10) SOURCE.DAT - SOURCE WASTE STREAM INFORMATION.
C
C ITS RESULTS ARE OUTPUT INTO A FILE CALLED IMPOUT.DAT.  THIS FILE IS
C RECREATED FOR EACH NEW RUN. THUS, THERE MUST NOT BE A FILE WITH
C THIS NAME AT THE TIME OF PROGRAM EXECUTION.
C
C THE PROGRAM IS WRITTEN FOR AN IBM PERSONAL COMPUTER OR A COMPATIBLE
C COMPUTER SUCH AS COMPAQ.  THE PROGRAM IS COMPILED AND EXECUTED USING
C MICROSOFT FORTRAN77 VERSION 3.30.
C
C AUTHORS AND COGNIZANT INDIVIDUALS ARE:
C
C O. I. OZTUNALI  - (212) 839-3235
C ENVIROSPHERE COMPANY, TWO WORLD TRADE CENTER, NY, NY, 10048
C
C G. W. ROLES     - (301) 427-4791
C USNRC, 7915 EASTERN AVE, SILVER SPRING, MD 20910
C-----------------------------------------------------------------------
$DEBUG
$NOFLOATCALLS
      CHARACTER SCNT(8)*15,SCNI(8)*6,SCNE(4)*6,SCNL(3)*6,SCNO(3)*6,
     *          SCNW(15)*6,ORG(10)*8,BIC(7)*5,BASN*10,NUC*8
C WHAT FOLLOWS IS CONTAINED IN A FILE CALLED IMPCOM.FOR, AND IS
C INPUT INTO SEVERAL SUBROUTINES THROUGH THE "$INCLUDE" METACOMMAND.
C SEE APPENDIX A/VOLUME 2 FOR PARAMETER DEFINITIONS.
      COMMON/CHRC/BASN(249),NUC(100)/DCFS/PDCF(100,10,8)
     +/BAST/BAS(249,104),BIMP(7,10,60),ISPC(249,10),IMOD(249),MODE(249)
     +/NUCS/AL(100),FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
     +/FACI/IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS,ILFE
     +/DTEC/EMP,EFF,SEF,DPT,DTK,EMPQ(3),EFFQ(6),SEFQ(6),DPTQ(6),DTKQ(6)
     +/DTNX/ID(8).IDQ(6,8)/FTEC/DMIN(6),VOLE(6),ACSQ(6),ALEN(6),
     + WIDT(6),DISN(7),VOLS(7),AREA(7),VBAK(7),TSUM(7),RADF(8)
     +/ENVT/TDP(4),TDO(4),TPO(4),VEL(4),CSK(4,4),DIS(4,4,5),STP(4,4,5)
     +/ENVI/FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,POP(4),NRET/ENVG/
     + PRC(2),TSC(2),QFC(4),UTTM,DTTM,DTPC,TTM(4),TPC(4),DSUR,SVEL,DISP
C END OF IMPCOM.FOR FILE
```

```
      COMMON/CHYN/ICH(8,57),LCH(57),ACT(8)/UPTK/FK(27)/CALS/DUMMY(50)
      DIMENSION TYMD(15),INDEX(6)
      DATA SCNT/'INTRUDER SCENS ','EXPOSED WASTE  ','LEACHATE-ACCUMN',
     2          'OPERATIONAL AXS','INTRUDER WELL  ','BOUNDARY WELL  ',
     3          'POPULATION WELL','SURFACE WATER  '/,SCNI/'IN-DRI',
     4 'IN-DIS','IN-CO1','IN-CO2','IN-CO3','IN-AG1','IN-AG2','IN-AG3'/,
     5 SCNE/'EX-INA','EX-INW','EX-ERA','EX-ERW'/,SCNL/'LA-OPS','LA-OVF',
     6 'LA-EVP'/,SCNO/'OP-SCF','OP-SCW','OP-FYR'/,SCNW/' 20 YR',
     7 ' 40 YR',' 60 YR',' 80 YR','100 YR','120 YR','160 YR','200 YR',
     8 '400 YR','600 YR','800 YR',' 1K YR',' 5K YR','10K YR','20K YR'/,
     9 ORG/' LUNGS  ','S. WALL ','LLI WALL','T. BODY ','KIDNEYS ',
     *     ' LIVER  ','RED MAR ','  BONE  ','THYROID ','  ICRP  '/,
     1 BIC/' A    ',' SA   ',' B    ',' C    ',' D1   ',' D2   ','TOTAL'/
      DATA TYMD/20.,40.,60.,80.,100.,120.,160.,200.,400.,600.,
     .          800.,1000.,5000.,10000.,20000./,NSTR/249/
  101 FORMAT(8A10)
  102 FORMAT(1H1/2X,8A10)
  103 FORMAT(10I5)
  104 FORMAT(2X'IR  ='I3,2X'OVFL='I3,2X'IBUF='I3,2X'NBRN='I3,
     *       2X'NBES='I3/2X'ICLS='I5,2X'IOBS='I5,2X'IINS='I5/
     *       2X'IBEG='I5,2X'IEND='I5,2X'ILFE='I5)
  105 FORMAT(/2X'COMBINATION INDICES ARE: '6I4)
  106 FORMAT(8E11.4)
  107 FORMAT(/2X'MINIMUM DEPTHS ARE: '6F6.1)
  108 FORMAT(/2X'DISPOSAL CONFIGURATION'//3X'NO ID IU IT IC IE IB IX IS'
     * 3X'EFF'6X'SEF'6X'DPT'6X'DTK'5X'VOLE'5X'AREA')
  109 FORMAT(2X,9I3,1P,6E9.2)
  110 FORMAT(/2X'RECALCULATED PARAMETERS'//3X'NO'3X'EFF'6X'SEF'6X,
     *          'DPT'6X'DTK'5X'TSUM'5X'AREA'5X'DISN'5X'VBAK')
  111 FORMAT(2X,I3,1P,8E9.2)
  201 FORMAT(/2X'NEW WASTE STREAM DATA - NSTR ='I4//1P,3(2X,A5'='E9.2)/
     + 4(2X,A5'='E9.2)//2X,'NAME,VOLM,NET CON/ACT,IMOD,MODE,ISPC INDXS')
  202 FORMAT(2X,1P,A10,2E9.2,2I4,I9,2I5,I4,6I2)
  301 FORMAT(1H1/2X,A15)
  303 FORMAT(/2X'CLASS = 'A5/2X' TIME '10(1X,A8))
  304 FORMAT(2X,A6,1P,10E9.2)
C PRELIMINARY READ AND WRITE OF INFORMATION: PROGRAM TITLE (BASN);
C GENERAL DECISION INDICES; COMBINATION INDICES (INDEX); MINIMUM
C DEPTHS (DMIN); AND DISPOSAL TECHNOLOGY CONFIGURATION AND PARAMETERS.
      OPEN(1,FILE='IMPCON.DAT')
      OPEN(6,FILE='IMPOUT.DAT',STATUS='NEW')
      READ(1,101) (BASN(I),I=1,8)
      WRITE(6,102) (BASN(I),I=1,8)
      READ(1,103) IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS
      ILFE=IEND-IBEG+1
      WRITE(6,104) IR,IOFL,IBUF,NBRN,NBES,ICLS,IOBS,IINS,IBEG,IEND,ILFE
      READ(1,103) INDEX
      WRITE(6,105) INDEX
      READ(1,106) DMIN
      WRITE(6,107) DMIN
```

```
      OPEN(2,FILE='DISTEC.DAT',FORM='FORMATTED',ACCESS='DIRECT',RECL=88)
      DO 10 I=1,6
      READ(1,103) (IDQ(I,J),J=1,8)
      IREC=IDQ(I,1)
      READ(2,106,REC=IREC) EFFQ(I),SEFQ(I),DPTQ(I),DTKQ(I),
     *                     VOLE(I),ACSQ(I),ALEN(I),WIDT(I)
   10 CONTINUE
      WRITE(6,108)
      WRITE(6,109) (I,(IDQ(I,J),J=1,8),EFFQ(I),SEFQ(I),DPTQ(I),
     *             DTKQ(I),VOLE(I),ACSQ(I),I=1,6)
      CLOSE (1)
      CLOSE (2)
C END OF PRELIMINARY READ AND WRITE OF INFORMATION. START OF MAIN CODE.
C READE - ENVIRONMENTAL PARAMETERS, READF - RADIONUCLIDE PARAMETERS.
      CALL READE(IR)
      CALL READF(IR)
C MEURGE - VOLUMES AND RECALCULATION OF PARAMETERS
      CALL MEURGE(NSTR,INDEX)
      WRITE(6,110)
      WRITE(6,111) (I,EFFQ(I),SEFQ(I),DPTQ(I),DTKQ(I),
     *                TSUM(I),AREA(I),DISN(I),VBAK(I),I=1,6)
      WRITE(6,201) NSTR,(BIC(I),VOLS(I),I=1,7)
      WRITE(6,202) (BASN(I),BAS(I,1),BAS(I,4),IMOD(I),MODE(I),
     +             (ISPC(I,J),J=1,10),I=1,NSTR)
C START CALCULATION OF IMPACTS. IMPACTS ARE PRINTED AFTER EACH MAIN
C SECTION THROUGH THE USE OF SUBROUTINE PRT. INTIMP - INTRUDER IMPACTS,
C EXPWAS - EXPOSED WASTE IMPACTS, OVRFLO - LEACHATE ACCUMULATION IMPACTS,
C OPSIMP - OPERATIONAL ACCIDENTS, GWATER - GROUNDWATER IMPACTS.
      CALL INTIMP(NSTR)
      WRITE(6,301) SCNT(1)
      CALL PRT(BIMP,VOLS,ORG,BIC,SCNI,8)
      CALL EXPWAS(NSTR)
      WRITE(6,301) SCNT(2)
      CALL PRT(BIMP,VOLS,ORG,BIC,SCNE,4)
      IF(IOFL.EQ.0)GO TO 25
      CALL OVRFLO(NSTR)
      WRITE(6,301) SCNT(3)
      CALL PRT(BIMP,VOLS,ORG,BIC,SCNL,3)
   25 CALL OPSIMP(NSTR)
      WRITE(6,301) SCNT(4)
      CALL PRT(BIMP,VOLS,ORG,BIC,SCNO,3)
   30 CALL GWATER(NSTR,TYMD)
C GROUNDWATER IMPACTS ARE PRINTED IN THE MAIN CODE.
      DO 35 K=1,6
      DO 35 I=1,60
      DO 35 J=1,10
   35 BIMP(7,J,I)=BIMP(7,J,I)+BIMP(K,J,I)
      DO 45 ISET=1,4
      IF(ISET.EQ.4.AND.IR.EQ.4)GO TO 45
      IS=(ISET-1)*15
```

```
      WRITE(6,301) SCNT(ISET+4)
      DO 40 ICL=1,7
      WRITE(6,303) BIC(ICL),ORG
   40 WRITE(6,304) (SCNW(K),(BIMP(ICL,IG,IS+K),IG=1,10),K=1,15)
   45 CONTINUE
      CLOSE (6)
   50 STOP 'NORMAL TERMINATION'
      END
C-----------------------------------------------------------------------
      SUBROUTINE PRT(BIMP,VOLS,ORG,BIC,SCN,I2)
C-----------------------------------------------------------------------
C PRT PRINTS THE POST-DISPOSAL IMPACTS CALCULATED BY ALL BUT GWATER
C-----------------------------------------------------------------------
      CHARACTER ORG(10)*8,BIC(7)*5,SCN*6
      DIMENSION BIMP(7,10,60),VOLS(7),SCN(I2)
  202 FORMAT(/2X'SCENARIO = 'A6/2X'CLASS '10(1X,A8))
  203 FORMAT(3X,A5,1P,10E9.2)
      CALL AVG(BIMP,VOLS,I2)
      DO 30 I=1,I2
      WRITE(6,202) SCN(I),ORG
   30 WRITE(6,203) (BIC(K),(BIMP(K,IG,I),IG=1,10),K=1,7)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE AVG(BIMP,VOLS,II)
C-----------------------------------------------------------------------
C AVG CALCULATES VOLUME AVERAGED IMPACTS.
C-----------------------------------------------------------------------
      DIMENSION BIMP(7,10,60),VOLS(7)
      DO 20 K=1,6
      A1=VOLS(K)/VOLS(7)
      DO 20 I=1,II
      DO 20 J=1,10
   20 BIMP(7,J,I)=BIMP(7,J,I)+BIMP(K,J,I)*A1
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE INTIMP(NSTR)
C-----------------------------------------------------------------------
C INTIMP CALCULATES IMPACTS ASSOCIATED WITH INTRUDER SCENARIOS. FIVE
C SCENARIOS ARE CONSIDERED: DRILLING, DRILLING AGRICULTURE, DISCOVERY,
C CONSTRUCTION, AND AGRICULTURE.  DRILLING-AGRICULTURE SCENARIO AND
C RADON IMPACTS ARE INCLUDED ONLY IN THE AGRICULTURE SCENARIO.
C-----------------------------------------------------------------------
$INCLUDE:'IMPCOM.FOR'
      COMMON/CALS/Z2(10),Z3(10),Z4(10),Z5(10),Z8(10)
      CALL ZERO(BIMP,4200)
      DO 90 ITY=1,3
C DRILLING AND DISCOVERY ARE CONSIDERED ONLY FOR ITY=1; THREE DIFFERENT
C TIMES ARE CONSIDERED FOR THE CONSTRUCTION AND AGRICULTURE SCENARIOS.
```

```
      IF(ITY.EQ.1)GDEL=ICLS+IOBS+IINS
      IF(ITY.EQ.2)GDEL=ICLS+IOBS+500.
      IF(ITY.EQ.3)GDEL=ICLS+IOBS+1000.
      DO 60 IN=1,100
C NUCLIDE LOOP IS OUTERMOST DUE TO EXECUTION TIME REQUIRED BY CHNS/CALI.
      CALL CHNS(IN,GDEL)
      CALL CALI(IN)
      DO 50 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 50
C IU=0 SIGNIFIES (1) CLASS IS NOT CONSIDERED, OR (2) VOLUME IS ZERO.
      A11=BAS(ISTR,1)*BAS(ISTR,IN+4)/VOLS(ICL)
      IF(A11.LT.1.E-30)GO TO 50
      I1=MODE(ISTR)/10
      I2=MODE(ISTR)-I1*10
C MODE IS AN ARRAY SET IN MEURGE.  IT SIGNIFIES THE FOLLOWING:
C I1 = 1 - REGULAR; 2 - ACT MET; 3 - SOURCE;
C I2 = 1 - REGULAR; 2 - GROUTED; 3 - RC; 4 - GROUTED & RC;
      I5=ISPC(ISTR,5)
      I6=ISPC(ISTR,6)
      I8=ISPC(ISTR,8)
      I9=ISPC(ISTR,9)
      I10=ISPC(ISTR,10)
      IF(I1.EQ.2)GDELA=FACTS(GDEL,I9,1)
      IF(I1.EQ.3)GDELS=FSORS(GDEL,I10,1)
      IF(I1.NE.3.OR.I8.LE.1)GO TO 10
      IF(GDELS.LT.300.)GDELS=300.
      IF(GDEL.LT.GDELS)GO TO 50
C FD IS F-SUB-D; A5 IS DISPERSIBILITY FACTOR (IF ANY);
C A6 IS LEACHABILITY FACTOR; AND A9 IS ACTIVATED METAL FACTOR.
   10 FD=EMP*SEF
      A5=1.
      A6=1.
      A9=1.
      IF(I1.NE.1)GO TO 12
      IF(NBES.NE.0)A5=10.**(-I5)
      GO TO 16
   12 IF(I1.EQ.3)GO TO 14
      A5=FACTS(GDEL,I9,2)
      A6=FACTS(GDEL,I9,3)
      A9=FACTS(GDEL,I9,4)
      GO TO 16
   14 A5=FSORS(GDEL,I10,2)*A11/FD
      A6=FSORS(GDEL,I10,3)*A11/FD
      A9=FSORS(GDEL,I10,4)*A11/FD
   16 F2=FD*0.057
C F2 IS MODIFIED DEPENDING ON THE WASTE DISPOSAL DEPTH (DPT).
      IF(DPT.GE.5.)F2=F2*0.1
      IF(DPT.GE.10.)F2=0.
```

```
      NXD=0
      IF(I1.EQ.2.AND.GDEL.LT.GDELA)GO TO 20
      IF(I1.EQ.3.AND.GDEL.LT.GDELS)GO TO 20
      IF(ITY.NE.1.OR.(ITY.EQ.1.AND.I2.GE.3))GO TO 20
C DRILLING
      NXD=1
      F1=2.9E-05
      IF(I1.NE.3)F1=FD*DTK*9.39E-07
      A12=F1*A11*UWT(IN,1)
      IF(A12.LE.1.E-30)GO TO 20
      DO 18 IG=1,10
   18 BIMP(ICL,IG,1)=BIMP(ICL,IG,1)+A12*Z5(IG)
C DISCOVERY & CONSTRUCTION
   20 A1=F2*A5*FSC
      A3=F2*A9
      IF(I1.EQ.3)A4=FSORS(GDEL,I10,4)*2.19E-4
      IF(DPT.GE.5.)A4=A4*0.1
      IF(DPT.GE.10.)A4=0.
      NDS=0
      IF(ITY.NE.1.OR.IU.EQ.1)GO TO 25
      IF((I2.EQ.1.AND.IU.GE.2).OR.ID.GT.8)NDS=1
   25 DO 30 IG=1,10
      D2=A1*Z2(IG)+A3*Z5(IG)
      IF(I1.EQ.3)D2=D2+A4*Z8(IG)
      IF(NDS.EQ.1)BIMP(ICL,IG,2)=BIMP(ICL,IG,2)+D2*A11*1.2E-2
      IF(NDS.EQ.0)BIMP(ICL,IG,ITY+2)=BIMP(ICL,IG,ITY+2)+D2*A11
   30 CONTINUE
C AGRICULTURE AND DRILLING-AGRICULTURE (F3)
      IF(NDS.EQ.1)F2=0.
      F4=F2*0.25/0.057
      IF(I1.EQ.3)F4=F4*1.02
      F3=1.11E-6*DTK*FD*UWT(IN,2)
      IF(I1.EQ.3)F3=3.43E-5*UWT(IN,2)
      IF(NXD.EQ.0)F3=0.
      B1=F4*A5*FSA
      B2=F4*A6*0.5
      B3=F4*A9*0.27
      B4=B3*0.132
      B3=B3+F3
      IF(I1.EQ.2)B3=B3*A5
      IF(I1.EQ.2)B4=B4*(1.-A5)
      DO 40 IG=1,10
      D2=B1*Z3(IG)+B2*Z4(IG)+B3*Z5(IG)
      IF(I1.EQ.2)D2=D2+B4*Z8(IG)
      IF(I1.EQ.3.AND.GDEL.LT.GDELS)D2=B4*Z8(IG)
   40 BIMP(ICL,IG,ITY+5)=BIMP(ICL,IG,ITY+5)+D2*A11
   50 CONTINUE
   60 CONTINUE
C RADON SECTION
      C1=AL(45)*GDEL
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      C2=AL(47)*GDEL
      DO 80 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 80
      A11=BAS(ISTR,1)/VOLS(ICL)
C ATTENJATE RADON USING CALCULATED DISPOSAL DEPTHS.
      C3=EXM((DPT-3.)*0.977)
      IF(C3.GT.1.)C3=1.
      A11=A11*C3
      FD=EMP*SEF
      C3=BAS(ISTR,49)*EXM(C1)
      C4=BAS(ISTR,51)+BAS(ISTR,52)
      IF(C1.NE.C2)C3=C3+C4*C1*(EXM(C1)-EXM(C2))/(C2-C1)
      C3=C3*A11*FD*1.03E-6
      IF(C3.LE.1.E-30)GO TO 80
      DO 70 IG=1,10
   70 BIMP(ICL,IG,ITY+5)=BIMP(ICL,IG,ITY+5)+C3*PDCF(44,IG,2)
   80 CONTINUE
   90 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE EXPWAS(NSTR)
C-----------------------------------------------------------------------
C EXPWAS CALCULATES IMPACTS ASSOCIATED WITH EXPOSED WASTE SCENARIOS.
C FOUR SCENARIOS ARE CONSIDERED: INTRUDER-AIR, INTRUDER-WATER,
C EROSION-AIR, AND EROSION-WATER.
C-----------------------------------------------------------------------
$INCLUDE:'IMPCOM.FOR'
      COMMON/CALS/Z3(10),Z7(10),ZDUM(30)
      CALL ZERO(BIMP,4200)
C INTRUSION SCENARIOS ARE CONSIDERED FIRST (DO LOOP 30)
      GINT=ICLS+IOBS+IINS
      DO 30 INUC=1,100
C AGAIN, NUCLIDE LOOP IS OUTERMOST DUE TO TIME REQUIRED BY CHNS/CALE.
      CALL CHNS(INUC,GINT)
      CALL CALE(INUC)
      DO 25 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      CALL RETRV(ICL)
C CLASSES OF WASTE WITH A ZERO VOLUME, OR DISPOSED IN A REINFORCED
C CONCRETE CELL, OR WITH DPT>10 M ARE EXEMPTED FROM THIS SCENARIO.
      IF(IU.EQ.0.OR.ID.GT.8.OR.DPT.GT.10.)GO TO 25
      A11=BAS(ISTR,1)*BAS(ISTR,INUC+4)/VOLS(ICL)
      IF(A11.LT.1.E-30)GO TO 25
      FRA=19.72*EINT*POP(IR)*1.8E+3
      IF(DPT.GE.5.)FRA=FRA*0.1
      FRW=1.15E-4*POPW*1.8E+3*0.25*EMP*SEF
      IF(DPT.GE.5.)FRW=FRW*0.1
```

```
      I1=MODE(ISTR)/10
      I5=ISPC(ISTR,5)
      I6=ISPC(ISTR,6)
      I7=ISPC(ISTR,7)
      I9=ISPC(ISTR,9)
      I10=ISPC(ISTR,10)
      A5=1.
      A6=1.
      IF(I1.NE.1.OR.NBES.EQ.0)GO TO 10
      A5=10.**(-I5)
      IF(I6.EQ.2)A6=1./30.
      IF(I6.EQ.3)A6=1./160.
      IF(I6.EQ.4)A6=1./400.
      IF(IS.EQ.0.OR.I7.EQ.1)A6=A6*4.
      IF(I6.EQ.1)A6=1.
      GO TO 15
   10 IF(I1.EQ.2)A5=FACTS(GINT,I9,2)
      IF(I1.EQ.3)A5=FSORS(GINT,I10,2)
      IF(I1.EQ.2)A6=FACTS(GINT,I9,3)
      IF(I1.EQ.3)A6=FSORS(GINT,I10,3)
   15 A2=FRA*A11*A5
      A3=FRW*A11*A6
      DO 20 IG=1,10
      BIMP(ICL,IG,1)=BIMP(ICL,IG,1)+A2*Z3(IG)
      BIMP(ICL,IG,2)=BIMP(ICL,IG,2)+A3*Z7(IG)
   20 CONTINUE
   25 CONTINUE
   30 CONTINUE
C EROSION SCENARIOS ARE CONSIDERED NEXT (DO LOOP 60)
      GERO=2000.
      DO 60 INUC=1,100
      CALL CHNS(INUC,GERO)
      CALL CALE(INUC)
      DO 50 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      CALL RETRV(ICL)
C ONLY WASTE CLASSES WITH ZERO VOLUME OR WITH DPT>5 ARE EXEMPTED.
      IF(IU.EQ.0.OR.DPT.GT.5.)GO TO 50
      A1=BAS(ISTR,1)*BAS(ISTR,INUC+4)/VOLS(ICL)
      IF(A1.LT.1.E-30)GO TO 50
      VUR=EMP*EFF*SEF
      A2=A1*19.72*EERO*POPE*VOLS(ICL)/VUR
      A3=A1*1.15E-4*POPW*VOLS(ICL)/VUR
      DO 40 IG=1,10
      BIMP(ICL,IG,3)=BIMP(ICL,IG,3)+A2*Z3(IG)
      BIMP(ICL,IG,4)=BIMP(ICL,IG,4)+A3*Z7(IG)
   40 CONTINUE
   50 CONTINUE
   60 CONTINUE
      RETURN
```

```
      END
C----------------------------------------------------------------------
      SUBROUTINE OVRFLO(NSTR)
C----------------------------------------------------------------------
C OVRFLO CALCULATES IMPACTS ASSOCIATED WITH THREE LEACHATE ACCUMULATION
C SCENARIOS: TREATMENT/RELEASE, OVERFLOW, AND EVAPORATION.
C----------------------------------------------------------------------
$INCLUDE:'IMPCOM.FOR'
      CALL ZERO(BIMP,4200)
      GDEL=ICLS+IOBS
C NUCLIDE LOOP IS INNER IN THIS CASE SINCE CHAIN EFFECTS ARE NEGLECTED.
      DO 50 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 50
      A11=BAS(ISTR,1)/VOLS(ICL)
      IF(A11.LT.1.E-30)GO TO 50
      VL=PRC(1)*VOLS(ICL)/(EMP*EFF)
      I1=MODE(ISTR)/10
      I6=ISPC(ISTR,6)
      I7=ISPC(ISTR,7)
      I9=ISPC(ISTR,9)
      I10=ISPC(ISTR,10)
      IF(I1.EQ.2)GDELA=FACTS(GDEL,I9,1)
      IF(I1.EQ.3)GDELS=FSORS(GDEL,I10,1)
      IF(I1.EQ.2.AND.GDEL.LT.GDELA)GO TO 50
      IF(I1.EQ.3.AND.GDEL.LT.GDELS)GO TO 50
      A6=1.
      IF(I1.NE.1.OR.NBES.EQ.0)GO TO 10
      IF(I6.EQ.2)A6=1./30.
      IF(I6.EQ.3)A6=1./160.
      IF(I6.EQ.4)A6=1./400.
      IF(IS.EQ.0.OR.I7.EQ.1)A6=A6*4.
      IF(I6.EQ.1)A6=1.
      GO TO 20
   10 IF(I1.EQ.2)A6=FACTS(GDEL,I9,3)
      IF(I1.EQ.3)A6=FSORS(GDEL,I10,3)
   20 A4=A6*VL/4.5E6
      DO 40 INUC=1,100
      A7=1.
      A1=ILFE*(1.-EXM(AL(INUC)))
      IF(A1.GT.1.E-20)A7=(1.-EXM(AL(INUC)*ILFE))/A1
      A5=A4*A7*FMF(INUC)*BAS(ISTR,INUC+4)
      A6=A5*EXM(AL(INUC)*GDEL)
      A7=A6*POP(IR)
      A5=A5*TSC(2)
      DO 30 IG=1,10
      BIMP(ICL,IG,1)=BIMP(ICL,IG,1)+A5*PDCF(INUC,IG,7)
      BIMP(ICL,IG,2)=BIMP(ICL,IG,2)+A6*PDCF(INUC,IG,7)
      BIMP(ICL,IG,3)=BIMP(ICL,IG,3)+A7*PDCF(INUC,IG,3)*FRACT(INUC,2)
```

```
   30 CONTINUE
   40 CONTINUE
   50 CONTINUE
      RETURN
      END
C---------------------------------------------------------------------
      SUBROUTINE OPSIMP(NSTR)
C---------------------------------------------------------------------
C OPSIMP CALCULATES IMPACTS ASSOCIATED WITH THREE ACCIDENT SCENARIOS:
C SINGLE CONTAINER-OFFSITE, SINGLE CONTAINER-WORKER, AND FIRE.
C---------------------------------------------------------------------
$INCLUDE:'IMPCOM.FOR'
      DIMENSION SUMS(10),SUMO(10),SUMF(10)
      DATA EDF1/1.56E-6/,EDF2/1.90E-5/,FRVQ/4.81E-3/,FIFX/1.25E-7/
      CALL ZERO(BIMP,4200)
      DO 40 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 40
      I1=MODE(ISTR)/10
      I9=ISPC(ISTR,9)
      I10=ISPC(ISTR,10)
      IF(I1.EQ.2)GDELA=FACTS(GDEL,I9,1)
      IF(I1.EQ.3)GDELS=FSORS(GDEL,I10,1)
      IF(I1.EQ.2.AND.GDELA.GT.0.)GO TO 40
      IF(I1.EQ.3.AND.GDELS.GT.0.)GO TO 40
      ISC=ISPC(ISTR,4)/10
      IFL=ISPC(ISTR,4)-ISC*10
      FES=FRVQ*AXOQ*EDF1
      IF(ISC.NE.0)FES=FES/(10.**ISC)
      FEO=FRVQ*FIFX
      FEA=100.*FXOQ
      IF(IFL.NE.0)FEA=FEA/(20.**IFL)
      CALL ZERO(SUMS,10)
      CALL ZERO(SUMO,10)
      CALL ZERO(SUMF,10)
      A2=BAS(ISTR,1)/VOLS(ICL)
      DO 20 I=1,100
      A1=BAS(ISTR,I+4)*A2
      DO 10 J=1,10
      SUMS(J)=SUMS(J)+A1*PDCF(I,J,1)
      SUMO(J)=SUMO(J)+A1*PDCF(I,J,2)
   10 SUMF(J)=SUMF(J)+A1*PDCF(I,J,1)*FRACT(I,3)
   20 CONTINUE
      DO 30 J=1,10
      BIMP(ICL,J,1)=BIMP(ICL,J,1)+SUMS(J)*FES
      BIMP(ICL,J,2)=BIMP(ICL,J,2)+SUMO(J)*FEO
   30 BIMP(ICL,J,3)=BIMP(ICL,J,3)+SUMF(J)*FEA
   40 CONTINUE
      RETURN
```

```
      END
C-----------------------------------------------------------------------
      SUBROUTINE GWATER(NSTR,TYMD)
C-----------------------------------------------------------------------
C GWATER CALCULATES IMPACTS ASSOCIATED WITH FOUR GROUNDWATER SCENARIOS:
C INTRUDER-WELL, BOUNDARY-WELL, POPULATION-WELL, AND SURFACE WATER. TO
C SAVE EXECUTION TIME, INDIVIDUAL WASTE STREAMS HAVING THE SAME WASTE
C CLASS, MODE INDEX, AND SOME OF THE ISPC VALUES (I6 THROUGH I10) ARE
C COMBINED INTO MACRO STREAMS.  NOPT IS A DECISION INDEX DENOTING
C WHETHER INCREASED PERCOLATION RESULTING FROM INTRUDER ACTIVITIES WILL
C BE CONSIDERED (NOPT=1) OR NOT (NOPT=0).
C-----------------------------------------------------------------------
$INCLUDE:'IMPCOM.FOR'
      DIMENSION RES(15,4),TYMD(15),ICNT(249),BASD(104),ISPCD(6)
      DATA NOPT/1/,NSEC/10/,NPTH/4/
      CALL ZERO(BIMP,4200)
      TVOL=AREA(7)*PRC(1)
      IF(TVOL.LT.7700.)TVOL=7700.
      PRC1=PRC(1)*TSC(1)
      PRC2=PRC(2)*TSC(2)
C SURFACE WATER SCENARIO IS NOT CONSIDERED FOR WESTERN REGION (IR=4).
      IF(IR.EQ.4)NPTH=3
C THIS LOOP PREPARES ICNT ARRAY FOR THE MACRO-STREAM CALCULATION.
      DO 10 I=1,NSTR
   10 ICNT(I)=1
      DO 90 ICL=1,6
C THIS SECTION CALCULATES PERCOLATION UNDER TWO CONDITIONS: PERC WHICH
C IS NORMAL CASE, AND PERC2 WHICH INCLUDES INTRUDER DISTURBED SURFACE
      CALL RETRV(ICL)
      IF(IB.GT.1)PRC1=0.1*PRC1
      IF(IB.GT.1)PRC2=0.1*PRC2
      IF(IC.EQ.1)PERC=PRC1
      IF(IC.EQ.2)PERC=PRC2
      IF(IU.NE.1.OR.IX.EQ.3)GO TO 12
      IF(IX.EQ.1)PERC=4.*PRC1
      IF(IC.EQ.1.AND.IX.EQ.2)PERC=2.25*PRC1
      IF(IC.EQ.2.AND.IX.EQ.2)PERC=4.*PRC2
   12 NX=0
      IF(PERC.LT.PRC1)NX=1
      PERC2=3.6*PERC+0.1*PRC1
      GINS=ICLS+IOBS+IINS
      DO 80 ISTR=1,NSTR
C THIS STATEMENT EXCLUDES WASTES NOT IN THIS CLASS OR THOSE CONSIDERED
C PREVIOUSLY AS PART OF A MACRO-STREAM (ICNT IS EQUAL TO ZERO)
      IF(ICL.NE.IMOD(ISTR).OR.ICNT(ISTR).EQ.0)GO TO 80
      ICNT(ISTR)=0
C INUMB IS THE NUMBER OF STREAMS AND BASD IS THE TOTAL ACTIVITY
      INUMB=1
      DO 14 J=5,104
   14 BASD(J)=BAS(ISTR,J)*BAS(ISTR,1)
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      ISPCD(1)=MODE(ISTR)
      DO 16 J=2,6
   16 ISPCD(J)=ISPC(ISTR,J+4)
C THIS OPEN DO LOOP (UP TO STATEMENT 24) ADDS OTHER WASTE STREAMS WITH
C THE SAME CLASS, MODE, AND ISPC'S (I6 THROUGH I10) TO THE MACRO STREAM.
      ISTRD=ISTR
   18 ISTRD=ISTRD+1
      IF(ISTRD.GT.NSTR)GO TO 24
      IF(ICL.NE.IMOD(ISTRD).OR.ICNT(ISTRD).EQ.0)GO TO 18
      IF(ISPCD(1).NE.MODE(ISTRD))GO TO 18
      DO 20 J=2,6
      IF(ISPCD(J).NE.ISPC(ISTRD,J+4))GO TO 18
   20 CONTINUE
      ICNT(ISTRD)=0
      INUMB=INUMB+1
      DO 22 J=5,104
   22 BASD(J)=BASD(J)+BAS(ISTRD,J)*BAS(ISTRD,1)
      GO TO 18
   24 I1=ISPCD(1)/10
      I6=ISPCD(2)
      I7=ISPCD(3)
      I8=ISPCD(4)
      I9=ISPCD(5)
      I10=ISPCD(6)
C THIS POINT IS THE START OF MAIN PORTION OF GWATER. GDEL=300 YEARS FOR
C HIC WASTES, APPROPRIATE DELAY TIME FOR SOURCES, OTHERWISE IT IS ZERO.
      GDEL=0.
      IF(I8.EQ.3)GDEL=300.
      IF(I1.EQ.3)GDEL=FSORS(GDEL,I10,1)
      A6=1.
      IF(I1.NE.1.OR.NBES.EQ.0)GO TO 26
      IF(I6.EQ.2)A6=1./30.
      IF(I6.EQ.3)A6=1./160.
      IF(I6.EQ.4)A6=1./400.
      IF(IS.EQ.0.OR.I7.EQ.1)A6=A6*4.
      IF(I6.EQ.1)A6=1.
      GO TO 28
   26 IF(I1.EQ.2)A6=FACTS(1.,I9,3)
      IF(I1.EQ.3)A6=FSORS(GDEL,I10,3)
   28 I2=NRET
      IF(IS.EQ.0.OR.I7.EQ.1)I2=I2-1
      IF(I2.LE.0)I2=1
      IF(A6.LT.1.E-12)GO TO 80
      TDUM=EMP*EFF*SEF/(PERC*A6)
      DO 70 INUC=1,100
C FIRST SECTION (UP TO STATEMENT 45) CONSIDERS NORMAL RELEASES
      TDUR=TDUM/FMF(INUC)
      B0=EXM(AL(INUC)*RET(INUC,I2)*UTTM)
      B1=B0*BASD(INUC+4)/TDUR
      IF(B1.LT.1.E-20)GO TO 70
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      C1=TDUR
      IF(NX.EQ.0.OR.NOPT.EQ.0)GO TO 30
      IF(C1.LT.GINS)C1=GINS
   30 CALL RTIJ(RES,GDEL,C1,0.,TYMD,INUC,NPTH,I2)
      DO 45 IPTH=1,NPTH
      I4=(IPTH-1)*15
      B2=B1/(QFC(IPTH)*NSEC)
      IF(TVOL.GT.QFC(IPTH))B2=B2*QFC(IPTH)/TVOL
      I3=6
      IF(IPTH.EQ.4)I3=7
      DO 40 ITYM=1,15
      A3=EXM(AL(INUC)*TYMD(ITYM))*RES(ITYM,IPTH)
      DO 35 I=1,10
   35 BIMP(ICL,I,I4+ITYM)=BIMP(ICL,I,I4+ITYM)+A3*B2*PDCF(INUC,I,I3)
   40 CONTINUE
   45 CONTINUE
C THIS SECTION (UP TO STATEMENT 60) CONSIDERS INCREASED RELEASES
C DISCUSSED IN SECTION 4.3.3.2 OF VOLUME 1.
      IF(NX.EQ.0.OR.NOPT.EQ.0.OR.TDUR.LT.GINS)GO TO 70
      T1=GINS
      T2=T1+PERC*(TDUR-T1)/PERC2
      CALL RTIJ(RES,GDEL,T2,T1,TYMD,INUC,NPTH,I2)
      B1=B1*PERC2/PERC
      DO 60 IPTH=1,NPTH
      I4=(IPTH-1)*15
      B2=B1/(QFC(IPTH)*NSEC)
      IF(TVOL.GT.QFC(IPTH))B2=B2*QFC(IPTH)/TVOL
      I3=6
      IF(IPTH.EQ.4)I3=7
      DO 55 ITYM=1,15
      A3=EXM(AL(INUC)*TYMD(ITYM))*RES(ITYM,IPTH)
      DO 50 I=1,10
   50 BIMP(ICL,I,I4+ITYM)=BIMP(ICL,I,I4+ITYM)+A3*B2*PDCF(INUC,I,I3)
   55 CONTINUE
   60 CONTINUE
   70 CONTINUE
   80 CONTINUE
   90 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE RTIJ(RES,GDEL,TDUR,TMIN,TYMD,INUC,NPTH,I1)
C-----------------------------------------------------------------------
C RTIJ CALCULATES R-SUB-TIJ FOR GIVEN PARAMETERS
C-----------------------------------------------------------------------
      COMMON/ENVG/P1(8),UTTM,DTTM,DTPC,TTM(4),TPC(4),P2(3)/NUCS/
     +      AL(100),FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
      DIMENSION RES(15,4),TYMD(15)
      CALL ZERO(RES,4*15)
      DO 30 IPTH=1,NPTH
```

```
      A1=RET(INUC,I1)*TTM(IPTH)+GDEL
      DO 20 ITYM=1,15
      TYM=TYMD(ITYM)-TMIN
      A2=TYMD(ITYM)-TDUR
      DO 10 ISEC=1,10
      B3=1.0/(A1+RET(INUC,I1)*(ISEC-1)*DTTM)
      IF(TYM*1.1*B3.LT.1.0) GO TO 20
      B4=TPC(IPTH)+(ISEC-1)*DTPC
      A3=0.5*ERFS(B3*TYM,B4)
      IF(A2.GT.0.0)A3=A3-0.5*ERFS(B3*A2,B4)
      IF(A3.LT.0.0)A3=0.0
   10 RES(ITYM,IPTH)=RES(ITYM,IPTH)+A3
   20 CONTINUE
   30 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      FUNCTION ERFS(A1,A2)
C-----------------------------------------------------------------------
C ERFS AND POLY EVALUATE THE ERROR FUNCTION
C-----------------------------------------------------------------------
      A3=0.5*SQRT(A2/A1)
      A4=A3*(1.-A1)
      A5=A3*(1.+A1)
      IF(A4.GT.0)GO TO 10
      ERFS=2.+EXM(A4*A4)*(POLY(A5)-POLY(-A4))
      RETURN
   10 ERFS=EXM(A4*A4)*(POLY(A4)+POLY(A5))
      RETURN
      END
C-----------------------------------------------------------------------
      FUNCTION POLY(X1)
      DATA A1,A2,A3,A4,A5,P/.254829592,-.284496736,1.421413741,
     *                     -1.453152027,1.061405429,.3275911/
      T1=1./(1.+P*X1)
      POLY=T1*(A1+T1*(A2+T1*(A3+T1*(A4+T1*A5))))
      RETURN
      END
C-----------------------------------------------------------------------
C STARTING AT THIS POINT, THE REMAINDER OF THE CODE IS ALSO USED IN
C THE INTRUDE PROGRAM.
C-----------------------------------------------------------------------
      SUBROUTINE READE(IR)
C-----------------------------------------------------------------------
C READE INPUTS ENVIRONMENTAL INFORMATION FROM THE FILE ENVIRO.DAT
C-----------------------------------------------------------------------
      COMMON/FTEC/DMINS(30),VOLS(35),RADF(8)/UPTK/FK(27)
     +/ENVT/TDP(4),TDO(4),TPO(4),VEL(4),CSK(4,4),DIS(4,4,5),STP(4,4,5)
     +/ENVI/FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,POP(4),NRET/ENVG/
     + PRC(2),TSC(2),QFC(4),UTTM,DTTM,DTPC,TTM(4),TPC(4),DSUR,SVEL,DISP
```

```
      DIMENSION TSCP(2)
  101 FORMAT(8E10.3)
  102 FORMAT(I5)
      OPEN(2,FILE='ENVIRO.DAT')
C FIRST READ REGION SPECIFIC INFORMATION (DO LOOP 50)
      DO 50 I=1,4
      READ(2,101) TDP(I),TDO(I),TPO(I),VEL(I),(CSK(I,J),J=1,4),
     +            ((DIS(I,J,K),STP(I,J,K),K=1,4),J=1,4)
      IF(I.NE.IR) GO TO 30
      READ(2,101) FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,
     +            (PRC(J),J=1,2),(TSC(J),J=1,2),(QFC(J),J=1,4),
     +            UVEL,UTCK,DSUR,SVEL,DISP,(TSCP(J),J=1,2),TSCW
      READ(2,102) NRET
      FSC=FSC/0.057
      UTTM=UTCK/UVEL
      POP(I)=POPE/3.
      DO 20 J=1,2
   20 TSC(J)=TSCW*TSC(J)+(1.-TSCW)*TSCP(J)
      GO TO 50
   30 READ(2,101) A2,A3,A4,A5,A1
      POP(I)=A1/3.
      READ(2,101) A1
      READ(2,101) A1
      READ(2,102) J
   50 CONTINUE
C FINALLY READ THE UPTAKE PARAMETERS
      READ(2,101) FK
      CLOSE(2)
      RETURN
      END
C---------------------------------------------------------------------
      SUBROUTINE READF(IR)
C---------------------------------------------------------------------
C READF INPUTS RADIONUCLIDE INFORMATION FROM THE FILE FUNDCF.DAT,
C AND CALCULATES PATHWAY DOSE CONVERSION FACTOR VALUES.
C---------------------------------------------------------------------
      CHARACTER BASN*10,NUC*8
      COMMON/CHRC/BASN(249),NUC(100)/DCFS/PDCF(100,10,8)/NUCS/AL(100),
     + FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)/UPTK/V1,V2,S1,S2,
     + Z,RI(4),R,CY,D,F2,F3(4),F5,F7,F8,F8P,F11,F13,F13P,F14,F15,F18
      COMMON/CHYN/ICH(8,57),LCH(57),ACT(8)
      DIMENSION DCF1(10),DCF2(10),DCF3(10),DCF4(10),DCF5(10),FF(5)
  101 FORMAT(A8,1X,3E9.2,18X,4E9.2)
  102 FORMAT(9X,10E9.2)
  103 FORMAT(3(I2,8I3))
      OPEN(1,FILE='FUNDCF.DAT')
      AL2=ALOG(2.)
C DO LOOP 40 READS RADIONUCLIDES ONE AT A TIME AND CALCULATES PDCF'S
      DO 40 IN=1,100
      READ(1,101) NUC(IN),AL(IN),FMF(IN),DCF3D,EAVG,(FRACT(IN,I),I=1,3)
```

```
      READ(1,102) (DCF1(I),I=1,10),(DCF2(I),I=1,10)
      READ(1,102) (DCF4(I),I=1,10),(DCF5(I),I=1,10)
      READ(1,102) (RET(IN,I),I=1,5),(FF(I),I=1,5)
      AL(IN)=AL2/AL(IN)
      A1=FUWT(EAVG,1)*60.96
      UWT(IN,1)=EXM(A1)*(1.+0.95*A1+0.35*A1*A1)
      A1=FUWT(EAVG,2)*60.96*1.6
      UWT(IN,2)=EXM(A1)*(1.+0.95*A1+0.35*A1*A1)
      DO 10 I=1,10
      A1=1.
      IF(DCF4(4).GT.0.)A1=DCF4(I)/DCF4(4)
   10 DCF3(I)=DCF3D*A1
      PTP=F2+F3(IR)*(FF(2)*F5+FF(3)*F7*365.)
      PT=PTP*FF(1)
      FT=F8*FF(2)*F5+F8P*FF(3)*F7*365.+F11
      F12N=FF(4)*F13+FF(5)*F13P
      V=V1
      IF(IN.EQ.31)V=V2
      D1=86400.*V/(S2*Z)
      D2=86400.*R*V/S1
      W1=RI(IR)/(S2*Z)
      W2=R*RI(IR)/S1
      DO 30 IO=1,10
      A1=F18*(F14*(F15*DCF2(IO)+DCF5(IO))+DCF4(IO))
      PDCF(IN,IO,1)=F15*DCF2(IO)+DCF5(IO)+A1*D1
      PDCF(IN,IO,2)=F15*DCF2(IO)+DCF5(IO)+0.242*A1*D1
      PDCF(IN,IO,3)=PDCF(IN,IO,1)+(D1*PT+(D2/CY)*PTP)*DCF1(IO)
      PDCF(IN,IO,4)=(PT/D)*DCF1(IO)
      PDCF(IN,IO,5)=DCF3(IO)
      PDCF(IN,IO,6)=(W1*PT+(W2/CY)*PTP+FT/1000)*DCF1(IO)+W1*A1
      PDCF(IN,IO,7)=PDCF(IN,IO,6)+(F12N/1000)*DCF1(IO)
      PDCF(IN,IO,8)=DCF4(IO)
      DO 20 J=1,8
   20 PDCF(IN,IO,J)=PDCF(IN,IO,J)*1.E+12
   30 CONTINUE
   40 CONTINUE
C FINALLY READ CHAIN RADIONUCLIDE INFORMATION
      READ(1,103) (LCH(I),(IC\ ',I),J=1,8),I=1,57)
      CLOSE(1)
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE MEURGE(NSTR,INDEX)
C-----------------------------------------------------------------
C MEURGE IS THE LARGEST SUBROUTINE IN IMPACTS.  IT INPUTS THE AREA
C AREA CONCENTRATION LIMITS (FROM LIMITS.DAT), CLASSIFIED WASTE STREAM
C DATA (FROM CLAOUT.DAT), WASTE STREAMS TO BE CONSIDERED (FROM INPUTS.DAT)
C AND WASTE VOLUMES TO BE CONSIDERED (FROM VOLUME.DAT).  IT ALSO
C CONDENSES THE WASTE STREAMS, RECALCULATES DISPOSAL TECHNOLOGY
C PARAMETERS, AND CALCULATES SEVERAL IMPACTS PARAMETERS.
```

```
C-----------------------------------------------------------------------
      CHARACTER BASNB(150)*10,BASNI(4)*10,BASND*10,NUCD(4)*8,TST*1
$INCLUDE:'IMPCOM.FOR'
      DIMENSION IREGI(4),IBLGI(4),FVOLI(4),ARL(100),COND(4),INDEX(6)
      QUADS(A,B,C)=(A-0.5*C)*(B-0.5*C)
      CUBCS(A,B,C)=A*B*C-0.25*(A+B)*C*C+C*C*C/12.
  101 FORMAT(83X,E8.1)
  102 FORMAT(8A10)
  103 FORMAT(A10,I7,2I5,I3,6I2,2X,I2/20X,E10.3,10X,2E10.3)
  104 FORMAT(7X,4(1X,A8,E9.2),A1)
  105 FORMAT(/2X'INPUTS STREAMS: NAME, REGN, BKLG, FRAC - OLD NSTR ='I5)
  106 FORMAT(4(A10,2I2,F6.0))
  107 FORMAT(2X,4(A10,2I2,F5.2,1X))
C BAS MUST BE SET EQUAL TO ZERO HERE, SINCE IT EXCEEDS 64K OF MEMORY.
      DO 10 I=1,NSTR
      DO 10 J=1,104
   10 BAS(I,J)=0.
      OPEN(1,FILE='LIMITS.DAT')
      READ(1,101) (ARL(I),I=1,100)
      CLOSE(1)
      OPEN(2,FILE='CLAOUT.DAT')
      OPEN(3,FILE='INPUTS.DAT')
      READ(3,102) (BASNB(I),I=1,150)
C START INPUT OF THE CLASSIFIED WASTE STREAMS
      ISTR=0
   12 ISTR=ISTR+1
      IF(ISTR.GT.NSTR)STOP 'TOO MANY WASTE STREAMS'
      READ(2,103,END=26) BASN(ISTR),(ISPC(ISTR,J),J=1,10),
     .                   ICL,(BAS(ISTR,J),J=2,4)
      IF(ICL.LE.2)IMOD(ISTR)=ICL
      IF(ICL.GT.2)IMOD(ISTR)=1+(ICL+1)/2
      IF(IMOD(ISTR).NE.5)GO TO 18
      DO 14 ISTQ=1,150
      IF(BASN(ISTR).EQ.BASNB(ISTQ))GO TO 16
   14 CONTINUE
      STOP 'CANT FIND THE INPUT WASTE STREAM'
   16 IF(ISTQ.GT.79)IMOD(ISTR)=6
   18 READ(2,104) (NUCD(I),COND(I),I=1,4),TST
      DO 24 J=1,4
      IF(NUCD(J).EQ.' ')GO TO 12
      DO 20 I=1,100
      IF(NUCD(J).EQ.NUC(I))GO TO 22
   20 CONTINUE
      STOP 'CANT FIND INPUT NUCLIDE NAME'
   22 BAS(ISTR,4+I)=COND(J)
   24 CONTINUE
      IF(TST.NE.'$')GO TO 18
      GO TO 12
C END OF CLASSIFIED WASTE STREAMS INPUT LOOP, START OF VOLUMES LOOP
   26 NSTR=ISTR-1
```

```
      CLOSE(2)
      OPEN(9,FILE='VOLUME.DAT',ACCESS='DIRECT',RECL=810)
      WRITE(6,105) NSTR
   28 READ(3,106,END=40) (BASNI(I),IREGI(I),IBLGI(I),FVOLI(I),I=1,4)
      WRITE(6,107) (BASNI(I),IREGI(I),IBLGI(I),FVOLI(I),I=1,4)
      DO 36 ISTRD=1,4
      IF(BASNI(ISTRD).EQ.' ')GO TO 40
      BASND=BASNI(ISTRD)
      DO 30 ISTQ=1,150
      IF(BASND.EQ.BASNB(ISTQ))GO TO 32
   30 CONTINUE
      STOP 'CANT FIND THE INPUT WASTE STREAM'
   32 IRI=IREGI(ISTRD)
      IBLG=IBLGI(ISTRD)
      DO 34 ISTR=1,NSTR
      IF(BASN(ISTR).NE.BASND)GO TO 34
      A1=VOLUMES(ISTQ,IRI,IBLG,IBEG,IEND)
C ONE DRUM VOLUME IS ASSIGNED TO EACH SOURCE
      IF(ISPC(ISTR,10).NE.0)A1=A1*0.208
      BAS(ISTR,1)=BAS(ISTR,1)+BAS(ISTR,2)*FVOLI(ISTRD)*A1
   34 CONTINUE
   36 CONTINUE
      GO TO 28
C END OF VOLUMES LOOP, CONDENSE WASTE STREAMS
   40 CLOSE (3)
      CLOSE (9)
      DO 50 ISTR=1,NSTR
      IF(BAS(ISTR,1).GT.1.E-12)GO TO 50
      DO 42 ISTRJ=ISTR,NSTR
      IF(BAS(ISTRJ,1).GT.1.E-12)GO TO 44
   42 CONTINUE
      GO TO 52
   44 BASN(ISTR)=BASN(ISTRJ)
      DO 46 J=1,104
   46 BAS(ISTR,J)=BAS(ISTRJ,J)
      DO 48 J=1,10
   48 ISPC(ISTR,J)=ISPC(ISTRJ,J)
      IMOD(ISTR)=IMOD(ISTRJ)
      BAS(ISTRJ,1)=0.
   50 CONTINUE
   52 NSTR=ISTR-1
C WASTE STREAMS HAVE BEEN CONDENSED, CALCULATE AREAL SUMS
      CALL ZERO(DISN,21)
      DO 58 ICL=1,6
      DO 56 J=1,100
      IF(ARL(J).LE.1.)GO TO 56
      A2=0.
      DO 54 ISTR=1,NSTR
      IF(ICL.EQ.IMOD(ISTR))A2=A2+BAS(ISTR,1)*BAS(ISTR,J+4)
   54 CONTINUE
```

```
      TSUM(ICL)=TSUM(ICL)+A2/ARL(J)
   56 CONTINUE
   58 CONTINUE
C CALCULATE MODE OF THE WASTE STREAM AND VOLUMES
      CALL ZERO(VOLS,14)
      DO 62 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      I1=0
      IF(ICL.EQ.0)GO TO 60
      CALL RETRV(ICL)
      I1=11
      IF(IB.EQ.3)I1=I1+1
      IF(ID.GT.8)I1=I1+2
      IF(ISPC(ISTR,9).NE.0)I1=I1+10
      IF(ISPC(ISTR,10).NE.0)I1=I1+20
   60 MODE(ISTR)=I1
      IF(IUQ(ICL).EQ.0)GO TO 62
      VOLS(ICL)=VOLS(ICL)+BAS(ISTR,1)
      VOLS(7)=VOLS(7)+BAS(ISTR,1)
   62 CONTINUE
      DO 64 ICL=1,6
      IF(VOLS(ICL).LE.1.E-6)IUQ(ICL)=0
   64 CONTINUE
C START RECALCULATION SUBSECTION
      ICL=1
   66 J=INDEX(ICL)
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 94
      IF(J.NE.1)GO TO 76
C SECTION FOR WASTE CLASSES DISPOSED IN SEPARATE DISPOSAL CELLS
      I=ICL
      HYT=DPT+DTK-DMIN(I)
      IF(DMIN(I).LE.2.)HYT=DTK
      A2=TSUM(I)
      IF(HYT.GT.0.)GO TO 68
      CALL MODIFY(ICL,NX)
      IF(NX.EQ.2)GO TO 94
      HYT=DPT+DTK-DMIN(I)
   68 IF(ID.LE.6)GO TO 72
C STRAIGHT WALLS SECTION
      A3=A2*HYT*EMP/VOLS(I)
      IF(A3.LE.1.)GO TO 70
      HYT=HYT/A3
      EFFQ(I)=HYT
      DPTQ(I)=DTK+DPT-HYT
      DTKQ(I)=HYT
   70 AREA(I)=VOLS(I)/(HYT*EMP)
      DISN(I)=AREA(I)/ACSQ(I)
      VBAK(I)=AREA(I)*(DTK-HYT)
      GO TO 94
```

```
C SLOPED WALLS SECTION
   72 A4=ALEN(I)
      A5=WIDT(I)
      A6=DTK+1.-HYT
      A7=VOLE(I)-CUBCS(A4,A5,A6)
      A3=A2*A7*EMP/(VOLS(I)*QUADS(A4,A5,DTK+1.))
      IF(A3.LE.1.)GO TO 74
      HYT=HYT/A3
      A6=DTK+1.-HYT
      A7=VOLE(I)-CUBCS(A4,A5,A6)
      EFFQ(I)=A7/QUADS(A4,A5,A6)
      SEFQ(I)=SEF*QUADS(A4,A5,1.)/QUADS(A4,A5,A6)
      DPTQ(I)=DTK+DPT-HYT
      DTKQ(I)=HYT
   74 DISN(I)=VOLS(I)/(A7*EMP)
      AREA(I)=DISN(I)*A4*A5
      VBAK(I)=DISN(I)*CUBCS(A4,A5,A6)
      GO TO 94
C MIXED DISPOSAL SECTION, STRAIGHT AND SLOPED WALLS ARE DONE TOGETHER
   76 I1=ICL
      I2=ICL+J-1
      VT=0.
      TS=0.
      DO 78 K=I1,I2
      VT=VT+VOLS(K)
      TS=TS+TSUM(K)
      IF(DPT+DTK.GT.DMIN(K))GO TO 78
      CALL MODIFY(ICL,NX)
      IF(NX.EQ.2)GO TO 76
   78 CONTINUE
      A4=ALEN(I1)
      A5=WIDT(I1)
      IF(ID.GT.6)DI3=VT/(EFF*EMP*ACSQ(I1))
      IF(ID.LE.6)DI3=VT/(EFF*EMP*QUADS(A4,A5,1.))
      DO 80 K=I1,I2
      A6=DMIN(K)-1.
      IF(ID.GT.6)DI4=VOLS(K)/(EMP*ACSQ(I1)*(DPT+DTK-DMIN(K)))
      IF(ID.LE.6)DI4=VOLS(K)/(EMP*(VOLE(K)-CUBCS(A4,A5,A6)))
      IF(DI3.LT.DI4)DI3=DI4
   80 CONTINUE
      A2=0.
      IF(ID.GT.6)AC=ACSQ(I1)
      IF(ID.LE.6)AC=QUADS(A4,A5,DTK+1.)
      DO 86 KK=I1,I2
      K=I2-KK+I1
   82 A3=VOLS(K)/(DI3*AC*EMP)
      IF(ID.GT.6)GO TO 84
      A1=QUADS(A4,A5,DTK+1.-A2-0.48*A3)
      IF(A1-AC.LT.0.01)GO TO 84
      AC=A1
```

```
      GO TO 82
   84 DTKQ(K)=A3
      A2=A2+DTKQ(K)
      DPTQ(K)=DTK+DPT-A2
      IF(ID.GT.6)AREA(K)=DI3*AC*VOLS(K)/VT
      IF(ID.LE.6)AREA(K)=DI3*A4*A5*VOLS(K)/VT
   86 CONTINUE
      A6=DTK+1.-A2
      IF(ID.GT.6)A3=TS/(AC*DI3)
      IF(ID.LE.6)A3=TS*EMP*(VOLE(K)-CUBCS(A4,A5,A6))/(VT*AC)
      IF(A3.LE.1.)A3=1.
   88 A2=0.
      IF(A3.GT.1.)DI3=DI3*A3
      DO 90 KK=I1,I2
      K=I2-KK+I1
      EFFQ(K)=EFFQ(K)/A3
      DTKQ(K)=DTKQ(K)/A3
      A2=A2+DTKQ(K)
      DPTQ(K)=DTK+DPT-A2
      AREA(K)=AREA(K)*A3
   90 DISN(K)=DI3*VOLS(K)/VT
      IF(DTK.GE.A2)GO TO 92
      A3=A2/DTK
      GO TO 88
   92 VBAK(I1)=DI3*AC*(DTK+1.-A2)
      ICL=ICL+J-1
   94 ICL=ICL+1
      IF(ICL.LE.6)GO TO 66
C CALCULATE TOTAL AREAS, PLUG BACKFILL VOLUMES, AND OTHER PARAMETERS
      DO 96 J=1,6
      VBAK(7)=VBAK(7)+VBAK(J)
      DISN(7)=DISN(7)+DISN(J)
      TSUM(7)=TSUM(7)+TSUM(J)
   96 AREA(7)=AREA(7)+AREA(J)
      B1=0.5+SQRT(1.25)
      A2=SQRT(B1*AREA(7))
      A3=30.
      IF(IBUF.EQ.2)A3=300.
      AREA(7)=AREA(7)+2.*A3*(A2+(A2/B1)+2.*A3)+200.
      SECTOR=A2/10.
      TTM(1)=0.5*SECTOR
      TTM(2)=0.5*SECTOR+A3
      TTM(3)=0.5*DSUR
      TTM(4)=DSUR
      DO 98 J=1,4
      TTM(J)=TTM(J)/SVEL
   98 TPC(J)=TTM(J)/DISP
      DTTM=SECTOR/SVEL
      DTPC=SECTOR/DISP
      RETURN
```

```
      END
C-----------------------------------------------------------------------
      SUBROUTINE RETRV(ICL)
C-----------------------------------------------------------------------
C RETRV SIMPLY RETRIEVES THE DISPOSAL TECHNOLOGY INDICES FOR CLASS ICL
C-----------------------------------------------------------------------
      COMMON/DTNX/ID(8),IDQ(6,8)/DTEC/EMP,EFF(4),EMPQ(3),EFFQ(6,4)
      DO 10 I=1,8
   10 ID(I)=IDQ(ICL,I)
      IE=ID(5)
      EMP=EMPQ(IE)
      DO 20 I=1,4
   20 EFF(I)=EFFQ(ICL,I)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE CHNS(INUC,GDEL)
C-----------------------------------------------------------------------
C CHNS CALCULATES THE DAUGHTER PRODUCTS OF INUC AND STORES THEM IN ACT
C-----------------------------------------------------------------------
      COMMON/CHYN/ICH(8,57),LCH(57),ACT(8)/NUCS/AL(100),
     +            FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
      REAL*8 Y,Z,DACT(8),HLM(8),EHLM(8)
      CALL ZERO(ACT,8)
      IF(INUC.GT.43)GO TO 10
      ACT(1)=EXM(AL(INUC)*GDEL)
      RETURN
   10 NCH=INUC-43
      IEN=LCH(NCH)
      DO 20 I=1,IEN
      J=ICH(I,NCH)
      HLM(I)=AL(J)
      Y=HLM(I)*GDEL
      Z=0.
      IF(Y.LT.85.)Z=DEXP(-Y)
   20 EHLM(I)=Z
      DACT(1)=EHLM(1)
      DO 60 I=2,IEN
      Y=1.0
      DO 30 J=2,I
   30 Y=Y*HLM(J)
      DACT(I)=0.
      DO 50 K=1,I
      Z=EHLM(K)
      DO 40 J=1,I
      IF(K.NE.J)Z=Z/(HLM(J)-HLM(K))
   40 CONTINUE
      DACT(I)=DACT(I)+Z
   50 CONTINUE
      DACT(I)=DACT(I)*Y
```

```
      IF(DACT(I).LT.0.)DACT(I)=0.
   60 CONTINUE
      DO 70 I=1,IEN
   70 ACT(I)=DACT(I)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE CALI(INUC)
C-----------------------------------------------------------------------
C CALI CALCULATES PDCF'S WEIGHTED WITH DAUGHTERS FOR INTIMP
C-----------------------------------------------------------------------
      COMMON/DCFS/PDCF(100,10,8)/CHYN/ICH(8,57),LCH(57),ACT(8)
     +       /CALS/C2(10),C3(10),C4(10),C5(10),C8(10)/NUCS/AL(100),
     +              FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
      IF(INUC.GT.43)GO TO 20
      A1=ACT(1)
      DO 10 IP=1,10
      C2(IP)=A1*PDCF(INUC,IP,2)
      C3(IP)=A1*PDCF(INUC,IP,3)
      C4(IP)=A1*PDCF(INUC,IP,4)*FMF(INUC)
      C5(IP)=A1*PDCF(INUC,IP,5)
   10 C8(IP)=A1*PDCF(INUC,IP,8)
      RETURN
   20 NCH=INUC-43
      IEN=LCH(NCH)
      CALL ZERO(C2,50)
      DO 40 I=1,IEN
      NN=ICH(I,NCH)
      DO 30 IP=1,10
      C2(IP)=C2(IP)+ACT(I)*PDCF(NN,IP,2)
      C3(IP)=C3(IP)+ACT(I)*PDCF(NN,IP,3)
      C4(IP)=C4(IP)+ACT(I)*PDCF(NN,IP,4)*FMF(NN)
      C5(IP)=C5(IP)+ACT(I)*PDCF(NN,IP,5)
   30 C8(IP)=C8(IP)+ACT(I)*PDCF(NN,IP,8)
   40 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE CALE(INUC)
C-----------------------------------------------------------------------
C CALE CALCULATES PDCF'S WEIGHTED WITH DAUGHTERS FOR EXPWAS
C-----------------------------------------------------------------------
      COMMON/DCFS/PDCF(100,10,8)/CALS/C3(10),C7(10),CDUM(30)
     +       /CHYN/ICH(8,57),LCH(57),ACT(8)
      IF(INUC.GT.43)GO TO 20
      A1=ACT(1)
      DO 10 IP=1,10
      C3(IP)=A1*PDCF(INUC,IP,3)
   10 C7(IP)=A1*PDCF(INUC,IP,7)
      RETURN
```

```
   20 NCH=INUC-43
      IEN=LCH(NCH)
      CALL ZERO(C3,20)
      DO 40 I=1,IEN
      NN=ICH(I,NCH)
      DO 30 IP=1,10
      C3(IP)=C3(IP)+ACT(I)*PDCF(NN,IP,3)
   30 C7(IP)=C7(IP)+ACT(I)*PDCF(NN,IP,7)
   40 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      FUNCTION VOLUMES(ISTQ,IRI,IBLG,IBEG,IEND)
C-----------------------------------------------------------------------
C READS GENERATED VOLUMES FROM VOLUME.DAT
C-----------------------------------------------------------------------
      CHARACTER NAME*10
      DIMENSION VL(4,50)
      READ(9,REC=ISTQ) NAME,VL
      A1=0.
      IF(NAME.EQ.'XXXXXXXXXX')GO TO 40
      I1=IBEG-1980-IBLG
      IF(I1.LE.0)STOP 'TOO MANY BACKLOG YEARS'
      I2=IEND-1980
      DO 20 I=I1,I2
   20 A1=A1+VL(IRI,I)
   40 VOLUMES=A1
      RETURN
      END
C-----------------------------------------------------------------------
      FUNCTION FUWT(EN,II)
C-----------------------------------------------------------------------
C FUWT CALCULATES THE RADIONUCLIDE-SPECIFIC GAMMA ATTENUATION
C COEFFICIENTS (CM**2/G) FOR WATER (II=1) AND SOIL (II=2).
C-----------------------------------------------------------------------
      DIMENSION ENE(17),UWT(17,2)
      DATA ENE/.01,.015,.02,.03,.04,.06,.08,.1,.15,.2,.3,.4,.6,.8,1.,1.5
     * ,2./,UWT/5.18,1.58,.775,.370,.267,.206,.184,.171,.151,.137,.119,
     * .106,.0896,.0786,.0707,.0575,.0494,19.0,5.73,2.49,.859,.463,.252,
     * .194,.169,.140,.126,.108,.0959,.0808,.0707,.0636,.0518,.0447/
      DO 10 I=1,17
      IF(EN.LT.ENE(I))GO TO 20
   10 CONTINUE
      I=18
   20 IF(I.NE.1)GO TO 30
      A1=(UWT(2,II)-UWT(1,II))/(ENE(2)-ENE(1))
      FUWT=UWT(1,II)+A1*(EN-ENE(1))
      RETURN
   30 IF(I.GT.17)GO TO 40
      A1=(UWT(I,II)-UWT(I-1,II))/(ENE(I)-ENE(I-1))
```

```
      FUWT=UWT(I-1,II)+A1*(EN-ENE(I-1))
      RETURN
   40 A1=(UWT(17,II)-UWT(16,II))/(ENE(17)-ENE(16))
      FUWT=UWT(17,II)-A1*(ENE(17)-EN)
      RETURN
      END
C-----------------------------------------------------------------------
      FUNCTION FACTS(GDEL,II,NX)
C-----------------------------------------------------------------------
C FACTS (AND THE FOLLOWING FSORS) RETURN WASTE STREAM SPECIFIC PATHWAY
C "REDUCTION" FACTORS FOR ACTIVATED METAL (AND SOURCE) WASTE STREAMS.
C IT SHOULD BE NOTED THAT ACTIVATED METAL FACTORS ARE READ IN FROM THE
C METALS.DAT FILE; A SIMILAR FILE HAS NOT BEEN PREPARED FOR FSORS.
C-----------------------------------------------------------------------
      DIMENSION FAC(20),FAD(20),FAW(20),FAG(20)
      DATA INDEX/1/,FAD/20*1./,FAW/20*1./
      IF(INDEX.EQ.0)GO TO 20
      OPEN(9,FILE='METALS.DAT')
      READ(9,101,END=10) (FAC(I),FAG(I),I=1,20)
  101 FORMAT(14X,2E9.2)
   10 CLOSE(9)
      INDEX=0
   20 IF(II.EQ.0.OR.II.GT.20)STOP 'FACTS HAS BEEN FED UNREAL II'
      A1=GDEL/FAC(II)
      IF(A1.GT.1.)A1=1.
      IF(NX.EQ.1)A2=FAC(II)
      IF(NX.EQ.2)A2=FAD(II)*A1
      IF(NX.EQ.3)A2=FAW(II)*A1
      IF(NX.EQ.4)A2=FAG(II)+A1*(1.-FAG(II))
      FACTS=A2
      RETURN
      END
C
      FUNCTION FSORS(GDEL,II,NX)
      DIMENSION FSS(20),FSD(20),FSW(20),FSG(20)
      DATA FSS/20*1./,FSD/20*1./,FSW/20*1./,FSG/20*1./,INDEX/1/
C AS CAN BE SEEN, ALL THE SOURCE PARAMETERS ARE SET EQUAL TO UNITY.
C A SECTION SIMILAR TO FACTS CAN BE INSERTED IF DATA BECOMES AVAILABLE.
   10 IF(II.EQ.0.OR.II.GT.20)STOP 'FSORS HAS BEEN FED UNREAL II'
      A1=GDEL/FSS(II)
      IF(A1.GT.1.)A1=1.
      IF(NX.EQ.1)A2=FSS(II)
      IF(NX.EQ.2)A2=FSD(II)
      IF(NX.EQ.3)A2=FSW(II)
      IF(A1.LT.1.AND.(NX.EQ.2.OR.NX.EQ.3))A2=0.
      IF(NX.EQ.4)A2=FSG(II)+A1*(1.-FSG(II))
      FSORS=A2
      RETURN
      END
C
```

```
      SUBROUTINE ZERO(A,N)
      DIMENSION A(N)
      DO 10 I=1,N
   10 A(I)=0.
      RETURN
      END
C
      FUNCTION EXM(A1)
      A2=0.0
      IF(A1.LT.85.)A2=EXP(-A1)
      EXM=A2
      RETURN
      END

      SUBROUTINE MODIFY(ICL,NX)
      CHARACTER LAB(3)*24,BCL(7)*5
      COMMON/DTEC/PREL(5),EMPQ(15),DPTQ(6),DTKQ(6)/DTNX/IDS(8),IDQ(6),
     +          IUQ(6),IRST(36)/FTEC/DMIN(30),DISN(7),VOLS(7),REST(29)
      DATA LAB/'STOP                    : 1','DO NOT CONSIDER CLASS: 2',
     +         'MODIFY DMIN TO 2M       : 3'/,BCL/'   A ',',' SA ',
     3         '   B ','   C ','  D1 ','  D2 ','TOTAL'/
  101 FORMAT(/2X'*** DEPTH PROBLEM ***'/2X'CLASS: 'A5,2X'DMIN:'F5.1,
     * 2X'ID:'I3,2X'DPT:'F5.1,2X'DTK:'F5.1//2X'OPTIONS FOLLOW'/
     * 2X,A24/2X,A24/2X,A24/2X'SELECT FROM ABOVE     : '\)
  102 FORMAT(I1)
  103 FORMAT(//2X'OPTION 'I1' HAS BEEN SELECTED, PROGRAM CONTINUING'/)
      WRITE(6,101) BCL(ICL),DMIN(ICL),IDQ(ICL),DPTQ(ICL),DTKQ(ICL),LAB
   10 WRITE(*,101) BCL(ICL),DMIN(ICL),IDQ(ICL),DPTQ(ICL),DTKQ(ICL),LAB
      READ(*,102) IOPT
      IF(IOPT.LT.1.OR.IOPT.GT.3)GO TO 10
      IF(IOPT.EQ.1)STOP 'STOP OPTION FROM MODIFY HAS BEEN SELECTED'
      WRITE(6,103) IOPT
      IF(IOPT.EQ.3)GO TO 20
      IUQ(ICL)=0
      VOLS(7)=VOLS(7)-VOLS(ICL)
      VOLS(ICL)=0.
      NX=2
      RETURN
   20 DMIN(ICL)=2.
      NX=3
      RETURN
      END
C
      BLOCK DATA
      COMMON/DTEC/V1(5),EMPQ(3),V2(24)
      DATA EMPQ/.5,.75,1./
      END
```

B.6 INTRUDE Code

```
      PROGRAM INTRUDE
C-----------------------------------------------------------------------
C THIS PROGRAM CALCULATES POST DISPOSAL INTRUDER SCENARIO IMPACTS
C USING THE UPDATED METHODOLOGY CONTAINED IN NUREG/CR-4370.
C IT USES THE FOLLOWING FILES (SAME FILES AS IMPACTS):
C
C    (1) IMPCON.DAT - INPUT COMMAND FILE
C    (2) FUNDCF.DAT - FUNDAMENTAL DOSE CONVERSION FACTORS AND OTHER
C                     RADIONUCLIDE SPECIFIC INFORMATION.
C    (3) ENVIRO.DAT - ENVIRONMENTAL PARAMETERS
C    (4) INPUTS.DAT - WASTE STREAMS TO BE CONSIDERED
C    (5) CLAOUT.DAT - CLASSIFIED WASTE STREAM DATA (OUTPUT OF CLASIFY)
C    (6) DISTEC.DAT - DISPOSAL TECHNOLOGY INFORMATION
C    (7) LIMITS.DAT - RADIONUCLIDE LIMITS (AREA CONCENTRATIONS USED HERE)
C    (8) VOLUME.DAT - REGION SPECIFIC ANNUAL WASTE STREAM VOLUMES
C    (9) METALS.DAT - ACTIVATED METALS INFORMATION, AND
C   (10) SOURCE.DAT - SOURCE WASTE STREAM INFORMATION.
C
C ITS RESULTS ARE OUTPUT INTO A FILE CALLED INTOUT.DAT.  THIS FILE IS
C RECREATED FOR EACH NEW RUN. THUS, THERE MUST NOT BE A FILE WITH
C THIS NAME AT THE TIME OF PROGRAM EXECUTION.
C
C THE PROGRAM IS WRITTEN FOR AN IBM PERSONAL COMPUTER OR A COMPATIBLE
C COMPUTER SUCH AS COMPAQ.  THE PROGRAM IS COMPILED AND EXECUTED USING
C MICROSOFT FORTRAN77 VERSION 3.30.
C
C AUTHORS AND COGNIZANT INDIVIDUALS ARE:
C
C O. I. OZTUNALI  - (212) 839-3235
C ENVIROSPHERE COMPANY, TWO WORLD TRADE CENTER, NY, NY, 10048
C
C G. W. ROLES     - (301) 427-4791
C USNRC, 7915 EASTERN AVE, SILVER SPRING, MD 20910
C-----------------------------------------------------------------------
$DEBUG
$NOFLOATCALLS
      CHARACTER TYMC(10)*8,SCN(4)*9,ORG(10)*8,BIC(7)*5,BASN*10,NUC*8
C WHAT FOLLOWS IS CONTAINED IN A FILE CALLED IMPCOM.FOR, AND IS
C INPUT INTO SEVERAL SUBROUTINES THROUGH THE "$INCLUDE" METACOMMAND.
C SEE APPENDIX A/VOLUME 2 FOR PARAMETER DEFINITIONS.
      COMMON/CHRC/BASN(249),NUC(100)/DCFS/PDCF(100,10,8)
     +/BAST/BAS(249,104),BIMP(7,10,60),ISPC(249,10),IMOD(249),MODE(249)
     +/NUCS/AL(100),FMF(100),UWT(100,2),RET(100,5),FRACT(100,3)
     +/FACI/IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS,ILFE
     +/DTEC/EMP,EFF,SEF,DPT,DTK,EMPQ(3),EFFQ(6),SEFQ(6),DPTQ(6),DTKQ(6)
     +/DTNX/ID(8),IDQ(6,8)/FTEC/DMIN(6),VOLE(6),ACSQ(6),ALEN(6),
     + WIDT(6),DISN(7),VOLS(7),AREA(7),VBAK(7),TSUM(7),RADF(8)
     +/ENVT/TDP(4),TDO(4),TPO(4),VEL(4),CSK(4,4),DIS(4,4,5),STP(4,4,5)
     +/ENVI/FSC,FSA,AXOQ,FXOQ,POPE,POPW,EERO,EINT,POP(4),NRET/ENVG/
     + PRC(2),TSC(2),QFC(4),UTTM,DTTM,DTPC,TTM(4),TPC(4),DSUR,SVEL,DISP
```

```
C END OF IMPCOM.FOR FILE
      COMMON/CHYN/ICH(8,57),LCH(57),ACT(8)/UPTK/FK(27)/CALS/DUMMY(50)
      DIMENSION TYMD(10),INDEX(6)
      DATA TYMC/'   0 YRS','  20 YRS','  60 YRS',' 100 YRS',' 200 YRS',
     2          ' 300 YRS',' 500 YRS','  1K YRS','  2K YRS','  5K YRS'/,
     5   SCN/'DRILLING ','DISCOVERY','CONSTRCTN','AGRICULTR'/,NSTR/249/,
     3       ORG/' LUNGS   ','S. WALL  ','LLI WALL','T. BODY  ','KIDNEYS  ',
     4          ' LIVER   ','RED MAR  ','  BONE   ','THYROID  ','  ICRP   '/,
     6   BIC/'  A   ','  SA  ','  B   ','  C   ','  D1  ','  D2  ','TOTAL'/
      DATA TYMD/0.,20.,60.,100.,200.,300.,500.,1000.,2000.,5000./
  101 FORMAT(8A10)
  102 FORMAT(1H1/2X'INTRUDE PROGRAM: '8A10)
  103 FORMAT(10I5)
  104 FORMAT(2X'IR  ='I3,2X'OVFL='I3,2X'IBUF='I3,2X'NBRN='I3,
     *        2X'NBES='I3/2X'ICLS='I5,2X'IOBS='I5,2X'IINS='I5/
     *        2X'IBEG='I5,2X'IEND='I5,2X'ILFE='I5)
  105 FORMAT(/2X'COMBINATION INDICES ARE: '6I4)
  106 FORMAT(8E11.4)
  107 FORMAT(/2X'MINIMUM DEPTHS ARE: '6F6.1)
  108 FORMAT(/2X'DISPOSAL CONFIGURATION'//3X'NO ID IU IT IC IE IB IX IS'
     * 3X'EFF'6X'SEF'6X'DPT'6X'DTK'5X'VOLE'5X'AREA')
  109 FORMAT(2X,9I3,1P,6E9.2)
  110 FORMAT(/2X'RECALCULATED PARAMETERS'//3X'NO'3X'EFF'6X'SEF'6X
     *          'DPT'6X'DTK'5X'TSUM'5X'AREA'5X'DISN'5X'VBAK')
  111 FORMAT(2X,I3,1P,8E9.2)
  201 FORMAT(/2X'NEW WASTE STREAM DATA - NSTR ='I4//1P,3(2X,A5'='E9.2)/
     + 4(2X,A5'='E9.2)//2X'NAME,VOLM,NET CON/ACT,IMOD,MODE,ISPC INDXS')
  202 FORMAT(2X,1P,A10,2E9.2,2I4,I9,2I5,I4,6I2)
  301 FORMAT(1H1/2X'IMPACTS OF CLASS 'A5,1P/'  VOLS='E9.2'  AREA='E9.2/
     * 2X,'DPT ='E9.2'  DTK ='E9.2/2X'TSUM='E9.2'  DISN='E9.2)
  302 FORMAT(/2X'SCENARIO: 'A9/2X'    TIMES '10(A8,1X))
  303 FORMAT(2X,A8,1P,10E9.2)
C PRELIMINARY READ AND WRITE OF INFORMATION: PROGRAM TITLE (BASN);
C GENERAL DECISION INDICES; COMBINATION INDICES (INDEX); MINIMUM
C DEPTHS (DMIN); AND DISPOSAL TECHNOLOGY CONFIGURATION AND PARAMETERS.
      OPEN(6,FILE='INTOUT.DAT',STATUS='NEW')
      OPEN(1,FILE='IMPCON.DAT')
      READ(1,101) (BASN(I),I=1,8)
      WRITE(6,102) (BASN(I),I=1,8)
      READ(1,103) IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS
      ILFE=IEND-IBEG+1
      WRITE(6,104) IR,IOFL,IBUF,NBRN,NBES,ICLS,IOBS,IINS,IBEG,IEND,ILFE
      READ(1,103) INDEX
      WRITE(6,105) INDEX
      READ(1,106) DMIN
      WRITE(6,107) DMIN
      OPEN(2,FILE='DISTEC.DAT',FORM='FORMATTED',ACCESS='DIRECT',RECL=88)
      DO 10 I=1,6
      READ(1,103) (IDQ(I,J),J=1,8)
      IREC=IDQ(I,1)
```

```
      READ(2,106,REC=IREC) EFFQ(I),SEFQ(I),DPTQ(I),DTKQ(I),
     *                     VOLE(I),ACSQ(I),ALEN(I),WIDT(I)
   10 CONTINUE
      WRITE(6,108)
      WRITE(6,109) (I,(IDQ(I,J),J=1,8),EFFQ(I),SEFQ(I),
     *             DPTQ(I),DTKQ(I),VOLE(I),ACSQ(I),I=1,6)
      CLOSE (1)
      CLOSE (2)
C END OF PRELIMINARY READ AND WRITE OF INFORMATION. START OF MAIN CODE.
C READE - ENVIRONMENTAL PARAMETERS, READF - RADIONUCLIDE PARAMETERS.
      CALL READE(IR)
      CALL READF(IR)
C MEURGE - VOLUMES AND RECALCULATION OF PARAMETERS
      CALL MEURGE(NSTR,INDEX)
      WRITE(6,110)
      WRITE(6,111) (I,EFFQ(I),SEFQ(I),DPTQ(I),DTKQ(I),
     *                TSUM(I),AREA(I),DISN(I),VBAK(I),I=1,6)
      WRITE(6,201) NSTR,(BIC(I),VOLS(I),I=1,7)
      WRITE(6,202) (BASN(I),BAS(I,1),BAS(I,4),IMOD(I),MODE(I),
     +             (ISPC(I,J),J=1,10),I=1,NSTR)
C CALCULATE IMPACTS, CALCULATE TOTAL IMPACTS, AND PRINT.
      CALL INTIMP(NSTR,TYMD)
      DO 20 K=1,6
      A1=VOLS(K)/VOLS(7)
      DO 20 I=1,40
      DO 20 J=1,10
   20 BIMP(7,J,I)=BIMP(7,J,I)+BIMP(K,J,I)*A1
      DO 40 K=1,7
      WRITE(6,301)BIC(K),VOLS(K),AREA(K),DPTQ(K),DTKQ(K),TSUM(K),DISN(K)
      DO 30 IJ=1,4
      WRITE(6,302) SCN(IJ),ORG
      I1=(IJ-1)*10
   30 WRITE(6,303) (TYMC(I),(BIMP(K,J,I+I1),J=1,10),I=1,10)
   40 CONTINUE
      CLOSE (6)
      STOP 'NORMAL TERMINATION'
      END
C------------------------------------------------------------------------
      SUBROUTINE INTIMP(NSTR,TYMD)
C------------------------------------------------------------------------
C INTIMP CALCULATES IMPACTS ASSOCIATED WITH INTRUDER SCENARIOS. FIVE
C SCENARIOS ARE CONSIDERED: DRILLING, DRILLING AGRICULTURE, DISCOVERY,
C CONSTRUCTION, AND AGRICULTURE.  DRILLING-AGRICULTURE AND RADON IMPACTS
C ARE CONSIDERED ONLY IN THE AGRICULTURE SCENARIO.
C------------------------------------------------------------------------
$INCLUDE:'IMPCOM.FOR'
      COMMON/CALS/Z2(10),Z3(10),Z4(10),Z5(10),Z8(10)
      DIMENSION TYMD(10)
      CALL ZERO(BIMP,4200)
      DO 90 ITY=1,10
```

```
C TEN DIFFERENT DECAY TIMES ARE CONSIDERED FOR THE FOUR DISTINCT
C SCENARIOS: DRILLING, DISCOVERY, CONSTRUCTION, AND AGRICULTURE.
      GDEL=ICLS+IOBS+TYMD(ITY)
      DO 60 IN=1,100
C NUCLIDE LOOP IS OUTERMOST DUE TO EXECUTION TIME REQUIRED BY CHNS/CALI.
      CALL CHNS(IN,GDEL)
      CALL CALI(IN)
      DO 50 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 50
C IU=0 SIGNIFIES (1) CLASS IS NOT CONSIDERED, OR (2) VOLUME IS ZERO.
      A11=BAS(ISTR,1)*BAS(ISTR,IN+4)/VOLS(ICL)
      IF(A11.LT.1.E-30)GO TO 50
      I1=MODE(ISTR)/10
      I2=MODE(ISTR)-I1*10
C MODE IS AN ARRAY SET IN MEURGE.  IT SIGNIFIES THE FOLLOWING:
C I1 = 1 - REGULAR; 2 - ACT MET; 3 - SOURCE;
C I2 = 1 - REGULAR; 2 - GROUTED; 3 - RC; 4 - GROUTED & RC;
      I5=ISPC(ISTR,5)
      I6=ISPC(ISTR,6)
      I8=ISPC(ISTR,8)
      I9=ISPC(ISTR,9)
      I10=ISPC(ISTR,10)
      IF(I1.EQ.2)GDELA=FACTS(GDEL,I9,1)
      IF(I1.EQ.3)GDELS=FSORS(GDEL,I10,1)
      IF(I1.NE.3.OR.I8.LE.1)GO TO 10
      IF(GDELS.LT.300.)GDELS=300.
      IF(GDEL.LT.GDELS)GO TO 50
C FD IS F-SUB-D; A5 IS DISPERSIBILITY FACTOR (IF ANY);
C A6 IS LEACHABILITY FACTOR; AND A9 IS ACTIVATED METAL FACTOR.
   10 FD=EMP*SEF
      A5=1.
      A6=1.
      A9=1.
      IF(I1.NE.1)GO TO 12
      IF(NBES.NE.0)A5=10.**(-I5)
      GO TO 16
   12 IF(I1.EQ.3)GO TO 14
      A5=FACTS(GDEL,I9,2)
      A6=FACTS(GDEL,I9,3)
      A9=FACTS(GDEL,I9,4)
      GO TO 16
   14 A5=FSORS(GDEL,I10,2)*A11/FD
      A6=FSORS(GDEL,I10,3)*A11/FD
      A9=FSORS(GDEL,I10,4)*A11/FD
   16 F2=FD*0.057
C F2 IS MODIFIED DEPENDING ON THE WASTE DISPOSAL DEPTH (DPT).
      IF(DPT.GE.5.)F2=F2*0.1
      IF(DPT.GE.10.)F2=0.
```

```
      IF(I1.EQ.2.AND.GDEL.LT.GDELA)GO TO 20
      IF(I1.EQ.3.AND.GDEL.LT.GDELS)GO TO 20
C     IF(GDEL.LE.500..AND.I2.GE.3)GO TO 20
C DRILLING
      F1=2.9E-05
      IF(I1.NE.3)F1=FD*DTK*9.39E-07
      A12=F1*A11*UWT(IN,1)
      IF(A12.LE.1.E-30)GO TO 20
      DO 18 IG=1,10
   18 BIMP(ICL,IG,ITY)=BIMP(ICL,IG,ITY)+A12*Z5(IG)
C DISCOVERY & CONSTRUCTION
   20 A1=F2*A5*FSC
      A3=F2*A9
      IF(I1.EQ.3)A4=FSORS(GDEL,I10,4)*2.19E-4
      IF(DPT.GE.5.)A4=A4*0.1
      IF(DPT.GE.10.)A4=0.
      DO 30 IG=1,10
      D2=A1*Z2(IG)+A3*Z5(IG)
      IF(I1.EQ.3)D2=D2+A4*Z8(IG)
      BIMP(ICL,IG,ITY+10)=BIMP(ICL,IG,ITY+10)+D2*A11*1.2E-2
      BIMP(ICL,IG,ITY+20)=BIMP(ICL,IG,ITY+20)+D2*A11
   30 CONTINUE
C AGRICULTURE AND DRILLING-AGRICULTURE (F3)
      F4=F2*0.25/0.057
      IF(I1.EQ.3)F4=F4*1.02
      F3=1.11E-6*DTK*FD*UWT(IN,2)
      IF(I1.EQ.3)F3=3.43E-5*UWT(IN,2)
      B1=F4*A5*FSA
      B2=F4*A6*0.5
      B3=F4*A9*0.27
      B4=B3*0.132
      B3=B3+F3
      IF(I1.EQ.2)B3=B3*A5
      IF(I1.EQ.2)B4=B4*(1.-A5)
      DO 40 IG=1,10
      D2=B1*Z3(IG)+B2*Z4(IG)+B3*Z5(IG)
      IF(I1.EQ.2)D2=D2+B4*Z8(IG)
      IF(I1.EQ.3.AND.GDEL.LT.GDELS)D2=B4*Z8(IG)
   40 BIMP(ICL,IG,ITY+30)=BIMP(ICL,IG,ITY+30)+D2*A11
   50 CONTINUE
   60 CONTINUE
C RADON SECTION
      C1=AL(45)*GDEL
      C2=AL(47)*GDEL
      DO 80 ISTR=1,NSTR
      ICL=IMOD(ISTR)
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 80
      A11=BAS(ISTR,1)/VOLS(ICL)
C ATTENUATE RADON USING CALCULATED DISPOSAL DEPTHS.
```

```
      C3=EXM((DPT-3.)*0.977)
      IF(C3.GT.1.)C3=1.
      A11=A11*C3
      FD=EMP*SEF
      C3=BAS(ISTR,49)*EXM(C1)
      C4=BAS(ISTR,51)+BAS(ISTR,52)
      IF(C1.NE.C2)C3=C3+C4*C1*(EXM(C1)-EXM(C2))/(C2-C1)
      C3=C3*A11*FD*1.03E-6
      IF(C3.LE.1.E-30)GO TO 80
      DO 70 IG=1,10
   70 BIMP(ICL,IG,ITY+30)=BIMP(ICL,IG,ITY+30)+C3*PDCF(44,IG,2)
   80 CONTINUE
   90 CONTINUE
      RETURN
      END
C-------------------------------------------------------------------
C THE REMAINDER OF THIS CODE, STARTING WITH SUBROUTINE READE, IS
C IDENTICAL WITH THE IMPACTS CODE.  THIS SECTION HAS BEEN GIVEN
C EARLIER IN THIS APPENDIX AS PART OF THE IMPACTS CODE.
C-------------------------------------------------------------------
```

B.7 ECONOMY Code

```
      PROGRAM ECONOMY
C-----------------------------------------------------------------------
C THIS PROGRAM CALCULATES THE PROCESSING AND TRANSPORTATION IMPACTS
C AND THE DISPOSAL COSTS USING THE UPDATED METHODOLOGY CONTAINED IN
C NUREG/CR-4370. IT USES THE FOLLOWING FILES (ALSO USED BY IMPACTS):
C
C    (1) IMPCON.DAT - INPUT COMMAND FILE
C    (2) FUNDCF.DAT - FUNDAMENTAL DOSE CONVERSION FACTORS AND OTHER
C                     RADIONUCLIDE SPECIFIC INFORMATION.
C    (3) ENVIRO.DAT - ENVIRONMENTAL PARAMETERS
C    (4) INPUTS.DAT - WASTE STREAMS TO BE CONSIDERED
C    (5) CLAOUT.DAT - CLASSIFIED WASTE STREAM DATA (OUTPUT OF CLASIFY)
C    (6) DISTEC.DAT - DISPOSAL TECHNOLOGY INFORMATION
C    (7) LIMITS.DAT - RADIONUCLIDE LIMITS, AND
C    (8) VOLUME.DAT - REGION SPECIFIC ANNUAL WASTE STREAM VOLUMES
C
C IT DOES NOT USE THE TWO FILES CALLED METALS.DAT AND SOURCE.DAT. ITS
C RESULTS ARE OUTPUT INTO A FILE CALLED ECYOUT.DAT.  THIS FILE IS
C RECREATED FOR EACH NEW RUN. THUS, THERE MUST NOT BE A FILE WITH
C THIS NAME AT THE TIME OF PROGRAM EXECUTION.
C
C THE PROGRAM IS WRITTEN FOR AN IBM PERSONAL COMPUTER OR A COMPATIBLE
C COMPUTER SUCH AS COMPAQ.  THE PROGRAM IS COMPILED AND EXECUTED USING
C MICROSOFT FORTRAN77 VERSION 3.30.
C
C AUTHORS AND COGNIZANT INDIVIDUALS ARE:
C
C O. I. OZTUNALI  - (212) 839-3235
C ENVIROSPHERE COMPANY, TWO WORLD TRADE CENTER, NY, NY, 10048
C
C G. W. ROLES     - (301) 427-4791
C USNRC, 7915 EASTERN AVE, SILVER SPRING, MD 20910
C-----------------------------------------------------------------------
$DEBUG
$NOFLOATCALLS
      CHARACTER TITLE(2)*20,NMPS*7,NMEQ*9
C WHAT FOLLOWS ARE THE COMMON BLOCKS USED IN ECONOMY.  UNLIKE THE
C IMPACTS AND INTRUDE CODES, THEY ARE HANDLED EXPLICITLY/SEPARATELY
C IN ECONOMY.  SEE APPENDIX A/VOLUME 2 FOR PARAMETER DEFINITIONS.
      COMMON/CHRC/NMPS(23),NMEQ(27)/CSHP/KONTS(6,18),KSHP(6),DSHP(6)
     +/MANP/WRK(9)/EQPT/EQP(27)/MANC/MC(6)/EQPC/IEQP(27,2)/UPTK/FK(27)
      COMMON/FACI/IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS,ILFE
     +/DTEC/EMP,EFF,SEF,DPT,DTK,EMPQ(3),EFFQ(6),SEFQ(6),DPTQ(6),DTKQ(6)
     +/DTNX/ID(8),IDQ(6,8)/FTEC/DMIN(6),VOLE(6),ACSQ(6),ALEN(6),WIDT(6),
     + DISN(7),VOLS(7),AREA(7),VBAK(7),TSUM(7),RADF(8)/BAST/DMY(10152)
C END OF COMMON BLOCKS
      DIMENSION INDEX(6),ISWC(6),VL(50)
      DATA NSTR/249/
  101 FORMAT(2A20)
  102 FORMAT(1H1/2X'ECONOMY PROGRAM : '2A20)
```

```
  103 FORMAT(10I5)
  104 FORMAT(2X'IR  ='I3,2X'OVFL='I3,2X'IBUF='I3,2X'NBRN='I3,
     *       2X'NBES='I3/2X'ICLS='I5,2X'IOBS='I5,2X'IINS='I5/
     *       2X'IBEG='I5,2X'IEND='I5,2X'ILFE='I5 )
  105 FORMAT(/2X'COMBINATION INDICES ARE: '6I4)
  106 FORMAT(8E11.4)
  107 FORMAT(/2X'MINIMUM DEPTHS ARE: '6F6.1)
  108 FORMAT(/2X'DISPOSAL CONFIGURATION'//3X'NO ID IU IT IC IE IB IX IS'
     * 3X'EFF'6X'SEF'6X'DPT'6X'DTK'5X'VOLE'5X'AREA')
  109 FORMAT(2X,9I3,1P,6E9.2)
  110 FORMAT(/2X'DISPOSAL CONFIGURATION - ANNUAL VALUES'//3X'NO'3X
     * 'EFF'6X'SEF'6X'DPT'6X'DTK'5X'TSUM'5X'AREA'5X'DISN'5X'VBAK')
  111 FORMAT(2X,I3,1P,8E9.2)
C PRELIMINARY READ AND WRITE OF INFORMATION: PROGRAM TITLE; GENERAL
C DECISION INDICES; COMBINATION INDICES (INDEX); MINIMUM DEPTHS
C (DMIN); AND DISPOSAL TECHNOLOGY CONFIGURATION AND PARAMETERS.
      OPEN(1,FILE='IMPCON.DAT')
      OPEN(6,FILE='ECYOUT.DAT',STATUS='NEW')
      READ(1,101) TITLE
      WRITE(6,102) TITLE
      READ(1,103) IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS
      ILFE=IEND-IBEG+1
      WRITE(6,104) IR,IOFL,IBUF,NBRN,NBES,ICLS,IOBS,IINS,IBEG,IEND,ILFE
      READ(1,103) INDEX
      WRITE(6,105) INDEX
      READ(1,106) DMIN
      WRITE(6,107) DMIN
      OPEN(2,FILE='A:DISTEC.DAT',FORM='FORMATTED',ACCESS='DIRECT',
     *       RECL=88)
      DO 10 I=1,6
      READ(1,103) (IDQ(I,J),J=1,8)
      IREC=IDQ(I,1)
      READ(2,106,REC=IREC) EFFQ(I),SEFQ(I),DPTQ(I),DTKQ(I),
     *                     VOLE(I),ACSQ(I),ALEN(I),WIDT(I)
   10 CONTINUE
      WRITE(6,108)
      WRITE(6,109) (I,(IDQ(I,J),J=1,8),EFFQ(I),SEFQ(I),
     *                 DPTQ(I),DTKQ(I),VOLE(I),ACSQ(I),I=1,6)
      CLOSE (1)
      CLOSE (2)
C END OF PRELIMINARY READ AND WRITE OF INFORMATION. START OF MAIN CODE.
C ENVIRONMENTAL PARAMETERS AND RADIONUCLIDE PARAMETERS ARE READ IN
C MEURGE, WHICH CALCULATES VOLUMES, RECALCULATES DT PARAMETERS, AND
C CALCULATES AND PRINTS PROCESSING AND TRANSPORTATION IMPACTS.
      CALL MEURGE(NSTR,INDEX,ISWC)
C PREOPS PERFORMS CALCULATION OF PREOPERATIONAL AND OPERATIONAL COSTS.
      CALL PREOPS(ISWC,UNST,STAB)
      WRITE(6,110)
      WRITE(6,111) (I,EFFQ(I),SEFQ(I),DPTQ(I),DTKQ(I),
     *                TSUM(I),AREA(I),DISN(I),VBAK(I),I=1,6)
```

```
C CLOSUR AND SURACT PERFORM CLOSURE/OBSERVATION/INSTITUTIONAL COSTS.
      CALL CLOSUR(ISWC)
      CALL SURACT(UNST,STAB,ILFE)
C WRITIT PRINTS COSTS FOR ALL PERIODS.
      CALL WRITIT
C TVALUE PERFORMS TIME VALUE OF MONEY CALCULATIONS, AND PRINTS THEM OUT.
      DO 20 I=1,ILFE
   20 VL(I)=VOLS(7)
      CALL TVALUE(VL,ILFE,ICLS,IOBS,IINS)
      STOP 'NORMAL TERMINATION'
      END
C-----------------------------------------------------------------------
      SUBROUTINE PREOPS(ISWC,UNST,STAB)
C-----------------------------------------------------------------------
C PREOPS PERFORMS PREOPERATIONAL AND OPERATIONAL COST CALCULATIONS.
C THESE TWO PERIODS ARE INTIMATELY INTERACTIVE; THUS, THEY CANNOT BE
C SEPARATED INTO TWO DISTINCT ALGORITHMS.
C-----------------------------------------------------------------------
      COMMON/MANP/WRK(9)/MANC/MC(6)/EQPT/EQP(27)/EQPC/IEQP(27,2)
     +/FACI/IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS,ILFE
     +/DTNX/ID,IU,IT,IC,IE,IB,IX,IS,IDQ(6),IUQ(6),ITQ(6),ICQ(6),IEQ(6),
     + IBQ(6),IXQ(6),ISQ(6)/FTEC/DMIN(6),VOLE(6),ACSQ(6),ALEN(6),WIDT(6)
     + ,DISN(7),VOLS(7),AREA(7),VBAK(7),TSUM(7),RADF(8)/OPEQ/A8(27)
     +/BAST/PAC(5,11),OPC(50,11),CLC(3),SUC(4),AIC(2),ETC(9538)
C/MANP/WRK(1) = Rad Tech       ; WRK(2) = QA Tech  ; WRK(3) = HE Operator
C       WRK(4) = S Laborer     ; WRK(5) = Laborer  ; WRK(6) = Surveyor
C       WRK(7) = Non-Badged Ad ; WRK(8) = Badged Ad; WRK(9) = Security
C/EQPT/EQP(1) = Bulldozer   ; EQP(2) = FE Loader     ; EQP(3) = Dump Truck
C       EQP(4) = Pan Scraper ; EQP(5) = Motor Grader ; EQP(6) = Backhoe
C       EQP(7) = 40 Ton Crane; EQP(8) = 100 Ton Crane; EQP(9) = S Forklift
C       EQP(10) = L Forklift ; EQP(11) = Water Truck ; EQP(12) = Auger Rig
C       EQP(13) = Stemmer    ; EQP(14) = Paving M    ; EQP(15) = Tandem RL
C       EQP(16) = Compactor  ; EQP(17) = H Tamper    ; EQP(18) = CEM Truck
C       EQP(19) = CEM BCKET  ; EQP(20) = CEM PU&PI   ; EQP(21) = Pickup Tr
C       EQP(22) = 4WD Truck  ; EQP(23) = Sedan       ; EQP(24) = Yard TRKR
C       EQP(25) = Flatbed    ; EQP(26) = Accessors   ; EQP(27) = Farm TRKR
      DIMENSION PCT1(5),PCT2(5),CST2(5,2),CST1(5),ISWC(6),A6(5),A7(5)
      DATA PCT1/.2,3*.02,.74/,PCT2/0.,.1,0.,.1,.8/,CST1/4*0.,200./,
     2 CST2/1150.,1891.,392.,1043.,350.,1150.,1957.,457.,1111.,350./,
     3 A6/2.E3,5.E3,2.E4,3.5E4,5.E4/,A7/40.,100.,200.,350.,500./
C PAC(YEAR,NO) CONTAINS THE FOLLOWING (BASED ON TABLE 6-2):
C (1) LAND; (2) LICENSING; (3) ADMIN; (4) STARTUP OVERHEAD;
C (5) HEAVY EQPT; (6) LIGHT EQP; (7) LAND DEVMNT; (8) BUILDINGS;
C (9) UTILS; (10) ENGINEERING & DESIGN; AND (11) CONTINGENCY.
      CALL ZERO(PAC,614)
      AADM=9.1*4047.
      ADIS=AREA(7)*ILFE
      DL=1.272*SQRT(ADIS)
      DW=DL/1.618
      BW=30.5
```

```
      IF(IBUF.EQ.1)BW=305.
      PL=2*(DL+DW+4.*BW)
      ABUF=2.*BW*(DL+DW+2.*BW)
      ACON=0.3*(ADIS+ABUF)
      PER1=PL+2.*DL+4.*BW
      C1=(AADM+ADIS+ABUF+ACON)*2.*2.471E-4
C CALCULATE LAND PREP (3.583E-4); ACCESS ROADS (100.); FENCING & LIGHTING
C (PL*.06581); PERIMETER ROADS (PER1*0.05).  PARKING IS ADDED LATER.
      C2=(AADM+ADIS+ABUF)*3.583E-4+100.+PL*.06581+PER1*0.05
      DO 10 I=1,5
      PAC(I,1)=PCT1(I)*C1
   10 PAC(I,7)=PCT2(I)*C2
      CMAIN=C1+C2
      I1=1
C CALCULATE STABLE AND UNSTABLE WASTE VOLUMES
      STAB=0.
      DO 15 I=1,6
      IF(IUQ(I).GT.1)STAB=STAB+VOLS(I)
      IF(IDQ(I).GT.8)I1=2
   15 CONTINUE
      UNST=VOLS(7)-STAB
      DO 20 I=1,5
      PAC(I,2)=CST2(I,I1)
      PAC(I,3)=646.5
   20 PAC(I,9)=CST1(I)
C NEXT ALL PERSONNEL & EQUIPMENT MUST BE CALCULATED FOR (4), (5), (6),
C AND (8); THESE ARE DONE THROUGH SUBROUTINES OPDOS, DISPM, AND ENVMT.
C OPDOS: ADMIN/SUP PERS & EQPM'T (0), VEH CHECK IN/OUT (2),
C        WASTE PROCESSING/REPACK (3) & EMPLACEMENT (4)
C DISPM: CONSTRUCTION (1), BACKFILLING (5), COVER (6) & CEMENT PLANT (7)
C ENVMT: FACILITY MAINTENANCE (8) AND ENVIRONMENTAL MONITORING (9)
      CALL ZERO(WRK,9)
      CALL ZERO(EQP,27)
      CALL OPDOS(ISWC,CADM,WRK,EQP)
      CALL AREAS(AADM,ADIS,ABUF,ACON)
      CALL DISPM(ECY,QAC,DISN,VOLS,VBAK,WRK,EQP,6)
      A1=(ILFE+1.)/2.
      CALL ENVMT(ENC,A1,UNST,STAB,WRK,EQP,IR,6)
C THESE ROUTINES RETURN WRK AND EQP IN ANNUAL PERSON- AND EQPT-YEARS
      CALL BUILDS(TOTC)
      PAC(5,8)=TOTC
C OPC(YEAR,NO) CONTAINS THE FOLLOWING (BASED ON SECTION 6.2):
C 1 - SALARIES; 2 - CELL MATS; 3 - ENV MON; 4 - PERS TR & MON
C 5 - HE OPS  ; 6 - QAC      ; 7 - CONSTNT; 8 - HE REPLACEMNT
C 9 - LE REPLM; 10 - MAINT   ; 11 - CONTINGENCY
C A1 = ALL PERS; A2 = UNBADGED PERS;
C STARTUP COSTS (4), AND SALARIES - 1, MATERIALS - 2, E MONITORING - 3
C                      TRAINING - 4, HE OPS - 5, QA - 6, AND MAINT - 10
      CMAIN=(CMAIN+TOTC)*0.01
      A1=WRK(7)+WRK(8)
```

```
      A2=WRK(7)
      C1=CADM
      DO 25 I=1,6
      A1=A1+WRK(I)
   25 C1=C1+WRK(I)*MC(I)
C WRKEQP PRINTS OUT WORKERS AND EQUIPMENT
      CALL WRKEQP(WRK,EQP)
      PAC(5,4)=C1*1.3/2.
      C1=C1*1.3
C TRAINING COSTS (SECTION 6.2.4) : $2.1/YR BADGED & $.5/YR UNBADGED
      C4=(A1-A2)*2.1+A2*.5
      C5=0.
      DO 30 I=1,27
   30 C5=C5+EQP(I)*A8(I)*250.
      DO 35 I=1,ILFE
      OPC(I,1)=C1
      OPC(I,2)=ECY
      OPC(I,3)=ENC
      OPC(I,4)=C4
      OPC(I,5)=C5
      OPC(I,6)=QAC
   35 OPC(I,10)=CMAIN
C CONSTANT COSTS (INC MISC&UTILS) - 7 : ADMIN=75; COMPACT=100;
C REGUL=170; CONS=100; LEGAL=150; OUTREACH=100;INSURANCE=150 : 845
      C1=VOLS(7)
      I=C1/10000.
      IF(I.GT.5)I=5
      C2=180.+I*60.+FINTP(C1,A6,A7,5)
      DO 40 I=1,ILFE
      J=MOD(I,5)
      OPC(I,7)=845.+C2
C ADD $200K EVERY 5 YEARS TO REGULATORY COSTS
      IF(J.EQ.0)OPC(I,7)=OPC(I,7)+200.
   40 CONTINUE
C ADD $200K FOR THE CLOSURE PLAN IF IT HAS NOT BEEN ALREADY ADDED
      IF(MOD(ILFE,5).NE.0)OPC(ILFE,7)=OPC(ILFE,7)+200.
C HE PURCHASE (5), AND REPLACEMENT - 8; NO REPLACEMENT THE LAST TWO YEARS
      C1=0.
      DO 50 I=1,27
      K=IEQP(I,2)
      IF(K.EQ.0)GO TO 50
      C2=EQP(I)*IEQP(I,1)
      DO 45 J=1,ILFE-2
      IF(MOD(J,K).EQ.0)OPC(J,8)=OPC(J,8)+C2
   45 CONTINUE
   50 C1=C1+C2
      PAC(5,5)=C1
C LE PURCHASE (6) AND REPLACEMENT - 9; NO REPLACEMENT THE LAST TWO YEARS
      C1=A1*3.5
      PAC(5,6)=C1
```

```
      DO 55 I=10,ILFE-2,10
   55 OPC(I,9)=OPC(I,9)+C1
C PREOPERATIONAL ENGINEERING (9) AND CONTINGENCY (10) COSTS
      DO 65 I=1,5
C ADD PARKING & ENG/DESIGN COSTS
      PAC(I,7)=PAC(I,7)+A1*0.4*PCT2(I)
      PAC(I,10)=0.1*(PAC(I,9)+PAC(I,7)+PAC(I,8))
      C1=0.
      DO 60 J=1,10
   60 C1=C1+PAC(I,J)
   65 PAC(I,11)=0.2*C1
C THIS ENDS PREOPERATIONAL COSTS; FINALLY, GET OPC CONTINGENCY.
      DO 75 I=1,ILFE
      C1=0.
      DO 70 J=1,10
   70 C1=C1+OPC(I,J)
   75 OPC(I,11)=0.2*C1
      RETURN
      END
C-------------------------------------------------------------------
      SUBROUTINE WRKEQP(WRK,EQP)
C-------------------------------------------------------------------
C WRKEQP PRINTS OUT THE NUMBER OF WORKERS AND EQUIPMENT
C-------------------------------------------------------------------
      CHARACTER NMPS*7,NMDS*7,NMEQ*9
      COMMON/CHRC/NMPS(9),NMDS(14),NMEQ(27)
      DIMENSION WRK(9),EQP(27)
  101 FORMAT(/2X'WORKERS'/3(2X'LABEL    NUMBER'2X))
  102 FORMAT(3(2X,A7,F8.3,2X))
  103 FORMAT(/2X'EQUIPMENT'/3(2X'LABEL    NUMBER'2X))
      WRITE(6,101)
      WRITE(6,102) (NMPS(I),WRK(I),I=1,9)
      WRITE(6,103)
      WRITE(6,102) (NMEQ(I),EQP(I),I=1,27)
      RETURN
      END
C-------------------------------------------------------------------
      SUBROUTINE CLOSUR(ISWC)
C-------------------------------------------------------------------
C CLOSUR CALCULATES THE CLOSURE COSTS BASED ON SECTION 6.3 OF VOLUME 1.
C-------------------------------------------------------------------
      COMMON/FACI/IR,IBETW(9),ILFE/LSEQ/A9(27)/FTEC/DMIN(6),VOLE(6),
     + ACSQ(6),ALEN(6),WIDT(6),DISN(7),VOLS(7),AREA(7),VBAK(7),TSUMS(15)
     +/DTNX/ID,IU,IT,IC,IE,IB,IX,IS,IDQ(6,8)/DTEC/EMP,EFF,SEF,DPT,DTK,
     + EMPQ(27)/BAST/PAC(5,11),OPC(50,11),CLC(3),SUC(4),AIC(2),ETC(9481)
     + ,WRKD(9),EQPD(27),VOLSD(7),VBAKD(7),DISND(7)/MANC/MC(6)
C 1 : SALARIES ; 2 - EQUIPMENT EXPENSES ; 3 - OTHER COSTS
      DIMENSION ISWC(6),PMW(5),PME(5)
C PMW AND PME FROM TABLE 6-28 - CONVERTED INTO PERSON & EQPT YEARS.
      DATA PMW/.214,.856,.285,.927,.524/,PME/.177,.706,.235,.765,.432/
```

```
      CUBCS(A,B,C)=A*B*C-0.25*(A+B)*C*C+C*C*C/12.
      CALL ZERO(WRKD,57)
      CALL RETRV(1)
      II=ISWC(1)
      IF(II.GT.5)II=5
C CALCULATE NEW DISPOSAL TECHNOLOGY PARAMETERS
      A1=1130.
      IF(II.EQ.5)A1=3400.
      HYT=DPT+DTK-DMIN(1)
      IF(ID.LE.6)GO TO 10
      DISND(1)=A1/(ACSQ(1)*EMP*HYT)
      VBAKD(1)=A1*(DTK-HYT)/(HYT*EMP)
      GO TO 15
   10 A4=ALEN(1)
      A5=WIDT(1)
      DISND(1)=A1/(EMP*(VOLE(1)-CUBCS(A4,A5,1.)))
      VBAKD(1)=DISND(1)*CUBCS(A4,A5,1.)
   15 VOLSD(1)=A1
C CALL DISPM WITH THE NEW CONFIGURATION
      CALL DISPM(ECY,QAC,DISND,VOLSD,VBAKD,WRKD,EQPD,1)
      A2=ILFE
C CALL ENVMT WITH THE NEW CONFIGURATION
      CALL ENVMT(ENC,A2,A1,0.,WRKD,EQPD,IR,1)
C ADD WORKERS FOR EMPLACEMENT
      A1=PMW(II)/10.
      WRKD(1)=WRKD(1)+2.*A1
      WRKD(2)=WRKD(2)+A1
      WRKD(3)=WRKD(3)+2.*A1
      WRKD(4)=WRKD(4)+2.*A1
      WRKD(5)=WRKD(5)+3.*A1
C ADD EQUIPMENT FOR EMPLACEMENT
      IF(II.EQ.5)GO TO 25
      IF(II.GT.2)GO TO 20
      A1=PME(II)/5.
      EQPD(7)=EQPD(7)+A1
      EQPD(8)=EQPD(8)+A1
      EQPD(9)=EQPD(9)+2.*A1
      EQPD(10)=EQPD(10)+A1
      GO TO 30
   20 A1=PME(II)/3.
      EQPD(7)=EQPD(7)+2.*A1
      EQPD(8)=EQPD(8)+A1
      GO TO 30
   25 A1=PME(II)/4.
      EQPD(7)=EQPD(7)+A1
      EQPD(8)=EQPD(8)+A1
      EQPD(10)=EQPD(10)+2.*A1
   30 A1=0.
      A2=0.
      DO 35 I=1,6
```

```
      A1=A1+WRKD(I)
   35 A2=A2+WRKD(I)*MC(I)
      A1=A1+6.
      CLC(1)=226.2+A2
C EQUIPMENT OPERATES 250 DAYS/YEAR AT .8 EFFICIENCY = 200 DAYS
      A2=0.
      DO 40 I=1,27
   40 A2=A2+EQPD(I)*A9(I)
      CLC(2)=A2*200.
C ADD ENV.MON.+DIS.MAT.+QAC+PER.MON. TO CONSTANT COSTS
      A2=1165.
      IF(II.EQ.5)A2=1215.
      CLC(3)=A2+ENC+ECY+QAC+0.60*A1
C 20% CONTINGENCY
      DO 45 I=1,3
      CLC(I)=CLC(I)*1.2
   45 CONTINUE
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE SURACT(UNST,STAB,ILFE)
C-----------------------------------------------------------------------
C SURACT CALCULATES THE OBSERVATION AND INSTITUTIONAL COSTS
C-----------------------------------------------------------------------
      COMMON/BAST/POC(608),SUC(4),AIC(2),ETC(9538)/MANC/MC(6)
      DIMENSION B12(4,3),EMC(3,4),EQR(4,2),WRKD(5)
C B1 : T6-30; B12 : T6-18; EMC : T6-31; EQR : T6-33; ORDERED AU,AS,HU,HS
      DATA B12/.025,.000625,.05,.00125,.025,.000625,.05,.00125,.05,
     1 .00125,.1,.0025/,EMC/41.5,75.,110.,40.15,61.5,83.,75.,230.,
     2 400.,61.5,95.,130./,EQR/.06,0.,.25,.06,2*0.,2*.25/
C  VOLUMES : STAB = STABLE; UNST = UNSTABLE; TOTL = TOTAL;
C  I5 = 1 : ARID/UNSTABLE; = 3 : HUMID/UNSTABLE;
      STAB=STAB*ILFE/1000.
      UNST=UNST*ILFE/1000.
      TOTL=STAB+UNST
      I5=1
      IF(IR.NE.4)I5=3
C ENVIRONMENTAL MONITORING
      IF(TOTL.LE.50.)A5=(UNST*EMC(1,I5)+STAB*EMC(1,I5+1))*TOTL/50.
      IF(TOTL.LE.50.)GO TO 25
      IF(TOTL.GT.500.)GO TO 15
      A1=EMC(1,I5)+(EMC(2,I5)-EMC(1,I5))*(TOTL-50.)/450.
      A2=EMC(1,I5+1)+(EMC(2,I5+1)-EMC(1,I5+1))*(TOTL-50.)/450.
      GO TO 20
   15 A1=EMC(2,I5)+(EMC(3,I5)-EMC(2,I5))*(TOTL-500.)/500.
      A2=EMC(2,I5+1)+(EMC(3,I5+1)-EMC(2,I5+1))*(TOTL-500.)/500.
   20 A5=UNST*A1+STAB*A2
   25 SUC(2)=A5/TOTL
C SALARIES ARE COMPOSED OF THREE ITEMS: TOTL TERM - FAC.MAINT;
C SUC(2) TERM - ENV.MON'G; OTHERS (TABLE 6-18); WRKD IS IN WORKDAYS
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```
      CALL ZERO(WRKD,5)
      WRKD(1)=.0375*TOTL+SUC(2)*.0075
      WRKD(2)=.0375*TOTL+SUC(2)*.0025+B12(I5,1)*UNST+B12(I5+1,1)*STAB
      WRKD(4)=.05*TOTL+B12(I5,2)*UNST+B12(I5+1,2)*STAB
      WRKD(5)=.025*TOTL+B12(I5,3)*UNST+B12(I5+1,3)*STAB
C 220 PERSON-DAYS = 1 PERSON-YEAR
      A1=220.
      SUC(1)=36.4
      DO 30 I=1,5
      SUC(1)=SUC(1)+WRKD(I)*MC(I)/220.
   30 A1=A1+WRKD(I)
C PERSONNEL MONITORING & EQUIPMENT EXPENSES
      SUC(2)=SUC(2)+.600*A1/220.
      SUC(3)=17.5+.420*(EQR(I5,1)*UNST+EQR(I5+1,1)*STAB)
     +            +.050*(EQR(I5,2)*UNST+EQR(I5+1,2)*STAB)
C OTHER COSTS & INSTITUTIONAL PERIOD COSTS
      A1=SUC(1)+SUC(2)+SUC(3)
      SUC(4)=624.+0.2*A1
      AIC(1)=A1*1.2
      AIC(2)=330.*1.2
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE WRITIT
C-----------------------------------------------------------------------
C WRITIT PRINTS ALL THE COSTS.
C-----------------------------------------------------------------------
      CHARACTER LAP(12)*15,LAO(12)*15,LAC(3)*15,LAS(4)*15,LAI(2)*15
      COMMON/BAST/PAC(5,11),OPC(50,11),CLC(3),SUC(4),AIC(2),SUM1(5),
     +            SUM2(50),ETC(9483)/FACI/IR,IBETW(9),ILFE
      DIMENSION IYR(50)
      DATA LAP/'LAND COSTS     ','LICENSING COSTS','ADMINISTRATION ',
     2         'STARTUP OVERHD ','HEAVY EQPT PURC','LIGHT EQPT PURC',
     3         'LAND DEVELPMNT ','BUILDINGS COSTS','UTILITIES      ',
     4         'ENG & DESIGN   ','CONTINGENCY    ','TOTALS         '/
      DATA LAO/'SALARIES + OH  ','DIS CELL MATRS ','ENV MONITORING ',
     2         'PER TRN & MON  ','HEAVY EQPT OPS ','QA AND CONTROL ',
     3         'CONSTANT COSTS ','HEAVY EQPT REPL','LIGHT EQPT REPL',
     4         'MAINTENANCE    ','CONTINGENCY    ','TOTALS         '/
      DATA LAC/'SALARIES       ','EQPT EXPENSES  ','OTHER COSTS    '/,
     2     LAS/'SALARIES       ','ENV&PER MONITRG','EQPT EXPENSES  ',
     3    'OTHER COSTS    '/,LAI/'VARIABLE COSTS ','OTHER COSTS    '/
      CALL ZERO(SUM1,55)
      DO 12 I=1,50
      DO 10 J=1,11
   10 SUM2(I)=SUM2(I)+OPC(I,J)
   12 IYR(I)=I
      DO 16 I=1,5
      DO 14 J=1,11
   14 SUM1(I)=SUM1(I)+PAC(I,J)
```

```
   16 CONTINUE
      WRITE(6,101) (IYR(I),I=1,5)
      WRITE(6,102) (LAP(I),(PAC(J,I),J=1,5),I=1,11)
      WRITE(6,102) LAP(12),(SUM1(J),J=1,5)
      WRITE(6,103)
      DO 20 I1=1,ILFE,8
      I2=I1+7
      WRITE(6,104) (IYR(I),I=I1,I2)
      WRITE(6,105) (LAO(I),(OPC(J,I),J=I1,I2),I=1,11)
      WRITE(6,105) LAO(12),(SUM2(J),J=I1,I2)
   20 CONTINUE
      WRITE(6,106)
      WRITE(6,107) (LAC(I),CLC(I),I=1,3),(LAS(I),SUC(I),I=1,4),
     +             (LAI(I),AIC(I),I=1,2)
  101 FORMAT(//2X'PREOPERATIONAL COSTS'/2X'ITEM'11X,5('  YEAR 'I2))
  102 FORMAT(2X,A15,1P,5E9.2)
  103 FORMAT(//2X'OPERATIONAL COSTS')
  104 FORMAT(/2X'ITEM'11X,8('  YEAR 'I2))
  105 FORMAT(2X,A15,1P,8E9.2)
  106 FORMAT(//2X'CLO/OBS/INS COSTS'/2X'ITEM'15X'COSTS')
  107 FORMAT(2X,A15,1P,E9.2)
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE OPDOS(ISWC,CADM,WRK,EQP)
C-----------------------------------------------------------------
C OPDOS PERFORMS SEVERAL FUNCTIONS. IT CALCULATES PERSONNEL AND EQPMENT
C FOR ADMIN/SUP (0), VEHICLE CHECK IN/OUT (2), WASTE PROCESSING (I.E.,
C REPACK) (3), AND EMPLACEMENT (4).  IT ALSO CALCULATES AND PRINTS
C VEHICLE CHECK IN/OUT AND EMPLACEMENT OCCUPATIONAL EXPOSURES.
C-----------------------------------------------------------------
      COMMON/CSHP/KONTS(6,18),KSHP(6),DSHP(6)
     +/FACI/IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS,ILFE
     +/DTNX/ID,IU,IT,IC,IE,IB,IX,IS,IDQ(6),IUQ(6),ITQ(6),ICQ(6),IEQ(6),
     + IBQ(6),IXQ(6),ISQ(6)/FTEC/DMIN(6),VOLE(6),ACSQ(6),ALEN(6),
     + WIDT(6),DISN(7),VOLS(7),AREA(7),VBAK(7),TSUM(7),RADF(8)
      DIMENSION KONT(4,18),NADT(5,3),NADE(5,5),NADA(5,5),NWPB(6,5),
     *          VADT(5),CADT(5),VWPB(6),EMPDOS(7),SHPDOS(7),ISWC(6),
     *          WRK(9),EQP(27)
C NADT&VADT&CADT = TAB 6-9; NADE&NADA = TAB 6-5; NWPB&VWPB = TAB 6-12;
      DATA NADT/3,4,8,13,18,8,9,12,16,18,3,4,5,6,6/,VADT/2000.,5000.,
     2     20000.,35000.,50000./,CADT/351.,391.3,570.7,869.7,1014./,
     3     NADE/2,2,3,4,5,2,2,3,4,5,3*1,2,2,0,0,3*1,0,0,1,2,3/,
     +     NADA/15*0,1,1,0,6*1,2/,NWPB/2,3,3,4,5,6,2,2,3,3,4,5,6*0,
     5     3*2,3*3,1,1,4*2/,VWPB/0.,1.E4,2.E4,3.E4,4.E4,5.E4/
      DATA KONT/100,120,100,120, 37, 60, 37, 60,  8, 12,  9, 13,
     2            3, 12,  4, 13, 68, 83, 68, 83,600,720,600,720,
     3          150,180,150,180, 13, 20, 15, 22,125,150,125,150,
     4            5, 12,  7, 14, 43, 88, 43, 88,100,156,100,156,
     5          300,360,300,360,600,720,600,720,100,156,100,156,
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     6          300,360,300,360,300,360,300,360,750,900,750,900/
C INTERPOLATE/EXTRAPOLATE FOR ADMIN/SUP PERS & EQPM'T (2); ALL VOLUMES
C ARE ANNUAL IN THIS ROUTINE, NADE, NADA, NWPB ARE IN NUMBERS
      IWPB=1
      DO 10 I=1,6
      IF(ISWC(I).GT.4)IWPB=2
   10 CONTINUE
      B1=VOLS(7)
      DO 15 I=1,5
      IF(B1.LT.VADT(I))GO TO 20
   15 CONTINUE
   20 J=I
      IF(J.EQ.1)GO TO 30
      IF(J.GT.5)J=5
      B2=(B1-VADT(J-1))/(VADT(J)-VADT(J-1))
      CADM=CADT(J-1)+B2*(CADT(J)-CADT(J-1))
      I1=NADT(J-1,1)+B2*(NADT(J,1)-NADT(J-1,1))+1.0
      I2=NADT(J-1,2)+B2*(NADT(J,2)-NADT(J-1,2))+1.0
      I3=NADT(J-1,3)+B2*(NADT(J,3)-NADT(J-1,3))+1.0
      DO 25 I=21,25
      I4=B2*(NADE(J,I-20)-NADE(J-1,I-20))+1.0
      EQP(I)=EQP(I)+NADE(J-1,I-20)+I4
      IF(IWPB.EQ.2)EQP(I)=EQP(I)+NADA(J,I-20)
   25 CONTINUE
      GO TO 40
   30 CADM=CADT(1)
      I1=NADT(1,1)
      I2=NADT(1,2)
      I3=NADT(1,3)
      DO 35 I=21,25
      EQP(I)=EQP(I)+NADE(1,I-20)
      IF(IWPB.EQ.2)EQP(I)=EQP(I)+NADA(1,I-20)
   35 CONTINUE
   40 WRK(7)=I1
      WRK(8)=I2
      WRK(9)=I3
C INTERPOLATE REPACK PERSONNEL AND COSTS (3)
      IF(IWPB.EQ.1)GO TO 60
      DO 45 I=1,6
      IF(B1.LE.VWPB(I))GO TO 50
   45 CONTINUE
   50 J=I
      IF(J.GT.6)J=6
      DO 55 I=1,5
   55 WRK(I)=WRK(I)+NWPB(J,I)
C I1=0 NO SEG; I1=1 SEG; I2=0 NO LAY; I2=1 LAY
   60 I1=1
      I2=1
      DO 65 ICL=1,6
      IF(ICL.NE.1.AND.IUQ(ICL).EQ.1)I1=0
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      IF(ISQ(ICL).NE.0)I1=1
   65 CONTINUE
      IF(IUQ(4).NE.4.AND.IUQ(4).NE.0)GO TO 70
      IF(IUQ(5).NE.5.AND.IUQ(5).NE.0)GO TO 70
      IF(IUQ(6).NE.6.AND.IUQ(6).NE.0)GO TO 70
      I2=0
C VEHICLE CHECK IN/OUT (2), AND EMPLACEMENT (4) DOSES BASED ON
C DSHP, KSHP, AND KONTS CALCULATED IN MEURGE.
   70 CALL ZERO(EMPDOS,7)
      CALL ZERO(SHPDOS,7)
      DO 100 ICL=1,6
      ISWCD=ISWC(ICL)
      SHPDOS(ICL)=0.235*2.*DSHP(ICL)/ILFE
C (2):CONVERT KSHP(ICL) TO PERSON-YEARS BY DIVIDING BY 220 DAYS/YEAR
      A1=KSHP(ICL)*0.05/(ILFE*220.)
      WRK(1)=WRK(1)+3*A1
      WRK(2)=WRK(2)+A1
      WRK(4)=WRK(4)+A1
C REPACKAGING WASTE MUST BE PUT INTO BLOCS; 4.1 M3& 50 MAN-MIN/BLOC
      A1=0.
      IF(ISWCD.GT.4)A1=VOLS(ICL)*50./4.1
      IF(ISWCD.GT.4)GO TO 80
      DO 75 IKON=1,18
   75 A1=A1+KONTS(ICL,IKON)*KONT(ISWCD,IKON)
      A1=A1/ILFE
C IF WASTE IS SEGREGATED, INCREASE PERSON-MINUTES BY 10%
   80 IF(I1.EQ.1)A1=A1*1.1
      EMPDOS(ICL)=EMPDOS(ICL)+A1*0.5/60.
C (4):CONVERT A1 FROM MINUTES TO YEARS - 360 MIN/DAY & 220 DAYS/YEAR
      A1=A1/(360.*220.)
      WRK(1)=WRK(1)+A1*0.20
      WRK(2)=WRK(2)+A1*0.10
c IF THERE IS LAYERING, INCREASE QA TECH BY 10%
      IF(I2.EQ.1)WRK(2)=WRK(2)+A1*0.01
      WRK(3)=WRK(3)+A1*0.20
      WRK(4)=WRK(4)+A1*0.20
      WRK(5)=WRK(5)+A1*0.30
C EQUIPMENT HAS 480 MIN/DAY, 250 DAYS/YEAR, BUT 0.8 AVAILABILITY
      A1=A1*360.*220./(480.*250.*.8)
      IF(ISWCD.GT.4)GO TO 95
      IF(ISWCD.GT.2)GO TO 90
      A7=A1/5.
      EQP(7)=EQP(7)+A7
      EQP(8)=EQP(8)+A7
      EQP(9)=EQP(9)+2.*A7
      EQP(10)=EQP(10)+A7
      GO TO 100
   90 A7=A1/3.
      EQP(7)=EQP(7)+2.*A7
      EQP(8)=EQP(8)+A7
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```
      GO TO 100
   95 A7=A1/4.
      EQP(7)=EQP(7)+A7
      EQP(8)=EQP(8)+A7
      EQP(10)=EQP(10)+2.*A7
  100 CONTINUE
      DO 105 I=1,6
      SHPDOS(7)=SHPDOS(7)+SHPDOS(I)
  105 EMPDOS(7)=EMPDOS(7)+EMPDOS(I)
C PRINT SHIPMENT AND EMPLACEMENT EXPOSURES
 9001 FORMAT(2X'SHIP ODOSE-PMR '1P,7E9.2/2X'EMPL ODOSE-PMR '7E9.2)
      WRITE(6,9001) SHPDOS,EMPDOS
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE DISPM(ECY,QAC,DISN,VOLS,VBAK,WRK,EQP,NQ)
C-----------------------------------------------------------------------
C DISPM CALCULATES PERSONNEL AND MATERIAL FOR CONSTRUCTION (1),
C BACKFILLING (5), COVER (6), AND CEMENT PLANT (7). IT ALSO CALCU-
C LATES DISPOSAL MATERIAL COSTS (ECY) AND QA COSTS (QAC)
C-----------------------------------------------------------------------
      COMMON/DTEC/EMP,REST(31)/DTNX/ID,IU,IT,IC,IE,IB,IX,IS,IDQQ(48)
      DIMENSION A1(14,3),A2(14),A4(5,14),A5(18,14),A6(4,14,2),
     + A7(16,14,2),A8(14),A9(6),B1N(5,2),B1M(5,3),B1D(5,8),B1G(5,2),
     + B2N(3,2),B2M(6,3),B2D(5,8),B2G(2,2),IB2M(6),IB2D(5),IB2G(2),
     + B1(6),B2(18),DISN(7),VOLS(7),VBAK(7),WRK(9),EQP(27)
C A1  = DISPOSAL MATERIAL COSTS   ; A2  = DISPOSAL QA COSTS
C A4  = DISPOSAL PERSONNEL RQMTS  ; A5  = DISPOSAL EQUIPMENT RQMTS
C A6  = COVER PERSONNEL RQMTS     ; A7  = COVER EQUIPMENT RQMTS
C A8  = CEMENT VOLUME             ; A9  = CEM PLANT PERS RQMTS
C B1N = BACKFILL PERS-NORMAL      ; B1M = BACKFILL PERS-MODERATE
C B1D = ADD PERS FOR DYNAMIC COMP ; B1G = GROUT BACKFILL PERSONNEL
C B2N = BACKFILL EQPT-NORMAL      ; B2M = BACKFILL EQPT-MODERATE
C B2D = ADD EQPT FOR DYNAMIC COMP ; B2G = GROUT BACKFILL EQPT
C IB2M,IB2D,IB2G : NUMBER OF THE EQUIPMENT; VCEM=CEMENT VOLUME
C A1 AND A2 ARE FROM TABLE 6-19;
      DATA A1/6.792,1.272,.447,.349,.712,.260,9.459,1.455,278.755,
     1 271.974,161.899,154.469,182.341,182.343,1.087,.147,4.602,.624,
     2 .079,.336,.648,2.743,.353,1.494,.232,.983,1.134,.349,16.185,
     3 2.195,9.203,1.248,1.182,.672,9.648,5.486,8.203,2.987,5.975,
     4 1.666,32.004,9.601/,A2/.5,.2,.5,2*.2,.1,.3,.2,4*2.5,2*3./
C A4 AND A5 ARE FROM TABLE C-12
      DATA A4/3.5,122.44,100.33,123.27,.5,.3,9.89,9.5,10.2,.5,5.3,
     2 191.14,147.02,191.14,.5,2.9,10.51,8.23,10.62,.5,.25,8.66,7.77,
     3 9.05,.25,.2,8.54,5.69,8.62,.25,.8,23.78,30.66,26.,1.,2.,78.62,
     4 39.87,79.55,1.,10.6,137.89,675.52,241.96,.5,10.5,136.46,673.52,
     5 236.96,.5,8.2,135.92,501.44,181.,1.,8.1,134.51,495.44,176.08,
     6 1.,6.2,130.34,240.91,247.02,.5,7.5,174.5,278.77,291.46,.5/
      DATA A5/32.98,24.56,97.22,51.67,12.13,.59,.5,11*0.,2.57,1.98,7.5,
     2 3.61,1.21,.21,.3,11*0.,29.85,37.94,147.02,51.67,4.67,0.,68.11,
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     3 11*0.,2.66,2.10,8.23,4.37,0.89,0.,.5,11*0.,.29,1.57,5.77,0.,.38,
     4 6.42,12*0.,.29,1.45,5.69,0.,.38,6.42,12*0.,2.39,3.44,10.66,0.,
     5 5.95,6*0.,12.,6*0.,2.39,10.28,39.87,0.,5.38,6*0.,60.,6*0.,
     6 26.12,11.95,47.59,16.44,6.22,0.,60.64,6*0.,2*.71,15.02,0.,12.76,
     7 26.12,11.95,47.59,16.44,6.22,0.,60.64,8*0.,15.02,0.,12.76,
     8 29.85,11.92,47.52,14.46,4.61,0.,49.84,6*0.,2*.7,23.83,0.,4.96,
     9 29.85,11.92,47.52,14.46,4.61,0.,49.84,8*0.,23.83,0.,4.96,
     + 40.85,21.35,85.02,33.37,22.65,0.,.24,8*0.,11.88,0.,10.58,
     1 50.22,30.81,122.88,55.33,23.07,0.,.99,8*0.,11.88,0.,10.58/
C A6 AND A7 ARE FROM TABLE C-18 & 19
      DATA A6/.9,34.26,2*28.58,.08,3.29,2*3.88,.9,31.79,2*30.34,.1,4.31,
     2 2*4.11,.06,1.77,2*2.08,.07,2.32,2*2.21,.5,14.46,2*17.04,.6,19.95,
     3 2*18.09,.4,12.69,2*15.7,.5,15.14,2*16.27,.3,8.87,2*11.03,.3,
     4 10.47,2*11.41,2.1,59.32,2*75.16,1.,33.16,2*31.66,1.,47.56,2*28.6,
     6 .1,6.4,2*3.9,1.2,50.6,2*34.4,.2,6.9,2*4.7,.07,3.2,2*1.9,.09,3.7,
     6 2*2.5,.6,28.3,2*17.,.7,30.2,2*20.5,.7,32.5,2*19.8,.6,25.1,2*17.6,
     7 .5,22.2,2*13.6,.5,20.4,2*16.2,2.7,120.2,2*75.2,1.2,52.8,2*35.8/
      DATA A7/13.17,6.58,26.53,0.,4.51,5*0.,2.25,5*0.,1.79,.89,3.57,0.,
     2 .61,5*0.,.31,5*0.,15.18,7.58,30.34,0.,9.03,11*0.,2.06,1.03,4.11,
     3 0.,1.22,11*0.,.96,.48,1.92,0.,.33,5*0.,.16,5*0.,1.11,.55,2.21,0.,
     4 .66,11*0.,7.85,3.92,15.7,0.,2.69,5*0.,1.34,5*0.,9.05,4.52,18.09,
     5 0.,5.38,11*0.,7.48,3.74,14.97,0.,1.47,5*0.,.73,5*0.,8.13,4.07,
     6 16.27,0.,2.94,11*0.,5.27,2.64,10.55,0.,.96,5*0.,.48,5*0.,5.7,
     7 2.85,11.41,0.,1.92,11*0.,36.41,18.2,72.81,0.,4.71,5*0.,2.35,5*0.,
     8 15.82,7.92,31.66,0.,9.42,11*0.,13.2,6.6,26.3,0.,13.5,5*0.,2.3,
     9 4*0.,14.2,1.8,.9,3.6,0.,1.8,5*0.,.3,4*0.,1.9,17.2,8.6,34.4,0.,9.,
     + 10*0.,15.8,2.3,1.2,4.7,0.,1.2,10*0.,2.1,.9,.4,1.7,0.,1.,5*0.,.2,
     1 4*0.,.9,1.3,.6,2.5,0.,.7,10*0.,1.2,7.8,3.9,15.7,0.,8.1,5*0.,1.3,
     2 4*0.,8.5,10.2,5.1,20.5,0.,5.4,10*0.,9.4,9.5,4.8,19.,0.,7.4,5*0.,
     3 .7,4*0.,10.9,8.8,4.4,17.6,0.,2.9,10*0.,9.,6.6,3.3,13.2,0.,4.8,
     4 5*0.,.5,4*0.,7.6,8.1,4.1,16.2,0.,1.9,10*0.,6.3,36.4,18.2,72.8,
     5 0.,23.6,5*0.,2.4,4*0.,42.,17.9,9.,35.8,0.,9.4,10*0.,16.5/
C B1N: TABLE C-15; B1M: TABLE C-16; B1D: TABLE C-17; B2N: TABLE C-15;
C B2M: TABLE C-16; B2D: TABLE C-17; B1G: TABLE 6-15; A9 : TABLE 6-16
      DATA B1N/3.27,.109,3.27,4.36,3.27,14.2,1.64,14.2,4.36,145./,
     2 B1M/5.89,.161,5.89,4.36,5.89,15.8,.492,15.8,4.36,28.9,14.2,87.3,
     3 14.2,4.36,68.7/,B1D/33.2,1.7,48.4,23.5,98.2,3.7,.2,5.4,2.6,11.1,
     4 33.2,1.7,48.4,23.5,98.2,3.7,.2,5.4,2.6,11.1,1.5,.08,2.2,1.1,4.3,
     5 1.5,.08,2.2,1.1,4.3,1.7,.09,2.5,1.2,5.2,1.7,.09,2.5,1.2,5.2/,
     6 B2N/2.18,1.09,4.36,0.,14.2,4.36/,B2M/2.18,1.09,4.36,2.62,3*0.,
     7 2.73,4.36,0.,13.1,2*0.,14.2,4.36,2*0.,54.5/,IB2M/1,2,3,16,13,17/,
     8 B2D/11.8,5.9,23.5,16.6,14.1,1.3,.7,2.6,1.9,1.6,11.8,5.9,23.5,
     9 16.6,14.1,1.3,.7,2.6,1.9,1.6,.6,.3,1.2,.9,.7,.6,.3,1.2,.9,.7,.5,
     + .3,1.1,.7,.6,.5,.3,1.1,.7,.6/,IB2D/1,2,3,8,16/,A9/0.,.04,1.,2.,
     1 1.,0./,B1G/8.72,.261,0.,8.72,17.4,8.72,.436,8.72,8.72,26.2/,
     1 B2G/8.72,0.,2*8.72/,IB2G/18,20/,A8/8*0.,2*1835.,2*812.,2*1298./
      CALL ZERO(B1,6)
      CALL ZERO(B2,18)
      VCEM=0.
      ECY=0.
```

```
      QAC=0.
      DO 100 ICL=1,NQ
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 100
      C1=DISN(ICL)
C CEMENT VOLUME (7), CONSTRUCTION (1) & COVER (6) BASED ON DISN
      ECY=ECY+C1*A1(ID,1)
      IF(IC.EQ.1)ECY=ECY+C1*A1(ID,2)
      IF(IC.EQ.2)ECY=ECY+C1*A1(ID,3)
      QAC=QAC+C1*A2(ID)
      VCEM=VCEM+A8(ICL)*C1
      DO 10 I=2,6
   10 B1(I)=B1(I)+A4(I-1,ID)*C1
      DO 15 I=1,18
   15 B2(I)=B2(I)+A5(I,ID)*C1
      IF(IC.EQ.1)J=1
      IF(IC.NE.1)J=2
      DO 20 I=2,5
   20 B1(I)=B1(I)+A6(I-1,ID,J)*C1
      DO 25 I=1,16
   25 B2(I)=B2(I)+A7(I,ID,J)*C1
C NEXT DO BACKFILL (5) REQM'TS
      C2=(VBAK(ICL)+VOLS(ICL)*(1.-EMP)/EMP)/1000.
      IF(IB.EQ.3)C2=VBAK(ICL)/1000.
      IF(IB.EQ.3.AND.ID.GT.8.AND.ID.LT.13)GO TO 80
      J=1
      IF(ID.GT.8.AND.ID.LT.13)J=2
      IF(IX.EQ.2)GO TO 40
      DO 30 I=1,5
   30 B1(I)=B1(I)+B1N(I,J)*C2
      DO 35 I=1,3
   35 B2(I)=B2(I)+B2N(I,J)*C2
      IF(IX.EQ.3)GO TO 60
      GO TO 80
   40 IF(J.EQ.2)J=3
      IF(ID.EQ.8)J=2
      DO 45 I=1,5
   45 B1(I)=B1(I)+B1M(I,J)*C2
      DO 50 I=1,6
      K=IB2M(I)
   50 B2(K)=B2(K)+B2M(K,J)*C2
      IF(IX.NE.3)GO TO 80
   60 IF(ID.GT.8)STOP 'DYNAMIC COMPACTION NOT ALLOWED'
      DO 65 I=1,5
   65 B1(I)=B1(I)+B1D(I,ID)*C1
      DO 70 I=1,6
      K=IB2D(I)
   70 B2(K)=B2(K)+B2D(I,ID)*C1
   80 IF(IB.NE.3)GO TO 100
C GROUTING SECTION
```

```
      C3=(VOLS(ICL)*EMP/(1.-EMP))/1000.
      IF(ID.GT.8.AND.ID.LT.13)C3=C3+VBAK(ICL)/1000.
      VCEM=VCEM+C3
      J=2
      IF(ID.EQ.5.OR.ID.EQ.6.OR.ID.EQ.7.OR.ID.EQ.11.OR.ID.EQ.12)J=1
      DO 85 I=1,5
   85 B1(I)=B1(I)+B1G(I,J)*C3
      DO 90 I=1,2
      K=IB2G(I)
   90 B2(K)=B2(K)+B2G(I,J)*C3
  100 CONTINUE
C MODIFY B1 AND B2, AND STORE ONTO WRK AND EQP
      DO 105 I=1,6
  105 WRK(I)=WRK(I)+B1(I)/220.
      DO 110 I=1,18
  110 EQP(I)=EQP(I)+B2(I)/(250.*.8)
C CEMENT PLANT RQMTS (7)
      DO 115 I=1,6
  115 WRK(I)=WRK(I)+VCEM*A9(I)/(50.*220.)
      EQP(2)=EQP(2)+VCEM/(50.*250.*.8)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE ENVMT(ENC,A1,A3,A2,B1,B2,IR,NQ)
C-----------------------------------------------------------------------
C ENVMT CALCULATES FAC. MAINTENANCE (8) AND ENV. MONITORING (9).
C-----------------------------------------------------------------------
      COMMON/DTNX/ISS(8),IDQ(6),IUQ(6),IETC(30),ISQ(6)
     +      /FTEC/DMINS(37),VOLS(7),REST(29)
      DIMENSION GW(2,2),OM(2,3),B11(5,2),B12(4,5),FEL(4),B1(9),B2(27)
      DATA GW/.003,2*.03,.3/,OM/40.,2*60.,2*80.,100./,B11/2*.075,0.,
     1 .1,.05,2*.15,0.,.2,.1/,B12/4*0.,.000625,.00125,.025,.05,4*0.,
     2 .000625,.00125,.025,.05,.00125,.0025,.005,.1/,FEL/0.,2*.025,.1/
C GW = GROUNDWATER, TAB 6-23; OM = OTHER, TAB 6-21; B11 = FAC.MAIN1, TAB
C 6-17; B12 = FAC.MAIN2, TAB 6-18; FEL = FRONT END LOADER, TAB 6-18;
C A1  = MULTIPLIER; A2 = STABLE VOL; A3 = UNSTABLE VOL; A4 = TOTAL VOL;
C I1 = CHEM SEGRN; I2 = ST/UNS SEG; I3 = CLASS D WAST; I4 = REPACK OPT;
C I5= 1 (ARID), 2 (HUMID).  CALCULATION AT MID-POINT OF PLANT LIFE.
      I1=0
      I2=0
      I4=0
      DO 10 I=1,NQ
      IF(ISQ(I).NE.0)I1=1
      IF(IUQ(I).NE.1)I2=1
      IF(IDQ(I).GT.12)I4=1
   10 CONTINUE
      I3=0
      IF(VOLS(5).GT.1..OR.VOLS(6).GT.1.)I3=1
C START ENVIRONMENTAL MONITORING; FIRST, ATMOSPHERIC COSTS FROM TAB 6-22
      ENC=42.
```

```
      IF(I1.EQ.1)ENC=ENC+14.
      IF(I2.EQ.1)ENC=ENC+14.
      IF(I3.EQ.1)ENC=ENC+14.
      IF(I4.EQ.1)ENC=ENC+70.
C NEXT GROUNDWATER COSTS
      A1=A1/1000.
      I5=2
      IF(IR.EQ.4)I5=1
      ENC=ENC+A1*(A2*GW(I5,1)+A3*GW(I5,2))
C FINALLY BASIC COSTS
      A4=A2+A3
      IF(A4.LE.2000.)ENC=ENC+OM(I5,1)
      IF(A4.GT.2000..AND.A4.LE.25000.)ENC=ENC+OM(I5,1)+
     +                (A4-2000.)*(OM(I5,2)-OM(I5,1))/23000.
      IF(A4.GT.25000..AND.A4.LE.50000.)ENC=ENC+OM(I5,2)+
     +                (A4-25000.)*(OM(I5,3)-OM(I5,2))/25000.
      IF(A4.GT.50000.)ENC=ENC+OM(I5,3)
C END OF MONITORING; CALCULATE RADTECH AND QATECH REQMTS
      B1(1)=B1(1)+ENC*7.5/220.
      B1(2)=B1(2)+ENC*2.5/220.
C MAINTENANCE REQUIREMENTS
      IF(I4.EQ.0)J=1
      IF(I4.NE.0)J=2
      DO 20 I=1,5
      B1(I)=B1(I)+A1*A4*B11(I,J)/220.
   20 B1(I)=B1(I)+A1*(A2*B12(I5,I)+A3*B12(I5+2,I))/220.
      B2(3)=B2(3)+A1*(A2*FEL(I5)+A3*FEL(I5+2))/200.
      IF(I5.EQ.2)B2(27)=B2(27)+A1*A4*0.1/200.
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE BUILDS(TOTC)
C-----------------------------------------------------------------------
C BUILDS CALCULATES ALL THE COSTS ASSOCIATED WITH BUILDINGS
C-----------------------------------------------------------------------
      COMMON/DTNX/ISS(8),IDQ(30),IBQ(6),IXQ(6),ISQ(6)/FTEC/DMINS(37),
     + VOLS(7),REST(29)/FACI/IRIB(10),ILFE/MANP/B1(9)/EQPT/B2(27)
C A1=WORKERS; A2=DUMMY; A4=TOTAL EQUIPMENT; NEEDS ONLY VOLS FROM FTEC.
      A1=0.
      DO 10 I=1,6
   10 A1=A1+B1(I)
      A4=0.
      DO 20 I=1,
   20 A4=A4+B2(I)
C WASTE ACTIVITIES AND STORAGE SHED AND ADMIN BLDG
C $318.6 = $317 WASTE ACTIVITIES + $10.6 STORAGE SHED
      A2=B1(7)+B1(8)
      TOTC=381.6+0.463*(A2*12.5+350.)
C HEALTH PHYSICS
      A2=A1+B1(9)
```

```
      A3=A2*12.5+200.
      IF(A3.LE.300.)A3=300.
      TOTC=TOTC+0.596*A3
C WAREHOUSE
      A2=A1+B1(7)+B1(8)
      A3=A2*6.-10.
      IF(A3.LE.200.)A3=200.
      TOTC=TOTC+0.331*A3
C GARAGE - $69.51 = $331/M**2 * 210 M**2 / 1000
      A2=69.51
      TOTC=TOTC+A2
      IF(A4.GT.13.)TOTC=TOTC+A2
      IF(A4.GT.39.)TOTC=TOTC+A2
C WPRB AND CEMENT PLANT
      DO 30 I=1,6
      IF(IDQ(I).GT.8.OR.IBQ(I).EQ.3)GO TO 40
   30 CONTINUE
      GO TO 50
   40 TOTC=TOTC+160.
   50 A1=0.
      DO 60 I=1,6
      IF(IDQ(I).GT.8)A1=A1+VOLS(I)
   60 CONTINUE
      IF(A1.GT.1.)TOTC=TOTC+600.+0.02*A1
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE RETRV(ICL)
      COMMON/DTNX/ID(8),IDQ(6,8)/DTEC/EMP,EFF(4),EMPQ(3),EFFQ(6,4)
      DO 10 I=1,8
   10 ID(I)=IDQ(ICL,I)
      IE=ID(5)
      EMP=EMPQ(IE)
      DO 20 I=1,4
   20 EFF(I)=EFFQ(ICL,I)
      RETURN
      END
C-----------------------------------------------------------------
      FUNCTION FINTP(A1,B1,B2,NB)
      DIMENSION B1(NB),B2(NB)
      IF(A1.GT.B1(1))GO TO 10
      A2=B2(1)
      GO TO 40
   10 DO 20 I=1,NB
      IF(A1.LT.B1(I))GO TO 30
   20 CONTINUE
   30 J=I
      IF(J.GT.NB)J=NB
      A2=B2(J-1)+(B2(J)-B2(J-1))*(A1-B1(J-1))/(B1(J)-B1(J-1))
   40 FINTP=A2
```

```
      RETURN
      END
C-----------------------------------------------------------------------
      BLOCK DATA
      CHARACTER NMPS*7,NMDS*7,NMEQ*9
      COMMON/CHRC/NMPS(9),NMDS(14),NMEQ(27)/DTEC/V1(5),EMPQ(3),V2(24)
     +      /MANC/MC(6)/EQPC/IEQP(27,2)/OPEQ/A8(27)/LSEQ/A9(27)
      DATA  NMPS/'RADTECH','QA TECH','HE OPS ','SKILLED','LABORER',
     1 'SURVEYR','AD NBGD','AD BGD ','GUARDS '/,    NMDS/'LTR-H  ',
     2 'STR-H  ','LTR-A  ','STR-A  ','SLTR-H ','SLTR-A ','AUGR-H ',
     3 'AUGR-A ','CTR-H  ','CTR-A  ','CSLTR-H','CSLTR-A','REPCK-H',
     4 'REPCK-A'/,NMEQ/'BULLDOZER','FE LOADER','DMP TRUCK','PAN SCRPR',
     8 'MOTOR GDR','BACKHOE  ','40-TN CRN','100-TN CR','S-FRKLIFT',
     9 'L-FRKLIFT','H2O TRUCK','AUGER RIG','STEMMER  ','PAVING M.',
     . 'TANDEM RL','COMPACTOR','H. TAMPER','CEM TRUCK','CEM BCKET',
     1 'CEM PU&PI','PICKUP TR','4WD TRUCK','SEDAN    ','YARD TRKR',
     2 'FLATBED  ','ACCESSORS','FARM TRKR'/,EMPQ/.5,.75,1./
C IEQP - EQUIPMENT COSTS AND REPLACEMENT SCHEDULE, TABLE 6-4
C   MC - SALARY COSTS/YEAR FOR WORKERS, TABLE 6-8
C   A8 - EQUIPMENT MAINTENANCE COSTS PER MACHINE DAY, TABLE 6-24
C   A9 - EQUIPMENT LEASING COSTS PER MACHINE DAY, TABLE 6-29
      DATA IEQP/200,100,40,60,2*100,150,500,30,40,55,400,4,90,35,80,1,
     2 45,5,100,10,15,12,120,20,100,20,16*10,5,10,2*0,3*5,4*10/,MC/4*25,
     3 15,60/,A8/.21,.14,.1,.28,.13,.045,.115,.25,.05,.06,.07,.2,0.,.085
     4 ,.04,.1,.003,.025,0.,.22,6*0.,.025/,A9/.89,.42,.215,.94,.42,.245,
     5 .48,.835,.14,.16,.2,.6,0.,.355,.17,.3,.012,.05,0.,.46,6*0.,.05/
      END
C-----------------------------------------------------------------------
      SUBROUTINE MEURGE(NSTR,INDEX,ISWC)
C-----------------------------------------------------------------------
C MEURGE IS THE LARGEST SUBROUTINE IN ECONOMY. IT INPUTS/
C INTEGRATES/CALCULATES THE FOLLOWING INFORMATION:
C (1) AREA CONCENTRATION LIMITS (FROM LIMITS.DAT)
C (2) CLASSIFIED WASTE STREAM DATA (FROM CLAOUT.DAT)
C (3) WASTE STREAMS TO BE CONSIDERED (FROM INPUTS.DAT)
C (4) WASTE VOLUMES TO BE CONSIDERED (FROM VOLUME.DAT)
C (5) RECALCULATES DISPOSAL TECHNOLOGY PARAMETERS, AND
C (6) CALCULATES SEVERAL IMPACTS PARAMETERS INCLUDING:
C      T1   - (ICL,IRI,IG) INCINERATION POPULATION IMPACTS
C      T2   - (ICL,IRA) TRANSPORTATION POPULATION IMPACTS
C      T3   - (ICL,1) PROCESSING COSTS ; (ICL,2) PROCESSING OC. DOSE
C               (ICL,3) LOADING OC. DOSE ; (ICL,4) TRANSPORTATION OC.DOSE
C               (ICL,5) TRANSPORTATION COSTS
C      T4   - (ISTR,IORG,2) INCINERATION POP FACTORS
C      T5   - (ISTR) EXTERNAL RADIATION LEVELS
C-----------------------------------------------------------------------
      CHARACTER BASN(249)*10,BASNB(150)*10,BASNI(4)*10,BASND*10,
     + NUC(100)*8,NUCD(4)*8,TST*1
      COMMON/CSHP/KONTS(6,18),KSHPS(6),DZSHP(6)/UPTK/V1,V2,S1,S2,Z,
     + RI(4),R,CY,D,F2,F3(4),F5,F7,F8,F8P,F11,F13,F13P,F14,F15,F18
```

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      COMMON/FACI/IR,IOFL,IBUF,NBRN,NBES,IBEG,IEND,ICLS,IOBS,IINS,ILFE
     +/DTEC/EMP,EFF,SEF,DPT,DTK,EMPQ(3),EFFQ(6),SEFQ(6),DPTQ(6),DTKQ(6)
     +/DTNX/ID,IU,IT,IC,IE,IB,IX,IS,IDQ(6),IUQ(6),ITQ(6),ICQ(6),IEQ(6),
     + IBQ(6),IXQ(6),ISQ(6)/FTEC/DMIN(6),VOLE(6),ACSQ(6),ALEN(6),
     + WIDT(6),DISN(7),VOLS(7),AREA(7),VBAK(7),TSUM(7),RADF(8)
     +/BAST/PDCF(100,10),DCF3(100),FRACT(100,3),BAS(249,4),TSUMD(249,6),
     + UPRS(249,2),T1(7,4,10),T2(7,4),T3(7,5),T4(249,10,2),T5(249),
     + TDP(4),TDO(4),TPO(4),VEL(4),CSK(4,4),DIS(4,4,5),STP(4,4,5)
      DIMENSION IPKQ(5,15),KONT(3,18),PCST(5,2),TCST(2,3),UPRSD(7,2),
     + USOLD(3,2),COFF(3),PKVL(5),IPAKD(5),ARL(100),BASS(100),IREGI(4),
     + IBLGI(4),FVOLI(4),ISPC(249,5),COND(4),FF1(5),FF(5),POP(4),
     + DCF1(10),DCF2(10),DCF4(10),DCF5(10),INDEX(6),ISWC(6)
      QUADS(A,B,C)=(A-0.5*C)*(B-0.5*C)
      CUBCS(A,B,C)=A*B*C-0.25*(A+B)*C*C+C*C*C/12.
      DATA IPKQ/ 0, 0,69,15,16,23, 8,69, 0, 0, 0, 3,97, 0, 0,
     2          50, 0,50, 0, 0,100,0, 0, 0, 0, 0,100,0, 0, 0,
     3           0, 0,100,0, 0, 0, 0, 0,100,0, 0, 0, 0,0,100,
     4           0, 0,50, 0,50, 0,90,10, 0, 0, 0, 0,15,15,70,
     5          28,16,56, 0, 0,10, 5,85, 0, 0,70,30, 0, 0, 0/,
     6 KONT/1103, 3024,120,1103, 4076, 60,1203,36100, 12,1303,70100, 12,
     7      1403,11100, 83,1511, 1100,720,2113, 3100,180,2213,36096, 20,
     8      2211, 6004,150,2313,70048, 12,2311,14051, 88,2311, 6001,156,
     .      2411, 2100,360,2511, 1100,720,3311, 6051,156,3311, 1049,360,
     1      3431, 2100,360,3531, 1100,900/,PCST/500.,250.,25.,4000.,
     2      5000.,6000.,4000.,350.,4000.,5000./,TCST/2.08,1.54,1.81,
     3      1.40,1.44,1.33/,UPRSD/412.,619.,1237.,849.,2534.,2384.,1278.
     4      ,3*15.,4.42,8.,6.12,5.35/,USOLD/1577.,3007.,2759.,3*4./,
     5 COFF/.195,.341,.546/,PKVL/3.625,0.453,0.208,1.416,4.814/
 9001 FORMAT(A8,75X,E8.1)
 9002 FORMAT(8E10.3)
 9003 FORMAT(I5)
 9004 FORMAT(27X,E9.2,27X,3E9.2)
 9005 FORMAT(9X,10E9.2)
 9006 FORMAT(8A10)
 9007 FORMAT(A10,I7,2I5,13X,I2,2X,I2/10X,2E10.3,20X,E10.3)
 9008 FORMAT(7X,4(1X,A8,E9.2),A1)
 9009 FORMAT(/2X'INPUTS STREAMS: NAME, REGN, BKLG, FRAC - OLD NSTR ='I5)
 9010 FORMAT(4(A10,2I2,F6.0))
 9011 FORMAT(2X,4(A10,2I2,F5.2,1X))
C READ NUCLIDE NAMES AND AREA LIMITS
      OPEN(1,FILE='A:LIMITS.DAT')
      READ(1,9001) (NUC(I),ARL(I),I=1,100)
      CLOSE(1)
C READ ENVIRONMENTAL PARAMETERS AND PATHWAY FACTORS
      OPEN(1,FILE='A:ENVIRO.DAT')
      DO 12 I=1,4
      READ(1,9002) TDP(I),TDO(I),TPO(I),VEL(I),(CSK(I,J),J=1,4),
     +            ((DIS(I,J,K),STP(I,J,K),K=1,4),J=1,4)
      DO 10 J=1,4
      DIS(I,J,5)=DIS(I,J,1)+DIS(I,J,2)+DIS(I,J,3)+DIS(I,J,4)
```

```
   10 STP(I,J,5)=STP(I,J,1)+STP(I,J,2)+STP(I,J,3)+STP(I,J,4)
      READ(1,9002) A2,A3,A4,A5,A1
      POP(I)=A1/3.
      READ(1,9002) A1
      READ(1,9002) A1
      READ(1,9003) J
   12 CONTINUE
      READ(1,9002) V1,V2,S1,S2,Z,RI,R,CY,D,F2,F3,F5,F7,
     +             F8,F8P,F11,F13,F13P,F14,F15,F18
      READ(1,9002) RADF
      CLOSE(1)
C READ FUNDCF AND CALCULATE PDCFS
      OPEN(1,FILE='A:FUNDCF.DAT')
      DO 14 IN=1,100
      READ(1,9004) DCF3(IN),(FRACT(IN,I),I=1,3)
      READ(1,9005) (DCF1(I),I=1,10),(DCF2(I),I=1,10)
      READ(1,9005) (DCF4(I),I=1,10),(DCF5(I),I=1,10)
      READ(1,9005) (FF1(I),I=1,5),(FF(I),I=1,5)
      DCF3(IN)=DCF3(IN)*1.E+12
      V=V1
      IF(IN.EQ.31)V=V2
      D1=86400.*V/(S2*Z)
      D2=86400.*R*V/S1
      A1=D1*PTP*FF(1)+(D2/CY)*F2+F3(IR)*(FF(2)*F5+FF(3)*F7*365.)
      DO 14 I=1,10
      A2=F15*DCF2(I)+DCF5(I)
      PDCF(IN,I)=(A1*DCF1(I)+A2+D1*F18*(F14*A2+DCF4(I)))*1.E+12
   14 CONTINUE
      CLOSE(1)
C BAS1 - DISPOSED VOLUMES ; BAS2 - CLASSIFIED FRACTION
C BAS3 - DENSITY          ; BAS4 - TOTAL ACTIVITY
      OPEN(2,FILE='A:CLAOUT.DAT')
      OPEN(3,FILE='A:INPUTS.DAT')
      READ(3,9006) (BASNB(I),I=1,150)
      CALL ZERO(T1,5572)
      DO 16 I=1,6
      DZSHP(I)=0.
      KSHPS(I)=0
      DO 16 J=1,18
   16 KONTS(I,J)=0
C BEGIN READING OF CLAOUT.DAT
      ISTR=0
   18 ISTR=ISTR+1
      IF(ISTR.GT.NSTR)STOP 'TOO MANY WASTE STREAMS'
      READ(2,9007,END=40) BASN(ISTR),(ISPC(ISTR,J),J=1,4),ICL,
     .                    BAS(ISTR,3),BAS(ISTR,2),BAS(ISTR,4)
      BAS(ISTR,1)=0.
      IF(ICL.LE.2)ISPC(ISTR,5)=ICL
      IF(ICL.GT.2)ISPC(ISTR,5)=1+(ICL+1)/2
      IF(ISPC(ISTR,5).NE.5)GO TO 20
```

```
      CALL MATCH(BASNB,BASN(ISTR),ISTQ)
      IF(ISTQ.GT.79)ISPC(ISTR,5)=6
   20 J=ISPC(ISTR,1)
      IPAK=J/100000
      IPRC=(J/10000)-IPAK*10
      ISOL=(J/1000)-IPAK*100-IPRC*10
      A1=ISPC(ISTR,2)
      A1=A1/ISPC(ISTR,3)
      A2=BAS(ISTR,2)
      A3=A2*A1
      DO 22 J=1,2
      A4=0.
      IF(IPRC.GT.7)STOP 'IPRC EXCEEDS 7'
      IF(IPRC.GT.0)A4=A3*UPRSD(IPRC,J)
      IF(ISOL.GT.0.AND.ISOL.LE.3)A4=A4+A2*USOLD(ISOL,J)
   22 UPRS(ISTR,J)=A4
C READ NUCLIDE CON/ACT, AND STORE THEM IN BASS.
      CALL ZERO(BASS,100)
   24 READ(2,9008) (NUCD(I),COND(I),I=1,4),TST
      DO 30 J=1,4
      IF(NUCD(J).EQ.' ')GO TO 32
      DO 26 I=1,100
      IF(NUCD(J).EQ.NUC(I))GO TO 28
   26 CONTINUE
      STOP 'CANT FIND NUCLIDE NAME'
   28 BASS(I)=COND(J)
   30 CONTINUE
      IF(TST.NE.'$')GO TO 24
C FORM PARTIAL SUMS FOR ARL, INCINERATION, AND TRANSPORTATION
   32 ICL=ISPC(ISTR,5)
      A1=0.
      DO 34 I=1,100
      IF(ARL(I).GT.1.)A1=A1+BASS(I)/ARL(I)
   34 CONTINUE
      TSUMD(ISTR,ICL)=A1
      DO 38 I=1,100
      DO 36 K=1,2
      A1=BASS(I)/((1./FRACT(I,K))-1.)
      DO 36 J=1,10
   36 T4(ISTR,J,K)=T4(ISTR,J,K)+A1*PDCF(I,J)
   38 T5(ISTR)=T5(ISTR)+BASS(I)*DCF3(I)
      T5(ISTR)=T5(ISTR)/8760.
      GO TO 18
C END OF CLAOUT READ; NEXT SECTION OBTAINS GENERATED VOLUMES
   40 NSTR=ISTR-1
      CLOSE(2)
      OPEN(9,FILE='A:VOLUME.DAT',ACCESS='DIRECT',RECL=810)
      WRITE(6,9009) NSTR
   42 READ(3,9010,END=62) (BASNI(I),IREGI(I),IBLGI(I),FVOLI(I),I=1,4)
      WRITE(6,9011) (BASNI(I),IREGI(I),IBLGI(I),FVOLI(I),I=1,4)
```

```
      DO 60 ISTRD=1,4
      IF(BASNI(ISTRD).EQ.' ')GO TO 62
      BASND=BASNI(ISTRD)
      CALL MATCH(BASNB,BASND,ISTQ)
      IRI=IREGI(ISTRD)
      IBLG=IBLGI(ISTRD)
      DO 58 ISTR=1,NSTR
      IF(BASN(ISTR).NE.BASND.OR.ISPC(ISTR,5).EQ.0)GO TO 58
C VOLUMES: A3 = DISPOSED; A4 = ORIGINAL; A5 = TRANSPORTED;
      ICL=ISPC(ISTR,5)
      A1=ISPC(ISTR,2)
      A1=A1/ISPC(ISTR,3)
      A3=BAS(ISTR,2)*FVOLI(ISTRD)*VOLUMES(ISTQ,IRI,IBLG,IBEG,IEND)
      IF(A3.LT.1.E-6)GO TO 58
      IF(ISPC(ISTR,4).NE.0)A3=A3*0.208
      A4=A3*A1
      BAS(ISTR,1)=BAS(ISTR,1)+A3
      J=ISPC(ISTR,1)
      IPAK=J/100000
      IPRC=(J/10000)-IPAK*10
      ISOL=(J/1000)-IPAK*100-IPRC*10
      ILOC=(J/100)-IPAK*1000-IPRC*100-ISOL*10
      IINC=(J/10)-IPAK*10000-IPRC*1000-ISOL*100-ILOC*10
      IENV=J-IPAK*100000-IPRC*10000-ISOL*1000-ILOC*100-IINC*10
      A5=A3
      IF(ILOC.EQ.2)A5=A4
C PACKAGING COSTS
      DO 44 I=1,5
      A6=PCST(I,1)
      IPAKD(I)=IPKQ(I,IPAK)
      IF(ISOL.EQ.3)A6=A6+PCST(I,2)
   44 T3(ICL,1)=T3(ICL,1)+A5*A6*IPAKD(I)/(100.*PKVL(I))
      T3(ICL,1)=T3(ICL,1)+A3*UPRS(ISTR,1)
      T3(ICL,2)=T3(ICL,2)+A3*UPRS(ISTR,2)*RADF(IENV)
      IPCL=1
      IF(T5(ISTR).GT.513.)IPCL=2
      IF(T5(ISTR).GT.2.56E4)IPCL=3
      IF(IPRC.LT.5)GO TO 48
      J=IRI
      K=2
      IF(ILOC.EQ.2)J=IR
      IF(ILOC.EQ.2)K=1
      DO 46 I=1,10
   46 T1(ICL,J,I)=T1(ICL,J,I)+T4(ISTR,I,K)*POP(J)
   48 IF(IPCL.NE.3)GO TO 52
      DO 50 I=1,2
      IF(IPAKD(I).EQ.0)GO TO 50
      IPAKD(3)=IPAKD(3)+IPAKD(I)
      IPAKD(I)=0
   50 CONTINUE
```

```
C I1 = CARE LEVEL ; I2 = PACKAGE TYPE     ; I3 = RTRN&OVERWEIGHT STATUS
C I4 = COFF INDEX ; I5 = NO OF PACS/SHPMT ; I6 = % OF VOLUME THIS MODE
   52 DO 56 IKON=1,18
      I1=KONT(1,IKON)/1000
      IF(I1.NE.IPCL)GO TO 56
      I2=(KONT(1,IKON)/100)-I1*10
      IF(IPAKD(I2).EQ.0)GO TO 56
      I3=(KONT(1,IKON)/10)-I1*100-I2*10
      I4=KONT(1,IKON)-I1*1000-I2*100-I3*10
      I5=KONT(2,IKON)/1000
      I6=KONT(2,IKON)-I5*1000
      FRS=(I6*IPAKD(I2))/1.E4
      A6=A5*FRS
      A7=DIS(IR,IRI,5)
      A8=STP(IR,IRI,5)
      KSHP=1.0+A6/(I5*PKVL(I2))
      KPAK=1.0+A6/PKVL(I2)
      DZD1=1.6*COFF(I4)*T5(ISTR)/BAS(ISTR,3)
      DZD2=DZD1*COFF(1)/COFF(I4)
      DZD3=DZD2*2.8
      IF(DZD1.GT.10.)DZD1=10.
      IF(DZD2.GT.10.)DZD2=10.
      IF(DZD3.GT.10.)DZD3=10.
      KSHPS(ICL)=KSHPS(ICL)+KSHP
      DZSHP(ICL)=DZSHP(ICL)+KSHP*DZD1
      KONTS(ICL,IKON)=KONTS(ICL,IKON)+KPAK
      T3(ICL,3)=T3(ICL,3)+KPAK*KONT(3,IKON)*RADF(IENV)/60.
      T3(ICL,4)=T3(ICL,4)+2.*KSHP*(DZD2*A7/VEL(IR)+DZD3*A8*0.235)
      NX=1
      IF(I3.EQ.1.OR.I3.EQ.3)NX=2
      NC=2
      IF(A7.LE.400.)NC=1
      IF(A7.GT.1000.)NC=3
      A9=KSHP*A7
      T3(ICL,5)=T3(ICL,5)+A9*NX*TCST(NX,NC)*1.15
      IF(NX.EQ.2)T3(ICL,5)=T3(ICL,5)+KSHP*CSK(IR,IRI)*310.
      IF(I3.GE.2)T3(ICL,5)=T3(ICL,5)+A9*0.76+A8*60.
      A9=100.*KSHP*DZD1
      DO 54 IRD=1,4
      A1=TDP(IRD)*DIS(IR,IRI,IRD)/VEL(IRD)+TDO(IRD)*STP(IR,IRI,IRD)
   54 T2(ICL,IRD)=T2(ICL,IRD)+TPO(IRD)*A9*A1
   56 CONTINUE
   58 CONTINUE
   60 CONTINUE
      GO TO 42
   62 CLOSE (3)
      CLOSE (9)
C RECALCULATION SECTION
      ICL=1
   66 J=INDEX(ICL)
```

```
      CALL RETRV(ICL)
      IF(IU.EQ.0)GO TO 94
      IF(J.NE.1)GO TO 76
C SECTION FOR WASTE CLASSES DISPOSED IN SEPARATE DISPOSAL CELLS
      I=ICL
      HYT=DPT+DTK-DMIN(I)
      IF(DMIN(I).LE.2.)HYT=DTK
      A2=TSUM(I)
      IF(HYT.GT.0.)GO TO 68
      CALL MODIFY(ICL,NX)
      IF(NX.EQ.2.OR.VOLS(I).LT.1.)GO TO 94
      HYT=DPT+DTK-DMIN(I)
   68 IF(ID.LE.6)GO TO 72
C STRAIGHT WALLS SECTION
      A3=A2*HYT*EMP/VOLS(I)
      IF(A3.LE.1.)GO TO 70
      HYT=HYT/A3
      EFFQ(I)=HYT
      DPTQ(I)=DTK+DPT-HYT
      DTKQ(I)=HYT
   70 AREA(I)=VOLS(I)/(HYT*EMP)
      DISN(I)=AREA(I)/ACSQ(I)
      VBAK(I)=AREA(I)*(DTK-HYT)
      GO TO 94
C SLOPED WALLS SECTION
   72 A4=ALEN(I)
      A5=WIDT(I)
      A6=DTK+1.-HYT
      A7=VOLE(I)-CUBCS(A4,A5,A6)
      A3=A2*A7*EMP/(VOLS(I)*QUADS(A4,A5,DTK+1.))
      IF(A3.LE.1.)GO TO 74
      HYT=HYT/A3
      A6=DTK+1.-HYT
      A7=VOLE(I)-CUBCS(A4,A5,A6)
      EFFQ(I)=A7/QUADS(A4,A5,A6)
      SEFQ(I)=SEF*QUADS(A4,A5,1.)/QUADS(A4,A5,A6)
      DPTQ(I)=DTK+DPT-HYT
      DTKQ(I)=HYT
   74 DISN(I)=VOLS(I)/(A7*EMP)
      AREA(I)=DISN(I)*A4*A5
      VBAK(I)=DISN(I)*CUBCS(A4,A5,A6)
      GO TO 94
C MIXED DISPOSAL SECTION, STRAIGHT AND SLOPED WALLS ARE DONE TOGETHER
   76 I1=ICL
      I2=ICL+J-1
      VT=0.
      TS=0.
      DO 78 K=I1,I2
      VT=VT+VOLS(K)
      TS=TS+TSUM(K)
```

```
      IF(DPT+DTK.GT.DMIN(K))GO TO 78
      CALL MODIFY(K,NX)
      IF(NX.EQ.2)GO TO 76
   78 CONTINUE
      A4=ALEN(I1)
      A5=WIDT(I1)
      IF(ID.GT.6)DI3=VT/(EFF*EMP*ACSQ(I1))
      IF(ID.LE.6)DI3=VT/(EFF*EMP*QUADS(A4,A5,1.))
      DO 80 K=I1,I2
      A6=DMIN(K)-1.
      IF(ID.GT.6)DI4=VOLS(K)/(EMP*ACSQ(I1)*(DPT+DTK-DMIN(K)))
      IF(ID.LE.6)DI4=VOLS(K)/(EMP*(VOLE(K)-CUBCS(A4,A5,A6)))
      IF(DI3.LT.DI4)DI3=DI4
   80 CONTINUE
      A2=0.
      IF(ID.GT.6)AC=ACSQ(I1)
      IF(ID.LE.6)AC=QUADS(A4,A5,DTK+1.)
      DO 86 KK=I1,I2
      K=I2-KK+I1
   82 A3=VOLS(K)/(DI3*AC*EMP)
      IF(ID.GT.6)GO TO 84
      A1=QUADS(A4,A5,DTK+1.-A2-0.48*A3)
      IF(A1-AC.LT.0.01)GO TO 84
      AC=A1
      GO TO 82
   84 DTKQ(K)=A3
      A2=A2+DTKQ(K)
      DPTQ(K)=DTK+DPT-A2
      IF(ID.GT.6)AREA(K)=DI3*AC*VOLS(K)/VT
      IF(ID.LE.6)AREA(K)=DI3*A4*A5*VOLS(K)/VT
   86 CONTINUE
      A6=DTK+1.-A2
      IF(ID.GT.6)A3=TS/(AC*DI3)
      IF(ID.LE.6)A3=TS*EMP*(VOLE(K)-CUBCS(A4,A5,A6))/(VT*AC)
      IF(A3.LE.1.)A3=1.
   88 A2=0.
      IF(A3.GT.1.)DI3=DI3*A3
      DO 90 KK=I1,I2
      K=I2-KK+I1
      EFFQ(K)=EFFQ(K)/A3
      DTKQ(K)=DTKQ(K)/A3
      A2=A2+DTKQ(K)
      DPTQ(K)=DTK+DPT-A2
      AREA(K)=AREA(K)*A3
   90 DISN(K)=DI3*VOLS(K)/VT
      IF(DTK.GE.A2)GO TO 92
      A3=A2/DTK
      GO TO 88
   92 VBAK(I1)=DI3*AC*(DTK+1.-A2)
      ICL=ICL+J-1
```

```
   94 ICL=ICL+1
      IF(ICL.LE.6)GO TO 66
C PRINT OUT ALL THE CALCULATIONS
      CALL TRITE(BASN,ISPC,PKVL,NSTR)
      A1=1./ILFE
      DO 96 J=1,6
      ISWC(J)=1
      IF(IDQ(J).EQ. 3)ISWC(J)=3
      IF(IDQ(J).GT. 4)ISWC(J)=3
      IF(IDQ(J).GT.12)ISWC(J)=5
      IF(IEQ(J).EQ. 2)ISWC(J)=ISWC(J)+1
      VOLS(J)=VOLS(J)*A1
      DISN(J)=DISN(J)*A1
      AREA(J)=AREA(J)*A1
      VBAK(J)=VBAK(J)*A1
      VBAK(7)=VBAK(7)+VBAK(J)
      DISN(7)=DISN(7)+DISN(J)
   96 AREA(7)=AREA(7)+AREA(J)
      VOLS(7)=VOLS(7)*A1
      B1=0.5+SQRT(1.25)
      A2=SQRT(B1*AREA(7))
      A3=30.
      IF(IBUF.EQ.2)A3=300.
      AREA(7)=AREA(7)+2.*A3*(A2+(A2/B1)+2.*A3)+200.
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE TRITE(BASN,ISPC,PKVL,NSTR)
C-----------------------------------------------------------------------
C TRITE PRINTS ALL THE PROCESSING AND TRANSPORTATION RELATED IMPACTS.
C-----------------------------------------------------------------------
      CHARACTER BASN(249)*10,LB1(23)*7,LB2(9)*15,BCL(7)*5,ORG(10)*8
      COMMON/FACI/IRR(10),ILFE/DTNX/IDD(8),IDQ(6),IUQ(6),IREST(36)
     +/FTEC/DMINS(37),VOLS(21),TSUM(7),RADF(8)/BAST/PDCF(1400),
     + BAS(249,4),TSUMD(249,6),UPRS(498),T1(7,4,10),T2(7,4),T3(7,5),
     + T4(4980),T5(249),ETC(192)/CSHP/KONTS(6,18),KSHPS(6),DZSHP(6)
      DIMENSION ISPC(249,5),PKVL(5),VSUM(7),INDX(18),IRI(4)
      DATA ORG/' LUNGS  ','S. WALL ','LLI WALL','T. BODY ','KIDNEYS ',
     2         ' LIVER  ','RED MAR ','  BONE  ','THYROID ','  ICRP  '/,
     3   BCL/'  A  ','  SA ','  B  ','  C  ','  D1 ','  D2 ','TOTAL'/,
     4 LB1/'R-LB/VN','R-LB/FB','R-SB/VN','R-DR/VN','R-SL/VN','R-LL/LC',
     5     'S-LB/ST','S-SB/ST','S-SB/LC','S-DR/ST','S-DR/LC','S-DR/SC',
     6     'S-SL/SC','S-LL/LC','E-DR/SC','E-DR/1D','E-SL/SC','E-LL/LC',
     7     'LG-BOX ','SM-BOX ','DRUM   ','SM-LINR','LG-LINR'/,
     8 LB2/'PRCS COSTS ($) ','PRCS ODOSE-PMR ','LOAD ODOSE-PMR ',
     9     'TRAN ODOSE-PMR ','TRAN COSTS ($) ','VOLUMES - M**3 ',
     .     'VOLUMES CHECK  ','SHIPMENT DOSES ','SHIPMENTS      '/
      DATA INDX/1,1,2,3,4,5,1,2,2,3,3,3,4,5,3,3,4,5/,IRI/1,2,3,4/
  101 FORMAT(//2X'BASIC WASTE STREAM DATA'1P//3(2X,A5'='E9.2)/
     +       4(2X,A5'='E9.2)//2X'NAME,VOLM,CVOL,DENS,CON/ACT,ISPC NDX')
```

```
102 FORMAT(2X,A10,1P,4E9.2,I8,2I5,2I2)
103 FORMAT(/2X'TOTAL INCIN/POP (P-MREM) - REGION ='I2/3X'CLASS'10A9)
104 FORMAT(2X,A5,1P,10E9.2)
105 FORMAT(//2X'TOTAL TRANS POP (P-MREM)'/3X'CLASS '4(2X'IRI='I2,3X))
106 FORMAT(2X,A5,1P,4(2X,E9.2))
109 FORMAT(//2X'TRANSPORTATION INFORMATION'//2X'ITEM'11X,6(2X,A5,2X))
110 FORMAT(2X,A15,1P,6E9.2)
111 FORMAT(2X,A15,6(I7,2X))
112 FORMAT(2X'DETAILS OF PACKAGES')
113 FORMAT(7X,A8,2X,6(I7,2X))
114 FORMAT(//2X'WASTE STREAMS AND SURFACE DOSES (MR/HR)')
115 FORMAT(4(2X,A10,1P,E9.2))
116 FORMAT(//2X'ANNUAL IMPACTS ',7(2X,A5,2X))
117 FORMAT(2X,A15,1P,7E9.2)
    CALL ZERO(TSUM,7)
    DO 18 ICL=1,6
    DO 12 K=1,4
    DO 10 J=1,10
 10 T1(7,K,J)=T1(7,K,J)+T1(ICL,K,J)
 12 T2(7,K)=T2(7,K)+T2(ICL,K)
    DO 14 J=1,5
 14 T3(7,J)=T3(7,J)+T3(ICL,J)
    A1=0.
    DO 16 ISTR=1,NSTR
    IF(ICL.EQ.ISPC(ISTR,5))A1=A1+BAS(ISTR,1)*TSUMD(ISTR,ICL)
 16 CONTINUE
    TSUM(ICL)=A1
 18 TSUM(7)=TSUM(7)+A1
    CALL ZERO(VOLS,7)
    DO 20 ISTR=1,NSTR
    K=ISPC(ISTR,5)
    IF(IUQ(K).EQ.0)GO TO 20
    VOLS(K)=VOLS(K)+BAS(ISTR,1)
    VOLS(7)=VOLS(7)+BAS(ISTR,1)
 20 CONTINUE
    WRITE(6,101) (BCL(I),VOLS(I),I=1,7)
    WRITE(6,102) (BASN(I),(BAS(I,J),J=1,4),(ISPC(I,J),J=1,5),I=1,NSTR)
    A1=1./ILFE
    DO 22 I=1,7
    DO 22 J=1,5
 22 T3(I,J)=T3(I,J)*A1
    DO 24 J=1,4
    WRITE(6,103) J,ORG
    WRITE(6,104) (BCL(ICL),(T1(ICL,J,IG),IG=1,10),ICL=1,7)
 24 CONTINUE
    WRITE(6,105) IRI
    DO 26 ICL=1,6
 26 WRITE(6,106) BCL(ICL),(T2(ICL,J),J=1,4)
    CALL ZERO(VSUM,6)
    DO 28 I=1,18
```

```
      J=INDX(I)
      DO 28 K=1,6
   28 VSUM(K)=VSUM(K)+KONTS(K,I)*PKVL(J)
      WRITE(6,109) (BCL(I),I=1,6)
      WRITE(6,110) LB2(6),(VOLS(I),I=1,6)
      WRITE(6,110) LB2(7),(VSUM(I),I=1,6)
      WRITE(6,110) LB2(8),DZSHP
      WRITE(6,111) LB2(9),KSHPS
      WRITE(6,112)
      DO 30 I=1,18
   30 WRITE(6,113) LB1(I),(KONTS(J,I),J=1,6)
C     WRITE(6,114)
C     WRITE(6,115) (BASN(I),T5(I),I=1,NSTR)
      WRITE(6,116) BCL
      DO 32 J=1,5
   32 WRITE(6,117) LB2(J),(T3(ICL,J),ICL=1,7)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE MODIFY(ICL,NX)
C-----------------------------------------------------------------------
C MODIFY AIDS IN DECISIONS IF DMIN CRITERIA IS NOT SATISFIED
C-----------------------------------------------------------------------
      CHARACTER LAB(3)*24,BCL(7)*5
      COMMON/DTEC/PREL(5),EMPQ(15),DPTQ(6),DTKQ(6)/DTNX/IDS(8),IDQ(6),
     +           IUQ(6),IRST(36)/FTEC/DMIN(30),DISN(7),VOLS(7),REST(29)
      DATA LAB/'STOP                   : 1','DO NOT CONSIDER CLASS: 2',
     +         'MODIFY DMIN TO 2M      : 3'/,BCL/'   A ','  SA ',
     3         '   B ','   C ','  D1 ','  D2 ','TOTAL'/
  101 FORMAT(/2X'*** DEPTH PROBLEM ***'/2X'CLASS: 'A5,2X'DMIN:'F5.1,
     * 2X'ID:'I3,2X'DPT:'F5.1,2X'DTK:'F5.1//2X'OPTIONS FOLLOW'/
     * 2X,A24/2X,A24/2X,A24/2X'SELECT FROM ABOVE     : '\)
  102 FORMAT(I1)
  103 FORMAT(//2X'OPTION 'I1' HAS BEEN SELECTED, PROGRAM CONTINUING'/)
      WRITE(6,101) BCL(ICL),DMIN(ICL),IDQ(ICL),DPTQ(ICL),DTKQ(ICL),LAB
   10 WRITE(*,101) BCL(ICL),DMIN(ICL),IDQ(ICL),DPTQ(ICL),DTKQ(ICL),LAB
      READ(*,102) IOPT
      IF(IOPT.LT.1.OR.IOPT.GT.3)GO TO 10
      IF(IOPT.EQ.1)STOP 'STOP OPTION FROM MODIFY HAS BEEN SELECTED'
      WRITE(6,103) IOPT
      WRITE(*,103) IOPT
      IF(IOPT.EQ.3)GO TO 20
      IUQ(ICL)=0
      VOLS(7)=VOLS(7)-VOLS(ICL)
      VOLS(ICL)=0.
      NX=2
      RETURN
   20 DMIN(ICL)=2.
      NX=3
      RETURN
```

```
      END
C-----------------------------------------------------------------------
      SUBROUTINE MATCH(BASNB,BASND,ISTQ)
C-----------------------------------------------------------------------
C MATCH MATCHES WASTE STREAM (BASND) AGAINST THE ORDER (BASNB).
C-----------------------------------------------------------------------
      CHARACTER BASNB(150)*10,BASND*10
      DO 10 I=1,150
      IF(BASNB(I).EQ.BASND)GO TO 20
   10 CONTINUE
      STOP 'CANNOT MATCH INPUT WASTE STREAM'
   20 ISTQ=I
      RETURN
      END
C-----------------------------------------------------------------------
      FUNCTION VOLUMES(ISTQ,IRI,IBLG,IBEG,IEND)
C-----------------------------------------------------------------------
C READS GENERATED VOLUMES FROM VOLUME.DAT
C-----------------------------------------------------------------------
      CHARACTER NAME*10
      DIMENSION VL(4,50)
      READ(9,REC=ISTQ) NAME,VL
      A1=0.
      IF(NAME.EQ.'XXXXXXXXXX')GO TO 40
      I1=IBEG-1980-IBLG
      IF(I1.LE.0)STOP 'TOO MANY BACKLOG YEARS'
      I2=IEND-1980
      DO 20 I=I1,I2
   20 A1=A1+VL(IRI,I)
   40 VOLUMES=A1
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE TVALUE(VL,IOPS,ICLS,IOBS,IINS)
C-----------------------------------------------------------------------
C TVALUE CALCULATES TIME-VALUE-OF-MONEY.  DETAILS OF THE METHODOLOGY
C CAN BE FOUND IN SECTION C.6 OF APPENDIX C, VOLUME 1.
C-----------------------------------------------------------------------
      CHARACTER LABEL(17)*5,LABL(12)*13
      COMMON/BAST/PAC(5,11),OPC(50,11),CLC(3),SUC(4),AIC(2),ETC(8293)
      DIMENSION VL(50),CLCY(20),SURC(20),AINS(999),PARS(12)
      DATA LABEL/'PVPOE','PVPOC','PVOE ','PVOC ','PVCC ','PVSC ',
     *           'PVSBC','PVSBI','PVDB ','PVDE ','PVICP','PVICO',
     *           'PVITC','PVR  ',' USC ',' UC1 ',' UCA '/,
     *     LABL/'DISCOUNT RATE','TAX RATE     ','INTEREST RATE',
     *           'F-SUB-PREOPS ','F-SUB-OPERTNS','F-SUB-CLOSURE',
     *           'F-SUB-SURVEIL','F-SUB-INSTIT ','SURETY/CLOSUR',
     *           'SURETY/INSTIT','ITC RATE     ','ADJUSTMNT FAC'/
      DATA CLCY/20*0./,SURC/20*0./,AINS/999*0./,IPOS/5/
      DATA PARS/.15,.5,.08,2*.04,2*.05,.06,2*.01,.08,.04/,IYEAR/1984/
```

```
C INPUT AND OUTPUT ECONOMIC PARAMETERS
  101 FORMAT(//2X'ENTER AND/OR CONFIRM ECONOMIC PARAMETERS')
  102 FORMAT(2X,A13' ='F5.2' ENTER NEW VALUE (RETURN OTHERWISE)? '\)
  103 FORMAT(E10.3)
  104 FORMAT(2X,A13' ='F5.2)
  105 FORMAT(2X'OLD DISCOUNT YR'I5' ENTER NEW YR (RETURN OTHERWISE)? '\)
  106 FORMAT(I4)
  107 FORMAT(/2X'ALL COSTS ARE BEING DISCOUNTED TO 'I4)
      WRITE(*,101)
      WRITE(6,101)
      DO 10 I=1,12
      WRITE(*,102) LABL(I),PARS(I)
      READ(*,103) A1
      IF(A1.GT.0.)PARS(I)=A1
      IF(I.LT.12)GO TO 10
      WRITE(*,105) IYEAR
      READ(*,106) IYN
   10 WRITE(6,104) LABL(I),PARS(I)
C CALL FOR OPTIONS
      IF(IYN.EQ.IYEAR.OR.IYN.EQ.0)GO TO 16
      A1=(1.+PARS(12))**(IYN-IYEAR)
      IYEAR=IYN
      CALL MULTIP(A1,PAC)
   16 WRITE(6,107) IYEAR
      A1=CLC(1)+CLC(2)+CLC(3)
      CALL CLOSRU(CLCY,A1,ICLS)
      A1=SUC(1)+SUC(2)+SUC(3)+SUC(4)
      CALL SURVEU(SURC,A1,IOBS)
      A1=AIC(1)+AIC(2)
      CALL INSTIU(AINS,A1,IINS)
C SET PRELIMINARY PARAMETERS
      AD=1.+PARS(1)
      TVAL=PARS(2)
      AI=1.+PARS(3)
      AP=1.+PARS(4)
      APD=AP/AD
      AO=1.+PARS(5)
      AOD=AO/AD
      AC=1.+PARS(6)
      ACD=AC/AD
      AS=1.+PARS(7)
      ASD=AS/AD
      AJ=1.+PARS(8)
      AJI=AJ/AI
C PREOPERATIONAL COSTS
      BP=1.
      BPD=1.
      C1=0.
      C2=0.
      C4=0.
```

```
      DO 20 I=1,IPOS
      BP=BP*AP
      BPD=BPD*APD
      D1=0.
      D2=PAC(I,9)+PAC(I,10)
      DO 18 J=1,4
      D1=D1+PAC(I,J)
   18 D2=D2+PAC(I,J+4)
      D3=PAC(I,6)+PAC(I,7)+PAC(I,9)+PAC(I,10)
      C1=C1+D1*BPD*1.2
      C2=C2+D2*BPD*1.2
   20 C4=C4+D3*BP*1.2
      PVPOE=(1.-TVAL)*C1
      PVPOC=C2
      PVICP=PARS(11)*C2
      PVDB=C4*TVAL/(AD**IPOS)
C CALCULATE PVDE
      C1=(PAC(5,5)+PAC(5,6))*1.2
      C2=OPC(5,8)*1.2
      C1=C1-C2
      D1=DEP1(10,AD,AOD,IOPS)
      D2=DEP1(5,AD,AOD,IOPS)
      PVDE=TVAL*BPD*(C1*D1+C2*D2)
      D1=DEP2(10,AOD,IOPS)
      D2=DEP2(5,AOD,IOPS)
      PVICO=PARS(11)*BPD*(C1*D1+C2*D2)
      PVITC=PVICP+PVICO
C OPERATIONAL COSTS
      BO=1.
      BOD=1.
      BID=1.
      C1=0.
      C2=0.
      C3=0.
      C4=0.
      UCA=0.
      PVICS=0.
      PVSBC=0.
      DO 30 I=1,IOPS
      BO=BO*AO
      BOD=BOD*AOD
      BID=BID/AI
      PVICS=PVICS+BID*VL(I)
      D1=0.
      DO 25 J=1,11
   25 D1=D1+OPC(I,J)
      D2=(OPC(I,8)+OPC(I,9))*1.2
      C1=C1+(D1-D2)*BOD
      C2=C2+D2*BOD
      C3=C3+1./(AD**I)
```

```
      C4=C4+VL(I)*BOD
      UCA=UCA+BO
   30 PVSBC=PVSBC+BOD
      PVOE=(1.-TVAL)*BPD*C1
      PVOC=BPD*C2
      PVDB=PVDB*C3/IOPS
      PVR=(1.-TVAL)*BPD*C4
      PVICS=PVICS/(AI**IPOS)
C CLOSURE COSTS
      BCD=1.
      BO=1.
      C1=0.
      C2=0.
      DO 35 I=1,ICLS
      D1=CLCY(I)
      IF(D1.LT.1.E-12)GO TO 40
      BCD=BCD*ACD
      C1=C1+D1*BCD
      BO=BO*AO
   35 C2=C2+D1*BO
   40 PVCC=(1.-TVAL)*BPD*BOD*C1
      PVSBC=(1.-TVAL)*PARS(10)*BPD*PVSBC*C2
C SURVEILLANCE COSTS
      BSD=1.
      C1=0.
      DO 45 I=1,IOBS
      D1=SURC(I)
      IF(D1.LT.1.E-12)GO TO 50
      BSD=BSD*ASD
      D1=D1*BSD
   45 C1=C1+D1
   50 PVSC=C1*BPD*BOD*BCD*(1.-TVAL)
C INSTITUTIONAL COSTS
      BJI=1.
      C1=0.
      DO 55 I=1,IINS
      BJI=BJI*AJI
   55 C1=C1+BJI*AINS(I)
      C2=(AP**IPOS)*(AO**IOPS)*(AC**ICLS)*(AS**IOBS)
      PVICC=C1*C2/(AI**(IPOS+IOPS+ICLS+IOBS))
      USC=PVICC/PVICS
C CALCULATE PVSBI
      C1=C1*(AO**ICLS)
      BJD=1.
      C3=0.
      DO 75 I=1,IOPS
      BJD=BJD*AOD
      BIN=1.
      C2=0.
      DO 70 J=1,I
```

```
      BIN=BIN*AI
   70 C2=C2+VL(J)*USC*BIN
      C2=C2*(AI**ICLS)
      IF(C1.GT.C2)GO TO 75
      WRITE(*,203) C1,C2,I
C     WRITE(6,203) C1,C2,I
  203 FORMAT(2X'NEGATIVE SUM TERM: C1='1P,E9.2' C2='E9.2'  YEAR='I3)
      C2=C1
   75 C3=C3+BJD*(C1-C2)
      PVSBI=(1.-TVAL)*PARS(9)*BPD*C3
      A1=PVPOE+PVPOC+PVOE+PVOC+PVCC+PVSC+PVSBC+PVSBI-PVDB-PVDE-PVITC
      UCN=A1/PVR
      UCA=UCN*UCA/IOPS
      WRITE(*,201) (LABEL(I),I=1,6),PVPOE,PVPOC,PVOE,PVOC,PVCC,PVSC
      WRITE(*,201) (LABEL(I),I=7,12),PVSBC,PVSBI,PVDB,PVDE,PVICP,PVICO
      WRITE(*,202) (LABEL(I),I=13,17),PVITC,PVR,USC,UCN,UCA
      WRITE(6,201) (LABEL(I),I=1,6),PVPOE,PVPOC,PVOE,PVOC,PVCC,PVSC
      WRITE(6,201) (LABEL(I),I=7,12),PVSBC,PVSBI,PVDB,PVDE,PVICP,PVICO
      WRITE(6,202) (LABEL(I),I=13,17),PVITC,PVR,USC,UCN,UCA
  201 FORMAT(/2X,6(2X,A5,2X)/2X,1P,6E9.2)
  202 FORMAT(/2X,5(2X,A5,2X)/2X,1P,5E9.2)
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE MULTIP(A1,PAC)
      DIMENSION PAC(614)
      DO 10 I=1,614
   10 PAC(I)=PAC(I)*A1
      RETURN
      END
C-----------------------------------------------------------------
      SUBROUTINE CLOSRU(CLCY,A2,ICLS)
C OPTIONS SUBROUTINE FOR CLOSURE COSTS.  IF NOPT=0, THE CALCULATED
C COSTS ARE USED FOR ICLS NUMBER OF YEARS. IF NOPT=1, THEN ICLS AND
C THE CONSTANT COST FOR EACH YEAR MUST BE INPUT IN FREE FORMAT.
      DIMENSION CLCY(20)
  101 FORMAT(/' CLOSURE PERIOD='I2' CALCULATED COSTS='1P,E9.2)
  102 FORMAT(' INPUT CLOSURE OPTION: 0=CALCULATED, 1=OVERRIDE ? '\)
  103 FORMAT(' OPTION SELECTED: 0=CALCULATED, 1=OVERRIDE - 'I1)
  104 FORMAT(' INPUT NEW CLOSURE PERIOD (YRS) AND COST (1000 $) ? '\)
  105 FORMAT(/' CLOSURE PERIOD='I3' NEW COSTS='1P,E9.2)
      WRITE(*,101) ICLS,A2
      WRITE(6,101) ICLS,A2
      WRITE(*,102)
      READ(*,*) NOPT
      WRITE(6,103) NOPT
      IF(NOPT.EQ.0)GO TO 20
      WRITE(*,104)
      READ(*,*) ICLS,A1
      WRITE(6,105) ICLS,A1
```

```
      DO 10 I=1,ICLS
   10 CLCY(I)=A1
      RETURN
   20 DO 30 I=1,ICLS
   30 CLCY(I)=A2
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE SURVEU(SURC,A2,IOBS)
C OPTIONS SUBROUTINE FOR SURVEILLANCE COSTS.  IF NOPT=0, THE CALCULATED
C COSTS ARE USED FOR IOBS NUMBER OF YEARS. IF NOPT=1, THEN IOBS AND
C THE CONSTANT COST FOR EACH YEAR MUST BE INPUT IN FREE FORMAT.
      DIMENSION SURC(20)
  101 FORMAT(/' SURVEIL PERIOD='I2' CALCULATED COSTS='1P,E9.2)
  102 FORMAT(' INPUT SURVEIL OPTION: 0=CALCULATED, 1=OVERRIDE ? '\)
  103 FORMAT(' OPTION SELECTED: 0=CALCULATED, 1=OVERRIDE - 'I1)
  104 FORMAT(' INPUT NEW SURVEIL PERIOD (YRS) AND COST (1000 $) ? '\)
  105 FORMAT(/' SURVEIL PERIOD='I3' NEW COSTS='1P,E9.2)
      WRITE(*,101) IOBS,A2
      WRITE(6,101) IOBS,A2
      WRITE(*,102)
      READ(*,*) NOPT
      WRITE(6,103) NOPT
      IF(NOPT.EQ.0)GO TO 20
      WRITE(*,104)
      READ(*,*) IOBS,A1
      WRITE(6,105) IOBS,A1
      DO 10 I=1,IOBS
   10 SURC(I)=A1
      RETURN
   20 DO 30 I=1,IOBS
   30 SURC(I)=A2
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE INSTIU(AINS,A2,IINS)
C OPTIONS SUBROUTINE FOR INSTITUTIONAL CONTROL PERIOD COSTS.
C IF NOPT=0, THE CALCULATED COSTS ARE USED FOR IINS YEARS;
C IF NOPT=1, LUMP SUM COSTS ($1000) ARE ADDED TO CALCULATED COSTS
C              FOR SPECIFIC YEARS MEASURED FROM YEAR 1.  INPUT PROCESS
               TERMINATED WHEN THE INPUT YEAR IS ZERO.
C IF NOPT=2, THE CODE ASKS FOR PAIRS OF VALUES: INTEGER DURATION (YRS),
C              AND COST (1000 $); THE INPUT PROCESS IS TERMINATED WHEN THE
C              DURATION IS ZERO.
C
C NOPT=1 EXAMPLE: $500,000 IS TO BE ADDED TO YEARS 25, 50, AND 75.
C NOPT=2 EXAMPLE: FOUR PERIODS WITH 10, 20, 30, AND 40 YEARS (IINS=100)
C         WITH COSTS OF $4,000,000, 3,000,000, 2,000,000, AND 1,000,000,
C         RESPECTIVELY.  THE INPUTS WOULD THEN CONSIST OF THE FOLLOWING:
C
```

```
C        NOPT=1 EXAMPLE              NOPT=2 EXAMPLE
C
C        1                           2
C        25,500.                     10,4000.
C        50,500.                     20,3000.
C        75,500.                     30,2000.
C        0,0.                        40,1000.
C                                    0,0.
C
      DIMENSION AINS(999)
  101 FORMAT(/' INSTITU PERIOD='I4' CALCULATED COSTS='1P,E9.2)
  102 FORMAT(' INPUT OPTION: 0=CALC, 1=LUMP SUM, 2=OVERRIDE ? '\)
  103 FORMAT(' OPT SELCTD: 0=CALC, 1=LUMP SUM, 2=OVERRIDE - 'I1)
  104 FORMAT(' INPUT YEAR AND COST TO BE ADDED ($1000) ? '\)
  105 FORMAT(2X'$'1P,E9.2' HAS BEEN ADDED TO YEAR 'I3)
  106 FORMAT(' INPUT NEW DURATION AND COST IN PAIRS ? '\)
  107 FORMAT(' NEW INSTITUTIONAL COST: $'1P,E9.2' FOR 'I4' YEARS')
      WRITE(*,101) IINS,A2
      WRITE(6,101) IINS,A2
      DO 10 I=1,IINS
   10 AINS(I)=A2
      WRITE(*,102)
      READ(*,*) NOPT
      WRITE(6,103) NOPT
      IF(NOPT.EQ.0)RETURN
      IF(NOPT.EQ.2)GO TO 20
   15 WRITE(*,104)
      READ(*,*) I,A1
      IF(I.EQ.0)RETURN
      WRITE(6,105) A1,I
      AINS(I)=AINS(I)+A1
      GO TO 15
   20 WRITE(*,106)
      IINS=0
   25 READ(*,*) K,A1
      IOLD=IINS
      IINS=IINS+K
      IF(IINS.GT.999)STOP 'INSTITUTIONAL CONTROL PERIOD EXCEEDS 999 YRS'
      IF(K.EQ.0)RETURN
      WRITE(6,107) A1,K
      DO 30 I=1,K
   30 AINS(I+IOLD)=A1
      GO TO 25
      END
C-----------------------------------------------------------------------
      FUNCTION DEP1(NN,AD,AOD,IOPS)
C DEPRECIATION FOR VARIOUS PERIODS.
      A1=1./NN
      C1=0.
      DO 10 I=1,NN
```

```
      A1=A1/AD
   10 C1=C1+A1
      II=1+(IOPS-1)/NN
      A1=1.
      C2=AOD**NN
      C3=0.
      DO 20 I=1,II
      C3=C3+A1
   20 A1=A1*C2
      DEP1=C1*C3
      RETURN
      END
C---------------------------------------------------------------------
      FUNCTION DEP2(NN,AOD,IOPS)
C DEPRECIATION FOR VARIOUS PERIODS.
      II=1+(IOPS-1)/NN
      A1=1.
      C2=AOD**NN
      C3=0.
      DO 20 I=1,II
      A1=A1*C2
   20 C3=C3+A1
      DEP2=C3
      RETURN
      END
C---------------------------------------------------------------------
      SUBROUTINE ZERO(A,N)
      DIMENSION A(N)
      DO 10 I=1,N
   10 A(I)=0.
      RETURN
      END
C---------------------------------------------------------------------
      SUBROUTINE AREAS(AADM,ADIS,ABUF,ACON)
      WRITE(6,101) ADIS,AADM,ABUF,ACON
  101 FORMAT(//2X'AREAS OF THE FACILITY (M**2)'/2X'DISPOSAL='1P,E9.2/
     * 2X'ADMINIST='E9.2/2X'BUFFER  ='E9.2/2X'CONTINGY='E9.2/)
      RETURN
      END
```

B.8 SACAL Code

```
      PROGRAM SACAL
C***********************************************************************
C THIS PROGRAM IS DESIGNED TO CALCULATE THE SELF-ABSORPTION VALUE FOR A
C GIVEN GEOMETRIC SOURCE AT A SPECIFIED DISTANCE AND RECEPTOR LOCATION.
C THIS CALCULATED VALUE IS A RATIO  (Ús / Úa) WHERE:
C
C     Ús  IS FOR THE SHIELDING MATERIAL
C     Úa  IS FOR THE INTERVENING AIR
C
C EACH OF THE ABOVE  Ú's ARE A RESULT OF THE RATIOING OF THE MATERIAL'S
C SELF-ABSORPTION VALUE WITH IT'S NON-SELF-ABSORPTION VALUE.
C***********************************************************************
      CHARACTER*1 SOURCE
      DIMENSION US(7)
   10 WRITE(*,100)
C ENTER GEOMETRY.
      READ(*,120) SOURCE
C CALL ENERGY TO GET GAMMA ENERGY AND ATTENUATION COEFFICIENTS.
      CALL ENERGY(GAMMA,US)
C CALL APPROPRIATE SUBROUTINE TO PERFORM CALCULATIONS
      IF(SOURCE.EQ.'P')CALL PLATE(GAMMA,US)
      IF(SOURCE.EQ.'D')CALL DISK(GAMMA,US)
      IF(SOURCE.EQ.'S')CALL SPHERE(GAMMA,US)
      IF(SOURCE.EQ.'C')CALL CYLNDR(GAMMA,US)
      WRITE(*,130)
      IF(IYN(IJK).EQ.1)GO TO 10
      STOP
  100 FORMAT(1X,25(/),'PROGRAM SACAL FOR CALCULATING (Ús/Úa)'/3X,
     1 'SPECIFY GEOMETRY:'/3X'(P)LATE;(D)ISK;(S)PHERE;(C)YLINDER;? '\)
  120 FORMAT(A1)
  130 FORMAT(' DO YOU WISH ANOTHER GEOMETRY (Y OR N)? '\)
      END
C-----------------------------------------------------------------------
      BLOCK DATA
C-----------------------------------------------------------------------
C BLOCK DATA INPUTS GAMMA ATTENUATION COEFFICIENTS FOR VARIOUS TYPES OF
C MEDIA (IN CM2/G): ALUMINIUM, IRON, LEAD, U-238, AIR, WATER, AND
C CONCRETE. THEY HAVE BEEN OBTAINED FROM THE RADIATION HEALTH HANDBOOK.
C-----------------------------------------------------------------------
      COMMON/MAC/AL(28),FE(28),PB(28),U8(28),AIR(28),
     1           H2O(28),CON(28)/MEV/PHT(28),DENS(7)
      DATA AL/ 26.30,7.9300,3.4100,1.1200,0.5670,0.3690,0.2800,
     1         0.2030,0.1710,0.1380,0.1220,0.1040,0.0927,0.0844,
     2         0.0780,0.0684,0.0613,0.0500,0.0432,0.0354,0.0311,
     3         0.0284,0.0266,0.0244,0.0231,0.0219,0.0216,0.0219/
      DATA FE/173.00,56.400,25.500,8.1300,3.6200,1.9400,1.2000,
     1         0.5950,0.3700,0.1960,0.1460,0.1100,0.0940,0.0840,
     2         0.0769,0.0669,0.0599,0.0488,0.0425,0.0362,0.0331,
     3         0.0314,0.0305,0.0298,0.0298,0.0307,0.0321,0.0345/
      DATA PB/133.00,115.00,85.700,29.700,14.000,7.8100,4.8700,
```

```
     1         2.3300,5.4000,1.9700,0.9910,0.4040,0.2310,0.1610,
     2         0.1250,0.0885,0.0708,0.0517,0.0455,0.0418,0.0416,
     3         0.0424,0.0435,0.0459,0.0484,0.0548,0.0606,0.0696/
      DATA U8/178.00,63.900,71.000,41.000,19.700,11.100,6.9600,
     1         3.3500,1.9100,2.5600,1.2800,0.5090,0.2860,0.1930,
     2         0.1460,0.0997,0.0776,0.0548,0.0475,0.0438,0.0435,
     3         0.0445,0.0455,0.0480,0.0506,0.0573,0.0636,0.0733/
      DATA AIR/4.990,1.5500,0.7520,0.3490,0.2480,0.2080,0.1880,
     1         0.1670,0.1540,0.1360,0.1230,0.1070,0.0954,0.0870,
     2         0.0805,0.0707,0.0636,0.0518,0.0445,0.0358,0.0308,
     3         0.0275,0.0252,0.0223,0.0204,0.0181,0.0170,0.0162/
      DATA H2O/5.180,1.5800,0.7750,0.3700,0.2670,0.2270,0.2060,
     1         0.1840,0.1710,0.1510,0.1370,0.1190,0.1060,0.0968,
     2         0.0896,0.0786,0.0707,0.0575,0.0494,0.0397,0.0340,
     3         0.0303,0.0277,0.0243,0.0222,0.0194,0.0181,0.0171/
      DATA CON/26.9, 8.2400,3.5900,1.1900,0.6050,0.3920,0.2950,
     1         0.2130,0.1790,0.1440,0.1270,0.1080,0.0963,0.0877,
     2         0.0810,0.0709,0.0637,0.0519,0.0448,0.0365,0.0319,
     3         0.0290,0.0270,0.0245,0.0231,0.0215,0.0210,0.0210/
      DATA PHT/.01,.015,.02,.03,.04,.05,.06,.08,.1,.15,.2,.3,.4,
     2          .5,.6,.8,1.,1.5,2.,3.,4.,5.,6.,8.,10.,15.,20.,30./
      DATA DENS/2.699, 7.86, 11.35, 18.68, 0.001293, 1., 2.25/
      END
C-----------------------------------------------------------------------
      SUBROUTINE ENERGY(GAMMA,US)
C-----------------------------------------------------------------------
C ENERGY INPUTS THE GAMMA ENERGY, INTERPOLATES TO GET THE GAMMA ATTENUA-
C TION COEFFICIENTS, AND CHECKS TO SEE IF DENSITIES ARE TO BE MODIFIED.
C-----------------------------------------------------------------------
      DIMENSION DEN(7),US(7)
      CHARACTER SHIELD(7)*4
      COMMON/MAC/USB(28,7)/MEV/PHT(28),DENS(7)
      DATA SHIELD/'ALUM','IRON','LEAD','U238','AIR ','H2O ','CON '/
  100 FORMAT(//' SPECIFY GAMMA ENERGY IN MeV: '\)
  110 FORMAT(' ENERGY LEVEL < 0. MeV, REENTER')
  120 FORMAT(' ENERGY LEVEL > 30 MeV, REENTER')
  130 FORMAT(' DO YOU WISH TO MODIFY THE DENSITY OF 'A4' ?'/
     1       ' IF YES ENTER NEW VALUE (gm/cm**3) ELSE RETURN: '\)
  140 FORMAT(F10.0)
    5 WRITE(*,100)
      READ(*,140) GAMMA
      IF(GAMMA.LE.0.0)WRITE(*,110)
      IF(GAMMA.LE.0.0)GO TO 5
      IF(GAMMA.GT.30.)WRITE(*,120)
      IF(GAMMA.GT.30.)GO TO 5
      IF(GAMMA.LT.PHT(1))GO TO 35
      DO 10 I=2,28
      IF(GAMMA.EQ.PHT(I))GO TO 25
      IF(GAMMA.LT.PHT(I))GO TO 15
   10 CONTINUE
```

```
   15 A1=(PHT(I)-GAMMA)/(PHT(I)-PHT(I-1))
      DO 20 J=1,7
   20 US(J)=USB(I,J)-A1*(USB(I,J)-USB(I-1,J))
      GO TO 45
   25 DO 30 J=1,7
   30 US(J)=USB(I,J)
      GO TO 45
   35 A1=(PHT(2)-GAMMA)/(PHT(2)-PHT(1))
      DO 40 J=1,7
   40 US(J)=USB(2,J)-A1*(USB(2,J)-USB(1,J))
   45 DO 50 J=1,7
      WRITE(*,130) SHIELD(J)
      READ(*,140) DEN(J)
      IF(DEN(J).LE.0.0) DEN(J)=DENS(J)
   50 CONTINUE
      DO 55 J=1,7
   55 US(J)=US(J)*DEN(J)
      RETURN
      END
C-------------------------------------------------------------------
      SUBROUTINE PLATE(GAMMA,US)
C-------------------------------------------------------------------
C PLATE PERFORMS THE FLUX CALCULATIONS FOR A PLATE OF DIMENSIONS LENGTH,
C WIDTH, AND DEPTH, AT A DISTANCE OF DIST.
C-------------------------------------------------------------------
      DIMENSION US(7),HMU(7),ADEPTH(7),SA(7)
      REAL LENGTH
      PARAMETER (PI=3.1415927)
   10 WRITE(*,130)
      READ(*,160) LENGTH
      WRITE(*,140)
      READ(*,160) WIDTH
      WRITE(*,150)
      READ(*,160) DEPTH
      RADIUS=SQRT(LENGTH*WIDTH/PI)
      WRITE(*,170)
      READ(*,160) DIST
      DO 15 I=1,7
      ADEPTH(I)=DEPTH
      HMU(I)=3/US(I)
      IF(HMU(I).LE.DEPTH) ADEPTH(I)=HMU(I)
   15 CONTINUE
      A=DEPTH
      DO 20 I=1,7
      IF(I.EQ.5) GO TO 20
      IF(ADEPTH(I).NE.A.OR.I.EQ.1)
     1      CALL AIR(RADIUS,ADEPTH(I),DIST,PI,US(5),THETA,PHIA)
      CALL SHLDPL(THETA,US(I),US(5),ADEPTH(I),DIST,PHIS)
      SA(I)=PHIS/PHIA
      A=ADEPTH(I)
```

```
   20 CONTINUE
      WRITE(*,200) LENGTH, WIDTH, DEPTH, DIST, GAMMA
      CALL PRT(SA)
      WRITE(*,300)
      IF(IYN(IJK).EQ.1) GO TO 10
      RETURN
  130 FORMAT(//' LENGTH OF PLATE (cm)? '\)
  140 FORMAT(' WIDTH OF PLATE  (cm)? '\)
  150 FORMAT(' DEPTH OF PLATE  (cm)? '\)
  160 FORMAT(F10.0)
  170 FORMAT(' DISTANCE BETWEEN RECEPTOR AND PLATE SURFACE (cm)? '\)
  200 FORMAT(5(/),' CALCULATION OF  Ús/Úa FOR PLATE SOURCE'/1X,21('-')
     1 //3X'LENGTH (cm) ='F7.2/3X'WIDTH  (cm) ='F7.2/3X'DEPTH  (cm) ='
     2 F7.2/' DISTANCE (cm) ='1P,E10.3/' ENERGY  (MeV) ='E10.3//)
  300 FORMAT(' DO YOU WISH ANOTHER PLATE CALCULATION (Y OR N)? '\)
      END
C---------------------------------------------------------------------
      SUBROUTINE DISK(GAMMA,US)
C---------------------------------------------------------------------
C DISK PERFORMS THE FLUX CALCULATIONS FOR A DISK OF DIMENSIONS RADIUS,
C AND DEPTH, AT A DISTANCE OF DIST.
C---------------------------------------------------------------------
      DIMENSION US(7), HMU(7), ADEPTH(7), SA(7)
   10 WRITE(*,130)
      READ(*,150) RADIUS
      WRITE(*,140)
      READ(*,150) DEPTH
      WRITE(*,160)
      READ(*,150) DIST
      DO 15 I=1,7
      ADEPTH(I)=DEPTH
      HMU(I)=3/US(I)
      IF(HMU(I).LE.DEPTH) ADEPTH(I)=HMU(I)
   15 CONTINUE
      A=DEPTH
      DO 20 I=1,7
      IF(I.EQ.5) GO TO 20
      IF(ADEPTH(I).NE.A.OR.I.EQ.1)
     1      CALL AIR(RADIUS,ADEPTH(I),DIST,PI,US(5),THETA,PHIA)
      CALL SHLDPL(THETA,US(I),US(5),ADEPTH(I),DIST,PHIS)
      SA(I)=PHIS/PHIA
      A=ADEPTH(I)
   20 CONTINUE
      WRITE(*,200) RADIUS, DEPTH, DIST, GAMMA
      CALL PRT(SA)
      WRITE(*,300)
      IF(IYN(IJK).EQ.1) GO TO 10
      RETURN
  130 FORMAT(//' RADIUS OF DISK (cm)? '\)
  140 FORMAT(' DEPTH OF DISK  (cm)? '\)
```

```
 150 FORMAT(F10.0)
 160 FORMAT(' DISTANCE BETWEEN RECEPTOR AND DISK SURFACE (cm)? '\)
 200 FORMAT(5(/),' CALCULATION OF  Us/Ua FOR A DISK SOURCE'/
   1 1X,21('-')//3X'RADIUS (cm) ='F7.2/3X'DEPTH  (cm) ='F7.2/
   2 ' DISTANCE (cm) ='1P,E10.3/' ENERGY  (MeV) ='E10.3//)
 300 FORMAT(' DO YOU WISH ANOTHER DISK CALCULATION (Y OR N)? '\)
     END
C-----------------------------------------------------------------
     SUBROUTINE SPHERE(GAMMA,US)
C-----------------------------------------------------------------
C SPHERE PERFORMS THE FLUX CALCULATIONS FOR A SPHERE OF DIMENSION
C RADIUS, AT A DISTANCE OF DIST WITH TWO OPTIONS: MEASURED FROM THE
C SURFACE OF THE SPHERE OR FROM THE CENTER OF THE SPHERE.
C-----------------------------------------------------------------
     DIMENSION US(7), SA(7), PHI(7)
     CHARACTER*1 TYPE
  10 DO 20 I=1,7
     SA(I)=1.0
  20 CONTINUE
     WRITE(*,130)
     READ(*,140) RADIUS
     WRITE(*,150)
     READ(*,160) TYPE
     IF(TYPE.EQ.'C') WRITE(*,170)
     IF(TYPE.EQ.'S') WRITE(*,180)
     READ(*,140) DIST
     IF(TYPE.EQ.'C') A=DIST-RADIUS
     IF(TYPE.EQ.'S') A=DIST
     AA=A+RADIUS
     THETA=ATAN2(RADIUS,AA)
     IF(THETA.LT.1.00001.AND.THETA.GT.0.99999) GO TO 50
     UR=US(5)*RADIUS
     UZ=US(5)*Z
     UA=US(5)*A
     WDP1=UZ+UA
     WDP2=(UZ+UA)/COS(THETA)
     E1A=E1(WDP1)
     E1B=E1(WDP2)
     PHI(5)=E1A-E1B
     DO 30 I=1,7
     IF(I.EQ.5) GO TO 30
     UR=US(I)*RADIUS
     CALL RATIO(UR,UZ)
     Z=UZ/US(I)
     AA=A+Z
     THETA=ATAN2(RADIUS,AA)
     WDP1=UZ+UA
     WDP2=(UZ+UA)/COS(THETA)
     E1A=E1(WDP1)
     E1B=E1(WDP2)
```

```
      PHI(I)=E1A-E1B
   30 CONTINUE
      DO 40 I=1,7
      IF (I.EQ.5) GO TO 40
      SA(I)=PHI(I)/PHI(5)
   40 CONTINUE
   50 IF (TYPE.EQ.'S') WRITE (*,200) RADIUS, DIST, GAMMA
      IF (TYPE.EQ.'C') WRITE (*,210) RADIUS, DIST, GAMMA
      CALL PRT(SA)
      WRITE (*,300)
      IF (IYN(IJK).EQ.1) GO TO 10
      RETURN
  130 FORMAT(//' RADIUS OF SPHERE (cm)? '\)
  140 FORMAT(F10.0)
  150 FORMAT(' MEASURE DISTANCE FROM THE (C)ENTER'/
     1       ' OR THE (S)URFACE OF THE SPHERE? - '\)
  160 FORMAT(A1)
  170 FORMAT(' DISTANCE BETWEEN RECEPTOR AND CENTER OF SPHERE (cm)? '\)
  180 FORMAT(' DISTANCE BETWEEN RECEPTOR AND SURFACE OF SPHERE (cm)? '\)
  200 FORMAT (5(/),' CALCULATION OF Ús/Úa FOR A SPHERE SOURCE'/
     1 1X,21('-')//3X'REFERENCED FROM THE SURFACE'/3X'RADIUS (cm) =',
     2 F7.2/' DISTANCE (cm) ='1P,E10.3/' ENERGY  (MeV) ='E10.3//)
  210 FORMAT (5(/),' CALCULATION OF Ús/Úa FOR A SPHERE SOURCE'/
     1 1X,21('-')//3X'REFERENCED FROM THE CENTER'/3X'RADIUS (cm) =',
     2 F7.2/' DISTANCE (cm) ='1P,E10.3/' ENERGY  (MeV) ='E10.3//)
  300 FORMAT (1X,'DO YOU WISH ANOTHER SPHERE CALCULATION? - '\)
      END
C-----------------------------------------------------------------------
      SUBROUTINE CYLNDR(GAMMA,US)
C-----------------------------------------------------------------------
C CYLNDR PERFORMS THE FLUX CALCULATIONS FOR A CYLINDER OF DIMENSIONS
C RADIUS AND HEIGHT, AT A DISTANCE OF DIST FROM THE SIDE OF THE CYLINDER.
C-----------------------------------------------------------------------
      DIMENSION US(7), SA(7), PHI(7)
   10 WRITE (*,140)
      READ (*,130) RADIUS
      WRITE (*,150)
      READ (*,130) HEIGHT
      WRITE (*,160)
      READ (*,130) DIST
      A=RADIUS+DIST
      B=HEIGHT/2
      THETA=ATAN2(B,A)
      UAR=US(5)*A
      FX=F(THETA,UAR)
      PHI(5)=FX/A
      DO 20 I=1,7
      IF (I.EQ.5) GO TO 20
      UR=US(I)*RADIUS
      CALL RATIO(UR,UZ)
```

```
      Z=UZ/US(I)
      AA=DIST+Z
      THETA=ATAN2(B,AA)
      UA=US(5)*DIST
      C=UZ+UA
      FX=F(THETA,C)
      PHI(I)=FX/(DIST+UZ)
   20 CONTINUE
      DO 30 I=1,7
      IF(I.EQ.5) GO TO 30
      SA(I)=PHI(I)/PHI(5)
   30 CONTINUE
      WRITE(*,200) RADIUS, HEIGHT, DIST, GAMMA
      CALL PRT(SA)
      WRITE(*,300)
      IF(IYN(IJK).EQ.1) GO TO 10
      RETURN
  130 FORMAT(F10.0)
  140 FORMAT(//' RADIUS OF CYLINDER (cm)? '\)
  150 FORMAT(' HEIGHT OF CYLINDER (cm)? '\)
  160 FORMAT(' DISTANCE BETWEEN RECEPTOR AND CYLINDER SIDE (cm)? '\)
  200 FORMAT(5(/),1X'CALCULATION OF  Ús/Úa FOR A CYLINDER SOURCE'/
     1 1X,21('-')//3X'RADIUS (cm) ='F7.2/3X'HEIGHT (cm) ='
     2 F7.2/1X'DISTANCE (cm) ='1PE10.3/1X'ENERGY  (MeV) ='E10.3//)
  300 FORMAT(' DO YOU WISH ANOTHER CYLINDER CALCULATION (Y OR N)? '\)
      END
C-----------------------------------------------------------------------
      SUBROUTINE PRT(SA)
      DIMENSION SA(7)
      WRITE(*,100) SA(1),SA(2),SA(3),SA(4),SA(6),SA(7)
  100 FORMAT(5X'Úal / Úair  ='1P,E10.3/5X'Úir / Úair  ='E10.3/5X,
     1        'Úld / Úair  ='E10.3/5X'Úur / Úair  ='E10.3/5X,
     2        'Úwt / Úair  ='E10.3/5X'Úcc / Úair  ='E10.3/5X//)
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE AIR(R,DP,DS,PI,U,THETA,PHI)
      A=DP+DS
      THETA2=ATAN2(R,DS)
      THETA1=ATAN2(R,A)
      THETA=(THETA2-THETA1)/2+THETA1
      AD=R/TAN(THETA)
      UA=U*AD
      X=UA*(1/COS(THETA))
      WDP1=E1(UA)
      WDP2=E1(X)
      PHI=DP*(WDP1-WDP2)
      RETURN
      END
C-----------------------------------------------------------------------
```

```
      SUBROUTINE SHLDPL(T,U1,U2,DP,DS,PHI)
      UA=U2*DS
      US=U1*DP
      UT=UA+US
      UC=UT*(1/COS(T))
      UZ=UA*(1/COS(T))
      A=E2(UA)
      B=E2(UT)
      C=E2(UC)
      D=E2(UZ)
      PHI=(A-B+C*COS(T)-D*COS(T))/U1
      RETURN
      END
C-----------------------------------------------------------------------
      SUBROUTINE RATIO(X,Y)
      DIMENSION UZ(137), UR(137)
      DATA UZ/0.000,0.075,0.150,0.225,0.300,0.375,0.425,0.550,0.625,
     2        0.750,0.850,0.900,1.000,1.088,1.175,1.250,1.300,1.325,
     3        1.375,1.400,1.486,1.538,1.575,1.613,1.638,1.669,1.713,
     4        1.763,1.800,1.825,1.850,1.875,1.900,1.919,1.950,1.969,
     5        1.988,2.013,2.025,2.050,2.088,2.125,2.138,2.175,2.200,
     6        2.225,2.238,2.250,2.263,2.275,2.294,2.306,2.319,2.331,
     7        2.344,2.356,2.369,2.375,2.388,2.400,2.413,2.419,2.438,
     8        2.450,2.463,2.475,2.488,2.500,2.513,2.525,2.538,2.550,
     9        2.563,2.569,2.575,2.588,2.594,2.606,2.613,2.619,2.625,
     .        2.638,2.650,2.663,2.675,2.681,2.688,2.694,2.706,2.713,
     1        2.725,2.738,2.750,2.763,2.775,2.781,2.788,2.800,2.819,
     2        2.825,2.838,2.850,2.863,2.875,2.888,2.900,2.919,2.925,
     3        2.938,2.950,2.963,2.975,2.981,2.988,3.000,3.013,3.025,
     4  3.038,3.056,3.063,3.075,3.088,3.100,3.125,3.150,3.163,3.181,
     5  3.200,3.225,3.250,3.275,3.300,3.325,3.375,3.663,3.813,4.000/
      DATA UR/0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 0.9, 1.1, 1.3,1.4,
     2       1.6, 1.8, 2.0, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 3.0, 3.1, 3.2,
     3       3.3, 3.4, 3.6, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6,
     4       4.7, 4.8, 4.9, 5.0, 5.2, 5.4, 5.5, 5.7, 5.9, 6.0, 6.1, 6.2,
     5       6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 7.0, 7.1, 7.2, 7.3, 7.4,
     6       7.5, 7.6, 7.8, 7.9, 8.0, 8.2, 8.3, 8.4, 8.6, 8.7, 8.8, 9.0,
     7  9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9,10.0,10.2,10.4,10.5,
     8 10.6,10.7,10.8,10.9,11.0,11.2,11.4,11.5,11.7,11.9,12.0,12.1,12.3,
     9 12.5,12.7,12.8,13.0,13.2,13.4,13.6,13.8,14.0,14.1,14.4,14.5,14.7,
     . 14.9,15.0,15.1,15.3,15.6,15.8,16.0,16.2,16.4,16.6,16.8,17.0,17.4,
     C 17.8,18.0,18.4,18.8,19.2,19.7,20.1,20.6,21.1,22.0,28.0,31.0,35.0/
      IF(X.LT.0.0) WRITE(*,100)
      IF(X.LT.0.0) STOP
      DO 10 I=1,137
         IF(UR(I).EQ.X) GO TO 15
         IF(UR(I).GT.X) GO TO 20
   10 CONTINUE
      Y=(UZ(137)-UZ(136)*(X-UR(137))/(X-UR(136)))
     1 /(1-((X-UR(137))/(X-UR(136))))
```

```
      RETURN
   15 Y=UZ(I)
      RETURN
   20 IF(I.EQ.1) GO TO 25
      Y=UZ(I)-((UZ(I)-UZ(I-1))*(UR(I)-X)/(UR(I)-UR(I-1)))
      RETURN
   25 Y=UZ(I)-(UZ(I)/UR(I)*(UR(I)-X))
      RETURN
  100 FORMAT(' WARNING!!!!! Ur < 0.0  PROGRAM TERMINATED!')
      END
C---------------------------------------------------------------------
      FUNCTION FXP(X)
      IF(X.GT.88) X=88
      IF(X.LT.-80) X=-80
      FXP=EXP(X)
      RETURN
      END
C---------------------------------------------------------------------
      FUNCTION E1(X)
C---------------------------------------------------------------------
C E1 IS THE EXPONENTIAL INTEGRAL OF THE FIRST KIND.
C---------------------------------------------------------------------
      DIMENSION AA(6), AB(4)
      DATA AA/-0.57721566,  0.99999193, -0.24991055,
     1          0.05519968, -0.00976004,  0.00107857/
      DATA AB/2.334733, 0.250621, 3.330657, 1.681534/
      IF(X.LT.0.0) WRITE(*,100)
      IF(X.LT.0.0) STOP
      IF(X.GT.1.0) GO TO 10
      E1=AA(1)+AA(2)*X+AA(3)*X**2+AA(4)*X**3
     1  +AA(5)*X**4+AA(6)*X**5+2.0E-07-ALOG(X)
      RETURN
   10 IF(X.GE.10.0) GO TO 15
      E1=((X**2+AB(1)*X+AB(2))/(X**2+AB(3)*X+AB(4))+5.0E-05)
     1  /(X*FXP(X))
      RETURN
   15 E1=FXP(-X)*(1/(X+1)+1/(X+1)**3)
      RETURN
  100 FORMAT(' WARNING!!!!!   E1(X) HAS A NEGATIVE X VALUE!')
      END
C---------------------------------------------------------------------
      FUNCTION E2(Y)
C---------------------------------------------------------------------
C E2 IS THE EXPONENTIAL INTEGRAL OF THE SECOND KIND.
C---------------------------------------------------------------------
      IF(Y.LT.10.0) WDP=E1(Y)
      IF(Y.LT.10.0) E2=(FXP(-Y)-Y*WDP)
      IF(Y.GE.10.0) E2=FXP(-Y)*(1/(Y+2)+2/(Y+2)**3)
      RETURN
      END
```

```
C-----------------------------------------------------------------------
      FUNCTION IYN(K)
      CHARACTER I*1
   10 FORMAT(A1)
      READ(*,10) I
      J=0
      IF(I.EQ.'Y'.OR.I.EQ.'y')J=1
      IYN=J
      RETURN
      END
C-----------------------------------------------------------------------
      FUNCTION F(T,X)
C-----------------------------------------------------------------------
C THIS SUBROUTINE EVALUATES THE SECANT INTEGRAL FOR A VALUE OF T AND X.
C-----------------------------------------------------------------------
      DIMENSION V10X(35), V20X(35), V30X(35), V40X(35), V50X(35),
     1    V60X(35), V75X(35), V90X(35), FACTOR(8,35), XF(35), TF(8)
      DATA TF/10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 75.0, 90.0/
      DATA XF/.0,.1,.2,.3,.4,.5,.6,.7,.8,.9,1.,1.2,1.4,1.6,1.8,2.,2.2,
     1 2.4,2.6,2.8,3.,3.5,4.,4.5,5.,5.5,6.,6.5,7.,7.5,8.,8.5,9.,9.5,10./
      DATA V10X/.174533,.157843,.142749,.129099,.116754,.105589,.095492,
     1          .086361,.078103,.070634,.063880,.052247,.042733,.034951,
     2          .028587,.023381,.019123,.015641,.012793,.010463,.008558,
     3          .005178,.003132,.001895,.001147,.000694,.000420,.000254,
     4          .000154,.000093,.000056,.000034,.000021,.000012,.000008/
      DATA V20X/.349066,.315187,.284598,.256978,.232040,.209522,.189191,
     1          .170833,.154256,.139289,.125775,.102553,.083620,.068183,
     2          .055597,.045335,.036967,.030145,.024582,.020045,.016347,
     4          .009817,.005896,.003542,.002127,.001278,.000768,.000461,
     5          .000277,.000167,.000100,.000060,.000036,.000022,.000013/
      DATA V30X/.523599,.471456,.424515,.382255,.344209,.309957,.279118,
     1          .251353,.226354,.203845,.183579,.148899,.120780,.097979,
     2          .079488,.064492,.052329,.042463,.034460,.027968,.022700,
     4          .013477,.008005,.004756,.002828,.001682,.001001,.000596,
     5          .000355,.000211,.000126,.000075,.000045,.000027,.000016/
      DATA V40X/.698132,.625886,.561159,.503165,.451198,.404629,.362893,
     1          .325486,.291957,.261901,.234956,.189138,.152298,.122667,
     2          .098829,.079644,.064201,.051766,.041750,.033680,.027177,
     4          .015912,.009330,.005478,.003221,.001896,.001117,.000659,
     5          .000389,.000230,.000136,.000081,.000048,.000028,.000017/
      DATA V50X/.872665,.777323,.692565,.617194,.550154,.490508,.437428,
     1          .390178,.348109,.310642,.277267,.221027,.176336,.140792,
     2          .112497,.089954,.071979,.057635,.046179,.037024,.029702,
     4          .017164,.009951,.005787,.003374,.001972,.001155,.000678,
     5          .000399,.000235,.000139,.000082,.000048,.000029,.000017/
      DATA V60X/1.047198,.923778,.815477,.720366,.636769,.563236,
     1 .498504,.441478,.391204,.346851,.307694,.242523,.191533,.151541,
     2          .120105,.095342,.075797,.060342,.048100,.038387,.030670,
     4          .017576,.010128,.005862,.003407,.001986,.001162,.000681,
     5          .000400,.000235,.000139,.000082,.000048,.000029,.000017/
```

```
      DATA V75X/1.308997,1.123611,.968414,.837712,.727031,.632830,
     1  .552287,.483134,.423535,.371996,.327288,.254485,.198885,.156087,
     2          .122932,.097108,.076905,.061040,.048541,.038667,.030848,
     4          .017634,.010147,.005869,.003409,.001987,.001162,.000681,
     5          .000400,.000235,.000139,.000082,.000048,.000029,.000017/
      DATA V90X/1.570796,1.228632,1.023680,.868832,.745203,.643694,
     1  .558890,.487198,.426062,.373579,.328286,.254889,.199051,.156156,
     2          .122961,.097121,.076911,.061043,.048542,.038668,.030848,
     4          .017634,.010147,.005869,.003409,.001987,.001162,.000681,
     5          .000400,.000235,.000139,.000082,.000048,.000029,.000017/
      DO 5 M=1,35
      FACTOR(1,M)=V10X(M)
      FACTOR(2,M)=V20X(M)
      FACTOR(3,M)=V30X(M)
      FACTOR(4,M)=V40X(M)
      FACTOR(5,M)=V50X(M)
      FACTOR(6,M)=V60X(M)
      FACTOR(7,M)=V75X(M)
      FACTOR(8,M)=V90X(M)
    5 CONTINUE
      A=0.0
      B=0.0
      C=0.0
      D=0.0
      A1=0.0
      A2=0.0
      IF(T.LE.0.0.OR.T.GT.90.0) WRITE(*,100)
      IF(T.LE.0.0.OR.T.GT.90.0) STOP
      IF(X.LT.0.0.OR.X.GT.10.0) WRITE(*,110)
      IF(X.LT.0.0.OR.X.GT.10.0) STOP
      DO 10 I=1,8
      IF(T.LE.TF(I)) GO TO 15
   10 CONTINUE
   15 DO 20 J=1,35
      IF(X.LE.XF(J)) GO TO 25
   20 CONTINUE
   25 IF(I.EQ.1) GO TO 30
      IF(J.EQ.1) GO TO 35
      A=FACTOR(I,J)
      B=FACTOR(I-1,J)
      C=FACTOR(I,J-1)
      D=FACTOR(I-1,J-1)
      A1=A-((TF(I)-T)/(TF(I)-TF(I-1))*(A-B))
      A2=C-((TF(I)-T)/(TF(I)-TF(I-1))*(C-D))
      F=A1-((A1-A2)*(XF(J)-X)/(XF(J)-XF(J-1)))
      RETURN
   30 IF(J.EQ.1) GO TO 40
      A=FACTOR(I+1,J)
      B=FACTOR(I,J)
      C=FACTOR(I+1,J-1)
```

```
      D=FACTOR(I,J-1)
      A1=A-((A-B)*(TF(I+1)-T)/(TF(I+1)-TF(I)))
      A2=C-((C-D)*(TF(I+1)-T)/(TF(I+1)-TF(I)))
      F=A1-((A1-A2)*(XF(J)-X)/(XF(J)-XF(J-1)))
      RETURN
   35 A=FACTOR(I,1)
      B=FACTOR(I-1,1)
      F=A-((A-B)*(TF(I)-T)/(TF(I)-TF(I-1)))
      RETURN
   40 A=FACTOR(I+1,1)
      B=FACTOR(I,1)
      F=A-((A-B)*(TF(I+1)-T)/(TF(I+1)-TF(I)))
      RETURN
  100 FORMAT(' F(Õ,X) CAN NOT HAVE A Õ <= 0.0 OR > 90.0')
  110 FORMAT(' F(Õ,X) CAN NOT HAVE AN X <= 0.0 OR > 10.0')
```

APPENDIX C

LISTING OF THE DATA FILES

TABLE OF CONTENTS

C.1 REACTR.DAT File

Dresden 1	IL	3	BWR	3	50	700	1959	2011
Yankee Rowe	MA	1	PWR	1	175	600	1960	2000
Indian Point 1	NY	1	PWR	2	50	615	1962	2013
Big Rock Point	MI	3	BWR	3	72	240	1962	2002
Humbolt Bay	CA	5	BWR	5	50	242	1963	2000
Haddam Neck	CN	1	PWR	1	575	1825	1967	2007
LaCrosse	WI	3	BWR	3	50	165	1967	2007
San Onofre	CA	5	PWR	2	436	1347	1967	2007
Oyster Creek	NJ	1	BWR	5	650	1930	1969	2009
Nine Mile Point 1	NY	1	BWR	3	620	1850	1969	2009
R. E. Ginna 1	NY	1	PWR	1	470	1520	1969	2009
Millstone 1	CN	1	BWR	5	660	2011	1970	2010
H. B. Robinson	SC	2	PWR	1	700	2200	1970	2010
Dresden 2	IL	3	BWR	3	794	2527	1970	2011
Monticello	MN	3	BWR	4	545	1670	1970	2010
Point Beach 1	WI	3	PWR	1	497	1518	1970	2010
Dresden 3	IL	3	BWR	3	794	2527	1971	2011
Palisades	MI	3	PWR	1	805	2530	1971	2011
Maine Yankee	ME	1	PWR	2	825	2630	1972	2012
Vermont Yankee	VT	1	BWR	4	514	1593	1972	2012
Surry 1	VA	2	PWR	2	822	2441	1972	2012
Turkey Point 3	FL	2	PWR	2	693	2200	1972	2012
Point Beach 2	WI	3	PWR	1	497	1518	1972	2012
Quad-Cities 1	IL	3	BWR	4	789	2511	1972	2012
Quad-Cities 2	IL	3	BWR	4	789	2511	1972	2012
Indian Point 2	NY	1	PWR	2	873	2758	1973	2013
Peach Bottom 2	PA	1	BWR	4	1065	3293	1973	2013
Browns Ferry 1	AL	2	BWR	4	1065	3293	1973	2013
Oconee 1	SC	2	PWR	1	887	2568	1973	2013
Oconee 2	SC	2	PWR	1	887	2568	1973	2013
Surry 2	VA	2	PWR	2	822	2441	1973	2013
Turkey Point 4	FL	2	PWR	2	693	2200	1973	2013
Prairie Island 1	MN	3	PWR	1	530	1650	1973	2013
Zion 1	IL	3	PWR	1	1040	3250	1973	2013
Zion 2	IL	3	PWR	1	1040	3250	1973	2013
Ft. Calhoun	NE	4	PWR	1	457	1500	1973	2013
Calvert Cliffs 1	MD	1	PWR	2	845	2700	1974	2014
Calvert Cliffs 2	MD	1	PWR	2	845	2700	1974	2014
J. A. Fitzpatrick	NY	1	BWR	3	821	2436	1974	2014
Peach Bottom 3	PA	1	BWR	4	1065	3293	1974	2014
Pilgrim 1	MA	1	BWR	5	665	1998	1974	2014
Three Mile Is. 1A	PA	1	PWR	1	50	0	1974	1986
Browns Ferry 2	AL	2	BWR	4	1065	3293	1974	2014
E. I. Hatch 1	GA	2	BWR	4	786	2436	1974	2014
Oconee 3	SC	2	PWR	1	887	2568	1974	2014
Duane Arnold 1	IA	3	BWR	4	538	1658	1974	2014
Kewannee	WI	3	PWR	1	535	1650	1974	2014
Prairie Island 2	MN	3	PWR	1	530	1650	1974	2014

REACTR.DAT

Arkansas 1	AR	4	PWR	1	850	2568	1974	2014
Cooper	NE	4	BWR	4	778	2381	1974	2014
Rancho Seco 1	CA	5	PWR	1	918	2772	1974	2014
Millstone 2	CT	1	PWR	2	870	2700	1975	2015
Brunswick 2	NC	2	BWR	5	821	2436	1975	2015
D. C. Cook 1	MI	3	PWR	1	1054	3250	1975	2015
Trojan 1	OR	5	PWR	1	1130	3411	1975	2015
Beaver Valley 1	PA	1	PWR	1	852	2660	1976	2016
Indian Point 3	NY	1	PWR	2	965	3025	1976	2016
Salem 1	NJ	1	PWR	2	1090	3338	1976	2016
Browns Ferry 3	AL	2	BWR	4	1065	3293	1976	2016
Brunswick 1	NC	2	BWR	5	821	2436	1976	2016
St. Lucie 1	FL	2	PWR	2	802	2700	1976	2016
Crystal River 3	FL	2	PWR	2	825	2544	1977	2017
J. M. Farley 1	AL	2	PWR	1	829	2652	1977	2017
Davis-Besse 1	OH	3	PWR	1	906	2772	1977	2017
E. I. Hatch 2	GA	2	BWR	4	784	2436	1978	2018
North Anna 1	VA	2	PWR	1	907	2775	1978	2018
D. C. Cook 2	MI	3	PWR	1	1100	3391	1978	2018
North Anna 2	VA	2	PWR	1	907	2775	1980	2020
Arkansas 2	AR	4	PWR	1	912	2815	1980	2020
Salem 2	NJ	1	PWR	2	1115	3411	1981	2021
J. M. Farley 2	AL	2	PWR	1	829	2652	1981	2021
Sequoyah 1	TN	2	PWR	1	1148	3411	1981	2021
W. B. McGuire 1	NC	2	PWR	1	1180	3411	1981	2021
Sequoyah 2	NC	2	PWR	1	1148	3411	1982	2022
La Salle 1	IL	3	BWR	3	1078	3293	1982	2022
San Onofre 2	CA	5	PWR	2	1100	3410	1983	2023
Susquehanna 1	PA	1	BWR	4	1050	3293	1983	2023
St. Lucie 2	FL	2	PWR	2	810	2570	1983	2023
Diablo Canyon 1	CA	5	PWR	2	1084	3338	1985	2025
San Onofre 3	CA	5	PWR	2	1100	3410	1984	2024
WNP-2	WA	5	BWR	4	1100	3323	1984	2024
La Salle 2	IL	3	BWR	3	1078	3293	1984	2024
V. C. Summer 1	SC	2	PWR	1	900	2785	1984	2024
W. B. McGuire 2	NC	2	PWR	1	1180	3411	1984	2024
Watts Bar 1	TN	2	PWR	1	1177	3425	1985	2025
Three Mile Is. 1B	PA	1	PWR	1	819	2535	1986	2014
Shoreham	NY	1	BWR	5	819	2436	1985	2025
Susquehanna 2	PA	1	BWR	4	1050	3293	1985	2025
Grand Gulf 1	MS	2	BWR	3	1250	3833	1985	2025
Waterford 3	LA	2	PWR	1	1113	3410	1985	2025
Byron 1	IL	3	PWR	1	1120	3425	1985	2025
Callaway 1	MO	3	PWR	1	1120	3411	1985	2025
E. Fermi 2	MI	3	BWR	4	1093	3292	1985	2025
Commanche Peak 1	TX	4	PWR	1	1111	3411	1985	2025
Palo Verde 1	AZ	5	PWR	1	1270	3817	1985	2025
Limerick 1	PA	1	BWR	4	1065	3293	1985	2025
Catawba 1	SC	2	PWR	1	1145	3411	1985	2025
River Bend 1	LA	2	BWR	3	934	2894	1985	2025
Perry 1	OH	3	BWR	3	1205	3579	1985	2025

REACTR.DAT

Wolf Creek	KS	4	PWR	1	1150	3411	1985	2025
Diablo Canyon 2	CA	5	PWR	2	1106	3411	1985	2025
Hope Creek 1	NJ	1	BWR	5	1067	3293	1986	2026
Clinton 1	IL	3	BWR	4	933	2894	1986	2026
Nine Mile Point 2	NY	1	BWR	4	1100	3323	1986	2026
Limerick 2	PA	1	BWR	5	1065	3293	1988	2028
Beaver Valley 2	PA	1	PWR	1	833	2660	1986	2026
Shearon Harris 1	NC	2	PWR	1	900	2775	1986	2026
Braidwood 1	IL	3	PWR	1	1120	3360	1986	2026
Commanche Peak 2	TX	4	PWR	1	1111	3411	1986	2026
Palo Verde 2	AZ	5	PWR	1	1270	3817	1986	2026
Millstone 3	CT	1	PWR	2	1156	3411	1986	2026
Watts Bar 2	TN	2	PWR	1	1177	3425	1988	2028
Bryon 2	IL	3	PWR	1	1120	3425	1986	2026
Seabrook 1	NH	1	PWR	2	1200	3411	1986	2026
A W Vogtle 1	GA	2	PWR	1	1110	3425	1987	2027
Catawba 2	SC	2	PWR	1	1145	3411	1987	2027
Braidwood 2	IL	3	PWR	1	1120	3425	1987	2027
South Texas 1	TX	4	PWR	2	1250	3817	1987	2027
Palo Verde 3	AZ	5	PWR	1	1270	3817	1987	2027
A W Vogtle 2	GA	2	PWR	1	1110	3425	1988	2028
Grand Gulf 2	MS	2	BWR	4	1250	3833	1989	2029
Bellefonte 1	AL	2	PWR	1	1213	3621	1989	2029
South Texas 2	TX	4	PWR	2	1250	3817	1989	2029
WNP 1	WA	5	PWR	1	1218	3619	1989	2029
WNP 3	WA	5	PWR	2	1242	3817	1989	2029
Perry 2	OH	3	BWR	4	1205	3579	1990	2030
Three Mile Is. 2A	PA	1	PWR	1	100	0	1979	1990
Three Mile Is. 2B	PA	1	PWR	1	906	2772	1990	2019
Seabrook 2	NH	1	PWR	2	1200	3411	1992	2032
Bellefonte 2	AL	2	PWR	1	1213	3621	1991	2031
Carroll Cty 1	IL	3	PWR	1	1120	3425	2001	2041
Carroll Cty 2	IL	3	PWR	1	1120	3425	2002	2042

C.2 VRATES.DAT File

```
P-IXRESIN   1  2.24   E-02 6.37 E-02
P-CONCLIQ   2  1.77   E-01 8.67 E-02
P-FSLUDGE   3  0.          0.
P-FCARTRG   4  7.36   E-03 1.08 E-02
B-IXRESIN   5  4.90   E-02 3.82 E-02 1.73 E-01
B-CONCLIQ   6  3.25   E-01 0.        3.78 E-01
B-FSLUDGE   7  3.40   E-02 2.23 E-01 2.64 E-01
P-COTRASH   8  1.64   E-01 1.97 E-01
P-NCTRASH   9  1.55   E-01 2.74 E-01
B-COTRASH  10  2.87   E-01 3.98 E-01 9.87 E-01
B-NCTRASH  11  7.00   E-02 2.79 E-01 5.09 E-01
L-NFRCOMP  12  2.79   E-02
L-DECONRS  13  1.00   E-04 3.0  E-03
F-PROCESS  14  2.68   E-02 0.        .20  .50  .00  .30
F-COTRASH  15  8.09   E-02 0.        .20  .50  .00  .30
F-NCTRASH  16  1.43   E-02 0.        .20  .50  .00  .30
U-PROCESS  17  9.64   E-03 0.        .00  .00  .50  .50
L-PUDECON  18
L-BURNUPS  19  5.7         0.        .0   .439 .526 .035 1985 21.05      1984
I-COTRASH  20  4014.       269.      .31  .22  .27  .20
I+COTRASH  21  4014.       269.      .31  .22  .27  .20
I-ABSLIQD  22  159.        10.5      .31  .22  .27  .20
I+ABSLIQD  23  159.        10.5      .31  .22  .27  .20
I-LIQSCVL  24  938.     708.      478.      376.      188.      1980 1984 .31  .22  .27  .20
I+LIQSCVL  25  938.     708.      478.      376.      188.      1980 1984 .31  .22  .27  .20
I-BIOWAST  26  498.     343.5     189.      188.      188.      1980 1984 .31  .22  .27  .20
I+BIOWAST  27  498.     343.5     189.      188.      188.      1980 1984 .31  .22  .27  .20
N-SSTRASH  28  5122.       343.      .50  .10  .20  .20
N+SSTRASH  29  5122.       343.      .50  .10  .20  .20
N-SSWASTE  30  1808.       121.      .50  .10  .20  .20
N-LOTRASH  31  1445.       97.       .30  .20  .30  .20
N+LOTRASH  32  1445.       97.       .30  .20  .30  .20
N-LOWASTE  33  1719.       115.      .30  .20  .30  .20
N-ISOPROD  34  30.         0.        1.0  .00  .00  .00
N-ISOTRSH  35  52.2        0.        1.0  .00  .00  .00
N-SORMFG1  36  2.8         0.        1.0  .00  .00  .00
N-SORMFG2  37  253.        0.        .00  .00  .00  1.0
N-SORMFG3  38  .35         0.        .00  .00  1.0  .00
N-SORMFG4  39  160.        0.        .00  .00  1.0  .00
N-NECOTRA  40  158.        0.        1.0  .00  .00  .00
N-NEABLIQ  41  9.9         0.        1.0  .00  .00  .00
N-NESOLIQ  42  46.6        0.        1.0  .00  .00  .00
N-NEVIALS  43  0.9         0.        1.0  .00  .00  .00
N-NENCGLS  44  43.7        0.        1.0  .00  .00  .00
N-NEWOTAL  45  16.7        0.        1.0  .00  .00  .00
N-NETRGAS  46  .108        0.        1.0  .00  .00  .00
N-NETRILI  47  .972        0.        1.0  .00  .00  .00
N-NECARLI  48  .0486       0.        1.0  .00  .00  .00
```

VRATES.DAT

N-MWTRASH	49	6.3	0.	.00	.00	1.0	.00	
N-MWABLIQ	50	.38	0.	.00	.00	1.0	.00	
N-MWSOLIQ	51	.36	0.	.00	.00	1.0	.00	
N-MWWASTE	52	1.5	0.	.00	.00	1.0	.00	
N-TRIPLAT	53	4.4	0.	.063	.052	.262	.620	
N-TRITGAS	54	24.6	0.	.569	.0	.024	.402	
N-TRISCNT	55	1.3	0.	.162	.671	.112	.056	
N-TRILIQD	56	7.1	0.	.186	.0	.036	.777	
N-TRITRSH	57	23.9	0.	.556	.283	.132	.029	
N-TRIFOIL	58	10.6	0.	.897	.097	.0	.006	
N-HIGHACT	59	74.4	5.	.31	.22	.27	.20	
N-TRITSOR	60	8.	0.	.25	.25	.25	.25	
N-CARBSOR	61	4.	0.	.25	.25	.25	.25	
N-COBLSOR	62	20.	0.	.25	.25	.25	.25	
N-NICKSOR	63	4.	0.	.25	.25	.25	.25	
N-STROSOR	64	8.	0.	.25	.25	.25	.25	
N-CESISOR	65	20.	0.	.25	.25	.25	.25	
N-PLU8SOR	66	6.	0.	.25	.25	.25	.25	
N-PLU9SOR	67	4.	0.	.25	.25	.25	.25	
N-AMERSOR	68	8.	0.	.25	.25	.25	.25	
N-PUBESOR	69	6.	0.	.25	.25	.25	.25	
N-AMBESOR	70	60.	0.	.25	.25	.25	.25	
N-RANEEDS	71	639.	0.	.45	.16	.20	.19	
N-RACELLS	72	280.	0.	.45	.16	.20	.19	
N-RAPLAQU	73	27.	0.	.45	.16	.20	.19	
N-RANPAPP	74	5.	0.	.45	.16	.20	.19	
N-RABESOR	75	7.	0.	.25	.27	.11	.36	
N-RAMISCL	76	142.	0.	.23	.08	.23	.47	
N-RARESIN	77	212.4	0.	.25	.20	.24	.31	1990
M-NAVYDRY	78	354.	0.	.12	.54	.00	.34	
M-NAVYWET	79	55.	0.	.12	.54	.00	.34	
R-HLLWFRP	70	1200.						
R-FUEHARD	81	112.						
R-HULLFRP	82	532.						
R-ILLWFRP	83	220.						
R-SILIGEL	84	10.						
R-MPCOTRH	85	803.						
R-MPCOTRL	86	2400.						
R-MPNCTRA	87	1200.						
R-DEGREXT	88	16.						
R-MPRESIN	89	10.						
R-SBRESIN	90	18.						
R-SBCOLIQ	91	30.						
R-SBCOTRA	92	1220.						
R-SBNCTRA	93	120.						
R-UFFINES	94	68.						
R-UFK2MUD	95	140.						
R-UFCOTRA	96	110.						
R-UFNCTRA	97	40.						
R-PUCOTRA	98	100.						
R-PUNCTRA	99	52.						

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R-MOXCOTR 100  240.
R-MOXNCTR 101  160.
R-MOXSOLN 102  148.
P-DECORES 103  2.75       4.     E-01 2.318E-04-2.397E-08 1.925E-12
P-DEACINT 104  63.        4.     E-01 2.318E-04-2.397E-08 1.925E-12
P-DEACVES 105  55.5       1.3    E-01 3.589E-04-2.713E-08-1.258E-12
P-DEACTCO 106  177.       2.3    E-01 5.829E-05 4.163E-08 1.307E-12
P-DECONME 107  1366.      5.08   E-01-3.917E-04 3.156E-07-4.673E-11
P-DECONCO 108  2653.      2.3    E-01 5.829E-05 4.163E-08 1.307E-12
P-DETRASH 109  354.5      -1.145E-02 5.954E-04-1.757E-07 2.518E-11
P-DERESIN 110  7.5        -1.145E-02 5.954E-04-1.757E-07 2.518E-11
P-DEFILCR 111  2.2        -1.145E-02 5.954E-04-1.757E-07 2.518E-11
P-DEEVAPB 112  33.        -1.145E-02 5.954E-04-1.757E-07 2.518E-11
B-DECORES 113  11.75      2.83   E-01 1.772E-04
B-DEACINT 114  20.75      2.83   E-01 1.772E-04
B-DEACVES 115  2.         2.11   E-01 2.26 E-04
B-DEACTCO 116  22.5       4.18   E-01 1.726E-05
B-DECONME 117  3657.      0.          3.106E-04
B-DECONCO 118  650.       8.37   E-01 2.334E-05
B-DETRASH 119  848.       2.67   E-01 2.035E-04
B-DERESIN 120  10.5       2.67   E-01 2.035E-04
B-DEEVAPB 121  109.5      2.67   E-01 2.035E-04
W-THORHLW 122  15.7       1988 1990
W-PUREHLW 123  667.       1988 1990
W-COTRASH 124  771.       1984 1990
W-NCSOLID 125  814.       1984 1990
W-LLWTFRE 126  66.9       1984 1990
W-FRSRESN 127  16.1       1984 1985
W-FRSLIQD 128  5.9        1988 1990
W-RTSRESN 129  7.4        1988 1990
W-LTTRASH 130  99.        1984 1985 182.1      1988 1990 49.2       1993 2000
W-HTTRASH 131  69.6       1984 1985 130.2      1988 1990 37.5       1993 2000
W-LTEQUIP 132  605.       1984 1985 14.        1988 1990 151.3      1993 2000
W-HTEQUIP 133  214.2      1984 1985 5.3        1988 1990 92.4       1993 2000
W-PDWLIQD 134  32.9       1984 1985
W-VITSUPR 135  500.       1988 1990
W-VITWASH 136  30.9       1988 1990
W-VITSCRB 137  188.1      1988 1990
W-VITMELT 138  2.6        1988 1990
W-VITFRAC 139  0.5        1988 1990
W-VITZEOL 140  140.5      1988 1990
W-DDRACKS 141  85.3       1993 2000
W-DDLTRUB 142  111.4      1993 2000
W-DDHTRUB 143  9.2        1993 2000
W-DDLTLQD 144  58.9       1993 2000
W-DDHTLQD 145  20.        1993 2000
W-DDRESIN 146  62.5       1993 2000
L-SPENTFU 147  0.01       0.013     976.8      706.9     852.1      185.2
L-FUEHARD 148  0.0016     0.0017    141.1      104.6     122.4      28.0
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C.3 ENVIRO.DAT File

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7.060E-05 9.570E-07 2280.     50.        2.        8.        8.       20.
 300.     1.           0.     0.           0.     0.          0.     0.
 500.     2.         500.     2.           0.     0.          0.     0.
 500.     2.           0.     0.         500.     2.          0.     0.
 500.     2.           0.     0.        1000.     2.       1500.     3.
9.180E-12 2.960E-11 9.680E-11 1.830E-09 1.515E-09 1.110E-07 5.530E-07 2.030E-06
0.074     0.036     2.660E-03 1.290E-03 7700.     7700.     2.000E+05 4.500E+05
0.1       0.        1000.     0.1       0.05      0.3       0.2       1.0
   2
7.060E-05 9.570E-07  610.     50.        8.        3.        8.       20.
 500.     2.         500.     2.           0.     0.          0.     0.
   0.     0.         400.     1.           0.     0.          0.     0.
   0.     0.         500.     2.         500.     2.          0.     0.
   0.     0.         500.     2.        1000.     2.       1500.     3.
2.010E-11 3.180E-11 1.400E-10 1.830E-09 5.250E-10 1.110E-07 1.540E-08 2.500E-06
0.180     0.030     6.470E-03 1.080E-03 7700.     7700.     2.000E+05 4.500E+05
0.2       2.        1000.     1.25      0.05      0.3       0.2       1.0
   3
7.060E-05 9.570E-07  790.     50.        8.        8.        5.       14.
 500.     2.           0.     0.         500.     2.          0.     0.
   0.     0.         500.     2.         500.     2.          0.     0.
   0.     0.           0.     0.        1000.     2.          0.     0.
   0.     0.           0.     0.        1000.     2.       1500.     3.
2.510E-11 3.280E-11 6.210E-11 1.830E-09 5.790E-10 1.110E-07 2.050E-06 4.490E-06
0.050     0.025     1.800E-03 9.000E-04 7700.     7700.     2.000E+05 4.500E+05
0.1       7.        2000.     0.66      0.05      0.3       0.2       1.0
   2
3.920E-05 9.570E-07   60.     50.       20.       20.       14.        8.
 500.     2.           0.     0.        1000.     2.       1500.     3.
   0.     0.         500.     2.        1000.     2.       1500.     3.
   0.     0.           0.     0.        1000.     2.       1500.     3.
   0.     0.           0.     0            0.     0.       1500.     3.
2.640E-10 8.060E-11 4.110E-11 1.830E-09 3.990E-11 0.        7.950E-06 6.840E-05
0.001     0.001     3.600E-05 3.600E-05 7700.     7700.     2.000E+05 4.500E+05
0.1       28.       10000.    10.       0.05      0.2       0.1       1.0
   4
.0008     .01       .0483     .000765   240.      .00068    .00068    .0011
.0027     .25       1.        1600.     190.      .25       .36       .22
.36       .95       .3        50.       60.       370.      6.9       1.
8.500E-09 8000.     16.
0.5       0.1       0.1       0.1       0.1       0.1       0.1       0.1
```

C.4 DISTEC.DAT File

```
6.2300E+00 8.8000E-01 2.0000E+00 6.7000E+00 3.8326E+04 5.4000E+03 1.8000E+02 3.0000E+01
3.8800E+00 6.9000E-01 2.0000E+00 4.7000E+00 2.7630E+03 6.0000E+02 6.0000E+01 1.0000E+01
1.1400E+01 8.8000E-01 2.0000E+00 1.3000E+01 6.5539E+04 5.4000E+03 1.8000E+02 3.0000E+01
5.2500E+00 6.9000E-01 2.0000E+00 7.0000E+00 3.5330E+03 6.0000E+02 6.0000E+01 1.0000E+01
4.7300E+00 4.7000E-01 2.0000E+00 4.7000E+00 1.2090E+03 2.4000E+02 6.0000E+01 4.0000E+00
4.8200E+00 4.7000E-01 2.0000E+00 5.0000E+00 1.2270E+03 2.4000E+02 6.0000E+01 4.0000E+00
4.7000E+00 7.9000E-02 2.0000E+00 4.7000E+00 1.6120E+03 2.8270E+02 2.8270E+02 1.0000E+00
2.9000E+01 7.9000E-02 2.0000E+00 2.9000E+01 8.4840E+03 2.8270E+02 2.8270E+02 1.0000E+00
5.7000E+00 4.4000E-01 2.0000E+00 5.7000E+00 5.0330E+03 8.6040E+02 8.6040E+02 1.0000E+00
5.7000E+00 4.4000E-01 2.0000E+00 5.7000E+00 5.0330E+03 8.6040E+02 8.6040E+02 1.0000E+00
5.7000E+00 1.7000E-01 2.0000E+00 5.7000E+00 1.3160E+03 2.2500E+02 2.2500E+02 1.0000E+00
5.7000E+00 1.7000E-01 2.0000E+00 5.7000E+00 1.3160E+03 2.2500E+02 2.2500E+02 1.0000E+00
6.7500E+00 6.8000E-01 2.0000E+00 6.7500E+00 2.8690E+04 4.2500E+03 4.2500E+03 1.0000E+00
6.7500E+00 6.8000E-01 2.0000E+00 6.7500E+00 2.8690E+04 4.2500E+03 4.2500E+03 1.0000E+00
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C.5 WASCAR.DAT File

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P-IXRESIN   -2   1 7.71E+00
     1   1200001    100    100 11 1 1 0 0 0 0 9.00E-01
     1   1201101    100    140 23 2 2 0 2 0 0 1.70E+00
     1   1202101    100    200 31 3 3 0 2 0 0 1.20E+00
     1    763121   1800    200 32 3 4 0 2 0 0 1.20E+00
     1   1204001    100    100 11 1 1 0 3 0 0 9.00E-01
       .00E+00  .00E+00 3.50E-04 1.80E-03 3.50E-03 1.80E-02 3.50E-02 1.80E-01
      3.50E-01 1.80E+00 3.50E+00 1.80E+01 3.50E+01 1.80E+02 3.50E+02 1.00E+03
       .00E+00  .00E+00  .00E+00 7.00E-03 5.50E-02 1.33E-01 1.94E-01 3.87E-01
      4.70E-01 6.91E-01 7.76E-01 9.19E-01 9.58E-01 9.90E-01 9.98E-01 1.00E+00
       .00E+00  .00E+00  .00E+00 1.10E-03 2.15E-03 6.05E-03 1.20E-02 4.99E-02
      8.70E-02 3.31E-01 5.81E-01 1.65E+00 2.60E+00 4.88E+00 6.93E+00 7.71E+00
      H-3    * 6.13E-01 C-14   * 2.25E-02 FE-55  Y 5.39E-01 CO-60  Y 1.04E+00
      NI-59  W 6.43E-04 NI-63  W 1.98E-01 SR-90  D 4.47E-02 NB-94  Y 2.04E-05
      TC-99  D 1.90E-04 I-129  D 5.62E-04 CS-135 D 1.90E-04 CS-137 D 5.05E+00
      U-235  Y 1.09E-05 U-238  Y 8.55E-05 NP-237 W 2.09E-09 PU-238 Y 5.99E-03
      PU-239 Y 4.20E-03 PU-241 Y 1.83E-01 PU-242 Y 9.20E-06 AM-241 W 4.31E-03
      AM-243 W 2.90E-04 CM-243 W 2.29E-06 CM-244 W 3.18E-03                   $
P-CONCLIQ   -2   2 8.41E-01
     2   1201101    100    140 23 1 2 0 1 0 0 1.70E+00
     2   1201101    100    140 23 2 2 0 2 0 0 1.70E+00
     2   1242101    600    200 31 3 3 0 2 0 0 1.20E+00
     2   1263121    800    200 32 3 4 0 2 0 0 1.20E+00
     2   1201101    100    140 23 2 2 0 2 0 0 1.70E+00
       .00E+00  .00E+00  .00E+00  .00E+00 3.50E-04 1.80E-03 3.50E-03 1.80E-02
      3.50E-02 1.80E-01 3.50E-01 1.80E+00 3.50E+00 1.80E+01 3.50E+01 1.80E+02
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00 4.00E-03 1.00E-02 5.30E-02
      1.44E-01 4.30E-01 6.34E-01 9.38E-01 9.70E-01 9.96E-01 9.97E-01 1.00E+00
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00 1.70E-03 2.12E-03 1.01E-02
      1.89E-02 7.22E-02 1.36E-01 3.64E-01 4.30E-01 5.66E-01 5.83E-01 8.41E-01
      H-3    * 2.66E-02 C-14   * 9.80E-04 FE-55  Y 1.75E-01 CO-60  Y 3.40E-01
      NI-59  W 2.09E-04 NI-63  W 6.45E-02 SR-90  D 1.94E-03 NB-94  Y 6.62E-06
      TC-99  D 8.26E-06 I-129  D 2.44E-05 CS-135 D 8.26E-06 CS-137 D 2.20E-01
      U-235  Y 4.75E-07 U-238  Y 3.73E-06 NP-237 W 9.10E-11 PU-238 Y 3.95E-04
      PU-239 Y 2.55E-04 PU-241 Y 1.11E-02 PU-242 Y 5.59E-07 AM-241 W 2.31E-04
      AM-243 W 1.56E-05 CM-243 W 9.03E-08 CM-244 W 1.48E-04                   $
P-FSLUDGE   -2   1 7.71E+00
     3   1200001    100    100 02 0 1 0 0 0 0 9.00E-01
     3   1201101    100    140 23 2 2 0 2 0 0 1.70E+00
     3   1202101    100    200 31 3 3 0 2 0 0 1.20E+00
     3    763121    500    200 32 3 4 0 2 0 0 1.20E+00
     3   1204001    100    100 02 0 1 0 3 0 0 9.00E-01
       .00E+00  .00E+00 3.50E-04 1.80E-03 3.50E-03 1.80E-02 3.50E-02 1.80E-01
      3.50E-01 1.80E+00 3.50E+00 1.80E+01 3.50E+01 1.80E+02 3.50E+02 1.00E+03
       .00E+00  .00E+00  .00E+00 7.00E-03 5.50E-02 1.33E-01 1.94E-01 3.87E-01
      4.70E-01 6.91E-01 7.76E-01 9.19E-01 9.58E-01 9.90E-01 9.98E-01 1.00E+00
       .00E+00  .00E+00  .00E+00 1.10E-03 2.15E-03 6.05E-03 1.20E-02 4.99E-02
      8.70E-02 3.31E-01 5.81E-01 1.65E+00 2.60E+00 4.88E+00 6.93E+00 7.71E+00
      H-3    * 1.89E-02 C-14   * 6.97E-04 FE-55  Y 2.26E+00 CO-60  Y 4.38E+00
      NI-59  W 2.71E-03 NI-63  W 8.33E-01 SR-90  D 1.38E-03 NB-94  Y 8.55E-05
      TC-99  D 5.86E-06 I-129  D 1.73E-05 CS-135 D 5.86E-06 CS-137 D 1.56E-01
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        U-235  Y 1.07E-06 U-238  Y 8.40E-06 NP-237 W 2.05E-10 PU-238 Y 3.48E-04
        PU-239 Y 1.13E-03 PU-241 Y 4.93E-02 PU-242 Y 2.48E-06 AM-241 W 1.93E-03
        AM-243 W 1.30E-04 CM-243 W 2.26E-06 CM-244 W 1.29E-03                  $
P-FCARTRG   -2   0 4.48E+00
      4    700001    100    100 21 1 1 0 0 0 0 1.30E+00
      4    701101    100    100 33 2 2 0 2 0 0 1.70E+00
      4    702101    100    100 31 3 3 0 2 0 0 1.20E+00
      4    703101    100    100 32 3 4 0 2 0 0 1.20E+00
      4    704101    100    100 31 1 1 0 3 0 0 1.30E+00
        H-3    * 2.77E-03 C-14   * 1.02E-04 FE-55  Y 1.34E+00 CO-60  Y 2.58E+00
        NI-59  W 1.59E-03 NI-63  W 4.91E-01 SR-90  D 2.02E-04 NB-94  Y 5.03E-05
        TC-99  D 8.62E-07 I-129  D 2.55E-06 CS-135 D 8.62E-07 CS-137 D 2.30E-02
        U-235  Y 8.77E-07 U-238  Y 6.91E-06 NP-237 W 1.69E-10 PU-238 Y 6.05E-04
        PU-239 Y 9.15E-04 PU-241 Y 4.00E-02 PU-242 Y 2.01E-06 AM-241 W 3.95E-04
        AM-243 W 2.65E-05 CM-243 W 4.65E-07 CM-244 W 2.65E-04                  $
B-IXRESIN   -2   3 5.60E+00
      5   1200001    100    100 11 1 1 0 0 0 0 9.00E-01
      5   1201101    100    140 23 2 2 0 2 0 0 1.70E+00
      5   1202101    100    200 31 3 3 0 2 0 0 1.20E+00
      5    763121   1800    200 32 3 4 0 2 0 0 1.20E+00
      5   1204001    100    100 11 1 1 0 3 0 0 9.00E-01
         .00E+00  .00E+00 3.50E-04 1.80E-03 3.50E-03 1.80E-02 3.50E-02 1.80E-01
        3.50E-01 1.80E+00 3.50E+00 1.80E+01 3.50E+01 1.80E+02 3.50E+02 1.00E+03
         .00E+00  .00E+00 1.00E-03 1.00E-03 5.00E-03 4.20E-02 7.10E-02 1.85E-01
        2.57E-01 5.63E-01 6.81E-01 9.38E-01 9.74E-01 9.98E-01 9.99E-01 1.00E+00
         .00E+00  .00E+00 2.50E-04 2.50E-04 1.73E-03 8.66E-03 1.53E-02 6.75E-02
        1.21E-01 5.23E-01 8.91E-01 2.67E+00 3.52E+00 4.89E+00 5.14E+00 5.60E+00
        H-3    * 2.32E-02 C-14   * 1.44E-03 FE-55  Y 1.15E+00 CO-60  Y 1.92E+00
        NI-59  W 1.18E-03 NI-63  W 2.60E-02 SR-90  D 4.40E-03 NB-94  Y 3.74E-05
        TC-99  D 9.25E-05 I-129  D 2.47E-04 CS-135 D 9.25E-05 CS-137 D 2.47E+00
        U-235  Y 6.44E-08 U-238  Y 5.08E-07 NP-237 W 1.23E-11 PU-238 Y 1.01E-04
        PU-239 Y 6.46E-05 PU-241 Y 3.14E-03 PU-242 Y 1.41E-07 AM-241 W 2.80E-05
        AM-243 W 1.90E-06 CM-243 W 3.26E-08 CM-244 W 2.20E-05                  $
B-CONCLIQ   -2   4 8.68E-01
      6   1201101    100    140 23 1 2 0 1 0 0 1.70E+00
      6   1201101    100    140 23 2 2 0 2 0 0 1.70E+00
      6   1242101    240    200 31 3 3 0 2 0 0 1.20E+00
      6   1263121    640    200 32 3 4 0 2 0 0 1.20E+00
      6   1201101    100    140 23 2 2 0 2 0 0 1.70E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        3.50E-03 1.80E-02 3.50E-02 1.80E-01 3.50E-01 1.80E+00 3.50E+00 1.80E+01
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         .00E+00 7.50E-02 7.50E-02 5.32E-01 7.55E-01 8.43E-01 9.04E-01 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         .00E+00 9.50E-03 9.50E-03 8.72E-02 1.38E-01 2.24E-01 3.86E-01 8.65E-01
        H-3    * 1.95E-03 C-14   * 1.22E-04 FE-55  Y 2.38E-01 CO-60  Y 3.97E-01
        NI-59  W 2.45E-04 NI-63  W 5.38E-03 SR-90  D 3.69E-04 NB-94  Y 7.75E-06
        TC-99  D 7.82E-06 I-129  D 2.08E-05 CS-135 D 7.82E-06 CS-137 D 2.08E-01
        U-235  Y 1.08E-07 U-238  Y 8.47E-07 NP-237 W 2.07E-11 PU-238 Y 6.22E-04
        PU-239 Y 2.95E-04 PU-241 Y 1.44E-02 PU-242 Y 6.14E-07 AM-241 W 3.75E-04
        AM-243 W 2.53E-05 CM-243 W 8.10E-07 CM-244 W 6.41E-04                  $
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B-FSLUDGE   -2   3 5.61E+00
      7  1200001    100    100 02 0 1 0 0 0 0 9.00E-01
      7  1201101    100    140 23 2 2 0 2 0 0 1.70E+00
      7  1202101    100    200 31 3 3 0 2 0 0 1.20E+00
      7   763121    500    200 32 3 4 0 2 0 0 1.20E+00
      7  1204001    100    100 02 0 1 0 3 0 0 9.00E-01
   .00E+00  .00E+00 3.50E-04 1.80E-03 3.50E-03 1.80E-02 3.50E-02 1.80E-01
  3.50E-01 1.80E+00 3.50E+00 1.80E+01 3.50E+01 1.80E+02 3.50E+02 1.00E+03
   .00E+00  .00E+00 1.00E-03 1.00E-03 5.00E-03 4.20E-02 7.10E-02 1.85E-01
  2.57E-01 5.63E-01 6.81E-01 9.38E-01 9.74E-01 9.98E-01 9.99E-01 1.00E+00
   .00E+00  .00E+00 2.50E-04 2.50E-04 1.73E-03 8.66E-03 1.53E-02 6.75E-02
  1.21E-01 5.23E-01 8.91E-01 2.67E+00 3.52E+00 4.89E+00 5.14E+00 5.60E+00
  H-3    * 1.35E-02 C-14   * 8.32E-04 FE-55  Y 1.54E+00 CO-60  Y 2.58E+00
  NI-59  W 1.59E-03 NI-63  W 3.47E-02 SR-90  D 2.53E-03 NB-94  Y 5.02E-05
  TC-99  D 5.35E-05 I-129  D 1.42E-04 CS-135 D 5.35E-05 CS-137 D 1.42E+00
  U-235  Y 3.55E-07 U-238  Y 2.79E-06 NP-237 W 6.82E-11 PU-238 Y 4.98E-04
  PU-239 Y 2.52E-04 PU-241 Y 1.23E-02 PU-242 Y 5.54E-07 AM-241 W 1.67E-04
  AM-243 W 1.12E-05 CM-243 W 3.17E-07 CM-244 W 2.39E-04                  $
P-COTRASH    2   5 5.50E-02
      8  1410101    300    100 10 1 1 0 0 0 0 4.00E-01
      8  1410101    300    100 10 1 1 0 0 0 0 4.00E-01
      8  1420101    600    100 10 1 1 0 0 0 0 8.00E-01
      8   763121   8000    200 32 3 4 0 2 0 0 1.20E+00
      8  1414101    300    100 10 1 1 0 3 0 0 4.00E-01
   .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
   .00E+00  .00E+00  .00E+00 9.61E-03 1.93E-02 7.70E-02 1.93E-01 9.62E-01
   .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
   .00E+00  .00E+00  .00E+00 2.60E-01 4.90E-01 8.40E-01 9.60E-01 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 6.92E-03 1.10E-02 3.23E-02 4.42E-02 5.50E-02
  H-3    * 7.32E-04 C-14   * 2.70E-05 FE-55  Y 1.44E-02 CO-60  Y 2.78E-02
  NI-59  W 1.72E-05 NI-63  W 5.29E-03 SR-90  D 5.34E-05 NB-94  Y 5.45E-07
  TC-99  D 2.28E-07 I-129  D 6.73E-07 CS-135 D 2.28E-07 CS-137 D 6.04E-03
  U-235  Y 1.91E-08 U-238  Y 1.50E-07 NP-237 W 3.67E-12 PU-238 Y 1.44E-05
  PU-239 Y 1.34E-05 PU-241 Y 5.82E-04 PU-242 Y 2.92E-08 AM-241 W 9.56E-06
  AM-243 W 6.47E-09 CM-243 W 6.63E-09 CM-244 W 6.31E-06                  $
P-NCTRASH    2   6 3.77E-01
      9  1500001    100    100 11 1 1 0 0 0 0 4.00E-01
      9  1500001    100    100 11 1 1 0 0 0 0 4.00E-01
      9  1500001    100    100 11 1 1 0 0 0 0 4.00E-01
      9  1530201    600    100 11 3 4 0 0 0 0 2.40E+00
      9  1504001    100    100 11 1 1 0 3 0 0 4.00E-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 4.11E-02 8.22E-02 3.29E-01 4.11E+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 4.90E-01 7.20E-01 9.20E-01 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 2.08E-02 3.70E-02 8.07E-02 3.77E-01
  H-3    * 5.03E-03 C-14   * 1.85E-04 FE-55  Y 9.86E-02 CO-60  Y 1.91E-01
  NI-59  W 1.18E-04 NI-63  W 3.63E-02 SR-90  D 3.68E-04 NB-94  Y 3.73E-06
  TC-99  D 1.56E-06 I-129  D 4.61E-06 CS-135 D 1.56E-06 CS-137 D 4.15E-02
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      U-235  Y 1.31E-07 U-238  Y 1.03E-06 NP-237 W 2.52E-11 PU-238 Y 9.92E-05
      PU-239 Y 9.14E-05 PU-241 Y 3.99E-03 PU-242 Y 2.01E-07 AM-241 W 6.55E-05
      AM-243 W 4.43E-06 CM-243 W 4.58E-08 CM-244 W 4.31E-05                   $
B-COTRASH    2   7 1.97E-02
    10    1310101    200    100 10 1 1 0 0 0 0 3.00E-01
    10    1310101    200    100 10 1 1 0 0 0 0 3.00E-01
    10    1320101    600    100 10 1 1 0 0 0 0 8.00E-01
    10     763121   8000    200 32 3 4 0 2 0 0 1.20E+00
    10    1314101    200    100 10 1 1 0 3 0 0 3.00E-01
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00  .00E+00  .00E+00 6.83E-03 1.37E-02 5.45E-02 1.37E-01 6.82E-01
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00  .00E+00  .00E+00 7.00E-01 8.30E-01 9.40E-01 9.80E-01 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 4.23E-03 5.48E-03 8.29E-03 1.18E-02 1.97E-02
      H-3    * 5.67E-05 C-14   * 3.50E-06 FE-55  Y 5.03E-03 CO-60  Y 8.47E-03
      NI-59  W 5.21E-06 NI-63  W 1.14E-04 SR-90  D 1.06E-05 NB-94  Y 1.64E-07
      TC-99  D 2.25E-07 I-129  D 5.99E-07 CS-135 D 2.25E-07 CS-137 D 5.99E-03
      U-235  Y 1.02E-09 U-238  Y 8.04E-09 NP-237 W 1.97E-13 PU-238 Y 1.92E-06
      PU-239 Y 9.72E-07 PU-241 Y 4.72E-05 PU-242 Y 2.12E-09 AM-241 W 8.11E-07
      AM-243 W 5.47E-08 CM-243 W 1.62E-09 CM-244 W 1.26E-06                   $
B-NCTRASH    2   8 8.53E-02
    11    1500001    100    100 11 1 1 0 0 0 0 4.00E-01
    11    1500001    100    100 11 1 1 0 0 0 0 4.00E-01
    11    1500001    100    100 11 1 1 0 0 0 0 4.00E-01
    11    1530201    600    100 11 3 4 0 0 0 0 2.40E+00
    11    1504001    100    100 11 1 1 0 3 0 0 4.00E-01
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00  .00E+00  .00E+00 2.95E-02 5.90E-02 2.36E-01 5.90E-01 2.92E+00
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00  .00E+00  .00E+00 6.90E-01 7.80E-01 9.30E-01 9.77E-01 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 1.76E-02 2.17E-02 3.91E-02 5.72E-02 8.53E-02
      H-3    * 2.46E-04 C-14   * 1.51E-05 FE-55  Y 2.18E-02 CO-60  Y 3.65E-02
      NI-59  W 2.26E-05 NI-63  W 4.92E-04 SR-90  D 4.63E-05 NB-94  Y 7.11E-07
      TC-99  D 9.38E-07 I-129  D 2.59E-06 CS-135 D 9.76E-07 CS-137 D 2.59E-02
      U-235  Y 4.46E-09 U-238  Y 3.49E-08 NP-237 W 8.50E-13 PU-238 Y 8.37E-06
      PU-239 Y 4.19E-06 PU-241 Y 2.04E-04 PU-242 Y 9.21E-09 AM-241 W 3.52E-06
      AM-243 W 2.36E-07 CM-243 W 7.03E-09 CM-244 W 5.43E-06                   $
L-NFRCOMP    2   9 9.26E+01
    12     800001    100    100 33 3 1 0 0 1 0 7.80E+00
    12     805101    100    100 33 3 1 0 4 1 0 7.80E+00
    12     805101    100    100 33 3 1 0 4 1 0 7.80E+00
    12     805101    100    100 33 3 1 0 4 1 0 7.80E+00
    12     805101    100    100 33 3 1 0 4 1 0 7.80E+00
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00 1.00E-03
      1.00E-02 1.00E-01 1.00E+00 1.00E+01 1.00E+02 1.00E+03 1.00E+04 1.00E+05
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00 2.87E-02
      2.84E-01 4.60E-01 4.63E-01 4.86E-01 9.35E-01 9.79E-01 9.98E-01 1.00E+00
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00 5.60E-04
      4.86E-03 1.80E-02 1.97E-02 3.23E-01 5.79E+00 1.51E+01 6.78E+01 9.56E+01
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          H-3     * 3.34E+00 C-14    * 1.91E-03 CL-36  W 2.38E-04 FE-55   Y 4.29E+01
          CO-60  Y 4.10E+01 NI-59  W 1.71E-01 NI-63  W 5.18E+00 SR-90   D 1.57E-04
          NB-94  Y 4.06E-05 TC-99  D 7.03E-05 CS-137 D 5.09E-04           3.01E+00$
L-DECONRS    2   0 2.34E+01
     13   1200001    100    100 11 1 1 1 0 0 0 9.00E-01
     13   1201101    100    140 23 2 2 1 2 0 0 1.70E+00
     13   1202101    100    200 31 3 3 1 2 0 0 1.20E+00
     13    763121   1800    200 32 3 4 0 2 0 0 1.20E+00
     13   1204001    100    100 11 1 1 1 3 0 0 9.00E-01
          FE-55  Y 2.63E+00 CO-60  Y 1.89E+01 NI-63  W 9.96E-01 RU-106 Y 8.46E-01
          SB-125 W 1.88E-03 EU-154 W 3.76E-05 PU-238 Y 1.13E-02 PU-239 Y 7.52E-03
          CM-242 W 1.13E-02 CM-244 W 3.76E-03          1.59E+00                  $
F-PROCESS    2   0 1.08E-04
     14    700002    100    100 03 0 1 0 0 0 0 1.00E+00
     14    700002    100    100 03 0 1 0 0 0 0 1.00E+00
     14    700002    100    100 03 0 1 0 0 0 0 1.00E+00
     14    700002    100    100 03 0 1 0 0 0 0 1.00E+00
     14    704002    100    100 03 0 1 0 3 0 0 1.00E+00
          U-235  Y 2.30E-05 U-238  Y 8.54E-05                                    $
F-COTRASH    2   0 5.58E-06
     15    710102    150    100 10 1 1 0 0 0 0 2.00E-01
     15    710102    150    100 10 1 1 0 0 0 0 2.00E-01
     15    720102    600    100 10 1 1 0 0 0 0 8.00E-01
     15    763122   4000    200 32 3 4 0 2 0 0 1.20E+00
     15    714102    150    100 10 1 1 0 3 0 0 2.00E-01
          U-235  Y 1.18E-06 U-238  Y 4.40E-06                                    $
F-NCTRASH    2   0 5.33E-06
     16    500002    100    100 11 1 1 0 0 0 0 4.00E-01
     16    500002    100    100 11 1 1 0 0 0 0 4.00E-01
     16    500002    100    100 11 1 1 0 0 0 0 4.00E-01
     16    530202    600    100 11 1 1 0 0 0 0 2.40E+00
     16    504002    100    100 11 1 1 0 3 0 0 4.00E-01
          U-235  Y 1.13E-06 U-238  Y 4.20E-06                                    $
U-PROCESS    2   0 3.81E-04
     17    700002    100    100 03 0 1 0 0 0 0 1.00E+00
     17    700002    100    100 03 0 1 0 0 0 0 1.00E+00
     17    700002    100    100 03 0 1 0 0 0 0 1.00E+00
     17    700002    100    100 03 0 1 0 0 0 0 1.00E+00
     17    704002    100    100 03 0 1 0 3 0 0 1.00E+00
          U-235  Y 1.65E-05 U-238  Y 3.64E-04                                    $
L-PUDECON    2   0 4.17E+00
     18    500002    100    100 11 1 1 1 0 0 0 1.60E+00
     18    500002    100    100 11 1 1 1 0 0 0 1.60E+00
     18    500002    100    100 11 1 1 1 0 0 0 1.60E+00
     18    500002    100    100 11 1 1 1 0 0 0 1.60E+00
     18    504002    100    100 11 1 1 1 3 0 0 1.60E+00
          PU-238 Y 8.13E-02 PU-239 Y 1.28E-01 PU-241 Y 3.85E+00 PU-242 Y 4.80E-05
          AM-241 W 1.11E-01                                                      $
L-BURNUPS    2  10 4.46E+04
     19    701101    100    100 12 1 2 0 1 0 0 1.70E+00
     19    701101    100    100 12 1 2 0 1 0 0 1.70E+00
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     19     702101    100    143 11 1 3 0 1 0 0 1.40E+00
     19     703101    100    143 21 1 4 0 1 0 0 1.40E+00
     19     704001    100    100 12 1 2 0 3 0 0 1.70E+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 1.00E+02 1.00E+05 2.00E+05 5.00E+05
       .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 6.50E-01 9.40E-01 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 1.54E+01 3.18E+04 4.53E+04
      H-3    * 4.16E+01 C-14   * 7.93E-02 FE-55  Y 8.92E+00 CO-60  Y 9.91E+00
      NI-59  W 2.97E-03 NI-63  W 3.96E-01 SR-90  D 6.44E+03 TC-99  D 1.29E+00
      RU-106 Y 1.68E+04 CM-244 W 1.29E+02 SN-126 W 4.76E-02 I-129  D 3.27E-03
      CS-135 D 2.68E-02 CS-137 D 9.12E+03 EU-152 W 1.19E+00 EU-154 W 5.45E+02
      U-234  Y 2.08E-03 U-235  Y 1.59E-03 U-236  Y 2.18E-02 U-238  Y 3.17E-02
      NP-237 W 3.07E-02 PU-236 Y 2.28E-02 PU-238 Y 2.08E+02 PU-239 Y 7.33E+01
      PU-241 Y 1.09E+04 PU-242 Y 1.59E-01 AM-241 W 3.67E+01 AM-243 W 1.39E+00
      CM-242 W 3.57E+02 CM-243 W 3.86E-01          6.90E+02                 $
I-COTRASH    2   0 1.13E-01
     20     710102    200    100 10 1 1 0 0 0 0 3.00E-01
     20     710102    200    100 10 1 1 0 0 0 0 3.00E-01
     20     720102    600    100 10 1 1 0 0 0 0 8.00E-01
     20     753112   2000    200 32 3 4 0 2 0 0 1.20E+00
     20     714102    200    100 10 1 1 0 3 0 0 3.00E-01
      H-3    * 9.13E-02 C-14   * 5.26E-03 CO-60  Y 1.04E-02 SR-90  D 1.45E-03
      TC-99  D 3.39E-09 CS-137 D 4.56E-03 AM-241 W 4.82E-06                 $
I+COTRASH    2   0 1.13E-01
     21     700002    100    100 10 1 1 0 0 0 0 1.00E-01
     21     700002    100    100 10 1 1 0 0 0 0 1.00E-01
     21     720202    600    100 10 1 1 0 0 0 0 8.00E-01
     21     773222   8000    200 32 3 4 0 2 0 0 1.20E+00
     21     704002    100    100 10 1 1 0 3 0 0 1.00E-01
      H-3    * 9.13E-02 C-14   * 5.26E-03 CO-60  Y 1.04E-02 SR-90  D 1.45E-03
      TC-99  D 3.39E-09 CS-137 D 4.56E-03 AM-241 W 4.82E-06                 $
I-ABSLIQD    2   0 1.99E-01
     22     700002    100    300 01 0 1 1 0 0 0 1.00E+00
     22     700002    100    300 01 0 1 1 0 0 0 1.00E+00
     22     700002    100    300 01 0 1 1 0 0 0 1.00E+00
     22     753112  10000    200 32 3 4 0 2 0 0 1.20E+00
     22     704002    100    300 01 0 1 1 3 0 0 1.00E+00
      H-3    * 1.42E-01 C-14   * 8.16E-03 CO-60  Y 3.12E-02 SR-90  D 4.34E-03
      TC-99  D 1.02E-08 CS-137 D 1.37E-02                                   $
I+ABSLIQD    2   0 1.99E-01
     23     700002    100    300 01 0 1 1 0 0 0 1.00E+00
     23     700002    100    300 01 0 1 1 0 0 0 1.00E+00
     23     700002    100    300 01 0 1 1 0 0 0 1.00E+00
     23     700002    100    300 01 0 1 1 0 0 0 1.00E+00
     23     704002    100    300 01 0 1 1 3 0 0 1.00E+00
      H-3    * 1.42E-01 C-14   * 8.16E-03 CO-60  Y 3.12E-02 SR-90  D 4.34E-03
      TC-99  D 1.02E-08 CS-137 D 1.37E-02                                   $
I-LIQSCVL    2   0 9.60E-03
     24     700002    100    300 00 0 1 1 0 0 0 9.00E-01
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     24    700002    100    300 00 0 1 1 0 0 0 9.00E-01
     24    710102    128    300 00 0 1 1 0 0 0 9.00E-01
     24    753112    452    200 32 3 4 0 2 0 0 1.20E+00
     24    704002    100    300 00 0 1 1 3 0 0 9.00E-01
       H-3    * 5.01E-03 C-14    * 2.51E-04 CO-60  Y 4.34E-03                      $
I+LIQSCVL    2   0 9.60E-03
     25    700002    100    300 00 0 1 1 0 0 0 9.00E-01
     25    700002    100    300 00 0 1 1 0 0 0 9.00E-01
     25    710202    128    300 00 0 1 1 0 0 0 9.00E-01
     25    710202    128    300 00 0 1 1 0 0 0 9.00E-01
     25    704002    100    300 00 0 1 1 3 0 0 9.00E-01
       H-3    * 5.01E-03 C-14    * 2.51E-04 CO-60  Y 4.34E-03                      $
I-BIOWAST    2   0 2.06E-01
     26    700002    100    192 11 0 1 1 0 0 0 1.10E+00
     26    700002    100    192 11 0 1 1 0 0 0 1.10E+00
     26    700002    100    192 11 0 1 1 0 0 0 1.10E+00
     26    753112   1500    200 32 3 4 0 2 0 0 1.20E+00
     26    704002    100    192 11 0 1 1 3 0 0 1.10E+00
       H-3    * 1.75E-01 C-14    * 1.01E-02 CO-60  Y 3.99E-03 SR-90  D 8.33E-03
       TC-99  D 6.51E-09 CS-137 D 8.76E-03                                         $
I+BIOWAST    2   0 2.06E-01
     27    700002    100    192 11 0 1 1 0 0 0 1.10E+00
     27    700002    100    192 11 0 1 1 0 0 0 1.10E+00
     27    700002    100    192 11 0 1 1 0 0 0 1.10E+00
     27    700002    100    192 11 0 1 1 0 0 0 1.10E+00
     27    704002    100    192 11 0 1 1 3 0 0 1.10E+00
       H-3    * 1.75E-01 C-14    * 1.01E-02 CO-60  Y 3.99E-03 SR-90  D 8.33E-03
       TC-99  D 6.51E-09 CS-137 D 8.76E-03                                         $
N-SSTRASH    2   0 1.12E-05
     28    710102    150    100 11 1 1 0 0 0 0 2.00E-01
     28    710102    150    100 11 1 1 0 0 0 0 2.00E-01
     28    720102    500    100 11 1 1 0 0 0 0 6.00E-01
     28    753112   1000    200 32 3 4 0 2 0 0 1.20E+00
     28    714102    150    100 11 1 1 0 3 0 0 2.00E-01
       U-235  Y 2.36E-06 U-238  Y 8.80E-06                                         $
N+SSTRASH    2   0 1.12E-05
     29    700002    100    100 11 1 1 0 0 0 0 1.00E-01
     29    700002    100    100 11 1 1 0 0 0 0 1.00E-01
     29    720202    500    100 11 1 1 0 0 0 0 6.00E-01
     29    773222   4000    200 32 3 4 0 2 0 0 1.20E+00
     29    704002    100    100 11 1 1 0 3 0 0 1.00E-01
       U-235  Y 2.36E-06 U-238  Y 8.80E-06                                         $
N-SSWASTE    2   0 2.17E-04
     30    700002    100    100 13 0 1 0 0 0 0 1.00E+00
     30    700002    100    100 13 0 1 0 0 0 0 1.00E+00
     30    700002    100    100 13 0 1 0 0 0 0 1.00E+00
     30    700002    100    100 13 0 1 0 0 0 0 1.00E+00
     30    704002    100    100 13 0 1 0 3 0 0 1.00E+00
       U-235  Y 4.60E-05 U-238  Y 1.71E-04                                         $
N-LOTRASH    2   0 3.53E-02
     31    710102    200    100 10 1 1 0 0 0 0 3.00E-01
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     31     710102    200     100 10 1 1 0 0 0 0 3.00E-01
     31     720102    600     100 10 1 1 0 0 0 0 8.00E-01
     31     753112   2000     200 32 3 4 0 2 0 0 1.20E+00
     31     714102    200     100 10 1 1 0 3 0 0 3.00E-01
        H-3     * 2.85E-02 C-14    * 1.64E-03 CO-60  Y 3.25E-03 SR-90  D 4.53E-04
        TC-99  D 1.06E-09 CS-137 D 1.42E-03 AM-241 W 1.51E-06                  $
N+LOTRASH    2   0 3.53E-02
     32     700002    100     100 10 1 1 0 0 0 0 1.00E-01
     32     700002    100     100 10 1 1 0 0 0 0 1.00E-01
     32     720202    600     100 10 1 1 0 0 0 0 8.00E-01
     32     773222   8000     200 32 3 4 0 2 0 0 1.20E+00
     32     704002    100     100 10 1 1 0 3 0 0 1.00E-01
        H-3     * 2.85E-02 C-14    * 1.64E-03 CO-60  Y 3.25E-03 SR-90  D 4.53E-04
        TC-99  D 1.06E-09 CS-137 D 1.42E-03 AM-241 W 1.51E-06                  $
N-LOWASTE    2   0 2.11E-02
     33     700002    100     100 10 0 1 1 0 0 0 5.00E-01
     33     700002    100     100 10 0 1 1 0 0 0 5.00E-01
     33     700002    100     100 10 0 1 1 0 0 0 5.00E-01
     33     700002    100     100 10 0 1 1 0 0 0 5.00E-01
     33     704002    100     100 10 0 1 1 3 0 0 5.00E-01
        H-3     * 1.63E-02 C-14    * 9.36E-04 CO-60  Y 1.47E-03 SR-90  D 1.31E-03
        TC-99  D 7.76E-10 CS-137 D 1.04E-03                                    $
N-ISOPROD   -2   0 2.26E+01
     34     701001    100     100 11 1 2 0 1 0 0 1.70E+00
     34     701101    100     100 11 1 2 0 1 0 0 1.70E+00
     34     702101    100     143 21 2 3 0 1 0 0 1.20E+00
     34     703101    100     143 31 2 4 0 1 0 0 1.20E+00
     34     704001    100     100 11 1 2 0 3 0 0 1.70E+00
        H-3     * 1.09E-02 C-14    * 1.17E-05 FE-55  Y 1.60E+01 NI-63  W 2.46E-01
        SR-90  D 2.35E+00 TC-99  D 8.48E-05 RU-106 Y 2.42E+00 I-129  D 7.04E-07
        CS-135 D 8.48E-05 CS-137 D 1.54E+00 U-235  Y 4.70E-04 U-238  Y 5.48E-06
        NP-237 W 1.03E-13 PU-238 Y 3.81E-05 PU-239 Y 1.07E-05 PU-241 Y 1.37E-03
        PU-242 Y 1.85E-08 AM-241 W 2.12E-06 AM-243 W 2.43E-07 CM-242 W 2.27E-04
        CM-243 W 5.57E-08 CM-244 W 3.20E-05          2.22E+02                  $
N-ISOTRSH    2   0 1.14E-03
     35     500001    100     100 10 1 1 0 0 0 0 6.00E-01
     35     500001    100     100 10 1 1 0 0 0 0 6.00E-01
     35     500001    100     100 10 1 1 0 0 0 0 6.00E-01
     35     530201    600     100 10 1 1 0 0 0 0 2.40E+00
     35     504001    100     100 10 1 1 0 3 0 0 6.00E-01
        H-3     * 1.51E-06 C-14    * 1.62E-09 CO-60  Y 5.63E-04 SR-90  D 2.70E-04
        TC-99  D 1.18E-08 CM-243 W 1.79E-11 CM-244 W 1.03E-08 I-129  D 9.77E-11
        CS-135 D 1.18E-08 CS-137 D 2.70E-04 U-235  Y 3.00E-05 U-238  Y 1.67E-07
        NP-237 W 3.31E-17 PU-238 Y 1.22E-08 PU-239 Y 3.44E-09 PU-241 Y 4.40E-07
        PU-242 Y 5.94E-12 AM-241 W 6.80E-10 AM-243 W 7.77E-11 CM-242 W 7.29E-08
                 6.38E-02                                                      $
N-SORMFG1    2  11 8.00E+00
     36     700002    100     100 11 1 1 0 0 0 0 2.00E+00
     36     700002    100     100 11 1 1 0 0 0 0 2.00E+00
     36     700002    100     100 11 1 1 0 0 0 0 2.00E+00
     36     700002    100     100 11 1 1 0 0 0 0 2.00E+00
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     36    704002    100    100 11 1 1 0 3 0 0 2.00E+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 1.00E-03 1.00E+00 1.00E+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 6.00E-01 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 5.00E-03 8.00E+00
       AM-241 W 8.00E+00                                                        $
N-SORMFG2    2  12 3.57E+00
     37   1100001    100    100 11 1 1 1 0 0 0 4.00E-01
     37   1100001    100    100 11 1 1 1 0 0 0 4.00E-01
     37   1100001    100    100 11 1 1 1 0 0 0 4.00E-01
     37   1100001    100    100 11 1 1 1 0 0 0 4.00E-01
     37   1104001    100    100 11 1 1 1 3 0 0 4.00E-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 1.00E-01 5.00E+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 9.90E-01 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 5.65E-02 3.57E+00
       CO-60  Y 2.90E+00 CS-137 D 6.50E-01                                      $
N-SORMFG3    2   0 6.00E+03
     38    700001    100    200 11 1 1 0 0 0 0 4.00E-01
     38    700001    100    200 11 1 1 0 0 0 0 4.00E-01
     38    700001    100    200 11 1 1 0 0 0 0 4.00E-01
     38    700001    100    200 11 1 1 0 0 0 0 4.00E-01
     38    704001    100    200 11 1 1 0 3 0 0 4.00E-01
       CS-137 D 6.00E+03                                                        $
N-SORMFG4    2   0 6.04E-01
     39    500002    100    100 11 1 1 0 0 0 0 4.00E-01
     39    500002    100    100 11 1 1 0 0 0 0 4.00E-01
     39    500002    100    100 11 1 1 0 0 0 0 4.00E-01
     39    530202    600    100 11 1 1 0 0 0 0 2.40E+00
     39    504002    100    100 11 1 1 0 3 0 0 4.00E-01
       H-3    * 1.70E-01 C-14   * 2.40E-04 SR-90  D 2.63E-03 CS-137 D 4.31E-01
       TH-228 Y 4.54E-09           5.03E-01                                     $
N-NECOTRA    2   0 4.21E-01
     40    710102    200    100 10 1 1 1 0 0 0 3.00E-01
     40    710102    200    100 10 1 1 1 0 0 0 3.00E-01
     40    720102    600    100 10 1 1 1 0 0 0 8.00E-01
     40    753112   2000    200 32 3 4 0 2 0 0 1.20E+00
     40    714102    200    100 10 1 1 1 3 0 0 3.00E-01
       H-3    * 3.80E-01 C-14   * 4.07E-02          1.19E-01                    $
N-NEABLIQ    2   0 5.56E+01
     41    700002    100    410 00 0 1 1 0 0 0 9.00E-01
     41    700002    100    410 00 0 1 1 0 0 0 9.00E-01
     41    700002    100    410 00 0 1 1 0 0 0 9.00E-01
     41    700002    100    410 00 0 1 1 0 0 0 9.00E-01
     41    704002    100    410 10 0 1 1 3 0 0 9.00E-01
       H-3    * 5.48E+01 C-14   * 8.43E-01          1.89E+01                    $
N-NESOLIQ    2   0 2.62E+01
```

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     42      701102     100     140 23 1 2 0 1 0 0 1.70E+00
     42      701102     100     140 23 2 2 0 2 0 0 1.70E+00
     42      702102     100     200 31 3 3 0 2 0 0 1.20E+00
     42      703102     100     200 32 3 4 0 2 0 0 1.20E+00
     42      701102     100     140 23 2 2 0 2 0 0 1.70E+00
       H-3     * 2.60E+01 C-14     * 1.56E-01               8.57E-02              $
N-NEVIALS     2   0 3.16E+01
     43      700002     100     300 10 0 1 1 0 0 0 1.00E+00
     43      700002     100     300 10 0 1 1 0 0 0 1.00E+00
     43      700002     100     300 10 0 1 1 0 0 0 1.00E+00
     43      700002.    100     300 10 0 1 1 0 0 0 1.00E+00
     43      704002     100     300 10 0 1 1 3 0 0 1.00E+00
       H-3     * 3.09E+01 C-14     * 7.37E-01               1.59E+01              $
N-NENCGLS     2   0 1.99E+01
     44      700002     100     100 11 0 1 1 0 0 0 1.00E+00
     44      700002     100     100 11 0 1 1 0 0 0 1.00E+00
     44      700002     100     100 11 0 1 1 0 0 0 1.00E+00
     44      700002     100     100 11 0 1 1 0 0 0 1.00E+00
     44      704002     100     100 11 0 1 1 3 0 0 1.00E+00
       H-3     * 1.99E+01 C-14     * 1.88E-02               3.57E-02              $
N-NEWOTAL     2   0 5.66E-01
     45      700002     100     100 11 0 1 1 0 0 0 1.00E+00
     45      700002     100     100 11 0 1 1 0 0 0 1.00E+00
     45      700002     100     100 11 0 1 1 0 0 0 1.00E+00
     45      700002     100     100 11 0 1 1 0 0 0 1.00E+00
     45      704002     100     100 11 0 1 1 3 0 0 1.00E+00
       H-3     * 4.15E-01 C-14     * 1.51E-01               4.98E-02              $
N-NETRGAS     2   0 4.62E+04
     46      704002     100     535 13 0 1 0 3 0 0 1.00E-03
     46      704002     100     535 13 0 1 0 3 0 0 1.00E-03
     46      704002     100     535 13 0 1 0 3 0 0 1.00E-03
     46      704002     100     535 13 0 1 0 3 0 0 1.00E-03
     46      704002     100     535 13 0 1 0 3 0 0 1.00E-03
       H-3     * 4.62E+04                                                         $
N-NETRILI     2   0 4.62E+04
     47      704002     100     535 20 0 1 1 3 0 0 9.00E-01
     47      704002     100     535 20 0 1 1 3 0 0 9.00E-01
     47      704002     100     535 20 0 1 1 3 0 0 9.00E-01
     47      704002     100     535 20 0 1 1 3 0 0 9.00E-01
     47      704002     100     535 20 0 1 1 3 0 0 9.00E-01
       H-3     * 4.62E+04                                                         $
N-NECARLI     2   0 4.11E+02
     48      704002     100     535 20 0 1 1 3 0 0 9.00E-01
     48      704002     100     535 20 0 1 1 3 0 0 9.00E-01
     48      704002     100     535 20 0 1 1 3 0 0 9.00E-01
     48      704002     100     535 20 0 1 1 3 0 0 9.00E-01
     48      704002     100     535 20 0 1 1 3 0 0 9.00E-01
       C-14    * 4.11E+02                                                         $
N-MWTRASH     2   0 1.84E+00
     49      700002     100     100 10 1 1 1 0 0 0 4.00E-01
     49      700002     100     100 10 1 1 1 0 0 0 4.00E-01
```

```
     49    700002    100    100 10 1 1 1 0 0 0 4.00E-01
     49    700002    100    100 10 1 1 1 0 0 0 4.00E-01
     49    704002    100    100 10 1 1 1 3 0 0 4.00E-01
        H-3    * 1.59E+00 C-14    * 2.48E-01                                       $
N-MWABLIQ    2   0 2.07E+02
     50    700002    100    550 00 0 1 1 0 0 0 1.00E+00
     50    700002    100    550 00 0 1 1 0 0 0 1.00E+00
     50    700002    100    550 00 0 1 1 0 0 0 1.00E+00
     50    700002    100    550 00 0 1 1 0 0 0 1.00E+00
     50    704002    100    550 00 0 1 1 3 0 0 1.00E+00
        H-3    * 1.93E+02 C-14    * 1.40E+01                                       $
N-MWSOLIQ    2   0 1.01E+03
     51    701102    100    140 23 1 2 0 1 0 0 1.70E+00
     51    701102    100    140 23 2 2 0 2 0 0 1.70E+00
     51    702102    100    200 31 3 3 0 2 0 0 1.20E+00
     51    703102    100    200 32 3 4 0 2 0 0 1.20E+00
     51    701102    100    140 23 2 2 0 2 0 0 1.70E+00
        H-3    * 1.01E+03                                                          $
N-MWWASTE    2   0 3.50E+01
     52    700002    100    100 10 0 1 1 0 0 0 4.00E-01
     52    700002    100    100 10 0 1 1 0 0 0 4.00E-01
     52    700002    100    100 10 0 1 1 0 0 0 4.00E-01
     52    700002    100    100 10 0 1 1 0 0 0 4.00E-01
     52    704002    100    100 10 0 1 1 3 0 0 4.00E-01
        H-3    * 6.69E+00 C-14    * 2.83E+01                                       $
N-TRIPLAT    2  13 4.89E+02
     53    700002    100    100 32 0 1 0 0 0 0 1.00E+00
     53    700002    100    100 32 0 1 0 0 0 0 1.00E+00
     53    700002    100    100 32 0 1 0 0 0 0 1.00E+00
     53    700002    100    100 32 0 1 0 0 0 0 1.00E+00
     53    704002    100    100 32 0 1 0 3 0 0 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 3.50E+01 3.50E+02 3.50E+03 3.50E+04
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
          .00E+00  .00E+00  .00E+00  .00E+00 7.23E-01 8.61E-01 9.64E-01 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 1.59E+01 2.80E+01 1.37E+02 4.89E+02
        H-3    * 4.89E+02                                                          $
N-TRITGAS    2  14 5.94E+02
     54    700002    100    100 01 0 1 0 0 0 0 1.00E-03
     54    700002    100    100 01 0 1 0 0 0 0 1.00E-03
     54    700002    100    100 01 0 1 0 0 0 0 1.00E-03
     54    700002    100    100 01 0 1 0 0 0 0 1.00E-03
     54    704002    100    100 01 0 1 0 3 0 0 1.00E-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 3.50E+01 3.50E+02 3.50E+03 3.50E+04
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
          .00E+00  .00E+00  .00E+00  .00E+00 2.30E-02 4.64E-01 9.51E-01 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 2.36E+01 1.79E+02 3.86E+02 5.94E+02
        H-3    * 5.94E+02                                                          $
```

```
N-TRISCNT     2  15 4.22E+01
     55     700002    100    300 00 0 1 1 0 0 0 9.00E-01
     55     700002    100    300 00 0 1 1 0 0 0 9.00E-01
     55     710102    128    300 00 0 1 1 0 0 0 9.00E-01
     55     753112    452    200 31 3 4 1 2 0 0 1.20E+00
     55     704002    100    300 00 0 1 1 3 0 0 9.00E-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 3.50E+00 3.50E+01 3.50E+02 3.50E+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 1.68E-01 5.03E-01 9.95E-01 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 2.33E+00 7.57E+00 3.84E+01 4.22E+01
      H-3     * 4.22E+01                                                     $
N-TRILIQD     2  16 7.11E+02
     56     700002    100    300 01 0 1 1 0 0 0 1.00E+00
     56     701102    100    140 23 2 2 1 2 0 0 1.70E+00
     56     702102    100    200 31 3 3 1 2 0 0 1.20E+00
     56     753112  10000    200 31 3 4 1 2 0 0 1.20E+00
     56     704002    100    300 01 0 1 1 3 0 0 1.00E+00
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00  .00E+00 3.50E+00 3.50E+01 3.50E+02 3.50E+03 3.50E+04 1.00E+05
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00  .00E+00 2.22E-01 6.24E-01 8.26E-01 9.58E-01 9.97E-01 1.00E+00
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00  .00E+00 1.96E+00 8.81E+00 3.26E+01 1.92E+02 4.18E+02 7.11E+02
      H-3     * 7.11E+02                                                     $
N-TRITRSH     2  17 6.94E+01
     57     700002    100    100 10 0 1 0 0 0 0 1.00E-01
     57     700002    100    100 10 0 1 0 0 0 0 1.00E-01
     57     700002    100    100 10 0 1 0 0 0 0 1.00E-01
     57     730202    600    100 10 0 1 0 0 0 0 8.00E-01
     57     704002    100    100 10 0 1 0 3 0 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 3.50E+00 3.50E+01 3.50E+02 3.50E+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 2.27E-01 7.76E-01 9.51E-01 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 1.19E+00 7.56E+00 2.05E+01 6.94E+01
      H-3     * 6.94E+01                                                     $
N-TRIFOIL     2  18 7.80E+02
     58     700002    100    100 32 0 1 0 0 0 0 4.00E-01
     58     700002    100    100 32 0 1 0 0 0 0 4.00E-01
     58     700002    100    100 32 0 1 0 0 0 0 4.00E-01
     58     730202    600    100 32 0 1 0 0 0 0 2.40E+00
     58     704002    100    100 32 0 1 0 3 0 0 4.00E-01
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00  .00E+00  .00E+00 3.50E+00 3.50E+01 3.50E+02 3.50E+04 1.00E+05
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00  .00E+00  .00E+00 3.30E-02 1.22E-01 2.10E-01 9.94E-01 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 2.03E+00 7.73E+00 4.03E+01 3.79E+02 7.80E+02
```

```
     H-3    * 7.80E+02                                                              $
 N-HIGHACT    2   0 2.10E+02
     59     700002    100     100 33 3 1 0 0 2 0 7.80E+00
     59     705102    100     100 33 3 1 0 4 2 0 7.80E+00
     59     705102    100     100 33 3 1 0 4 2 0 7.80E+00
     59     705102    100     100 33 3 1 0 4 2 0 7.80E+00
     59     705102    100     100 33 3 1 0 4 2 0 7.80E+00
     C-14    * 1.32E-02 FE-55  Y 1.15E+02 CO-60  Y 8.48E+01 NI-59  W 6.56E-02
     NI-63  W 1.06E+01 NB-94  Y 4.47E-04                                            $
 N-TRITSOR    1  41 1.00E+00
     60     700002    100     100 13 1 1 0 0 0 1 4.00E-01
     60     701102    100     100 33 1 1 0 2 0 1 1.70E+00
     60     701102    100     100 33 1 1 0 2 0 1 1.70E+00
     60     701102    100     100 33 1 1 0 2 0 1 1.70E+00
     60     704002    100     100 23 1 1 0 3 0 1 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 1.00E-02 1.00E-01 1.00E+00 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 3.70E-02 4.07E-01 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 1.59E-03 1.45E-01 1.00E+00
     H-3    * 1.00E+00                                                              $
 N-CARBSOR    1  42 1.00E-02
     61     700002    100     100 13 1 1 0 0 0 2 4.00E-01
     61     701102    100     100 33 1 1 0 2 0 2 1.70E+00
     61     701102    100     100 33 1 1 0 2 0 2 1.70E+00
     61     701102    100     100 33 1 1 0 2 0 2 1.70E+00
     61     704002    100     100 23 1 1 0 3 0 2 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 1.00E-02 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 5.00E-01 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 1.82E-03 1.00E-02
     C-14    * 1.00E-02                                                             $
 N-COBLSOR    1  43 5.00E+02
     62     700002    100     100 13 1 1 0 0 0 3 4.00E-01
     62     701102    100     100 33 1 1 0 2 0 3 1.70E+00
     62     701102    100     100 33 1 1 0 2 0 3 1.70E+00
     62     701102    100     100 33 1 1 0 2 0 3 1.70E+00
     62     704002    100     100 23 1 1 0 3 0 3 1.00E+00
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00 1.00E-02 1.00E-01 1.00E+00 1.00E+01 1.00E+02 1.00E+03 1.00E+04
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00 1.20E-02 1.57E-01 3.21E-01 4.60E-01 6.12E-01 8.00E-01 1.00E+00
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00 2.27E-03 2.11E-02 1.26E-01 7.74E-01 6.22E+00 5.81E+01 5.00E+02
     CO-60  Y 5.00E+02                                                              $
 N-NICKSOR    1  44 1.00E-02
     63     700002    100     100 13 1 1 0 0 0 4 4.00E-01
     63     701102    100     100 33 1 1 0 2 0 4 1.70E+00
```

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     63    701102    100    100 33 1 1 0 2 0 4 1.70E+00
     63    701102    100    100 33 1 1 0 2 0 4 1.70E+00
     63    704002    100    100 23 1 1 0 3 0 4 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 1.00E-02 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 2.50E-01 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 1.29E-03 1.00E-02
       NI-63  W 1.00E-02                                                      $
N-STROSOR    1  45 1.00E+00
     64    700002    100    100 13 1 1 0 0 0 5 4.00E-01
     64    701102    100    100 33 1 1 0 2 0 5 1.70E+00
     64    701102    100    100 33 1 1 0 2 0 5 1.70E+00
     64    701102    100    100 33 1 1 0 2 0 5 1.70E+00
     64    704002    100    100 23 1 1 0 3 0 5 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 1.00E-02 1.00E-01 1.00E+00 1.00E+01 1.00E+02
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00  .00E+00  .00E+00 6.60E-02 2.37E-01 6.05E-01 9.60E-01 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 1.28E-03 9.59E-03 8.16E-02 5.25E-01 1.00E+00
       SR-90  D 1.00E+00                                                      $
N-CESISOR    1  46 1.00E+02
     65    700002    100    100 13 1 1 0 0 0 6 4.00E-01
     65    701102    100    100 33 1 1 0 2 0 6 1.70E+00
     65    701102    100    100 33 1 1 0 2 0 6 1.70E+00
     65    701102    100    100 33 1 1 0 2 0 6 1.70E+00
     65    704002    100    100 23 1 1 0 3 0 6 1.00E+00
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00 1.00E-02 1.00E-01 1.00E+00 1.00E+01 1.00E+02 1.00E+03 1.00E+04
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00 2.60E-02 2.42E-01 5.62E-01 7.73E-01 8.61E-01 9.43E-01 1.00E+00
        .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        .00E+00 1.57E-03 1.42E-02 9.55E-02 4.98E-01 1.61E+00 1.39E+01 1.00E+02
       CS-137 D 1.00E+02                                                      $
N-PLU8SOR    1  47 4.60E+00
     66    700002    100    100 13 1 1 0 0 0 7 4.00E-01
     66    701102    100    100 33 1 1 0 2 0 7 1.70E+00
     66    701102    100    100 33 1 1 0 2 0 7 1.70E+00
     66    701102    100    100 33 1 1 0 2 0 7 1.70E+00
     66    704002    100    100 23 1 1 0 3 0 7 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 1.00E-01 1.00E+00 1.00E+01 1.00E+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 3.70E-02 3.70E-01 6.29E-01 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 1.15E-02 1.05E-01 5.35E-01 4.60E+00
       PU-238 Y 4.60E+00                                                      $
N-PLU9SOR    1   0 3.00E+00
     67    700002    100    100 13 1 1 0 0 0 8 4.00E-01
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     67     701102    100     100 33 1 1 0 2 0 8 1.70E+00
     67     701102    100     100 33 1 1 0 2 0 8 1.70E+00
     67     701102    100     100 33 1 1 0 2 0 8 1.70E+00
     S7     704002    100     100 23 1 1 0 3 0 8 1.00E+00
        PU-239 Y 3.00E+00                                                             $
N-AMERSOR    1  48 5.00E-01
     68     700002    100     100 13 1 1 0 0 0 9 4.00E-01
     68     701102    100     100 33 1 1 0 2 0 9 1.70E+00
     68     701102    100     100 33 1 1 0 2 0 9 1.70E+00
     68     701102    100     100 33 1 1 0 2 0 9 1.70E+00
     68     704002    100     100 23 1 1 0 3 0 9 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 1.00E-02 1.00E-01 1.00E+00 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 3.50E-02 2.12E-01 5.45E-01 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 1.02E-03 8.68E-03 6.57E-02 5.00E-01
        AM-241 W 5.00E-01                                                             $
N-PUBESOR    1  49 2.35E+01
     69     700002    100     100 13 1 1 0 0 010 4.00E-01
     69     701102    100     100 33 1 1 0 2 010 1.70E+00
     69     701102    100     100 33 1 1 0 2 010 1.70E+00
     69     701102    100     100 33 1 1 0 2 010 1.70E+00
     69     704002    100     100 23 1 1 0 3 010 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 1.00E+01 1.00E+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 3.33E-01 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 3.36E+00 2.35E+01
        PU-238 Y 2.35E+01                                                             $
N-AMBESOR    1  50 8.20E+00
     70     700002    100     100 13 1 1 0 0 011 4.00E-01
     70     701102    100     100 33 1 1 0 2 011 1.70E+00
     70     701102    100     100 33 1 1 0 2 011 1.70E+00
     70     701102    100     100 33 1 1 0 2 011 1.70E+00
     70     704002    100     100 23 1 1 0 3 011 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 1.00E-01 1.00E+00 1.00E+01 1.00E+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 2.50E-01 5.00E-01 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 1.56E-02 7.88E-01 8.20E+00
        AM-241 W 8.20E+00                                                             $
N-RANEEDS    1  19 5.65E-03
     71     700002    100     100 13 1 1 0 0 012 4.00E-01
     71     701102    100     100 33 1 1 0 2 012 1.70E+00
     71     701102    100     100 33 1 1 0 2 012 1.70E+00
     71     701102    100     100 33 1 1 0 2 012 1.70E+00
     71     704002    100     100 23 1 1 0 3 012 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
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        1.00E-04 5.00E-04 1.00E-03 5.00E-03 1.00E-02 5.00E-02 1.00E-01 5.00E-01
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        1.00E-04 1.15E-03 2.35E-02 5.44E-01 9.44E-01 9.97E-01 9.99E-01 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        1.00E-04 4.27E-04 7.11E-04 2.95E-03 4.97E-03 5.52E-03 5.61E-03 5.65E-03
        RA-226 W 5.65E-03                                                      $
N-RACELLS    1  20 7.09E-03
     72     700002    100     100 13 1 1 0 0 013 4.00E-01
     72     701102    100     100 33 1 1 0 2 013 1.70E+00
     72     701102    100     100 33 1 1 0 2 013 1.70E+00
     72     701102    100     100 33 1 1 0 2 013 1.70E+00
     72     704002    100     100 23 1 1 0 3 013 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         .00E+00  .00E+00 5.00E-04 1.00E-03 5.00E-03 1.00E-02 5.00E-02 1.00E-01
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         .00E+00  .00E+00 3.00E-03 5.70E-02 4.66E-01 8.40E-01 9.98E-01 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         .00E+00  .00E+00 4.60E-04 6.02E-04 2.88E-03 4.97E-03 6.97E-03 7.09E-03
        RA-226 W 7.09E-03                                                      $
N-RAPLAQU    1  21 1.00E-02
     73     700002    100     100 13 1 1 0 0 014 4.00E-01
     73     701102    100     100 33 1 1 0 2 014 1.70E+00
     73     701102    100     100 33 1 1 0 2 014 1.70E+00
     73     701102    100     100 33 1 1 0 2 014 1.70E+00
     73     704002    100     100 23 1 1 0 3 014 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         .00E+00  .00E+00 1.00E-04 1.00E-03 5.00E-03 1.00E-02 5.00E-02 1.00E-01
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         .00E+00  .00E+00 6.00E-03 1.20E-02 3.18E-01 7.37E-01 9.78E-01 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         .00E+00  .00E+00 7.00E-06 4.45E-04 3.31E-03 6.08E-03 8.88E-03 1.00E-02
        RA-226 W 1.00E-02                                                      $
N-RANPAPP    1   0 5.00E-02
     74     700002    100     100 13 1 1 0 0 015 4.00E-01
     74     701102    100     100 33 1 1 0 2 015 1.70E+00
     74     701102    100     100 33 1 1 0 2 015 1.70E+00
     74     701102    100     100 33 1 1 0 2 015 1.70E+00
     74     704002    100     100 23 1 1 0 3 015 1.00E+00
        RA-226 W 5.00E-02                                                      $
N-RABESOR    1  22 4.57E-01
     75     700002    100     100 13 0 1 0 0 016 4.00E-01
     75     701102    100     100 33 0 1 0 2 016 1.70E+00
     75     701102    100     100 33 0 1 0 2 016 1.70E+00
     75     701102    100     100 33 0 1 0 2 016 1.70E+00
     75     704002    100     100 23 0 1 0 3 016 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00 5.00E-04
        1.00E-03 5.00E-03 1.00E-02 5.00E-02 1.00E-01 5.00E-01 1.00E+00 5.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        1.05E-01 2.45E-01 3.61E-01 5.01E-01 5.24E-01 6.98E-01 7.45E-01 1.00E+00
         .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
        3.60E-04 2.30E-03 4.61E-03 8.51E-03 1.25E-02 8.48E-02 1.22E-01 4.57E-01
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         RA-226 W 4.57E-01                                                        $
N-RAMISCL     1  23 2.27E-02
     76     700002    100    100 13 0 1 0 0 017 4.00E-01
     76     701102    100    100 33 0 1 0 2 017 1.70E+00
     76     701102    100    100 33 0 1 0 2 017 1.70E+00
     76     701102    100    100 33 0 1 0 2 017 1.70E+00
     76     704002    100    100 23 0 1 0 3 017 1.00E+00
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         1.00E-06 1.00E-05 1.00E-04 1.00E-03 1.00E-02 1.00E-01 1.00E+00 1.00E+01
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         3.83E-01 7.43E-01 7.78E-01 8.75E-01 9.77E-01 9.81E-01 9.94E-01 1.00E+00
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
         6.13E-07 2.30E-06 4.39E-06 5.80E-05 3.83E-04 6.05E-04 6.68E-03 2.27E-02
         RA-226 W 2.27E-02                                                        $
N-RARESIN     1   0 3.50E-02
     77     800002    100    100 11 1 1 0 0 0 0 9.00E-01
     77     801102    100    140 23 2 2 0 2 0 0 1.70E+00
     77     802102    100    200 31 3 3 0 2 0 0 1.20E+00
     77     873112   1800    200 31 3 4 0 2 0 0 1.20E+00
     77     804002    100    100 11 1 1 0 3 0 0 9.00E-01
         RA-226 W 3.50E-02                                                        $
M-NAVYDRY     2   0 2.00E-02
     78     700001    100    100 10 1 1 0 0 0 0 4.00E-01
     78     700001    100    100 10 1 1 0 0 0 0 4.00E-01
     78     700001    100    100 10 1 1 0 0 0 0 4.00E-01
     78     730201    600    100 10 1 1 0 0 0 0 2.40E+00
     78     704001    100    100 10 1 1 0 3 0 0 4.00E-01
         H-3    * 2.67E-04 C-14    * 9.82E-06 FE-55  Y 5.24E-03 CO-60  Y 1.01E-02
         NI-59  W 6.24E-06 NI-63   W 1.92E-03 SR-90  D 1.95E-05 NB-94  Y 1.97E-07
         TC-99  D 8.26E-08 I-129   D 2.44E-07 CS-135 D 8.26E-08 CS-137 D 2.20E-03
         U-235  Y 6.92E-09 U-238   Y 5.46E-08 NP-237 W 1.33E-12 PU-238 Y 5.24E-06
         PU-239 Y 4.85E-06 PU-241  Y 2.11E-04 PU-242 Y 1.06E-08 AM-241 W 3.47E-06
         AM-243 W 2.34E-07 CM-243  W 2.40E-09 CM-244 W 2.29E-06                   $
M-NAVYWET     2  24 7.88E-01
     79     701101    100    100 23 1 2 0 1 0 0 1.70E+00
     79     701101    100    100 23 2 2 0 2 0 0 1.70E+00
     79     702101    100    143 31 3 3 0 2 0 0 1.20E+00
     79     763111    800    200 31 3 4 0 2 0 0 1.20E+00
     79     701101    100    100 23 2 2 0 2 0 0 1.70E+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 1.00E-01 1.00E+00 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 0.00E+00 9.40E-01 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 0.00E+00 2.00E-01 7.88E-01
         H-3    * 6.26E-02 C-14    * 2.29E-03 FE-55  Y 5.51E-02 CO-60  Y 1.07E-01
         NI-59  W 6.57E-05 NI-63   W 2.03E-02 SR-90  D 4.57E-03 NB-94  Y 2.08E-06
         TC-99  D 1.94E-05 I-129   D 5.73E-05 CS-135 D 1.94E-05 CS-137 D 5.16E-01
         U-235  Y 1.11E-06 U-238   Y 8.74E-06 NP-237 W 2.13E-10 PU-238 Y 6.12E-04
         PU-239 Y 4.29E-04 PU-241  Y 1.87E-02 PU-242 Y 9.40E-07 AM-241 W 4.40E-04
         AM-243 W 2.97E-05 CM-243  W 2.34E-07 CM-244 W 3.25E-04                   $
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R-HLLWFRP     2    0 8.26E+05
     80    1201101    100     140 23 1 2 0 1 0 0 1.70E+00
     80    1201101    100     140 23 2 2 0 2 0 0 1.70E+00
     80    1242101    600     200 31 3 3 0 2 0 0 1.20E+00
     80    1263121    800     200 32 3 4 0 2 0 0 1.20E+00
     80    1201101    100     140 23 2 2 0 2 0 0 1.70E+00
        H-3    * 5.60E+01 C-14   * 9.33E-01 SR-90  D 1.02E+05 TC-99  D 2.17E+01
        RU-106 Y 3.17E+05 SN-126 W 9.17E-01 SB-125 W 9.83E+03 I-129  D 2.92E-04
        CS-134 D 2.00E+05 CS-135 D 5.17E-01 CS-137 D 1.55E+05 EU-152 W 2.67E+01
        EU-154 W 1.02E+04 TH-228 Y 8.83E-03 TH-230 Y 2.13E-05 PA-231 W 1.78E-05
        U-232  Y 9.93E-05 U-233  Y 3.25E-07 U-234  Y 2.80E-03 U-235  Y 1.33E-04
        U-236  Y 2.20E-03 U-238  Y 2.62E-03 PU-236 Y 2.68E-03 PU-238 Y 4.62E+01
        PU-239 Y 2.98E+00 PU-240 Y 6.10E+00 PU-241 Y 1.46E+03 PU-242 Y 3.25E-02
        AM-241 W 1.18E+03 AM-243 W 7.88E+01 CM-242 W 1.65E+04 CM-243 W 1.62E+01
        CM-244 W 1.19E+04 CM-248 W 1.24E-05 CF-252 Y 5.62E-04 AC-227 W 1.61E-06
                 1.51E+06                                                      $
R-FUEHARD     2    0 1.49E+05
     81     800001    100     100 33 3 1 0 0 3 0 7.80E+00
     81     805101    100     100 33 3 1 0 4 3 0 7.80E+00
     81     805101    100     100 33 3 1 0 4 3 0 7.80E+00
     81     805101    100     100 33 3 1 0 4 3 0 7.80E+00
     81     805101    100     100 33 3 1 0 4 3 0 7.80E+00
        C-14   * 8.90E-01 FE-55  Y 7.10E+04 CO-60  Y 7.10E+04 NI-59  W 5.40E+01
        NI-63  W 7.40E+03 SR-90  D 1.80E-02 NB-94  Y 1.80E-03 TC-99  D 1.30E-01$
R-HULLFRP     2    0 1.66E+03
     82     800001    100     100 33 3 1 0 0 4 0 1.00E+00
     82     805101    100     100 33 3 1 0 4 4 0 1.00E+00
     82     805101    100     100 33 3 1 0 4 4 0 1.00E+00
     82     805101    100     100 33 3 1 0 4 4 0 1.00E+00
     82     805101    100     100 33 3 1 0 4 4 0 1.00E+00
        H-3    * 2.40E+02 C-14   * 2.30E-01 FE-55  Y 3.40E+02 CO-60  Y 3.80E+02
        NI-59  W 1.10E-01 NI-63  W 1.50E+01 SR-90  D 1.20E+02 TC-99  D 2.40E-02
        CS-135 D 5.80E-04 CS-137 D 1.80E+02 U-234  Y 6.40E-04 U-235  Y 3.00E-05
        U-236  Y 4.90E-04 U-238  Y 6.00E-04 NP-237 W 7.50E-04 PU-236 Y 6.00E-04
        PU-238 Y 1.00E+01 PU-239 Y 6.80E-01 PU-240 Y 1.40E+00 PU-241 Y 3.40E+02
        PU-242 Y 7.30E-03 AM-241 W 1.30E+00 AM-243 W 8.80E-02 CM-242 W 1.90E+01
        CM-243 W 1.80E-02 CM-244 W 1.40E+01                                    $
R-ILLWFRP     2    0 1.68E+03
     83     801101    100     140 23 1 2 0 1 0 0 1.70E+00
     83     801101    100     140 23 2 2 0 2 0 0 1.70E+00
     83     842101    600     200 31 3 3 0 2 0 0 1.20E+00
     83     763121    800     200 32 3 4 0 2 0 0 1.20E+00
     83     801101    100     140 23 2 2 0 2 0 0 1.70E+00
        H-3    * 3.80E+00 C-14   * 5.10E-05 SR-90  D 5.60E+00 TC-99  D 1.30E-04
        I-129  D 9.60E-04 CS-135 D 2.80E-05 CS-137 D 8.50E+00 U-234  Y 3.10E-03
        U-235  Y 1.50E-04 U-236  Y 2.40E-03 U-238  Y 2.90E-03 NP-237 W 3.60E-05
        PU-236 Y 2.90E-03 PU-238 Y 5.10E+01 PU-239 Y 3.30E+00 PU-240 Y 6.60E+00
        PU-241 Y 1.60E+03 PU-242 Y 3.60E-02 AM-241 W 6.50E-02 AM-243 W 4.50E-03
        CM-242 W 9.00E-01 CM-243 W 8.80E-04 CM-244 W 6.60E-01                  $
R-SILIGEL     2    0 3.73E+00
     84     700001    100     100 00 0 1 0 0 0 0 8.00E-01
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     84    700001    100     100 00 0 1 0 0 0 0 8.00E-01
     84    700001    100     100 00 0 1 0 0 0 0 8.00E-01
     84    700001    100     100 00 0 1 0 0 0 0 8.00E-01
     84    704001    100     100 00 0 1 0 3 0 0 8.00E-01
       PU-236 Y 6.40E-06 PU-238 Y 1.10E-01 PU-239 Y 7.20E-03 PU-240 Y 1.50E-02
       PU-241 Y 3.60E+00 PU-242 Y 7.80E-05                                    $
R-MPCOTRH    2   0 9.78E-01
     85    710101    300     100 10 1 1 0 0 0 0 4.00E-01
     85    710101    300     100 10 1 1 0 0 0 0 4.00E-01
     85    720101    600     100 10 1 1 0 0 0 0 8.00E-01
     85    763121   8000     200 32 3 4 0 2 0 0 1.20E+00
     85    714101    300     100 10 1 1 0 3 0 0 4.00E-01
       C-14   * 1.53E-06 SR-90  D 1.65E-01 TC-99  D 3.61E-05 CS-135 D 8.54E-07
       CS-137 D 2.52E-01 U-234  Y 9.31E-07 U-235  Y 4.37E-08 U-236  Y 7.14E-07
       U-238  Y 8.77E-07 NP-237 W 1.10E-06 PU-236 Y 8.77E-07 PU-238 Y 1.53E-02
       PU-239 Y 9.88E-04 PU-240 Y 1.98E-03 PU-241 Y 4.94E-01 PU-242 Y 1.07E-05
       AM-241 W 1.97E-03 AM-243 W 1.31E-04 CM-242 W 2.74E-02 CM-243 W 2.63E-05
       CM-244 W 1.97E-02                                                      $
R-MPCOTRL    2   0 2.99E-04
     86    710101    300     100 10 1 1 0 0 0 0 4.00E-01
     86    710101    300     100 10 1 1 0 0 0 0 4.00E-01
     86    720101    600     100 10 1 1 0 0 0 0 8.00E-01
     86    763121   8000     200 32 3 4 0 2 0 0 1.20E+00
     86    714101    300     100 10 1 1 0 3 0 0 4.00E-01
       C-14   * 4.70E-10 SR-90  D 5.10E-05 TC-99  D 1.10E-08 CS-135 D 2.60E-10
       CS-137 D 7.80E-05 U-234  Y 2.80E-10 U-235  Y 1.30E-11 U-236  Y 2.20E-10
       U-238  Y 2.70E-10 NP-237 W 3.30E-10 PU-236 Y 2.70E-10 PU-238 Y 4.60E-06
       PU-239 Y 3.00E-07 PU-240 Y 6.10E-07 PU-241 Y 1.50E-04 PU-242 Y 3.30E-09
       AM-241 W 5.90E-07 AM-243 W 3.90E-08 CM-242 W 8.30E-06 CM-243 W 8.10E-09
       CM-244 W 6.00E-06                                                      $
R-MPNCTRA    2   0 6.01E-01
     87    500001    100     100 11 1 1 0 0 0 0 4.00E-01
     87    500001    100     100 11 1 1 0 0 0 0 4.00E-01
     87    500001    100     100 11 1 1 0 0 0 0 4.00E-01
     87    530201    600     100 11 1 1 0 0 0 0 2.40E+00
     87    504001    100     100 11 1 1 0 3 0 0 4.00E-01
       C-14   * 1.87E-06 SR-90  D 2.03E-01 TC-99  D 4.37E-05 CS-135 D 1.05E-06
       CS-137 D 3.10E-01 U-234  Y 1.13E-06 U-235  Y 5.33E-08 U-236  Y 8.67E-07
       U-238  Y 1.07E-06 NP-237 W 1.33E-06 PU-236 Y 1.07E-06 PU-238 Y 1.87E-02
       PU-239 Y 1.20E-03 PU-240 Y 2.40E-03 PU-241 Y 6.00E-01 PU-242 Y 1.32E-05
       AM-241 W 1.32E-03 AM-243 W 1.60E-04 CM-242 W 3.33E-02 CM-243 W 3.23E-05
       CM-244 W 2.40E-02                                                      $
R-DEGREXT    2   0 2.38E+03
     88    700101    100     300 00 0 1 1 0 0 0 8.00E-01
     88    700101    100     300 00 0 1 1 0 0 0 8.00E-01
     88    700101    100     300 00 0 1 1 0 0 0 8.00E-01
     88    763121    450     200 32 3 4 0 2 0 0 1.20E+00
     88    704101    100     300 00 0 1 1 3 0 0 8.00E-01
       C-14   * 7.00E-09 SR-90  D 7.60E-04 TC-99  D 1.60E-07 I-129  D 4.40E-04
       CS-135 D 3.90E-09 CS-137 D 1.20E-03 U-234  Y 4.30E-05 U-235  Y 2.00E-06
       U-236  Y 3.30E-05 U-238  Y 4.00E-05 NP-237 W 5.00E-05 PU-236 Y 4.00E-03
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        PU-238 Y 6.90E+01 PU-239 Y 4.50E+00 PU-240 Y 9.10E+00 PU-241 Y 2.30E+03
        PU-242 Y 4.90E-02 AM-241 W 8.90E-02 AM-243 W 5.90E-03 CM-242 W 1.20E+00
        CM-243 W 1.20E+00 CM-244 W 9.00E-01                                    $
R-MPRESIN    2   0 3.77E+02
     89    900001    100    100 11 1 1 0 0 0 0 9.00E-01
     89    901101    100    140 23 2 2 0 2 0 0 1.70E+00
     89    902101    100    200 31 3 3 0 2 0 0 1.20E+00
     89    763121   1800    200 32 3 4 0 2 0 0 1.20E+00
     89    904001    100    100 11 1 1 0 3 0 0 9.00E-01
        C-14   * 1.10E-05 SR-90  D 1.20E+00 TC-99  D 2.60E-04 I-129  D 1.40E-02
        CS-135 D 6.20E-06 CS-137 D 1.90E+00 U-234  Y 6.80E-04 U-235  Y 3.20E-05
        U-236  Y 5.20E-04 U-238  Y 6.40E-04 NP-237 W 8.00E-06 PU-236 Y 6.40E-04
        PU-238 Y 1.10E+01 PU-239 Y 7.20E-01 PU-240 Y 1.50E+00 PU-241 Y 3.60E+02
        PU-242 Y 7.80E-03 AM-241 W 1.40E-02 AM-243 W 9.40E-04 CM-242 W 2.00E-01
        CM-243 W 1.90E-04 CM-244 W 1.40E-01                                    $
R-SBRESIN    2   0 5.02E+01
     90    900001    100    100 11 1 1 0 0 0 0 9.00E-01
     90    901101    100    140 23 2 2 0 2 0 0 1.70E+00
     90    9021C1    100    200 31 3 3 0 2 0 0 1.20E+00
     90    763121   1800    200 32 3 4 0 2 0 0 1.20E+00
     90    904001    100    100 11 1 1 0 3 0 0 9.00E-01
        FE-55  Y 7.78E+00 CO-60  Y 4.86E+00 SR-90  D 6.21E-01 CS-137 D 3.69E+01$
R-SBCOLIQ    2   0 4.28E+01
     91    901101    100    140 23 1 2 0 1 0 0 1.70E+00
     91    901101    100    140 23 2 2 0 2 0 0 1.70E+00
     91    942101    600    200 31 3 3 0 2 0 0 1.20E+00
     91    763121    800    200 32 3 4 0 2 0 0 1.20E+00
     91    901101    100    140 23 2 2 0 2 0 0 1.70E+00
        FE-55  Y 1.08E+01 CO-60  Y 6.77E+00 SR-90  D 8.60E-01 CS-137 D 5.13E+01$
R-SBCOTRA    2   0 3.44E-02
     92    710101    300    100 10 1 1 0 0 0 0 4.00E-01
     92    710101    300    100 10 1 1 0 0 0 0 4.00E-01
     92    720101    600    100 10 1 1 0 0 0 0 8.00E-01
     92    763121   8000    200 32 3 4 0 2 0 0 1.20E+00
     92    714101    300    100 10 1 1 0 3 0 0 4.00E-01
        FE-55  Y 5.28E-03 CO-60  Y 3.31E-03 SR-90  D 4.30E-04 CS-137 D 2.54E-02$
R-SBNCTRA    2   0 1.50E-02
     93    500001    100    100 11 1 1 0 0 0 0 4.00E-01
     93    500001    100    100 11 1 1 0 0 0 0 4.00E-01
     93    500001    100    100 11 1 1 0 0 0 0 2.40E+00
     93    530201    600    100 11 1 1 0 0 0 0 2.40E+00
     93    504001    100    100 11 1 1 0 3 0 0 2.40E+00
        FE-55  Y 2.36E-03 CO-60  Y 1.44E-03 SR-90  D 1.86E-04 CS-137 D 1.10E-02$
R-UFFINES    2   0 6.63E+00
     94    700001    100    100 03 0 1 0 0 0 0 1.50E+00
     94    700001    100    100 03 0 1 0 0 0 0 1.50E+00
     94    700001    100    100 03 0 1 0 0 0 0 1.50E+00
     94    700001    100    100 03 0 1 0 0 0 0 1.50E+00
     94    704001    100    100 03 0 1 0 3 0 0 1.50E+00
        U-234  Y 1.51E-02 U-235  Y 7.09E-04 U-236  Y 1.15E-02 U-238  Y 1.42E-02
        PU-236 Y 1.16E-05 PU-238 Y 1.92E-01 PU-239 Y 1.27E-02 PU-240 Y 2.64E-02
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        PU-241 Y 6.35E+00 PU-242 Y 1.38E-04                                          $
R-UFK2MUD     2   0 1.73E-02
     95     700001    100     100 03 0 1 0 0 0 0 1.20E+00
     95     700001    100     100 03 0 1 0 0 0 0 1.20E+00
     95     700001    100     100 03 0 1 0 0 0 0 1.20E+00
     95     700001    100     100 03 0 1 0 0 0 0 1.20E+00
     95     704001    100     100 03 0 1 0 3 0 0 1.20E+00
        U-234  Y 6.30E-03 U-235  Y 3.00E-04 U-236  Y 4.80E-03 U-238  Y 5.90E-03$
R-UFCOTRA     2   0 8.68E-03
     96     710101    300     100 10 1 1 0 0 0 0 4.00E-01
     96     710101    300     100 10 1 1 0 0 0 0 4.00E-01
     96     720101    600     100 10 1 1 0 0 0 0 8.00E-01
     96     763121   8000     200 32 3 4 0 2 0 0 1.20E+00
     96     714101    300     100 10 1 1 0 3 0 0 4.00E-01
        U-234  Y 3.15E-03 U-235  Y 1.48E-04 U-236  Y 2.41E-03 U-238  Y 2.97E-03$
R-UFNCTRA     2   0 5.15E-03
     97     500001    100     100 11 1 1 0 0 0 0 4.00E-01
     97     500001    100     100 11 1 1 0 0 0 0 4.00E-01
     97     500001    100     100 11 1 1 0 0 0 0 4.00E-01
     97     530201    600     100 11 1 1 0 0 0 0 2.40E+00
     97     504001    100     100 11 1 1 0 3 0 0 4.00E-01
        U-234  Y 1.87E-03 U-235  Y 8.80E-05 U-236  Y 1.43E-03 U-238  Y 1.76E-03$
R-PUCOTRA     2   0 8.81E+03
     98     710101    300     100 10 1 1 0 0 0 0 4.00E-01
     98     710101    300     100 10 1 1 0 0 0 0 4.00E-01
     98     720101    600     100 10 1 1 0 0 0 0 8.00E-01
     98     763121   8000     200 32 3 4 0 2 0 0 1.20E+00
     98     714101    300     100 10 1 1 0 3 0 0 4.00E-01
        PU-236 Y 1.65E-02 PU-238 Y 2.75E+02 PU-239 Y 1.80E+01 PU-240 Y 3.64E+01
        PU-241 Y 8.48E+03 PU-242 Y 1.95E-01                                          $
R-PUNCTRA     2   0 1.35E+03
     99     500001    100     100 11 1 1 0 0 0 0 4.00E-01
     99     500001    100     100 11 1 1 0 0 0 0 4.00E-01
     99     500001    100     100 11 1 1 0 0 0 0 4.00E-01
     99     530201    600     100 11 1 1 0 0 0 0 2.40E+00
     99     504001    100     100 11 1 1 0 3 0 0 4.00E-01
        PU-236 Y 2.58E-03 PU-238 Y 4.28E+01 PU-239 Y 2.77E+00 PU-240 Y 5.62E+00
        PU-241 Y 1.30E+03 PU-242 Y 3.04E-02                                          $
R-MOXCOTR     2   0 1.01E+03
    100     710102    300     100 10 1 1 0 0 0 0 4.00E-01
    100     710102    300     100 10 1 1 0 0 0 0 4.00E-01
    100     720102    600     100 10 1 1 0 0 0 0 8.00E-01
    100     763122   8000     200 32 3 4 0 2 0 0 1.20E+00
    100     714102    300     100 10 1 1 0 3 0 0 4.00E-01
        U-234  Y 6.42E-04 U-235  Y 2.58E-05 U-236  Y 1.26E-07 U-238  Y 5.25E-04
        NP-237 W 2.63E-07 PU-236 Y 1.50E-03 PU-238 Y 3.08E+01 PU-239 Y 2.17E+00
        PU-240 Y 4.33E+00 PU-241 Y 9.75E+02 PU-242 Y 2.33E-02 AM-241 W 1.60E+00
                 2.58E-02                                                            $
R-MOXNCTR     2   0 1.66E+02
    101     500002    100     100 11 1 1 0 0 0 0 4.00E-01
    101     500002    100     100 11 1 1 0 0 0 0 4.00E-01
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    101     500002    100     100 11 1 1 0 0 0 0 4.00E-01
    101     530202    600     100 11 1 1 0 0 0 0 2.40E+00
    101     504002    100     100 11 1 1 0 3 0 0 4.00E-01
        U-234  Y 1.10E-04 U-235  Y 4.13E-06 U-236  Y 2.09E-08 U-238  Y 8.80E-05
        NP-237 W 4.40E-08 PU-236 Y 2.48E-04 PU-238 Y 5.23E+00 PU-239 Y 3.53E-01
        PU-240 Y 7.15E-01 PU-241 Y 1.60E+02 PU-242 Y 3.85E-03 AM-241 W 2.64E-01
                 4.13E-03                                                      $
R-MOXSOLN    2   0 2.35E+02
    102     701102    100     140 23 1 2 0 1 0 0 1.70E+00
    102     701102    100     140 23 2 2 0 2 0 0 1.70E+00
    102     742102    600     200 31 3 3 0 2 0 0 1.20E+00
    102     763122    800     200 32 3 4 0 2 0 0 1.20E+00
    102     701102    100     140 23 2 2 0 2 0 0 1.70E+00
        U-234  Y 1.15E-04 U-235  Y 4.07E-06 U-236  Y 2.19E-08 U-238  Y 9.47E-05
        NP-237 W 4.78E-08 PU-236 Y 2.70E-04 PU-238 Y 5.62E+00 PU-239 Y 3.85E-01
        PU-240 Y 7.71E-01 PU-241 Y 1.76E+02 PU-242 Y 4.16E-03 AM-241 W 5.21E+01
                 4.47E-03                                                      $
P-DECORES    2   0 3.10E+05
    103     800001    100     100 33 3 1 0 0 5 0 7.80E+00
    103     805101    100     100 33 3 1 0 4 5 0 7.80E+00
    103     805101    100     100 33 3 1 0 4 5 0 7.80E+00
    103     805101    100     100 33 3 1 0 4 5 0 7.80E+00
    103     805101    100     100 33 3 1 0 4 5 0 7.80E+00
        H-3    * 8.66E+00 C-14   * 2.17E+01 CL-36  W 4.42E-01 FE-55  Y 1.82E+05
        CO-60  Y 1.12E+05 NI-59  W 9.53E+01 NI-63  W 1.55E+04 SR-90  D 1.73E+00
        NB-94  Y 3.47E-01 TC-99  D 1.12E-01 I-129  D 5.20E-07 CS-135 D 3.47E-05
        CS-137 D 1.73E+00 U-233  Y 3.12E-04 PU-239 Y 6.06E-03          1.22E+00$
P-DEACINT    2  25 5.70E+03
    104     800001    100     100 33 3 1 0 0 6 0 7.80E+00
    104     805101    100     100 33 3 1 0 4 6 0 7.80E+00
    104     805101    100     100 33 3 1 0 4 6 0 7.80E+00
    104     805101    100     100 33 3 1 0 4 6 0 7.80E+00
    104     805101    100     100 33 3 1 0 4 6 0 7.80E+00
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
          .00E+00 1.00E+00 1.00E+01 1.00E+02 5.00E+02 5.00E+03 1.00E+04 5.00E+04
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
          .00E+00 9.09E-02 2.10E-01 4.24E-01 4.60E-01 5.16E-01 9.45E-01 1.00E+00
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
          .00E+00 8.00E-01 4.29E+00 4.45E+01 5.95E+01 2.41E+02 3.69E+03 5.70E+03
        H-3    * 1.35E+00 C-14   * 4.23E-01 CL-36  W 9.03E-03 FE-55  Y 3.38E+03
        CO-60  Y 1.97E+03 NI-59  W 2.68E+00 NI-63  W 3.35E+02 SR-90  D 7.05E-04
        NB-94  Y 4.09E-03 TC-99  D 1.16E-03 I-129  D 1.97E-09 CS-135 D 1.27E-07
        CS-137 D 7.05E-03 U-233  Y 1.41E-05 PU-239 Y 3.24E-04          1.00E+01$
P-DEACVES    2  26 8.67E+01
    105     800001    100     100 33 3 1 0 0 7 0 7.80E+00
    105     805101    100     100 33 3 1 0 4 7 0 7.80E+00
    105     805101    100     100 33 3 1 0 4 7 0 7.80E+00
    105     805101    100     100 33 3 1 0 4 7 0 7.80E+00
    105     805101    100     100 33 3 1 0 4 7 0 7.80E+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 5.00E-01 5.00E+02
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        .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 5.14E-01 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 1.80E-01 8.67E+01
      H-3    * 1.16E-02 C-14   * 6.53E-03 CL-36  W 1.43E-04 FE-55  Y 5.28E+01
      CO-60  Y 2.87E+01 NI-59  W 3.84E-02 NI-63  W 5.10E+00 SR-90  D 1.34E-04
      NB-94  Y 5.64E-05 TC-99  D 1.34E-05 I-129  D 3.76E-11 CS-135 D 2.42E-09
      CS-137 D 1.34E-04 U-233  Y 1.43E-07 PU-239 Y 2.42E-06            1.67E-04$
P-DEACTCO    2   0 2.80E+00
    106     500001    100    100 23 1 1 0 0 0 0 4.50E+00
    106     500001    100    100 23 1 1 0 0 0 0 4.50E+00
    106     500001    100    100 23 1 1 0 0 0 0 4.50E+00
    106     500001    100    100 23 1 1 0 0 0 0 4.50E+00
    106     504001    100    100 23 1 1 0 3 0 0 4.50E+00
      H-3    * 8.56E-01 C-14   * 3.09E-04 CL-36  W 3.32E-10 FE-55  Y 1.86E+00
      CO-60  Y 7.95E-02 NI-59  W 1.12E-05 NI-63  W 1.41E-03 SR-90  D 7.80E-06
      NB-94  Y 1.11E-06 TC-99  D 4.42E-08 I-129  D 2.36E-12 CS-135 D 1.50E-10
      CS-137 D 8.13E-06 U-233  Y 1.24E-06 PU-239 Y 1.81E-06            2.27E-02$
P-DECONME    2   0 1.57E-01
    107     500001    100    100 12 1 1 0 0 0 0 2.00E+00
    107     500001    100    100 12 1 1 0 0 0 0 2.00E+00
    107     500001    100    100 12 1 1 0 0 0 0 2.00E+00
    107     500001    100    100 12 1 1 0 0 0 0 2.00E+00
    107     504001    100    100 12 1 1 0 3 0 0 2.00E+00
      H-3    * 1.10E-05 C-14   * 5.26E-07 FE-55  Y 4.16E-02 CO-60  Y 7.47E-02
      NI-59  W 4.61E-05 NI-63  W 3.78E-03 SR-90  D 4.38E-05 NB-94  Y 1.46E-06
      TC-99  D 1.23E-08 I-129  D 3.42E-08 CS-135 D 1.23E-08 CS-137 D 3.84E-04
      U-235  Y 7.02E-08 U-238  Y 5.54E-07 NP-237 W 1.35E-11 PU-238 Y 1.37E-03
      PU-239 Y 1.81E-03 PU-241 Y 3.36E-02 PU-242 Y 3.97E-06 AM-241 W 5.42E-06
      AM-243 W 3.68E-07 CM-243 W 3.55E-07 CM-244 W 3.36E-06                   $
P-DECONCO    2   0 9.40E-03
    108     500001    100    100 12 1 1 0 0 0 0 3.00E+00
    108     500001    100    100 12 1 1 0 0 0 0 3.00E+00
    108     500001    100    100 12 1 1 0 0 0 0 3.00E+00
    108     500001    100    100 12 1 1 0 0 0 0 3.00E+00
    108     504001    100    100 12 1 1 0 3 0 0 3.00E+00
      H-3    * 6.49E-07 C-14   * 3.09E-08 FE-55  Y 2.44E-03 CO-60  Y 4.39E-03
      NI-59  W 2.71E-06 NI-63  W 2.22E-04 SR-90  D 2.58E-06 NB-94  Y 8.56E-08
      TC-99  D 7.21E-10 I-129  D 2.10E-09 CS-135 D 7.21E-10 CS-137 D 2.26E-05
      U-235  Y 4.13E-09 U-238  Y 3.25E-08 NP-237 W 7.93E-13 PU-238 Y 8.07E-05
      PU-239 Y 1.06E-04 PU-241 Y 2.13E-03 PU-242 Y 2.33E-07 AM-241 W 3.19E-07
      AM-243 W 2.16E-08 CM-243 W 2.09E-08 CM-244 W 1.97E-07                   $
P-DETRASH    2   0 5.30E-01
    109     710101    300    100 10 1 1 0 0 0 0 4.00E-01
    109     710101    300    100 10 1 1 0 0 0 0 4.00E-01
    109     720101    600    100 10 1 1 0 0 0 0 8.00E-01
    109     763121   8000    200 32 3 4 0 2 0 0 1.20E+00
    109     714101    300    100 10 1 1 0 3 0 0 4.00E-01
      H-3    * 7.05E-03 C-14   * 2.61E-04 FE-55  Y 1.39E-01 CO-60  Y 2.68E-01
      NI-59  W 1.65E-04 NI-63  W 5.10E-02 SR-90  D 5.15E-04 NB-94  Y 5.51E-06
      TC-99  D 2.19E-06 I-129  D 6.49E-06 CS-135 D 2.19E-06 CS-137 D 5.82E-02
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        U-235  Y 1.84E-07 U-238  Y 1.45E-06 NP-237 W 3.54E-11 PU-238 Y 1.39E-04
        PU-239 Y 1.29E-04 PU-241 Y 5.61E-03 PU-242 Y 2.82E-07 AM-241 W 9.22E-05
        AM-243 W 6.23E-06 CM-243 W 6.38E-08 CM-244 W 6.08E-05                  $
P-DERESIN    2   0 1.40E+03
    110     900001    100     100 11 1 1 1 0 0 0 9.00E-01
    110     901101    100     140 23 2 2 1 2 0 0 1.70E+00
    110     902101    100     200 31 3 3 1 2 0 0 1.20E+00
    110     763121   1800     200 32 3 4 0 2 0 0 1.20E+00
    110     904001    100     100 11 1 1 1 3 0 0 9.00E-01
        H-3    * 1.11E+02 C-14   * 4.06E+00 FE-55  Y 9.75E+01 CO-60  Y 1.89E+02
        NI-59  W 1.16E-01 NI-63  W 3.59E+01 SR-90  D 8.08E+00 NB-94  Y 3.68E-03
        TC-99  D 3.43E-02 I-129  D 1.02E-01 CS-135 D 3.43E-02 CS-137 D 9.13E+02
        U-235  Y 1.96E-03 U-238  Y 1.55E-02 NP-237 W 3.78E-07 PU-238 Y 1.08E+00
        PU-239 Y 7.58E-01 PU-241 Y 3.31E+01 PU-242 Y 1.66E-03 AM-241 W 7.79E-01
        AM-243 W 5.25E-02 CM-243 W 4.13E-04 CM-244 W 3.75E-01                  $
P-DEFILCR    2   0 5.59E+02
    111     700001    100     100 21 1 1 0 0 0 0 1.30E+00
    111     701101    100     100 33 2 2 0 2 0 0 1.70E+00
    111     702101    100     100 31 3 3 0 2 0 0 1.20E+00
    111     703101    100     100 31 3 4 0 2 0 0 1.20E+00
    111     704001    100     100 31 1 1 0 3 0 0 1.30E+00
        H-3    * 3.46E-01 C-14   * 1.28E-02 FE-55  Y 1.67E+02 CO-60  Y 3.22E+02
        NI-59  W 1.99E-01 NI-63  W 6.14E+01 SR-90  D 2.53E-02 NB-94  Y 6.29E-03
        TC-99  D 1.08E-04 I-129  D 3.19E-04 CS-135 D 1.08E-04 CS-137 D 2.87E+00
        U-235  Y 1.10E-04 U-238  Y 8.64E-04 NP-237 W 2.11E-08 PU-238 Y 7.56E-02
        PU-239 Y 1.14E-01 PU-241 Y 5.00E+00 PU-242 Y 2.51E-04 AM-241 W 4.94E-02
        AM-243 W 3.31E-03 CM-243 W 5.81E-05 CM-244 W 3.31E-02                  $
P-DEEVAPB    2   0 1.04E+02
    112     901101    100     140 23 1 2 1 1 0 0 1.70E+00
    112     901101    100     140 23 2 2 1 2 0 0 1.70E+00
    112     942101    600     200 31 3 3 1 2 0 0 1.20E+00
    112     763121    800     200 32 3 4 0 2 0 0 1.20E+00
    112     901101    100     140 23 2 2 0 2 0 0 1.70E+00
        H-3    * 2.31E-01 C-14   * 1.46E-02 FE-55  Y 2.85E+01 CO-60  Y 4.76E+01
        NI-59  W 2.94E-02 NI-63  W 6.45E-01 SR-90  D 4.42E-02 NB-94  Y 9.29E-04
        TC-99  D 9.38E-04 I-129  D 2.49E-03 CS-135 D 9.38E-04 CS-137 D 2.49E+01
        U-235  Y 1.29E-05 U-238  Y 1.02E-04 NP-237 W 2.48E-09 PU-238 Y 7.46E-02
        PU-239 Y 3.54E-02 PU-241 Y 1.73E+00 PU-242 Y 7.36E-05 AM-241 W 4.50E-02
        AM-243 W 3.03E-03 CM-243 W 9.71E-05 CM-244 W 7.69E-02                  $
B-DECORES    2   0 1.29E+05
    113     800001    100     100 33 3 1 0 0 8 0 7.80E+00
    113     805101    100     100 33 3 1 0 4 8 0 7.80E+00
    113     805101    100     100 33 3 1 0 4 8 0 7.80E+00
    113     805101    100     100 33 3 1 0 4 8 0 7.80E+00
    113     805101    100     100 33 3 1 0 4 8 0 7.80E+00
        H-3    * 1.73E+01 C-14   * 9.71E+00 CL-36  W 2.13E-01 FE-55  Y 7.85E+04
        CO-60  Y 4.26E+04 NI-59  W 5.72E+01 NI-63  W 7.58E+03 SR-90  D 2.00E-01
        NB-94  Y 8.40E-02 TC-99  D 2.00E-02 I-129  D 5.59E-08 CS-135 D 3.59E-06
        CS-137 D 2.00E-01 U-233  Y 2.13E-04 PU-239 Y 3.59E-03           1.26E+03$
B-DEACINT    2  27 3.00E+03
    114     800001    100     100 33 3 1 0 0 9 0 7.80E+00
```

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    114     805101    100     100 33 3 1 0 4 9 0 7.80E+00
    114     805101    100     100 33 3 1 0 4 9 0 7.80E+00
    114     805101    100     100 33 3 1 0 4 9 0 7.80E+00
    114     805101    100     100 33 3 1 0 4 9 0 7.80E+00
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00  .00E+00 5.00E+01 1.00E+02 5.00E+02 1.00E+03 1.00E+04 5.00E+04
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00  .00E+00 4.80E-02 1.81E-01 2.41E-01 3.61E-01 8.19E-01 1.00E+00
       .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       .00E+00  .00E+00 2.50E+01 5.00E+01 7.24E+01 3.67E+02 9.11E+02 3.03E+03
      H-3    * 4.03E-01 C-14   * 2.26E-01 CL-36  W 4.96E-03 FE-55  Y 1.83E+03
      CO-60  Y 9.91E+02 NI-59  W 1.33E+00 NI-63  W 1.77E+02 SR-90  D 4.65E-03
      NB-94  Y 1.95E-03 TC-99  D 4.65E-04 I-129  D 1.30E-09 CS-135 D 8.36E-08
      CS-137 D 4.65E-03 U-233  Y 4.96E-06 PU-239 Y 8.36E-05            2.93E+01$
B-DEACVES    2    0 2.70E+02
    115     800001    100     100 33 3 1 0 010 0 7.80E+00
    115     805101    100     100 33 3 1 0 410 0 7.80E+00
    115     805101    100     100 33 3 1 0 410 0 7.80E+00
    115     805101    100     100 33 3 1 0 410 0 7.80E+00
    115     805101    100     100 33 3 1 0 410 0 7.80E+00
      H-3    * 9.80E-02 C-14   * 1.91E-02 CL-36  W 3.91E-04 FE-55  Y 1.60E+02
      CO-60  Y 9.39E+01 NI-59  W 1.25E-01 NI-63  W 1.56E+01 SR-90  D 9.80E-05
      NB-94  Y 1.91E-04 TC-99  D 5.86E-05 I-129  D 2.97E-11 CS-135 D 2.50E-09
      CS-137 D 1.37E-04 U-233  Y 8.63E-07 PU-239 Y 2.27E-05            1.07E-03$
B-DEACTCO    2    0 1.90E+00
    116     500001    100     100 23 1 1 0 0 0 0 4.50E+00
    116     500001    100     100 23 1 1 0 0 0 0 4.50E+00
    116     500001    100     100 23 1 1 0 0 0 0 4.50E+00
    116     500001    100     100 23 1 1 0 0 0 0 4.50E+00
    116     504001    100     100 23 1 1 0 3 0 0 4.50E+00
      H-3    * 5.86E-01 C-14   * 2.12E-04 CL-36  W 1.09E-05 FE-55  Y 1.26E+00
      CO-60  Y 5.19E-02 NI-59  W 7.66E-06 NI-63  W 9.53E-04 SR-90  D 5.23E-06
      NB-94  Y 6.53E-07 TC-99  D 2.34E-08 I-129  D 1.63E-12 CS-135 D 1.06E-10
      CS-137 D 5.66E-06 U-233  Y 1.04E-07 PU-239 Y 9.19E-07            2.76E-03$
B-DECONME    2    0 5.70E-01
    117     500001    100     100 12 1 1 0 0 0 0 2.00E+00
    117     500001    100     100 12 1 1 0 0 0 0 2.00E+00
    117     500001    100     100 12 1 1 0 0 0 0 2.00E+00
    117     500001    100     100 12 1 1 0 0 0 0 2.00E+00
    117     504001    100     100 12 1 1 0 3 0 0 2.00E+00
      H-3    * 3.93E-05 C-14   * 1.87E-06 FE-55  Y 1.48E-01 CO-60  Y 2.66E-01
      NI-59  W 1.64E-04 NI-63  W 1.35E-02 SR-90  D 1.56E-04 NB-94  Y 5.19E-06
      TC-99  D 4.37E-08 I-129  D 1.22E-07 CS-135 D 4.37E-08 CS-137 D 1.37E-03
      U-235  Y 2.49E-07 U-238  Y 1.97E-06 NP-237 W 4.80E-11 PU-238 Y 4.89E-03
      PU-239 Y 6.44E-03 PU-241 Y 1.29E-01 PU-242 Y 1.41E-05 AM-241 W 1.93E-05
      AM-243 W 1.31E-06 CM-243 W 1.26E-06 CM-244 W 1.20E-05                    $
B-DECONCO    2    0 4.39E-02
    118     500001    100     100 12 1 1 0 0 0 0 3.00E+00
    118     500001    100     100 12 1 1 0 0 0 0 3.00E+00
    118     500001    100     100 12 1 1 0 0 0 0 3.00E+00
    118     500001    100     100 12 1 1 0 0 0 0 3.00E+00
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    118     504001    100     100 12 1 1 0 3 0 0 3.00E+00
        H-3    * 3.04E-06 C-14    * 1.45E-07 FE-55  Y 1.14E-02 CO-60  Y 2.05E-02
        NI-59  W 1.27E-05 NI-63   W 1.04E-03 SR-90  D 1.21E-05 NB-94  Y 4.01E-07
        TC-99  D 3.37E-09 I-129   D 9.41E-09 CS-135 D 3.37E-09 CS-137 D 1.06E-04
        U-235  Y 1.93E-08 U-238   Y 1.52E-07 NP-237 W 3.72E-12 PU-238 Y 3.77E-04
        PU-239 Y 4.97E-04 PU-241  Y 9.98E-03 PU-242 Y 1.09E-06 AM-241 W 1.49E-06
        AM-243 W 1.01E-07 CM-243  W 9.77E-08 CM-244 W 9.24E-07                   $
B-DETRASH    2   0 5.30E-01
    119     710101    300     100 10 1 1 0 0 0 0 4.00E-01
    119     710101    300     100 10 1 1 0 0 0 0 4.00E-01
    119     720101    600     100 10 1 1 0 0 0 0 8.00E-01
    119     763121   8000     200 32 3 4 0 2 0 0 1.20E+00
    119     714101    300     100 10 1 1 0 3 0 0 4.00E-01
        H-3    * 1.52E-03 C-14    * 9.40E-05 FE-55  Y 1.35E-01 CO-60  Y 2.27E-01
        NI-59  W 1.40E-04 NI-63   W 3.06E-03 SR-90  D 2.86E-04 NB-94  Y 4.42E-06
        TC-99  D 6.03E-06 I-129   D 1.61E-05 CS-135 D 6.03E-06 CS-137 D 1.61E-01
        U-235  Y 2.75E-08 U-238   Y 2.16E-07 NP-237 W 5.29E-12 PU-238 Y 5.16E-05
        PU-239 Y 2.61E-05 PU-241  Y 1.27E-03 PU-242 Y 5.68E-08 AM-241 W 2.18E-05
        AM-243 W 1.47E-06 CM-243  W 4.35E-08 CM-244 W 3.39E-04                   $
B-DERESIN    2   0 5.40E+00
    120     900001    100     100 11 1 1 1 0 0 0 9.00E-01
    120     901101    100     140 21 2 2 1 2 0 0 1.70E+00
    120     902101    100     200 31 3 3 1 2 0 0 1.20E+00
    120     763121   1800     200 32 3 4 0 2 0 0 1.20E+00
    120     904001    100     100 11 1 1 1 3 0 0 9.00E-01
        H-3    * 2.24E-02 C-14    * 1.39E-03 FE-55  Y 1.10E+00 CO-60  Y 1.86E+00
        NI-59  W 1.14E-03 NI-63   W 2.51E-02 SR-90  D 4.25E-03 NB-94  Y 3.61E-05
        TC-99  D 8.91E-05 I-129   D 2.38E-04 CS-135 D 8.91E-05 CS-137 D 2.38E+00
        U-235  Y 6.21E-08 U-238   Y 4.91E-07 NP-237 W 1.19E-11 PU-238 Y 9.72E-05
        PU-239 Y 6.21E-05 PU-241  Y 3.04E-03 PU-242 Y 1.37E-07 AM-241 W 2.71E-05
        AM-243 W 1.83E-06 CM-243  W 3.15E-08 CM-244 W 2.12E-05                   $
B-DEEVAPB    2   0 7.50E+01
    121     901101    100     140 23 1 2 1 1 0 0 1.70E+00
    121     901101    100     140 23 2 2 1 2 0 0 1.70E+00
    121     942101    240     200 31 3 3 1 2 0 0 1.20E+00
    121     963121    640     200 32 3 4 0 2 0 0 1.20E+00
    121     901101    100     140 23 2 2 1 2 0 0 1.70E+00
        H-3    * 1.69E-01 C-14    * 1.05E-02 FE-55  Y 2.05E+01 CO-60  Y 3.44E+01
        NI-59  W 2.12E-02 NI-63   W 4.66E-01 SR-90  D 3.20E-04 NB-94  Y 6.71E-04
        TC-99  D 6.77E-04 I-129   D 1.80E-03 CS-135 D 6.77E-04 CS-137 D 1.80E+01
        U-235  Y 9.28E-06 U-238   Y 7.34E-05 NP-237 W 1.79E-09 PU-238 Y 5.38E-02
        PU-239 Y 2.55E-02 PU-241  Y 1.24E+00 PU-242 Y 5.58E-05 AM-241 W 3.25E-02
        AM-243 W 2.20E-03 CM-243  W 7.01E-05 CM-244 W 5.55E-02                   $
W-THORHLW    2   0 2.86E+04
    122    1201101    100     140 23 1 2 0 1 0 0 1.70E+00
    122    1201101    100     140 23 2 2 0 2 0 0 1.70E+00
    122    1242101    600     200 31 3 3 0 2 0 0 1.20E+00
    122     763121    800     200 31 3 4 0 2 0 0 1.20E+00
    122    1201101    100     140 23 2 2 0 2 0 0 1.70E+00
        CO-60  Y 3.19E+01 SR-90   D 1.38E+04 CS-134 D 1.15E+01 CS-137 D 1.47E+04
        EU-154 W 8.94E+01 U-235   Y 4.00E-05 U-238  Y 4.10E-04 NP-237 W 1.15E-02
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              2.74E+04                                                        $
W-PUREHLW    2    0 7.93E+03
    123    1201101    100    140 23 1 2 0 1 0 0 1.70E+00
    123    1201101    100    140 23 2 2 0 2 0 0 1.70E+00
    123    1242101    600    200 31 3 3 0 2 0 0 1.20E+00
    123     763121    800    200 31 3 4 0 2 0 0 1.20E+00
    123    1201101    100    140 23 2 2 0 2 0 0 1.70E+00
        H-3    * 1.20E+00 SR-90  D 3.35E+03 TC-99  D 9.50E-01 RU-106 Y 5.50E-02
        SB-125 W 3.05E+00 SN-126 W 2.00E-02 I-129  D 2.35E-03 CS-134 D 1.05E+01
        CS-135 D 1.75E-02 CS-137 D 4.45E+03 EU-152 W 2.05E-01 EU-154 W 6.50E+01
        NP-237 W 4.48E-10 PU-238 Y 7.50E-01 PU-239 Y 1.39E+00 PU-241 Y 3.50E+01
        PU-242 Y 5.00E-04 AM-241 W 1.00E+01 AM-243 W 1.10E-01 CM-242 W 5.00E-04
        CM-244 W 4.40E+00          7.68E+03                                   $
W-COTRASH    2    0 6.42E-04
    124     510101    300    100 10 1 1 0 0 0 0 4.00E-01
    124     510101    300    100 10 1 1 0 0 0 0 4.00E-01
    124     520101    600    100 10 1 1 0 0 0 0 8.00E-01
    124     763121   8000    200 31 3 4 0 2 0 0 1.20E+00
    124     514101    300    100 10 1 1 0 3 0 0 4.00E-01
        H-3    * 4.80E-12 C-14   * 5.44E-12 NI-63  W 3.84E-11 SR-90  D 3.07E-04
        TC-99  D 3.20E-08 RU-106 Y 1.41E-07 SB-125 W 6.08E-07 SN-126 W 1.60E-09
        I-129  D 8.32E-15 CS-134 D 2.66E-07 CS-135 D 4.48E-09 CS-137 D 3.20E-04
        EU-152 W 2.11E-08 EU-154 W 8.00E-06 NP-237 W 1.96E-09 PU-238 Y 3.52E-07
        PU-239 Y 1.12E-07 PU-241 Y 4.48E-06 PU-242 Y 6.72E-11 AM-241 W 4.80E-07
        AM-243 W 9.28E-09 CM-242 W 8.32E-09 CM-243 W 1.34E-09 CM-244 W 4.16E-07
                 6.63E-04                                                     $
W-NCSOLID    2    0 2.81E-03
    125     500001    100    100 11 1 1 0 0 0 0 4.00E-01
    125     500001    100    100 11 1 1 0 0 0 0 4.00E-01
    125     500001    100    100 11 1 1 0 0 0 0 4.00E-01
    125     530101    600    100 11 1 1 0 0 0 0 2.40E+00
    125     504001    100    100 11 1 1 0 3 0 0 4.00E-01
        H-3    * 2.10E-11 C-14   * 2.38E-11 NI-63  W 1.68E-10 SR-90  D 1.34E-03
        TC-99  D 1.40E-07 RU-106 Y 6.16E-07 SB-125 W 2.66E-06 SN-126 W 7.00E-09
        I-129  D 3.64E-14 CS-134 D 1.16E-06 CS-135 D 1.96E-08 CS-137 D 1.40E-03
        EU-152 W 9.24E-08 EU-154 W 3.50E-05 NP-237 W 1.96E-09 PU-238 Y 1.54E-06
        PU-239 Y 4.90E-07 PU-241 Y 1.96E-05 PU-242 Y 2.94E-10 AM-241 W 2.10E-06
        AM-243 W 4.06E-08 CM-242 W 3.64E-08 CM-243 W 5.88E-09 CM-244 W 1.82E-06
                 2.90E-03                                                     $
W-LLWTFRE    2    0 1.48E-02
    126     700001    100    100 11 0 1 0 0 0 0 9.00E-01
    126     701101    100    140 23 2 2 0 2 0 0 1.70E+00
    126     702101    100    200 31 3 3 0 2 0 0 1.20E+00
    126     763121    500    200 31 3 4 0 2 0 0 1.20E+00
    126     704001    100    100 11 0 1 0 3 0 0 9.00E-01
        H-3    * 1.11E-10 C-14   * 1.25E-10 NI-63  W 8.84E-10 SR-90  D 7.07E-03
        TC-99  D 7.37E-07 RU-106 Y 3.24E-06 SB-125 W 1.40E-05 SN-126 W 3.68E-08
        I-129  D 1.92E-13 CS-134 D 6.11E-06 CS-135 D 1.03E-07 CS-137 D 7.37E-03
        EU-152 W 4.86E-07 EU-154 W 1.84E-04 NP-237 W 1.03E-08 PU-238 Y 8.10E-06
        PU-239 Y 2.58E-06 PU-241 Y 1.03E-04 PU-242 Y 1.55E-09 AM-241 W 1.11E-05
        AM-243 W 2.14E-07 CM-242 W 1.92E-07 CM-243 W 3.09E-08 CM-244 W 9.58E-06
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           2.26E-02                                                                      $
W-FRSRESN    2  28 2.16E+01
    127     800001    100    100 11 0 1 0 0 0 0 9.00E-01
    127     801101    100    140 23 2 2 0 2 0 0 1.70E+00
    127     802101    100    200 31 3 3 0 2 0 0 1.20E+00
    127     863121    500    200 31 3 4 0 2 0 0 1.20E+00
    127     804001    100    100 11 0 1 0 3 0 0 9.00E-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 1.00E+01 1.00E+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 1.33E-01 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 2.80E+00 2.16E+01
        SR-90  D 1.86E+00 CS-137 D 1.98E+01                                              $
W-FRSLIQD    2   0 3.74E+00
    128     701101    100    140 23 1 2 0 1 0 0 1.70E+00
    128     701101    100    140 23 2 2 0 2 0 0 1.70E+00
    128     742101    600    200 31 3 3 0 2 0 0 1.20E+00
    128     763121    800    200 31 3 4 0 2 0 0 1.20E+00
    128     701101    100    140 23 1 2 0 2 0 0 1.70E+00
        SR-90  D 3.80E-01 CS-137 D 3.36E+00                                              $
W-RTSRESN    2  29 3.28E+00
    129     700001    100    100 11 0 1 0 0 0 0 9.00E-01
    129     701101    100    140 23 2 2 0 2 0 0 1.70E+00
    129     702101    100    200 31 3 3 0 2 0 0 1.20E+00
    129     763121    500    200 31 3 4 0 2 0 0 1.20E+00
    129     704001    100    100 11 0 1 0 3 0 0 9.00E-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 1.00E+00 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 1.94E-01 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 7.30E-01 3.28E+00
        SR-90  D 3.28E-01 CS-137 D 2.95E+00                                              $
W-LTTRASH    2  30 2.87E-02
    130     510101    300    100 10 1 1 0 0 0 0 4.00E-01
    130     510101    300    100 10 1 1 0 0 0 0 4.00E-01
    130     520101    600    100 10 1 1 0 0 0 0 8.00E-01
    130     763121   8000    200 31 3 4 0 2 0 0 1.20E+00
    130     514101    300    100 10 1 1 0 3 0 0 4.00E-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 1.00E-01 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 7.70E-01 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 2.69E-02 5.82E-02
        H-3    * 2.14E-10 C-14   * 2.43E-10 NI-63  W 1.71E-09 SR-90  D 1.37E-02
        TC-99  D 1.43E-06 RU-106 Y 6.28E-06 SB-125 W 2.17E-05 SN-126 W 7.14E-08
        I-129  D 3.71E-13 CS-134 D 1.19E-05 CS-135 D 2.00E-07 CS-137 D 1.43E-02
        EU-152 W 9.42E-07 EU-154 W 3.57E-04 NP-237 W 2.00E-08 PU-238 Y 1.57E-05
        PU-239 Y 5.00E-06 PU-241 Y 2.00E-04 PU-242 Y 3.00E-09 AM-241 W 2.14E-05
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        AM-243 W 4.14E-07 CM-242 W 3.71E-07 CM-243 W 6.00E-08 CM-244 W 1.86E-05
                 2.95E-02                                                     $
W-HTTRASH    2  31 7.45E-02
    131     510101   300    100 10 1 1 0 0 0 0 4.00E-01
    131     510101   300    100 10 1 1 0 0 0 0 4.00E-01
    131     520101   600    100 10 1 1 0 0 0 0 8.00E-01
    131     763121  8000    200 31 3 4 0 2 0 0 1.20E+00
    131     514101   300    100 10 1 1 0 3 0 0 4.00E-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 1.00E-01 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 7.05E-01 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 3.40E-02 1.24E-01
        H-3    * 3.62E-10 C-14   * 4.10E-10 NI-63  W 2.89E-09 SR-90  D 2.32E-02
        TC-99  D 2.41E-06 RU-106 Y 1.06E-05 SB-125 W 4.58E-05 SN-126 W 1.21E-07
        I-129  D 6.27E-13 CS-134 D 2.00E-05 CS-135 D 3.38E-07 CS-137 D 2.41E-02
        EU-152 W 1.59E-06 EU-154 W 6.03E-04 NP-237 W 8.54E-06 PU-238 Y 6.71E-03
        PU-239 Y 2.13E-03 PU-241 Y 3.38E-04 PU-242 Y 1.28E-06 AM-241 W 9.15E-03
        AM-243 W 1.77E-04 CM-242 W 6.27E-07 CM-243 W 2.56E-05 CM-244 W 7.93E-03
                 4.95E-02                                                     $
W-LTEQUIP    2  32 1.11E+01
    132     500001   100    100 12 1 1 0 0 0 0 2.00E+00
    132     500001   100    100 12 1 1 0 0 0 0 2.00E+00
    132     500001   100    100 12 1 1 0 0 0 0 2.00E+00
    132     500001   100    100 12 1 1 0 0 0 0 2.00E+00
    132     504001   100    100 12 1 1 0 3 0 0 2.00E+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 1.00E+02 1.00E+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 9.09E-01 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 1.02E+01 2.26E+01
        H-3    * 8.32E-08 C-14   * 9.43E-08 NI-63  W 6.66E-07 SR-90  D 5.33E+00
        TC-99  D 5.55E-04 RU-106 Y 2.44E-03 SB-125 W 1.05E-02 SN-126 W 2.77E-05
        I-129  D 1.44E-10 CS-134 D 4.61E-03 CS-135 D 7.77E-05 CS-137 D 5.55E+00
        EU-152 W 3.66E-04 EU-154 W 1.39E-01 NP-237 W 7.77E-06 PU-238 Y 6.10E-03
        PU-239 Y 1.94E-03 PU-241 Y 7.77E-02 PU-242 Y 1.17E-06 AM-241 W 8.32E-03
        AM-243 W 1.61E-04 CM-242 W 1.44E-04 CM-243 W 2.33E-05 CM-244 W 7.21E-03
                 1.15E+01                                                     $
W-HTEQUIP    2  33 4.09E+01
    133     500001   100    100 12 1 1 0 0 0 0 2.00E+00
    133     500001   100    100 12 1 1 0 0 0 0 2.00E+00
    133     500001   100    100 12 1 1 0 0 0 0 2.00E+00
    133     500001   100    100 12 1 1 0 0 0 0 2.00E+00
    133     504001   100    100 12 1 1 0 3 0 0 2.00E+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 1.00E+02 1.00E+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 2.21E-01 1.00E+00
          .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
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     .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00 1.03E+01 8.25E+01
     H-3    * 3.00E-07 C-14    * 3.41E-07 NI-63  W 2.40E-06 SR-90  D 1.92E+01
     TC-99  D 2.00E-03 RU-106 Y 8.81E-03 SB-125 W 3.81E-02 SN-126 W 1.00E-04
     I-129  D 5.21E-10 CS-134 D 1.66E-02 CS-135 D 2.80E-04 CS-137 D 2.00E+01
     EU-152 W 1.32E-03 EU-154 W 5.01E-01 NP-237 W 2.88E-04 PU-238 Y 2.26E-01
     PU-239 Y 7.20E-02 PU-241 Y 2.80E-01 PU-242 Y 4.32E-05 AM-241 W 3.08E-01
     AM-243 W 5.96E-03 CM-242 W 5.21E-04 CM-243 W 8.64E-04 CM-244 W 2.67E-01
              4.16E+01                                                   $
W-PDWLIQD    2    0 5.04E+01
   134    701101    100    140 23 1 2 0 1 0 0 1.70E+00
   134    701101    100    140 23 2 2 0 2 0 0 1.70E+00
   134    742101    600    200 31 3 3 0 2 0 0 1.20E+00
   134    763121    800    200 31 3 4 0 2 0 0 1.20E+00
   134    701101    100    140 23 1 2 0 2 0 0 1.70E+00
     SR-90  D 2.45E+01 TC-99  D 2.55E-03 CS-137 D 2.55E+01 PU-238 Y 2.80E-02
     PU-239 Y 8.92E-03 PU-241 Y 3.57E-01 AM-241 W 3.82E-02               $
W-VITSUPR    2    0 9.43E-01
   135    701101    100    140 23 1 2 0 1 0 0 1.70E+00
   135    701101    100    140 23 2 2 0 2 0 0 1.70E+00
   135    742101    600    200 31 3 3 0 2 0 0 1.20E+00
   135    763121    800    200 31 3 4 0 2 0 0 1.20E+00
   135    701101    100    140 23 1 2 0 2 0 0 1.70E+00
     H-3    * 1.40E-04 C-14    * 1.40E-04 NI-63  W 5.60E-04 SR-90  D 3.60E-02
     TC-99  D 1.10E-01 RU-106 Y 2.40E-02 SN-126 W 2.80E-04 SB-125 W 1.10E-03
     CS-134 D 4.20E-04 CS-137 D 5.30E-01 EU-152 W 3.80E-02 EU-154 W 6.00E-02
     PU-238 Y 9.00E-03 PU-239 Y 3.00E-03 PU-241 Y 1.30E-01          9.01E-01$
W-VITWASH    2    0 3.65E+01
   136    701101    100    140 23 1 2 0 1 0 0 1.70E+00
   136    701101    100    140 23 2 2 0 2 0 0 1.70E+00
   136    742101    600    200 31 3 3 0 2 0 0 1.20E+00
   136    763121    800    200 31 3 4 0 2 0 0 1.20E+00
   136    701101    100    140 23 1 2 0 2 0 0 1.70E+00
     SR-90  D 2.00E-01 TC-99  D 2.90E+00 RU-106 Y 1.30E+00 CS-137 D 2.90E+01
     EU-152 W 1.00E+00 EU-154 W 1.70E+00 PU-238 Y 2.40E-01 PU-241 Y 1.80E-01
              8.93E+00                                                   $
W-VITSCRB    2    0 7.07E+01
   137    701101    100    140 23 1 2 0 1 0 0 1.70E+00
   137    701101    100    140 23 2 2 0 2 0 0 1.70E+00
   137    742101    600    200 31 3 3 0 2 0 0 1.20E+00
   137    763121    800    200 31 3 4 0 2 0 0 1.20E+00
   137    701101    100    140 23 1 2 0 2 0 0 1.70E+00
     SR-90  D 7.00E-01 CS-137 D 7.00E+01                                 $
W-VITMELT    2    0 2.77E+03
   138    701101    100    140 23 1 2 0 1 0 0 1.70E+00
   138    701101    100    140 23 2 2 0 2 0 0 1.70E+00
   138    742101    600    200 31 3 3 0 2 0 0 1.20E+00
   138    763121    800    200 31 3 4 0 2 0 0 1.20E+00
   138    701101    100    140 23 1 2 0 2 0 0 1.70E+00
     SR-90  D 1.23E+03 CS-137 D 1.54E+03                                 $
W-VITFRAC    2    0 6.23E-02
   139    701101    100    140 23 1 2 0 1 0 0 1.70E+00
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     139     701101    100    140 23 2 2 0 2 0 0 1.70E+00
     139     742101    600    200 31 3 3 0 2 0 0 1.20E+00
     139     763121    800    200 31 3 4 0 2 0 0 1.20E+00
     139     701101    100    140 23 1 2 0 2 0 0 1.70E+00
         SR-90  D 6.59E-04 CS-134 D 5.70E-07 CS-135 D 9.62E-09 CS-137 D 6.16E-02
         PU-238 Y 7.56E-07 PU-239 Y 2.40E-07 PU-241 Y 9.62E-06 AM-241 W 1.03E-06$
W-VITZEOL    2   0 3.78E+00
     140     700001    100    100 33 1 2 0 1 0 C 1.00E+00
     140     701101    100    140 23 2 2 0 2 0 0 1.70E+00
     140     702101    100    200 31 3 3 0 2 0 0 1.20E+00
     140     763121    800    200 31 3 4 0 2 0 0 1.20E+00
     140     704001    100    100 13 1 2 0 3 0 0 1.00E+00
         SR-90  D 3.99E-03 CS-134 D 3.44E-06 CS-135 D 5.81E-08 CS-137 D 3.78E+00
         PU-238 Y 4.56E-06 PU-239 Y 1.45E-06 PU-241 Y 5.81E-05 AM-241 W 6.23E-06$
W-DDRACKS    2  34 1.37E-01
     141     500001    100    100 12 1 1 0 0 0 0 2.00E+00
     141     500001    100    100 12 1 1 0 0 0 0 2.00E+00
     141     500001    100    100 12 1 1 0 0 0 0 2.00E+00
     141     500001    100    100 12 1 1 0 0 0 0 2.00E+00
     141     504001    100    100 12 1 1 0 3 0 0 2.00E+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 1.00E+00 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 9.09E-01 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 2.04E-01 2.78E-01
         H-3    * 1.02E-09 C-14   * 1.16E-09 NI-63  W 8.18E-09 SR-90  D 6.55E-02
         TC-99  D 6.82E-06 RU-106 Y 3.00E-05 SB-125 W 1.30E-04 SN-126 W 3.41E-07
         I-129  D 1.77E-12 CS-134 D 5.66E-05 CS-135 D 9.55E-07 CS-137 D 6.82E-02
         EU-152 W 4.50E-06 EU-154 W 1.71E-03 NP-237 W 9.55E-08 PU-238 Y 7.50E-05
         PU-239 Y 2.39E-05 PU-241 Y 9.55E-04 PU-242 Y 1.43E-08 AM-241 W 1.02E-04
         AM-243 W 1.98E-06 CM-242 W 1.77E-06 CM-243 W 2.86E-07 CM-244 W 8.87E-05
                  1.41E-01                                                      $
W-DDLTRUB    2  35 1.83E-02
     142     500001    100    100 12 1 1 0 0 0 0 2.00E+00
     142     500001    100    100 12 1 1 0 0 0 0 2.00E+00
     142     500001    100    100 12 1 1 0 0 0 0 2.00E+00
     142     500001    100    100 12 1 1 0 0 0 0 2.00E+00
     142     504001    100    100 12 1 1 0 3 0 0 2.00E+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 1.00E-01 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 9.09E-01 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 2.04E-02 3.71E-02
         H-3    * 1.36E-10 C-14   * 1.55E-10 NI-63  W 1.09E-09 SR-90  D 8.73E-03
         TC-99  D 9.10E-07 RU-106 Y 4.00E-06 SB-125 W 1.73E-05 SN-126 W 4.55E-08
         I-129  D 2.36E-13 CS-134 D 7.55E-06 CS-135 D 1.27E-07 CS-137 D 9.10E-03
         EU-152 W 6.00E-07 EU-154 W 2.27E-04 NP-237 W 1.27E-08 PU-238 Y 1.00E-05
         PU-239 Y 3.18E-06 PU-241 Y 1.27E-04 PU-242 Y 1.91E-09 AM-241 W 1.36E-05
         AM-243 W 2.64E-07 CM-242 W 2.36E-07 CM-243 W 3.82E-08 CM-244 W 1.18E-05
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              1.88E-02                                                              $
W-DDHTRUB    2  36 2.44E-01
    143     500001    100     100 12 1 1 0 0 0 0 2.00E+00
    143     500001    100     100 12 1 1 0 0 0 0 2.00E+00
    143     500001    100     100 12 1 1 0 0 0 0 2.00E+00
    143     500001    100     100 12 1 1 0 0 0 0 2.00E+00
    143     504001    100     100 12 1 1 0 3 0 0 2.00E+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 1.00E+00 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 8.85E-01 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 1.30E-01 2.65E-01
        H-3    * 1.53E-10 C-14   * 1.73E-10 NI-63  W 1.22E-09 SR-90  D 9.77E-03
        TC-99  D 1.02E-06 RU-106 Y 4.48E-06 SB-125 W 1.93E-05 SN-126 W 5.09E-08
        I-129  D 2.65E-13 CS-134 D 8.45E-06 CS-135 D 1.43E-07 CS-137 D 1.02E-02
        EU-152 W 6.72E-07 EU-154 W 2.55E-04 NP-237 W 7.32E-05 PU-238 Y 5.75E-02
        PU-239 Y 1.83E-02 PU-241 Y 1.43E-04 PU-242 Y 1.10E-05 AM-241 W 7.84E-02
        AM-243 W 1.52E-03 CM-242 W 2.65E-07 CM-243 W 2.19E-04 CM-244 W 6.79E-02
              2.10E-02                                                              $
W-DDLTLQD    2   0 1.40E+02
    144     701101    100     140 23 1 2 1 1 0 0 1.70E+00
    144     701101    100     140 23 2 2 1 2 0 0 1.70E+00
    144     742101    600     200 31 3 3 1 2 0 0 1.20E+00
    144     763121    800     200 31 3 4 0 2 0 0 1.20E+00
    144     701101    100     140 23 1 2 1 2 0 0 1.70E+00
        H-3    * 1.05E-06 C-14   * 1.19E-06 NI-63  W 8.40E-06 SR-90  D 6.72E+01
        TC-99  D 7.00E-03 RU-106 Y 3.08E-02 SB-125 W 1.33E-01 SN-126 W 3.50E-04
        I-129  D 1.82E-09 CS-134 D 5.81E-02 CS-135 D 9.80E-04 CS-137 D 7.00E+01
        EU-152 W 4.62E-03 EU-154 W 1.75E-00 NP-237 W 9.80E-05 PU-238 Y 7.70E-02
        PU-239 Y 2.45E-02 PU-241 Y 9.80E-01 PU-242 Y 1.47E-05 AM-241 W 1.05E-01
        AM-243 W 2.03E-03 CM-242 W 1.82E-03 CM-243 W 2.94E-04 CM-244 W 9.10E-02
              1.46E+02                                                              $
W-DDHTLQD    2  37 9.85E+02
    145     701101    100     140 23 1 2 1 1 0 0 1.70E+00
    145     701101    100     140 23 2 2 1 2 0 0 1.70E+00
    145     742101    600     200 31 3 3 1 2 0 0 1.20E+00
    145     763121    800     200 31 3 4 0 2 0 0 1.20E+00
    145     701101    100     140 23 1 2 1 2 0 0 1.70E+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 1.00E+03 1.00E+04
         .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 2.03E-01 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 2.45E+02 2.00E+03
        H-3    * 7.38E-06 C-14   * 8.36E-06 NI-63  W 5.90E-05 SR-90  D 4.72E+02
        TC-99  D 4.92E-02 RU-106 Y 2.16E-01 SB-125 W 9.35E-01 SN-126 W 2.46E-03
        I-129  D 1.28E-08 CS-134 D 4.08E-01 CS-135 D 6.89E-03 CS-137 D 4.92E+02
        EU-152 W 3.25E-02 EU-154 W 1.23E+01 NP-237 W 1.47E-04 PU-238 Y 1.15E-01
        PU-239 Y 3.67E-02 PU-241 Y 6.89E+00 PU-242 Y 2.20E-05 AM-241 W 1.57E-01
        AM-243 W 3.04E-03 CM-242 W 1.28E-02 CM-243 W 4.14E-04 CM-244 W 1.36E-01
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                1.02E+03                                                            $
W-DDRESIN    2    0 3.93E+02
    146     700001    100     100 11 1 1 0 0 0 0 9.00E-01
    146     701101    100     140 23 2 2 0 2 0 0 1.70E+00
    146     702101    100     200 31 3 3 0 2 0 0 1.20E+00
    146     763121   1800     200 31 3 4 0 2 0 0 1.20E+00
    146     704001    100     100 11 1 1 0 3 0 0 9.00E-01
        H-3    * 2.94E-06 C-14    * 3.33E-06 NI-63  W 2.35E-05 SR-90  D 1.88E+02
        TC-99  D 1.96E-02 RU-106 Y 8.62E-02 SB-125 W 3.72E-01 SN-126 W 9.80E-04
        I-129  D 5.10E-09 CS-134 D 1.63E-01 CS-135 D 2.74E-03 CS-137 D 1.96E+02
        EU-152 W 1.29E-02 EU-154 W 4.90E+00 NP-237 W 2.74E-04 PU-238 Y 2.16E-01
        PU-239 Y 6.86E-02 PU-241 Y 2.74E+00 PU-242 Y 4.12E-05 AM-241 W 2.94E-01
        AM-243 W 5.68E-03 CM-242 W 5.10E-03 CM-243 W 8.23E-04 CM-244 W 2.55E-01
                4.06E+02                                                            $
L-SPENTFU    2    0 1.12E+06
    147     800001    200     100 33 3 1 0 0 0 0 8.00E+00
    147     805101    200     100 33 3 1 0 4 0 0 8.00E+00
    147     805101    200     100 33 3 1 0 4 0 0 8.00E+00
    147     305101    200     100 33 3 1 0 4 0 0 8.00E+00
    147     805101    200     100 33 3 1 0 4 0 0 8.00E+00
        H-3    * 1.04E+03 C-14    * 1.98E+00 FE-55  Y 2.22E+02 CO-60  Y 2.47E+02
        NI-59  W 7.41E-02 NI-63  W 9.88E+00 SR-90  D 1.61E+05 TC-99  D 3.21E+01
        RU-106 Y 4.20E+05 CM-244 W 3.21E+03 SN-126 W 1.19E+00 I-129  D 8.15E-02
        CS-135 D 6.67E-01 CS-137 D 2.27E+05 EU-152 W 2.96E+01 EU-154 W 1.36E+04
        U-234  Y 5.19E-02 U-235  Y 3.95E-02 U-236  Y 5.43E-01 U-238  Y 7.90E-01
        NP-237 W 7.66E-01 PU-236 Y 5.68E-01 PU-238 Y 5.19E+03 PU-239 Y 7.16E+02
        PU-240 Y 1.11E+03 PU-241 Y 2.72E+05 PU-242 Y 3.95E+00 AM-241 W 9.14E+02
        AM-243 W 3.46E+01 CM-242 W 8.89E+03 CM-243 W 9.63E+00          2.47E+06$
L-FUEHARD    2    0 1.49E+05
    148     800001    100     100 33 3 1 0 011 0 7.80E+00
    148     805101    100     100 33 3 1 0 411 0 7.80E+00
    148     805101    100     100 33 3 1 0 411 0 7.80E+00
    148     805101    100     100 33 3 1 0 411 0 7.80E+00
    148     805101    100     100 33 3 1 0 411 0 7.80E+00
        C-14   * 8.90E-01 FE-55  Y 7.10E+04 CO-60  Y 7.10E+04 NI-59  W 5.40E+01
        NI-63  W 7.40E+03 SR-90  D 1.80E-02 NB-94  Y 1.80E-03 TC-99  D 1.30E-01$
```

C.6 LIMITS.DAT File

```
H-3    * 1.23E+01 4 4.0E+01 1.0E+20 1.0E+20 1.0E+20 8.0E+00 1.0E+20 1.0E+20 1.0E+20 1.0E+20  1
C-14   * 5.73E+03 3 8.0E-01 8.0E-01 8.0E+00 8.0E+01 2.0E-01 2.0E-01 2.0E+00 2.0E+01 1.0E+20  2
NA-22  D 2.62E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20  3
CL-36  D 3.08E+05 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  4
CL-36  W 3.08E+05 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  5
FE-55  W 2.60E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20  6
FE-55  Y 2.60E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20  7
CO-60  W 5.26E+00 4 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20  8
CO-60  Y 5.26E+00 4 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20  9
NI-59  D 8.00E+04 3 2.2E+00 2.2E+00 2.2E+01 2.2E+02 5.0E-01 5.0E-01 5.0E+00 5.0E+01 1.0E+20 10
NI-59  W 8.00E+04 3 2.2E+00 2.2E+00 2.2E+01 2.2E+02 5.0E-01 5.0E-01 5.0E+00 5.0E+01 1.0E+20 11
NI-63  D 9.20E+01 5 3.5E+00 7.0E+01 7.0E+02 7.0E+03 7.0E-01 1.5E+01 1.5E+02 1.5E+03 1.0E+20 12
NI-63  W 9.20E+01 5 3.5E+00 7.0E+01 7.0E+02 7.0E+03 7.0E-01 1.5E+01 1.5E+02 1.5E+03 1.0E+20 13
SR-90  D 2.81E+01 4 4.0E-02 1.5E+02 7.0E+03 7.0E+04 8.0E-03 3.2E+01 1.5E+03 1.5E+04 1.0E+20 14
SR-90  Y 2.81E+01 4 4.0E-02 1.5E+02 7.0E+03 7.0E+04 8.0E-03 3.2E+01 1.5E+03 1.5E+04 1.0E+20 15
NB-94  W 2.00E+04 3 2.0E-03 2.0E-03 2.0E-02 2.0E-01 4.0E-04 4.0E-04 4.0E-03 4.0E-02 1.3E+02 16
NB-94  Y 2.00E+04 3 2.0E-03 2.0E-03 2.0E-02 2.0E-01 4.0E-04 4.0E-04 4.0E-03 4.0E-02 1.3E+02 17
TC-99  D 2.12E+05 2 3.0E-01 3.0E-01 3.0E+00 3.0E+01 6.0E-02 6.0E-02 6.0E-01 6.0E+00 1.0E+20 18
TC-99  W 2.12E+05 2 3.0E-01 3.0E-01 3.0E+00 3.0E+01 6.0E-02 6.0E-02 6.0E-01 6.0E+00 1.0E+20 19
RU-106 Y 1.01E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 20
AG-108 D 1.27E+02 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 21
AG-108 W 1.27E+02 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 22
AG-108 Y 1.27E+02 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 23
CD-109 D 1.24E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 24
CD-109 W 1.24E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 25
CD-109 Y 1.24E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 26
SN-126 D 1.05E+05 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 27
SN-126 W 1.05E+05 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 28
SB-125 D 2.71E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 29
SB-125 W 2.71E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 30
I-129  D 1.17E+07 2 8.0E-03 8.0E-03 8.0E-02 8.0E-01 2.0E-03 2.0E-03 2.0E-02 2.0E-01 1.0E+20 31
CS-134 D 2.05E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 32
CS-135 D 3.00E+06 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 33
CS-137 D 3.00E+01 4 1.0E+00 4.4E+01 4.6E+03 1.1E+04 2.0E-01 9.0E+00 7.4E+02 7.4E+02 5.5E+03 34
EU-152 W 1.27E+01 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 35
EU-154 W 1.60E+01 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 36
PB-210 W 2.04E+01 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 37
AC-227 Y 2.16E+01 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 38
AC-227 W 2.16E+01 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 39
TH-228 Y 1.91E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 40
TH-228 W 1.91E+00 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 41
TH-229 Y 7.34E+03 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 42
TH-229 W 7.34E+03 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 43
RN-222 * 1.05E-02 6 7.0E+02 1.0E+20 1.0E+20 1.0E+20 1.5E+02 1.0E+20 1.0E+20 1.0E+20 1.0E+20 44
RA-226 W 1.60E+03 1 2.0E+00 2.0E+00 2.0E+01 2.0E+02 3.0E-03 3.0E-03 3.0E-02 3.0E-01 2.3E+03 45
RA-228 W 6.70E+00 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 46
TH-230 Y 8.00E+04 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 47
TH-230 W 8.00E+04 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 48
TH-232 Y 1.41E+10 0  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00  .0E+00 49
```

TH-232	W	1.41E+10	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	50
PA-231	Y	3.25E+04	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	51
PA-231	W	3.25E+04	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	52
U-232	Y	7.20E+01	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	53
U-232	W	7.20E+01	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	54
U-232	D	7.20E+01	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	55
U-233	Y	1.62E+05	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	56
U-233	W	1.62E+05	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	57
U-233	D	1.62E+05	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	58
U-234	Y	2.47E+05	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	59
U-234	W	2.47E+05	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	60
U-234	D	2.47E+05	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	61
U-235	Y	7.10E+08	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	62
U-235	W	7.10E+08	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	63
U-235	D	7.10E+08	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	64
U-236	Y	2.39E+07	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	65
U-236	W	2.39E+07	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	66
U-236	D	2.39E+07	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	67
U-238	Y	4.51E+09	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	68
U-238	W	4.51E+09	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	69
U-238	D	4.51E+09	0	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	70
NP-237	Y	2.14E+06	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	2.0E+00	2.0E+00	2.0E+01	2.0E+02	1.9E+04	71
NP-237	W	2.14E+06	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	2.0E+00	2.0E+00	2.0E+01	2.0E+02	1.9E+04	72
PU-236	Y	2.85E+00	6	7.0E+02	1.0E+20	1.0E+20	1.0E+20	1.5E+02	1.0E+20	1.0E+20	1.0E+20	1.0E+20	73
PU-236	W	2.85E+00	6	7.0E+02	1.0E+20	1.0E+20	1.0E+20	1.5E+02	1.0E+20	1.0E+20	1.0E+20	1.0E+20	74
PU-238	Y	8.64E+01	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	75
PU-238	W	8.64E+01	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	76
PU-239	Y	2.44E+04	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	77
PU-239	W	2.44E+04	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	78
PU-240	Y	6.58E+03	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	79
PU-240	W	6.58E+03	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	80
PU-241	Y	1.32E+01	1	3.5E+02	3.5E+02	3.5E+03	3.5E+04	1.0E-01	1.0E-01	1.0E+00	1.0E+00	1.0E+20	81
PU-241	W	1.32E+01	1	3.5E+02	3.5E+02	3.5E+03	3.5E+04	1.0E-01	1.0E-01	1.0E+00	1.0E+00	1.0E+20	82
PU-242	Y	3.79E+05	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	83
PU-242	W	3.79E-05	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	84
PU-244	Y	7.60E+07	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	85
PU-244	W	7.60E+07	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	86
AM-241	Y	4.58E+02	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	87
AM-241	W	4.58E+02	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	88
AM-243	Y	7.95E+03	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	89
AM-243	W	7.95E+03	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	90
CM-242	Y	4.45E-01	1	2.0E+03	2.0E+03	2.0E+04	2.0E+05	7.0E-01	7.0E-01	7.0E+00	7.0E+01	1.0E+20	91
CM-242	W	4.45E-01	1	2.0E+03	2.0E+03	2.0E+04	2.0E+05	7.0E-01	7.0E-01	7.0E+00	7.0E+01	1.0E+20	92
CM-243	Y	3.20E+01	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	93
CM-243	W	3.20E+01	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	94
CM-244	Y	1.76E+01	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	95
CM-244	W	1.76E+01	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	96
CM-248	Y	4.70E+05	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	97
CM-248	W	4.70E+05	1	1.0E+01	1.0E+01	1.0E+02	1.0E+03	4.0E-03	4.0E-03	4.0E-02	4.0E-01	1.9E+04	98
CF-252	Y	2.65E+00	6	7.0E+02	1.0E+20	1.0E+20	1.0E+20	1.5E+02	1.0E+20	1.0E+20	1.0E+20	1.0E+20	99
CF-252	W	2.65E+00	6	7.0E+02	1.0E+20	1.0E+20	1.0E+20	1.5E+02	1.0E+20	1.0E+20	1.0E+20	1.0E+20	00

C.7 METALS.DAT File

```
 1 L-NFRCOMP   2190.     .17
 2 N-HIGHACT    164.     .28
 3 R-FUEHARD   3610.     .17
 4 R-HULLFRP     42.     .17
 5 P-DECORES   1840.     .17
 6 P-DEACINT   2190.     .17
 7 P-DEACVES    850.     .17
 8 B-DECORES   3350.     .17
 9 B-DEACINT   2190.     .17
10 B-DEACVES   1060.     .17
11 L-FUEHARD   3610.     .17
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C.8 FUNDCF.DAT File

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H-3    *  1.23E+01 1.15E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 9.00E-01 9.00E-01 9.00E-01
       1  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  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
       1   .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       1   .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       1  1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 4.80E+00 1.20E-02 1.40E-02 9.00E-01 9.00E-01
C-14   *  5.73E+03 5.76E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 7.50E-01 7.50E-01 7.50E-01
       2  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
       2  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
       2   .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       2   .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
       2  1.00E+01 1.00E+01 1.00E+01 1.00E+01 1.00E+01 5.50E+00 3.10E-02 1.60E-02 4.60E+03 9.10E+03
NA-22  D  2.62E+00 1.62E-04 1.34E-05 6.91E-02 2.19E+00 7.84E-01 2.50E-03 5.00E-03 1.90E-02
       3  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
       3  9.43E-06 6.22E-06 7.53E-06 9.16E-06 9.91E-06 9.45E-06 1.30E-05 1.60E-05 8.14E-06 1.14E-05
       3  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
       3  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
       3  8.50E+01 1.74E+02 3.53E+02 7.20E+02 1.47E+03 4.60E-03 8.30E-02 3.50E-02 1.00E+02 2.00E+02
CL-36  D  3.08E+05 1.15E-01 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.50E-03 5.00E-03 1.90E-02
       4  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  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
       4  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
       4  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
       4  2.00E+00 3.00E+00 4.00E+00 5.00E+00 7.00E+00 5.00E+00 8.00E-02 1.70E-02 5.00E+01 1.00E+02
CL-36  W  3.08E+05 1.15E-01 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.50E-03 5.00E-03 1.90E-02
       5  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
       5  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
       5  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
       5  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
       5  2.00E+00 3.00E+00 4.00E+00 5.00E+00 7.00E+00 5.00E+00 8.00E-02 1.70E-02 5.00E+01 1.00E+02
FE-55  W  2.60E+00 1.48E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.50E-03 5.00E-03 1.90E-02
       6  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
       6  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
       6  1.26E-09 3.24E-10 6.53E-10 1.59E-08 1.91E-12 1.55E-11 4.14E-10 2.04E-09 7.96E-10 7.66E-09
       6  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 3.98E-08
       6  6.30E+02 1.29E+03 2.64E+03 5.40E+03 1.11E+04 4.20E-04 1.90E-02 2.70E-04 1.00E+02 3.20E+03
FE-55  Y  2.60E+00 1.48E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.50E-03 5.00E-03 1.90E-02
       7  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
       7  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
       7  1.26E-09 3.24E-10 6.56E-10 1.59E-08 1.91E-12 1.55E-11 4.14E-10 2.04E-09 7.96E-10 7.66E-09
       7  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 3.98E-08
       7  6.30E+02 1.29E+03 2.64E+03 5.40E+03 1.11E+04 4.20E-04 1.90E-02 2.70E-04 1.00E+02 3.20E+03
CO-60  W  5.26E+00 1.48E-02 1.55E-05 5.75E-02 2.51E+00 1.25E+00 2.50E-03 5.00E-03 1.90E-02
       8  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-06 1.13E-05
       8  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
       8  2.02E-04 1.86E-04 1.85E-04 2.14E-04 2.01E-04 1.91E-04 2.04E-04 2.16E-04 2.52E-04 2.07E-04
       8  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 1.19E-02
       8  4.20E+02 8.61E+02 1.76E+03 3.60E+03 7.38E+03 1.50E-02 9.70E-03 1.80E-03 5.00E+01 2.00E+02
CO-60  Y  5.26E+00 1.48E-02 1.55E-05 5.75E-02 2.51E+00 1.25E+00 2.50E-03 5.00E-03 1.90E-02
       9  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-06 1.13E-05
       9  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
       9  2.02E-04 1.86E-04 1.85E-04 2.14E-04 2.01E-04 1.91E-04 2.04E-04 2.16E-04 2.52E-04 2.07E-04
       9  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 1.19E-02
       9  4.20E+02 8.61E+02 1.76E+03 3.60E+03 7.38E+03 1.50E-02 9.70E-03 1.80E-03 5.00E+01 2.00E+02
NI-59  D  8.00E+04 1.48E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.50E-03 5.00E-03 1.90E-02
      10  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
      10  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
      10  2.37E-09 6.11E-10 1.23E-09 3.00E-08 3.59E-12 2.91E-11 7.77E-10 3.85E-09 1.50E-09 1.45E-08
      10  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 6.70E-08
      10  4.20E+02 8.61E+02 1.76E+03 3.60E+03 7.38E+03 2.10E-02 2.00E-03 1.00E-03 1.00E+02 1.00E+02
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NI-59	W	8.00E+04	1.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	5.00E-03	1.90E-02	
	11	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
	11	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	9.18E-07
	11	2.37E-09	6.11E-10	1.23E-09	3.00E-08	3.59E-12	2.91E-11	7.77E-10	3.85E-09	1.50E-09	1.45E-08
	11	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	6.70E-08
	11	4.20E+02	8.61E+02	1.76E+03	3.60E+03	7.38E+03	2.10E-02	2.00E-03	1.00E-03	1.00E+02	1.00E+02
NI-63	D	9.20E+01	1.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	5.00E-03	1.90E-02	
	12	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
	12	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
	12	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
	12	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
	12	4.20E+02	8.61E+02	1.76E+03	3.60E+03	7.38E+03	2.10E-02	2.00E-03	1.00E-03	1.00E+02	1.00E+02
NI-63	W	9.20E+01	1.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	5.00E-03	1.90E-02	
	13	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
	13	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
	13	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
	13	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
	13	4.20E+02	8.61E+02	1.76E+03	3.60E+03	7.38E+03	2.10E-02	2.00E-03	1.00E-03	1.00E+02	1.00E+02
SR-90	D	2.81E+01	9.86E-03	1.92E-13	4.31E-02	3.06E-08	2.19E+00	2.50E-03	5.00E-03	1.90E-02	
	14	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
	14	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
	14	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
	14	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
	14	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	7.50E-02	5.90E-04	1.40E-03	3.00E+01	1.00E+02
SR-90	Y	2.81E+01	9.86E-03	1.92E-13	4.31E-02	3.06E-08	2.19E+00	2.50E-03	5.00E-03	1.90E-02	
	15	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
	15	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
	15	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
	15	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
	15	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	7.50E-02	5.90E-04	1.40E-03	3.00E+01	1.00E+02
NB-94	W	2.00E+04	1.11E-02	9.50E-06	7.14E-02	1.56E+00	7.88E-01	2.50E-03	5.00E-03	1.90E-02	
	16	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
	16	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
	16	1.40E-04	1.30E-04	1.27E-04	1.49E-04	1.38E-04	1.31E-04	1.42E-04	1.55E-04	1.76E-04	1.44E-04
	16	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	7.43E-03
	16	1.00E+03	2.16E+03	4.63E+03	1.00E+04	2.16E+04	9.40E-03	2.50E-01	2.00E-02	3.00E+04	1.00E+02
NB-94	Y	2.00E+04	1.11E-02	9.50E-06	7.14E-02	1.56E+00	7.88E-01	2.50E-03	5.00E-03	1.90E-02	
	17	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
	17	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
	17	1.40E-04	1.30E-04	1.27E-04	1.49E-04	1.38E-04	1.31E-04	1.42E-04	1.55E-04	1.76E-04	1.44E-04
	17	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	7.43E-03
	17	1.00E+03	2.16E+03	4.63E+03	1.00E+04	2.16E+04	9.40E-03	2.50E-01	2.00E-02	3.00E+04	1.00E+02
TC-99	D	2.12E+05	1.15E-01	1.39E-14	1.82E-01	5.83E-09	8.97E-02	1.00E-02	1.00E-02	3.80E-02	
	18	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
	18	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
	18	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	5.08E-11
	18	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	2.15E-09
	18	2.00E+00	3.00E+00	4.00E+00	5.00E+00	7.00E+00	1.10E+00	8.70E-03	9.90E-03	1.50E+01	5.00E+00
TC-99	W	2.12E+05	1.15E-01	1.39E-14	1.82E-01	5.83E-09	8.97E-02	1.00E-02	1.00E-02	3.80E-02	
	19	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
	19	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
	19	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	5.08E-11
	19	2.09E-09	1.82E-09	1.71E-09	2.34E-09	1.93E-09	1.69E-09	1.53E-09	3.65E-09	3.07E-09	2.15E-09
	19	2.00E+00	3.00E+00	4.00E+00	5.00E+00	7.00E+00	1.10E+00	8.70E-03	9.90E-03	1.50E+01	5.00E+00
RU-106	Y	1.01E+00	1.15E-01	1.11E-06	8.12E-02	1.85E-01	5.84E-01	1.00E-02	1.00E-02	3.80E-02	
	20	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
	20	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
	20	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	1.90E-05
	20	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	9.50E-04
	20	2.00E+00	3.00E+00	4.00E+00	5.00E+00	7.00E+00	1.40E-03	4.00E-01	6.10E-07	1.00E+01	3.00E+02

AG-108 D	1.27E+02	1.62E-04	8.81E-06	8.12E-02	1.47E+00	5.77E-01	2.50E-03	5.00E-03	1.90E-02	
21	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
21	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
21	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	1.51E-04
21	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	7.47E-03
21	8.50E+01	1.74E+02	3.53E+02	7.20E+02	1.47E+03	1.50E-01	1.90E-03	1.90E-02	2.30E+00	7.70E+02
AG-108 W	1.27E+02	1.62E-04	8.81E-06	8.12E-02	1.47E+00	5.77E-01	2.50E-03	5.00E-03	1.90E-02	
22	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
22	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
22	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	1.51E-04
22	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	7.47E-03
22	8.50E+01	1.74E+02	3.53E+02	7.20E+02	1.47E+03	1.50E-01	1.90E-03	1.90E-02	2.30E+00	7.70E+02
AG-108 Y	1.27E+02	1.62E-04	8.81E-06	8.12E-02	1.47E+00	5.77E-01	2.50E-03	5.00E-03	1.90E-02	
23	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
23	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
23	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	1.51E-04
23	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	7.47E-03
23	8.50E+01	1.74E+02	3.53E+02	7.20E+02	1.47E+03	1.50E-01	1.90E-03	1.90E-02	2.30E+00	7.70E+02
CD-109 D	1.24E+00	1.48E-02	2.27E-07	5.63E-01	2.75E-02	2.59E-02	2.50E-03	5.00E-03	1.90E-02	
24	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
24	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
24	7.75E-07	5.58E-07	5.34E-07	1.76E-06	9.07E-07	4.90E-07	3.86E-07	1.32E-06	1.39E-06	1.18E-06
24	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
24	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	3.00E-01	5.30E-04	1.00E-03	2.00E+02	2.00E+03
CD-109 W	1.24E+00	1.48E-02	2.27E-07	5.63E-01	2.75E-02	2.59E-02	2.50E-03	5.00E-03	1.90E-02	
25	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
25	5.40E-05	3.34E-06	1.09E-05	5.20E-05	4.22E-04	7.59E-05	3.77E-06	3.43E-06	2.83E-06	3.96E-05
25	7.75E-07	5.58E-07	5.34E-07	1.76E-06	9.07E-07	4.90E-07	3.86E-07	1.32E-06	1.39E-06	1.18E-06
25	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
25	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	3.00E-01	5.30E-04	1.00E-03	2.00E+02	2.00E+03
CD-109 Y	1.24E+00	1.48E-02	2.27E-07	5.63E-01	2.75E-02	2.59E-02	2.50E-03	5.00E-03	1.90E-02	
26	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
26	2.89E-04	1.54E-06	9.25E-06	6.39E-05	1.24E-04	2.32E-05	1.65E-06	1.46E-06	8.88E-07	4.51E-05
26	7.75E-07	5.58E-07	5.34E-07	1.76E-06	9.07E-07	4.90E-07	3.86E-07	1.32E-06	1.39E-06	1.18E-06
26	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
26	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	3.00E-01	5.30E-04	1.00E-03	2.00E+02	2.00E+03
SN-126 D	1.05E+05	1.62E-04	1.18E-05	8.26E-02	1.99E+00	4.83E-01	2.50E-03	5.00E-03	1.90E-02	
27	2.22E-06	[illegible]	1.60E-04	1.95E-05	3.03E-06	2.53E-06	1.01E-05	1.87E-05	2.04E-06	1.95E-05
27	5.96E-05	[illegible]	7.92E-05	8.66E-05	5.33E-05	4.74E-05	2.08E-04	4.37E-04	4.85E-05	8.66E-05
27	1.81E-04	1.67E-04	1.63E-04	1.93E-04	1.76E-04	1.68E-04	1.82E-04	2.09E-04	2.27E-04	1.86E-04
27	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	2.02E-02
27	8.50E+01	1.74E+02	3.53E+02	7.20E+02	1.47E+03	2.50E-03	8.00E-02	1.20E-03	3.00E+03	1.00E+03
SN-126 W	1.05E+05	1.62E-04	1.18E-05	8.26E-02	1.99E+00	4.83E-01	2.50E-03	5.00E-03	1.90E-02	
28	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
28	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
28	1.81E-04	1.67E-04	1.63E-04	1.93E-04	1.76E-04	1.68E-04	1.82E-04	2.09E-04	2.27E-04	1.86E-04
28	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	2.02E-02
28	8.50E+01	1.74E+02	3.53E+02	7.20E+02	1.47E+03	2.50E-03	8.00E-02	1.20E-03	3.00E+03	1.00E+03
SB-125 D	2.71E+00	1.62E-04	2.49E-06	8.71E-02	4.21E-01	4.88E-01	2.50E-03	5.00E-03	1.90E-02	
29	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
29	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
29	3.83E-05	3.52E-05	3.44E-05	4.19E-05	3.78E-05	3.57E-05	3.90E-05	4.55E-05	4.85E-05	4.00E-05
29	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	1.94E-03
29	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	1.10E-02	4.00E-03	1.10E-04	1.00E+00	1.00E+01
SB-125 W	2.71E+00	1.62E-04	2.49E-06	8.71E-02	4.21E-01	4.88E-01	2.50E-03	5.00E-03	1.90E-02	
30	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
30	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
30	3.83E-05	3.52E-05	3.44E-05	4.19E-05	3.78E-05	3.57E-05	3.90E-05	4.55E-05	4.85E-05	4.00E-05
30	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	1.94E-03
30	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	1.10E-02	4.00E-03	1.10E-04	1.00E+00	1.00E+01

I-129 D	1.17E+07	1.15E-01	1.61E-08	4.63E-01	3.00E-03	4.00E-02	1.00E-02	1.00E-02	3.80E-02	
31	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
31	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
31	1.07E-06	7.81E-07	6.70E-07	2.02E-06	1.77E-06	8.44E-07	4.03E-07	1.87E-06	2.17E-06	1.47E-06
31	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	2.80E-05
31	2.00E+00	3.00E+00	4.00E+00	5.00E+00	7.00E+00	4.50E-03	7.00E-03	9.90E-03	1.50E+01	5.00E+00
CS-134 D	2.05E+00	1.62E-04	9.41E-06	7.50E-02	1.56E+00	6.98E-01	2.50E-03	5.00E-03	1.90E-02	
32	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
32	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
32	1.39E-04	1.28E-04	1.25E-04	1.48E-04	1.36E-04	1.30E-04	1.41E-04	1.56E-04	1.74E-04	1.43E-04
32	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	7.25E-03
32	8.50E+01	1.74E+02	3.53E+02	7.20E+02	1.47E+03	5.00E-03	1.40E-02	7.10E-03	2.00E+03	1.00E+02
CS-135 D	3.00E+06	1.62E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	5.00E-03	1.90E-02	
33	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
33	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
33	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
33	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
33	8.50E+01	1.74E+02	3.53E+02	7.20E+02	1.47E+03	5.00E-03	1.40E-02	7.10E-03	2.00E+03	1.00E+02
CS-137 D	3.00E+01	1.62E-04	3.39E-06	7.77E-02	5.63E-01	6.62E-01	2.50E-03	5.00E-03	1.90E-02	
34	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
34	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
34	5.08E-05	4.69E-05	4.59E-05	5.43E-05	4.97E-05	5.73E-05	5.15E-05	5.74E-05	6.37E-05	5.29E-05
34	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	2.77E-03
34	8.50E+01	1.74E+02	3.53E+02	7.20E+02	1.47E+03	5.00E-03	1.40E-02	7.10E-03	2.00E+03	1.00E+02
EU-152 W	1.27E+01	1.11E-04	6.20E-06	7.04E-02	1.03E+00	6.04E-01	2.50E-03	5.00E-03	1.90E-02	
35	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
35	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
35	9.73E-05	8.92E-05	8.81E-05	1.04E-04	9.66E-05	9.10E-05	9.69E-05	1.11E-04	1.24E-04	1.00E-04
35	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	5.32E-03
35	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	2.50E-03	4.80E-03	2.00E-05	2.50E+01	1.00E+03
EU-154 W	1.60E+01	1.11E-04	6.91E-06	6.73E-02	1.14E+00	7.39E-01	2.50E-03	5.00E-03	1.90E-02	
36	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
36	2.93E-04	6.66E-05	6.62E-05	2.86E-04	1.25E-04	1.58E-03	3.92E-04	1.94E-03	2.64E-05	2.86E-04
36	1.06E-04	9.81E-05	9.66E-05	1.14E-04	1.05E-04	9.95E-05	1.07E-04	1.19E-04	1.34E-04	1.10E-04
36	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	5.89E-03
36	9.00E+00	1.80E+01	3.60E+01	7.30E+01	1.47E+02	2.50E-03	4.80E-03	2.00E-05	2.50E+01	1.00E+03
PB-210 W	2.04E+01	4.11E-03	1.03E-08	3.76E-01	1.96E-03	4.08E-02	2.50E-03	5.00E-03	1.90E-02	
37	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
37	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
37	1.45E-07	1.12E-07	9.73E-08	2.57E-07	1.64E-07	1.24E-07	6.52E-08	2.64E-07	2.43E-07	1.88E-07
37	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	4.82E-06
37	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	4.00E-03	7.10E-04	1.20E-04	1.00E+02	1.00E+02
AC-227 Y	2.16E+01	4.11E-03	1.78E-06	1.07E-01	3.19E-01	2.83E-01	2.50E-03	5.00E-03	1.90E-02	
38	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
38	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
38	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	4.26E-05
38	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	1.93E-03
38	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	6.00E-02	2.00E-05	2.50E+01	1.00E+03
AC-227 W	2.16E+01	4.11E-03	1.78E-06	1.07E-01	3.19E-01	2.83E-01	2.50E-03	5.00E-03	1.90E-02	
39	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
39	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
39	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	4.26E-05
39	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	1.93E-03
39	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	6.00E-02	2.00E-05	2.50E+01	1.00E+03
TH-228 Y	1.91E+00	4.11E-07	8.62E-06	5.48E-02	1.40E+00	9.62E-01	2.50E-03	5.00E-03	1.90E-02	
40	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
40	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
40	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	3.08E-04
40	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	1.96E-02
40	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	4.20E-03	2.00E-04	5.00E-06	3.00E+01	5.00E+02

FUNDCF.DAT

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TH-228 W  1.91E+00 4.11E-03 8.62E-06 5.48E-02 1.40E+00 9.62E-01 2.50E-03 5.00E-03 1.90E-02
      41  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
      41  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
      41  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 3.08E-04
      41  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 1.96E-02
      41  8.40E+02 1.72E+03 3.51E+03 7.20E+03 1.48E+04 4.20E-03 2.00E-04 5.00E-06 3.00E+01 5.00E+02
TH-229 Y  7.34E+03 4.11E-03 1.20E-06 1.07E-01 2.12E-01 2.25E-01 2.50E-03 5.00E-03 1.90E-02
      42  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
      42  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
      42  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 2.05E-04
      42  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 1.12E-02
      42  8.40E+02 1.72E+03 3.51E+03 7.20E+03 1.48E+04 4.20E-03 2.00E-04 5.00E-06 3.00E+01 5.00E+02
TH-229 W  7.34E+03 4.11E-03 1.20E-06 1.07E-01 2.12E-01 2.25E-01 2.50E-03 5.00E-03 1.90E-02
      43  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
      43  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
      43  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 2.05E-04
      43  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 1.12E-02
      43  8.40E+02 1.72E+03 3.51E+03 7.20E+03 1.48E+04 4.20E-03 2.00E-04 5.00E-06 3.00E+01 5.00E+02
RN-222 *  1.05E-02 1.00E+00 9.51E-06 6.39E-02 1.56E+00 8.37E-01 2.50E-03 5.00E-03 1.90E-02
      44  0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00
      44  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
      44  1.48E-04 1.36E-04 1.35E-04 1.57E-04 1.46E-04 1.39E-04 1.50E-04 1.65E-04 1.65E-04 1.51E-04
      44  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 2.20E-02
      44  1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 3.50E+00 2.00E-02 2.00E-02 1.00E+00 1.00E+00
RA-226 W  1.60E+03 4.11E-03 3.16E-08 1.30E-01 6.16E-03 1.86E-01 2.50E-03 5.00E-03 1.90E-02
      45  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
      45  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
      45  6.22E-07 5.62E-07 5.51E-07 6.67E-07 5.85E-07 5.70E-07 5.96E-07 9.18E-07 8.36E-07 6.42E-07
      45  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 2.21E-02
      45  3.00E+01 6.10E+01 1.23E+02 2.50E+02 5.08E+02 1.40E-02 5.10E-04 5.90E-04 5.00E+01 2.50E+02
RA-228 W  6.70E+00 4.11E-03 4.31E-06 6.96E-02 7.10E-01 7.40E-01 2.50E-03 5.00E-03 1.90E-02
      46  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
      46  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
      46  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 8.24E-05
      46  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 4.37E-03
      46  3.00E+01 6.10E+01 1.23E+02 2.50E+02 5.08E+02 1.40E-02 5.10E-04 5.90E-04 5.00E+01 2.50E+02
TH-230 Y  8.00E+04 4.11E-03 1.07E-09 2.11E-01 3.09E-04 7.54E-02 2.50E-03 5.00E-03 1.90E-02
      47  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
      47  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
      47  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 5.49E-08
      47  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 1.52E-06
      47  8.40E+02 1.72E+03 3.51E+03 7.20E+03 1.48E+04 4.20E-03 2.00E-04 5.00E-06 3.00E+01 5.00E+02
TH-230 W  8.00E+04 4.11E-03 1.07E-09 2.11E-01 3.09E-04 7.54E-02 2.50E-03 5.00E-03 1.90E-02
      48  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
      48  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
      48  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 5.49E-08
      48  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 1.52E-06
      48  8.40E+02 1.72E+03 3.51E+03 7.20E+03 1.48E+04 4.20E-03 2.00E-04 5.00E-06 3.00E+01 5.00E+02
TH-232 Y  1.41E+10 4.11E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.50E-03 5.00E-03 1.90E-02
      49  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
      49  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
      49  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 3.54E-08
      49  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 6.78E-07
      49  8.40E+02 1.72E+03 3.51E+03 7.20E+03 1.48E+04 4.20E-03 2.00E-04 5.00E-06 3.00E+01 5.00E+02
TH-232 W  1.41E+10 4.11E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.50E-03 5.00E-03 1.90E-02
      50  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
      50  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 4.18E-01
      50  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 3.54E-08
      50  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 6.78E-07
      50  8.40E+02 1.72E+03 3.51E+03 7.20E+03 1.48E+04 4.20E-03 2.00E-04 5.00E-06 3.00E+01 5.00E+02
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PA-231 Y	3.25E+04	4.11E-03	2.05E-07	1.31E-01	3.73E-02	1.39E-01	2.50E-03	5.00E-03	1.90E-02	
51	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
51	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
51	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	2.98E-06
51	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	1.30E-04
51	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	8.00E-02	5.00E-06	1.10E+01	1.10E+02
PA-231 W	3.25E+04	4.11E-03	2.05E-07	1.31E-01	3.73E-02	1.39E-01	2.50E-03	5.00E-03	1.90E-02	
52	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
52	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
52	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	2.98E-06
52	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	1.30E-04
52	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	8.00E-02	5.00E-06	1.10E+01	1.10E+02
U-232 Y	7.20E+01	1.25E-04	8.32E-10	2.11E-01	2.04E-04	7.58E-02	2.50E-03	5.00E-03	1.90E-02	
53	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
53	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
53	[illegible].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	5.46E-08
53	[illegible]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	9.72E-07
53	8.4[illegible]+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-232 W	7.20E[illegible]	1.25E-04	8.32E-10	2.11E-01	2.04E-04	7.58E-02	2.50E-03	5.00E-03	1.90E-02	
54	3.24E-05	[illegible].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
54	6.70E-02	[illegible]4E-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
54	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	5.46E-08
54	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	9.72E-07
54	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-232 D	7.20E+01	1.25E-04	8.32E-10	2.11E-01	2.04E-04	7.58E-02	2.50E-03	5.00E-03	1.90E-02	
55	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
55	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
55	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	5.46E-08
55	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	9.72E-07
55	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-233 Y	1.62E+05	1.25E-04	3.16E-10	2.03E-01	7.06E-05	8.01E-02	2.50E-03	5.00E-03	1.90E-02	
56	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
56	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
56	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	3.16E-08
56	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	9.54E-07
56	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-233 W	1.62E+05	1.25E-04	3.16E-10	2.03E-01	7.06E-05	8.01E-02	2.50E-03	5.00E-03	1.90E-02	
57	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
57	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
57	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	3.16E-08
57	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	9.54E-07
57	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-233 D	1.62E+05	1.25E-04	3.16E-10	2.03E-01	7.06E-05	8.01E-02	2.50E-03	5.00E-03	1.90E-02	
58	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
58	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
58	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	3.16E-08
58	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	9.54E-07
58	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-234 Y	2.47E+05	1.25E-04	4.89E-10	2.23E-01	1.19E-04	7.13E-02	2.50E-03	5.00E-03	1.90E-02	
59	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
59	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
59	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	3.98E-08
59	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	5.16E-07
59	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-234 W	2.47E+05	1.25E-04	4.89E-10	2.23E-01	1.19E-04	7.13E-02	2.50E-03	5.00E-03	1.90E-02	
60	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
60	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
60	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	3.98E-08
60	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	5.16E-07
60	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01

U-234	D	2.47E+05	1.25E-04	4.89E-10	2.23E-01	1.19E-04	7.13E-02	2.50E-03	5.00E-03	1.90E-02	
	61	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
	61	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
	61	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	3.98E-08
	61	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	5.16E-07
	61	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-235	Y	7.10E+08	1.25E-04	7.46E-07	1.37E-01	1.47E-01	1.47E-01	2.50E-03	5.00E-03	1.90E-02	
	62	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
	62	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
	62	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	1.59E-05
	62	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	7.01E-04
	62	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-235	W	7.10E+08	1.25E-04	7.46E-07	1.37E-01	1.47E-01	1.47E-01	2.50E-03	5.00E-03	1.90E-02	
	63	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
	63	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
	63	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	1.59E-05
	63	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	7.01E-04
	63	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-235	D	7.10E+08	1.25E-04	7.46E-07	1.37E-01	1.47E-01	1.47E-01	2.50E-03	5.00E-03	1.90E-02	
	64	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
	64	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
	64	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	1.59E-05
	64	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	7.01E-04
	64	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-236	Y	2.39E+07	1.25E-04	2.62E-10	2.58E-01	6.01E-05	6.14E-02	2.50E-03	5.00E-03	1.90E-02	
	65	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
	65	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
	65	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	3.51E-08
	65	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	3.90E-07
	65	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-236	W	2.39E+07	1.25E-04	2.62E-10	2.58E-01	6.01E-05	6.14E-02	2.50E-03	5.00E-03	1.90E-02	
	66	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
	66	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
	66	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	3.51E-08
	66	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	3.90E-07
	66	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-236	D	2.39E+07	1.25E-04	2.62E-10	2.58E-01	6.01E-05	6.14E-02	2.50E-03	5.00E-03	1.90E-02	
	67	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
	67	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
	67	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	3.51E-08
	67	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	3.90E-07
	67	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-238	Y	4.51E+09	1.25E-04	6.55E-08	1.25E-01	1.51E-02	1.42E-01	2.50E-03	5.00E-03	1.90E-02	
	68	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
	68	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
	68	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	1.78E-04
	68	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	9.30E-03
	68	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-238	W	4.51E+09	1.25E-04	6.55E-08	1.25E-01	1.51E-02	1.42E-01	2.50E-03	5.00E-03	1.90E-02	
	69	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
	69	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
	69	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	1.78E-04
	69	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	9.30E-03
	69	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01
U-238	D	4.51E+09	1.25E-04	6.55E-08	1.25E-01	1.51E-02	1.42E-01	2.50E-03	5.00E-03	1.90E-02	
	70	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
	70	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
	70	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	1.78E-04
	70	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	9.30E-03
	70	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	2.50E-03	3.40E-04	6.10E-04	2.00E+00	6.00E+01

FUNDCF.DAT

NP-237 Y	2.14E+06	4.67E-04	1.10E-06	1.22E-01	2.18E-01	1.89E-01	2.50E-03	5.00E-03	1.90E-02	
71	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
71	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
71	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	2.28E-05
71	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	1.02E-03
71	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	6.00E-02	2.00E-04	5.00E-06	1.00E+01	4.00E+02
NP-237 W	2.14E+06	4.67E-04	1.10E-06	1.22E-01	2.18E-01	1.89E-01	2.50E-03	5.00E-03	1.90E-02	
72	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
72	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
72	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	2.28E-05
72	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	1.02E-03
72	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	6.00E-02	2.00E-04	5.00E-06	1.00E+01	4.00E+02
PU-236 Y	2.85E+00	4.67E-04	1.46E-10	2.22E-01	3.19E-05	7.21E-02	2.50E-03	5.00E-03	1.90E-02	
73	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
73	4.45E-01	3.45E-06	1.30E-04	1.10E-02	6.60E-03	5.00E-02	1.80E-02	2.09E-01	3.40E-04	7.95E-02
73	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	4.64E-08
73	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	3.41E-07
73	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-236 W	2.85E+00	4.67E-04	1.46E-10	2.22E-01	3.19E-05	7.21E-02	2.50E-03	5.00E-03	1.90E-02	
74	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
74	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
74	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	4.64E-08
74	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	3.41E-07
74	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-238 Y	8.64E+01	4.67E-04	1.09E-10	2.97E-01	2.64E-05	5.45E-02	2.50E-03	5.00E-03	1.90E-02	
75	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
75	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
75	1.22E-08	5.66E-09	7.22E-09	7.66E-08	2.67E-09	2.63E-09	4.51E-09	2.05E-08	1.51E-08	3.94E-08
75	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	2.33E-07
75	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-238 W	8.64E+01	4.67E-04	1.09E-10	2.97E-01	2.64E-05	5.45E-02	2.50E-03	5.00E-03	1.90E-02	
76	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
76	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
76	1.22E-08	5.66E-09	7.22E-09	7.66E-08	2.67E-09	2.63E-09	4.51E-09	2.05E-08	1.51E-08	3.94E-08
76	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	2.33E-07
76	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-239 Y	2.44E+04	4.67E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	5.00E-03	1.90E-02	
77	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
77	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
77	8.95E-09	6.03E-09	6.55E-09	3.37E-08	4.85E-09	4.85E-09	5.59E-09	1.47E-08	1.17E-08	1.94E-08
77	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	2.92E-07
77	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-239 W	2.44E+04	4.67E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	5.00E-03	1.90E-02	
78	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
78	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
78	8.95E-09	6.03E-09	6.55E-09	3.37E-08	4.85E-09	4.35E-09	5.59E-09	1.47E-08	1.17E-08	1.94E-08
78	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	2.92E-07
78	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-240 Y	6.58E+03	4.67E-04	1.32E-10	2.99E-01	2.87E-05	5.45E-02	2.50E-03	5.00E-03	1.90E-02	
79	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
79	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
79	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	3.78E-08
79	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	2.31E-07
79	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-240 W	6.58E+03	4.67E-04	1.32E-10	2.99E-01	2.87E-05	5.45E-02	2.50E-03	5.00E-03	1.90E-02	
80	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
80	6.00E-02	2.62E-06	1.00E-04	1.24E-01	2.56E-01	1.97E+00	7.55E-01	1.04E+01	1.50E-02	6.00E-01
80	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	3.78E-08
80	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	2.31E-07
80	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02

PU-241 Y	1.32E+01	4.67E-04	1.37E-12	1.41E-01	2.83E-07	1.49E-01	2.50E-03	5.00E-03	1.90E-02	
81	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
81	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
81	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
81	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
81	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-241 W	1.32E+01	4.67E-04	1.37E-12	1.41E-01	2.83E-07	1.49E-01	2.50E-03	5.00E-03	1.90E-02	
82	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
82	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
82	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
82	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
82	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-242 Y	3.79E+05	4.67E-04	1.29E-10	2.93E-01	2.82E-05	5.53E-02	2.50E-03	5.00E-03	1.90E-02	
83	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
83	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
83	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	3.14E-08
83	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	1.99E-07
83	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-242 W	3.79E+05	4.67E-04	1.29E-10	2.93E-01	2.82E-05	5.53E-02	2.50E-03	5.00E-03	1.90E-02	
84	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
84	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
84	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	3.14E-08
84	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	1.99E-07
84	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-244 Y	7.60E+07	4.67E-04	1.62E-06	7.96E-02	2.69E-01	5.85E-01	2.50E-03	5.00E-03	1.90E-02	
85	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
85	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
85	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	3.02E-05
85	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	1.52E-03
85	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
PU-244 W	7.60E+07	4.67E-04	1.62E-06	7.96E-02	2.69E-01	5.85E-01	2.50E-03	5.00E-03	1.90E-02	
86	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
86	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
86	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	3.02E-05
86	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	1.52E-03
86	8.40E+02	1.72E+03	3.51E+03	7.20E+03	1.48E+04	5.60E-04	3.90E-04	1.00E-07	2.50E+01	1.00E+02
AM-241 Y	4.58E+02	4.11E-03	7.65E-08	2.52E-01	2.14E-02	6.00E-02	2.50E-03	5.00E-03	1.90E-02	
87	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
87	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
87	2.01E-06	1.64E-06	1.45E-06	2.66E-06	1.98E-06	1.78E-06	1.08E-06	3.69E-06	3.17E-06	2.21E-06
87	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	7.29E-05
87	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	5.60E-03	3.90E-03	4.10E-07	2.50E+02	1.00E+03
AM-241 W	4.58E+02	4.11E-03	7.65E-08	2.52E-01	2.14E-02	6.00E-02	2.50E-03	5.00E-03	1.90E-02	
88	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
88	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
88	2.01E-06	1.64E-06	1.45E-06	2.66E-06	1.98E-06	1.78E-06	1.08E-06	3.69E-06	3.17E-06	2.21E-06
88	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	7.29E-05
88	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	5.60E-03	3.90E-03	4.10E-07	2.50E+02	1.00E+03
AM-243 Y	7.95E+03	4.11E-03	9.41E-07	1.54E-01	2.19E-01	1.21E-01	2.50E-03	5.00E-03	1.90E-02	
89	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
89	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
89	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	2.12E-05
89	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	9.16E-04
89	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	5.60E-03	3.90E-03	4.10E-07	2.50E+02	1.00E+03
AM-243 W	7.95E+03	4.11E-03	9.41E-07	1.54E-01	2.19E-01	1.21E-01	2.50E-03	5.00E-03	1.90E-02	
90	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
90	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
90	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	2.12E-05
90	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	9.16E-04
90	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	5.60E-03	3.90E-03	4.10E-07	2.50E+02	1.00E+03

CM-242 Y	4.45E-01	4.67E-04	4.81E-10	1.82E-01	1.09E-04	9.32E-02	2.50E-03	5.00E-03	1.90E-02	
91	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
91	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
91	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	4.41E-08
91	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	2.59E-07
91	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CM-242 W	4.45E-01	4.67E-04	4.81E-10	1.82E-01	1.09E-04	9.32E-02	2.50E-03	5.00E-03	1.90E-02	
92	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
92	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	[illegible]
92	1.44E-08	6.70E-09	8.48E-09	8.52E-08	2.78E-09	2.82E-09	5.26E-09	2.39E-08	[illegible]	[illegible]
92	1.26E-07	8.19E-08	8.33E-08	4.48E-07	7.59E-08	7.00E-08	5.74E-08	2.22E-07	[illegible]	[illegible]
92	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CM-243 Y	3.20E+01	4.67E-04	5.55E-07	1.35E-01	1.17E-01	1.62E-01	2.50E-03	5.00E-03	1.90E-02	
93	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
93	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
93	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	1.23E-05
93	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	5.42E-04
93	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CM-243 W	3.20E+01	4.67E-04	5.55E-07	1.35E-01	1.17E-01	1.62E-01	2.50E-03	5.00E-03	1.90E-02	
94	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
94	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
94	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	1.23E-05
94	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	5.42E-04
94	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CM-244 Y	1.76E+01	4.67E-04	5.94E-11	3.69E-01	1.29E-05	4.65E-02	2.50E-03	5.00E-03	1.90E-02	
95	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
95	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
95	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	3.89E-08
95	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	2.15E-07
95	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CM-244 W	1.76E+01	4.67E-04	5.94E-11	3.69E-01	1.29E-05	4.65E-02	2.50E-03	5.00E-03	1.90E-02	
96	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
96	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
96	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	3.89E-08
96	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	2.15E-07
96	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CM-248 Y	4.70E+05	4.67E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	5.00E-03	1.90E-02	
97	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
97	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
97	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	2.78E-08
97	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	1.62E-07
97	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CM-248 W	4.70E+05	4.67E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	5.00E-03	1.90E-02	
98	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
98	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
98	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	2.78E-08
98	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	1.62E-07
98	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CF-252 Y	2.65E+00	4.11E-03	1.36E-08	1.07E+00	1.09E-03	1.72E-02	2.50E-03	5.00E-03	1.90E-02	
99	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
99	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
99	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	3.09E-08
99	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	2.07E-07
99	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03
CF-252 W	2.65E+00	4.11E-03	1.36E-08	1.07E+00	1.09E-03	1.72E-02	2.50E-03	5.00E-03	1.90E-02	
100	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
100	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
100	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	3.09E-08
100	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	2.07E-07
100	3.00E+02	6.09E+02	1.23E+03	2.50E+03	5.08E+03	2.50E-03	2.00E-04	2.00E-05	2.50E+01	1.00E+03

FUNDCF.DAT

```
2 44 37  0  0  0  0  0  0 3 45 44 37  0  0  0  0  0 2 46 40  0  0  0  0  0  0
4 47 45 44 37  0  0  0  0 4 48 45 44 37  0  0  0  0 3 49 46 40  0  0  0  0  0
3 50 46 40  0  0  0  0  0 2 51 38  0  0  0  0  0  0 2 52 38  0  0  0  0  0  0
2 53 40  0  0  0  0  0  0 2 54 40  0  0  0  0  0  0 2 55 40  0  0  0  0  0  0
2 56 42  0  0  0  0  0  0 2 57 42  0  0  0  0  0  0 2 58 42  0  0  0  0  0  0
5 59 47 45 44 37  0  0  0 5 60 47 45 44 37  0  0  0 5 61 47 45 44 37  0  0  0
3 62 51 38  0  0  0  0  0 3 63 51 38  0  0  0  0  0 3 64 51 38  0  0  0  0  0
4 65 49 46 40  0  0  0  0 4 66 49 46 40  0  0  0  0 4 67 49 46 40  0  0  0  0
6 68 59 47 45 44 37  0  0 6 69 59 47 45 44 37  0  0 6 70 59 47 45 44 37  0  0
3 71 56 42  0  0  0  0  0 3 72 56 42  0  0  0  0  0 3 73 53 40  0  0  0  0  0
3 74 53 40  0  0  0  0  0 6 75 59 47 45 44 37  0  0 6 76 59 47 45 44 37  0  0
4 77 62 51 38  0  0  0  0 4 78 62 51 38  0  0  0  0 5 79 65 49 46 40  0  0  0
5 80 65 49 46 40  0  0  0 5 81 87 71 56 42  0  0  0 5 82 87 71 56 42  0  0  0
7 83 68 59 47 45 44 37  0 7 84 68 59 47 45 44 37  0 6 85 79 65 49 46 40  0  0
6 86 79 65 49 46 40  0  0 4 87 71 56 42  0  0  0  0 4 88 71 56 42  0  0  0  0
5 89 77 62 51 38  0  0  0 5 90 77 62 51 38  0  0  0 7 91 75 59 47 45 44 37  0
7 92 75 59 47 45 44 37  0 6 93 89 77 62 51 38  0  0 6 94 89 77 62 51 38  0  0
6 95 79 65 49 46 40  0  0 6 96 79 65 49 46 40  0  0 7 97 85 79 65 49 46 40  0
7 98 85 79 65 49 46 40  0 8 99 97 85 79 65 49 46 40 8100 97 85 79 65 49 46 40
```

APPENDIX D

EXAMPLE PROBLEMS

TABLE OF CONTENTS

D.1 Introduction

This appendix provides copies of computer printouts for the example problems presented in Chapter 4.0 of this volume. A few items are worth noting.

Two printouts are presented for the INVERSE code, the first for sources (Section D.2) and the second for regular waste (Section D.3). The output for the sources example problem was specifically discussed in Section 4.1. However, the INVERSE output for regular waste was referenced in Section 4.1 and is included in this appendix for the reader's information. This second INVERSE output also presents limiting concentrations for Ra-226 based solely on impacts from Rn-222 ingrowth within buildings.

For the code users information, the ECONOMY code (Section D.7) is followed by a short list of definitions of abbreviations used in the output.

The principal output of the VOLUMES code (see Section 4.6) is in binary format and is not listed in this appendix. Output from the SACAL utility code is fully illustrated in Section 4.7 and is also not listed in this appendix.

D.2 INVERSE Output (Sources)

IR = 2 OVFL= 0 IBUF= 1 NBRN= 0 NBES= 1
IBEG= 1991 IEND= 2020 ICLS= 1
IOBS= 5 INST= 100 ILFE= 30

IU= 1 ID= 1 IT= 1 IC= 1
IE= 1 IB= 1 IX= 1 IS= 0

ISPC INDICES: 1 1 1 0 0 0 0 0 1

DLC = 500.0 MREM/YR DLCW = 4.0 MREM/YR

VOLS= 5.00E+05 SECT= 1.00E+02 BUFF= 1.00E+02 SORD= 1.50E-02

EFF = 6.23E+00 SEF = 1.00E+00 DPT = 2.00E+00 DTK = 2.00E+00

SOURCE WASTE STREAM

GDEL= 1.00E+00 DISP= 1.00E+00 SOLS= 1.00E+00 GAMM= 1.00E+00

MINIMUMS		IN-DR1	IN-DR2	IN-DR3	IN-DA1	IN-DA2	IN-DA3	IN-CO1	IN-CO2
H-3	*	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C-14	*	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
NA-22	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CL-36	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	9.26E+04	9.26E+04
CL-36	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	9.47E+03	9.48E+03
FE-55	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
FE-55	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CO-60	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.54E+04	.00E+00
CO-60	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.54E+04	.00E+00
NI-59	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.57E+05	1.57E+05
NI-59	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.25E+05	2.26E+05
NI-63	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.49E+05	.00E+00
NI-63	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.00E+05	.00E+00
SR-90	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.35E+04	.00E+00
SR-90	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.95E+03	.00E+00
NB-94	W	1.72E+01	1.74E+01	1.77E+01	6.81E+01	6.90E+01	7.02E+01	6.39E-02	6.48E-02
NB-94	Y	1.72E+01	1.74E+01	1.77E+01	6.81E+01	6.90E+01	7.02E+01	6.39E-02	6.48E-02
TC-99	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.91E+05	2.91E+05
TC-99	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.86E+04	2.86E+04
RU-106	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	D	5.58E+01	4.95E+02	7.59E+03	3.07E+02	2.72E+03	4.17E+04	1.23E-01	1.09E+00
AG-108	W	5.58E+01	4.95E+02	7.59E+03	3.07E+02	2.72E+03	4.17E+04	1.23E-01	1.09E+00
AG-108	Y	5.58E+01	4.95E+02	7.59E+03	3.07E+02	2.72E+03	4.17E+04	1.23E-01	1.09E+00
CD-109	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SN-126	D	3.28E+01	3.29E+01	3.30E+01	2.23E+02	2.23E+02	2.24E+02	5.15E-02	5.16E-02
SN-126	W	3.28E+01	3.29E+01	3.30E+01	2.23E+02	2.23E+02	2.24E+02	5.15E-02	5.16E-02
SB-125	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SB-125	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
I-129	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.81E+01	4.81E+01
CS-134	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CS-135	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.10E+04	3.10E+04
CS-137	D	7.39E+02	.00E+00	.00E+00	3.52E+03	.00E+00	.00E+00	2.05E+00	2.12E+04
EU-152	W	1.32E+04	.00E+00	.00E+00	6.86E+04	.00E+00	.00E+00	3.19E+01	.00E+00
EU-154	W	2.61E+03	.00E+00	.00E+00	1.11E+04	.00E+00	.00E+00	8.66E+00	.00E+00
PB-210	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.44E+03	.00E+00
AC-227	Y	1.91E+04	.00E+00	.00E+00	2.52E+05	.00E+00	.00E+00	5.57E+00	.00E+00
AC-227	W	1.91E+04	.00E+00	.00E+00	2.52E+05	.00E+00	.00E+00	4.87E+00	.00E+00

INVERSE Output (Sources)

TH-228	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-228	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-229	Y	1.54E+03	1.60E+03	1.68E+03	2.91E+04	3.02E+04	3.17E+04	2.00E-01	2.08E-01
TH-229	W	1.54E+03	1.60E+03	1.68E+03	2.91E+04	3.02E+04	3.17E+04	1.76E-01	1.83E-01
RN-222	*	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
RA-226	W	3.02E+02	3.59E+02	4.46E+02	7.65E+03	9.09E+03	1.13E+04	6.64E-02	7.90E-02
RA-228	W	6.42E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.07E+03	.00E+00
TH-230	Y	7.24E+04	1.66E+04	9.25E+03	.00E+00	.00E+00	.00E+00	5.11E-01	2.30E-01
TH-230	W	7.24E+04	1.66E+04	9.25E+03	.00E+00	.00E+00	.00E+00	3.95E-01	2.04E-01
TH-232	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.29E-02	4.29E-02
TH-232	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.16E-02	4.16E-02
PA-231	Y	2.99E+03	2.93E+03	2.96E+03	1.49E+05	1.46E+05	1.47E+05	1.15E-01	1.14E-01
PA-231	W	2.99E+03	2.93E+03	2.96E+03	1.49E+05	1.46E+05	1.47E+05	9.01E-02	8.94E-02
U-232	Y	9.44E+03	4.44E+05	.00E+00	.00E+00	.00E+00	.00E+00	1.64E-01	7.72E+00
U-232	W	9.44E+03	4.44E+05	.00E+00	.00E+00	.00E+00	.00E+00	1.79E-01	8.42E+00
U-232	D	9.44E+03	4.44E+05	.00E+00	.00E+00	.00E+00	.00E+00	1.77E-01	8.30E+00
U-233	Y	.00E+00	4.24E+05	2.19E+05	.00E+00	.00E+00	.00E+00	1.69E+00	1.29E+00
U-233	W	.00E+00	4.24E+05	2.19E+05	.00E+00	.00E+00	.00E+00	1.13E+01	3.67E+00
U-233	D	.00E+00	4.24E+05	2.19E+05	.00E+00	.00E+00	.00E+00	1.59E+01	4.04E+00
U-234	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.86E+00	1.83E+00
U-234	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.56E+01	2.00E+01
U-234	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	7.14E+01	4.00E+01
U-235	Y	6.59E+03	6.45E+03	6.27E+03	2.59E+05	2.53E+05	2.47E+05	5.91E-01	5.66E-01
U-235	W	6.59E+03	6.45E+03	6.27E+03	2.59E+05	2.53E+05	2.47E+05	8.04E-01	7.59E-01
U-235	D	6.59E+03	6.45E+03	6.27E+03	2.59E+05	2.53E+05	2.47E+05	8.20E-01	7.72E-01
U-236	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.99E+00	1.99E+00
U-236	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.84E+01	2.84E+01
U-236	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	8.82E+01	8.82E+01
U-238	Y	8.09E+04	8.09E+04	8.09E+04	.00E+00	.00E+00	.00E+00	1.71E+00	1.71E+00
U-238	W	8.09E+04	8.09E+04	8.09E+04	.00E+00	.00E+00	.00E+00	7.10E+00	7.06E+00
U-238	D	8.09E+04	8.09E+04	8.09E+04	.00E+00	.00E+00	.00E+00	8.45E+00	8.41E+00
NP-237	Y	2.47E+03	2.47E+03	2.47E+03	6.06E+04	6.06E+04	6.06E+04	2.91E-01	2.91E-01
NP-237	W	2.47E+03	2.47E+03	2.47E+03	6.06E+04	6.06E+04	6.06E+04	2.21E-01	2.21E-01
PU-236	Y	2.83E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.98E+00	1.87E+02
PU-236	W	2.83E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.98E+00	1.87E+02
PU-238	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.58E+00	3.88E+01
PU-238	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	9.92E-01	2.44E+01
PU-239	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.99E-01	6.06E-01
PU-239	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.62E-01	3.66E-01
PU-240	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	6.06E-01	6.32E-01
PU-240	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.49E-01	3.64E-01
PU-241	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.22E+01	4.05E+01
PU-241	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.21E+01	4.05E+01
PU-242	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	6.17E-01	6.17E-01
PU-242	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.68E-01	3.68E-01
PU-244	Y	1.66E+02	1.66E+02	1.66E+02	8.99E+02	8.99E+02	8.99E+02	2.34E-01	2.30E-01
PU-244	W	1.66E+02	1.66E+02	1.66E+02	8.99E+02	8.99E+02	8.99E+02	1.86E-01	1.84E-01
AM-241	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	6.57E-01	1.20E+00
AM-241	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.16E-01	7.61E-01
AM-243	Y	9.03E+03	9.35E+03	9.77E+03	7.65E+05	7.92E+05	8.27E+05	3.16E-01	3.26E-01
AM-243	W	9.03E+03	9.35E+03	9.77E+03	7.65E+05	7.92E+05	8.27E+05	2.36E-01	2.43E-01
CM-242	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.05E+02	7.50E+03
CM-242	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.05E+02	7.50E+03
CM-243	Y	6.63E+04	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.53E+00	8.04E+01
CM-243	W	6.63E+04	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.62E+00	8.03E+01
CM-244	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.11E+01	2.36E+02
CM-244	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.92E+01	2.36E+02
CM-248	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.36E-01	2.36E-01
CM-248	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.94E-01	1.94E-01
CF-252	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.19E+04	4.19E+04
CF-252	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.19E+04	4.19E+04

INVERSE Output (Sources)

MINIMUMS		IN-CO3	IN-DI1	IN-DI2	IN-DI3	IN-AG1	IN-AG2	IN-AG3	EX-INT
H-3	*	.00E+00	.00E+00	.00E+00	.00E+00	1.74E+03	.00E+00	.00E+00	.00E+00
C-14	*	.00E+00	.00E+00	.00E+00	.00E+00	4.52E+01	4.75E+01	5.04E+01	1.66E+05
NA-22	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CL-36	D	9.28E+04	.00E+00	.00E+00	.00E+00	1.26E+00	1.26E+00	1.26E+00	7.46E+05
CL-36	W	9.49E+03	7.89E+05	7.90E+05	7.91E+05	1.26E+00	1.26E+00	1.26E+00	7.46E+05
FE-55	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
FE-55	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CO-60	W	.00E+00	.00E+00	.00E+00	.00E+00	3.76E+04	.00E+00	.00E+00	.00E+00
CO-60	Y	.00E+00	.00E+00	.00E+00	.00E+00	3.76E+04	.00E+00	.00E+00	.00E+00
NI-59	D	1.58E+05	.00E+00	.00E+00	.00E+00	2.80E+04	2.81E+04	2.82E+04	.00E+00
NI-59	W	2.27E+05	.00E+00	.00E+00	.00E+00	2.86E+04	2.87E+04	2.88E+04	.00E+00
NI-63	D	.00E+00	.00E+00	.00E+00	.00E+00	2.29E+04	4.65E+05	.00E+00	.00E+00
NI-63	W	.00E+00	.00E+00	.00E+00	.00E+00	2.32E+04	4.73E+05	.00E+00	.00E+00
SR-90	D	.00E+00	.00E+00	.00E+00	.00E+00	4.36E+02	.00E+00	.00E+00	.00E+00
SR-90	Y	.00E+00	1.63E+05	.00E+00	.00E+00	2.00E+03	.00E+00	.00E+00	.00E+00
NB-94	W	6.60E-02	5.33E+00	5.40E+00	5.50E+00	5.29E-02	5.37E-02	5.46E-02	7.79E+03
NB-94	Y	6.59E-02	5.33E+00	5.40E+00	5.50E+00	5.29E-02	5.37E-02	5.46E-02	7.79E+03
TC-99	D	2.92E+05	.00E+00	.00E+00	.00E+00	1.70E+01	1.70E+01	1.71E+01	.00E+00
TC-99	W	2.87E+04	.00E+00	.00E+00	.00E+00	1.70E+01	1.70E+01	1.71E+01	.00E+00
RU-106	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	D	1.67E+01	1.03E+01	9.10E+01	1.39E+03	1.02E-01	9.04E-01	1.38E+01	8.40E+05
AG-108	W	1.67E+01	1.03E+01	9.10E+01	1.39E+03	1.02E-01	9.04E-01	1.38E+01	8.40E+05
AG-108	Y	1.67E+01	1.03E+01	9.10E+01	1.39E+03	1.02E-01	9.04E-01	1.38E+01	8.40E+05
CD-109	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SN-126	D	5.18E-02	4.29E+00	4.30E+00	4.31E+00	4.26E-02	4.27E-02	4.29E-02	2.55E+04
SN-126	W	5.18E-02	4.29E+00	4.30E+00	4.31E+00	4.26E-02	4.27E-02	4.29E-02	2.55E+04
SB-125	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SB-125	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
I-129	D	4.81E+01	4.01E+03	4.01E+03	4.01E+03	7.79E+00	7.79E+00	7.79E+00	4.07E+04
CS-134	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CS-135	D	3.10E+04	.00E+00	.00E+00	.00E+00	4.87E+03	4.87E+03	4.87E+03	6.85E+04
CS-137	D	.00E+00	1.71E+02	.00E+00	.00E+00	1.70E+00	1.75E+04	.00E+00	1.09E+05
EU-152	W	.00E+00	2.66E+03	.00E+00	.00E+00	2.64E+01	.00E+00	.00E+00	.00E+00
EU-154	W	.00E+00	7.21E+02	.00E+00	.00E+00	7.17E+00	.00E+00	.00E+00	.00E+00
PB-210	W	.00E+00	1.20E+05	.00E+00	.00E+00	9.32E+02	.00E+00	.00E+00	2.99E+05
AC-227	Y	.00E+00	4.65E+02	.00E+00	.00E+00	6.52E+00	.00E+00	.00E+00	2.85E+04
AC-227	W	.00E+00	4.06E+02	.00E+00	.00E+00	6.11E+00	.00E+00	.00E+00	2.85E+04
TH-228	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-228	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-229	Y	2.18E-01	1.67E+01	1.73E+01	1.82E+01	2.76E-01	2.87E-01	3.01E-01	5.16E+03
TH-229	W	1.91E-01	1.47E+01	1.52E+01	1.60E+01	2.57E-01	2.66E-01	2.79E-01	5.16E+03
RN-222	*	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
RA-226	W	9.81E-02	5.54E+00	6.58E+00	8.18E+00	5.49E-02	6.53E-02	8.11E-02	3.30E+03
RA-228	W	.00E+00	1.72E+05	.00E+00	.00E+00	1.75E+03	.00E+00	.00E+00	.00E+00
TH-230	Y	1.47E-01	4.26E+01	1.92E+01	1.23E+01	7.27E-01	2.35E-01	1.38E-01	9.29E+03
TH-230	W	1.36E-01	3.29E+01	1.70E+01	1.13E+01	6.22E-01	2.23E-01	1.34E-01	9.29E+03
TH-232	Y	4.29E-02	3.58E+00	3.58E+00	3.58E+00	3.75E-02	3.75E-02	3.75E-02	4.00E+03
TH-232	W	4.16E-02	3.47E+00	3.47E+00	3.47E+00	3.71E-02	3.71E-02	3.71E-02	4.00E+03
PA-231	Y	1.15E-01	9.59E+00	9.48E+00	9.58E+00	1.58E-01	1.56E-01	1.58E-01	4.93E+02
PA-231	W	9.04E-02	7.51E+00	7.45E+00	7.53E+00	1.37E-01	1.36E-01	1.37E-01	4.93E+02
U-232	Y	9.51E+02	1.37E+01	6.44E+02	7.93E+04	1.49E-01	7.01E+00	8.63E+02	4.11E+04
U-232	W	1.04E+03	1.49E+01	7.02E+02	8.64E+04	1.52E-01	7.17E+00	8.83E+02	3.37E+03
U-232	D	1.02E+03	1.47E+01	6.92E+02	8.52E+04	1.52E-01	7.14E+00	8.79E+02	3.37E+03

INVERSE Output (Sources)

U-233	Y	1.01E+00	1.41E+02	1.08E+02	8.38E+01	3.92E+00	2.57E+00	1.82E+00	2.26E+05
U-233	W	2.03E+00	9.45E+02	3.06E+02	1.69E+02	1.77E+01	5.26E+00	2.85E+00	3.69E+04
U-233	D	2.14E+00	1.33E+03	3.37E+02	1.78E+02	2.17E+01	5.55E+00	2.94E+00	3.69E+04
U-234	Y	1.75E+00	1.55E+02	1.52E+02	1.46E+02	4.59E+00	4.40E+00	3.96E+00	3.92E+05
U-234	W	1.35E+01	2.13E+03	1.66E+03	1.12E+03	4.82E+01	3.26E+01	1.80E+01	4.02E+04
U-234	D	2.03E+01	5.95E+03	3.33E+03	1.69E+03	9.43E+01	4.88E+01	2.19E+01	4.02E+04
U-235	Y	5.38E-01	4.93E+01	4.72E+01	4.48E+01	6.07E-01	5.88E-01	5.65E-01	1.55E+05
U-235	W	7.08E-01	6.70E+01	6.32E+01	5.90E+01	6.80E-01	6.56E-01	6.28E-01	3.90E+04
U-235	D	7.20E-01	6.83E+01	6.43E+01	6.00E+01	6.85E-01	6.60E-01	6.31E-01	3.90E+04
U-236	Y	1.99E+00	1.66E+02	1.65E+02	1.66E+02	4.92E+00	4.92E+00	4.92E+00	4.35E+05
U-236	W	2.84E+01	2.36E+03	2.36E+03	2.36E+03	5.44E+01	5.44E+01	5.44E+01	4.38E+04
U-236	D	8.82E+01	7.35E+03	7.35E+03	7.35E+03	1.14E+02	1.14E+02	1.14E+02	4.38E+04
U-238	Y	1.71E+00	1.43E+02	1.43E+02	1.42E+02	3.10E+00	3.10E+00	3.09E+00	3.22E+05
U-238	W	7.03E+00	5.91E+02	5.89E+02	5.85E+02	6.78E+00	6.77E+00	6.76E+00	4.52E+04
U-238	D	8.35E+00	7.04E+02	7.00E+02	6.96E+02	7.23E+00	7.22E+00	7.20E+00	4.52E+04
NP-237	Y	2.91E-01	2.43E+01	2.43E+01	2.43E+01	3.39E-01	3.39E-01	3.39E-01	1.60E+03
NP-237	W	2.21E-01	1.84E+01	1.84E+01	1.84E+01	2.95E-01	2.95E-01	2.95E-01	1.60E+03
PU-236	Y	2.31E+04	3.32E+02	1.56E+04	.00E+00	3.61E+00	1.70E+02	2.09E+04	9.97E+05
PU-236	W	2.31E+04	3.32E+02	1.56E+04	.00E+00	3.61E+00	1.70E+02	2.09E+04	9.97E+05
PU-238	Y	1.51E+03	1.32E+02	3.24E+03	1.26E+05	3.90E+00	9.59E+01	3.66E+03	1.50E+05
PU-238	W	1.07E+03	8.27E+01	2.04E+03	8.91E+04	2.45E+00	6.04E+01	2.60E+03	1.50E+05
PU-239	Y	6.15E-01	4.99E+01	5.05E+01	5.12E+01	1.48E+00	1.50E+00	1.52E+00	5.61E+04
PU-239	W	3.71E-01	3.01E+01	3.05E+01	3.09E+01	8.94E-01	9.04E-01	9.17E-01	5.59E+04
PU-240	Y	6.66E-01	5.05E+01	5.27E+01	5.55E+01	1.50E+00	1.56E+00	1.64E+00	5.66E+04
PU-240	W	3.84E-01	2.91E+01	3.04E+01	3.20E+01	8.64E-01	9.01E-01	9.50E-01	5.63E+04
PU-241	Y	8.63E+01	1.85E+03	3.38E+03	7.19E+03	4.25E+01	7.76E+01	1.65E+02	2.67E+04
PU-241	W	8.63E+01	1.84E+03	3.38E+03	7.19E+03	4.24E+01	7.76E+01	1.65E+02	2.67E+04
PU-242	Y	6.18E-01	5.14E+01	5.15E+01	5.15E+01	1.52E+00	1.52E+00	1.53E+00	5.75E+04
PU-242	W	3.68E-01	3.06E+01	3.07E+01	3.07E+01	9.09E-01	9.10E-01	9.10E-01	5.72E+04
PU-244	Y	2.26E-01	1.95E+01	1.92E+01	1.88E+01	2.59E-01	2.57E-01	2.55E-01	5.33E+04
PU-244	W	1.81E-01	1.55E+01	1.53E+01	1.51E+01	2.33E-01	2.31E-01	2.29E-01	5.30E+04
AM-241	Y	2.56E+00	5.47E+01	1.00E+02	2.13E+02	1.26E+00	2.30E+00	4.90E+00	7.88E+02
AM-241	W	1.62E+00	3.46E+01	6.34E+01	1.35E+02	8.69E-01	1.59E+00	3.39E+00	7.88E+02
AM-243	Y	3.37E-01	2.64E+01	2.71E+01	2.81E+01	3.87E-01	3.99E-01	4.16E-01	6.57E+02
AM-243	W	2.52E-01	1.96E+01	2.03E+01	2.10E+01	3.31E-01	3.42E-01	3.56E-01	6.57E+02
CM-242	Y	2.93E+05	2.54E+04	6.25E+05	.00E+00	7.53E+02	1.85E+04	7.08E+05	.00E+00
CM-242	W	2.93E+05	2.54E+04	6.25E+05	.00E+00	7.53E+02	1.85E+04	7.08E+05	.00E+00
CM-243	Y	8.36E+01	3.78E+02	6.70E+03	6.96E+03	5.85E+00	9.86E+01	1.03E+02	1.62E+04
CM-243	W	8.36E+01	3.02E+02	6.69E+03	6.96E+03	5.17E+00	9.86E+01	1.03E+02	1.62E+04
CM-244	Y	2.48E+02	4.26E+03	1.96E+04	2.07E+04	1.17E+02	5.82E+02	6.13E+02	1.47E+05
CM-244	W	2.48E+02	3.27E+03	1.96E+04	2.07E+04	9.17E+01	5.82E+02	6.13E+02	1.47E+05
CM-248	Y	2.36E-01	1.97E+01	1.97E+01	1.97E+01	5.38E-01	5.39E-01	5.39E-01	6.03E+02
CM-248	W	1.94E-01	1.61E+01	1.62E+01	1.62E+01	4.48E-01	4.48E-01	4.49E-01	6.03E+02
CF-252	Y	4.19E+04	.00E+00	.00E+00	.00E+00	9.55E+04	9.55E+04	9.56E+04	.00E+00
CF-252	W	4.19E+04	.00E+00	.00E+00	.00E+00	9.55E+04	9.55E+04	9.56E+04	.00E+00

INVERSE Output (Sources)

MINIMUMS		EX-ERO	LA-OPS	LA-OVF	INT-WL	BOU-WL	POP-WL	POP-SW
H-3	*	.00E+00	3.11E+02	4.71E-01	1.71E-01	4.79E+01	.00E+00	.00E+00
C-14	*	2.93E+02	1.78E+02	1.92E-01	1.07E-02	1.18E-02	1.02E-01	6.69E-02
NA-22	D	.00E+00	6.01E+04	3.18E+02	.00E+00	.00E+00	.00E+00	.00E+00
CL-36	D	1.05E+03	4.06E+01	4.38E-02	9.57E-05	9.57E-05	6.62E-04	1.36E-03
CL-36	W	1.05E+03	4.06E+01	4.38E-02	9.57E-05	9.57E-05	6.62E-04	1.36E-03
FE-55	W	.00E+00	8.91E+03	4.76E+01	.00E+00	.00E+00	.00E+00	.00E+00
FE-55	Y	.00E+00	8.90E+03	4.76E+01	.00E+00	.00E+00	.00E+00	.00E+00
CO-60	W	.00E+00	6.05E+02	1.44E+00	.00E+00	.00E+00	.00E+00	.00E+00
CO-60	Y	.00E+00	6.05E+02	1.44E+00	.00E+00	.00E+00	.00E+00	.00E+00
NI-59	D	4.25E+04	1.25E+04	1.35E+01	.00E+00	.00E+00	.00E+00	.00E+00
NI-59	W	4.25E+04	1.25E+04	1.35E+01	.00E+00	.00E+00	.00E+00	.00E+00
NI-63	D	.00E+00	5.08E+03	5.74E+00	.00E+00	.00E+00	.00E+00	.00E+00
NI-63	W	.00E+00	5.08E+03	5.74E+00	.00E+00	.00E+00	.00E+00	.00E+00
SR-90	D	.00E+00	8.30E+01	1.04E-01	.00E+00	.00E+00	.00E+00	.00E+00
SR-90	Y	.00E+00	6.42E+02	8.04E-01	.00E+00	.00E+00	.00E+00	.00E+00
NB-94	W	1.17E+01	4.34E+00	4.69E-03	.00E+00	.00E+00	.00E+00	.00E+00
NB-94	Y	1.17E+01	4.34E+00	4.69E-03	.00E+00	.00E+00	.00E+00	.00E+00
TC-99	D	8.07E+03	3.10E+02	3.34E-01	7.12E-04	7.12E-04	4.93E-03	1.05E-02
TC-99	W	8.07E+03	3.10E+02	3.34E-01	7.12E-04	7.12E-04	4.93E-03	1.05E-02
RU-106	Y	.00E+00	2.21E+02	1.47E+01	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	D	.00E+00	1.95E+04	2.18E+01	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	W	.00E+00	1.95E+04	2.18E+01	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	Y	.00E+00	1.95E+04	2.18E+01	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	D	.00E+00	1.03E+03	3.18E+01	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	W	.00E+00	1.03E+03	3.18E+01	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	Y	.00E+00	1.03E+03	3.18E+01	.00E+00	.00E+00	.00E+00	.00E+00
SN-126	D	3.63E+01	9.81E+02	1.06E+00	3.27E-01	7.25E+00	.00E+00	.00E+00
SN-126	W	3.63E+01	9.81E+02	1.06E+00	3.27E-01	7.25E+00	.00E+00	.00E+00
SB-125	D	.00E+00	5.62E+05	2.82E+03	.00E+00	.00E+00	.00E+00	.00E+00
SB-125	W	.00E+00	5.63E+05	2.82E+03	.00E+00	.00E+00	.00E+00	.00E+00
I-129	D	5.71E+01	2.20E+00	2.38E-03	5.18E-06	5.18E-06	3.59E-05	7.35E-05
CS-134	D	.00E+00	2.27E+03	1.86E+01	.00E+00	.00E+00	.00E+00	.00E+00
CS-135	D	9.61E+01	2.72E+03	2.94E+00	7.42E-01	1.62E+01	.00E+00	.00E+00
CS-137	D	.00E+00	4.96E+02	6.15E-01	.00E+00	.00E+00	.00E+00	.00E+00
EU-152	W	.00E+00	6.34E+04	9.50E+01	.00E+00	.00E+00	.00E+00	.00E+00
EU-154	W	.00E+00	4.11E+04	5.75E+01	.00E+00	.00E+00	.00E+00	.00E+00
PB-210	W	.00E+00	1.93E+01	2.56E-02	.00E+00	.00E+00	.00E+00	.00E+00
AC-227	Y	.00E+00	2.20E+00	2.88E-03	.00E+00	.00E+00	.00E+00	.00E+00
AC-227	W	.00E+00	2.20E+00	2.88E-03	.00E+00	.00E+00	.00E+00	.00E+00
TH-228	Y	.00E+00	4.15E+02	3.95E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-228	W	.00E+00	4.15E+02	3.96E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-229	Y	8.65E+00	7.74E+00	8.36E-03	.00E+00	.00E+00	.00E+00	.00E+00
TH-229	W	8.65E+00	7.73E+00	8.36E-03	.00E+00	.00E+00	.00E+00	.00E+00
RN-222	*	.00E+00	2.42E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
RA-226	W	1.04E+01	7.77E+00	8.41E-03	2.94E-03	2.57E-02	.00E+00	.00E+00
RA-228	W	.00E+00	4.15E+01	8.34E-02	.00E+00	.00E+00	.00E+00	.00E+00
TH-230	Y	5.08E+00	1.59E+01	1.72E-02	.00E+00	.00E+00	.00E+00	.00E+00
TH-230	W	5.08E+00	1.59E+01	1.72E-02	.00E+00	.00E+00	.00E+00	.00E+00
TH-232	Y	5.61E+00	1.45E+01	1.56E-02	.00E+00	.00E+00	.00E+00	.00E+00
TH-232	W	5.60E+00	1.45E+01	1.56E-02	.00E+00	.00E+00	.00E+00	.00E+00
PA-231	Y	7.07E-01	1.49E+00	1.61E-03	.00E+00	.00E+00	.00E+00	.00E+00
PA-231	W	7.07E-01	1.49E+00	1.61E-03	.00E+00	.00E+00	.00E+00	.00E+00
U-232	Y	.00E+00	1.71E+03	1.95E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-232	W	.00E+00	7.22E+01	8.26E-02	.00E+00	.00E+00	.00E+00	.00E+00
U-232	D	.00E+00	7.22E+01	8.26E-02	.00E+00	.00E+00	.00E+00	.00E+00

INVERSE Output (Sources)

U-233	Y	3.90E+01	2.01E+04	2.17E+01	.00E+00	.00E+00	.00E+00	.00E+00
U-233	W	2.40E+01	1.98E+03	2.14E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-233	D	2.40E+01	1.98E+03	2.14E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-234	Y	2.39E+02	2.02E+04	2.18E+01	.00E+00	.00E+00	.00E+00	.00E+00
U-234	W	5.00E+01	2.00E+03	2.16E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-234	D	5.00E+01	2.00E+03	2.16E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-235	Y	1.59E+01	2.01E+04	2.18E+01	.00E+00	.00E+00	.00E+00	.00E+00
U-235	W	1.31E+01	2.29E+03	2.48E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-235	D	1.31E+01	2.29E+03	2.48E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-236	Y	6.09E+02	2.16E+04	2.33E+01	.00E+00	.00E+00	.00E+00	.00E+00
U-236	W	6.14E+01	2.18E+03	2.35E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-236	D	6.14E+01	2.18E+03	2.35E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-238	Y	4.49E+02	1.60E+04	1.73E+01	.00E+00	.00E+00	.00E+00	.00E+00
U-238	W	6.33E+01	2.25E+03	2.43E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-238	D	6.33E+01	2.25E+03	2.43E+00	.00E+00	.00E+00	.00E+00	.00E+00
NP-237	Y	2.24E+00	1.95E+01	2.11E-02	.00E+00	.00E+00	.00E+00	.00E+00
NP-237	W	2.24E+00	1.95E+01	2.11E-02	.00E+00	.00E+00	.00E+00	.00E+00
PU-236	Y	.00E+00	2.29E+04	1.06E+02	.00E+00	.00E+00	.00E+00	.00E+00
PU-236	W	.00E+00	2.29E+04	1.06E+02	.00E+00	.00E+00	.00E+00	.00E+00
PU-238	Y	7.17E+05	9.56E+02	1.08E+00	.00E+00	.00E+00	.00E+00	.00E+00
PU-238	W	7.17E+05	9.52E+02	1.08E+00	.00E+00	.00E+00	.00E+00	.00E+00
PU-239	Y	8.31E+01	7.46E+02	8.05E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-239	W	8.27E+01	7.42E+02	8.02E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-240	Y	9.69E+01	7.46E+02	8.06E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-240	W	9.64E+01	7.42E+02	8.02E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-241	Y	6.53E+02	8.12E+04	1.20E+02	.00E+00	.00E+00	.00E+00	.00E+00
PU-241	W	6.53E+02	8.07E+04	1.19E+02	.00E+00	.00E+00	.00E+00	.00E+00
PU-242	Y	8.08E+01	7.73E+02	8.34E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-242	W	8.05E+01	7.69E+02	8.31E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-244	Y	6.38E+01	7.16E+02	7.73E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-244	W	6.36E+01	7.13E+02	7.70E-01	.00E+00	.00E+00	.00E+00	.00E+00
AM-241	Y	1.94E+01	1.04E+00	1.13E-03	.00E+00	.00E+00	.00E+00	.00E+00
AM-241	W	1.94E+01	1.04E+00	1.13E-03	.00E+00	.00E+00	.00E+00	.00E+00
AM-243	Y	1.09E+00	9.86E-01	1.07E-03	.00E+00	.00E+00	.00E+00	.00E+00
AM-243	W	1.09E+00	9.86E-01	1.07E-03	.00E+00	.00E+00	.00E+00	.00E+00
CM-242	Y	.00E+00	1.40E+04	1.73E+05	.00E+00	.00E+00	.00E+00	.00E+00
CM-242	W	.00E+00	1.40E+04	1.73E+05	.00E+00	.00E+00	.00E+00	.00E+00
CM-243	Y	2.69E+02	3.21E+01	3.95E-02	.00E+00	.00E+00	.00E+00	.00E+00
CM-243	W	2.69E+02	3.21E+01	3.95E-02	.00E+00	.00E+00	.00E+00	.00E+00
CM-244	Y	3.61E+04	5.05E+01	6.90E-02	.00E+00	.00E+00	00E+00	.00E+00
CM-244	W	3.61E+04	5.05E+01	6.90E-02	.00E+00	.00E+00	.00E+00	.00E+00
CM-248	Y	8.47E-01	8.10E+00	8.75E-03	.00E+00	.00E+00	.00E+00	.00E+00
CM-248	W	8.47E-01	8.10E+00	8.75E-03	.00E+00	.00E+00	.00E+00	.00E+00
CF-252	Y	1.50E+05	8.22E+01	4.26E-01	.00E+00	.00E+00	.00E+00	.00E+00
CF-252	W	1.50E+05	8.22E+01	4.26E-01	.00E+00	.00E+00	.00E+00	.00E+00

D.3 INVERSE Output (Regular Waste)

```
IR  =  2  OVFL=  0  IBUF=  1  NBRN=  0  NBES=  1
IBEG= 1991  IEND= 2020  ICLS=    1
IOBS=     5  INST=  100  ILFE=   30

IU=  1  ID=  1  IT=  1  IC=  1
IE=  1  IB=  1  IX=  1  IS=  0

ISPC INDICES:   1   1   1   0   0   0   0   0   0   0

DLC = 500.0 MREM/YR        DLCW =    4.0 MREM/YR

VOLS= 5.00E+05  SECT= 1.00E+02  BUFF= 1.00E+02  SORD= 1.50E-02

EFF = 6.23E+00  SEF = 1.00E+00  DPT = 2.00E+00  DTK = 2.00E+00
```

MINIMUMS		IN-DR1	IN-DR2	IN-DR3	IN-DA1	IN-DA2	IN-DA3	IN-CO1	IN-CO2
H-3	*	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C-14	*	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.78E+05	6.07E+05
NA-22	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CL-36	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.78E+03	2.78E+03
CL-36	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.84E+02	2.84E+02
FE-55	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
FE-55	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CO-60	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.36E+03	.00E+00
CO-60	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.36E+03	.00E+00
NI-59	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.71E+03	4.72E+03
NI-59	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	6.76E+03	6.78E+03
NI-63	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.46E+03	9.08E+04
NI-63	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	6.01E+03	1.22E+05
SR-90	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.04E+02	.00E+00
SR-90	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.86E+01	.00E+00
NB-94	W	2.65E+02	2.69E+02	2.74E+02	1.05E+03	1.07E+03	1.09E+03	1.92E-03	1.94E-03
NB-94	Y	2.65E+02	2.69E+02	2.74E+02	1.05E+03	1.07E+03	1.09E+03	1.92E-03	1.94E-03
TC-99	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	8.73E+03	8.74E+03
TC-99	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	8.58E+02	8.59E+02
RU-106	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	D	8.62E+02	7.65E+03	1.17E+05	4.74E+03	4.21E+04	6.45E+05	3.69E-03	3.28E-02
AG-108	W	8.62E+02	7.65E+03	1.17E+05	4.74E+03	4.21E+04	6.45E+05	3.69E-03	3.28E-02
AG-108	Y	8.62E+02	7.65E+03	1.17E+05	4.74E+03	4.21E+04	6.45E+05	3.69E-03	3.28E-02
CD-109	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SN-126	D	5.07E+02	5.08E+02	5.10E+02	3.44E+03	3.45E+03	3.46E+03	1.54E-03	1.55E-03
SN-126	W	5.07E+02	5.08E+02	5.10E+02	3.44E+03	3.45E+03	3.46E+03	1.54E-03	1.55E-03
SB-125	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SB-125	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
I-129	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.44E+00	1.44E+00
CS-134	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CS-135	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	9.30E+02	9.30E+02
CS-137	D	1.14E+04	.00E+00	.00E+00	5.44E+04	.00E+00	.00E+00	6.15E-02	6.35E+02
EU-152	W	2.04E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	9.58E-01	.00E+00
EU-154	W	4.02E+04	.00E+00	.00E+00	1.71E+05	.00E+00	.00E+00	2.60E-01	.00E+00
PB-210	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.33E+01	.00E+00
AC-227	Y	2.95E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.67E-01	6.28E+04
AC-227	W	2.95E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.46E-01	5.49E+04
TH-228	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-228	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

INVERSE Output (Regular Waste)

TH-229	Y	2.38E+04	2.47E+04	2.59E+04	4.50E+05	4.67E+05	4.89E+05	6.01E-03	6.25E-03
TH-229	W	2.38E+04	2.47E+04	2.59E+04	4.50E+05	4.67E+05	4.89E+05	5.28E-03	5.48E-03
RN-222	*	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	8.40E+04	.00E+00
RA-226	W	4.67E+03	5.55E+03	6.89E+03	1.18E+05	1.41E+05	1.74E+05	1.99E-03	2.37E-03
RA-228	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	6.21E+01	.00E+00
TH-230	Y	.00E+00	2.56E+05	1.43E+05	.00E+00	.00E+00	.00E+00	1.53E-02	6.91E-03
TH-230	W	.00E+00	2.56E+05	1.43E+05	.00E+00	.00E+00	.00E+00	1.19E-02	6.11E-03
TH-232	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.29E-03	1.29E-03
TH-232	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.25E-03	1.25E-03
PA-231	Y	4.62E+04	4.52E+04	4.57E+04	.00E+00	.00E+00	.00E+00	3.45E-03	3.41E-03
PA-231	W	4.62E+04	4.52E+04	4.57E+04	.00E+00	.00E+00	.00E+00	2.70E-03	2.68E-03
U-232	Y	1.46E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.93E-03	2.32E-01
U-232	W	1.46E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.37E-03	2.53E-01
U-232	D	1.46E+05	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.30E-03	2.49E-01
U-233	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.08E-02	3.87E-02
U-233	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	3.40E-01	1.10E-01
U-233	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.78E-01	1.21E-01
U-234	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.58E-02	5.48E-02
U-234	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	7.67E-01	5.99E-01
U-234	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.14E+00	1.20E+00
U-235	Y	1.02E+05	9.95E+04	9.69E+04	.00E+00	.00E+00	.00E+00	1.77E-02	1.70E-02
U-235	W	1.02E+05	9.95E+04	9.69E+04	.00E+00	.00E+00	.00E+00	2.41E-02	2.28E-02
U-235	D	1.02E+05	9.95E+04	9.69E+04	.00E+00	.00E+00	.00E+00	2.46E-02	2.32E-02
U-236	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.98E-02	5.98E-02
U-236	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	8.51E-01	8.51E-01
U-236	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.65E+00	2.65E+00
U-238	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.14E-02	5.13E-02
U-238	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.13E-01	2.12E-01
U-238	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.53E-01	2.52E-01
NP-237	Y	3.81E+04	3.81E+04	3.81E+04	9.36E+05	9.36E+05	9.36E+05	8.74E-03	8.73E-03
NP-237	W	3.81E+04	3.81E+04	3.81E+04	9.36E+05	9.36E+05	9.36E+05	6.62E-03	6.62E-03
PU-236	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.20E-01	5.62E+00
PU-236	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.20E-01	5.62E+00
PU-238	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	4.74E-02	1.17E+00
PU-238	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.98E-02	7.33E-01
PU-239	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.80E-02	1.82E-02
PU-239	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.08E-02	1.10E-02
PU-240	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.82E-02	1.90E-02
PU-240	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.05E-02	1.09E-02
PU-241	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	6.65E-01	1.22E+00
PU-241	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	6.64E-01	1.22E+00
PU-242	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.85E-02	1.85E-02
PU-242	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.10E-02	1.10E-02
PU-244	Y	2.57E+03	2.57E+03	2.57E+03	1.39E+04	1.39E+04	1.39E+04	7.01E-03	6.90E-03
PU-244	W	2.57E+03	2.57E+03	2.57E+03	1.39E+04	1.39E+04	1.39E+04	5.58E-03	5.51E-03
AM-241	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.97E-02	3.61E-02
AM-241	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.25E-02	2.28E-02
AM-243	Y	1.39E+05	1.44E+05	1.51E+05	.00E+00	.00E+00	.00E+00	9.49E-03	9.77E-03
AM-243	W	1.39E+05	1.44E+05	1.51E+05	.00E+00	.00E+00	.00E+00	7.07E-03	7.29E-03
CM-242	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	9.16E+00	2.25E+02
CM-242	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	9.16E+00	2.25E+02
CM-243	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.36E-01	2.41E+00
CM-243	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.09E-01	2.41E+00
CM-244	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.53E+00	7.07E+00
CM-244	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.18E+00	7.07E+00
CM-248	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	7.08E-03	7.09E-03
CM-248	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.81E-03	5.82E-03
CF-252	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.26E+03	1.26E+03
CF-252	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.26E+03	1.26E+03

INVERSE Output (Regular Waste)

MINIMUMS		IN-CO3	IN-DI1	IN-DI2	IN-DI3	IN-AG1	IN-AG2	IN-AG3	EX-INT
H-3	*	.00E+00	.00E+00	.00E+00	.00E+00	1.33E+01	.00E+00	.00E+00	.00E+00
C-14	*	6.44E+05	.00E+00	.00E+00	.00E+00	3.48E-01	3.65E-01	3.88E-01	6.24E+02
NA-22	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CL-36	D	2.78E+03	2.31E+05	2.32E+05	2.32E+05	9.63E-03	9.64E-03	9.65E-03	2.80E+03
CL-36	W	2.85E+02	2.37E+04	2.37E+04	2.37E+04	9.63E-03	9.64E-03	9.65E-03	2.80E+03
FE-55	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
FE-55	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CO-60	W	.00E+00	1.14E+05	.00E+00	.00E+00	1.15E+03	.00E+00	.00E+00	.00E+00
CO-60	Y	.00E+00	1.14E+05	.00E+00	.00E+00	1.15E+03	.00E+00	.00E+00	.00E+00
NI-59	D	4.74E+03	3.92E+05	3.94E+05	3.95E+05	2.46E+02	2.46E+02	2.47E+02	1.12E+05
NI-59	W	6.81E+03	5.63E+05	5.65E+05	5.68E+05	2.47E+02	2.48E+02	2.49E+02	1.12E+05
NI-63	D	.00E+00	3.72E+05	.00E+00	.00E+00	1.99E+02	4.05E+03	1.75E+05	9.06E+04
NI-63	W	.00E+00	5.01E+05	.00E+00	.00E+00	2.00E+02	4.07E+03	1.76E+05	9.06E+04
SR-90	D	.00E+00	3.37E+04	.00E+00	.00E+00	3.50E+00	6.74E+04	.00E+00	4.83E+03
SR-90	Y	.00E+00	4.88E+03	.00E+00	.00E+00	2.30E+01	4.43E+05	.00E+00	3.74E+04
NB-94	W	1.98E-03	1.60E-01	1.62E-01	1.65E-01	1.62E-03	1.64E-03	1.67E-03	2.92E+01
NB-94	Y	1.98E-03	1.60E-01	1.62E-01	1.65E-01	1.62E-03	1.64E-03	1.67E-03	2.92E+01
TC-99	D	8.76E+03	7.28E+05	7.29E+05	7.30E+05	1.30E-01	1.30E-01	1.31E-01	2.15E+04
TC-99	W	8.60E+02	7.15E+04	7.16E+04	7.17E+04	1.30E-01	1.30E-01	1.31E-01	2.15E+04
RU-106	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	D	5.02E-01	3.08E-01	2.73E+00	4.18E+01	3.12E-03	2.77E-02	4.24E-01	3.15E+03
AG-108	W	5.02E-01	3.08E-01	2.73E+00	4.18E+01	3.12E-03	2.77E-02	4.24E-01	3.15E+03
AG-108	Y	5.02E-01	3.08E-01	2.73E+00	4.18E+01	3.12E-03	2.77E-02	4.24E-01	3.15E+03
CD-109	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SN-126	D	1.55E-03	1.29E-01	1.29E-01	1.29E-01	1.30E-03	1.31E-03	1.31E-03	9.58E+01
SN-126	W	1.55E-03	1.29E-01	1.29E-01	1.29E-01	1.30E-03	1.31E-03	1.31E-03	9.58E+01
SB-125	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SB-125	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
I-129	D	1.44E+00	1.20E+02	1.20E+02	1.20E+02	1.04E-01	1.04E-01	1.04E-01	1.53E+02
CS-134	D	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
CS-135	D	9.30E+02	7.75E+04	7.75E+04	7.75E+04	1.40E+02	1.41E+02	1.41E+02	2.57E+02
CS-137	D	.00E+00	5.13E+00	5.29E+04	.00E+00	5.19E-02	5.36E+02	.00E+00	4.09E+02
EU-152	W	.00E+00	7.98E+01	.00E+00	.00E+00	8.09E-01	.00E+00	.00E+00	6.99E+05
EU-154	W	.00E+00	2.16E+01	.00E+00	.00E+00	2.19E-01	.00E+00	.00E+00	1.55E+05
PB-210	W	.00E+00	3.60E+03	.00E+00	.00E+00	1.98E+01	.00E+00	.00E+00	1.12E+03
AC-227	Y	.00E+00	1.39E+01	.00E+00	.00E+00	1.96E-01	7.37E+04	.00E+00	1.07E+02
AC-227	W	.00E+00	1.22E+01	.00E+00	.00E+00	1.84E-01	6.91E+04	.00E+00	1.07E+02
TH-228	Y	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-228	W	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TH-229	Y	6.55E-03	5.01E-01	5.20E-01	5.46E-01	8.39E-03	8.71E-03	9.14E-03	1.94E+01
TH-229	W	5.74E-03	4.40E-01	4.57E-01	4.79E-01	7.79E-03	8.09E-03	8.48E-03	1.94E+01
RN-222	*	.00E+00	.00E+00	.00E+00	.00E+00	3.84E+04	.00E+00	.00E+00	.00E+00
RA-226	W	2.94E-03	1.66E-01	1.98E-01	2.45E-01	1.67E-03	1.98E-03	2.46E-03	1.24E+01
RA-228	W	.00E+00	5.17E+03	.00E+00	.00E+00	5.34E+01	.00E+00	.00E+00	.00E+00
TH-230	Y	4.42E-03	1.28E+00	5.76E-01	3.69E-01	2.19E-02	7.11E-03	4.20E-03	3.48E+01
TH-230	W	4.08E-03	9.88E-01	5.09E-01	3.40E-01	1.88E-02	6.75E-03	4.07E-03	3.48E+01
TH-232	Y	1.29E-03	1.07E-01	1.07E-01	1.07E-01	1.14E-03	1.14E-03	1.14E-03	1.50E+01
TH-232	W	1.25E-03	1.04E-01	1.04E-01	1.04E-01	1.13E-03	1.13E-03	1.13E-03	1.50E+01
PA-231	Y	3.45E-03	2.88E-01	2.84E-01	2.87E-01	4.69E-03	4.62E-03	4.67E-03	1.85E+00
PA-231	W	2.71E-03	2.25E-01	2.24E-01	2.26E-01	4.08E-03	4.04E-03	4.08E-03	1.85E+00
U-232	Y	2.85E+01	4.11E-01	1.93E+01	2.38E+03	4.56E-03	2.14E-01	2.64E+01	1.54E+02
U-232	W	3.11E+01	4.48E-01	2.10E+01	2.59E+03	4.66E-03	2.19E-01	2.70E+01	1.26E+01
U-232	D	3.07E+01	4.41E-01	2.08E+01	2.56E+03	4.64E-03	2.18E-01	2.69E+01	1.26E+01

INVERSE Output (Regular Waste)

U-233	Y	3.02E-02	4.23E+00	3.23E+00	2.52E+00	1.20E-01	7.84E-02	5.55E-02	8.48E+02
U-233	W	6.08E-02	2.84E+01	9.17E+00	5.07E+00	5.39E-01	1.60E-01	8.67E-02	1.38E+02
U-233	D	6.41E-02	3.98E+01	1.01E+01	5.34E+00	6.57E-01	1.69E-01	8.92E-02	1.38E+02
U-234	Y	5.25E-02	4.65E+00	4.56E+00	4.38E+00	1.40E-01	1.34E-01	1.21E-01	1.47E+03
U-234	W	4.04E-01	6.39E+01	4.99E+01	3.36E+01	1.47E+00	9.92E-01	5.45E-01	1.51E+02
U-234	D	6.09E-01	1.79E+02	9.99E+01	5.08E+01	2.85E+00	1.48E+00	6.65E-01	1.51E+02
U-235	Y	1.61E-02	1.48E+00	1.42E+00	1.34E+00	1.86E-02	1.80E-02	1.72E-02	5.81E+02
U-235	W	2.13E-02	2.01E+00	1.90E+00	1.77E+00	2.08E-02	2.00E-02	1.92E-02	1.46E+02
U-235	D	2.16E-02	2.05E+00	1.93E+00	1.80E+00	2.09E-02	2.02E-02	1.93E-02	1.46E+02
U-236	Y	5.98E-02	4.98E+00	4.98E+00	4.98E+00	1.51E-01	1.51E-01	1.51E-01	1.63E+03
U-236	W	8.51E-01	7.09E+01	7.09E+01	7.09E+01	1.65E+00	1.65E+00	1.65E+00	1.64E+02
U-236	D	2.65E+00	2.20E+02	2.20E+02	2.20E+02	3.46E+00	3.46E+00	3.46E+00	1.64E+02
U-238	Y	5.13E-02	4.28E+00	4.28E+00	4.27E+00	9.48E-02	9.47E-02	9.46E-02	1.21E+03
U-238	W	2.11E-01	1.77E+01	1.77E+01	1.76E+01	2.07E-01	2.07E-01	2.07E-01	1.70E+02
U-238	D	2.51E-01	2.11E+01	2.10E+01	2.09E+01	2.21E-01	2.21E-01	2.20E-01	1.70E+02
NP-237	Y	8.73E-03	7.28E-01	7.28E-01	7.28E-01	9.79E-03	9.79E-03	9.79E-03	5.98E+00
NP-237	W	6.62E-03	5.52E-01	5.52E-01	5.52E-01	8.58E-03	8.58E-03	8.57E-03	5.98E+00
PU-236	Y	6.92E+02	9.96E+00	4.69E+02	5.77E+04	1.11E-01	5.20E+00	6.40E+02	3.74E+03
PU-236	W	6.92E+02	9.96E+00	4.69E+02	5.77E+04	1.11E-01	5.20E+00	6.40E+02	3.74E+03
PU-238	Y	4.54E+01	3.95E+00	9.71E+01	3.79E+03	1.19E-01	2.93E+00	1.12E+02	5.63E+02
PU-238	W	3.21E+01	2.48E+00	6.11E+01	2.67E+03	7.51E-02	1.85E+00	7.97E+01	5.61E+02
PU-239	Y	1.84E-02	1.50E+00	1.52E+00	1.54E+00	4.53E-02	4.58E-02	4.64E-02	2.11E+02
PU-239	W	1.11E-02	9.04E-01	9.14E-01	9.27E-01	2.74E-02	2.77E-02	2.81E-02	2.10E+02
PU-240	Y	2.00E-02	1.51E+00	1.58E+00	1.67E+00	4.58E-02	4.77E-02	5.03E-02	2.12E+02
PU-240	W	1.15E-02	8.73E-01	9.11E-01	9.60E-01	2.64E-02	2.76E-02	2.91E-02	2.11E+02
PU-241	Y	2.59E+00	5.55E+01	1.01E+02	2.16E+02	1.13E+00	2.06E+00	4.38E+00	1.00E+02
PU-241	W	2.59E+00	5.53E+01	1.01E+02	2.16E+02	1.13E+00	2.06E+00	4.38E+00	1.00E+02
PU-242	Y	1.85E-02	1.54E+00	1.54E+00	1.55E+00	4.66E-02	4.66E-02	4.67E-02	2.15E+02
PU-242	W	1.10E-02	9.19E-01	9.20E-01	9.21E-01	2.78E-02	2.78E-02	2.79E-02	2.14E+02
PU-244	Y	6.78E-03	5.84E-01	5.75E-01	5.65E-01	7.93E-03	7.87E-03	7.81E-03	2.00E+02
PU-244	W	5.43E-03	4.65E-01	4.60E-01	4.53E-01	7.12E-03	7.07E-03	7.02E-03	1.99E+02
AM-241	Y	7.68E-02	1.64E+00	3.01E+00	6.40E+00	3.34E-02	6.11E-02	1.30E-01	2.95E+00
AM-241	W	4.86E-02	1.04E+00	1.90E+00	4.05E+00	2.40E-02	4.40E-02	9.36E-02	2.95E+00
AM-243	Y	1.01E-02	7.91E-01	8.14E-01	8.44E-01	1.12E-02	1.16E-02	1.20E-02	2.46E+00
AM-243	W	7.57E-03	5.89E-01	6.08E-01	6.31E-01	9.66E-03	9.98E-03	1.04E-02	2.46E+00
CM-242	Y	8.79E+03	7.63E+02	1.88E+04	7.32E+05	2.31E+01	5.67E+02	2.17E+04	1.09E+05
CM-242	W	8.79E+03	7.63E+02	1.88E+04	7.32E+05	2.31E+01	5.67E+02	2.17E+04	1.09E+05
CM-243	Y	2.51E+00	1.13E+01	2.01E+02	2.09E+02	1.78E-01	2.86E+00	2.98E+00	6.09E+01
CM-243	W	2.51E+00	9.06E+00	2.01E+02	2.09E+02	1.58E-01	2.85E+00	2.98E+00	6.09E+01
CM-244	Y	7.45E+00	1.28E+02	5.89E+02	6.21E+02	3.57E+00	1.78E+01	1.88E+01	5.50E+02
CM-244	W	7.45E+00	9.80E+01	5.89E+02	6.21E+02	2.79E+00	1.78E+01	1.88E+01	5.50E+02
CM-248	Y	7.09E-03	5.90E-01	5.91E-01	5.91E-01	1.64E-02	1.64E-02	1.64E-02	2.26E+00
CM-248	W	5.82E-03	4.84E-01	4.85E-01	4.85E-01	1.36E-02	1.36E-02	1.36E-02	2.26E+00
CF-252	Y	1.26E+03	1.05E+05	1.05E+05	1.05E+05	2.90E+03	2.90E+03	2.90E+03	4.01E+05
CF-252	W	1.26E+03	1.05E+05	1.05E+05	1.05E+05	2.90E+03	2.90E+03	2.90E+03	4.01E+05

INVERSE Output (Regular Waste)

MINIMUMS		EX-ERO	LA-UPS	LA-OVF	INT-WL	BOU-WL	POP-WL	POP-SW
H-3	*	.00E+00	7.77E+01	1.18E-01	4.28E-02	1.20E+01	.00E+00	.00E+00
C-14	*	4.40E+00	4.44E+01	4.80E-02	2.68E-03	2.94E-03	2.55E-02	1.67E-02
NA-22	D	.00E+00	1.50E+04	7.94E+01	.00E+00	.00E+00	.00E+00	.00E+00
CL-36	D	1.58E+01	1.01E+01	1.10E-02	3.95E-05	3.95E-05	4.11E-04	6.83E-04
CL-36	W	1.58E+01	1.01E+01	1.10E-02	3.95E-05	3.95E-05	4.11E-04	6.83E-04
FE-55	W	.00E+00	2.23E+03	1.19E+01	.00E+00	.00E+00	.00E+00	.00E+00
FE-55	Y	.00E+00	2.23E+03	1.19E+01	.00E+00	.00E+00	.00E+00	.00E+00
CO-60	W	.00E+00	1.51E+02	3.60E-01	.00E+00	.00E+00	.00E+00	.00E+00
CO-60	Y	.00E+00	1.51E+02	3.60E-01	.00E+00	.00E+00	.00E+00	.00E+00
NI-59	D	6.38E+02	3.12E+03	3.37E+00	.00E+00	.00E+00	.00E+00	.00E+00
NI-59	W	6.38E+02	3.12E+03	3.37E+00	.00E+00	.00E+00	.00E+00	.00E+00
NI-63	D	.00E+00	1.27E+03	1.43E+00	.00E+00	.00E+00	.00E+00	.00E+00
NI-63	W	.00E+00	1.27E+03	1.43E+00	.00E+00	.00E+00	.00E+00	.00E+00
SR-90	D	.00E+00	2.07E+01	2.60E-02	.00E+00	.00E+00	.00E+00	.00E+00
SR-90	Y	.00E+00	1.61E+02	2.01E-01	.00E+00	.00E+00	.00E+00	.00E+00
NB-94	W	1.75E-01	1.09E+00	1.17E-03	.00E+00	.00E+00	.00E+00	.00E+00
NB-94	Y	1.75E-01	1.09E+00	1.17E-03	.00E+00	.00E+00	.00E+00	.00E+00
TC-99	D	1.21E+02	7.74E+01	8.36E-02	2.93E-04	2.93E-04	3.05E-03	5.26E-03
TC-99	W	1.21E+02	7.74E+01	8.36E-02	2.93E-04	2.93E-04	3.05E-03	5.26E-03
RU-106	Y	.00E+00	5.53E+01	3.67E+00	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	D	5.45E+05	4.88E+03	5.45E+00	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	W	5.45E+05	4.88E+03	5.45E+00	.00E+00	.00E+00	.00E+00	.00E+00
AG-108	Y	5.45E+05	4.88E+03	5.45E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	D	.00E+00	2.57E+02	7.95E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	W	.00E+00	2.57E+02	7.95E+00	.00E+00	.00E+00	.00E+00	.00E+00
CD-109	Y	.00E+00	2.57E+02	7.95E+00	.00E+00	.00E+00	.00E+00	.00E+00
SN-126	D	5.44E-01	2.45E+02	2.65E-01	8.17E-02	1.81E+00	.00E+00	.00E+00
SN-126	W	5.44E-01	2.45E+02	2.65E-01	8.17E-02	1.81E+00	.00E+00	.00E+00
SB-125	D	.00E+00	1.41E+05	7.04E+02	.00E+00	.00E+00	.00E+00	.00E+00
SB-125	W	.00E+00	1.41E+05	7.06E+02	.00E+00	.00E+00	.00E+00	.00E+00
I-129	D	8.57E-01	5.50E-01	5.94E-04	2.15E-06	2.15E-06	2.24E-05	3.69E-05
CS-134	D	.00E+00	5.68E+02	4.66E+00	.00E+00	.00E+00	.00E+00	.00E+00
CS-135	D	1.44E+00	6.80E+02	7.34E-01	1.86E-01	4.04E+00	.00E+00	.00E+00
CS-137	D	.00E+00	1.24E+02	1.54E-01	.00E+00	.00E+00	.00E+00	.00E+00
EU-152	W	.00E+00	1.58E+04	2.38E+01	.00E+00	.00E+00	.00E+00	.00E+00
EU-154	W	.00E+00	1.03E+04	1.44E+01	.00E+00	.00E+00	.00E+00	.00E+00
PB-210	W	.00E+00	4.83E+00	6.40E-03	.00E+00	.00E+00	.00E+00	.00E+00
AC-227	Y	.00E+00	5.49E-01	7.19E-04	.00E+00	.00E+00	.00E+00	.00E+00
AC-227	W	.00E+00	5.49E-01	7.19E-04	.00E+00	.00E+00	.00E+00	.00E+00
TH-228	Y	.00E+00	1.04E+02	9.89E-01	.00E+00	.00E+00	.00E+00	.00E+00
TH-228	W	.00E+00	1.04E+02	9.89E-01	.00E+00	.00E+00	.00E+00	.00E+00
TH-229	Y	1.30E-01	1.93E+00	2.09E-03	.00E+00	.00E+00	.00E+00	.00E+00
TH-229	W	1.30E-01	1.93E+00	2.09E-03	.00E+00	.00E+00	.00E+00	.00E+00
RN-222	*	.00E+00	6.04E+01	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
RA-226	W	1.56E-01	1.94E+00	2.10E-03	7.35E-04	6.42E-03	.00E+00	.00E+00
RA-228	W	.00E+00	1.04E+01	2.08E-02	.00E+00	.00E+00	.00E+00	.00E+00
TH-230	Y	7.62E-02	3.97E+00	4.29E-03	.00E+00	.00E+00	.00E+00	.00E+00
TH-230	W	7.62E-02	3.97E+00	4.29E-03	.00E+00	.00E+00	.00E+00	.00E+00
TH-232	Y	8.41E-02	3.62E+00	3.91E-03	.00E+00	.00E+00	.00E+00	.00E+00
TH-232	W	8.41E-02	3.62E+00	3.91E-03	.00E+00	.00E+00	.00E+00	.00E+00
PA-231	Y	1.06E-02	3.74E-01	4.03E-04	.00E+00	.00E+00	.00E+00	.00E+00
PA-231	W	1.06E-02	3.73E-01	4.03E-04	.00E+00	.00E+00	.00E+00	.00E+00
U-232	Y	.00E+00	4.27E+02	4.88E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-232	W	.00E+00	1.80E+01	2.06E-02	.00E+00	.00E+00	.00E+00	.00E+00
U-232	D	.00E+00	1.80E+01	2.06E-02	.00E+00	.00E+00	.00E+00	.00E+00

INVERSE Output (Regular Waste)

U-233	Y	5.84E-01	5.03E+03	5.44E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-233	W	3.60E-01	4.96E+02	5.35E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-233	D	3.60E-01	4.96E+02	5.35E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-234	Y	3.58E+00	5.05E+03	5.45E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-234	W	7.49E-01	5.01E+02	5.41E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-234	D	7.50E-01	5.01E+02	5.41E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-235	Y	2.39E-01	5.04E+03	5.44E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-235	W	1.96E-01	5.73E+02	6.19E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-235	D	1.96E-01	5.73E+02	6.19E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-236	Y	9.14E+00	5.40E+03	5.83E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-236	W	9.21E-01	5.44E+02	5.88E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-236	D	9.21E-01	5.44E+02	5.88E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-238	Y	6.73E+00	4.01E+03	4.33E+00	.00E+00	.00E+00	.00E+00	.00E+00
U-238	W	9.50E-01	5.62E+02	6.07E-01	.00E+00	.00E+00	.00E+00	.00E+00
U-238	D	9.50E-01	5.62E+02	6.07E-01	.00E+00	.00E+00	.00E+00	.00E+00
NP-237	Y	3.36E-02	4.88E+00	5.28E-03	.00E+00	.00E+00	.00E+00	.00E+00
NP-237	W	3.36E-02	4.88E+00	5.27E-03	.00E+00	.00E+00	.00E+00	.00E+00
PU-236	Y	.00E+00	5.72E+03	2.66E+01	.00E+00	.00E+00	.00E+00	.00E+00
PU-236	W	.00E+00	5.73E+03	2.66E+01	.00E+00	.00E+00	.00E+00	.00E+00
PU-238	Y	1.08E+04	2.39E+02	2.71E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-238	W	1.08E+04	2.38E+02	2.70E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-239	Y	1.25E+00	1.86E+02	2.01E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-239	W	1.24E+00	1.86E+02	2.00E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-240	Y	1.45E+00	1.86E+02	2.01E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-240	W	1.45E+00	1.86E+02	2.00E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-241	Y	9.79E+00	2.03E+04	3.00E+01	.00E+00	.00E+00	.00E+00	.00E+00
PU-241	W	9.79E+00	2.02E+04	2.99E+01	.00E+00	.00E+00	.00E+00	.00E+00
PU-242	Y	1.21E+00	1.93E+02	2.09E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-242	W	1.21E+00	1.92E+02	2.08E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-244	Y	9.57E-01	1.79E+02	1.93E-01	.00E+00	.00E+00	.00E+00	.00E+00
PU-244	W	9.54E-01	1.78E+02	1.93E-01	.00E+00	.00E+00	.00E+00	.00E+00
AM-241	Y	2.91E-01	2.59E-01	2.82E-04	.00E+00	.00E+00	.00E+00	.00E+00
AM-241	W	2.91E-01	2.59E-01	2.82E-04	.00E+00	.00E+00	.00E+00	.00E+00
AM-243	Y	1.63E-02	2.46E-01	2.66E-04	.00E+00	.00E+00	.00E+00	.00E+00
AM-243	W	1.63E-02	2.46E-01	2.66E-04	.00E+00	.00E+00	.00E+00	.00E+00
CM-242	Y	.00E+00	3.50E+03	4.33E+04	.00E+00	.00E+00	.00E+00	.00E+00
CM-242	W	.00E+00	3.50E+03	4.33E+04	.00E+00	.00E+00	.00E+00	.00E+00
CM-243	Y	4.03E+00	8.03E+00	9.88E-03	.00E+00	.00E+00	.00E+00	.00E+00
CM-243	W	4.03E+00	8.03E+00	9.88E-03	.00E+00	.00E+00	.00E+00	.00E+00
CM-244	Y	5.42E+02	1.26E+01	1.73E-02	.00E+00	.00E+00	.00E+00	.00E+00
CM-244	W	5.42E+02	1.26E+01	1.73E-02	.00E+00	.00E+00	.00E+00	.00E+00
CM-248	Y	1.27E-02	2.03E+00	2.19E-03	.00E+00	.00E+00	.00E+00	.00E+00
CM-248	W	1.27E-02	2.03E+00	2.19E-03	.00E+00	.00E+00	.00E+00	.00E+00
CF-252	Y	2.25E+03	2.05E+01	1.07E-01	.00E+00	.00E+00	.00E+00	.00E+00
CF-252	W	2.25E+03	2.05E+01	1.07E-01	.00E+00	.00E+00	.00E+00	.00E+00

LIMITS DUE TO RADON AT 0 THRU 7 M COVER ATTENUATION

RA-226 W 4.16E-03 1.10E-02 2.94E-02 7.80E-02 2.07E-01 5.50E-01 1.46E+00 3.88E+00

D.4 CLASIFY Output

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P-IXRESIN 1200001  100  100 11 1 1 0 0 0 0-2 1
          9.000E-01 6.049E-01 1.000E+00  .000E+00 2.360E-01
     1 H-3    * 1.88E-02 C-14   * 6.89E-04 FE-55  Y 1.65E-02 CO-60  Y 3.18E-02
     1 NI-59  W 1.97E-05 NI-63  W 6.06E-03 SR-90  D 1.37E-03 NB-94  Y 6.24E-07
     1 TC-99  D 5.81E-06 I-129  D 1.72E-05 CS-135 D 5.81E-06 CS-137 D 1.55E-01
     1 U-235  Y 3.34E-07 U-238  Y 2.62E-06 NP-237 W 6.40E-11 PU-238 Y 1.83E-04
     1 PU-239 Y 1.29E-04 PU-241 Y 5.60E-03 PU-242 Y 2.82E-07 AM-241 W 1.32E-04
     1 AM-243 W 8.88E-06 CM-243 W 7.01E-08 CM-244 W 9.73E-05                 $
P-CONCLIQ 1201101  100  140 23 1 2 0 1 0 0-2 1
          1.700E+00 1.359E+00 2.000E+00  .000E+00 3.112E-01
     2 H-3    * 9.84E-03 C-14   * 3.62E-04 FE-55  Y 6.47E-02 CO-60  Y 1.26E-01
     2 NI-59  W 7.73E-05 NI-63  W 2.39E-02 SR-90  D 7.18E-04 NB-94  Y 2.45E-06
     2 TC-99  D 3.06E-06 I-129  D 9.02E-06 CS-135 D 3.06E-06 CS-137 D 8.14E-02
     2 U-235  Y 1.76E-07 U-238  Y 1.38E-06 NP-237 W 3.37E-11 PU-238 Y 1.46E-04
     2 PU-239 Y 9.43E-05 PU-241 Y 4.11E-03 PU-242 Y 2.07E-07 AM-241 W 8.54E-05
     2 AM-243 W 5.77E-06 CM-243 W 3.34E-08 CM-244 W 5.47E-05                 $
P-FSLUDGE 1200001  100  100  2 0 1 0 0 0 0-2 1
          9.000E-01 8.442E-01 3.000E+00  .000E+00 1.090E+00
     3 H-3    * 2.67E-03 C-14   * 9.86E-05 FE-55  Y 3.20E-01 CO-60  Y 6.20E-01
     3 NI-59  W 3.83E-04 NI-63  W 1.18E-01 SR-90  D 1.95E-04 NB-94  Y 1.21E-05
     3 TC-99  D 8.29E-07 I-129  D 2.45E-06 CS-135 D 8.29E-07 CS-137 D 2.21E-02
     3 U-235  Y 1.51E-07 U-238  Y 1.19E-06 NP-237 W 2.90E-11 PU-238 Y 4.92E-05
     3 PU-239 Y 1.60E-04 PU-241 Y 6.97E-03 PU-242 Y 3.51E-07 AM-241 W 2.73E-04
     3 AM-243 W 1.84E-05 CM-243 W 3.20E-07 CM-244 W 1.82E-04                 $
P-FCARTRG  700001  100  100 21 1 1 0 0 0 0-2 1
          1.300E+00 1.000E+00  .000E+00  .000E+00 4.481E+00
     4 H-3    * 2.77E-03 C-14   * 1.02E-04 FE-55  Y 1.34E+00 CO-60  Y 2.58E+00
     4 NI-59  W 1.59E-03 NI-63  W 4.91E-01 SR-90  D 2.02E-04 NB-94  Y 5.03E-05
     4 TC-99  D 8.62E-07 I-129  D 2.55E-06 CS-135 D 8.62E-07 CS-137 D 2.30E-02
     4 U-235  Y 8.77E-07 U-238  Y 6.91E-06 NP-237 W 1.69E-10 PU-238 Y 6.05E-04
     4 PU-239 Y 9.15E-04 PU-241 Y 4.00E-02 PU-242 Y 2.01E-06 AM-241 W 3.95E-04
     4 AM-243 W 2.65E-05 CM-243 W 4.65E-07 CM-244 W 2.65E-04                 $
B-IXRESIN 1200001  100  100 11 1 1 0 0 0 0-2 1
          9.000E-01 5.880E-01 4.000E+00  .000E+00 6.010E-01
     5 H-3    * 2.49E-03 C-14   * 1.55E-04 FE-55  Y 1.23E-01 CO-60  Y 2.06E-01
     5 NI-59  W 1.27E-04 NI-63  W 2.79E-03 SR-90  D 4.72E-04 NB-94  Y 4.01E-06
     5 TC-99  D 9.93E-06 I-129  D 2.65E-05 CS-135 D 9.93E-06 CS-137 D 2.65E-01
     5 U-235  Y 6.91E-09 U-238  Y 5.45E-08 NP-237 W 1.32E-12 PU-238 Y 1.08E-05
     5 PU-239 Y 6.93E-06 PU-241 Y 3.37E-04 PU-242 Y 1.51E-08 AM-241 W 3.00E-06
     5 AM-243 W 2.04E-07 CM-243 W 3.50E-09 CM-244 W 2.36E-06                 $
B-CONCLIQ 1201101  100  140 23 1 2 0 1 0 0-2 1
          1.700E+00 1.284E+00 5.000E+00  .000E+00 3.241E-01
     6 H-3    * 7.29E-04 C-14   * 4.56E-05 FE-55  Y 8.89E-02 CO-60  Y 1.48E-01
     6 NI-59  W 9.15E-05 NI-63  W 2.01E-03 SR-90  D 1.38E-04 NB-94  Y 2.90E-06
     6 TC-99  D 2.92E-06 I-129  D 7.77E-06 CS-135 D 2.92E-06 CS-137 D 7.77E-02
     6 U-235  Y 4.04E-08 U-238  Y 3.16E-07 NP-237 W 7.73E-12 PU-238 Y 2.32E-04
     6 PU-239 Y 1.10E-04 PU-241 Y 5.38E-03 PU-242 Y 2.29E-07 AM-241 W 1.40E-04
     6 AM-243 W 9.45E-06 CM-243 W 3.03E-07 CM-244 W 2.39E-04                 $
B-FSLUDGE 1200001  100  100  2 0 1 0 0 0 0-2 1
          9.000E-01 6.852E-01 6.000E+00  .000E+00 9.210E-01
     7 H-3    * 2.22E-03 C-14   * 1.37E-04 FE-55  Y 2.53E-01 CO-60  Y 4.24E-01
     7 NI-59  W 2.61E-04 NI-63  W 5.70E-03 SR-90  D 4.16E-04 NB-94  Y 8.25E-06
     7 TC-99  D 8.79E-06 I-129  D 2.33E-05 CS-135 D 8.79E-06 CS-137 D 2.33E-01
     7 U-235  Y 5.83E-08 U-238  Y 4.58E-07 NP-237 W 1.12E-11 PU-238 Y 8.18E-05
     7 PU-239 Y 4.14E-05 PU-241 Y 2.02E-03 PU-242 Y 9.10E-08 AM-241 W 2.74E-05
     7 AM-243 W 1.84E-06 CM-243 W 5.21E-08 CM-244 W 3.93E-05                 $
P-COTRASH 1410101  300  100 10 1 1 0 0 0 0 2 1
          4.000E-01 3.333E-01 7.000E+00  .000E+00 1.650E-01
     8 H-3    * 2.20E-03 C-14   * 8.10E-05 FE-55  Y 4.32E-02 CO-60  Y 8.34E-02
     8 NI-59  W 5.16E-05 NI-63  W 1.59E-02 SR-90  D 1.60E-04 NB-94  Y 1.63E-06
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      8 TC-99   D 6.84E-07 I-129   D 2.02E-06 CS-135 D 6.84E-07 CS-137 D 1.81E-02
      8 U-235   Y 5.73E-08 U-238   Y 4.50E-07 NP-237 W 1.10E-11 PU-238 Y 4.32E-05
      8 PU-239 Y 4.02E-05 PU-241 Y 1.75E-03 PU-242 Y 8.76E-08 AM-241 W 2.87E-05
      8 AM-243 W 1.94E-08 CM-243 W 1.99E-08 CM-244 W 1.89E-05                   $
P-NCTRASH 1500001  100   100 11 1 1 0 0 0 0 2 1
          4.000E-01 9.874E-01 8.000E+00  .000E+00 3.309E-01
      9 H-3     * 4.41E-03 C-14    * 1.62E-04 FE-55  Y 8.64E-02 CO-60  Y 1.67E-01
      9 NI-59   W 1.03E-04 NI-63   W 3.18E-02 SR-90  D 3.23E-04 NB-94  Y 3.27E-06
      9 TC-99   D 1.37E-06 I-129   D 4.04E-06 CS-135 D 1.37E-06 CS-137 D 3.64E-02
      9 U-235   Y 1.15E-07 U-238   Y 9.03E-07 NP-237 W 2.21E-11 PU-238 Y 8.70E-05
      9 PU-239 Y 8.01E-05 PU-241 Y 3.50E-03 PU-242 Y 1.76E-07 AM-241 W 5.74E-05
      9 AM-243 W 3.88E-06 CM-243 W 4.02E-08 CM-244 W 3.78E-05                   $
B-COTRASH 1310101  200   100 10 1 1 0 0 0 0 2 1
          3.000E-01 5.000E-01 9.000E+00  .000E+00 3.947E-02
     10 H-3     * 1.13E-04 C-14    * 7.00E-06 FE-55  Y 1.01E-02 CO-60  Y 1.69E-02
     10 NI-59   W 1.04E-05 NI-63   W 2.28E-04 SR-90  D 2.12E-05 NB-94  Y 3.28E-07
     10 TC-99   D 4.50E-07 I-129   D 1.20E-06 CS-135 D 4.50E-07 CS-137 D 1.20E-02
     10 U-235   Y 2.04E-09 U-238   Y 1.61E-08 NP-237 W 3.94E-13 PU-238 Y 3.84E-06
     10 PU-239 Y 1.94E-06 PU-241 Y 9.44E-05 PU-242 Y 4.24E-09 AM-241 W 1.62E-06
     10 AM-243 W 1.09E-07 CM-243 W 3.24E-09 CM-244 W 2.52E-06                   $
B-NCTRASH 1500001  100   100 11 1 1 0 0 0 0 2 1
          4.000E-01 1.000E+00 1.000E+01  .000E+00 8.525E-02
     11 H-3     * 2.46E-04 C-14    * 1.51E-05 FE-55  Y 2.18E-02 CO-60  Y 3.65E-02
     11 NI-59   W 2.26E-05 NI-63   W 4.92E-04 SR-90  D 4.63E-05 NB-94  Y 7.11E-07
     11 TC-99   D 9.38E-07 I-129   D 2.59E-06 CS-135 D 9.76E-07 CS-137 D 2.59E-02
     11 U-235   Y 4.46E-09 U-238   Y 3.49E-08 NP-237 W 8.50E-13 PU-238 Y 8.37E-06
     11 PU-239 Y 4.19E-06 PU-241 Y 2.04E-04 PU-242 Y 9.21E-09 AM-241 W 3.52E-06
     11 AM-243 W 2.36E-07 CM-243 W 7.03E-09 CM-244 W 5.43E-06                   $
L-NFRCOMP  800001  100   100 33 3 1 0 0 1 0 2 1
          7.800E+00 9.432E-01 1.100E+01  .000E+00 7.298E+00
     12 H-3     * 2.63E-01 C-14    * 1.51E-04 CL-36  W 1.88E-05 FE-55  Y 3.38E+00
     12 CO-60   Y 3.23E+00 NI-59   W 1.35E-02 NI-63  W 4.08E-01 SR-90  D 1.24E-05
     12 NB-94   Y 3.20E-06 TC-99   D 5.54E-06 CS-137 D 4.01E-05                 $
L-DECONRS 1201101  100   140 23 2 2 1 2 0 0 2 2
          1.700E+00 1.400E+00  .000E+00  .000E+00 1.672E+01
     13 FE-55   Y 1.88E+00 CO-60   Y 1.35E+01 NI-63  W 7.11E-01 RU-106 Y 6.04E-01
     13 SB-125 W 1.34E-03 EU-154 W 2.69E-05 PU-238 Y 8.07E-03 PU-239 Y 5.37E-03
     13 CM-242 W 8.07E-03 CM-244 W 2.69E-03                                     $
F-PROCESS  700002  100   100  3 0 1 0 0 0 0 2 1
          1.000E+00 1.000E+00  .000E+00  .000E+00 1.084E-04
     14 U-235   Y 2.30E-05 U-238   Y 8.54E-05                                   $
F-COTRASH  710102  150   100 10 1 1 0 0 0 0 2 1
          2.000E-01 6.667E-01  .000E+00  .000E+00 8.370E-06
     15 U-235   Y 1.77E-06 U-238   Y 6.60E-06                                   $
F-NCTRASH  500002  100   100 11 1 1 0 0 0 0 2 1
          4.000E-01 1.000E+00  .000E+00  .000E+00 5.330E-06
     16 U-235   Y 1.13E-06 U-238   Y 4.20E-06                                   $
U-PROCESS  700002  100   100  3 0 1 0 0 0 0 2 1
          1.000E+00 1.000E+00  .000E+00  .000E+00 3.805E-04
     17 U-235   Y 1.65E-05 U-238   Y 3.64E-04                                   $
L-PUDECON  504002  100   100 11 1 1 1 3 0 0 2 8
          1.600E+00 1.000E+00  .000E+00  .000E+00 4.170E+00
     18 PU-238 Y 8.13E-02 PU-239 Y 1.28E-01 PU-241 Y 3.85E+00 PU-242 Y 4.80E-05
     18 AM-241 W 1.11E-01                                                       $
I-COTRASH  710102  200   100 10 1 1 0 0 0 0 2 1
          3.000E-01 5.000E-01  .000E+00  .000E+00 2.259E-01
     20 H-3     * 1.83E-01 C-14    * 1.05E-02 CO-60  Y 2.08E-02 SR-90  D 2.90E-03
     20 TC-99   D 6.78E-09 CS-137 D 9.12E-03 AM-241 W 9.64E-06                   $
I+COTRASH  700002  100   100 10 1 1 0 0 0 0 2 1
          1.000E-01 1.000E+00  .000E+00  .000E+00 1.130E-01
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     21 H-3     * 9.13E-02 C-14     * 5.26E-03 CO-60   Y 1.04E-02 SR-90   D 1.45E-03
     21 TC-99   D 3.39E-09 CS-137 D 4.56E-03 AM-241 W 4.82E-06                     $
I-ABSLIQD  700002  100  300  1 0 1 1 0 0 0 2 1
          1.000E+00 3.000E+00  .000E+00  .000E+00 6.647E-02
     22 H-3     * 4.73E-02 C-14     * 2.72E-03 CO-60   Y 1.04E-02 SR-90   D 1.45E-03
     22 TC-99   D 3.40E-09 CS-137 D 4.57E-03                                       $
I+ABSLIQD  700002  100  300  1 0 1 1 0 0 0 2 1
          1.000E+00 3.000E+00  .000E+00  .000E+00 6.647E-02
     23 H-3     * 4.73E-02 C-14     * 2.72E-03 CO-60   Y 1.04E-02 SR-90   D 1.45E-03
     23 TC-99   D 3.40E-09 CS-137 D 4.57E-03                                       $
I-LIQSCVL  700002  100  300  0 0 1 1 0 0 0 2 1
          9.000E-01 3.000E+00  .000E+00  .000E+00 3.[illegible]E-03
     24 H-3     * 1.67E-03 C-14     * 8.37E-05 CO-60   Y 1.45E-03                  $
I+LIQSCVL  700002  100  300  0 0 1 1 0 0 0 2 1
          9.000E-01 3.000E+00  .000E+00  .000E+00 3.200E-03
     25 H-3     * 1.67E-03 C-14     * 8.37E-05 CO-60   Y 1.45E-03                  $
I-BIOWAST  700002  100  192 11 0 1 1 0 0 0 2 1
          1.100E+00 1.920E+00  .000E+00  .000E+00 1.074E-01
     26 H-3     * 9.11E-02 C-14     * 5.26E-03 CO-60   Y 2.08E-03 SR-90   D 4.34E-03
     26 TC-99   D 3.39E-09 CS-137 D 4.56E-03                                       $
I+BIOWAST  700002  100  192 11 0 1 1 0 0 0 2 1
          1.100E+00 1.920E+00  .000E+00  .000E+00 1.074E-01
     27 H-3     * 9.11E-02 C-14     * 5.26E-03 CO-60   Y 2.08E-03 SR-90   D 4.34E-03
     27 TC-99   D 3.39E-09 CS-137 D 4.56E-03                                       $
N-SSTRASH  710102  150  100 11 1 1 0 0 0 0 2 1
          2.000E-01 6.667E-01  .000E+00  .000E+00 1.674E-05
     28 U-235   Y 3.54E-06 U-238   Y 1.32E-05                                      $
N+SSTRASH  700002  100  100 11 1 1 0 0 0 0 2 1
          1.000E-01 1.000E+00  .000E+00  .000E+00 1.116E-05
     29 U-235   Y 2.36E-06 U-238   Y 8.80E-06                                      $
N-SSWASTE  700002  100  100 13 0 1 0 0 0 0 2 1
          1.000E+00 1.000E+00  .000E+00  .000E+00 2.170E-04
     30 U-235   Y 4.60E-05 U-238   Y 1.71E-04                                      $
N-LOTRASH  710102  200  100 10 1 1 0 0 0 0 2 1
          3.000E-01 5.000E-01  .000E+00  .000E+00 7.053E-02
     31 H-3     * 5.70E-02 C-14     * 3.28E-03 CO-60   Y 6.50E-03 SR-90   D 9.06E-04
     31 TC-99   D 2.12E-09 CS-137 D 2.84E-03 AM-241 W 3.02E-06                     $
N+LOTRASH  700002  100  100 10 1 1 0 0 0 0 2 1
          1.000E-01 1.000E+00  .000E+00  .000E+00 3.526E-02
     32 h-3     * 2.85E-02 C-14     * 1.64E-03 CO-60   Y 3.25E-03 SR-90   D 4.53E-04
     32 TC-99   D 1.06E-09 CS-137 D 1.42E-03 AM-241 W 1.51E-06                     $
N-LOWASTE  700002  100  100 10 0 1 1 0 0 0 2 1
          5.000E-01 1.000E+00  .000E+00  .000E+00 2.106E-02
     33 H-3     * 1.63E-02 C-14     * 9.36E-04 CO-60   Y 1.47E-03 SR-90   D 1.31E-03
     33 TC-99   D 7.76E-10 CS-137 D 1.04E-03                                       $
N-ISOPROD  704001  100  100 11 1 2 0 3 0 0-2 4
          1.700E+00 1.000E+00  .000E+00  .000E+00 2.257E+01
     34 H-3     * 1.09E-02 C-14     * 1.17E-05 FE-55   Y 1.60E+01 NI-63   W 2.46E-01
     34 SR-90   D 2.35E+00 TC-99   D 8.48E-05 RU-106 Y 2.42E+00 I-129   D 7.04E-07
     34 CS-135 D 8.48E-05 CS-137 D 1.54E+00 U-235   Y 4.70E-04 U-238   Y 5.48E-06
     34 NP-237 W 1.03E-13 PU-238 Y 3.81E-05 PU-239 Y 1.07E-05 PU-241 Y 1.37E-03
     34 PU-242 Y 1.85E-08 AM-241 W 2.12E-06 AM-243 W 2.43E-07 CM-242 W 2.27E-04
     34 CM-243 W 5.57E-08 CM-244 W 3.20E-05                                        $
N-ISOTRSH  500001  100  100 10 1 1 0 0 0 0 2 1
          6.000E-01 1.000E+00  .000E+00  .000E+00 1.135E-03
     35 H-3     * 1.51E-06 C-14     * 1.62E-09 CO-60   Y 5.63E-04 SR-90   D 2.70E-04
     35 TC-99   D 1.18E-08 I-129   D 9.77E-11 CS-135 D 1.18E-08 CS-137 D 2.70E-04
     35 U-235   Y 3.00E-05 U-238   Y 1.67E-07 NP-237 W 3.31E-17 PU-238 Y 1.22E-08
     35 PU-239 Y 3.44E-09 PU-241 Y 4.40E-07 PU-242 Y 5.94E-12 AM-241 W 6.80E-10
     35 AM-243 W 7.77E-11 CM-242 W 7.29E-08 CM-243 W 1.79E-11 CM-244 W 1.03E-08$
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N-SORMFG1  700002  100  100 11 1 1 0 0 0 0 2 1
           2.000E+00 1.141E-02 1.300E+01  .000E+00 9.510E-05
     36 AM-241 W 9.51E-05                                                   $
N-SORMFG2 1100001  100  100 11 1 1 1 0 0 0 2 1
           4.000E-01 9.901E-01 1.400E+01  .000E+00 9.363E-02
     37 CO-60  Y 7.65E-02 CS-137 D 1.71E-02                                 $
N-SORMFG3  704001  100  200 11 1 1 0 3 0 0 2 6
           4.000E-01 2.000E+00  .000E+00  .000E+00 3.000E+03
     38 CS-137 D 3.00E+03                                                   $
N-SORMFG4  500002  100  100 11 1 1 0 0 0 0 2 1
           4.000E-01 1.000E+00  .000E+00  .000E+00 6.039E-01
     39 H-3    * 1.70E-01 C-14   * 2.40E-04 SR-90  D 2.63E-03 CS-137 D 4.31E-01
     39 TH-228 Y 4.54E-09                                                   $
N-NECOTRA  710102  200  100 10 1 1 1 0 0 0 2 1
           3.000E-01 5.000E-01  .000E+00  .000E+00 8.414E-01
     40 H-3    * 7.60E-01 C-14   * 8.14E-02                                 $
N-NEABLIQ  700002  100  410  0 0 1 1 0 0 0 2 1
           9.000E-01 4.100E+00  .000E+00  .000E+00 1.357E+01
     41 H-3    * 1.34E+01 C-14   * 2.06E-01                                 $
N-NESOLIQ  701102  100  140 23 1 2 0 1 0 0 2 1
           1.700E+00 1.400E+00  .000E+00  .000E+00 1.868E+01
     42 H-3    * 1.86E+01 C-14   * 1.11E-01                                 $
N-NEVIALS  700002  100  300 10 0 1 1 0 0 0 2 1
           1.000E+00 3.000E+00  .000E+00  .000E+00 1.055E+01
     43 H-3    * 1.03E+01 C-14   * 2.46E-01                                 $
N-NENCGLS  700002  100  100 11 0 1 1 0 0 0 2 1
           1.000E+00 1.000E+00  .000E+00  .000E+00 1.992E+01
     44 H-3    * 1.99E+01 C-14   * 1.88E-02                                 $
N-NEWOTAL  700002  100  100 11 0 1 1 0 0 0 2 1
           1.000E+00 1.000E+00  .000E+00  .000E+00 5.660E-01
     45 H-3    * 4.15E-01 C-14   * 1.51E-01                                 $
N-NETRGAS  704002  100  535 13 0 1 0 3 0 0 2 4
           1.000E-03 5.350E+00  .000E+00  .000E+00 8.636E+03
     46 H-3    * 8.64E+03                                                   $
N-NETRILI  704002  100  535 20 0 1 1 3 0 0 2 4
           9.000E-01 5.350E+00  .000E+00  .000E+00 8.636E+03
     47 H-3    * 8.64E+03                                                   $
N-NECARLI  704002  100  535 20 0 1 1 3 0 0 2 8
           9.000E-01 5.350E+00  .000E+00  .000E+00 7.682E+01
     48 C-14   * 7.68E+01                                                   $
N-MWTRASH  700002  100  100 10 1 1 1 0 0 0 2 1
           4.000E-01 1.000E+00  .000E+00  .000E+00 1.838E+00
     49 H-3    * 1.59E+00 C-14   * 2.48E-01                                 $
N-MWABLIQ  704002  100  550  0 0 1 1 3 0 0 2 6
           1.000E+00 5.500E+00  .000E+00  .000E+00 3.764E+01
     50 H-3    * 3.51E+01 C-14   * 2.55E+00                                 $
N-MWSOLIQ  701102  100  140 23 2 2 0 2 0 0 2 4
           1.700E+00 1.400E+00  .000E+00  .000E+00 7.214E+02
     51 H-3    * 7.21E+02                                                   $
N-MWWASTE  704002  100  100 10 0 1 1 3 0 0 2 8
           4.000E-01 1.000E+00  .000E+00  .000E+00 3.499E+01
     52 H-3    * 6.69E+00 C-14   * 2.83E+01                                 $
N-TRIPLAT  700002  100  100 32 0 1 0 0 0 0 2 1
           1.000E+00 7.252E-01 1.500E+01  .000E+00 1.609E+01
     53 H-3    * 1.61E+01                                                   $
N-TRITGAS  700002  100  100  1 0 1 0 0 0 0 2 1
           1.000E-03 3.000E-02 1.600E+01  .000E+00 2.607E+01
     54 H-3    * 2.61E+01                                                   $
N-TRISCNT  700002  100  300  0 0 1 1 0 0 0 2 1
           9.000E-01 1.907E+00 1.700E+01  .000E+00 5.296E+00
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     55 H-3     * 5.30E+00                                                            $
N-TRILIQD  700002  100  300  1 0 1 1 0 0 0 2 1
           1.000E+00 2.036E+00 1.800E+01  .000E+00 5.077E+00
     56 H-3     * 5.08E+00                                                            $
N-TRITRSH  700002  100  100 10 0 1 0 0 0 0 2 1
           1.000E-01 7.788E-01 1.900E+01  .000E+00 7.765E+00
     57 H-3     * 7.77E+00                                                            $
N-TRIFOIL  700002  100  100 32 0 1 0 0 0 0 2 1
           4.000E-01 1.234E-01 2.000E+01  .000E+00 8.247E+00
     58 H-3     * 8.25E+00                                                            $
N-HIGHACT  700002  100  100 33 3 1 0 0 2 0 2 1
           7.800E+00 1.000E+00  .000E+00  .000E+00 2.105E+02
     59 C-14    * 1.32E-02 FE-55   Y 1.15E+02 CO-60   Y 8.48E+01 NI-59   W 6.56E-02
     59 NI-63   W 1.06E+01 NB-94   Y 4.47E-04                                         $
N-TRITSOR  700002  100  100 13 1 1 0 0 0 1 1 1
           4.000E-01 8.682E-01 2.100E+01  .000E+00 8.100E-01
     60 H-3     * 8.10E-01                                                            $
N-CARBSOR  700002  100  100 13 1 1 0 0 0 2 1 1
           4.000E-01 1.000E+00 2.200E+01  .000E+00 1.000E-02
     61 C-14    * 1.00E-02                                                            $
N-COBLSOR  700002  100  100 13 1 1 0 0 0 3 1 1
           4.000E-01 6.224E-01 2.300E+01  .000E+00 9.102E+00
     62 CO-60   Y 9.10E+00                                                            $
N-NICKSOR  700002  100  100 13 1 1 0 0 0 4 1 1
           4.000E-01 1.000E+00 2.400E+01  .000E+00 1.000E-02
     63 NI-63   W 1.00E-02                                                            $
N-STROSOR  700002  100  100 13 1 1 0 0 0 5 1 1
           4.000E-01 5.280E-02 2.500E+01  .000E+00 1.024E-03
     64 SR-90   D 1.02E-03                                                            $
N-CESISOR  700002  100  100 13 1 1 0 0 0 6 1 1
           4.000E-01 2.776E-01 2.600E+01  .000E+00 2.323E-02
     65 CS-137 D 2.32E-02                                                             $
N-PLU8SOR  701102  100  100 33 1 1 0 2 0 7 1 6
           1.700E+00 1.480E-05 2.700E+01  .000E+00 4.600E-06
     66 PU-238 Y 4.60E-06                                                             $
N-AMERSOR  700002  100  100 13 1 1 0 0 0 9 1 1
           4.000E-01 1.400E-05 2.800E+01  .000E+00 4.080E-07
     68 AM-241 W 4.08E-07                                                             $
N-PUBESOR  701102  100  100 33 1 1 0 2 010 1 8
           1.700E+00 1.332E-05 2.900E+01  .000E+00 1.344E-04
     69 PU-238 Y 1.34E-04                                                             $
N-RANEEDS  701102  100  100 33 1 1 0 2 012 1 6
           1.700E+00 3.000E-05 3.100E+01  .000E+00 3.000E-05
     71 RA-226 W 3.00E-05                                                             $
N-RACELLS  700002  100  100 13 1 1 0 0 013 1 1
           4.000E-01 1.800E-05 3.200E+01  .000E+00 2.760E-06
     72 RA-226 W 2.76E-06                                                             $
N-RAPLAQU  700002  100  100 13 1 1 0 0 014 1 1
           4.000E-01 1.800E-04 3.300E+01  .000E+00 2.100E-07
     73 RA-226 W 2.10E-07                                                             $
N-RAMISCL  700002  100  100 13 0 1 0 0 017 1 1
           4.000E-01 4.630E-01 3.500E+01  .000E+00 9.879E-07
     76 RA-226 W 9.88E-07                                                             $
N-RARESIN  801102  100  140 23 2 2 0 2 0 0 1 6
           1.700E+00 1.400E+00  .000E+00  .000E+00 2.500E-02
     77 RA-226 W 2.50E-02                                                             $
M-NAVYDRY  700001  100  100 10 1 1 0 0 0 0 2 1
           4.000E-01 1.000E+00  .000E+00  .000E+00 1.999E-02
     78 H-3     * 2.67E-04 C-14    * 9.82E-06 FE-55   Y 5.24E-03 CO-60   Y 1.01E-02
     78 NI-59   W 6.24E-06 NI-63   W 1.92E-03 SR-90   D 1.95E-05 NB-94   Y 1.97E-07
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     78 TC-99  D 8.26E-08 I-129  D 2.44E-07 CS-135 D 8.26E-08 CS-137 D 2.20E-03
     78 U-235  Y 6.92E-09 U-238  Y 5.46E-08 NP-237 W 1.33E-12 PU-238 Y 5.24E-06
     78 PU-239 Y 4.85E-06 PU-241 Y 2.11E-04 PU-242 Y 1.06E-08 AM-241 W 3.47E-06
     78 AM-243 W 2.34E-07 CM-243 W 2.40E-09 CM-244 W 2.29E-06                  $
M-NAVYWET  701101  100  100 23 1 2 0 1 0 0 2 1
           1.700E+00 9.416E-01 3.600E+01  .000E+00 2.155E-01
     79 H-3    * 1.71E-02 C-14   * 6.26E-04 FE-55  Y 1.51E-02 CO-60  Y 2.92E-02
     79 NI-59  W 1.80E-05 NI-63  W 5.55E-03 SR-90  D 1.25E-03 NB-94  Y 5.69E-07
     79 TC-99  D 5.30E-06 I-129  D 1.57E-05 CS-135 D 5.30E-06 CS-137 D 1.41E-01
     79 U-235  Y 3.03E-07 U-238  Y 2.39E-06 NP-237 W 5.82E-11 PU-238 Y 1.67E-04
     79 PU-239 Y 1.17E-04 PU-241 Y 5.11E-03 PU-242 Y 2.57E-07 AM-241 W 1.20E-04
     79 AM-243 W 8.12E-06 CM-243 W 6.40E-08 CM-244 W 8.88E-05                  $
R-FUEHARD  805101  100  100 33 3 1 0 4 3 0 2 8
           7.800E+00 1.000E+00  .000E+00  .000E+00 1.495E+05
     81 C-14   * 8.90E-01 FE-55  Y 7.10E+04 CO-60  Y 7.10E+04 NI-59  W 5.40E+01
     81 NI-63  W 7.40E+03 SR-90  D 1.80E-02 NB-94  Y 1.80E-03 TC-99  D 1.30E-01$
R-SILIGEL  704001  100  100  0 0 1 0 3 0 0 2 8
           8.000E-01 1.000E+00  .000E+00  .000E+00 3.732E+00
     84 PU-236 Y 6.40E-06 PU-238 Y 1.10E-01 PU-239 Y 7.20E-03 PU-240 Y 1.50E-02
     84 PU-241 Y 3.60E+00 PU-242 Y 7.80E-05                                    $
R-MPCOTRH  714101  300  100 10 1 1 0 3 0 0 2 8
           4.000E-01 3.333E-01  .000E+00  .000E+00 2.936E+00
     85 C-14   * 4.59E-06 SR-90  D 4.95E-01 TC-99  D 1.08E-04 CS-135 D 2.56E-06
     85 CS-137 D 7.56E-01 U-234  Y 2.79E-06 U-235  Y 1.31E-07 U-236  Y 2.14E-06
     85 U-238  Y 2.63E-06 NP-237 W 3.30E-06 PU-236 Y 2.63E-06 PU-238 Y 4.59E-02
     85 PU-239 Y 2.96E-03 PU-240 Y 5.94E-03 PU-241 Y 1.48E+00 PU-242 Y 3.21E-05
     85 AM-241 W 5.91E-03 AM-243 W 3.93E-04 CM-242 W 8.22E-02 CM-243 W 7.89E-05
     85 CM-244 W 5.91E-02                                                      $
R-MPCOTRL  710101  300  100 10 1 1 0 0 0 0 2 1
           4.000E-01 3.333E-01  .000E+00  .000E+00 8.984E-04
     86 C-14   * 1.41E-09 SR-90  D 1.53E-04 TC-99  D 3.30E-08 CS-135 D 7.80E-10
     86 CS-137 D 2.34E-04 U-234  Y 8.40E-10 U-235  Y 3.90E-11 U-236  Y 6.60E-10
     86 U-238  Y 8.10E-10 NP-237 W 9.90E-10 PU-236 Y 8.10E-10 PU-238 Y 1.38E-05
     86 PU-239 Y 9.00E-07 PU-240 Y 1.83E-06 PU-241 Y 4.50E-04 PU-242 Y 9.90E-09
     86 AM-241 W 1.77E-06 AM-243 W 1.17E-07 CM-242 W 2.49E-05 CM-243 W 2.43E-08
     86 CM-244 W 1.80E-05                                                      $
R-MPNCTRA  504001  100  100 11 1 1 0 3 0 0 2 8
           4.000E-01 1.000E+00  .000E+00  .000E+00 1.194E+00
     87 C-14   * 1.87E-06 SR-90  D 2.03E-01 TC-99  D 4.37E-05 CS-135 D 1.05E-06
     87 CS-137 D 3.10E-01 U-234  Y 1.13E-06 U-235  Y 5.33E-08 U-236  Y 8.67E-07
     87 U-238  Y 1.07E-06 NP-237 W 1.33E-06 PU-236 Y 1.07E-06 PU-238 Y 1.87E-02
     87 PU-239 Y 1.20E-03 PU-240 Y 2.40E-03 PU-241 Y 6.00E-01 PU-242 Y 1.32E-05
     87 AM-241 W 1.32E-03 AM-243 W 1.60E-04 CM-242 W 3.33E-02 CM-243 W 3.23E-05
     87 CM-244 W 2.40E-02                                                      $
R-SBRESIN  901101  100  140 23 2 2 0 2 0 0 2 4
           1.700E+00 1.400E+00  .000E+00  .000E+00 3.583E+01
     90 FE-55  Y 5.56E+00 CO-60  Y 3.47E+00 SR-90  D 4.44E-01 CS-137 D 2.64E+01$
R-SBCOLIQ  901101  100  140 23 2 2 0 2 0 0 2 4
           1.700E+00 1.400E+00  .000E+00  .000E+00 4.981E+01
     91 FE-55  Y 7.71E+00 CO-60  Y 4.84E+00 SR-90  D 6.14E-01 CS-137 D 3.66E+01$
R-SBCOTRA  710101  300  100 10 1 1 0 0 0 0 2 1
           4.000E-01 3.333E-01  .000E+00  .000E+00 1.033E-01
     92 FE-55  Y 1.58E-02 CO-60  Y 9.93E-03 SR-90  D 1.29E-03 CS-137 D 7.62E-02$
R-SBNCTRA  500001  100  100 11 1 1 0 0 0 0 2 1
           4.000E-01 1.000E+00  .000E+00  .000E+00 1.499E-02
     93 FE-55  Y 2.36E-03 CO-60  Y 1.44E-03 SR-90  D 1.86E-04 CS-137 D 1.10E-02$
R-UFFINES  704001  100  100  3 0 1 0 3 0 0 2 8
           1.500E+00 1.000E+00  .000E+00  .000E+00 6.623E+00
     94 U-234  Y 1.51E-02 U-235  Y 7.09E-04 U-236  Y 1.15E-02 U-238  Y 1.42E-02
     94 PU-236 Y 1.16E-05 PU-238 Y 1.92E-01 PU-239 Y 1.27E-02 PU-240 Y 2.64E-02
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   94 PU-241 Y 6.35E+00 PU-242 Y 1.38E-04                                  $
R-UFK2MUD  700001  100  100  3 0 1 0 0 0 0 2 1
         1.200E+00 1.000E+00  .000E+00  .000E+00 1.730E-02
   95 U-234  Y 6.30E-03 U-235  Y 3.00E-04 U-236  Y 4.80E-03 U-238  Y 5.90E-03$
R-UFCOTRA  710101  300  100 10 1 1 0 0 0 0 2 1
         4.000E-01 3.333E-01  .000E+00  .000E+00 2.603E-02
   96 U-234  Y 9.45E-03 U-235  Y 4.44E-04 U-236  Y 7.23E-03 U-238  Y 8.91E-03$
R-UFNCTRA  500001  100  100 11 1 1 0 0 0 0 2 1
         4.000E-01 1.000E+00  .000E+00  .000E+00 5.148E-03
   97 U-234  Y 1.87E-03 U-235  Y 8.80E-05 U-236  Y 1.43E-03 U-238  Y 1.76E-03$
P-DECORES  805101  100  100 33 3 1 0 4 5 0 2 8
         7.800E+00 1.000E+00  .000E+00  .000E+00 3.096E+05
   103 H-3    * 8.66E+00 C-14   * 2.17E+01 CL-36  W 4.42E-01 FE-55  Y 1.82E+05
   103 CO-60  Y 1.12E+05 NI-59  W 9.53E+01 NI-63  W 1.55E+04 SR-90  D 1.73E+00
   103 NB-94  Y 3.47E-01 TC-99  D 1.12E-01 I-129  D 5.20E-07 CS-135 D 3.47E-05
   103 CS-137 D 1.73E+00 U-233  Y 3.12E-04 PU-239 Y 6.06E-03                  $
P-DEACINT  800001  100  100 33 3 1 1 0 0 6 0 2 1
         7.800E+00 4.447E-01 3.700E+01  .000E+00 5.303E+01
   104 H-3    * 1.26E-02 C-14   * 3.94E-03 CL-36  W 8.42E-05 FE-55  Y 3.15E+01
   104 CO-60  Y 1.84E+01 NI-59  W 2.50E-02 NI-63  W 3.12E+00 SR-90  D 6.57E-06
   104 NB-94  Y 3.81E-05 TC-99  D 1.08E-05 I-129  D 1.84E-11 CS-135 D 1.18E-09
   104 CS-137 D 6.57E-05 U-233  Y 1.31E-07 PU-239 Y 3.02E-06                  $
P-DEACVES  800001  100  100 33 3 1 0 0 7 0 2 1
         7.800E+00 8.307E-01 3.800E+01  .000E+00 5.654E+01
   105 H-3    * 7.57E-03 C-14   * 4.26E-03 CL-36  W 9.33E-05 FE-55  Y 3.44E+01
   105 CO-60  Y 1.87E+01 NI-59  W 2.51E-02 NI-63  W 3.33E+00 SR-90  D 8.74E-05
   105 NB-94  Y 3.68E-05 TC-99  D 8.74E-06 I-129  D 2.45E-11 CS-135 D 1.58E-09
   105 CS-137 D 8.74E-05 U-233  Y 9.33E-08 PU-239 Y 1.58E-06                  $
P-DEACTCO  500001  100  100 23 1 1 0 0 0 0 2 1
         4.500E+00 1.000E+00  .000E+00  .000E+00 2.797E+00
   106 H-3    * 8.56E-01 C-14   * 3.09E-04 CL-36  W 3.32E-10 FE-55  Y 1.86E+00
   106 CO-60  Y 7.95E-02 NI-59  W 1.12E-05 NI-63  W 1.41E-03 SR-90  D 7.80E-06
   106 NB-94  Y 1.11E-06 TC-99  D 4.42E-08 I-129  D 2.36E-12 CS-135 D 1.50E-10
   106 CS-137 D 8.13E-06 U-233  Y 1.24E-06 PU-239 Y 1.81E-06                  $
P-DECONME  500001  100  100 12 1 1 0 0 0 0 2 1
         2.000E+00 1.000E+00  .000E+00  .000E+00 1.574E-01
   107 H-3    * 1.10E-05 C-14   * 5.26E-07 FE-55  Y 4.16E-02 CO-60  Y 7.47E-02
   107 NI-59  W 4.61E-05 NI-63  W 3.78E-03 SR-90  D 4.38E-05 NB-94  Y 1.46E-06
   107 TC-99  D 1.23E-08 I-129  D 3.42E-08 CS-135 D 1.23E-08 CS-137 D 3.84E-04
   107 U-235  Y 7.02E-08 U-238  Y 5.54E-07 NP-237 W 1.35E-11 PU-238 Y 1.37E-03
   107 PU-239 Y 1.81E-03 PU-241 Y 3.36E-02 PU-242 Y 3.97E-06 AM-241 W 5.42E-06
   107 AM-243 W 3.68E-07 CM-243 W 3.55E-07 CM-244 W 3.36E-06                  $
P-DECONCO  500001  100  100 12 1 1 0 0 0 0 2 1
         3.000E+00 1.000E+00  .000E+00  .000E+00 9.398E-03
   108 H-3    * 6.49E-07 C-14   * 3.09E-08 FE-55  Y 2.44E-03 CO-60  Y 4.39E-03
   108 NI-59  W 2.71E-06 NI-63  W 2.22E-04 SR-90  D 2.58E-06 NB-94  Y 8.56E-08
   108 TC-99  D 7.21E-10 I-129  D 2.10E-09 CS-135 D 7.21E-10 CS-137 D 2.26E-05
   108 U-235  Y 4.13E-09 U-238  Y 3.25E-08 NP-237 W 7.93E-13 PU-238 Y 8.07E-05
   108 PU-239 Y 1.06E-04 PU-241 Y 2.13E-03 PU-242 Y 2.33E-07 AM-241 W 3.19E-07
   108 AM-243 W 2.16E-08 CM-243 W 2.09E-08 CM-244 W 1.97E-07                  $
P-DETRASH  710101  300  100 10 1 1 0 0 0 0 2 1
         4.000E-01 3.333E-01  .000E+00  .000E+00 1.591E+00
   109 H-3    * 2.12E-02 C-14   * 7.83E-04 FE-55  Y 4.17E-01 CO-60  Y 8.04E-01
   109 NI-59  W 4.95E-04 NI-63  W 1.53E-01 SR-90  D 1.55E-03 NB-94  Y 1.65E-05
   109 TC-99  D 6.57E-06 I-129  D 1.95E-05 CS-135 D 6.57E-06 CS-137 D 1.75E-01
   109 U-235  Y 5.52E-07 U-238  Y 4.35E-06 NP-237 W 1.06E-10 PU-238 Y 4.17E-04
   109 PU-239 Y 3.87E-04 PU-241 Y 1.68E-02 PU-242 Y 8.46E-07 AM-241 W 2.77E-04
   109 AM-243 W 1.87E-05 CM-243 W 1.91E-07 CM-244 W 1.82E-04                  $
P-DEFILCR  701101  100  100 33 2 2 0 2 0 0 2 8
         1.700E+00 1.000E+00  .000E+00  .000E+00 5.591E+02
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      111 H-3     * 3.46E-01 C-14    * 1.28E-02 FE-55   Y 1.67E+02 CO-60   Y 3.22E+02
      111 NI-59   W 1.99E-01 NI-63   W 6.14E+01 SR-90   D 2.53E-02 NB-94   Y 6.29E-03
      111 TC-99   D 1.08E-04 I-129   D 3.19E-04 CS-135 D 1.08E-04 CS-137 D 2.87E+00
      111 U-235   Y 1.10E-04 U-238   Y 8.64E-04 NP-237 W 2.11E-08 PU-238 Y 7.56E-02
      111 PU-239 Y 1.14E-01 PU-241 Y 5.00E+00 PU-242 Y 2.51E-04 AM-241 W 4.94E-02
      111 AM-243 W 3.31E-03 CM-243 W 5.81E-05 CM-244 W 3.31E-02                   $
P-DEEVAPB  901101  100   140 23 2 2 1 2 0 0 2 8
           1.700E+00 1.400E+00  .000E+00  .000E+00 7.424E+01
      112 H-3     * 1.65E-01 C-14    * 1.04E-02 FE-55   Y 2.04E+01 CO-60   Y 3.40E+01
      112 NI-59   W 2.10E-02 NI-63   W 4.61E-01 SR-90   D 3.16E-02 NB-94   Y 6.64E-04
      112 TC-99   D 6.70E-04 I-129   D 1.78E-03 CS-135 D 6.70E-04 CS-137 D 1.78E+01
      112 U-235   Y 9.21E-06 U-238   Y 7.29E-05 NP-237 W 1.77E-09 PU-238 Y 5.33E-02
      112 PU-239 Y 2.53E-02 PU-241 Y 1.24E+00 PU-242 Y 5.26E-05 AM-241 W 3.21E-02
      112 AM-243 W 2.16E-03 CM-243 W 6.94E-05 CM-244 W 5.49E-02                   $
B-DECORES  805101  100   100 33 3 1 0 4 8 0 2 8
           7.800E+00 1.000E+00  .000E+00  .000E+00 1.288E+05
      113 H-3     * 1.73E+01 C-14    * 9.71E+00 CL-36   W 2.13E-01 FE-55   Y 7.85E+04
      113 CO-60   Y 4.26E+04 NI-59   W 5.72E+01 NI-63   W 7.58E+03 SR-90   D 2.00E-01
      113 NB-94   Y 8.40E-02 TC-99   D 2.00E-02 I-129   D 5.59E-08 CS-135 D 3.59E-06
      113 CS-137 D 2.00E-01 U-233   Y 2.13E-04 PU-239 Y 3.59E-03                   $
B-DEACINT  800001  100   100 33 3 1 0 0 9 0 2 1
           7.800E+00 2.153E-01 3.900E+01  .000E+00 6.218E+01
      114 H-3     * 8.35E-03 C-14    * 4.68E-03 CL-36   W 1.03E-04 FE-55   Y 3.79E+01
      114 CO-60   Y 2.05E+01 NI-59   W 2.76E-02 NI-63   W 3.67E+00 SR-90   D 9.64E-05
      114 NB-94   Y 4.04E-05 TC-99   D 9.64E-06 I-129   D 2.69E-11 CS-135 D 1.73E-09
      114 CS-137 D 9.64E-05 U-233   Y 1.03E-07 PU-239 Y 1.73E-06                   $
B-DEACVES  800001  100   100 33 3 1 0 010 0 2 1
           7.800E+00 1.000E+00  .000E+00  .000E+00 2.697E+02
      115 H-3     * 9.80E-02 C-14    * 1.91E-02 CL-36   W 3.91E-04 FE-55   Y 1.60E+02
      115 CO-60   Y 9.39E+01 NI-59   W 1.25E-01 NI-63   W 1.56E+01 SR-90   D 9.80E-05
      115 NB-94   Y 1.91E-04 TC-99   D 5.86E-05 I-129   D 2.97E-11 CS-135 D 2.50E-09
      115 CS-137 D 1.37E-04 U-233   Y 8.63E-07 PU-239 Y 2.27E-05                   $
B-DEACTCO  500001  100   100 23 1 1 0 0 0 0 2 1
           4.500E+00 1.000E+00  .000E+00  .000E+00 1.899E+00
      116 H-3     * 5.86E-01 C-14    * 2.12E-04 CL-36   W 1.09E-05 FE-55   Y 1.26E+00
      116 CO-60   Y 5.19E-02 NI-59   W 7.66E-06 NI-63   W 9.53E-04 SR-90   D 5.23E-06
      116 NB-94   Y 6.53E-07 TC-99   D 2.34E-08 I-129   D 1.63E-12 CS-135 D 1.06E-10
      116 CS-137 D 5.66E-06 U-233   Y 1.04E-07 PU-239 Y 9.19E-07                   $
B-DECONME  500001  100   100 12 1 1 0 0 0 0 2 1
           2.000E+00 1.000E+00  .000E+00  .000E+00 5.696E-01
      117 H-3     * 3.93E-05 C-14    * 1.87E-06 FE-55   Y 1.48E-01 CO-60   Y 2.66E-01
      117 NI-59   W 1.64E-04 NI-63   W 1.35E-02 SR-90   D 1.56E-04 NB-94   Y 5.19E-06
      117 TC-99   D 4.37E-08 I-129   D 1.22E-07 CS-135 D 4.37E-08 CS-137 D 1.37E-03
      117 U-235   Y 2.49E-07 U-238   Y 1.97E-06 NP-237 W 4.80E-11 PU-238 Y 4.89E-03
      117 PU-239 Y 6.44E-03 PU-241 Y 1.29E-01 PU-242 Y 1.41E-05 AM-241 W 1.93E-05
      117 AM-243 W 1.31E-06 CM-243 W 1.26E-06 CM-244 W 1.20E-05                   $
B-DECONCO  500001  100   100 12 1 1 0 0 0 0 2 1
           3.000E+00 1.000E+00  .000E+00  .000E+00 4.393E-02
      118 H-3     * 3.04E-06 C-14    * 1.45E-07 FE-55   Y 1.14E-02 CO-60   Y 2.05E-02
      118 NI-59   W 1.27E-05 NI-63   W 1.04E-03 SR-90   D 1.21E-05 NB-94   Y 4.01E-07
      118 TC-99   D 3.37E-09 I-129   D 9.41E-09 CS-135 D 3.37E-09 CS-137 D 1.06E-04
      118 U-235   Y 1.93E-08 U-238   Y 1.52E-07 NP-237 W 3.72E-12 PU-238 Y 3.77E-04
      118 PU-239 Y 4.97E-04 PU-241 Y 9.98E-03 PU-242 Y 1.09E-06 AM-241 W 1.49E-06
      118 AM-243 W 1.01E-07 CM-243 W 9.77E-08 CM-244 W 9.24E-07                   $
B-DETRASH  710101  300   100 10 1 1 0 0 0 0 2 1
           4.000E-01 3.333E-01  .000E+00  .000E+00 1.590E+00
      119 H-3     * 4.56E-03 C-14    * 2.82E-04 FE-55   Y 4.05E-01 CO-60   Y 6.81E-01
      119 NI-59   W 4.20E-04 NI-63   W 9.18E-03 SR-90   D 8.58E-04 NB-94   Y 1.33E-05
      119 TC-99   D 1.81E-05 I-129   D 4.83E-05 CS-135 D 1.81E-05 CS-137 D 4.83E-01
      119 U-235   Y 8.25E-08 U-238   Y 6.48E-07 NP-237 W 1.59E-11 PU-238 Y 1.55E-04
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    119 PU-239 Y 7.83E-05 PU-241 Y 3.81E-03 PU-242 Y 1.70E-07 AM-241 W 6.54E-05
    119 AM-243 W 4.41E-06 CM-243 W 1.30E-07 CM-244 W 1.02E-03                  $
B-DERESIN  901101  100  140 21 2 2 1 2 0 0 2 4
          1.700E+00 1.400E+00  .000E+00  .000E+00 3.856E+00
    120 H-3     * 1.60E-02 C-14    * 9.93E-04 FE-55   Y 7.86E-01 CO-60   Y 1.33E+00
    120 NI-59   W 8.14E-04 NI-63   W 1.79E-02 SR-90   D 3.04E-03 NB-94   Y 2.58E-05
    120 TC-99   D 6.36E-05 I-129   D 1.70E-04 CS-135 D 6.36E-05 CS-137 D 1.70E+00
    120 U-235   Y 4.44E-08 U-238   Y 3.51E-07 NP-237 W 8.50E-12 PU-238 Y 6.94E-05
    120 PU-239 Y 4.44E-05 PU-241 Y 2.17E-03 PU-242 Y 9.79E-08 AM-241 W 1.94E-05
    120 AM-243 W 1.31E-06 CM-243 W 2.25E-08 CM-244 W 1.51E-05                  $
B-DEEVAPB  901101  100  140 23 2 2 1 2 0 0 2 6
          1.700E+00 1.400E+00  .000E+00  .000E+00 5.356E+01
    121 H-3     * 1.21E-01 C-14    * 7.50E-03 FE-55   Y 1.46E+01 CO-60   Y 2.46E+01
    121 NI-59   W 1.51E-02 NI-63   W 3.33E-01 SR-90   D 2.29E-04 NB-94   Y 4.79E-04
    121 TC-99   D 4.84E-04 I-129   D 1.29E-03 CS-135 D 4.84E-04 CS-137 D 1.29E+01
    121 U-235   Y 6.63E-06 U-238   Y 5.24E-05 NP-237 W 1.28E-09 PU-238 Y 3.84E-02
    121 PU-239 Y 1.82E-02 PU-241 Y 8.86E-01 PU-242 Y 3.99E-05 AM-241 W 2.32E-02
    121 AM-243 W 1.57E-03 CM-243 W 5.01E-05 CM-244 W 3.96E-02                  $
W-COTRASH  510101  300  100 10 1 1 0 0 0 0 2 1
          4.000E-01 3.333E-01  .000E+00  .000E+00 1.926E-03
    124 H-3     * 1.44E-11 C-14    * 1.63E-11 NI-63   W 1.15E-10 SR-90   D 9.21E-04
    124 TC-99   D 9.60E-08 RU-106 Y 4.23E-07 SN-126 W 4.80E-09 SB-125 W 1.82E-06
    124 I-129   D 2.50E-14 CS-134 D 7.98E-07 CS-135 D 1.34E-08 CS-137 D 9.60E-04
    124 EU-152 W 6.33E-08 EU-154 W 2.40E-05 NP-237 W 5.88E-09 PU-238 Y 1.06E-06
    124 PU-239 Y 3.36E-07 PU-241 Y 1.34E-05 PU-242 Y 2.02E-10 AM-241 W 1.44E-06
    124 AM-243 W 2.78E-08 CM-242 W 2.50E-08 CM-243 W 4.02E-09 CM-244 W 1.25E-06$
W-NCSOLID  500001  100  100 11 1 1 0 0 0 0 2 1
          4.000E-01 1.000E+00  .000E+00  .000E+00 2.805E-03
    125 H-3     * 2.10E-11 C-14    * 2.38E-11 NI-63   W 1.68E-10 SR-90   D 1.34E-03
    125 TC-99   D 1.40E-07 RU-106 Y 6.16E-07 SN-126 W 7.00E-09 SB-125 W 2.66E-06
    125 I-129   D 3.64E-14 CS-134 D 1.16E-06 CS-135 D 1.96E-08 CS-137 D 1.40E-03
    125 EU-152 W 9.24E-08 EU-154 W 3.50E-05 NP-237 W 1.96E-09 PU-238 Y 1.54E-06
    125 PU-239 Y 4.90E-07 PU-241 Y 1.96E-05 PU-242 Y 2.94E-10 AM-241 W 2.10E-06
    125 AM-243 W 4.06E-08 CM-242 W 3.64E-08 CM-243 W 5.88E-09 CM-244 W 1.82E-06$
W-LLWTFRE  700001  100  100 11 0 1 0 0 0 0 2 1
          9.000E-01 1.000E+00  .000E+00  .000E+00 1.478E-02
    126 H-3     * 1.11E-10 C-14    * 1.25E-10 NI-63   W 8.84E-10 SR-90   D 7.07E-03
    126 TC-99   D 7.37E-07 RU-106 Y 3.24E-06 SN-126 W 3.68E-08 SB-125 W 1.40E-05
    126 I-129   D 1.92E-13 CS-134 D 6.11E-06 CS-135 D 1.03E-07 CS-137 D 7.37E-03
    126 EU-152 W 4.86E-07 EU-154 W 1.84E-04 NP-237 W 1.03E-08 PU-238 Y 8.10E-06
    126 PU-239 Y 2.58E-06 PU-241 Y 1.03E-04 PU-242 Y 1.55E-09 AM-241 W 1.11E-05
    126 AM-243 W 2.14E-07 CM-242 W 1.92E-07 CM-243 W 3.09E-08 CM-244 W 9.58E-06$
W-FRSRESN  800001  100  100 11 0 1 0 0 0 0 2 1
          9.000E-01 4.333E-03 4.000E+01  .000E+00 9.148E-02
    127 SR-90   D 7.86E-03 CS-137 D 8.36E-02                                    $
W-FRSLIQD  701101  100  140 23 2 2 0 2 0 0 2 4
          1.700E+00 1.400E+00  .000E+00  .000E+00 2.671E+00
    128 SR-90   D 2.71E-01 CS-137 D 2.40E+00                                    $
W-RTSRESN  700001  100  100 11 0 1 0 0 0 0 2 1
          9.000E-01 5.707E-02 4.100E+01  .000E+00 2.146E-01
    129 SR-90   D 2.15E-02 CS-137 D 1.93E-01                                    $
W-LTTRASH  510101  300  100 10 1 1 0 0 0 0 2 1
          4.000E-01 1.396E-01 4.200E+01  .000E+00 2.161E-02
    130 H-3     * 1.61E-10 C-14    * 1.83E-10 NI-63   W 1.29E-09 SR-90   D 1.03E-02
    130 TC-99   D 1.08E-06 RU-106 Y 4.73E-06 SN-126 W 5.38E-08 SB-125 W 1.64E-05
    130 I-129   D 2.80E-13 CS-134 D 8.97E-06 CS-135 D 1.51E-07 CS-137 D 1.08E-02
    130 EU-152 W 7.10E-07 EU-154 W 2.69E-04 NP-237 W 1.51E-08 PU-238 Y 1.18E-05
    130 PU-239 Y 3.77E-06 PU-241 Y 1.51E-04 PU-242 Y 2.26E-09 AM-241 W 1.61E-05
    130 AM-243 W 3.12E-07 CM-242 W 2.80E-07 CM-243 W 4.52E-08 CM-244 W 1.40E-05$
W-HTTRASH  510101  300  100 10 1 1 0 0 0 0 2 1
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          4.000E-01 1.486E-02 4.300E+01  .000E+00 3.873E-03
     131 H-3     * 1.88E-11 C-14    * 2.13E-11 NI-63   W 1.50E-10 SR-90  D 1.21E-03
     131 TC-99  D 1.25E-07 RU-106 Y 5.51E-07 SN-126 W 6.29E-09 SB-125 W 2.38E-06
     131 I-129  D 3.26E-14 CS-134 D 1.04E-06 CS-135 D 1.76E-08 CS-137 D 1.25E-03
     131 EU-152 W 8.27E-08 EU-154 W 3.14E-05 NP-237 W 4.44E-07 PU-238 Y 3.49E-04
     131 PU-239 Y 1.11E-04 PU-241 Y 1.76E-05 PU-242 Y 6.66E-08 AM-241 W 4.76E-04
     131 AM-243 W 9.21E-06 CM-242 W 3.26E-08 CM-243 W 1.33E-06 CM-244 W 4.13E-04$
W-LTEQUIP  500001  100  100 12 1 1 0 0 0 0 2 1
          2.000E+00 1.480E-03 4.400E+01  .000E+00 8.186E-03
     132 H-3     * 6.11E-11 C-14    * 6.93E-11 NI-63   W 4.89E-10 SR-90  D 3.92E-03
     132 TC-99  D 4.08E-07 RU-106 Y 1.79E-06 SN-126 W 2.04E-08 SB-125 W 7.72E-06
     132 I-129  D 1.06E-13 CS-134 D 3.39E-06 CS-135 D 5.71E-08 CS-137 D 4.08E-03
     132 EU-152 W 2.69E-07 EU-154 W 1.02E-04 NP-237 W 5.71E-09 PU-238 Y 4.48E-06
     132 PU-239 Y 1.43E-06 PU-241 Y 5.71E-05 PU-242 Y 8.60E-10 AM-241 W 6.11E-06
     132 AM-243 W 1.18E-07 CM-242 W 1.06E-07 CM-243 W 1.71E-08 CM-244 W 5.30E-06$
W-HTEQUIP  500001  100  100 12 1 1 0 0 0 0 2 1
          2.000E+00 3.646E-04 4.500E+01  .000E+00 8.431E-03
     133 H-3     * 6.18E-11 C-14    * 7.02E-11 NI-63   W 4.94E-10 SR-90  D 3.96E-03
     133 TC-99  D 4.12E-07 RU-106 Y 1.81E-06 SN-126 W 2.06E-08 SB-125 W 7.85E-06
     133 I-129  D 1.07E-13 CS-134 D 3.42E-06 CS-135 D 5.77E-08 CS-137 D 4.12E-03
     133 EU-152 W 2.72E-07 EU-154 W 1.03E-04 NP-237 W 5.93E-08 PU-238 Y 4.66E-05
     133 PU-239 Y 1.48E-05 PU-241 Y 5.77E-05 PU-242 Y 8.90E-09 AM-241 W 6.34E-05
     133 AM-243 W 1.23E-06 CM-242 W 1.07E-07 CM-243 W 1.78E-07 CM-244 W 5.50E-05$
W-PDWLIQD  701101  100  140 23 2 2 0 2 0 0 2 6
          1.700E+00 1.400E+00  .000E+00  .000E+00 3.602E+01
     134 SR-90  D 1.75E+01 TC-99  D 1.82E-03 CS-137 D 1.82E+01 PU-238 Y 2.00E-02
     134 PU-239 Y 6.37E-03 PU-241 Y 2.55E-01 AM-241 W 2.73E-02                  $
W-VITSUPR  701101  100  140 23 2 2 0 2 0 0 2 4
          1.700E+00 1.400E+00  .000E+00  .000E+00 6.733E-01
     135 H-3     * 1.00E-04 C-14    * 1.00E-04 NI-63   W 4.00E-04 SR-90  D 2.57E-02
     135 TC-99  D 7.86E-02 RU-106 Y 1.71E-02 SN-126 W 2.00E-04 SB-125 W 7.86E-04
     135 CS-134 D 3.00E-04 CS-137 D 3.79E-01 EU-152 W 2.71E-02 EU-154 W 4.29E-02
     135 PU-238 Y 6.43E-03 PU-239 Y 2.14E-03 PU-241 Y 9.29E-02                  $
W-VITWASH  701101  100  140 23 2 2 0 2 0 0 2 8
          1.700E+00 1.400E+00  .000E+00  .000E+00 2.609E+01
     136 SR-90  D 1.43E-01 TC-99  D 2.07E+00 RU-106 Y 9.29E-01 CS-137 D 2.07E+01
     136 EU-152 W 7.14E-01 EU-154 W 1.21E+00 PU-238 Y 1.71E-01 PU-241 Y 1.29E-01$
W-VITSCRB  701101  100  140 23 2 2 0 2 0 0 2 6
          1.700E+00 1.400E+00  .000E+00  .000E+00 5.050E+01
     137 SR-90  D 5.00E-01 CS-137 D 5.00E+01                                    $
W-VITMELT  701101  100  140 23 2 2 0 2 0 0 2 6
          1.700E+00 1.400E+00  .000E+00  .000E+00 1.979E+03
     138 SR-90  D 8.79E+02 CS-137 D 1.10E+03                                    $
W-VITFRAC  701101  100  140 23 1 2 0 1 0 0 2 1
          1.700E+00 1.400E+00  .000E+00  .000E+00 4.448E-02
     139 SR-90  D 4.71E-04 CS-134 D 4.07E-07 CS-135 D 6.87E-09 CS-137 D 4.40E-02
     139 PU-238 Y 5.40E-07 PU-239 Y 1.71E-07 PU-241 Y 6.87E-06 AM-241 W 7.36E-07$
W-VITZEOL  701101  100  140 23 2 2 0 2 0 0 2 4
          1.700E+00 1.400E+00  .000E+00  .000E+00 2.703E+00
     140 SR-90  D 2.85E-03 CS-134 D 2.46E-06 CS-135 D 4.15E-08 CS-137 D 2.70E+00
     140 PU-238 Y 3.26E-06 PU-239 Y 1.04E-06 PU-241 Y 4.15E-05 AM-241 W 4.45E-06$
W-DDRACKS  500001  100  100 12 1 1 0 0 0 0 2 1
          2.000E+00 1.482E-01 4.600E+01  .000E+00 [illegible]37E-02
     141 H-3     * 1.22E-10 C-14    * 1.39E-10 NI-6[illegible] [illegible] 9.78E-10 SR-90  D 7.83E-03
     141 TC-99  D 8.16E-07 RU-106 Y 3.59E-06 SN-[illegible] [illegible] 4.0[illegible]E-08 SB-125 W 1.55E-05
     141 I-129  D 2.12E-13 CS-134 D 6.77E-06 [illegible] 1.14E-07 CS-137 D 8.16E-03
     141 EU-152 W 5.38E-07 EU-154 W 2.05E-0[illegible] [illegible] 1.14E-08 PU-238 Y 8.97E-06
     141 PU-239 Y 2.86E-06 PU-241 Y 1.14E-04 [illegible] 1.71E-09 AM-241 W 1.22E-05
     141 AM-243 W 2.37E-07 CM-242 W 2.12E-07 CM-243 W 3.42E-08 CM-244 W 1.06E-05$
W-DDLTRUB  500001  100  100 12 1 1 0 0 0 0 2 1
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          2.000E+00 9.154E-01 4.700E+01  .000E+00 1.061E-02
    142 H-3     * 7.91E-11 C-14     * 9.01E-11 NI-63   W 6.34E-10 SR-90   D 5.08E-03
    142 TC-99   D 5.29E-07 RU-106 Y 2.33E-06 SN-126 W 2.65E-08 SB-125 W 1.01E-05
    142 I-129   D 1.37E-13 CS-134 D 4.39E-06 CS-135 D 7.38E-08 CS-137 D 5.29E-03
    142 EU-152 W 3.49E-07 EU-154 W 1.32E-04 NP-237 W 7.38E-09 PU-238 Y 5.81E-06
    142 PU-239 Y 1.85E-06 PU-241 Y 7.38E-05 PU-242 Y 1.11E-09 AM-241 W 7.91E-06
    142 AM-243 W 1.54E-07 CM-242 W 1.37E-07 CM-243 W 2.22E-08 CM-244 W 6.86E-06$
W-DDHTRUB  500001  100   100 12 1 1 0 0 0 0 2 1
          2.000E+00 2.095E-02 4.800E+01  .000E+00 2.837E-03
    143 H-3     * 1.78E-12 C-14     * 2.01E-12 NI-63   W 1.42E-11 SR-90   D 1.13E-04
    143 TC-99   D 1.18E-08 RU-106 Y 5.20E-08 SN-126 W 5.91E-10 SB-125 W 2.24E-07
    143 I-129   D 3.08E-15 CS-134 D 9.81E-08 CS-135 D 1.66E-09 CS-137 D 1.18E-04
    143 EU-152 W 7.80E-09 EU-154 W 2.96E-06 NP-237 W 8.50E-07 PU-238 Y 6.68E-04
    143 PU-239 Y 2.12E-04 PU-241 Y 1.66E-06 PU-242 Y 1.28E-07 AM-241 W 9.10E-04
    143 AM-243 W 1.76E-05 CM-242 W 3.08E-09 CM-243 W 2.54E-06 CM-244 W 7.88E-04$
W-DDLTLQD  701101  100   140 23 2 2 1 2 0 0 2 8
          1.700E+00 1.400E+00  .000E+00  .000E+00 1.003E+02
    144 H-3     * 7.50E-07 C-14     * 8.50E-07 NI-63   W 6.00E-06 SR-90   D 4.80E+01
    144 TC-99   D 5.00E-03 RU-106 Y 2.20E-02 SN-126 W 2.50E-04 SB-125 W 9.50E-02
    144 I-129   D 1.30E-09 CS-134 D 4.15E-02 CS-135 D 7.00E-04 CS-137 D 5.00E+01
    144 EU-152 W 3.30E-03 EU-154 W 1.25E+00 NP-237 W 7.00E-05 PU-238 Y 5.50E-02
    144 PU-239 Y 1.75E-02 PU-241 Y 7.00E-01 PU-242 Y 1.05E-05 AM-241 W 7.50E-02
    144 AM-243 W 1.45E-03 CM-242 W 1.30E-03 CM-243 W 2.10E-04 CM-244 W 6.50E-02$
W-DDHTLQD  701101  100   140 23 1 2 1 1 0 0 2 1
          1.700E+00 6.474E-05 4.900E+01  .000E+00 1.964E-02
    145 H-3     * 1.47E-10 C-14     * 1.67E-10 NI-63   W 1.18E-09 SR-90   D 9.41E-03
    145 TC-99   D 9.81E-07 RU-106 Y 4.31E-06 SN-126 W 4.90E-08 SB-125 W 1.86E-05
    145 I-129   D 2.55E-13 CS-134 D 8.13E-06 CS-135 D 1.37E-07 CS-137 D 9.81E-03
    145 EU-152 W 6.48E-07 EU-154 W 2.45E-04 NP-237 W 2.93E-09 PU-238 Y 2.29E-06
    145 PU-239 Y 7.31E-07 PU-241 Y 1.37E-04 PU-242 Y 4.38E-10 AM-241 W 3.13E-06
    145 AM-243 W 6.06E-08 CM-242 W 2.55E-07 CM-243 W 8.25E-09 CM-244 W 2.71E-06$
W-DDRESIN  701101  100   140 23 2 2 0 2 0 0 2 8
          1.700E+00 1.400E+00  .000E+00  .000E+00 2.808E+02
    146 H-3     * 2.10E-06 C-14     * 2.38E-06 NI-63   W 1.68E-05 SR-90   D 1.34E+02
    146 TC-99   D 1.40E-02 RU-106 Y 6.16E-02 SN-126 W 7.00E-04 SB-125 W 2.66E-01
    146 I-129   D 3.64E-09 CS-134 D 1.16E-01 CS-135 D 1.96E-03 CS-137 D 1.40E+02
    146 EU-152 W 9.21E-03 EU-154 W 3.50E+00 NP-237 W 1.96E-04 PU-238 Y 1.54E-01
    146 PU-239 Y 4.90E-02 PU-241 Y 1.96E+00 PU-242 Y 2.94E-05 AM-241 W 2.10E-01
    146 AM-243 W 4.06E-03 CM-242 W 3.64E-03 CM-243 W 5.88E-04 CM-244 W 1.82E-01$
L-FUEHARD  805101  100   100 33 3 1 0 411 0 2 8
          7.800E+00 1.000E+00  .000E+00  .000E+00 1.495E+05
    148 C-14    * 8.90E-01 FE-55   Y 7.10E+04 CO-60   Y 7.10E+04 NI-59   W 5.40E+01
    148 NI-63   W 7.40E+03 SR-90   D 1.80E-02 NB-94   Y 1.80E-03 TC-99   D 1.30E-01$
P-IXRESIN 1201101  100   140 23 2 2 0 2 0 0-2 2
          1.700E+00 1.054E-01 1.000E+00  .000E+00 6.242E-01
    149 H-3     * 4.96E-02 C-14     * 1.82E-03 FE-55   Y 4.36E-02 CO-60   Y 8.42E-02
    149 NI-59   W 5.21E-05 NI-63   W 1.60E-02 SR-90   D 3.62E-03 NB-94   Y 1.65E-06
    149 TC-99   D 1.54E-05 I-129   D 4.55E-05 CS-135 D 1.54E-05 CS-137 D 4.09E-01
    149 U-235   Y 8.83E-07 U-238   Y 6.92E-06 NP-237 W 1.69E-10 PU-238 Y 4.85E-04
    149 PU-239 Y 3.40E-04 PU-241 Y 1.48E-02 PU-242 Y 7.45E-07 AM-241 W 3.49E-04
    149 AM-243 W 2.35E-05 CM-243 W 1.85E-07 CM-244 W 2.57E-04                   $
P-CONCLIQ 1201101  100   140 23 2 2 0 2 0 0-2 4
          1.700E+00 2.339E-02 2.000E+00  .000E+00 2.702E+00
    150 H-3     * 8.54E-02 C-14     * 3.15E-03 FE-55   Y 5.62E-01 CO-60   Y 1.09E+00
    150 NI-59   W 6.71E-04 NI-63   W 2.07E-01 SR-90   D 6.23E-03 NB-94   Y 2.13E-05
    150 TC-99   D 2.65E-05 I-129   D 7.83E-05 CS-135 D 2.65E-05 CS-137 D 7.06E-01
    150 U-235   Y 1.53E-06 U-238   Y 1.20E-05 NP-237 W 2.92E-10 PU-238 Y 1.27E-03
    150 PU-239 Y 8.19E-04 PU-241 Y 3.56E-02 PU-242 Y 1.79E-06 AM-241 W 7.42E-04
    150 AM-243 W 5.01E-05 CM-243 W 2.90E-07 CM-244 W 4.75E-04                   $
P-FSLUDGE 1201101  100   140 23 2 2 0 2 0 0-2 2
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          1.700E+00 1.260E-01 3.000E+00  .000E+00 7.305E+00
     151 H-3     * 1.79E-02 C-14    * 6.61E-04 FE-55  Y 2.14E+00 CO-60  Y 4.15E+00
     151 NI-59  W 2.57E-03 NI-63   W 7.90E-01 SR-90  D 1.31E-03 NB-94  Y 8.10E-05
     151 TC-99  D 5.55E-06 I-129   D 1.64E-05 CS-135 D 5.55E-06 CS-137 D 1.48E-01
     151 U-235  Y 1.01E-06 U-238   Y 7.96E-06 NP-237 W 1.94E-10 PU-238 Y 3.30E-04
     151 PU-239 Y 1.07E-03 PU-241 Y 4.67E-02 PU-242 Y 2.35E-06 AM-241 W 1.83E-03
     151 AM-243 W 1.23E-04 CM-243 W 2.14E-06 CM-244 W 1.22E-03                    $
B-IXRESIN 1201101  100  140 23 2 2 0 2 0 0-2 2
          1.700E+00 8.397E-02 4.000E+00  .000E+00 1.255E+00
     152 H-3     * 5.20E-03 C-14    * 3.23E-04 FE-55  Y 2.58E-01 CO-60  Y 4.30E-01
     152 NI-59  W 2.64E-04 NI-63   W 5.83E-03 SR-90  D 9.86E-04 NB-94  Y 8.38E-06
     152 TC-99  D 2.07E-05 I-129   D 5.54E-05 CS-135 D 2.07E-05 CS-137 D 5.54E-01
     152 U-235  Y 1.44E-08 U-238   Y 1.14E-07 NP-237 W 2.76E-12 PU-238 Y 2.26E-05
     152 PU-239 Y 1.45E-05 PU-241 Y 7.04E-04 PU-242 Y 3.16E-08 AM-241 W 6.28E-06
     152 AM-243 W 4.26E-07 CM-243 W 7.31E-09 CM-244 W 4.93E-06                    $
B-CONCLIQ 1201101  100  140 23 2 2 0 2 0 0-2 4
          1.700E+00 2.567E-02 5.000E+00  .000E+00 8.644E-01
     153 H-3     * 1.94E-03 C-14    * 1.22E-04 FE-55  Y 2.37E-01 CO-60  Y 3.96E-01
     153 NI-59  W 2.44E-04 NI-63   W 5.36E-03 SR-90  D 3.68E-04 NB-94  Y 7.72E-06
     153 TC-99  D 7.79E-06 I-129   D 2.07E-05 CS-135 D 7.79E-06 CS-137 D 2.07E-01
     153 U-235  Y 1.08E-07 U-238   Y 8.44E-07 NP-237 W 2.06E-11 PU-238 Y 6.20E-04
     153 PU-239 Y 2.94E-04 PU-241 Y 1.43E-02 PU-242 Y 6.12E-07 AM-241 W 3.74E-04
     153 AM-243 W 2.52E-05 CM-243 W 8.07E-07 CM-244 W 6.39E-04                    $
B-FSLUDGE 1201101  100  140 23 2 2 0 2 0 0-2 2
          1.700E+00 3.707E-02 6.000E+00  .000E+00 5.552E-01
     154 H-3     * 1.34E-03 C-14    * 8.24E-05 FE-55  Y 1.52E-01 CO-60  Y 2.55E-01
     154 NI-59  W 1.57E-04 NI-63   W 3.44E-03 SR-90  D 2.51E-04 NB-94  Y 4.97E-06
     154 TC-99  D 5.30E-06 I-129   D 1.41E-05 CS-135 D 5.30E-06 CS-137 D 1.41E-01
     154 U-235  Y 3.52E-08 U-238   Y 2.76E-07 NP-237 W 6.75E-12 PU-238 Y 4.93E-05
     154 PU-239 Y 2.50E-05 PU-241 Y 1.22E-03 PU-242 Y 5.49E-08 AM-241 W 1.65E-05
     154 AM-243 W 1.11E-06 CM-243 W 3.14E-08 CM-244 W 2.37E-05                    $
P-NCTRASH 1504001  100  100 11 1 1 0 3 0 0 2 6
          4.000E-01 1.255E-02 8.000E+00  .000E+00 4.039E+00
     155 H-3     * 5.38E-02 C-14    * 1.98E-03 FE-55  Y 1.06E+00 CO-60  Y 2.04E+00
     155 NI-59  W 1.26E-03 NI-63   W 3.88E-01 SR-90  D 3.94E-03 NB-94  Y 3.99E-05
     155 TC-99  D 1.67E-05 I-129   D 4.93E-05 CS-135 D 1.67E-05 CS-137 D 4.44E-01
     155 U-235  Y 1.40E-06 U-238   Y 1.10E-05 NP-237 W 2.70E-10 PU-238 Y 1.06E-03
     155 PU-239 Y 9.78E-04 PU-241 Y 4.27E-02 PU-242 Y 2.15E-06 AM-241 W 7.01E-04
     155 AM-243 W 4.74E-05 CM-243 W 4.90E-07 CM-244 W 4.61E-04                    $
L-NFRCOMP  805101  100  100 33 3 1 0 4 1 0 2 4
          7.800E+00 5.328E-02 1.100E+01  .000E+00 1.004E+03
     156 H-3     * 3.62E+01 C-14    * 2.07E-02 CL-36  W 2.58E-03 FE-55  Y 4.65E+02
     156 CO-60  Y 4.45E+02 NI-59   W 1.85E+00 NI-63  W 5.62E+01 SR-90  D 1.70E-03
     156 NB-94  Y 4.40E-04 TC-99   D 7.63E-04 CS-137 D 5.52E-03                   $
N-SORMFG1  704002  100  100 11 1 1 0 3 0 0 2 6
          2.000E+00 1.081E-01 1.300E+01  .000E+00 9.358E-04
     157 AM-241 W 9.36E-04                                                        $
N-SORMFG2 1104001  100  100 11 1 1 1 3 0 0 2 4
          4.000E-01 4.725E-03 1.400E+01  .000E+00 1.669E+02
     158 CO-60  Y 1.36E+02 CS-137 D 3.06E+01                                      $
N-TRIPLAT  704002  100  100 32 0 1 0 3 0 0 2 4
          1.000E+00 2.748E-01 1.500E+01  .000E+00 1.737E+03
     159 H-3     * 1.74E+03                                                       $
N-TRITGAS  704002  100  100  1 0 1 0 3 0 0 2 4
          1.000E-03 9.700E-01 1.600E+01  .000E+00 6.116E+02
     160 H-3     * 6.12E+02                                                       $
N-TRISCNT  753112  452  200 31 3 4 1 2 0 0 2 2
          1.200E+00 3.939E-02 1.700E+01  .000E+00 4.381E+00
     161 H-3     * 4.38E+00                                                       $
N-TRILIQD  701102  100  140 23 2 2 1 2 0 0 2 4
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          1.700E+00 4.501E-01 1.800E+01  .000E+00 1.557E+03
    162 H-3    * 1.56E+03                                                     $
N-TRITRSH  704002  100  100 10 0 1 0 3 0 0 2 4
          1.000E-01 2.212E-01 1.900E+01  .000E+00 2.864E+02
    163 H-3    * 2.86E+02                                                     $
N-TRIFOIL  704002  100  100 32 0 1 0 3 0 0 2 4
          4.000E-01 8.766E-01 2.000E+01  .000E+00 8.886E+02
    164 H-3    * 8.89E+02                                                     $
N-TRITSOR  701102  100  100 33 1 1 0 2 0 1 1 4
          1.700E+00 1.318E-01 2.100E+01  .000E+00 2.252E+00
    165 H-3    * 2.25E+00                                                     $
N-COBLSOR  701102  100  100 33 1 1 0 2 0 3 1 4
          1.700E+00 3.776E-01 2.300E+01  .000E+00 1.309E+03
    166 CO-60  Y 1.31E+03                                                     $
N-STROSOR  701102  100  100 33 1 1 0 2 0 5 1 4
          1.700E+00 9.170E-01 2.500E+01  .000E+00 6.778E-01
    167 SR-90  D 6.78E-01                                                     $
N-CESISOR  701102  100  100 33 1 1 0 2 0 6 1 4
          1.700E+00 4.720E-01 2.600E+01  .000E+00 6.975E-01
    168 CS-137 D 6.98E-01                                                     $
N-PLU8SOR  701102  100  100 33 1 1 0 2 0 7 1 8
          1.700E+00 1.332E-04 2.700E+01  .000E+00 4.143E-05
    169 PU-238 Y 4.14E-05                                                     $
N-AMERSOR  701102  100  100 33 1 1 0 2 0 9 1 6
          1.700E+00 1.260E-04 2.800E+01  .000E+00 3.675E-06
    170 AM-241 W 3.67E-06                                                     $
N-RANEEDS  701102  100  100 33 1 1 0 2 012 1 8
          1.700E+00 5.950E-04 3.100E+01  .000E+00 2.838E-04
    172 RA-226 W 2.84E-04                                                     $
N-RACELLS  701102  100  100 33 1 1 0 2 013 1 6
          1.700E+00 1.620E-04 3.200E+01  .000E+00 2.514E-05
    173 RA-226 W 2.51E-05                                                     $
N-RAPLAQU  701102  100  100 33 1 1 0 2 014 1 6
          1.700E+00 1.620E-03 3.300E+01  .000E+00 2.007E-06
    174 RA-226 W 2.01E-06                                                     $
N-RAMISCL  701102  100  100 33 0 1 0 2 017 1 6
          1.700E+00 2.878E-01 3.500E+01  .000E+00 5.563E-06
    175 RA-226 W 5.56E-06                                                     $
M-NAVYWET  701101  100  100 23 2 2 0 2 0 0 2 4
          1.700E+00 2.664E-02 3.600E+01  .000E+00 4.569E+00
    176 H-3    * 3.63E-01 C-14   * 1.33E-02 FE-55  Y 3.19E-01 CO-60  Y 6.20E-01
    176 NI-59  W 3.81E-04 NI-63  W 1.18E-01 SR-90  D 2.65E-02 NB-94  Y 1.21E-05
    176 TC-99  D 1.12E-04 I-129  D 3.32E-04 CS-135 D 1.12E-04 CS-137 D 2.99E+00
    176 U-235  Y 6.43E-06 U-238  Y 5.06E-05 NP-237 W 1.23E-09 PU-238 Y 3.55E-03
    176 PU-239 Y 2.49E-03 PU-241 Y 1.08E-01 PU-242 Y 5.45E-06 AM-241 W 2.55E-03
    176 AM-243 W 1.72E-04 CM-243 W 1.36E-06 CM-244 W 1.88E-03                 $
P-DEACINT  805101  100  100 33 3 1 0 4 6 0 2 4
          7.800E+00 5.029E-01 3.700E+01  .000E+00 7.067E+03
    177 H-3    * 1.68E+00 C-14   * 5.25E-01 CL-36  W 1.12E-02 FE-55  Y 4.20E+03
    177 CO-60  Y 2.45E+03 NI-59  W 3.33E+00 NI-63  W 4.16E+02 SR-90  D 8.76E-04
    177 NB-94  Y 5.08E-03 TC-99  D 1.44E-03 I-129  D 2.45E-09 CS-135 D 1.58E-07
    177 CS-137 D 8.76E-03 U-233  Y 1.75E-05 PU-239 Y 4.02E-04                 $
P-DEACVES  805101  100  100 33 3 1 0 4 7 0 2 4
          7.800E+00 1.693E-01 3.800E+01  .000E+00 2.345E+02
    178 H-3    * 3.14E-02 C-14   * 1.77E-02 CL-36  W 3.87E-04 FE-55  Y 1.43E+02
    178 CO-60  Y 7.77E+01 NI-59  W 1.04E-01 NI-63  W 1.38E+01 SR-90  D 3.63E-04
    178 NB-94  Y 1.53E-04 TC-99  D 3.63E-05 I-129  D 1.02E-10 CS-135 D 6.55E-09
    178 CS-137 D 3.63E-04 U-233  Y 3.87E-07 PU-239 Y 6.55E-06                 $
B-DEACINT  805101  100  100 33 3 1 0 4 9 0 2 4
          7.800E+00 6.126E-01 3.900E+01  .000E+00 1.330E+03
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    179 H-3     * 1.79E-01 C-14    * 1.00E-01 CL-36  W 2.20E-03 FE-55  Y 8.11E+02
    179 CO-60  Y 4.39E+02 NI-59   W 5.90E-01 NI-63  W 7.85E+01 SR-90  D 2.06E-03
    179 NB-94  Y 8.65E-04 TC-99   D 2.06E-04 I-129  D 5.76E-10 CS-135 D 3.71E-08
    179 CS-137 D 2.06E-03 U-233   Y 2.20E-06 PU-239 Y 3.71E-05                  $
W-FRSRESN  801101  100   140 23 2 2 0 2 0 0 2 2
          1.700E+00 2.426E-03 4.000E+01  .000E+00 2.790E-02
    180 SR-90  D 2.40E-03 CS-137 D 2.55E-02                                     $
W-RTSRESN  701101  100   140 23 2 2 0 2 0 0 2 2
          1.700E+00 3.196E-02 4.100E+01  .000E+00 1.124E-01
    181 SR-90  D 1.12E-02 CS-137 D 1.01E-01                                     $
W-LTTRASH  763121 8000   200 31 3 4 0 2 0 0 2 4
          1.200E+00 9.810E-03 4.200E+01  .000E+00 9.870E-01
    182 H-3     * 7.37E-10 C-14    * 6.28E-09 NI-63  W 5.89E-08 SR-90  D 4.72E-01
    182 TC-99  D 4.92E-05 RU-106 Y 2.16E-04 SN-126 W 2.46E-06 SB-125 W 7.47E-04
    182 I-129  D 1.28E-11 CS-134 D 4.10E-04 CS-135 D 6.89E-06 CS-137 D 4.92E-01
    182 EU-152 W 3.24E-05 EU-154 W 1.23E-02 NP-237 W 6.89E-07 PU-238 Y 5.41E-04
    182 PU-239 Y 1.72E-04 PU-241 Y 6.89E-03 PU-242 Y 1.03E-07 AM-241 W 7.37E-04
    182 AM-243 W 1.43E-05 CM-242 W 1.28E-05 CM-243 W 2.07E-06 CM-244 W 6.41E-04$
W-HTTRASH  763121 8000   200 31 3 4 0 2 0 0 2 6
          1.200E+00 1.393E-03 4.300E+01  .000E+00 7.327E-02
    183 H-3     * 3.56E-11 C-14    * 3.03E-10 NI-63  W 2.84E-09 SR-90  D 2.28E-02
    183 TC-99  D 2.37E-06 RU-106 Y 1.04E-05 SN-126 W 1.19E-07 SB-125 W 4.51E-05
    183 I-129  D 6.17E-13 CS-134 D 1.97E-05 CS-135 D 3.33E-07 CS-137 D 2.37E-02
    183 EU-152 W 1.56E-06 EU-154 W 5.93E-04 NP-237 W 8.40E-06 PU-238 Y 6.60E-03
    183 PU-239 Y 2.10E-03 PU-241 Y 3.33E-04 PU-242 Y 1.26E-06 AM-241 W 9.00E-03
    183 AM-243 W 1.74E-04 CM-242 W 6.17E-07 CM-243 W 2.52E-05 CM-244 W 7.80E-03$
W-LTEQUIP  504001  100   100 12 1 1 0 3 0 0 2 4
          2.000E+00 1.564E-01 4.400E+01  .000E+00 8.679E-01
    184 H-3     * 6.48E-09 C-14    * 7.35E-09 NI-63  W 5.19E-08 SR-90  D 4.15E-01
    184 TC-99  D 4.32E-05 RU-106 Y 1.90E-04 SN-126 W 2.16E-06 SB-125 W 8.18E-04
    184 I-129  D 1.12E-11 CS-134 D 3.59E-04 CS-135 D 6.05E-06 CS-137 D 4.32E-01
    184 EU-152 W 2.85E-05 EU-154 W 1.08E-02 NP-237 W 6.05E-07 PU-238 Y 4.75E-04
    184 PU-239 Y 1.51E-04 PU-241 Y 6.05E-03 PU-242 Y 9.12E-08 AM-241 W 6.48E-04
    184 AM-243 W 1.25E-05 CM-242 W 1.12E-05 CM-243 W 1.82E-06 CM-244 W 5.62E-04$
W-HTEQUIP  504001  100   100 12 1 1 0 3 0 0 2 4
          2.000E+00 3.740E-03 4.500E+01  .000E+00 8.677E-02
    185 H-3     * 6.36E-10 C-14    * 7.23E-10 NI-63  W 5.09E-09 SR-90  D 4.07E-02
    185 TC-99  D 4.24E-06 RU-106 Y 1.87E-05 SN-126 W 2.12E-07 SB-125 W 8.08E-05
    185 I-129  D 1.10E-12 CS-134 D 3.52E-05 CS-135 D 5.94E-07 CS-137 D 4.24E-02
    185 EU-152 W 2.80E-06 EU-154 W 1.06E-03 NP-237 W 6.11E-07 PU-238 Y 4.79E-04
    185 PU-239 Y 1.53E-04 PU-241 Y 5.94E-04 PU-242 Y 9.16E-08 AM-241 W 6.53E-04
    185 AM-243 W 1.26E-05 CM-242 W 1.10E-06 CM-243 W 1.83E-06 CM-244 W 5.66E-04$
W-DDRACKS  504001  100   100 12 1 1 0 3 0 0 2 4
          2.000E+00 8.518E-01 4.600E+01  .000E+00 1.578E-01
    186 H-3     * 1.18E-09 C-14    * 1.34E-09 NI-63  W 9.43E-09 SR-90  D 7.55E-02
    186 TC-99  D 7.86E-06 RU-106 Y 3.46E-05 SN-126 W 3.93E-07 SB-125 W 1.50E-04
    186 I-129  D 2.04E-12 CS-134 D 6.53E-05 CS-135 D 1.10E-06 CS-137 D 7.86E-02
    186 EU-152 W 5.19E-06 EU-154 W 1.97E-03 NP-237 W 1.10E-07 PU-238 Y 8.65E-05
    186 PU-239 Y 2.76E-05 PU-241 Y 1.10E-03 PU-242 Y 1.65E-08 AM-241 W 1.18E-04
    186 AM-243 W 2.28E-06 CM-242 W 2.04E-06 CM-243 W 3.30E-07 CM-244 W 1.02E-04$
W-DDLTRUB  504001  100   100 12 1 1 0 3 0 0 2 4
          2.000E+00 8.461E-02 4.700E+01  .000E+00 1.009E-01
    187 H-3     * 7.52E-10 C-14    * 8.57E-10 NI-63  W 6.03E-09 SR-90  D 4.83E-02
    187 TC-99  D 5.03E-06 RU-106 Y 2.21E-05 SN-126 W 2.52E-07 SB-125 W 9.56E-05
    187 I-129  D 1.30E-12 CS-134 D 4.17E-05 CS-135 D 7.02E-07 CS-137 D 5.03E-02
    187 EU-152 W 3.32E-06 EU-154 W 1.25E-03 NP-237 W 7.02E-08 PU-238 Y 5.53E-05
    187 PU-239 Y 1.76E-05 PU-241 Y 7.02E-04 PU-242 Y 1.06E-08 AM-241 W 7.52E-05
    187 AM-243 W 1.46E-06 CM-242 W 1.30E-06 CM-243 W 2.11E-07 CM-244 W 6.52E-05$
W-DDHTRUB  504001  100   100 12 1 1 0 3 0 0 2 6
          2.000E+00 1.885E-01 4.800E+01  .000E+00 2.677E-02
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     188 H-3     * 1.68E-11 C-14     * 1.90E-11 NI-63   W 1.34E-10 SR-90   D 1.07E-03
     188 TC-99   D 1.12E-07 RU-106 Y 4.91E-07 SN-126 W 5.58E-09 SB-125 W 2.11E-06
     188 I-129   D 2.90E-14 CS-134 D 9.26E-07 CS-135 D 1.57E-08 CS-137 D 1.12E-03
     188 EU-152 W 7.36E-08 EU-154 W 2.79E-05 NP-237 W 8.02E-06 PU-238 Y 6.30E-03
     188 PU-239 Y 2.01E-03 PU-241 Y 1.57E-05 PU-242 Y 1.21E-06 AM-241 W 8.59E-03
     188 AM-243 W 1.67E-04 CM-242 W 2.90E-08 CM-243 W 2.40E-05 CM-244 W 7.44E-03$
W-DDHTLQD  701101  100  140 23 2 2 1 2 0 0 2 4
          1.700E+00 2.081E-02 4.900E+01  .000E+00 6.316E+00
     189 H-3     * 4.73E-08 C-14     * 5.36E-08 NI-63   W 3.78E-07 SR-90   D 3.03E+00
     189 TC-99   D 3.15E-04 RU-106 Y 1.38E-03 SN-126 W 1.58E-05 SB-125 W 5.99E-03
     189 I-129   D 8.20E-11 CS-134 D 2.62E-03 CS-135 D 4.42E-05 CS-137 D 3.15E+00
     189 EU-152 W 2.08E-04 EU-154 W 7.88E-02 NP-237 W 9.42E-07 PU-238 Y 7.37E-04
     189 PU-239 Y 2.35E-04 PU-241 Y 4.42E-02 PU-242 Y 1.41E-07 AM-241 W 1.01E-03
     189 AM-243 W 1.95E-05 CM-242 W 8.20E-05 CM-243 W 2.65E-06 CM-244 W 8.72E-04$
P-IXRESIN 1201101  100  140 23 2 2 0 2 0 0-2 4
          1.700E+00 1.868E-01 1.000E+00  .000E+00 2.362E+00
     190 H-3     * 1.88E-01 C-14     * 6.89E-03 FE-55   Y 1.65E-01 CO-60   Y 3.19E-01
     190 NI-59   W 1.97E-04 NI-63   W 6.06E-02 SR-90   D 1.37E-02 NB-94   Y 6.25E-06
     190 TC-99   D 5.82E-05 I-129   D 1.72E-04 CS-135 D 5.82E-05 CS-137 D 1.55E+00
     190 U-235   Y 3.34E-06 U-238   Y 2.62E-05 NP-237 W 6.40E-10 PU-238 Y 1.83E-03
     190 PU-239 Y 1.29E-03 PU-241 Y 5.61E-02 PU-242 Y 2.82E-06 AM-241 W 1.32E-03
     190 AM-243 W 8.88E-05 CM-243 W 7.01E-07 CM-244 W 9.74E-04                    $
P-CONCLIQ 1201101  100  140 23 2 2 0 2 0 0-2 6
          1.700E+00 1.581E-02 2.000E+00  .000E+00 1.648E+01
     191 H-3     * 5.21E-01 C-14     * 1.92E-02 FE-55   Y 3.43E+00 CO-60   Y 6.66E+00
     191 NI-59   W 4.09E-03 NI-63   W 1.26E+00 SR-90   D 3.80E-02 NB-94   Y 1.30E-04
     191 TC-99   D 1.62E-04 I-129   D 4.78E-04 CS-135 D 1.62E-04 CS-137 D 4.31E+00
     191 U-235   Y 9.31E-06 U-238   Y 7.31E-05 NP-237 W 1.78E-09 PU-238 Y 7.74E-03
     191 PU-239 Y 5.00E-03 PU-241 Y 2.17E-01 PU-242 Y 1.10E-05 AM-241 W 4.53E-03
     191 AM-243 W 3.06E-04 CM-243 W 1.77E-06 CM-244 W 2.90E-03                    $
P-FSLUDGE 1201101  100  140 23 2 2 0 2 0 0-2 4
          1.700E+00 4.637E-03 3.000E+00  .000E+00 2.706E+00
     192 H-3     * 6.64E-03 C-14     * 2.45E-04 FE-55   Y 7.94E-01 CO-60   Y 1.54E+00
     192 NI-59   W 9.52E-04 NI-63   W 2.92E-01 SR-90   D 4.85E-04 NB-94   Y 3.00E-05
     192 TC-99   D 2.06E-06 I-129   D 6.07E-06 CS-135 D 2.06E-06 CS-137 D 5.48E-02
     192 U-235   Y 3.76E-07 U-238   Y 2.95E-06 NP-237 W 7.20E-11 PU-238 Y 1.22E-04
     192 PU-239 Y 3.97E-04 PU-241 Y 1.73E-02 PU-242 Y 8.71E-07 AM-241 W 6.78E-04
     192 AM-243 W 4.56E-05 CM-243 W 7.94E-07 CM-244 W 4.53E-04                    $
B-IXRESIN 1201101  100  140 23 2 2 0 2 0 0-2 4
          1.700E+00 4.742E-01 4.000E+00  .000E+00 7.834E+00
     193 H-3     * 3.25E-02 C-14     * 2.01E-03 FE-55   Y 1.61E+00 CO-60   Y 2.69E+00
     193 NI-59   W 1.65E-03 NI-63   W 3.64E-02 SR-90   D 6.16E-03 NB-94   Y 5.23E-05
     193 TC-99   D 1.29E-04 I-129   D 3.46E-04 CS-135 D 1.29E-04 CS-137 D 3.46E+00
     193 U-235   Y 9.01E-08 U-238   Y 7.11E-07 NP-237 W 1.72E-11 PU-238 Y 1.41E-04
     193 PU-239 Y 9.04E-05 PU-241 Y 4.39E-03 PU-242 Y 1.97E-07 AM-241 W 3.92E-05
     193 AM-243 W 2.66E-06 CM-243 W 4.56E-08 CM-244 W 3.08E-05                    $
B-CONCLIQ 1201101  100  140 23 2 2 0 2 0 0-2 6
          1.700E+00 9.009E-02 5.000E+00  .000E+00 4.763E+00
     194 H-3     * 1.07E-02 C-14     * 6.70E-04 FE-55   Y 1.31E+00 CO-60   Y 2.18E+00
     194 NI-59   W 1.35E-03 NI-63   W 2.95E-02 SR-90   D 2.03E-03 NB-94   Y 4.25E-05
     194 TC-99   D 4.29E-05 I-129   D 1.14E-04 CS-135 D 4.29E-05 CS-137 D 1.14E+00
     194 U-235   Y 5.93E-07 U-238   Y 4.65E-06 NP-237 W 1.14E-10 PU-238 Y 3.41E-03
     194 PU-239 Y 1.62E-03 PU-241 Y 7.91E-02 PU-242 Y 3.37E-06 AM-241 W 2.06E-03
     194 AM-243 W 1.39E-04 CM-243 W 4.45E-06 CM-244 W 3.52E-03                    $
B-FSLUDGE 1201101  100  140 23 2 2 0 2 0 0-2 4
          1.700E+00 3.727E-01 6.000E+00  .000E+00 8.055E+00
     195 H-3     * 1.94E-02 C-14     * 1.20E-03 FE-55   Y 2.21E+00 CO-60   Y 3.71E+00
     195 NI-59   W 2.28E-03 NI-63   W 4.99E-02 SR-90   D 3.63E-03 NB-94   Y 7.21E-05
     195 TC-99   D 7.69E-05 I-129   D 2.04E-04 CS-135 D 7.69E-05 CS-137 D 2.04E+00
     195 U-235   Y 5.10E-07 U-238   Y 4.01E-06 NP-237 W 9.80E-11 PU-238 Y 7.15E-04
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    195 PU-239 Y 3.62E-04 PU-241 Y 1.77E-02 PU-242 Y 7.96E-07 AM-241 W 2.40E-04
    195 AM-243 W 1.61E-05 CM-243 W 4.55E-07 CM-244 W 3.43E-04                  $
L-NFRCOMP  805101  100  100 33 3 1 0 4 1 0 2 6
           7.800E+00 3.316E-03 1.100E+01  .000E+00 8.828E+03
    196 H-3    * 3.18E+02 C-14   * 1.82E-01 CL-36  W 2.27E-02 FE-55  Y 4.09E+03
    196 CO-60  Y 3.91E+03 NI-59  W 1.63E+01 NI-63  W 4.94E+02 SR-90  D 1.50E-02
    196 NB-94  Y 3.87E-03 TC-99  D 6.70E-03 CS-137 D 4.85E-02                  $
N-SORMFG1  704002  100  100 11 1 1 0 3 0 0 2 8
           2.000E+00 4.845E-01 1.300E+01  .000E+00 9.775E-02
    197 AM-241 W 9.77E-02                                                      $
N-SORMFG2 1104001  100  100 11 1 1 1 3 0 0 2 6
           4.000E-01 5.168E-03 1.400E+01  .000E+00 5.164E+02
    198 CO-60  Y 4.22E+02 CS-137 D 9.46E+01                                    $
N-TRISCNT  753112  452  200 31 3 4 1 2 0 0 2 4
           1.200E+00 1.218E-01 1.700E+01  .000E+00 2.494E+01
    199 H-3    * 2.49E+01                                                      $
N-STROSOR  701102  100  100 33 1 1 0 2 0 5 1 6
           1.700E+00 3.022E-02 2.500E+01  .000E+00 1.252E+01
    200 SR-90  D 1.25E+01                                                      $
N-CESISOR  701102  100  100 33 1 1 0 2 0 6 1 6
           1.700E+00 1.698E-01 2.600E+01  .000E+00 4.967E+01
    201 CS-137 D 4.97E+01                                                      $
N-AMERSOR  701102  100  100 33 1 1 0 2 0 9 1 8
           1.700E+00 1.260E-03 2.800E+01  .000E+00 3.702E-05
    203 AM-241 W 3.70E-05                                                      $
N-RACELLS  701102  100  100 33 1 1 0 2 013 1 8
           1.700E+00 1.620E-03 3.200E+01  .000E+00 2.803E-04
    205 RA-226 W 2.80E-04                                                      $
N-RAPLAQU  701102  100  100 33 1 1 0 2 014 1 8
           1.700E+00 5.533E-03 3.300E+01  .000E+00 1.234E-04
    206 RA-226 W 1.23E-04                                                      $
N-RAMISCL  701102  100  100 33 0 1 0 2 017 1 8
           1.700E+00 4.878E-02 3.500E+01  .000E+00 1.259E-04
    207 RA-226 W 1.26E-04                                                      $
M-NAVYWET  701101  100  100 23 2 2 0 2 0 0 2 6
           1.700E+00 3.179E-02 3.600E+01  .000E+00 1.459E+01
    208 H-3    * 1.16E+00 C-14   * 4.24E-02 FE-55  Y 1.02E+00 CO-60  Y 1.98E+00
    208 NI-59  W 1.22E-03 NI-63  W 3.76E-01 SR-90  D 8.46E-02 NB-94  Y 3.85E-05
    208 TC-99  D 3.59E-04 I-129  D 1.06E-03 CS-135 D 3.59E-04 CS-137 D 9.55E+00
    208 U-235  Y 2.05E-05 U-238  Y 1.62E-04 NP-237 W 3.94E-09 PU-238 Y 1.13E-02
    208 PU-239 Y 7.94E-03 PU-241 Y 3.46E-01 PU-242 Y 1.74E-05 AM-241 W 8.14E-03
    208 AM-243 W 5.50E-04 CM-243 W 4.33E-06 CM-244 W 6.01E-03                  $
P-DEACINT  805101  100  100 33 3 1 0 4 6 0 2 6
           7.800E+00 5.238E-02 3.700E+01  .000E+00 4.032E+04
    209 H-3    * 9.57E+00 C-14   * 3.00E+00 CL-36  W 6.40E-02 FE-55  Y 2.40E+04
    209 CO-60  Y 1.40E+04 NI-59  W 1.90E+01 NI-63  W 2.37E+03 SR-90  D 5.00E-03
    209 NB-94  Y 2.90E-02 TC-99  D 8.22E-03 I-129  D 1.40E-08 CS-135 D 9.00E-07
    209 CS-137 D 5.00E-02 U-233  Y 9.99E-05 PU-239 Y 2.30E-03                  $
B-DEACINT  805101  100  100 33 3 1 0 4 9 0 2 6
           7.800E+00 1.721E-01 3.900E+01  .000E+00 1.262E+04
    210 H-3    * 1.70E+00 C-14   * 9.51E-01 CL-36  W 2.09E-02 FE-55  Y 7.70E+03
    210 CO-60  Y 4.17E+03 NI-59  W 5.60E+00 NI-63  W 7.45E+02 SR-90  D 1.96E-02
    210 NB-94  Y 8.20E-03 TC-99  D 1.96E-03 I-129  D 5.47E-09 CS-135 D 3.52E-07
    210 CS-137 D 1.96E-02 U-233  Y 2.09E-05 PU-239 Y 3.52E-04                  $
W-FRSRESN  801101  100  140 23 2 2 0 2 0 0 2 4
           1.700E+00 9.248E-01 4.000E+01  .000E+00 1.039E+01
    211 SR-90  D 8.92E-01 CS-137 D 9.50E+00                                    $
W-RTSRESN  701101  100  140 23 2 2 0 2 0 0 2 4
           1.700E+00 1.288E+00 4.100E+01  .000E+00 2.532E+00
    212 SR-90  D 2.53E-01 CS-137 D 2.28E+00                                    $
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W-LTTRASH  763121 8000  200 31 3 4 0 2 0 0 2 6
           1.200E+00 4.723E-03 4.200E+01  .000E+00 3.380E+00
    213 H-3     * 2.52E-09 C-14    * 2.15E-08 NI-63   W 2.02E-07 SR-90   D 1.62E+00
    213 TC-99   D 1.69E-04 RU-106 Y 7.41E-04 SN-126 W 8.42E-06 SB-125 W 2.56E-03
    213 I-129   D 4.37E-11 CS-134 D 1.40E-03 CS-135 D 2.36E-05 CS-137 D 1.69E+00
    213 EU-152 W 1.11E-04 EU-154 W 4.21E-02 NP-237 W 2.36E-06 PU-238 Y 1.85E-03
    213 PU-239 Y 5.90E-04 PU-241 Y 2.36E-02 PU-242 Y 3.54E-07 AM-241 W 2.52E-03
    213 AM-243 W 4.88E-05 CM-242 W 4.37E-05 CM-243 W 7.07E-06 CM-244 W 2.19E-03$
W-HTTRASH  514101  300  100 10 1 1 0 3 0 0 2 6
           4.000E-01 1.152E-01 4.300E+01  .000E+00 4.035E-02
    214 H-3     * 1.96E-10 C-14    * 2.22E-10 NI-63   W 1.57E-09 SR-90   D 1.26E-02
    214 TC-99   D 1.31E-06 RU-106 Y 5.74E-06 SN-126 W 6.56E-08 SB-125 W 2.48E-05
    214 I-129   D 3.40E-13 CS-134 D 1.08E-05 CS-135 D 1.83E-07 CS-137 D 1.31E-02
    214 EU-152 W 8.62E-07 EU-154 W 3.27E-04 NP-237 W 4.63E-06 PU-238 Y 3.64E-03
    214 PU-239 Y 1.15E-03 PU-241 Y 1.83E-04 PU-242 Y 6.94E-07 AM-241 W 4.96E-03
    214 AM-243 W 9.59E-05 CM-242 W 3.40E-07 CM-243 W 1.39E-05 CM-244 W 4.30E-03$
W-LTEQUIP  504001  100  100 12 1 1 0 3 0 0 2 6
           2.000E+00 7.586E-01 4.400E+01  .000E+00 6.490E+00
    215 H-3     * 4.85E-08 C-14    * 5.49E-08 NI-63   W 3.88E-07 SR-90   D 3.11E+00
    215 TC-99   D 3.23E-04 RU-106 Y 1.42E-03 SN-126 W 1.61E-05 SB-125 W 6.12E-03
    215 I-129   D 8.39E-11 CS-134 D 2.69E-03 CS-135 D 4.53E-05 CS-137 D 3.23E+00
    215 EU-152 W 2.13E-04 EU-154 W 8.10E-02 NP-237 W 4.53E-06 PU-238 Y 3.55E-03
    215 PU-239 Y 1.13E-03 PU-241 Y 4.53E-02 PU-242 Y 6.82E-07 AM-241 W 4.85E-03
    215 AM-243 W 9.38E-05 CM-242 W 8.39E-05 CM-243 W 1.36E-05 CM-244 W 4.20E-03$
W-HTEQUIP  504001  100  100 12 1 1 0 3 0 0 2 6
           2.000E+00 3.695E-02 4.500E+01  .000E+00 8.866E-01
    216 H-3     * 6.50E-09 C-14    * 7.39E-09 NI-63   W 5.20E-08 SR-90   D 4.16E-01
    216 TC-99   D 4.33E-05 RU-106 Y 1.91E-04 SN-126 W 2.17E-06 SB-125 W 8.25E-04
    216 I-129   D 1.13E-11 CS-134 D 3.60E-04 CS-135 D 6.07E-06 CS-137 D 4.33E-01
    216 EU-152 W 2.86E-05 EU-154 W 1.09E-02 NP-237 W 6.24E-06 PU-238 Y 4.90E-03
    216 PU-239 Y 1.56E-03 PU-241 Y 6.07E-03 PU-242 Y 9.36E-07 AM-241 W 6.67E-03
    216 AM-243 W 1.29E-04 CM-242 W 1.13E-05 CM-243 W 1.87E-05 CM-244 W 5.78E-03$
W-DDHTRUB  504001  100  100 12 1 1 0 3 0 0 2 8
           2.000E+00 6.930E-01 4.800E+01  .000E+00 1.727E-01
    217 H-3     * 1.08E-10 C-14    * 1.22E-10 NI-63   W 8.62E-10 SR-90   D 6.91E-03
    217 TC-99   D 7.21E-07 RU-106 Y 3.17E-06 SN-126 W 3.60E-08 SB-125 W 1.36E-05
    217 I-129   D 1.87E-13 CS-134 D 5.97E-06 CS-135 D 1.01E-07 CS-137 D 7.21E-03
    217 EU-152 W 4.75E-07 EU-154 W 1.80E-04 NP-237 W 5.17E-05 PU-238 Y 4.06E-02
    217 PU-239 Y 1.29E-02 PU-241 Y 1.01E-04 PU-242 Y 7.78E-06 AM-241 W 5.54E-02
    217 AM-243 W 1.07E-03 CM-242 W 1.87E-07 CM-243 W 1.55E-04 CM-244 W 4.80E-02$
W-DDHTLQD  701101  100  140 23 2 2 1 2 0 0 2 6
           1.700E+00 1.879E-01 4.900E+01  .000E+00 6.603E+01
    218 H-3     * 4.95E-07 C-14    * 5.60E-07 NI-63   W 3.95E-06 SR-90   D 3.16E+01
    218 TC-99   D 3.30E-03 RU-106 Y 1.45E-02 SN-126 W 1.65E-04 SB-125 W 6.27E-02
    218 I-129   D 8.58E-10 CS-134 D 2.73E-02 CS-135 D 4.62E-04 CS-137 D 3.30E+01
    218 EU-152 W 2.18E-03 EU-154 W 8.24E-01 NP-237 W 9.85E-06 PU-238 Y 7.71E-03
    218 PU-239 Y 2.46E-03 PU-241 Y 4.62E-01 PU-242 Y 1.47E-06 AM-241 W 1.05E-02
    218 AM-243 W 2.04E-04 CM-242 W 8.58E-04 CM-243 W 2.77E-05 CM-244 W 9.11E-03$
P-IXRESIN 1201101  100  140 23 2 2 0 2 0 0-2 6
           1.700E+00 2.139E-01 1.000E+00  .000E+00 1.117E+01
    219 H-3     * 8.88E-01 C-14    * 3.26E-02 FE-55   Y 7.81E-01 CO-60   Y 1.51E+00
    219 NI-59   W 9.32E-04 NI-63   W 2.87E-01 SR-90   D 6.48E-02 NB-94   Y 2.96E-05
    219 TC-99   D 2.75E-04 I-129   D 8.14E-04 CS-135 D 2.75E-04 CS-137 D 7.32E+00
    219 U-235   Y 1.58E-05 U-238   Y 1.24E-04 NP-237 W 3.03E-09 PU-238 Y 8.68E-03
    219 PU-239 Y 6.09E-03 PU-241 Y 2.65E-01 PU-242 Y 1.33E-05 AM-241 W 6.25E-03
    219 AM-243 W 4.20E-04 CM-243 W 3.32E-06 CM-244 W 4.61E-03                  $
P-CONCLIQ 1201101  100  140 23 2 2 0 2 0 0-2 8
           1.700E+00 1.332E-03 2.000E+00  .000E+00 7.100E+01
    220 H-3     * 2.24E+00 C-14    * 8.27E-02 FE-55   Y 1.48E+01 CO-60   Y 2.87E+01
    220 NI-59   W 1.76E-02 NI-63   W 5.44E+00 SR-90   D 1.64E-01 NB-94   Y 5.59E-04
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    220 TC-99   D 6.97E-04 I-129   D 2.06E-03 CS-135 D 6.97E-04 CS-137 D 1.86E+01
    220 U-235   Y 4.01E-05 U-238   Y 3.15E-04 NP-237 W 7.68E-09 PU-238 Y 3.33E-02
    220 PU-239 Y 2.15E-02 PU-241 Y 9.37E-01 PU-242 Y 4.72E-05 AM-241 W 1.95E-02
    220 AM-243 W 1.32E-03 CM-243 W 7.62E-06 CM-244 W 1.25E-02                  $
P-FSLUDGE 1201101  100  140 23 2 2 0 2 0 0-2 6
         1.700E+00 7.882E-02 3.000E+00  .000E+00 4.961E+01
    221 H-3     * 1.22E-01 C-14    * 4.49E-03 FE-55  Y 1.45E+01 CO-60  Y 2.82E+01
    221 NI-59   W 1.74E-02 NI-63   W 5.36E+00 SR-90  D 8.88E-03 NB-94  Y 5.50E-04
    221 TC-99   D 3.77E-05 I-129   D 1.11E-04 CS-135 D 3.77E-05 CS-137 D 1.00E+00
    221 U-235   Y 6.89E-06 U-238   Y 5.41E-05 NP-237 W 1.32E-09 PU-238 Y 2.24E-03
    221 PU-239 Y 7.27E-03 PU-241 Y 3.17E-01 PU-242 Y 1.60E-05 AM-241 W 1.24E-02
    221 AM-243 W 8.37E-04 CM-243 W 1.45E-05 CM-244 W 8.30E-03                  $
B-IXRESIN 1201101  100  140 23 2 2 0 2 0 0-2 6
         1.700E+00 1.867E-02 4.000E+00  .000E+00 7.641E+01
    222 H-3     * 3.17E-01 C-14    * 1.96E-02 FE-55  Y 1.57E+01 CO-60  Y 2.62E+01
    222 NI-59   W 1.61E-02 NI-63   W 3.55E-01 SR-90  D 6.00E-02 NB-94  Y 5.10E-04
    222 TC-99   D 1.26E-03 I-129   D 3.37E-03 CS-135 D 1.26E-03 CS-137 D 3.37E+01
    222 U-235   Y 8.79E-07 U-238   Y 6.93E-06 NP-237 W 1.68E-10 PU-238 Y 1.38E-03
    222 PU-239 Y 8.81E-04 PU-241 Y 4.28E-02 PU-242 Y 1.92E-06 AM-241 W 3.82E-04
    222 AM-243 W 2.59E-05 CM-243 W 4.45E-07 CM-244 W 3.00E-04                  $
B-FSLUDGE 1201101  100  140 23 2 2 0 2 0 0-2 6
         1.700E+00 3.008E-02 6.000E+00  .000E+00 5.490E+01
    223 H-3     * 1.32E-01 C-14    * 8.15E-03 FE-55  Y 1.51E+01 CO-60  Y 2.53E+01
    223 NI-59   W 1.56E-02 NI-63   W 3.40E-01 SR-90  D 2.48E-02 NB-94  Y 4.91E-04
    223 TC-99   D 5.24E-04 I-129   D 1.39E-03 CS-135 D 5.24E-04 CS-137 D 1.39E+01
    223 U-235   Y 3.48E-06 U-238   Y 2.73E-05 NP-237 W 6.68E-10 PU-238 Y 4.88E-03
    223 PU-239 Y 2.47E-03 PU-241 Y 1.20E-01 PU-242 Y 5.42E-06 AM-241 W 1.64E-03
    223 AM-243 W 1.10E-04 CM-243 W 3.10E-06 CM-244 W 2.34E-03                  $
L-NFRCOMP  805101  100  100 33 3 1 0 4 1 0 2 8
         7.800E+00 1.548E-04 1.100E+01  .000E+00 1.886E+04
    224 H-3     * 6.80E+02 C-14    * 3.89E-01 CL-36  W 4.85E-02 FE-55  Y 8.74E+03
    224 CO-60   Y 8.35E+03 NI-59   W 3.48E+01 NI-63  W 1.06E+03 SR-90  D 3.20E-02
    224 NB-94   Y 8.27E-03 TC-99   D 1.43E-02 CS-137 D 1.04E-01                $
W-FRSRESN  801101  100  140 23 2 2 0 2 0 0 2 6
         1.700E+00 4.667E-01 4.000E+01  .000E+00 2.583E+01
    231 SR-90   D 2.22E+00 CS-137 D 2.36E+01                                    $
W-HTTRASH  763121 8000  200 31 3 4 0 2 0 0 2 8
         1.200E+00 6.825E-03 4.300E+01  .000E+00 1.646E+00
    232 H-3     * 8.00E-10 C-14    * 6.80E-09 NI-63  W 6.39E-08 SR-90  D 5.13E-01
    232 TC-99   D 5.33E-05 RU-106 Y 2.34E-04 SN-126 W 2.68E-06 SB-125 W 1.01E-03
    232 I-129   D 1.39E-11 CS-134 D 4.42E-04 CS-135 D 7.47E-06 CS-137 D 5.33E-01
    232 EU-152 W 3.52E-05 EU-154 W 1.33E-02 NP-237 W 1.89E-04 PU-238 Y 1.48E-01
    232 PU-239 Y 4.71E-02 PU-241 Y 7.47E-03 PU-242 Y 2.83E-05 AM-241 W 2.02E-01
    232 AM-243 W 3.91E-03 CM-242 W 1.39E-05 CM-243 W 5.66E-04 CM-244 W 1.75E-01$
W-LTEQUIP  504001  100  100 12 1 1 0 3 0 0 2 8
         2.000E+00 8.355E-02 4.400E+01  .000E+00 7.278E+01
    233 H-3     * 5.44E-07 C-14    * 6.16E-07 NI-63  W 4.35E-06 SR-90  D 3.48E+01
    233 TC-99   D 3.63E-03 RU-106 Y 1.59E-02 SN-126 W 1.81E-04 SB-125 W 6.86E-02
    233 I-129   D 9.41E-10 CS-134 D 3.01E-02 CS-135 D 5.08E-04 CS-137 D 3.63E+01
    233 EU-152 W 2.39E-03 EU-154 W 9.08E-01 NP-237 W 5.08E-05 PU-238 Y 3.99E-02
    233 PU-239 Y 1.27E-02 PU-241 Y 5.08E-01 PU-242 Y 7.64E-06 AM-241 W 5.44E-02
    233 AM-243 W 1.05E-03 CM-242 W 9.41E-04 CM-243 W 1.52E-04 CM-244 W 4.71E-02$
W-HTEQUIP  504001  100  100 12 1 1 0 3 0 0 2 8
         2.000E+00 2.542E-01 4.500E+01  .000E+00 9.575E+00
    234 H-3     * 7.02E-08 C-14    * 7.98E-08 NI-63  W 5.61E-07 SR-90  D 4.49E+00
    234 TC-99   D 4.68E-04 RU-106 Y 2.06E-03 SN-126 W 2.34E-05 SB-125 W 8.91E-03
    234 I-129   D 1.22E-10 CS-134 D 3.88E-03 CS-135 D 6.55E-05 CS-137 D 4.68E+00
    234 EU-152 W 3.09E-04 EU-154 W 1.17E-01 NP-237 W 6.74E-05 PU-238 Y 5.29E-02
    234 PU-239 Y 1.68E-02 PU-241 Y 6.55E-02 PU-242 Y 1.01E-05 AM-241 W 7.21E-02
    234 AM-243 W 1.39E-03 CM-242 W 1.22E-04 CM-243 W 2.02E-04 CM-244 W 6.25E-02$
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W-DDHTLQD  701101  100  140 23 2 2 1 2 0 0 2 8
         1.700E+00 8.621E-01 4.900E+01  .000E+00 6.225E+02
    236 H-3     * 4.66E-06 C-14    * 5.28E-06 NI-63  W 3.73E-05 SR-90  D 2.98E+02
    236 TC-99  D 3.11E-02 RU-106 Y 1.36E-01 SN-126 W 1.55E-03 SB-125 W 5.91E-01
    236 I-129  D 8.09E-09 CS-134 D 2.58E-01 CS-135 D 4.35E-03 CS-137 D 3.11E+02
    236 EU-152 W 2.05E-02 EU-154 W 7.77E+00 NP-237 W 9.29E-05 PU-238 Y 7.27E-02
    236 PU-239 Y 2.32E-02 PU-241 Y 4.35E+00 PU-242 Y 1.39E-05 AM-241 W 9.92E-02
    236 AM-243 W 1.92E-03 CM-242 W 8.09E-03 CM-243 W 2.62E-04 CM-244 W 8.59E-02$
P-IXRESIN 1202101  100  200 31 3 3 0 2 0 0-2 6
         1.200E+00 9.987E-04 1.000E+00  .000E+00 8.053E-01
    237 H-3     * 6.40E-02 C-14    * 2.35E-03 FE-55  Y 5.63E-02 CO-60  Y 1.09E-01
    237 NI-59  W 6.72E-05 NI-63  W 2.07E-02 SR-90  D 4.67E-03 NB-94  Y 2.13E-06
    237 TC-99  D 1.98E-05 I-129  D 5.87E-05 CS-135 D 1.98E-05 CS-137 D 5.27E-01
    237 U-235  Y 1.14E-06 U-238  Y 8.93E-06 NP-237 W 2.18E-10 PU-238 Y 6.26E-04
    237 PU-239 Y 4.39E-04 PU-241 Y 1.91E-02 PU-242 Y 9.61E-07 AM-241 W 4.50E-04
    237 AM-243 W 3.03E-05 CM-243 W 2.39E-07 CM-244 W 3.32E-04                   $
P-FSLUDGE 1202101  100  200 31 3 3 0 2 0 0-2 6
         1.200E+00 1.061E-03 3.000E+00  .000E+00 1.723E+01
    238 H-3     * 4.23E-02 C-14    * 1.56E-03 FE-55  Y 5.05E+00 CO-60  Y 9.79E+00
    238 NI-59  W 6.06E-03 NI-63  W 1.86E+00 SR-90  D 3.09E-03 NB-94  Y 1.91E-04
    238 TC-99  D 1.31E-05 I-129  D 3.87E-05 CS-135 D 1.31E-05 CS-137 D 3.49E-01
    238 U-235  Y 2.39E-06 U-238  Y 1.88E-05 NP-237 W 4.58E-10 PU-238 Y 7.78E-04
    238 PU-239 Y 2.53E-03 PU-241 Y 1.10E-01 PU-242 Y 5.54E-06 AM-241 W 4.32E-03
    238 AM-243 W 2.91E-04 CM-243 W 5.05E-06 CM-244 W 2.88E-03                   $
B-FSLUDGE 1202101  100  200 31 3 3 0 2 0 0-2 6
         1.200E+00 2.125E-04 6.000E+00  .000E+00 3.922E+01
    239 H-3     * 9.44E-02 C-14    * 5.82E-03 FE-55  Y 1.08E+01 CO-60  Y 1.80E+01
    239 NI-59  W 1.11E-02 NI-63  W 2.43E-01 SR-90  D 1.77E-02 NB-94  Y 3.51E-04
    239 TC-99  D 3.74E-04 I-129  D 9.93E-04 CS-135 D 3.74E-04 CS-137 D 9.93E+00
    239 U-235  Y 2.48E-06 U-238  Y 1.95E-05 NP-237 W 4.77E-10 PU-238 Y 3.48E-03
    239 PU-239 Y 1.76E-03 PU-241 Y 8.60E-02 PU-242 Y 3.88E-06 AM-241 W 1.17E-03
    239 AM-243 W 7.83E-05 CM-243 W 2.22E-06 CM-244 W 1.67E-03                   $
W-HTTRASH  514101  300  100 10 1 1 0 3 0 0 2 8
         4.000E-01 5.355E-02 4.300E+01  .000E+00 3.562E-01
    240 H-3     * 1.73E-09 C-14    * 1.96E-09 NI-63  W 1.38E-08 SR-90  D 1.11E-01
    240 TC-99  D 1.15E-05 RU-106 Y 5.07E-05 SN-126 W 5.79E-07 SB-125 W 2.19E-04
    240 I-129  D 3.00E-12 CS-134 D 9.57E-05 CS-135 D 1.62E-06 CS-137 D 1.15E-01
    240 EU-152 W 7.61E-06 EU-154 W 2.88E-03 NP-237 W 4.09E-05 PU-238 Y 3.21E-02
    240 PU-239 Y 1.02E-02 PU-241 Y 1.62E-03 PU-242 Y 6.12E-06 AM-241 W 4.38E-02
    240 AM-243 W 8.47E-04 CM-242 W 3.00E-06 CM-243 W 1.22E-04 CM-244 W 3.79E-02$
P-IXRESIN 1201101  100  140 23 2 2 0 2 0 0-2 8
         1.700E+00 4.515E-02 1.000E+00  .000E+00 9.601E+01
    243 H-3     * 7.63E+00 C-14    * 2.80E-01 FE-55  Y 6.71E+00 CO-60  Y 1.30E+01
    243 NI-59  W 8.01E-03 NI-63  W 2.47E+00 SR-90  D 5.57E-01 NB-94  Y 2.54E-04
    243 TC-99  D 2.37E-03 I-129  D 7.00E-03 CS-135 D 2.37E-03 CS-137 D 6.29E+01
    243 U-235  Y 1.36E-04 U-238  Y 1.06E-03 NP-237 W 2.60E-08 PU-238 Y 7.46E-02
    243 PU-239 Y 5.23E-02 PU-241 Y 2.28E+00 PU-242 Y 1.15E-04 AM-241 W 5.37E-02
    243 AM-243 W 3.61E-03 CM-243 W 2.85E-05 CM-244 W 3.96E-02                   $
P-FSLUDGE 1201101  100  140 23 2 2 0 2 0 0-2 8
         1.700E+00 7.946E-03 3.000E+00  .000E+00 2.422E+02
    244 H-3     * 5.94E-01 C-14    * 2.19E-02 FE-55  Y 7.10E+01 CO-60  Y 1.38E+02
    244 NI-59  W 8.52E-02 NI-63  W 2.62E+01 SR-90  D 4.34E-02 NB-94  Y 2.69E-03
    244 TC-99  D 1.84E-04 I-129  D 5.44E-04 CS-135 D 1.84E-04 CS-137 D 4.90E+00
    244 U-235  Y 3.36E-05 U-238  Y 2.64E-04 NP-237 W 6.44E-09 PU-238 Y 1.09E-02
    244 PU-239 Y 3.55E-02 PU-241 Y 1.55E+00 PU-242 Y 7.79E-05 AM-241 W 6.07E-02
    244 AM-243 W 4.09E-03 CM-243 W 7.10E-05 CM-244 W 4.05E-02                   $
B-FSLUDGE 1201101  100  140 23 2 2 0 2 0 0-2 8
         1.700E+00 7.466E-04 6.000E+00  .000E+00 3.933E+02
    245 H-3     * 9.47E-01 C-14    * 5.84E-02 FE-55  Y 1.08E+02 CO-60  Y 1.81E+02
    245 NI-59  W 1.12E-01 NI-63  W 2.43E+00 SR-90  D 1.77E-01 NB-94  Y 3.52E-03
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    245 TC-99   D 3.75E-03 I-129   D 9.96E-03 CS-135 D 3.75E-03 CS-137 D 9.96E+01
    245 U-235   Y 2.49E-05 U-238   Y 1.96E-04 NP-237 W 4.78E-09 PU-238 Y 3.49E-02
    245 PU-239 Y 1.77E-02 PU-241 Y 8.63E-01 PU-242 Y 3.89E-05 AM-241 W 1.17E-02
    245 AM-243 W 7.86E-04 CM-243 W 2.22E-05 CM-244 W 1.68E-02                  $
P-IXRESIN 1202101   100   200 31 3 3 0 2 0 0-2 8
          1.200E+00 1.392E-04 1.000E+00  .000E+00 1.716E+01
    247 H-3     * 1.36E+00 C-14    * 5.01E-02 FE-55  Y 1.20E+00 CO-60  Y 2.31E+00
    247 NI-59   W 1.43E-03 NI-63   W 4.41E-01 SR-90  D 9.95E-02 NB-94  Y 4.54E-05
    247 TC-99   D 4.23E-04 I-129   D 1.25E-03 CS-135 D 4.23E-04 CS-137 D 1.12E+01
    247 U-235   Y 2.43E-05 U-238   Y 1.90E-04 NP-237 W 4.65E-09 PU-238 Y 1.33E-02
    247 PU-239 Y 9.35E-03 PU-241 Y 4.07E-01 PU-242 Y 2.05E-05 AM-241 W 9.59E-03
    247 AM-243 W 6.45E-04 CM-243 W 5.10E-06 CM-244 W 7.08E-03                  $
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D.5 IMPACTS Output

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IMPACTS RUN OF REGION 4 + SOURCES
IR  =  4  OVFL=  0  IBUF=  0  NBRN=  0  NBES=  0
ICLS=    1  IOBS=    5  IINS=  100
IBEG= 1991  IEND= 2020  ILFE=   30

COMBINATION INDICES ARE:    1   4   4   4   4   1

MINIMUM DEPTHS ARE:     2.0   2.0   2.0   5.0  10.0  10.0

DISPOSAL CONFIGURATION

 NO ID IU IT IC IE IB IX IS   EFF       SEF       DPT       DTK       VOLE      AREA
  1  4  1  1  1  1  1  3  1 5.25E+00 6.90E-01 2.00E+00 7.00E+00 3.53E+03 6.00E+02
  2  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  3  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  4  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  5  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  6 10  6  6  1  2  3  1  1 5.70E+00 4.40E-01 2.00E+00 5.70E+00 5.03E+03 8.60E+02

INPUTS STREAMS: NAME, REGN, BKLG, FRAC - OLD NSTR =  215
P-IXRESIN  4 0 1.00 P-CONCLIQ  4 0 1.00 P-FSLUDGE  4 0 1.00 P-FCARTRG  4 0 1.00
B-IXRESIN  4 0 1.00 B-CONCLIQ  4 0 1.00 B-FSLUDGE  4 0 1.00 P-COTRASH  4 0 1.00
P-NCTRASH  4 0 1.00 B-COTRASH  4 0 1.00 B-NCTRASH  4 0 1.00 L-NFRCOMP  4 0 1.00
L-DECONRS  4 0 1.00 F-PROCESS  4 0 1.00 F-COTRASH  4 0 1.00 F-NCTRASH  4 0 1.00
U-PROCESS  4 0 1.00 L-PUDECON  4 0 1.00 L-BURNUPS  4 0 1.00 I-COTRASH  4 0 1.00
I+COTRASH  4 0 1.00 I-ABSLIQD  4 0 1.00 I+ABSLIQD  4 0 1.00 I-LIQSCVL  4 0 1.00
I+LIQSCVL  4 0 1.00 I-BIOWAST  4 0 1.00 I+BIOWAST  4 0 1.00 N-SSTRASH  4 0 1.00
N+SSTRASH  4 0 1.00 N-SSWASTE  4 0 1.00 N-LOTRASH  4 0 1.00 N+LOTRASH  4 0 1.00
N-LOWASTE  4 0 1.00 N-ISOPROD  4 0 1.00 N-ISOTRSH  4 0 1.00 N-SORMFG1  4 0 1.00
N-SORMFG2  4 0 1.00 N-SORMFG3  4 0 1.00 N-SORMFG4  4 0 1.00 N-NECOTRA  4 0 1.00
N-NEABLIQ  4 0 1.00 N-NESOLIQ  4 0 1.00 N-NEVIALS  4 0 1.00 N-NENCGLS  4 0 1.00
N-NEWOTAL  4 0 1.00 N-NETRGAS  4 0 1.00 N-NETRILI  4 0 1.00 N-NECARLI  4 0 1.00
N-MWTRASH  4 0 1.00 N-MWABLIQ  4 0 1.00 N-MWSOLIQ  4 0 1.00 N-MWWASTE  4 0 1.00
N-TRIPLAT  4 0 1.00 N-TRITGAS  4 0 1.00 N-TRISCNT  4 0 1.00 N-TRILIQD  4 0 1.00
N-TRITRSH  4 0 1.00 N-TRIFOIL  4 0 1.00 N-HIGHACT  4 0 1.00 N-TRITSOR  4 0 1.00
N-CARBSOR  4 0 1.00 N-COBLSOR  4 0 1.00 N-NICKSOR  4 0 1.00 N-STROSOR  4 0 1.00
N-CESISOR  4 0 1.00 N-PLU8SOR  4 0 1.00 N-PLU9SOR  4 0 1.00 N-AMERSOR  4 0 1.00
N-PUBESOR  4 0 1.00 N-AMBESOR  4 0 1.00 N-RANEEDS  4 0 1.00 N-RACELLS  4 0 1.00
N-RAPLAQU  4 0 1.00 N-RANPAPP  4 0 1.00 N-RABESOR  4 0 1.00 N-RAMISCL  4 0 1.00
N-CARBSOR  1 0 1.00 N-COBLSOR  1 0 1.00 N-NICKSOR  1 0 1.00 N-STROSOR  1 0 1.00
N-CESISOR  1 0 1.00 N-PLU8SOR  1 0 1.00 N-PLU9SOR  1 0 1.00 N-AMERSOR  1 0 1.00
N-PUBESOR  1 0 1.00 N-AMBESOR  1 0 1.00 N-RANEEDS  1 0 1.00 N-RACELLS  1 0 1.00
N-RAPLAQU  1 0 1.00 N-RANPAPP  1 0 1.00 N-RABESOR  1 0 1.00 N-RAMISCL  1 0 1.00
N-CARBSOR  2 0 1.00 N-COBLSOR  2 0 1.00 N-NICKSOR  2 0 1.00 N-STROSOR  2 0 1.00
N-CESISOR  2 0 1.00 N-PLU8SOR  2 0 1.00 N-PLU9SOR  2 0 1.00 N-AMERSOR  2 0 1.00
N-PUBESOR  2 0 1.00 N-AMBESOR  2 0 1.00 N-RANEEDS  2 0 1.00 N-RACELLS  2 0 1.00
N-RAPLAQU  2 0 1.00 N-RANPAPP  2 0 1.00 N-RABESOR  2 0 1.00 N-RAMISCL  2 0 1.00
N-CARBSOR  3 0 1.00 N-COBLSOR  3 0 1.00 N-NICKSOR  3 0 1.00 N-STROSOR  3 0 1.00
N-CESISOR  3 0 1.00 N-PLU8SOR  3 0 1.00 N-PLU9SOR  3 0 1.00 N-AMERSOR  3 0 1.00
N-PUBESOR  3 0 1.00 N-AMBESOR  3 0 1.00 N-RANEEDS  3 0 1.00 N-RACELLS  3 0 1.00
N-RAPLAQU  3 0 1.00 N-RANPAPP  3 0 1.00 N-RABESOR  3 0 1.00 N-RAMISCL  3 0 1.00
N-RARESIN  4 0 1.00 M-NAVYWET  4 0 1.00 M-NAVYDRY  4 0 1.00 P-DECORES  4 0 1.00
P-DEACINT  4 0 1.00 P-DEACVES  4 0 1.00 P-DEACTCO  4 0 1.00 P-DECONME  4 0 1.00
P-DECONCO  4 0 1.00 P-DETRASH  4 0 1.00 P-DERESIN  4 0 1.00 P-DEFILCR  4 0 1.00
P-DEEVAPB  4 0 1.00 B-DECORES  4 0 1.00 B-DEACINT  4 0 1.00 B-DEACVES  4 0 1.00
B-DEACTCO  4 0 1.00 B-DECONME  4 0 1.00 B-DECONCO  4 0 1.00 B-DETRASH  4 0 1.00
B-DERESIN  4 0 1.00 B-DEEVAPB  4 0 1.00 N-TRITSOR  1 0 1.00 N-TRITSOR  2 0 1.00
N-TRITSOR  3 0 1.00            0 0  .00            0 0  .00            0 0  .00
```

```
*** DEPTH PROBLEM ***
CLASS:   D2   DMIN: 10.0  ID: 10  DPT:  2.0  DTK:  5.7

OPTIONS FOLLOW
STOP                  : 1
DO NOT CONSIDER CLASS: 2
MODIFY DMIN TO 2M     : 3
SELECT FROM ABOVE     :

OPTION 3 HAS BEEN SELECTED, PROGRAM CONTINUING


RECALCULATED PARAMETERS

 NO   EFF       SEF       DPT       DTK       TSUM      AREA      DISN      VBAK
  1 5.25E+00 6.90E-01 2.00E+00 7.00E+00 5.29E+00 3.79E+05 6.32E+02 3.68E+05
  2 1.14E+01 8.80E-01 2.01E+00 1.21E+00 2.87E-01 8.58E+02 1.59E-01 7.97E+03
  3 1.14E+01 8.80E-01 3.22E+00 6.18E+00 8.26E+00 4.08E+03 7.55E-01  .00E+00
  4 1.14E+01 8.80E-01 9.41E+00 5.25E+00 1.33E+01 3.03E+03 5.62E-01  .00E+00
  5 1.14E+01 8.80E-01 1.47E+01 3.43E-01 1.05E+01 1.85E+02 3.43E-02  .00E+00
  6 5.70E+00 4.40E-01 2.00E+00 5.70E+00 2.54E+00 1.99E+02 2.31E-01  .00E+00

NEW WASTE STREAM DATA - NSTR = 127

 A   = 9.32E+05   SA  = 4.80E+03   B   = 2.28E+04
 C   = 1.70E+04   D1  = 1.03E+03   D2  = 8.51E+02  TOTAL= 9.79E+05

NAME,VOLM,NET CON/ACT,IMOD,MODE,ISPC INDXS
P-IXRESIN  1.16E+04 2.36E-01   1  11  1200001  100  100  11 1 1 0 0 0 0
P-CONCLIQ  9.83E+04 3.11E-01   1  11  1201101  100  140  23 1 2 0 1 0 0
P-FCARTRG  4.38E+03 4.48E+00   1  11   700001  100  100  21 1 1 0 0 0 0
B-IXRESIN  8.21E+03 6.01E-01   1  11  1200001  100  100  11 1 1 0 0 0 0
B-CONCLIQ  8.00E+04 3.24E-01   1  11  1201101  100  140  23 1 2 0 1 0 0
B-FSLUDGE  1.23E+04 9.21E-01   1  11  1200001  100  100   2 0 1 0 0 0 0
P-COTRASH  2.98E+04 1.65E-01   1  11  1410101  300  100  10 1 1 0 0 0 0
P-NCTRASH  1.00E+05 3.31E-01   1  11  1500001  100  100  11 1 1 0 0 0 0
B-COTRASH  4.20E+04 3.95E-02   1  11  1310101  200  100  10 1 1 0 0 0 0
B-NCTRASH  3.27E+04 8.52E-02   1  11  1500001  100  100  11 1 1 0 0 0 0
L-NFRCOMP  1.87E+04 7.30E+00   1  21   800001  100  100  33 3 1 0 0 1 0
L-DECONRS  9.28E+02 1.67E+01   2  11  1201101  100  140  23 2 2 1 2 0 0
F-PROCESS  2.54E+04 1.08E-04   1  11   700002  100  100   3 0 1 0 0 0 0
F-COTRASH  5.11E+04 8.37E-06   1  11   710102  150  100  10 1 1 0 0 0 0
F-NCTRASH  1.36E+04 5.33E-06   1  11   500002  100  100  11 1 1 0 0 0 0
U-PROCESS  1.52E+04 3.80E-04   1  11   700002  100  100   3 0 1 0 0 0 0
I-COTRASH  2.70E+04 2.26E-01   1  11   710102  200  100  10 1 1 0 0 0 0
I+COTRASH  5.39E+04 1.13E-01   1  11   700002  100  100  10 1 1 0 0 0 0
I-ABSLIQD  6.36E+03 6.65E-02   1  11   700002  100  300   1 0 1 1 0 0 0
I+ABSLIQD  6.36E+03 6.65E-02   1  11   700002  100  300   1 0 1 1 0 0 0
I-LIQSCVL  3.38E+03 3.20E-03   1  11   700002  100  300   0 0 1 1 0 0 0
I+LIQSCVL  3.38E+03 3.20E-03   1  11   700002  100  300   0 0 1 1 0 0 0
I-BIOWAST  2.17E+03 1.07E-01   1  11   700002  100  192  11 0 1 1 0 0 0
I+BIOWAST  2.17E+03 1.07E-01   1  11   700002  100  192  11 0 1 1 0 0 0
N-SSTRASH  4.59E+04 1.67E-05   1  11   710102  150  100  11 1 1 0 0 0 0
N+SSTRASH  6.88E+04 1.12E-05   1  11   700002  100  100  11 1 1 0 0 0 0
N-SSWASTE  2.43E+04 2.17E-04   1  11   700002  100  100  13 0 1 0 0 0 0
N-LOTRASH  9.72E+03 7.05E-02   1  11   710102  200  100  10 1 1 0 0 0 0
N+LOTRASH  1.94E+04 3.53E-02   1  11   700002  100  100  10 1 1 0 0 0 0
```

N-LOWASTE	2.31E+04	2.11E-02	1	11	700002	100	100	10	0	1	1	0	0	0
N-SORMFG2	7.51E+03	9.36E-02	1	11	1100001	100	100	11	1	1	1	0	0	0
N-TRIPLAT	5.94E+01	1.61E+01	1	11	700002	100	100	32	0	1	0	0	0	0
N-TRITGAS	8.90E+00	2.61E+01	1	11	700002	100	100	1	0	1	0	0	0	0
N-TRISCNT	4.16E+00	5.30E+00	1	11	700002	100	300	0	0	1	1	0	0	0
N-TRILIQD	3.37E+02	5.08E+00	1	11	700002	100	300	1	0	1	1	0	0	0
N-TRITRSH	1.62E+01	7.76E+00	1	11	700002	100	100	10	0	1	0	0	0	0
N-TRIFOIL	2.35E-01	8.25E+00	1	11	700002	100	100	32	0	1	0	0	0	0
N-HIGHACT	1.00E+03	2.11E+02	1	21	700002	100	100	33	3	1	0	0	2	0
N-TRITSOR	4.33E+01	8.10E-01	1	31	700002	100	100	13	1	1	0	0	0	1
N-CARBSOR	2.50E+01	1.00E-02	1	31	700002	100	100	13	1	1	0	0	0	2
N-COBLSOR	7.77E+01	9.10E+00	1	31	700002	100	100	13	1	1	0	0	0	3
N-NICKSOR	2.50E+01	1.00E-02	1	31	700002	100	100	13	1	1	0	0	0	4
N-STROSOR	2.64E+00	1.02E-03	1	31	700002	100	100	13	1	1	0	0	0	5
N-CESISOR	3.46E+01	2.32E-02	1	31	700002	100	100	13	1	1	0	0	0	6
N-PLUBSOR	5.54E-04	4.60E-06	4	31	701102	100	100	33	1	1	0	2	0	7
N-AMERSOR	6.99E-04	4.08E-07	1	31	700002	100	100	13	1	1	0	0	0	9
N-PUBESOR	4.99E-04	1.34E-04	5	31	701102	100	100	33	1	1	0	2	0	10
N-RANEEDS	1.20E-01	3.00E-05	4	31	701102	100	100	33	1	1	0	2	0	12
N-RACELLS	3.14E-02	2.76E-06	1	31	700002	100	100	13	1	1	0	0	0	13
N-RAPLAQU	3.03E-02	2.10E-07	1	31	700002	100	100	13	1	1	0	0	0	14
N-RAMISCL	4.14E+02	9.88E-07	1	31	700002	100	100	13	0	1	0	0	0	17
N-RARESIN	2.77E+03	2.50E-02	4	11	801102	100	140	23	2	2	0	2	0	0
M-NAVYDRY	5.61E+02	2.00E-02	1	11	700001	100	100	10	1	1	0	0	0	0
M-NAVYWET	3.40E+03	2.15E-01	1	11	701101	100	100	23	1	2	0	1	0	0
P-DECORES	4.79E+01	3.10E+05	6	24	805101	100	100	33	3	1	0	4	5	0
P-DEACINT	4.88E+02	5.30E+01	1	21	800001	100	100	33	3	1	0	0	6	0
P-DEACVES	7.59E+02	5.65E+01	1	21	800001	100	100	33	3	1	0	0	7	0
P-DEACTCO	2.39E+03	2.80E+00	1	11	500001	100	100	23	1	1	0	0	0	0
P-DECONME	2.05E+04	1.57E-01	1	11	500001	100	100	12	1	1	0	0	0	0
P-DECONCO	3.58E+04	9.40E-03	1	11	500001	100	100	12	1	1	0	0	0	0
P-DETRASH	1.84E+03	1.59E+00	1	11	710101	300	100	10	1	1	0	0	0	0
P-DEFILCR	3.43E+01	5.59E+02	6	14	701101	100	100	33	2	2	0	2	0	0
P-DEEVAPB	7.20E+02	7.42E+01	6	14	901101	100	140	23	2	2	1	2	0	0
B-DECORES	4.84E+01	1.29E+05	6	24	805101	100	100	33	3	1	0	4	8	0
B-DEACINT	1.84E+01	6.22E+01	1	21	800001	100	100	33	3	1	0	0	9	0
B-DEACVES	8.12E+00	2.70E+02	1	21	800001	100	100	33	3	1	0	0	10	0
B-DEACTCO	7.93E+01	1.90E+00	1	11	500001	100	100	23	1	1	0	0	0	0
B-DECONME	1.19E+04	5.70E-01	1	11	500001	100	100	12	1	1	0	0	0	0
B-DECONCO	4.51E+03	4.39E-02	1	11	500001	100	100	12	1	1	0	0	0	0
B-DETRASH	1.21E+03	1.59E+00	1	11	710101	300	100	10	1	1	0	0	0	0
B-DERESIN	6.28E+01	3.86E+00	3	11	901101	100	140	21	2	2	1	2	0	0
B-DEEVAPB	6.55E+02	5.36E+01	4	11	901101	100	140	23	2	2	1	2	0	0
P-IXRESIN	2.03E+03	6.24E-01	2	11	1201101	100	140	23	2	2	0	2	0	0
P-CONCLIQ	1.69E+03	2.70E+00	3	11	1201101	100	140	23	2	2	0	2	0	0
B-IXRESIN	1.17E+03	1.25E+00	2	11	1201101	100	140	23	2	2	0	2	0	0
B-CONCLIQ	1.60E+03	8.64E-01	3	11	1201101	100	140	23	2	2	0	2	0	0
B-FSLUDGE	6.68E+02	5.55E-01	2	11	1201101	100	140	23	2	2	0	2	0	0
P-NCTRASH	1.27E+03	4.04E+00	4	11	1504001	100	100	11	1	1	0	3	0	0
L-NFRCOMP	1.06E+03	1.00E+03	3	21	805101	100	100	33	3	1	0	4	1	0
N-SORMFG2	3.59E+01	1.67E+02	3	11	1104001	100	100	11	1	1	1	3	0	0
N-TRIPLAT	2.25E+01	1.74E+03	3	11	704002	100	100	32	0	1	0	3	0	0
N-TRITGAS	2.88E+02	6.12E+02	3	11	704002	100	100	1	0	1	0	3	0	0
N-TRISCNT	8.60E-02	4.38E+00	2	11	753112	452	200	31	3	4	1	2	0	0
N-TRILIQD	7.45E+01	1.56E+03	3	11	701102	100	140	23	2	2	1	2	0	0
N-TRITRSH	4.60E+00	2.86E+02	3	11	704002	100	100	10	0	1	0	3	0	0
N-TRIFOIL	1.67E+00	8.89E+02	3	11	704002	100	100	32	0	1	0	3	0	0

N-TRITSOR	6.58E+00	2.25E+00	3	31	701102	100	100	33 1 1 0 2 0 1
N-CUBLSOR	4.71E+01	1.31E+03	3	31	701102	100	100	33 1 1 0 2 0 3
N-STROSOR	4.58E+01	6.78E-01	3	31	701102	100	100	33 1 1 0 2 0 5
N-CESISOR	5.89E+01	6.97E-01	3	31	701102	100	100	33 1 1 0 2 0 6
N-PLU8SOR	4.99E-03	4.14E-05	5	31	701102	100	100	33 1 1 0 2 0 7
N-AMERSOR	6.29E-03	3.68E-06	4	31	701102	100	100	33 1 1 0 2 0 9
N-RANEEDS	2.37E+00	2.84E-04	5	31	701102	100	100	33 1 1 0 2 012
N-RACELLS	2.83E-01	2.51E-05	4	31	701102	100	100	33 1 1 0 2 013
N-RAPLAQU	2.73E-01	2.01E-06	4	31	701102	100	100	33 1 1 0 2 014
N-RAMISCL	2.58E+02	5.56E-06	4	31	701102	100	100	33 0 1 0 2 017
M-NAVYWET	9.62E+01	4.57E+00	3	11	701101	100	100	23 2 2 0 2 0 0
P-DEACINT	5.52E+02	7.07E+03	3	21	805101	100	100	33 3 1 0 4 6 0
P-DEACVES	1.55E+02	2.35E+02	3	21	805101	100	100	33 3 1 0 4 7 0
B-DEACINT	5.24E+01	1.33E+03	3	21	805101	100	100	33 3 1 0 4 9 0
P-IXRESIN	3.60E+03	2.36E+00	3	11	1201101	100	140	23 2 2 0 2 0 0
P-CONCLIQ	1.14E+03	1.65E+01	4	11	1201101	100	140	23 2 2 0 2 0 0
B-IXRESIN	6.62E+03	7.83E+00	3	11	1201101	100	140	23 2 2 0 2 0 0
B-CONCLIQ	5.61E+03	4.76E+00	4	11	1201101	100	140	23 2 2 0 2 0 0
B-FSLUDGE	6.71E+03	8.06E+00	3	11	1201101	100	140	23 2 2 0 2 0 0
L-NFRCOMP	6.57E+01	8.83E+03	4	21	805101	100	100	33 3 1 0 4 1 0
N-SORMFG2	3.92E+01	5.16E+02	4	11	1104001	100	100	11 1 1 1 3 0 0
N-TRISCNT	2.66E-01	2.49E+01	3	11	753112	452	200	31 3 4 1 2 0 0
N-STROSOR	1.51E+00	1.25E+01	4	31	701102	100	100	33 1 1 0 2 0 5
N-CESISOR	2.12E+01	4.97E+01	4	31	701102	100	100	33 1 1 0 2 0 6
N-AMERSOR	6.29E-02	3.70E-05	5	31	701102	100	100	33 1 1 0 2 0 9
N-RACELLS	2.83E+00	2.80E-04	5	31	701102	100	100	33 1 1 0 2 013
N-RAPLAQU	9.32E-01	1.23E-04	5	31	701102	100	100	33 1 1 0 2 014
N-RAMISCL	4.37E+01	1.26E-04	5	31	701102	100	100	33 0 1 0 2 017
M-NAVYWET	1.15E+02	1.46E+01	4	11	701101	100	100	23 2 2 0 2 0 0
P-DEACINT	5.75E+01	4.03E+04	4	21	805101	100	100	33 3 1 0 4 6 0
B-DEACINT	1.47E+01	1.26E+04	4	21	805101	100	100	33 3 1 0 4 9 0
P-IXRESIN	4.12E+03	1.12E+01	4	11	1201101	100	140	23 2 2 0 2 0 0
P-CONCLIQ	9.63E+01	7.10E+01	5	11	1201101	100	140	23 2 2 0 2 0 0
B-IXRESIN	2.61E+02	7.64E+01	4	11	1201101	100	140	23 2 2 0 2 0 0
B-FSLUDGE	5.42E+02	5.49E+01	4	11	1201101	100	140	23 2 2 0 2 0 0
L-NFRCOMP	3.07E+00	1.89E+04	5	21	805101	100	100	33 3 1 0 4 1 0
P-IXRESIN	1.92E+01	8.05E-01	4	11	1202101	100	200	31 3 3 0 2 0 0
B-FSLUDGE	3.83E+00	3.92E+01	4	11	1202101	100	200	31 3 3 0 2 0 0
P-IXRESIN	8.69E+02	9.60E+01	5	11	1201101	100	140	23 2 2 0 2 0 0
B-FSLUDGE	1.35E+01	3.93E+02	5	11	1201101	100	140	23 2 2 0 2 0 0
P-IXRESIN	2.68E+00	1.72E+01	5	11	1202101	100	200	31 3 3 0 2 0 0

INTRUDER SCENS

SCENARIO = IN-DRI

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	1.58E-03	1.46E-03	1.43E-03	1.69E-03	1.54E-03	1.78E-03	1.60E-03	1.78E-03	1.98E-03	1.64E-03
SA	3.69E-03	3.41E-03	3.34E-03	3.95E-03	3.61E-03	4.16E-03	3.74E-03	4.17E-03	4.63E-03	3.84E-03
B	1.14E-01	1.05E-01	1.03E-01	1.22E-01	1.11E-01	1.28E-01	1.15E-01	1.28E-01	1.43E-01	1.18E-01
C	2.06E-01	1.90E-01	1.86E-01	2.20E-01	2.02E-01	2.32E-01	2.09E-01	2.33E-01	2.58E-01	2.14E-01
D1	1.78E-01	1.64E-01	1.60E-01	1.90E-01	1.74E-01	2.00E-01	1.80E-01	2.01E-01	2.23E-01	1.85E-01
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	7.93E-03	7.32E-03	7.16E-03	8.47E-03	7.75E-03	8.94E-03	8.03E-03	8.96E-03	9.94E-03	8.25E-03

SCENARIO = IN-DIS

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	4.12E+01	2.50E+01	2.45E+01	3.07E+01	2.93E+01	5.19E+01	3.55E+01	1.36E+02	3.41E+01	3.70E+01
B	1.72E+02	1.51E+02	1.48E+02	1.77E+02	1.63E+02	2.04E+02	1.73E+02	2.76E+02	2.06E+02	1.78E+02
C	4.28E+01	3.32E+01	3.25E+01	3.96E+01	3.72E+01	5.61E+01	4.24E+01	1.17E+02	4.51E+01	4.31E+01
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	1.37E+03	8.86E+02	8.67E+02	1.10E+03	1.06E+03	2.05E+03	1.34E+03	5.80E+03	1.21E+03	1.35E+03
TOTAL	6.15E+00	4.99E+00	4.88E+00	5.90E+00	5.50E+00	7.75E+00	6.11E+00	1.42E+01	6.79E+00	6.23E+00

SCENARIO = IN-C01

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	3.22E+02	1.55E+02	1.51E+02	1.99E+02	1.95E+02	4.29E+02	2.61E+02	1.37E+03	2.12E+02	2.72E+02
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	3.06E+02	1.47E+02	1.44E+02	1.89E+02	1.86E+02	4.09E+02	2.49E+02	1.31E+03	2.02E+02	2.59E+02

SCENARIO = IN-C02

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	1.04E+02	4.89E-01	4.95E-01	1.35E+01	2.10E+01	1.59E+02	6.07E+01	7.98E+02	1.88E+00	6.61E+01
SA	7.11E+02	1.30E+00	1.39E+00	9.19E+01	1.45E+02	1.11E+03	4.24E+02	5.70E+03	1.02E+01	4.61E+02
B	4.30E+02	2.13E+01	2.10E+01	9.36E+01	1.41E+02	9.35E+02	3.70E+02	4.53E+03	3.69E+01	3.59E+02
C	4.09E+02	7.15E+01	7.10E+01	1.42E+02	1.76E+02	8.37E+02	3.70E+02	3.85E+03	9.39E+01	3.57E+02
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	2.08E+04	1.60E+03	1.57E+03	5.32E+03	7.72E+03	4.83E+04	1.95E+04	2.32E+05	2.53E+03	1.85E+04
TOTAL	1.38E+02	3.60E+00	3.57E+00	2.26E+01	3.37E+01	2.35E+02	9.18E+01	1.16E+03	6.53E+00	9.58E+01

SCENARIO = IN-C03

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	8.77E+01	4.36E-01	4.42E-01	1.09E+01	1.66E+01	1.25E+02	4.78E+01	6.37E+02	1.54E+00	5.36E+01
SA	6.55E+02	9.74E-01	1.06E+00	8.12E+01	1.27E+02	9.72E+02	3.70E+02	5.03E+03	8.65E+00	4.11E+02
B	3.38E+02	2.51E+01	2.46E+01	7.63E+01	1.06E+02	6.38E+02	2.60E+02	3.11E+03	3.96E+01	2.63E+02
C	3.15E+02	5.82E+01	5.78E+01	1.07E+02	1.28E+02	5.61E+02	2.56E+02	2.59E+03	7.55E+01	2.55E+02
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	1.68E+04	2.30E+03	2.25E+03	4.97E+03	6.39E+03	3.29E+04	1.41E+04	1.56E+05	3.36E+03	1.40E+04
TOTAL	1.15E+02	4.01E+00	3.96E+00	1.87E+01	2.66E+01	1.77E+02	7.01E+01	8.84E+02	6.66E+00	7.57E+01

SCENARIO = IN-AG1

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	2.11E+02	1.84E+02	1.80E+02	2.14E+02	1.97E+02	2.44E+02	2.09E+02	3.23E+02	2.50E+02	2.15E+02
SA	7.74E-04	7.15E-04	7.00E-04	8.28E-04	7.58E-04	8.73E-04	7.85E-04	8.75E-04	9.71E-04	8.06E-04
B	2.38E-02	2.20E-02	2.15E-02	2.55E-02	2.33E-02	2.69E-02	2.42E-02	2.69E-02	2.99E-02	2.48E-02
C	9.07E-01	7.76E-01	7.69E-01	8.96E-01	8.33E-01	8.00E-01	8.55E-01	9.40E-01	9.55E-01	8.69E-01
D1	3.72E-02	3.44E-02	3.36E-02	3.98E-02	3.64E-02	4.20E-02	3.77E-02	4.21E-02	4.67E-02	3.88E-02
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	2.01E+02	1.75E+02	1.71E+02	2.04E+02	1.88E+02	2.32E+02	1.99E+02	3.08E+02	2.38E+02	2.05E+02

SCENARIO = IN-AG2

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	8.67E+00	7.50E-01	7.95E-01	2.02E+00	2.44E+00	1.37E+01	5.95E+00	6.65E+01	1.29E+00	6.11E+00
SA	5.60E+01	1.75E+00	1.97E+00	9.29E+00	1.31E+01	8.93E+01	3.54E+01	4.51E+02	6.18E+00	3.79E+01
B	7.23E+01	3.88E+01	3.88E+01	5.59E+01	5.02E+01	1.15E+02	7.26E+01	4.27E+02	6.98E+01	7.32E+01
C	1.20E+02	8.66E+01	8.62E+01	1.07E+02	1.02E+02	1.52E+02	1.21E+02	4.28E+02	1.11E+02	1.20E+02
D1	7.22E-06	6.15E-06	6.11E-06	7.11E-06	6.61E-06	6.29E-06	6.78E-06	7.45E-06	7.53E-06	6.89E-06
D2	5.08E+03	3.41E+03	3.38E+03	4.41E+03	4.07E+03	7.29E+03	5.27E+03	2.35E+04	4.67E+03	5.23E+03
TOTAL	1.67E+01	6.09E+00	6.10E+00	8.96E+00	8.85E+00	2.51E+01	1.42E+01	1.03E+02	8.87E+00	1.43E+01

SCENARIO = IN-AG3

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	7.34E+00	6.78E-01	7.17E-01	1.69E+00	1.98E+00	1.06E+01	4.74E+00	5.22E+01	1.15E+00	4.96E+00
SA	5.13E+01	1.36E+00	1.54E+00	7.91E+00	1.12E+01	7.70E+01	3.05E+01	3.93E+02	5.49E+00	3.34E+01
B	7.16E+01	4.58E+01	4.50E+01	6.19E+01	5.36E+01	9.51E+01	7.11E+01	3.13E+02	7.78E+01	7.21E+01
C	9.65E+01	7.09E+01	7.05E+01	8.70E+01	8.16E+01	1.14E+02	9.48E+01	3.00E+02	9.12E+01	9.49E+01
D1	5.81E-06	4.95E-06	4.92E-06	5.72E-06	5.32E-06	5.06E-06	5.46E-06	6.00E-06	6.06E-06	5.55E-06
D2	5.72E+03	4.40E+03	4.30E+03	5.43E+03	4.89E+03	6.87E+03	5.91E+03	1.83E+04	5.[illegible]1E+03	5.85E+03
TOTAL	1.56E+01	6.77E+00	6.70E+00	9.32E+00	8.85E+00	2.06E+01	1.31E+01	8.00E+01	9.65E+00	1.33E+01

EXPOSED WASTE

SCENARIO = EX-INA

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	5.53E+01	1.93E-01	4.66E-01	7.57E+00	1.22E+01	9.11E+01	3.49E+01	4.46E+02	1.83E+00	3.67E+01
SA	3.34E+02	1.84E+00	3.67E+00	4.46E+01	7.11E+01	5.14E+02	1.98E+02	2.52E+03	1.62E+01	2.13E+02
B	2.37E+02	1.09E+01	1.57E+01	5.59E+01	9.37E+01	5.00E+02	2.10E+02	2.29E+03	7.61E+01	2.04E+02
C	1.69E+02	2.35E+00	3.90E+00	3.85E+01	5.96E+01	4.02E+02	1.59E+02	1.93E+03	1.94E+01	1.49E+02
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	6.27E[illegible]	4.88E-01	8.94E-01	9.40E+00	1.52E+01	1.08E+02	4.19E+01	5.24E+02	3.93E+00	4.33E+01

SCENARIO = EX-INW

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

SCENARIO = EX-ERA

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	2.68E+03	1.51E+00	1.03E+01	3.07E+02	4.68E+02	3.61E+03	1.38E+03	1.87E+04	9.62E+01	1.58E+03
SA	3.17E+01	4.65E-03	1.03E-01	3.77E+00	5.86E+00	4.53E+01	1.72E+01	2.36E+02	1.73E+00	1.95E+01
B	6.10E+01	3.06E-01	8.51E-01	8.64E+00	1.35E+01	1.02E+02	3.95E+01	5.26E+02	3.85E+01	4.28E+01
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E[illegible]	[illegible]	[illegible]0E+00	.00E+00	.00E+00	.00E+00
D2	3.69E+02	2.90E+00	6.20E+00	5.59E+01	8.66E[illegible]	[illegible]	[illegible]4E+02	3.35E+03	3.59E+01	2.63E+02
TOTAL	2.55E+03	1.45E+00	9.82E+00	2.93E+02	4.46[illegible]	[illegible]	1.31E+03	1.78E+04	9.26E+01	1.51E+03

SCENARIO = EX-ERW

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDN[illegible]S	[illegible]	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00[illegible]00	[illegible]	.00E+00	.00E+00	.00E+00	.00E+00
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E[illegible]	[illegible]	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E[illegible]	[illegible]	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+[illegible]	[illegible]	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E[illegible]	[illegible]	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+0[illegible]	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

IMPACTS Output

OPERATIONAL AXS

SCENARIO = OP-SCF

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	8.92E-08	6.28E-09	4.61E-09	1.29E-08	1.63E-08	8.65E-08	3.65E-08	3.95E-07	7.63E-09	4.35E-08
SA	1.59E-07	1.71E-08	1.25E-08	2.39E-08	2.62E-08	1.04E-07	4.73E-08	4.12E-07	1.88E-08	6.17E-08
B	1.75E-07	3.03E-08	2.31E-08	3.46E-08	3.72E-08	9.44E-08	5.27E-08	3.09E-07	3.44E-08	6.86E-08
C	7.25E-07	9.73E-08	7.09E-08	1.41E-07	1.70E-07	7.15E-07	3.23E-07	2.93E-06	1.13E-07	3.59E-07
D1	2.51E-06	1.63E-07	1.38E-07	6.12E-07	1.03E-06	6.62E-06	2.64E-06	3.06E-05	2.77E-07	2.39E-06
D2	2.26E-06	1.98E-07	1.45E-07	5.04E-07	7.61E-07	4.66E-06	1.85E-06	2.06E-05	2.55E-07	1.74E-06
TOTAL	1.07E-07	8.80E-09	6.49E-09	1.67E-08	2.12E-08	1.09E-07	4.62E-08	4.87E-07	1.06E-08	5.36E-08

SCENARIO = OP-SCW

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	1.51E+03	5.47E+01	2.83E+01	2.07E+02	3.10E+02	2.12E+03	8.27E+02	1.00E+04	6.52E+01	8.85E+02
SA	2.94E+04	1.86E+03	9.77E+02	2.98E+03	3.52E+03	1.87E+04	7.61E+03	7.86E+04	1.67E+03	1.04E+04
B	1.85E+04	1.69E+03	9.38E+02	2.30E+03	3.12E+03	1.38E+04	6.06E+03	5.60E+04	1.81E+03	7.47E+03
C	6.19E+04	3.61E+03	2.00E+03	1.05E+04	1.68E+04	1.08E+05	4.27E+04	4.89E+05	4.47E+03	4.16E+04
D1	4.73E+05	1.65E+04	1.17E+04	1.02E+05	1.85E+05	1.27E+06	4.97E+05	5.94E+06	3.31E+04	4.50E+05
D2	5.19E+05	2.88E+04	1.47E+04	9.01E+04	1.44E+05	9.64E+05	3.73E+05	4.33E+06	3.28E+04	3.58E+05
TOTAL	4.04E+03	2.06E+02	1.13E+02	6.33E+02	9.97E+02	6.49E+03	2.56E+03	2.97E+04	2.53E+02	2.57E+03

SCENARIO = OP-FYR

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	5.11E+02	6.72E+01	4.95E+01	1.01E+02	1.22E+02	5.31E+02	2.44E+02	2.22E+03	7.72E+01	2.62E+02
SA	2.40E+01	2.41E+00	1.83E+00	3.41E+00	3.71E+00	1.46E+01	6.68E+00	5.81E+01	2.66E+00	8.91E+00
B	5.32E+02	1.53E+02	1.35E+02	1.54E+02	1.50E+02	1.72E+02	1.52E+02	1.75E+02	1.59E+02	2.08E+02
C	2.50E+03	4.02E+02	2.88E+02	4.43E+02	4.37E+02	9.84E+02	5.82E+02	2.90E+03	4.38E+02	8.44E+02
D1	4.23E+02	2.72E+01	2.31E+01	1.04E+02	1.75E+02	1.13E+03	4.49E+02	5.21E+03	4.66E+01	4.07E+02
D2	3.94E+02	3.77E+01	2.74E+01	8.45E+01	1.22E+02	7.14E+02	2.88E+02	3.15E+03	4.65E+01	2.78E+02
TOTAL	5.44E+02	7.46E+01	5.53E+01	1.08E+02	1.27E+02	5.28E+02	2.46E+02	2.18E+03	8.50E+01	2.70E+02

INTRUDER WELL

CLASS = A

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	1.74E-07	1.24E-07	3.66E-07	5.35E-07	1.79E-07	1.90E-07	1.85E-07	2.02E-07	1.20E-03	3.60E-05
40 YR	7.59E-06	1.06E-05	1.32E-05	1.74E-05	9.41E-06	1.09E-05	2.93E-05	6.08E-05	2.15E-03	7.76E-05
60 YR	1.35E-05	1.88E-05	2.34E-05	3.09E-05	1.67E-05	1.93E-05	5.22E-05	1.08E-04	3.49E-03	1.28E-04
80 YR	1.36E-05	1.89E-05	2.36E-05	3.13E-05	1.68E-05	1.95E-05	5.23E-05	1.09E-04	4.30E-03	1.52E-04
100 YR	1.38E-05	1.90E-05	2.40E-05	3.18E-05	1.70E-05	1.97E-05	5.24E-05	1.08E-04	5.72E-03	1.95E-04
120 YR	2.19E-05	3.05E-05	3.80E-05	5.03E-05	2.71E-05	3.14E-05	8.45E-05	1.75E-04	6.45E-03	2.31E-04
160 YR	2.70E-05	3.75E-05	4.68E-05	6.20E-05	3.34E-05	3.86E-05	1.04E-04	2.15E-04	8.60E-03	3.04E-04
200 YR	3.56E-05	4.97E-05	6.19E-05	8.19E-05	4.42E-05	5.11E-05	1.37E-04	2.85E-04	1.08E-02	3.84E-04
400 YR	6.55E-05	9.12E-05	1.14E-04	1.51E-04	8.11E-05	9.38E-05	2.52E-04	5.22E-04	2.15E-02	7.58E-04
600 YR	9.79E-05	1.37E-04	1.70E-04	2.24E-04	1.22E-04	1.41E-04	3.81E-04	7.91E-04	2.15E-02	8.16E-04
800 YR	1.22E-04	1.72E-04	2.11E-04	2.79E-04	1.52E-04	1.76E-04	4.77E-04	9.92E-04	2.16E-02	8.60E-04
1K YR	1.19E-04	1.68E-04	2.06E-04	2.72E-04	1.48E-04	1.72E-04	4.66E-04	9.68E-04	2.16E-02	8.55E-04
5K YR	7.47E-05	1.04E-04	1.29E-04	1.71E-04	9.25E-05	1.07E-04	2.88E-04	5.98E-04	2.15E-02	7.74E-04
10K YR	4.22E-05	5.79E-05	7.35E-05	9.80E-05	5.20E-05	6.00E-05	1.59E-04	3.28E-04	2.15E-02	7.15E-04
20K YR	1.47E-05	1.87E-05	2.62E-05	3.59E-05	1.77E-05	2.02E-05	4.97E-05	1.00E-04	2.14E-02	6.65E-04

CLASS = SA

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	3.49E-10	2.45E-10	7.32E-10	1.08E-09	3.59E-10	3.81E-10	3.72E-10	4.05E-10	2.42E-06	7.28E-08
40 YR	2.01E-09	2.41E-09	3.69E-09	5.06E-09	2.37E-09	2.68E-09	6.16E-09	1.22E-08	4.34E-06	1.33E-07
60 YR	3.47E-09	4.22E-09	6.36E-09	8.70E-09	4.12E-09	4.67E-09	1.09E-08	2.16E-08	7.04E-06	2.16E-07

80 YR	3.71E-09	4.39E-09	6.86E-09	9.44E-09	4.36E-09	4.93E-09	1.11E-08	2.19E-08	8.68E-06	2.65E-07
100 YR	4.12E-09	4.67E-09	7.72E-09	1.07E-08	4.78E-09	5.38E-09	1.16E-08	2.23E-08	1.16E-05	3.52E-07
120 YR	5.85E-09	6.98E-09	1.08E-08	1.48E-08	6.89E-09	7.81E-09	1.78E-08	3.52E-08	1.30E-05	3.98E-07
160 YR	7.37E-09	8.70E-09	1.36E-08	1.88E-08	8.66E-09	9.79E-09	2.21E-08	4.34E-08	1.74E-05	5.30E-07
200 YR	9.59E-09	1.14E-08	1.77E-08	2.43E-08	1.13E-08	1.28E-08	2.91E-08	5.73E-08	2.17E-05	6.64E-07
400 YR	1.81E-08	2.13E-08	3.35E-08	4.61E-08	2.12E-08	2.40E-08	5.38E-08	1.06E-07	4.34E-05	1.33E-06
600 YR	2.42E-08	3.00E-08	4.40E-08	6.00E-08	2.89E-08	3.29E-08	7.83E-08	1.57E-07	4.34E-05	1.34E-06
800 YR	2.88E-08	3.65E-08	5.19E-08	7.04E-08	3.46E-08	3.95E-08	9.65E-08	1.95E-07	4.34E-05	1.34E-06
1K YR	2.83E-08	3.58E-08	5.10E-08	6.92E-08	3.39E-08	3.87E-08	9.44E-08	1.90E-07	4.34E-05	1.34E-06
5K YR	1.98E-08	2.37E-08	3.63E-08	5.00E-08	2.34E-08	2.65E-08	6.07E-08	1.20E-07	4.34E-05	1.33E-06
10K YR	1.36E-08	1.48E-08	2.55E-08	3.61E-08	1.56E-08	1.75E-08	3.61E-08	6.88E-08	4.34E-05	1.32E-06
20K YR	8.38E-09	7.31E-09	1.61E-08	2.43E-08	9.08E-09	9.87E-09	1.54E-08	2.55E-08	4.33E-05	1.31E-06

CLASS = B

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	9.80E-10	7.26E-10	2.09E-09	2.95E-09	1.01E-09	1.07E-09	1.04E-09	1.13E-09	6.53E-06	1.96E-07
40 YR	3.51E-09	3.80E-09	6.76E-09	9.27E-09	4.01E-09	4.47E-09	8.92E-09	1.68E-08	1.17E-05	3.54E-07
60 YR	5.96E-09	6.56E-09	1.14E-08	1.57E-08	6.84E-09	7.66E-09	1.56E-08	2.96E-08	1.90E-05	5.76E-07
80 YR	6.61E-09	7.03E-09	1.28E-08	1.77E-08	7.51E-09	8.37E-09	1.63E-08	3.03E-08	2.34E-05	7.09E-07
100 YR	7.74E-09	7.84E-09	1.53E-08	2.11E-08	8.67E-09	9.61E-09	1.75E-08	3.16E-08	3.11E-05	9.42E-07
120 YR	1.03E-08	1.11E-08	1.99E-08	2.73E-08	1.17E-08	1.31E-08	2.59E-08	4.85E-08	3.51E-05	1.06E-06
160 YR	1.32E-08	1.40E-08	2.55E-08	3.52E-08	1.49E-08	1.66E-08	3.23E-08	6.02E-08	4.67E-05	1.42E-06
200 YR	1.69E-08	1.81E-08	3.27E-08	4.50E-08	1.93E-08	2.15E-08	4.23E-08	7.92E-08	5.84E-05	1.77E-06
400 YR	3.24E-08	3.42E-08	6.30E-08	8.69E-08	3.68E-08	4.09E-08	7.90E-08	1.47E-07	1.17E-04	3.54E-06
600 YR	4.03E-08	4.55E-08	7.66E-08	1.05E-07	4.66E-08	5.24E-08	1.11E-07	2.12E-07	1.17E-04	3.55E-06
800 YR	4.62E-08	5.39E-08	8.67E-08	1.18E-07	5.40E-08	6.09E-08	1.34E-07	2.61E-07	1.17E-04	3.56E-06
1K YR	4.55E-08	5.29E-08	8.55E-08	1.17E-07	5.31E-08	5.99E-08	1.31E-07	2.56E-07	1.17E-04	3.56E-06
5K YR	3.46E-08	3.73E-08	6.63E-08	9.19E-08	3.95E-08	4.41E-08	8.79E-08	1.65E-07	1.17E-04	3.54E-06
10K YR	2.66E-08	2.58E-08	5.21E-08	7.39E-08	2.95E-08	3.25E-08	5.62E-08	9.91E-08	1.17E-04	3.53E-06
20K YR	1.98E-08	1.59E-08	3.95E-08	5.86E-08	2.10E-08	2.25E-08	2.94E-08	4.33E-08	1.17E-04	3.51E-06

CLASS = C

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	1.62E-10	1.15E-10	3.41E-10	5.01E-10	1.67E-10	1.77E-10	1.73E-10	1.89E-10	1.12E-06	3.37E-08
40 YR	8.69E-10	1.05E-09	1.60E-09	2.19E-09	1.03E-09	1.16E-09	2.68E-09	5.30E-09	1.86E-06	5.70E-08
60 YR	1.52E-09	1.84E-09	2.78E-09	3.80E-09	1.80E-09	2.04E-09	4.74E-09	9.41E-09	3.10E-06	9.51E-08
80 YR	1.63E-09	1.92E-09	3.01E-09	4.15E-09	1.91E-09	2.16E-09	4.86E-09	9.54E-09	3.86E-06	1.18E-07
100 YR	1.80E-09	2.04E-09	3.36E-09	4.66E-09	2.08E-09	2.34E-09	5.03E-09	9.71E-09	5.03E-06	1.53E-07
120 YR	2.57E-09	3.06E-09	4.73E-09	6.50E-09	3.02E-09	3.42E-09	7.78E-09	1.53E-08	5.80E-06	1.77E-07
160 YR	3.23E-09	3.80E-09	5.97E-09	8.21E-09	3.79E-09	4.28E-09	9.62E-09	1.89E-08	7.65E-06	2.34E-07
200 YR	4.19E-09	4.98E-09	7.72E-09	1.06E-08	4.93E-09	5.58E-09	1.27E-08	2.50E-08	9.52E-06	2.91E-07
400 YR	7.86E-09	9.26E-09	1.45E-08	2.00E-08	9.22E-09	1.04E-08	2.34E-08	4.60E-08	1.86E-05	5.69E-07
600 YR	1.06E-08	1.31E-08	1.92E-08	2.62E-08	1.26E-08	1.44E-08	3.42E-08	6.86E-08	1.87E-05	5.77E-07
800 YR	1.26E-08	1.60E-08	2.27E-08	3.08E-08	1.51E-08	1.73E-08	4.23E-08	8.53E-08	1.88E-05	5.82E-07
1K YR	1.24E-08	1.57E-08	2.23E-08	3.03E-08	1.49E-08	1.70E-08	4.15E-08	8.37E-08	1.88E-05	5.81E-07
5K YR	8.69E-09	1.04E-08	1.59E-08	2.19E-08	1.03E-08	1.16E-08	2.67E-08	5.29E-08	1.87E-05	5.74E-07
10K YR	5.97E-09	6.52E-09	1.11E-08	1.58E-08	6.85E-09	7.67E-09	1.59E-08	3.03E-08	1.87E-05	5.69E-07
20K YR	3.66E-09	3.20E-09	7.02E-09	1.05E-08	3.96E-09	4.31E-09	6.74E-09	1.12E-08	1.87E-05	5.65E-07

CLASS = D1

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	1.33E-11	9.11E-12	2.71E-11	4.15E-11	1.37E-11	1.45E-11	1.42E-11	1.55E-11	9.32E-08	2.80E-09
40 YR	1.08E-10	1.37E-10	1.94E-10	2.65E-10	1.30E-10	1.48E-10	3.62E-10	7.29E-10	1.67E-07	5.18E-09
60 YR	1.89E-10	2.41E-10	3.37E-10	4.61E-10	2.28E-10	2.60E-10	6.40E-10	1.29E-09	2.71E-07	8.43E-09
80 YR	1.98E-10	2.47E-10	3.56E-10	4.89E-10	2.37E-10	2.70E-10	6.50E-10	1.31E-09	3.34E-07	1.03E-08
100 YR	2.14E-10	2.57E-10	3.87E-10	5.38E-10	2.53E-10	2.87E-10	6.66E-10	1.32E-09	4.45E-07	1.37E-08
120 YR	3.15E-10	3.96E-10	5.64E-10	7.73E-10	3.77E-10	4.30E-10	1.04E-09	2.10E-09	5.01E-07	1.55E-08

160 YR	3.94E-10	4.90E-10	7.07E-10	9.72E-10	4.70E-10	5.35E-10	1.29E-09	2.59E-09	6.69E-07	2.06E-08
200 YR	5.15E-10	6.45E-10	9.22E-10	1.27E-09	6.16E-10	7.02E-10	1.70E-09	3.42E-09	8.36E-07	2.58E-08
400 YR	9.63E-10	1.19E-09	1.73E-09	2.38E-09	1.15E-09	1.31E-09	3.14E-09	6.29E-09	1.67E-06	5.15E-08
600 YR	1.34E-09	1.73E-09	2.37E-09	3.23E-09	1.62E-09	1.85E-09	4.63E-09	9.41E-09	1.67E-06	5.22E-08
800 YR	1.62E-09	2.13E-09	2.86E-09	3.86E-09	1.97E-09	2.26E-09	5.75E-09	1.17E-08	1.67E-06	5.27E-08
1K YR	1.59E-09	2.08E-09	2.80E-09	3.79E-09	1.93E-09	2.21E-09	5.62E-09	1.15E-08	1.67E-06	5.27E-08
5K YR	1.07E-09	1.34E-09	1.90E-09	2.62E-09	1.28E-09	1.46E-09	3.56E-09	7.17E-09	1.67E-06	5.17E-08
10K YR	6.91E-10	8.05E-10	1.25E-09	1.77E-09	8.09E-10	9.13E-10	2.06E-09	4.04E-09	1.67E-06	5.10E-08
20K YR	3.71E-10	3.47E-10	6.88E-10	1.05E-09	4.09E-10	4.49E-10	7.90E-10	1.40E-09	1.67E-06	5.04E-08

CLASS = D2

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	1.34E-12	1.06E-12	2.82E-12	3.88E-12	1.39E-12	1.47E-12	1.42E-12	1.55E-12	8.41E-09	2.53E-10
40 YR	2.29E-12	2.35E-12	4.43E-12	5.98E-12	2.53E-12	2.77E-12	4.67E-12	8.14E-12	8.98E-09	2.72E-10
60 YR	4.33E-12	4.35E-12	8.47E-12	1.15E-11	4.76E-12	5.22E-12	8.60E-12	1.48E-11	1.79E-08	5.42E-10
80 YR	5.28E-12	5.09E-12	1.05E-11	1.42E-11	5.74E-12	6.26E-12	9.60E-12	1.59E-11	2.39E-08	7.21E-10
100 YR	5.86E-12	5.61E-12	1.16E-11	1.57E-11	6.34E-12	6.88E-12	1.02E-11	1.65E-11	2.69E-08	8.12E-10
120 YR	8.08E-12	7.87E-12	1.60E-11	2.17E-11	8.81E-12	9.62E-12	1.50E-11	2.52E-11	3.58E-08	1.08E-09
160 YR	1.01E-11	9.83E-12	1.99E-11	2.71E-11	1.10E-11	1.20E-11	1.86E-11	3.11E-11	4.48E-08	1.35E-09
200 YR	1.25E-11	1.24E-11	2.46E-11	3.34E-11	1.37E-11	1.50E-11	2.38E-11	4.02E-11	5.40E-08	1.63E-09
400 YR	2.18E-11	2.19E-11	4.24E-11	5.73E-11	2.39E-11	2.61E-11	4.24E-11	7.23E-11	8.98E-08	2.71E-09
600 YR	2.52E-11	2.68E-11	4.82E-11	6.50E-11	2.82E-11	3.11E-11	5.60E-11	1.01E-10	8.98E-08	2.72E-09
800 YR	2.78E-11	3.05E-11	5.26E-11	7.08E-11	3.14E-11	3.48E-11	6.62E-11	1.22E-10	8.98E-08	2.72E-09
1K YR	2.75E-11	3.00E-11	5.21E-11	7.01E-11	3.10E-11	3.44E-11	6.50E-11	1.19E-10	8.98E-08	2.72E-09
5K YR	2.27E-11	2.32E-11	4.36E-11	5.94E-11	2.51E-11	2.75E-11	4.62E-11	8.02E-11	8.97E-08	2.71E-09
10K YR	1.92E-11	1.81E-11	3.72E-11	5.16E-11	2.07E-11	2.24E-11	3.24E-11	5.16E-11	8.97E-08	2.71E-09
20K YR	1.62E-11	1.37E-11	3.13E-11	4.49E-11	1.69E-11	1.80E-11	2.07E-11	2.74E-11	8.96E-08	2.70E-09

CLASS = TOTAL

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	1.76E-07	1.25E-07	3.68E-07	5.40E-07	1.81E-07	1.92E-07	1.87E-07	2.04E-07	1.21E-03	3.63E-05
40 YR	7.60E-06	1.06E-05	1.32E-05	1.74E-05	9.41E-06	1.09E-05	2.93E-05	6.08E-05	2.17E-03	7.82E-05
60 YR	1.35E-05	1.89E-05	2.34E-05	3.09E-05	1.67E-05	1.94E-05	5.22E-05	1.08E-04	3.52E-03	1.29E-04
80 YR	1.36E-05	1.90E-05	2.36E-05	3.13E-05	1.69E-05	1.95E-05	5.24E-05	1.09E-04	4.34E-03	1.54E-04
100 YR	1.38E-05	1.91E-05	2.40E-05	3.19E-05	1.70E-05	1.97E-05	5.25E-05	1.09E-04	5.77E-03	1.97E-04
120 YR	2.19E-05	3.06E-05	3.81E-05	5.03E-05	2.72E-05	3.14E-05	8.45E-05	1.75E-04	6.51E-03	2.33E-04
160 YR	2.70E-05	3.75E-05	4.69E-05	6.20E-05	3.34E-05	3.86E-05	1.04E-04	2.15E-04	8.67E-03	3.07E-04
200 YR	3.57E-05	4.97E-05	6.19E-05	8.20E-05	4.42E-05	5.11E-05	1.37E-04	2.85E-04	1.08E-02	3.87E-04
400 YR	6.56E-05	9.12E-05	1.14E-04	1.51E-04	8.12E-05	9.39E-05	2.52E-04	5.22E-04	2.17E-02	7.63E-04
600 YR	9.80E-05	1.37E-04	1.70E-04	2.24E-04	1.22E-04	1.41E-04	3.81E-04	7.91E-04	2.17E-02	8.22E-04
800 YR	1.22E-04	1.72E-04	2.11E-04	2.79E-04	1.52E-04	1.76E-04	4.77E-04	9.92E-04	2.17E-02	8.66E-04
1K YR	1.19E-04	1.68E-04	2.06E-04	2.72E-04	1.48E-04	1.72E-04	4.66E-04	9.68E-04	2.17E-02	8.61E-04
5K YR	7.47E-05	1.04E-04	1.30E-04	1.72E-04	9.26E-05	1.07E-04	2.88E-04	5.98E-04	2.17E-02	7.80E-04
10K YR	4.22E-05	5.79E-05	7.36E-05	9.81E-05	5.20E-05	6.00E-05	1.59E-04	3.28E-04	2.16E-02	7.20E-04
20K YR	1.48E-05	1.87E-05	2.62E-05	3.60E-05	1.77E-05	2.02E-05	4.97E-05	1.00E-04	2.16E-02	6.70E-04

BOUNDARY WELL

CLASS = A

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	7.28E-10	9.40E-10	1.25E-09	7.23E-10	7.45E-10	7.21E-10	7.19E-10	5.71E-10	7.21E-10	7.82E-10
40 YR	2.77E-07	1.96E-07	5.80E-07	8.53E-07	2.85E-07	3.02E-07	2.95E-07	3.22E-07	1.91E-03	5.74E-05
60 YR	3.11E-07	2.20E-07	6.51E-07	9.58E-07	3.20E-07	3.39E-07	3.31E-07	3.61E-07	2.14E-03	6.44E-05
80 YR	1.22E-05	1.69E-05	2.12E-05	2.80E-05	1.51E-05	1.74E-05	4.67E-05	9.67E-05	4.26E-03	1.49E-04
100 YR	1.36E-05	1.89E-05	2.35E-05	3.12E-05	1.68E-05	1.94E-05	5.22E-05	1.08E-04	4.30E-03	1.52E-04
120 YR	1.38E-05	1.91E-05	2.42E-05	3.21E-05	1.71E-05	1.97E-05	5.24E-05	1.08E-04	6.41E-03	2.16E-04
160 YR	2.67E-05	3.72E-05	4.65E-05	6.15E-05	3.31E-05	3.83C-05	1.03E-04	2.13E-04	8.55E-03	3.03E-04

200 YR	2.71E-05	3.76E-05	4.72E-05	6.26E-05	3.35E-05	3.88E-05	1.04E-04	2.14E-04	1.07E-02	3.67E-04
400 YR	6.52E-05	9.07E-05	1.13E-04	1.50E-04	8.08E-05	9.34E-05	2.51E-04	5.20E-04	2.14E-02	7.55E-04
600 YR	8.84E-05	1.24E-04	1.53E-04	2.03E-04	1.10E-04	1.27E-04	3.43E-04	7.12E-04	2.15E-02	7.99E-04
800 YR	1.22E-04	1.71E-04	2.10E-04	2.78E-04	1.51E-04	1.75E-04	4.76E-04	9.89E-04	2.16E-02	8.60E-04
1K YR	1.19E-04	1.68E-04	2.06E-04	2.72E-04	1.48E-04	1.72E-04	4.66E-04	9.68E-04	2.16E-02	8.55E-04
5K YR	7.47E-05	1.04E-04	1.29E-04	1.71E-04	9.25E-05	1.07E-04	2.88E-04	5.98E-04	2.15E-02	7.74E-04
10K YR	4.22E-05	5.79E-05	7.35E-05	9.80E-05	5.20E-05	6.00E-05	1.59E-04	3.28E-04	2.15E-02	7.15E-04
20K YR	1.47E-05	1.87E-05	2.62E-05	3.59E-05	1.77E-05	2.02E-05	4.97E-05	1.00E-04	2.14E-02	6.65E-04

CLASS = SA

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	1.46E-13	1.89E-13	2.50E-13	1.45E-13	1.49E-13	1.45E-13	1.44E-13	1.15E-13	1.45E-13	1.57E-13
40 YR	5.56E-10	3.90E-10	1.17E-09	1.72E-09	5.72E-10	6.07E-10	5.93E-10	6.47E-10	3.86E-06	1.16E-07
60 YR	6.24E-10	4.38E-10	1.31E-09	1.93E-09	6.42E-10	6.82E-10	6.65E-10	7.26E-10	4.34E-06	1.30E-07
80 YR	3.43E-09	3.99E-09	6.37E-09	8.80E-09	4.01E-09	4.53E-09	1.01E-08	1.97E-08	8.61E-06	2.63E-07
100 YR	3.70E-09	4.37E-09	6.84E-09	9.42E-09	4.35E-09	4.92E-09	1.11E-08	2.18E-08	8.68E-06	2.65E-07
120 YR	4.31E-09	4.80E-09	8.12E-09	1.13E-08	4.98E-09	5.58E-09	1.17E-08	2.25E-08	1.29E-05	3.93E-07
160 YR	7.32E-09	8.64E-09	1.35E-08	1.86E-08	8.60E-09	9.72E-09	2.19E-08	4.31E-08	1.73E-05	5.28E-07
200 YR	7.96E-09	9.10E-09	1.49E-08	2.06E-08	9.26E-09	1.04E-08	2.26E-08	4.39E-08	2.16E-05	6.58E-07
400 YR	1.80E-08	2.12E-08	3.33E-08	4.59E-08	2.11E-08	2.39E-08	5.36E-08	1.05E-07	4.33E-05	1.32E-06
600 YR	2.24E-08	2.75E-08	4.09E-08	5.60E-08	2.66E-08	3.03E-08	7.11E-08	1.42E-07	4.34E-05	1.33E-06
800 YR	2.87E-08	3.65E-08	5.18E-08	7.02E-08	3.45E-08	3.94E-08	9.63E-08	1.94E-07	4.34E-05	1.34E-06
1K YR	2.83E-08	3.58E-08	5.10E-08	6.92E-08	3.39E-08	3.87E-08	9.44E-08	1.90E-07	4.34E-05	1.34E-06
5K YR	1.98E-08	2.37E-08	3.63E-08	5.00E-08	2.34E-08	2.65E-08	6.07E-08	1.20E-07	4.34E-05	1.33E-06
10K YR	1.36E-08	1.48E-08	2.55E-08	3.61E-08	1.56E-08	1.75E-08	3.61E-08	6.88E-08	4.34E-05	1.32E-06
20K YR	8.38E-09	7.31E-09	1.61E-08	2.43E-08	9.08E-09	9.87E-09	1.54E-08	2.55E-08	4.33E-05	1.31E-06

CLASS = B

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	1.59E-11	2.05E-11	2.71E-11	1.58E-11	1.62E-11	1.57E-11	1.57E-11	1.25E-11	1.57E-11	1.70E-11
40 YR	1.54E-09	1.13E-09	3.30E-09	4.68E-09	1.59E-09	1.69E-09	1.64E-09	1.79E-09	1.04E-05	3.13E-07
60 YR	1.72E-09	1.26E-09	3.70E-09	5.25E-09	1.78E-09	1.89E-09	1.84E-09	2.00E-09	1.17E-05	3.52E-07
80 YR	6.23E-09	6.51E-09	1.22E-08	1.68E-08	7.04E-09	7.83E-09	1.49E-08	2.74E-08	2.32E-05	7.02E-07
100 YR	6.60E-09	7.01E-09	1.28E-08	1.76E-08	7.49E-09	8.35E-09	1.62E-08	3.02E-08	2.34E-05	7.09E-07
120 YR	8.28E-09	8.23E-09	1.64E-08	2.28E-08	9.22E-09	1.02E-08	1.80E-08	3.22E-08	3.48E-05	1.05E-06
160 YR	1.31E-08	1.39E-08	2.54E-08	3.50E-08	1.48E-08	1.65E-08	3.21E-08	5.97E-08	4.65E-05	1.41E-06
200 YR	1.48E-08	1.51E-08	2.91E-08	4.02E-08	1.66E-08	1.84E-08	3.40E-08	6.19E-08	5.81E-05	1.76E-06
400 YR	3.23E-08	3.41E-08	6.28E-08	8.66E-08	3.66E-08	4.08E-08	7.87E-08	1.46E-07	1.16E-04	3.53E-06
600 YR	3.80E-08	4.22E-08	7.26E-08	9.95E-08	4.37E-08	4.90E-08	1.01E-07	1.93E-07	1.17E-04	3.55E-06
800 YR	4.61E-08	5.38E-08	8.66E-08	1.18E-07	5.39E-08	6.08E-08	1.34E-07	2.61E-07	1.17E-04	3.56E-06
1K YR	4.55E-08	5.29E-08	8.55E-08	1.17E-07	5.31E-08	5.99E-08	1.31E-07	2.56E-07	1.17E-04	3.56E-06
5K YR	3.46E-08	3.73E-08	6.63E-08	9.19E-08	3.95E-08	4.41E-08	8.79E-08	1.65E-07	1.17E-04	3.54E-06
10K YR	2.66E-08	2.58E-08	5.21E-08	7.39E-08	2.95E-08	3.25E-08	5.62E-08	9.91E-08	1.17E-04	3.53E-06
20K YR	1.98E-08	1.59E-08	3.95E-08	5.86E-08	2.10E-08	2.25E-08	2.94E-08	4.33E-08	1.17E-04	3.51E-06

CLASS = C

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	6.34E-14	8.19E-14	1.08E-13	6.29E-14	6.49E-14	6.28E-14	6.26E-14	4.97E-14	6.28E-14	6.81E-14
40 YR	2.43E-10	1.72E-10	5.09E-10	7.50E-10	2.50E-10	2.65E-10	2.59E-10	2.82E-10	1.68E-06	5.05E-08
60 YR	2.88E-10	2.04E-10	6.05E-10	8.89E-10	2.97E-10	3.15E-10	3.07E-10	3.35E-10	1.99E-06	5.99E-08
80 YR	1.49E-09	1.74E-09	2.76E-09	3.80E-09	1.74E-09	1.96E-09	4.36E-09	8.54E-09	3.69E-06	1.13E-07
100 YR	1.64E-09	1.92E-09	3.03E-09	4.17E-09	1.92E-09	2.17E-09	4.86E-09	9.52E-09	3.94E-06	1.20E-07
120 YR	1.87E-09	2.09E-09	3.52E-09	4.90E-09	2.16E-09	2.42E-09	5.10E-09	9.79E-09	5.57E-06	1.70E-07
160 YR	3.21E-09	3.78E-09	5.93E-09	8.16E-09	3.76E-09	4.25E-09	9.55E-09	1.88E-08	7.62E-06	2.33E-07
200 YR	3.48E-09	3.98E-09	6.50E-09	9.00E-09	4.05E-09	4.55E-09	9.86E-09	1.91E-08	9.47E-06	2.89E-07
400 YR	7.82E-09	9.22E-09	1.45E-08	1.99E-08	9.18E-09	1.04E-08	2.33E-08	4.58E-08	1.86E-05	5.68E-07
600 YR	9.79E-09	1.20E-08	1.78E-08	2.44E-08	1.16E-08	1.32E-08	3.11E-08	6.20E-08	1.87E-05	5.75E-07

800 YR	1.26E-08	1.60E-08	2.26E-08	3.07E-08	1.51E-08	1.73[illegible]-08	4.22E-08	8.51E-08	1.88E-05	5.82E-07
1K YR	1.24E-08	1.57E-08	2.23E-08	3.03E-08	1.49E-08	1.70L-08	4.15E-08	8.36E-08	1.88E-05	5.81E-07
5K YR	8.69E-09	1.04E-08	1.59E-08	2.19E-08	1.03E-08	1.16E-08	2.67E-08	5.29E-08	1.87E-05	5.74E-07
10K YR	5.96E-09	6.52E-09	1.11E-08	1.58E-08	6.85E-09	7.66E-09	1.59E-08	3.03E-08	1.87E-05	5.69E-07
20K YR	3.65E-09	3.20E-09	7.02E-09	1.05E-08	3.96E-09	4.31E-09	6.74E-09	1.12E-08	1.87E-05	5.65E-07

CLASS = D1

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	9.27E-15	1.20E-14	1.59E-14	9.21E-15	9.50E-15	9.19E-15	9.16E-15	7.28E-15	9.19E-15	9.96E-15
40 YR	2.12E-11	1.45E-11	4.32E-11	6.62E-11	2.18E-11	2.30E-11	2.27E-11	2.47E-11	1.49E-07	4.47E-09
60 YR	2.39E-11	1.63E-11	4.85E-11	7.44E-11	2.45E-11	2.59E-11	2.54E-11	2.77E-11	1.67E-07	5.02E-09
80 YR	1.81E-10	2.23E-10	3.27E-10	4.51E-10	2.16E-10	2.46E-10	5.84E-10	1.17E-09	3.32E-07	1.02E-08
100 YR	1.98E-10	2.46E-10	3.55E-10	4.88E-10	2.36E-10	2.69E-10	6.48E-10	1.30E-09	3.34E-07	1.03E-08
120 YR	2.21E-10	2.62E-10	4.02E-10	5.61E-10	2.60E-10	2.94E-10	6.72E-10	1.33E-09	4.98E-07	1.53E-08
160 YR	3.91E-10	4.86E-10	7.02E-10	9.65E-10	4.67E-10	5.32E-10	1.28E-09	2.57E-09	6.65E-07	2.05E-08
200 YR	4.15E-10	5.04E-10	7.51E-10	1.04E-09	4.92E-10	5.59E-10	1.31E-09	2.60E-09	8.32E-07	2.55E-08
400 YR	9.58E-10	1.19E-09	1.72E-09	2.37E-09	1.14E-09	1.30E-09	3.12E-09	6.26E-09	1.67E-06	5.14E-08
600 YR	1.23E-09	1.57E-09	2.19E-09	2.98E-09	1.48E-09	1.69E-09	4.19E-09	8.50E-09	1.67E-06	5.20E-08
800 YR	1.61E-09	2.12E-09	2.85E-09	3.86E-09	1.96E-09	2.25E-09	5.73E-09	1.17E-08	1.67E-06	5.27E-08
1K YR	1.59E-09	2.08E-09	2.80E-09	3.79E-09	1.93E-09	2.21E-09	5.62E-09	1.15E-08	1.67E-06	5.27E-08
5K YR	1.07E-09	1.34E-09	1.90E-09	2.62E-09	1.28E-09	1.46E-09	3.56E-09	7.17E-09	1.67E-06	5.17E-08
10K YR	6.90E-10	8.05E-10	1.25E-09	1.77E-09	8.09E-10	9.13E-10	2.06E-09	4.04E-09	1.67E-06	5.10E-08
20K YR	3.71E-10	3.47E-10	6.88E-10	1.05E-09	4.09E-10	4.49E-10	7.90E-10	1.40E-09	1.67E-06	5.04E-08

CLASS = D2

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	4.71E-17	6.08E-17	8.06E-17	4.68E-17	4.82E-17	4.67E-17	4.65E-17	3.70E-17	4.67E-17	5.06E-17
40 YR	1.50E-12	1.22E-12	3.07E-12	4.20E-12	1.54E-12	1.63E-12	1.58E-12	1.71E-12	8.96E-09	2.70E-10
60 YR	2.30E-12	1.82E-12	4.82E-12	6.63E-12	2.37E-12	2.52E-12	2.44E-12	2.65E-12	1.43E-08	4.31E-10
80 YR	4.26E-12	4.24E-12	8.30E-12	1.12E-11	4.66E-12	5.08E-12	8.08E-12	1.36E-11	1.80E-08	5.42E-10
100 YR	5.71E-12	5.40E-12	1.14E-11	1.55E-11	6.18E-12	6.73E-12	1.00E-11	1.64E-11	2.69E-08	8.10E-10
120 YR	6.09E-12	5.82E-12	1.20E-11	1.63E-11	6.57E-12	7.13E-12	1.04E-11	1.68E-11	2.80E-08	8.46E-10
160 YR	1.00E-11	9.77E-12	1.98E-11	2.69E-11	1.09E-11	1.19E-11	1.85E-11	3.08E-11	4.46E-08	1.35E-09
200 YR	1.16E-11	1.11E-11	2.30E-11	3.13E-11	1.25E-11	1.36E-11	2.02E-11	3.27E-11	5.38E-08	1.62E-09
400 YR	2.18E-11	2.19E-11	4.23E-11	5.72E-11	2.39E-11	2.61E-11	4.22E-11	7.20E-11	8.98E-08	2.71E-09
600 YR	2.42E-11	2.54E-11	4.65E-11	6.28E-11	2.69E-11	2.97E-11	5.20E-11	9.24E-11	8.98E-08	2.72E-09
800 YR	2.78E-11	3.04E-11	5.25E-11	7.07E-11	3.13E-11	3.48E-11	6.61E-11	1.22E-10	8.98E-08	2.72E-09
1K YR	2.75E-11	3.00E-11	5.21E-11	7.01E-11	3.10E-11	3.44E-11	6.50E-11	1.19E-10	8.98E-08	2.72E-09
5K YR	2.27E-11	2.32E-11	4.36E-11	5.94E-11	2.50E-11	2.74E-11	4.62E-11	8.02E-11	8.97E-08	2.71E-09
10K YR	1.92E-11	1.81E-11	3.72E-11	5.16E-11	2.07E-11	2.24E-11	3.24E-11	5.16E-11	8.97E-08	2.71E-09
20K YR	1.62E-11	1.36E-11	3.13E-11	4.49E-11	1.69E-11	1.80E-11	2.07E-11	2.74E-11	8.96E-08	2.70E-09

CLASS = TOTAL

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	7.44E-10	9.61E-10	1.27E-09	7.39E-10	7.62E-10	7.37E-10	7.35E-10	5.84E-10	7.37E-10	7.99E-10
40 YR	2.79E-07	1.98E-07	5.85E-07	8.60E-07	2.87E-07	3.05E-07	2.98E-07	3.24E-07	1.92E-03	5.79E-05
60 YR	3.13E-07	2.22E-07	6.57E-07	9.66E-07	3.22E-07	3.42E-07	3.34E-07	3.64E-07	2.16E-03	6.50E-05
80 YR	1.22E-05	1.69E-05	2.12E-05	2.81E-05	1.51E-05	1.74E-05	4.67E-05	9.67E-05	4.30E-03	1.50E-04
100 YR	1.36E-05	1.89E-05	2.36E-05	3.12E-05	1.68E-05	1.94E-05	5.22E-05	1.08E-04	4.34E-03	1.53E-04
120 YR	1.39E-05	1.91E-05	2.42E-05	3.21E-05	1.71E-05	1.97E-05	5.24E-05	1.08E-04	6.46E-03	2.17E-04
160 YR	2.68E-05	3.73E-05	4.65E-05	6.16E-05	3.31E-05	3.83E-05	1.03E-04	2.13E-04	8.63E-03	3.05E-04
200 YR	2.72E-05	3.76E-05	4.73E-05	6.27E-05	3.36E-05	3.88E-05	1.04E-04	2.14E-04	1.08E-02	3.70E-04
400 YR	6.53E-05	9.08E-05	1.13E-04	1.50E-04	8.08E-05	9.35E-05	2.51E-04	5.20E-04	2.16E-02	7.61E-04
600 YR	8.85E-05	1.24E-04	1.53E-04	2.03E-04	1.10E-04	1.27E-04	3.43E-04	7.13E-04	2.17E-02	8.05E-04
800 YR	1.22E-04	1.71E-04	2.11E-04	2.78E-04	1.51E-04	1.75E-04	4.76E-04	9.89E-04	2.17E-02	8.65E-04
1K YR	1.19E-04	1.68E-04	2.06E-04	2.72E-04	1.48E-04	1.72E-04	4.66E-04	9.68E-04	2.17E-02	8.61E-04
5K YR	7.47E-05	1.04E-04	1.30E-04	1.72E-04	9.26E-05	1.07E-04	2.88E-04	5.98E-04	2.17E-02	7.80E-04

10K YR	4.22E-05	5.79E-05	7.36E-05	9.81E-05	5.20E-05	6.00E-05	1.59E-04	3.28E-04	2.16E-02	7.20E-04
20K YR	1.48E-05	1.87E-05	2.62E-05	3.60E-05	1.77E-05	2.02E-05	4.97E-05	1.00E-04	2.16E-02	6.70E-04

POPULATION WELL

CLASS = A

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600 YR	8.95E-25	1.16E-24	1.53E-24	8.88E-25	9.16E-25	8.86E-25	8.84E-25	7.02E-25	8.86E-25	9.61E-25
800 YR	1.14E-29	1.47E-29	1.95E-29	1.13E-29	1.17E-29	1.13E-29	1.13E-29	8.94E-30	1.13E-29	1.22E-29
1K YR	1.45E-34	1.88E-34	2.48E-34	1.44E-34	1.49E-34	1.44E-34	1.43E-34	1.14E-34	1.44E-34	1.56E-34
5K YR	2.92E-07	3.30E-07	5.44E-07	7.59E-07	3.38E-07	3.80E-07	8.15E-07	1.57E-06	8.25E-04	2.51E-05
10K YR	1.62E-06	2.23E-06	2.83E-06	3.77E-06	2.00E-06	2.31E-06	6.12E-06	1.26E-05	8.26E-04	2.75E-05
20K YR	5.67E-07	7.20E-07	1.01E-06	1.38E-06	6.81E-07	7.78E-07	1.91E-06	3.86E-06	8.25E-04	2.56E-05

CLASS = SA

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600 YR	1.79E-28	2.32E-28	3.07E-28	1.78E-28	1.84E-28	1.78E-28	1.77E-28	1.41E-28	1.78E-28	1.93E-28
800 YR	2.28E-33	2.95E-33	3.91E-33	2.27E-33	2.34E-33	2.26E-33	2.26E-33	1.79E-33	2.26E-33	2.45E-33
1K YR	2.91E-38	3.76E-38	4.98E-38	2.89E-38	2.98E-38	2.88E-38	2.88E-38	2.28E-38	2.88E-38	3.13E-38
5K YR	2.72E-10	2.13E-10	5.53E-10	8.18E-10	2.87E-10	3.08E-10	3.86E-10	5.51E-10	1.67E-06	5.02E-08
10K YR	5.24E-10	5.71E-10	9.80E-10	1.39E-09	6.02E-10	6.73E-10	1.39E-09	2.65E-09	1.67E-06	5.07E-08
20K YR	3.22E-10	2.81E-10	6.21E-10	9.34E-10	3.49E-10	3.80E-10	5.92E-10	9.83E-10	1.67E-06	5.03E-08

CLASS = B

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600 YR	1.95E-26	2.52E-26	3.34E-26	1.94E-26	2.00E-26	1.93E-26	1.93E-26	1.53E-26	1.93E-26	2.09E-26
800 YR	2.85E-31	3.68E-31	4.88E-31	2.83E-31	2.92E-31	2.82E-31	2.82E-31	2.24E-31	2.82E-31	3.06E-31
1K YR	9.04E-36	1.17E-35	1.55E-35	8.98E-36	9.26E-36	8.96E-36	8.93E-36	7.10E-36	8.96E-36	9.71E-36
5K YR	7.01E-10	5.35E-10	1.47E-09	2.11E-09	7.31E-10	7.82E-10	8.69E-10	1.12E-09	4.49E-06	1.35E-07
10K YR	1.02E-09	9.93E-10	2.01E-09	2.84E-09	1.13E-09	1.25E-09	2.16E-09	3.82E-09	4.49E-06	1.36E-07
20K YR	7.61E-10	6.12E-10	1.52E-09	2.26E-09	8.06E-10	8.67E-10	1.13E-09	1.67E-09	4.49E-06	1.35E-07

CLASS = C

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600 YR	7.79E-29	1.01E-28	1.33E-28	7.73E-29	7.97E-29	7.71E-29	7.69E-29	6.11E-29	7.71E-29	8.36E-29
800 YR	9.93E-34	1.28E-33	1.70E-33	9.86E-34	1.02E-33	9.84E-34	9.81E-34	7.79E-34	9.84E-34	1.07E-33
1K YR	1.28E-38	1.66E-38	2.19E-38	1.27E-38	1.31E-38	1.27E-38	1.27E-38	1.01E-38	1.27E-38	1.38E-38
5K YR	1.18E-10	9.30E-11	2.40E-10	3.54E-10	1.25E-10	1.34E-10	1.68E-10	2.39E-10	7.21E-07	2.17E-08
10K YR	2.30E-10	2.51E-10	4.28E-10	6.06E-10	2.64E-10	2.95E-10	6.12E-10	1.17E-09	7.21E-07	2.19E-08
20K YR	1.41E-10	1.23E-10	2.70E-10	4.06E-10	1.52E-10	1.66E-10	2.59E-10	4.31E-10	7.21E-07	2.17E-08

CLASS = D1

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600 YR	1.14E-29	1.47E-29	1.95E-29	1.13E-29	1.17E-29	1.13E-29	1.13E-29	8.94E-30	1.13E-29	1.22E-29
800 YR	1.45E-34	1.88E-34	2.48E-34	1.44E-34	1.49E-34	1.44E-34	1.43E-34	1.14E-34	1.44E-34	1.56E-34
1K YR	1.85E-39	2.39E-39	3.16E-39	1.84E-39	1.89E-39	1.83E-39	1.83E-39	1.45E-39	1.83E-39	1.99E-39
5K YR	1.12E-11	9.05E-12	2.18E-11	3.31E-11	1.19E-11	1.28E-11	1.77E-11	2.73E-11	6.43E-08	1.94E-09
10K YR	2.66E-11	3.10E-11	4.81E-11	6.81E-11	3.11E-11	3.51E-11	7.92E-11	1.56E-10	6.43E-08	1.96E-09
20K YR	1.43E-11	1.34E-11	2.65E-11	4.03E-11	1.58E-11	1.73E-11	3.04E-11	5.38E-11	6.42E-08	1.94E-09

CLASS = D2

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600 YR	5.79E-32	7.48E-32	9.90E-32	5.75E-32	5.93E-32	5.73E-32	5.72E-32	4.54E-32	5.73E-32	6.22E-32
800 YR	7.38E-37	9.53E-37	1.26E-36	7.32E-37	7.55E-37	7.30E-37	7.29E-37	5.79E-37	7.30E-37	7.92E-37
1K YR	9.40E-42	1.21E-41	1.61E-41	9.33E-42	9.62E-42	9.31E-42	9.29E-42	7.37E-42	9.31E-42	1.01E-41
5K YR	6.01E-13	5.02E-13	1.21E-12	1.67E-12	6.22E-13	6.60E-13	6.88E-13	8.17E-13	3.45E-09	1.04E-10
10K YR	7.39E-13	6.97E-13	1.43E-12	1.98E-12	7.95E-13	8.60E-13	1.25E-12	1.99E-12	3.45E-09	1.04E-10
20K YR	6.22E-13	5.25E-13	1.21E-12	1.73E-12	6.49E-13	6.90E-13	7.97E-13	1.05E-12	3.45E-09	1.04E-10

IMPACTS Output

CLASS = TOTAL

TIME	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
20 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
40 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
80 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
120 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
160 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
400 YR	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
600 YR	9.14E-25	1.18E-24	1.56E-24	9.08E-25	9.36E-25	9.06E-25	9.03E-25	7.18E-25	9.06E-25	9.82E-25
800 YR	1.17E-29	1.51E-29	2.00E-29	1.16E-29	1.20E-29	1.16E-29	1.15E-29	9.17E-30	1.16E-29	1.26E-29
1K YR	1.54E-34	1.99E-34	2.64E-34	1.53E-34	1.58E-34	1.53E-34	1.52E-34	1.21E-34	1.53E-34	1.66E-34
5K YR	2.93E-07	3.30E-07	5.46E-07	7.62E-07	3.39E-07	3.81E-07	8.16E-07	1.58E-06	8.32E-04	2.53E-05
10K YR	1.63E-06	2.23E-06	2.83E-06	3.78E-06	2.00E-06	2.31E-06	6.12E-06	1.26E-05	8.33E-04	2.77E-05
20K YR	5.68E-07	7.21E-07	1.01E-06	1.39E-06	6.83E-07	7.79E-07	1.92E-06	3.87E-06	8.31E-04	2.58E-05

D.6 INTRUDE Output

```
INTRUDE PROGRAM: IMPACTS RUN OF REGION 4 + SOURCES
IR  =  4  OVFL=  0  IBUF=  0  NBRN=  0  NBES=  0
ICLS=    1  IOBS=    5  IINS=  100
IBEG= 1991  IEND= 2020  ILFE=   30

COMBINATION INDICES ARE:    1   4   4   4   4   1

MINIMUM DEPTHS ARE:    2.0   2.0   2.0   5.0  10.0  10.0
```

DISPOSAL CONFIGURATION

NO	ID	IU	IT	IC	IE	IB	IX	IS	EFF	SEF	DPT	DTK	VOLE	AREA
1	4	1	1	1	1	1	3	1	5.25E+00	6.90E-01	2.00E+00	7.00E+00	3.53E+03	6.00E+02
2	3	2	2	2	1	2	2	1	1.14E+01	8.80E-01	2.00E+00	1.30E+01	6.55E+04	5.40E+03
3	3	2	2	2	1	2	2	1	1.14E+01	8.80E-01	2.00E+00	1.30E+01	6.55E+04	5.40E+03
4	3	2	2	2	1	2	2	1	1.14E+01	8.80E-01	2.00E+00	1.30E+01	6.55E+04	5.40E+03
5	3	2	2	2	1	2	2	1	1.14E+01	8.80E-01	2.00E+00	1.30E+01	6.55E+04	5.40E+03
6	10	6	6	1	2	3	1	1	5.70E+00	4.40E-01	2.00E+00	5.70E+00	5.03E+03	8.60E+02

INPUTS STREAMS: NAME, REGN, BKLG, FRAC - OLD NSTR = 215

P-IXRESIN	4	0	1.00	P-CONCLIQ	4	0	1.00	P-FSLUDGE	4	0	1.00	P-FCARTRG	4	0	1.00
B-IXRESIN	4	0	1.00	B-CONCLIQ	4	0	1.00	B-FSLUDGE	4	0	1.00	P-COTRASH	4	0	1.00
P-NCTRASH	4	0	1.00	B-COTRASH	4	0	1.00	B-NCTRASH	4	0	1.00	L-NFRCOMP	4	0	1.00
L-DECONRS	4	0	1.00	F-PROCESS	4	0	1.00	F-COTRASH	4	0	1.00	F-NCTRASH	4	0	1.00
U-PROCESS	4	0	1.00	L-PUDECON	4	0	1.00	L-BURNUPS	4	0	1.00	I-COTRASH	4	0	1.00
I+COTRASH	4	0	1.00	I-ABSLIQD	4	0	1.00	I+ABSLIQD	4	0	1.00	I-LIQSCVL	4	0	1.00
I+LIQSCVL	4	0	1.00	I-BIOWAST	4	0	1.00	I+BIOWAST	4	0	1.00	N-SSTRASH	4	0	1.00
N+SSTRASH	4	0	1.00	N-SSWASTE	4	0	1.00	N-LOTRASH	4	0	1.00	N+LOTRASH	4	0	1.00
N-LOWASTE	4	0	1.00	N-ISOPROD	4	0	1.00	N-ISOTRSH	4	0	1.00	N-SORMFG1	4	0	1.00
N-SORMFG2	4	0	1.00	N-SORMFG3	4	0	1.00	N-SORMFG4	4	0	1.00	N-NECOTRA	4	0	1.00
N-NEABLIQ	4	0	1.00	N-NESOLIQ	4	0	1.00	N-NEVIALS	4	0	1.00	N-NENCGLS	4	0	1.00
N-NEWOTAL	4	0	1.00	N-NETRGAS	4	0	1.00	N-NETRILI	4	0	1.00	N-NECARLI	4	0	1.00
N-MWTRASH	4	0	1.00	N-MWABLIQ	4	0	1.00	N-MWSOLIQ	4	0	1.00	N-MWWASTE	4	0	1.00
N-TRIPLAT	4	0	1.00	N-TRITGAS	4	0	1.00	N-TRISCNT	4	0	1.00	N-TRILIQD	4	0	1.00
N-TRITRSH	4	0	1.00	N-TRIFOIL	4	0	1.00	N-HIGHACT	4	0	1.00	N-TRITSOR	4	0	1.00
N-CARBSOR	4	0	1.00	N-COBLSOR	4	0	1.00	N-NICKSOR	4	0	1.00	N-STROSOR	4	0	1.00
N-CESISOR	4	0	1.00	N-PLU8SOR	4	0	1.00	N-PLU9SOR	4	0	1.00	N-AMERSOR	4	0	1.00
N-PUBESOR	4	0	1.00	N-AMBESOR	4	0	1.00	N-RANEEDS	4	0	1.00	N-RACELLS	4	0	1.00
N-RAPLAQU	4	0	1.00	N-RANPAPP	4	0	1.00	N-RABESOR	4	0	1.00	N-RAMISCL	4	0	1.00
N-CARBSOR	1	0	1.00	N-COBLSOR	1	0	1.00	N-NICKSOR	1	0	1.00	N-STROSOR	1	0	1.00
N-CESISOR	1	0	1.00	N-PLU8SOR	1	0	1.00	N-PLU9SOR	1	0	1.00	N-AMERSOR	1	0	1.00
N-PUBESOR	1	0	1.00	N-AMBESOR	1	0	1.00	N-RANEEDS	1	0	1.00	N-RACELLS	1	0	1.00
N-RAPLAQU	1	0	1.00	N-RANPAPP	1	0	1.00	N-RABESOR	1	0	1.00	N-RAMISCL	1	0	1.00
N-CARBSOR	2	0	1.00	N-COBLSOR	2	0	1.00	N-NICKSOR	2	0	1.00	N-STROSOR	2	0	1.00
N-CESISOR	2	0	1.00	N-PLU8SOR	2	0	1.00	N-PLU9SOR	2	0	1.00	N-AMERSOR	2	0	1.00
N-PUBESOR	2	0	1.00	N-AMBESOR	2	0	1.00	N-RANEEDS	2	0	1.00	N-RACELLS	2	0	1.00
N-RAPLAQU	2	0	1.00	N-RANPAPP	2	0	1.00	N-RABESOR	2	0	1.00	N-RAMISCL	2	0	1.00
N-CARBSOR	3	0	1.00	N-COBLSOR	3	0	1.00	N-NICKSOR	3	0	1.00	N-STROSOR	3	0	1.00
N-CESISOR	3	0	1.00	N-PLU8SOR	3	0	1.00	N-PLU9SOR	3	0	1.00	N-AMERSOR	3	0	1.00
N-PUBESOR	3	0	1.00	N-AMBESOR	3	0	1.00	N-RANEEDS	3	0	1.00	N-RACELLS	3	0	1.00
N-RAPLAQU	3	0	1.00	N-RANPAPP	3	0	1.00	N-RABESOR	3	0	1.00	N-RAMISCL	3	0	1.00
N-RARESIN	4	0	1.00	M-NAVYWET	4	0	1.00	M-NAVYDRY	4	0	1.00	P-DECORES	4	0	1.00
P-DEACINT	4	0	1.00	P-DEACVES	4	0	1.00	P-DEACTCO	4	0	1.00	P-DECONME	4	0	1.00
P-DECONCO	4	0	1.00	P-DETRASH	4	0	1.00	P-DERESIN	4	0	1.00	P-DEFILCR	4	0	1.00
P-DEEVAPB	4	0	1.00	B-DECORES	4	0	1.00	B-DEACINT	4	0	1.00	B-DEACVES	4	0	1.00
B-DEACTCO	4	0	1.00	B-DECONME	4	0	1.00	B-DECONCO	4	0	1.00	B-DETRASH	4	0	1.00
B-DERESIN	4	0	1.00	B-DEEVAPB	4	0	1.00	N-TRITSOR	1	0	1.00	N-TRITSOR	2	0	1.00
N-TRITSOR	3	0	1.00		0	0	.00		0	0	.00		0	0	.00

```
*** DEPTH PROBLEM ***
CLASS:   D2    DMIN: 10.0   ID: 10   DPT:  2.0  DTK:  5.7

OPTIONS FOLLOW
STOP                   : 1
DO NOT CONSIDER CLASS: 2
MODIFY DMIN TO 2M      : 3
SELECT FROM ABOVE      :

OPTION 3 HAS BEEN SELECTED, PROGRAM CONTINUING


RECALCULATED PARAMETERS

 NO   EFF       SEF       DPT       DTK       TSUM      AREA      DISN      VBAK
  1 5.25E+00 6.90E-01 2.00E+00 7.00E+00 5.29E+00 3.79E+05 6.32E+02 3.68E+05
  2 1.14E+01 8.80E-01 2.01E+00 1.21E+00 2.87E-01 8.58E+02 1.59E-01 7.97E+03
  3 1.14E+01 8.80E-01 3.22E+00 6.18E+00 8.26E+00 4.08E+03 7.55E-01  .00E+00
  4 1.14E+01 8.80E-01 9.41E+00 5.25E+00 1.33E+01 3.03E+03 5.62E-01  .00E+00
  5 1.14E+01 8.80E-01 1.47E+01 3.43E-01 1.05E+01 1.85E+02 3.43E-02  .00E+00
  6 5.70E+00 4.40E-01 2.00E+00 5.70E+00 2.54E+00 1.99E+02 2.31E-01  .00E+00

NEW WASTE STREAM DATA - NSTR = 127

  A  = 9.32E+05    SA = 4.80E+03    B  = 2.28E+04
  C  = 1.70E+04    D1 = 1.03E+03    D2 = 8.51E+02  TOTAL= 9.79E+05

NAME,VOLM,NET CON/ACT,IMOD,MODE,ISPC INDXS
P-IXRESIN  1.16E+04 2.36E-01   1  11  1200001  100  100  11 1 1 0 0 0 0
P-CONCLIQ  9.83E+04 3.11E-01   1  11  1201101  100  140  23 1 2 0 1 0 0
P-FCARTRG  4.38E+03 4.48E+00   1  11   700001  100  100  21 1 1 0 0 0 0
B-IXRESIN  8.21E+03 6.01E-01   1  11  1200001  100  100  11 1 1 0 0 0 0
B-CONCLIQ  8.00E+04 3.24E-01   1  11  1201101  100  140  23 1 2 0 1 0 0
B-FSLUDGE  1.23E+04 9.21E-01   1  11  1200001  100  100   2 0 1 0 0 0 0
P-COTRASH  2.98E+04 1.65E-01   1  11  1410101  300  100  10 1 1 0 0 0 0
P-NCTRASH  1.00E+05 3.31E-01   1  11  1500001  100  100  11 1 1 0 0 0 0
B-COTRASH  4.20E+04 3.95E-02   1  11  1310101  200  100  10 1 1 0 0 0 0
B-NCTRASH  3.27E+04 8.52E-02   1  11  1500001  100  100  11 1 1 0 0 0 0
L-NFRCOMP  1.87E+04 7.30E+00   1  21   800001  100  100  33 3 1 0 0 1 0
L-DECONRS  9.28E+02 1.67E+01   2  11  1201101  100  140  23 2 2 1 2 0 0
F-PROCESS  2.54E+04 1.08E-04   1  11   700002  100  100   3 0 1 0 0 0 0
F-COTRASH  5.11E+04 8.37E-06   1  11   710102  150  100  10 1 1 0 0 0 0
F-NCTRASH  1.36E+04 5.33E-06   1  11   500002  100  100  11 1 1 0 0 0 0
U-PROCESS  1.52E+04 3.80E-04   1  11   700002  100  100   3 0 1 0 0 0 0
I-COTRASH  2.70E+04 2.26E-01   1  11   710102  200  100  10 1 1 0 0 0 0
I+COTRASH  5.39E+04 1.13E-01   1  11   700002  100  100  10 1 1 0 0 0 0
I-ABSLIQD  6.36E+03 6.65E-02   1  11   700002  100  300   1 0 1 1 0 0 0
I+ABSLIQD  6.36E+03 6.65E-02   1  11   700002  100  300   1 0 1 1 0 0 0
I-LIQSCVL  3.38E+03 3.20E-03   1  11   700002  100  300   0 0 1 1 0 0 0
I+LIQSCVL  3.38E+03 3.20E-03   1  11   700002  100  300   0 0 1 1 0 0 0
I-BIOWAST  2.17E+03 1.07E-01   1  11   700002  100  192  11 0 1 1 0 0 0
I+BIOWAST  2.17E+03 1.07E-01   1  11   700002  100  192  11 0 1 1 0 0 0
N-SSTRASH  4.59E+04 1.67E-05   1  11   710102  150  100  11 1 1 0 0 0 0
N+SSTRASH  6.88E+04 1.12E-05   1  11   700002  100  100  11 1 1 0 0 0 0
N-SSWASTE  2.43E+04 2.17E-04   1  11   700002  100  100  13 0 1 0 0 0 0
N-LOTRASH  9.72E+03 7.05E-02   1  11   710102  200  100  10 1 1 0 0 0 0
N+LOTRASH  1.94E+04 3.53E-02   1  11   700002  100  100  10 1 1 0 0 0 0
```

INTRUDE Output

N-LOWASTE	2.31E+04	2.11E-02	1	11	700002	100	100	10	0	1	1	0	0	0
N-SORMFG2	7.51E+03	9.36E-02	1	11	1100001	100	100	11	1	1	1	0	0	0
N-TRIPLAT	5.94E+01	1.61E+01	1	11	700002	100	100	32	0	1	0	0	0	0
N-TRITGAS	8.90E+00	2.61E+01	1	11	700002	100	100	1	0	1	0	0	0	0
N-TRISCNT	4.16E+00	5.30E+00	1	11	700002	100	300	0	0	1	1	0	0	0
N-TRILIQD	3.37E+02	5.08E+00	1	11	700002	100	300	1	0	1	1	0	0	0
N-TRITRSH	1.62E+01	7.76E+00	1	11	700002	100	100	10	0	1	0	0	0	0
N-TRIFOIL	2.35E-01	8.25E+00	1	11	700002	100	100	32	0	1	0	0	0	0
N-HIGHACT	1.00E+03	2.11E+02	1	21	700002	100	100	33	3	1	0	0	2	0
N-TRITSOR	4.33E+01	8.10E-01	1	31	700002	100	100	13	1	1	0	0	0	1
N-CARBSOR	2.50E+01	1.00E-02	1	31	700002	100	100	13	1	1	0	0	0	2
N-COBLSOR	7.77E+01	9.10E+00	1	31	700002	100	100	13	1	1	0	0	0	3
N-NICKSOR	2.50E+01	1.00E-02	1	31	700002	100	100	13	1	1	0	0	0	4
N-STROSOR	2.64E+00	1.02E-03	1	31	700002	100	100	13	1	1	0	0	0	5
N-CESISOR	3.46E+01	2.32E-02	1	31	700002	100	100	13	1	1	0	0	0	6
N-PLU8SOR	5.54E-04	4.60E-06	4	31	701102	100	100	33	1	1	0	2	0	7
N-AMERSOR	6.99E-04	4.08E-07	1	31	700002	100	100	13	1	1	0	0	0	9
N-PUBESOR	4.99E-04	1.34E-04	5	31	701102	100	100	33	1	1	0	2	0	10
N-RANEEDS	1.20E-01	3.00E-05	4	31	701102	100	100	33	1	1	0	2	0	12
N-RACELLS	3.14E-02	2.76E-06	1	31	700002	100	100	13	1	1	0	0	0	13
N-RAPLAQU	3.03E-02	2.10E-07	1	31	700002	100	100	13	1	1	0	0	0	14
N-RAMISCL	4.14E+02	9.88E-07	1	31	700002	100	100	13	0	1	0	0	0	17
N-RARESIN	2.77E+03	2.50E-02	4	11	801102	100	140	23	2	2	0	2	0	0
M-NAVYDRY	5.61E+02	2.00E-02	1	11	700001	100	100	10	1	1	0	0	0	0
M-NAVYWET	3.40E+03	2.15E-01	1	11	701101	100	100	23	1	2	0	1	0	0
P-DECORES	4.79E+01	3.10E+05	6	24	805101	100	100	33	3	1	0	4	5	0
P-DEACINT	4.88E+02	5.30E+01	1	21	800001	100	100	33	3	1	0	0	6	0
P-DEACVES	7.59E+02	5.65E+01	1	21	800001	100	100	33	3	1	0	0	7	0
P-DEACTCO	2.39E+03	2.80E+00	1	11	500001	100	100	23	1	1	0	0	0	0
P-DECONME	2.05E+04	1.57E-01	1	11	500001	100	100	12	1	1	0	0	0	0
P-DECONCO	3.58E+04	9.40E-03	1	11	500001	100	100	12	1	1	0	0	0	0
P-DETRASH	1.84E+03	1.59E+00	1	11	710101	300	100	10	1	1	0	0	0	0
P-DEFILCR	3.43E+01	5.59E+02	6	14	701101	100	100	33	2	2	0	2	0	0
P-DEEVAPB	7.20E+02	7.42E+01	6	14	901101	100	140	23	2	2	1	2	0	0
B-DECORES	4.84E+01	1.29E+05	6	24	805101	100	100	33	3	1	0	4	8	0
B-DEACINT	1.84E+01	6.22E+01	1	21	800001	100	100	33	3	1	0	0	9	0
B-DEACVES	8.12E+00	2.70E+02	1	21	800001	100	100	33	3	1	0	0	10	0
B-DEACTCO	7.93E+01	1.90E+00	1	11	500001	100	100	23	1	1	0	0	0	0
B-DECONME	1.19E+04	5.70E-01	1	11	500001	100	100	12	1	1	0	0	0	0
B-DECONCO	4.51E+03	4.39E-02	1	11	500001	100	100	12	1	1	0	0	0	0
B-DETRASH	1.21E+03	1.59E+00	1	11	710101	300	100	10	1	1	0	0	0	0
B-DERESIN	6.28E+01	3.86E+00	3	11	901101	100	140	21	2	2	1	2	0	0
B-DEEVAPB	6.55E+02	5.36E+01	4	11	901101	100	140	23	2	2	1	2	0	0
P-IXRESIN	2.03E+03	6.24E-01	2	11	1201101	100	140	23	2	2	0	2	0	0
P-CONCLIQ	1.69E+03	2.70E+00	3	11	1201101	100	140	23	2	2	0	2	0	0
B-IXRESIN	1.17E+03	1.25E+00	2	11	1201101	100	140	23	2	2	0	2	0	0
B-CONCLIQ	1.60E+03	8.64E-01	3	11	1201101	100	140	23	2	2	0	2	0	0
B-FSLUDGE	6.68E+02	5.55E-01	2	11	1201101	100	140	23	2	2	0	2	0	0
P-NCTRASH	1.27E+03	4.04E+00	4	11	1504001	100	100	11	1	1	0	3	0	0
L-NFRCOMP	1.06E+03	1.00E+03	3	21	805101	100	100	33	3	1	0	4	1	0
N-SORMFG2	3.59E+01	1.67E+02	3	11	1104001	100	100	11	1	1	1	3	0	0
N-TRIPLAT	2.25E+01	1.74E+03	3	11	704002	100	100	32	0	1	0	3	0	0
N-TRITGAS	2.88E+02	6.12E+02	3	11	704002	100	100	1	0	1	0	3	0	0
N-TRISCNT	8.60E-02	4.38E+00	2	11	753112	452	200	31	3	4	1	2	0	0
N-TRILIQD	7.45E+01	1.56E+03	3	11	701102	100	140	23	2	2	1	2	0	0
N-TRITRSH	4.60E+00	2.86E+02	3	11	704002	100	100	10	0	1	0	3	0	0
N-TRIFOIL	1.67E+00	8.89E+02	3	11	704002	100	100	32	0	1	0	3	0	0

INTRUDE Output

N-TRITSOR	6.58E+00	2.25E+00	3	31	701102	100	100	33	1	1	0	2	0	1
N-COBLSOR	4.71E+01	1.31E+03	3	31	701102	100	100	33	1	1	0	2	0	3
N-STROSOR	4.58E+01	6.78E-01	3	31	701102	100	100	33	1	1	0	2	0	5
N-CESISOR	5.89E+01	6.97E-01	3	31	701102	100	100	33	1	1	0	2	0	6
N-PL[illegible]SOR	4.99E-03	4.14E-05	5	31	701102	100	100	33	1	1	0	2	0	7
N-AM[illegible]OR	6.29E-03	3.68E-06	4	31	701102	100	100	33	1	1	0	2	0	9
N-RANEEDS	2.37E+00	2.84E-04	5	31	701102	100	100	33	1	1	0	2	012	
N-RACELLS	2.83E-01	2.51E-05	4	31	701102	100	100	33	1	1	0	2	013	
N-RAPLAQU	2.73E-01	2.01E-06	4	31	701102	100	100	33	1	1	0	2	014	
N-RAMISCL	2.58E+02	5.56E-06	4	31	701102	100	100	33	0	1	0	2	017	
M-NAVYWET	9.62E+01	4.57E+00	3	11	701101	100	100	23	2	2	0	2	0	0
P-DEACINT	5.52E+02	7.07E+03	3	21	805101	100	100	33	3	1	0	4	6	0
P-DEACVES	1.55E+02	2.35E+02	3	21	805101	100	100	33	3	1	0	4	7	0
B-DEACINT	5.24E+01	1.33E+03	3	21	805101	100	100	33	3	1	0	4	9	0
P-IXRESIN	3.60E+03	2.36E+00	3	11	1201101	100	140	23	2	2	0	2	0	0
P-CONCLIQ	1.14E+03	1.65E+01	4	11	1201101	100	140	23	2	2	0	2	0	0
B-IXRESIN	6.62E+03	7.83E+00	3	11	1201101	100	140	23	2	2	0	2	0	0
B-CONCLIQ	5.61E+03	4.76E+00	4	11	1201101	100	140	23	2	2	0	2	0	0
B-FSLUDGE	6.71E+03	8.06E+00	3	11	1201101	100	140	23	2	2	0	2	0	0
L-NFRCOMP	6.57E+01	8.83E+03	4	21	805101	100	100	33	3	1	0	4	1	0
N-SORMFG2	3.92E+01	5.16E+02	4	1[illegible]	1104001	100	100	11	1	1	1	3	0	0
N-TRISCNT	2.66E-01	2.49E+01	3	11	753112	452	200	31	3	4	1	2	0	0
N-STROSOR	1.51E+00	1.25E+01	4	31	701102	100	100	33	1	1	0	2	0	5
N-CESISOR	2.12E+01	4.97E+01	4	31	701102	100	100	33	1	1	0	2	0	6
N-AMERSOR	6.29E-02	3.70E-05	5	31	701102	100	100	33	1	1	0	2	0	9
N-RACELLS	2.83E+00	2.80E-04	5	31	701102	100	100	33	1	1	0	2	013	
N-RAPLAQU	9.32E-01	1.23E-04	5	31	701102	100	100	33	1	1	0	2	014	
N-RAMISCL	4.37E+01	1.26E-04	5	31	701102	100	100	33	0	1	0	2	017	
M-NAVYWET	1.15E+02	1.46E+01	4	11	701101	100	100	23	2	2	0	2	0	0
P-DEACINT	5.75E+01	4.03E+04	4	21	805101	100	100	33	3	1	0	4	6	0
B-DEACINT	1.47E+01	1.26E+04	4	21	805101	100	100	33	3	1	0	4	9	0
P-IXRESIN	4.12E+03	1.12E+01	4	11	1201101	100	140	23	2	2	0	2	0	0
P-CONCLIQ	9.63E+01	7.10E+01	5	11	1201101	100	140	23	2	2	0	2	0	0
B-IXRESIN	2.61E+02	7.64E+01	4	11	1201101	100	140	23	2	2	0	2	0	0
B-FSLUDGE	5.42E+02	5.49E+01	4	11	1201101	100	140	23	2	2	0	2	0	0
L-NFRCOMP	3.07E+00	1.89E+04	5	21	805101	100	100	33	3	1	0	4	1	0
P-IXRESIN	1.92E+01	8.05E-01	4	11	1202101	100	200	31	3	3	0	2	0	0
B-FSLUDGE	3.83E+00	3.92E+01	4	11	1202101	100	200	31	3	3	0	2	0	0
P-IXRESIN	8.69E+02	9.60E+01	5	11	1201101	100	140	23	2	2	0	2	0	0
B-FSLUDGE	1.35E+01	3.93E+02	5	11	1201101	100	140	23	2	2	0	2	0	0
P-IXRESIN	2.68E+00	1.72E+01	5	11	1202101	100	200	31	3	3	0	2	0	0

INTRUDE Output

IMPACTS OF CLASS A
VOLS= 9.32E+05 AREA= 3.79E+05
DPT = 2.00E+00 DTK = 7.00E+00
TSUM= 5.29E+00 DISN= 6.32E+02

SCENARIO: DRILLING

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.85E-01	2.62E-01	2.61E-01	3.02E-01	2.83E-01	2.72E-01	2.88E-01	3.06E-01	3.56E-01	2.92E-01
20 YRS	2.93E-02	2.70E-02	2.67E-02	3.11E-02	2.90E-02	2.95E-02	2.96E-02	3.19E-02	3.66E-02	3.02E-02
60 YRS	4.07E-03	3.76E-03	3.68E-03	4.35E-03	3.99E-03	4.57E-03	4.13E-03	4.59E-03	5.10E-03	4.24E-03
100 YRS	1.58E-03	1.46E-03	1.43E-03	1.69E-03	1.54E-03	1.78E-03	1.60E-03	1.78E-03	1.98E-03	1.64E-03
200 YRS	1.61E-04	1.48E-04	1.45E-04	1.72E-04	1.57E-04	1.80E-04	1.63E-04	1.82E-04	2.02E-04	1.67E-04
300 YRS	1.99E-05	1.84E-05	1.80E-05	2.13E-05	1.95E-05	2.16E-05	2.02E-05	2.24E-05	2.50E-05	2.07E-05
500 YRS	4.53E-06	4.20E-06	4.10E-06	4.83E-06	4.46E-06	4.26E-06	4.58E-06	5.05E-06	5.71E-06	4.66E-06
1K YRS	4.35E-06	4.04E-06	3.94E-06	4.64E-06	4.29E-06	4.07E-06	4.40E-06	4.84E-06	5.48E-06	4.48E-06
2K YRS	4.20E-06	3.90E-06	3.81E-06	4.47E-06	4.14E-06	3.93E-06	4.25E-06	4.66E-06	5.28E-06	4.32E-06
5K YRS	3.94E-06	3.66E-06	3.57E-06	4.20E-06	3.88E-06	3.69E-06	4.00E-06	4.37E-06	4.96E-06	4.05E-06

SCENARIO: DISCOVERY

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.14E+02	1.95E+02	1.94E+02	2.25E+02	2.11E+02	2.08E+02	2.16E+02	2.46E+02	2.65E+02	2.19E+02
20 YRS	2.96E+01	2.53E+01	2.50E+01	2.95E+01	2.76E+01	3.18E+01	2.91E+01	4.71E+01	3.44E+01	2.98E+01
60 YRS	7.14E+00	4.75E+00	4.65E+00	5.75E+00	5.44E+00	8.91E+00	6.40E+00	2.12E+01	6.47E+00	6.62E+00
100 YRS	3.86E+00	1.85E+00	1.82E+00	2.38E+00	2.34E+00	5.15E+00	3.13E+00	1.65E+01	2.54E+00	3.27E+00
200 YRS	1.78E+00	1.90E-01	1.86E-01	4.20E-01	5.21E-01	2.71E+00	1.15E+00	1.25E+01	2.77E-01	1.22E+00
300 YRS	1.44E+00	2.42E-02	2.39E-02	2.08E-01	3.12E-01	2.25E+00	8.68E-01	1.11E+01	5.00E-02	9.34E-01
500 YRS	1.25E+00	5.87E-03	5.94E-03	1.62E-01	2.52E-01	1.91E+00	7.28E-01	9.58E+00	2.26E-02	7.93E-01
1K YRS	1.05E+00	5.23E-03	5.30E-03	1.31E-01	1.99E-01	1.50E+00	5.74E-01	7.65E+00	1.85E-02	6.43E-01
2K YRS	9.13E-01	4.85E-03	4.92E-03	1.08E-01	1.61E-01	1.21E+00	4.63E-01	6.26E+00	1.57E-02	5.35E-01
5K YRS	8.18E-01	4.39E-03	4.46E-03	9.44E-02	1.39E-01	1.04E+00	4.01E-01	5.43E+00	1.38E-02	4.69E-01

SCENARIO: CONSTRCTN

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	1.79E+04	1.63E+04	1.62E+04	1.88E+04	1.76E+04	1.73E+04	1.80E+04	2.05E+04	2.21E+04	1.83E+04
20 YRS	2.47E+03	2.11E+03	2.08E+03	2.46E+03	2.30E+03	2.65E+03	2.43E+03	3.92E+03	2.87E+03	2.48E+03
60 YRS	5.95E+02	3.96E+02	3.87E+02	4.79E+02	4.53E+02	7.43E+02	5.33E+02	1.76E+03	5.39E+02	5.52E+02
100 YRS	3.22E+02	1.55E+02	1.51E+02	1.99E+02	1.95E+02	4.29E+02	2.61E+02	1.37E+03	2.12E+02	2.72E+02
200 YRS	1.48E+02	1.58E+01	1.55E+01	3.50E+01	4.34E+01	2.26E+02	9.56E+01	1.04E+03	2.31E+01	1.02E+02
300 YRS	1.20E+02	2.02E+00	1.99E+00	1.74E+01	2.60E+01	1.87E+02	7.24E+01	9.26E+02	4.16E+00	7.79E+01
500 YRS	1.04E+02	4.89E-01	4.95E-01	1.35E+01	2.10E+01	1.59E+02	6.07E+01	7.98E+02	1.88E+00	6.61E+01
1K YRS	8.77E+01	4.36E-01	4.42E-01	1.09E+01	1.66E+01	1.25E+02	4.78E+01	6.37E+02	1.54E+00	5.36E+01
2K YRS	7.61E+01	4.04E-01	4.10E-01	9.00E+00	1.34E+01	1.01E+02	3.86E+01	5.21E+02	1.31E+00	4.46E+01
5K YRS	6.82E+01	3.66E-01	3.72E-01	7.87E+00	1.16E+01	8.70E+01	3.34E+01	4.53E+02	1.15E+00	3.91E+01

SCENARIO: AGRICULTR

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.64E+04	2.43E+04	2.41E+04	2.79E+04	2.62E+04	2.53E+04	2.66E+04	2.84E+04	3.29E+04	2.71E+04
20 YRS	3.16E+03	2.90E+03	2.88E+03	3.35E+03	3.11E+03	3.23E+03	3.19E+03	3.55E+03	3.93E+03	3.26E+03
60 YRS	5.24E+02	4.72E+02	4.63E+02	5.48E+02	5.03E+02	5.96E+02	5.27E+02	6.83E+02	6.41E+02	5.41E+02
100 YRS	2.11E+02	1.84E+02	1.80E+02	2.14E+02	1.97E+02	2.44E+02	2.09E+02	3.23E+02	2.50E+02	2.15E+02
200 YRS	3.05E+01	1.89E+01	1.86E+01	2.34E+01	2.22E+01	3.99E+01	2.74E+01	1.08E+02	2.60E+01	2.81E+01
300 YRS	1.17E+01	2.56E+00	2.58E+00	4.31E+00	4.66E+00	1.82E+01	8.80E+00	7.96E+01	3.79E+00	9.00E+00
500 YRS	8.67E+00	7.50E-01	7.95E-01	2.02E+00	2.44E+00	1.37E+01	5.95E+00	6.65E+01	1.29E+00	6.11E+00
1K YRS	7.34E+00	6.78E-01	7.17E-01	1.69E+00	1.98E+00	1.06E+01	4.74E+00	5.22E+01	1.15E+00	4.96E+00
2K YRS	6.40E+00	6.21E-01	6.57E-01	1.44E+00	1.64E+00	8.42E+00	3.86E+00	4.18E+01	1.05E+00	4.13E+00
5K YRS	5.71E+00	5.34E-01	5.60E-01	1.23E+00	1.41E+00	7.20E+00	3.28E+00	3.59E+01	9.47E-01	3.59E+00

IMPACTS OF CLASS SA
VOLS= 4.80E+03 AREA= 8.58E+02
DPT = 2.01E+00 DTK = 1.21E+00
TSUM= 2.87E-01 DISN= 1.59E-01

SCENARIO: DRILLING

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	1.91E+00	1.76E+00	1.75E+00	2.03E+00	1.90E+00	1.82E+00	1.93E+00	2.05E+00	2.39E+00	1.96E+00
20 YRS	1.58E-01	1.45E-01	1.44E-01	1.67E-01	1.57E-01	1.54E-01	1.59E-01	1.70E-01	1.97E-01	1.62E-01
60 YRS	9.98E-03	9.21E-03	9.03E-03	1.07E-02	9.78E-03	1.11E-02	1.01E-02	1.12E-02	1.25E-02	1.04E-02
100 YRS	3.69E-03	3.41E-03	3.34E-03	3.95E-03	3.61E-03	4.16E-03	3.74E-03	4.17E-03	4.63E-03	3.84E-03
200 YRS	3.67E-04	3.39E-04	3.32E-04	3.93E-04	3.60E-04	4.14E-04	3.73E-04	4.15E-04	4.61E-04	3.83E-04
300 YRS	3.80E-05	3.51E-05	3.43E-05	4.06E-05	3.72E-05	4.25E-05	3.85E-05	4.29E-05	4.76E-05	3.95E-05
500 YRS	2.04E-06	1.89E-06	1.84E-06	2.17E-06	2.00E-06	1.97E-06	2.06E-06	2.28E-06	2.56E-06	2.10E-06
1K YRS	1.65E-06	1.53E-06	1.49E-06	1.75E-06	1.62E-06	1.54E-06	1.67E-06	1.83E-06	2.07E-06	1.69E-06
2K YRS	1.59E-06	1.47E-06	1.44E-06	1.69E-06	1.56E-06	1.48E-06	1.61E-06	1.76E-06	1.99E-06	1.63E-06
5K YRS	1.43E-06	1.32E-06	1.29E-06	1.52E-06	1.41E-06	1.33E-06	1.45E-06	1.58E-06	1.79E-06	1.47E-06

SCENARIO: DISCOVERY

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	5.88E+03	5.38E+03	5.35E+03	6.20E+03	5.81E+03	5.61E+03	5.92E+03	6.43E+03	7.29E+03	6.01E+03
20 YRS	5.91E+02	5.26E+02	5.21E+02	6.09E+02	5.69E+02	6.01E+02	5.89E+02	7.65E+02	7.14E+02	6.00E+02
60 YRS	8.64E+01	6.48E+01	6.35E+01	7.70E+01	7.19E+01	1.03E+02	8.04E+01	1.99E+02	8.82E+01	8.31E+01
100 YRS	4.12E+01	2.50E+01	2.45E+01	3.07E+01	2.93E+01	5.19E+01	3.55E+01	1.36E+02	3.41E+01	3.70E+01
200 YRS	1.38E+01	2.49E+00	2.44E+00	4.29E+00	4.87E+00	2.03E+01	9.28E+00	8.99E+01	3.52E+00	9.89E+00
300 YRS	9.91E+00	2.60E-01	2.56E-01	1.53E+00	2.24E+00	1.55E+01	6.06E+00	7.76E+01	4.68E-01	6.54E+00
500 YRS	8.53E+00	1.56E-02	1.67E-02	1.10E+00	1.74E+00	1.34E+01	5.09E+00	6.84E+01	1.22E-01	5.53E+00
1K YRS	7.86E+00	1.17E-02	1.28E-02	9.74E-01	1.52E+00	1.17E+01	4.44E+00	6.03E+01	1.04E-01	4.94E+00
2K YRS	7.39E+00	1.04E-02	1.15E-02	8.84E-01	1.36E+00	1.05E+01	3.99E+00	5.44E+01	9.28E-02	4.51E+00
5K YRS	6.73E+00	8.97E-03	9.99E-03	7.94E-01	1.22E+00	9.36E+00	3.56E+00	4.88E+01	8.25E-02	4.06E+00

SCENARIO: CONSTRCTN

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	4.90E+05	4.48E+05	4.46E+05	5.16E+05	4.85E+05	4.68E+05	4.93E+05	5.36E+05	6.08E+05	5.01E+05
20 YRS	4.93E+04	4.39E+04	4.34E+04	5.07E+04	4.74E+04	5.01E+04	4.91E+04	6.38E+04	5.95E+04	5.00E+04
60 YRS	7.20E+03	5.40E+03	5.29E+03	6.42E+03	5.99E+03	8.60E+03	6.70E+03	1.66E+04	7.35E+03	6.92E+03
100 YRS	3.43E+03	2.08E+03	2.04E+03	2.56E+03	2.44E+03	4.32E+03	2.96E+03	1.14E+04	2.84E+03	3.08E+03
200 YRS	1.15E+03	2.08E+02	2.03E+02	3.57E+02	4.06E+02	1.69E+03	7.74E+02	7.50E+03	2.93E+02	8.24E+02
300 YRS	8.26E+02	2.17E+01	2.14E+01	1.28E+02	1.87E+02	1.30E+03	5.05E+02	6.47E+03	3.90E+01	5.45E+02
500 YRS	7.11E+02	1.30E+00	1.39E+00	9.19E+01	1.45E+02	1.11E+03	4.24E+02	5.70E+03	1.02E+01	4.61E+02
1K YRS	6.55E+02	9.74E-01	1.06E+00	8.12E+01	1.27E+02	9.72E+02	3.70E+02	5.03E+03	8.65E+00	4.11E+02
2K YRS	6.16E+02	8.66E-01	9.57E-01	7.37E+01	1.14E+02	8.72E+02	3.32E+02	4.54E+03	7.73E+00	3.76E+02
5K YRS	5.61E+02	7.48E-01	8.32E-01	6.62E+01	1.01E+02	7.80E+02	2.97E+02	4.07E+03	6.88E+00	3.39E+02

SCENARIO: AGRICULTR

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	5.77E+05	5.31E+05	5.28E+05	6.11E+05	5.73E+05	5.50E+05	5.83E+05	6.19E+05	7.19E+05	5.91E+05
20 YRS	5.65E+04	5.19E+04	5.14E+04	5.99E+04	5.58E+04	5.66E+04	5.71E+04	6.22E+04	7.04E+04	5.81E+04
60 YRS	7.04E+03	6.40E+03	6.27E+03	7.42E+03	6.81E+03	7.94E+03	7.09E+03	8.61E+03	8.70E+03	7.28E+03
100 YRS	2.76E+03	2.47E+03	2.42E+03	2.87E+03	2.63E+03	3.15E+03	2.76E+03	3.72E+03	3.36E+03	2.84E+03
200 YRS	3.37E+02	2.46E+02	2.41E+02	2.94E+02	2.76E+02	4.14E+02	3.14E+02	8.74E+02	3.38E+02	3.24E+02
300 YRS	8.93E+01	2.59E+01	2.57E+01	3.82E+01	4.04E+01	1.31E+02	6.66E+01	5.40E+02	3.91E+01	7.00E+01
500 YRS	5.60E+01	1.75E+00	1.97E+00	9.29E+00	1.31E+01	8.93E+01	3.54E+01	4.51E+02	6.18E+00	3.79E+01
1K YRS	5.13E+01	1.36E+00	1.54E+00	7.91E+00	1.12E+01	7.70E+01	3.05E+01	3.93E+02	5.49E+00	3.34E+01
2K YRS	4.82E+01	1.21E+00	1.38E+00	7.08E+00	9.93E+00	6.84E+01	2.71E+01	3.52E+02	5.19E+00	3.03E+01
5K YRS	4.38E+01	1.01E+00	1.17E+00	6.24E+00	8.79E+00	6.09E+01	2.40E+01	3.14E+02	4.89E+00	2.71E+01

INTRUDE Output

IMPACTS OF CLASS B
VOLS= 2.28E+04 AREA= 4.08E+03
DPT = 3.22E+00 DTK = 6.18E+00
TSUM= 8.26E+00 DISN= 7.55E-01

SCENARIO: DRILLING

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	8.87E+00	8.17E+00	8.11E+00	9.41E+00	8.80E+00	8.59E+00	8.96E+00	9.55E+00	1.11E+01	9.11E+00
20 YRS	1.27E+00	1.18E+00	1.16E+00	1.36E+00	1.26E+00	1.34E+00	1.29E+00	1.41E+00	1.60E+00	1.32E+00
60 YRS	2.89E-01	2.67E-01	2.61E-01	3.09E-01	2.83E-01	3.26E-01	2.93E-01	3.27E-01	3.63E-01	3.01E-01
100 YRS	1.14E-01	1.05E-01	1.03E-01	1.22E-01	1.11E-01	1.28E-01	1.15E-01	1.28E-01	1.43E-01	1.18E-01
200 YRS	1.14E-02	1.05E-02	1.03E-02	1.21E-02	1.11E-02	1.28E-02	1.15E-02	1.28E-02	1.43E-02	1.18E-02
300 YRS	1.23E-03	1.13E-03	1.11E-03	1.31E-03	1.20E-03	1.37E-03	1.24E-03	1.39E-03	1.54E-03	1.28E-03
500 YRS	1.09E-04	1.01E-04	9.88E-05	1.16E-04	1.07E-04	1.04E-04	1.10E-04	1.21E-04	1.37E-04	1.12E-04
1K YRS	9.86E-05	9.15E-05	8.94E-05	1.05E-04	9.72E-05	9.23E-05	1.00E-04	1.09E-04	1.24E-04	1.01E-04
2K YRS	9.52E-05	8.84E-05	8.63E-05	1.01E-04	9.38E-05	8.91E-05	9.65E-05	1.05E-04	1.20E-04	9.79E-05
5K YRS	3.92E-04	3.64E-04	3.56E-04	4.17E-04	3.86E-04	3.67E-04	3.98E-04	4.34E-04	4.93E-04	4.03E-04

SCENARIO: DISCOVERY

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	3.42E+04	3.15E+04	3.13E+04	3.63E+04	3.40E+04	3.27E+04	3.46E+04	3.68E+04	4.27E+04	3.51E+04
20 YRS	3.47E+03	3.19E+03	3.16E+03	3.68E+03	3.43E+03	3.49E+03	3.51E+03	3.88E+03	4.33E+03	3.57E+03
60 YRS	4.35E+02	3.93E+02	3.85E+02	4.57E+02	4.20E+02	4.99E+02	4.40E+02	5.80E+02	5.34E+02	4.51E+02
100 YRS	1.72E+02	1.51E+02	1.48E+02	1.77E+02	1.63E+02	2.04E+02	1.73E+02	2.76E+02	2.06E+02	1.78E+02
200 YRS	2.33E+01	1.52E+01	1.49E+01	1.88E+01	1.81E+01	3.42E+01	2.26E+01	9.51E+01	2.08E+01	2.28E+01
300 YRS	7.77E+00	1.71E+00	1.67E+00	3.00E+00	3.57E+00	1.57E+01	7.06E+00	6.90E+01	2.43E+00	6.88E+00
500 YRS	5.16E+00	2.56E-01	2.52E-01	1.12E+00	1.69E+00	1.12E+01	4.44E+00	5.44E+01	4.43E-01	4.31E+00
1K YRS	4.06E+00	3.01E-01	2.95E-01	9.16E-01	1.27E+00	7.66E+00	3.12E+00	3.73E+01	4.75E-01	3.15E+00
2K YRS	3.42E+00	4.17E-01	4.08E-01	8.72E-01	1.07E+00	5.29E+00	2.31E+00	2.55E+01	6.13E-01	2.45E+00
5K YRS	2.99E+00	3.96E-01	3.88E-01	7.70E-01	9.13E-01	4.21E+00	1.88E+00	2.03E+01	5.76E-01	2.05E+00

SCENARIO: CONSTRCTN

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.85E+06	2.63E+06	2.61E+06	3.02E+06	2.84E+06	2.72E+06	2.88E+06	3.07E+06	3.56E+06	2.93E+06
20 YRS	2.90E+05	2.66E+05	2.63E+05	3.07E+05	2.86E+05	2.91E+05	2.93E+05	3.23E+05	3.61E+05	2.98E+05
60 YRS	3.63E+04	3.28E+04	3.21E+04	3.80E+04	3.50E+04	4.15E+04	3.66E+04	4.83E+04	4.45E+04	3.76E+04
100 YRS	1.44E+04	1.26E+04	1.23E+04	1.47E+04	1.36E+04	1.70E+04	1.44E+04	2.30E+04	1.71E+04	1.48E+04
200 YRS	1.94E+03	1.27E+03	1.24E+03	1.56E+03	1.51E+03	2.95E+03	1.89E+03	7.92E+03	1.73E+03	1.90E+03
300 YRS	6.48E+02	1.42E+02	1.39E+02	2.50E+02	2.98E+02	1.31E+03	5.88E+02	5.75E+03	2.03E+02	5.73E+02
500 YRS	4.30E+02	2.13E+01	2.10E+01	9.36E+01	1.41E+02	9.35E+02	3.70E+02	4.53E+03	3.69E+01	3.59E+02
1K YRS	3.38E+02	2.51E+01	2.46E+01	7.63E+01	1.06E+02	6.38E+02	2.60E+02	3.11E+03	3.96E+01	2.63E+02
2K YRS	2.85E+02	3.47E+01	3.40E+01	7.27E+01	8.93E+01	4.41E+02	1.92E+02	2.13E+03	5.11E+01	2.04E+02
5K YRS	2.49E+02	3.30E+01	3.23E+01	6.42E+01	7.61E+01	3.50E+02	1.57E+02	1.69E+03	4.80E+01	1.71E+02

SCENARIO: AGRICULTR

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	5.68E+06	5.24E+06	5.23E+06	6.02E+06	5.65E+06	5.40E+06	5.74E+06	6.08E+06	7.08E+06	5.82E+06
20 YRS	5.21E+05	4.83E+05	4.84E+05	5.52E+05	5.17E+05	5.12E+05	5.26E+05	5.61E+05	6.47E+05	5.36E+05
60 YRS	4.41E+04	4.10E+04	4.07E+04	4.70E+04	4.32E+04	4.93E+04	4.47E+04	5.00E+04	5.49E+04	4.59E+04
100 YRS	1.64E+04	1.51E+04	1.48E+04	1.74E+04	1.60E+04	1.85E+04	1.66E+04	1.90E+04	2.04E+04	1.70E+04
200 YRS	1.68E+03	1.51E+03	1.48E+03	1.76E+03	1.61E+03	1.95E+03	1.70E+03	2.38E+03	2.07E+03	1.74E+03
300 YRS	2.32E+02	1.80E+02	1.78E+02	2.20E+02	2.02E+02	3.07E+02	2.34E+02	6.90E+02	2.62E+02	2.39E+02
500 YRS	7.23E+01	3.88E+01	3.88E+01	5.59E+01	5.02E+01	1.15E+02	7.26E+01	4.27E+02	6.98E+01	7.32E+01
1K YRS	7.16E+01	4.58E+01	4.50E+01	6.19E+01	5.36E+01	9.51E+01	7.11E+01	3.13E+02	7.78E+01	7.21E+01
2K YRS	7.26E+01	5.28E+01	5.15E+01	6.37E+01	5.76E+01	8.35E+01	7.27E+01	2.39E+02	8.48E+01	7.11E+01
5K YRS	6.44E+01	4.76E+01	4.61E+01	5.51E+01	5.11E+01	7.07E+01	6.28E+01	1.92E+02	7.78E+01	6.17E+01

IMPACTS OF CLASS C
VOLS= 1.70E+04 AREA= 3.03E+03
DPT = 9.41E+00 DTK = 5.25E+00
TSUM= 1.33E+01 DI[illegible]= 5.62E-01

SCENARIO: DRILLING

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	1.62E+01	1.49E+01	1.48E+01	1.71E+01	1.60E+01	1.57E+01	1.63E+01	1.74E+01	2.02E+01	1.66E+01
20 YRS	2.31E+00	2.13E+00	2.10E+00	2.46E+00	2.28E+00	2.43E+00	2.34E+00	2.55E+00	2.89E+00	2.39E+00
60 YRS	5.23E-01	4.83E-01	4.73E-01	5.59E-01	5.12E-01	5.89E-01	5.30E-01	5.91E-01	6.56E-01	5.45E-01
100 YRS	2.06E-01	1.90E-01	1.86E-01	2.20E-01	2.02E-01	2.32E-01	2.09E-01	2.33E-01	2.58E-01	2.14E-01
200 YRS	2.10E-02	1.94E-02	1.90E-02	2.24E-02	2.06E-02	2.36E-02	2.13E-02	2.37E-02	2.63E-02	2.19E-02
300 YRS	3.03E-03	2.80E-03	2.74E-03	3.24E-03	2.97E-03	3.30E-03	3.07E-03	3.42E-03	3.74E-03	3.15E-03
500 YRS	5.99E-04	5.52E-04	5.45E-04	6.37E-04	5.90E-04	5.66E-04	6.06E-04	6.69E-04	6.95E-04	6.13E-04
1K YRS	4.91E-04	4.52E-04	4.47E-04	5.22E-04	4.84E-04	4.60E-04	4.97E-04	5.47E-04	5.70E-04	5.02E-04
2K YRS	3.67E-04	3.39E-04	3.34E-04	3.90E-04	3.62E-04	3.44E-04	3.72E-04	4.09E-04	4.31E-04	3.76E-04
5K YRS	4.10E-04	3.80E-04	3.72E-04	4.36E-04	4.04E-04	3.83E-04	4.15E-04	4.54E-04	5.07E-04	4.21E-04

SCENARIO: DISCOVERY

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	3.61E+03	3.31E+03	3.29E+03	3.82E+03	3.58E+03	3.49E+03	3.64E+03	3.98E+03	4.49E+03	3.70E+03
20 YRS	4.70E+02	4.26E+02	4.21E+02	4.93E+02	4.59E+02	4.98E+02	4.75E+02	6.05E+02	5.78E+02	4.85E+02
60 YRS	9.78E+01	8.33E+01	8.15E+01	9.77E+01	8.06E+01	1.19E+02	9.81E+01	1.86E+02	1.13E+02	1.00E+02
100 YRS	4.28E+01	3.32E+01	3.25E+01	3.96E+01	3.72E+01	5.61E+01	4.24E+01	1.17E+02	4.51E+01	4.31E+01
200 YRS	1.01E+01	4.16E+00	4.08E+00	5.82E+00	6.14E+00	1.81E+01	9.60E+00	6.95E+01	5.63E+00	9.41E+00
300 YRS	6.16E+00	1.25E+00	1.23E+00	2.32E+00	2.83E+00	1.28E+01	5.75E+00	5.78E+01	1.66E+00	5.51E+00
500 YRS	4.90E+00	8.58E-01	8.52E-01	1.70E+00	2.12E+00	1.00E+01	4.44E+00	4.62E+01	1.13E+00	4.28E+00
1K YRS	3.78E+00	6.98E-01	6.93E-01	1.29E+00	1.54E+00	6.74E+00	3.07E+00	3.11E+01	9.06E-01	3.06E+00
2K YRS	2.86E+00	4.74E-01	4.71E-01	8.69E-01	1.01E+00	4.32E+00	1.99E+00	2.03E+01	6.17E-01	2.09E+00
5K YRS	2.12E+00	1.61E-01	1.59E-01	4.30E-01	5.53E-01	3.09E+00	1.29E+00	1.54E+01	2.27E-01	1.41E+00

SCENARIO: CONSTRCTN

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	3.01E+05	2.76E+05	2.74E+05	3.18E+05	2.98E+05	2.91E+05	3.04E+05	3.31E+05	3.74E+05	3.08E+05
20 YRS	3.92E+04	3.55E+04	3.50E+04	4.11E+04	3.82E+04	4.15E+04	3.96E+04	5.04E+04	4.82E+04	4.04E+04
60 YRS	8.15E+03	6.94E+03	6.79E+03	8.14E+03	7.55E+03	9.89E+03	8.17E+03	1.55E+04	9.43E+03	8.35E+03
100 YRS	3.57E+03	2.76E+03	2.71E+03	3.30E+03	3.10E+03	4.68E+03	3.54E+03	9.76E+03	3.75E+03	3.59E+03
200 YRS	8.39E+02	3.47E+02	3.40E+02	4.85E+02	5.12E+02	1.51E+03	8.00E+02	5.79E+03	4.69E+02	7.85E+02
300 YRS	5.13E+02	1.04E+02	1.03E+02	1.94E+02	2.36E+02	1.07E+03	4.79E+02	4.81E+03	1.39E+02	4.59E+02
500 YRS	4.09E+02	7.15E+01	7.10E+01	1.42E+02	1.76E+02	8.37E+02	3.70E+02	3.85E+03	9.39E+01	3.57E+02
1K YRS	3.15E+02	5.82E+01	5.78E+01	1.07E+02	1.28E+02	5.61E+02	2.56E+02	2.59E+03	7.55E+01	2.55E+02
2K YRS	2.38E+02	3.95E+01	3.92E+01	7.24E+01	8.42E+01	3.60E+02	1.65E+02	1.69E+03	5.14E+01	1.74E+02
5K YRS	1.76E+02	1.34E+01	1.33E+01	3.58E+01	4.61E+01	2.58E+02	1.08E+02	1.29E+03	1.89E+01	1.18E+02

SCENARIO: AGRICULTR

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	5.40E+05	4.97E+05	4.94E+05	5.72E+05	5.36E+05	5.17E+05	5.45E+05	5.80E+05	6.73E+05	5.54E+05
20 YRS	5.94E+04	5.47E+04	5.41E+04	6.31E+04	5.87E+04	6.02E+04	6.00E+04	6.54E+04	7.41E+04	6.12E+04
60 YRS	9.03E+03	8.29E+03	8.12E+03	9.61E+03	8.81E+03	1.02E+04	9.15E+03	1.07E+04	1.12E+04	9.39E+03
100 YRS	3.59E+03	3.28E+03	3.21E+03	3.80E+03	3.49E+03	4.09E+03	3.64E+03	4.55E+03	4.44E+03	3.73E+03
200 YRS	4.83E+02	4.12E+02	4.05E+02	4.86E+02	4.51E+02	5.77E+02	4.89E+02	9.64E+02	5.52E+02	4.97E+02
300 YRS	1.67E+02	1.25E+02	1.24E+02	1.53E+02	1.44E+02	2.14E+02	1.69E+02	5.54E+02	1.62E+02	1.68E+02
500 YRS	1.20E+02	8.66E+01	8.62E+01	1.07E+02	1.02E+02	1.52E+02	1.21E+02	4.28E+02	1.11E+02	1.20E+02
1K YRS	9.65E+01	7.09E+01	7.05E+01	8.70E+01	8.16E+01	1.14E+02	9.48E+01	3.00E+02	9.12E+01	9.49E+01
2K YRS	6.72E+01	4.83E+01	4.80E+01	5.88E+01	5.50E+01	7.46E+01	6.37E+01	1.95E+02	6.33E+01	6.42E+01
5K YRS	3.03E+01	1.68E+01	1.66E+01	2.11E+01	2.02E+01	3.59E+01	2.61E+01	1.21E+02	2.47E+01	2.67E+01

IMPACTS OF CLASS D1
VOLS= 1.03E+03 AREA= 1.85E+02
DPT = 1.47E+01 DTK = 3.43E-01
TSUM= 1.05E+01 DISN= 3.43E-02

SCENARIO: DRILLING

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	4.82E+00	4.44E+00	4.39E+00	5.12E+00	4.77E+00	4.88E+00	4.87E+00	5.26E+00	6.02E+00	4.97E+00
20 YRS	1.34E+00	1.24E+00	1.22E+00	1.43E+00	1.32E+00	1.48E+00	1.36E+00	1.51E+00	1.68E+00	1.40E+00
60 YRS	4.48E-01	4.14E-01	4.05E-01	4.79E-01	4.39E-01	5.06E-01	4.55E-01	5.07E-01	5.62E-01	4.67E-01
100 YRS	1.78E-01	1.64E-01	1.60E-01	1.90E-01	1.74E-01	2.00E-01	1.80E-01	2.01E-01	2.23E-01	1.85E-01
200 YRS	1.77E-02	1.63E-02	1.60E-02	1.89E-02	1.73E-02	1.99E-02	1.79E-02	1.99E-02	2.21E-02	1.84E-02
300 YRS	1.80E-03	1.66E-03	1.63E-03	1.93E-03	1.76E-03	2.02E-03	1.83E-03	2.04E-03	2.26E-03	1.88E-03
500 YRS	7.08E-05	6.54E-05	6.40E-05	7.57E-05	6.96E-05	6.95E-05	7.12E-05	7.99E-05	8.80E-05	7.30E-05
1K YRS	5.05E-05	4.67E-05	4.57E-05	5.39E-05	4.98E-05	4.72E-05	5.09E-05	5.67E-05	6.27E-05	5.19E-05
2K YRS	4.60E-05	4.27E-05	4.17E-05	4.91E-05	4.54E-05	4.31E-05	4.65E-05	5.14E-05	5.73E-05	4.73E-05
5K YRS	4.11E-05	3.82E-05	3.73E-05	4.38E-05	4.05E-05	3.85E-05	4.16E-05	4.58E-05	5.16E-05	4.23E-05

SCENARIO: DISCOVERY

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
20 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
300 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
500 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1K YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
2K YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
5K YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

SCENARIO: CONSTRCTN

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
20 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
60 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
100 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
200 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
300 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
500 YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1K YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
2K YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
5K YRS	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

SCENARIO: AGRICULTR

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	1.49E+00	1.37E+00	1.36E+00	1.58E+00	1.48E+00	1.48E+00	1.51E+00	1.62E+00	1.86E+00	1.53E+00
20 YRS	3.17E-01	2.93E-01	2.88E-01	3.39E-01	3.12E-01	3.43E-01	3.21E-01	3.54E-01	3.97E-01	3.29E-01
60 YRS	9.42E-02	8.70E-02	8.51E-02	1.01E-01	9.22E-02	1.06E-01	9.55E-02	1.06E-01	1.18E-01	9.81E-02
100 YRS	3.72E-02	3.44E-02	3.36E-02	3.98E-02	3.64E-02	4.20E-02	3.77E-02	4.21E-02	4.67E-02	3.88E-02
200 YRS	3.71E-03	3.42E-03	3.35E-03	3.97E-03	3.63E-03	4.18E-03	3.76E-03	4.19E-03	4.65E-03	3.86E-03
300 YRS	3.85E-04	3.55E-04	3.48E-04	4.11E-04	3.77E-04	4.31E-04	3.90E-04	4.35E-04	4.82E-04	4.01E-04
500 YRS	2.21E-05	2.00E-05	1.96E-05	2.30E-05	2.13E-05	2.09E-05	2.19E-05	2.41E-05	2.62E-05	2.23E-05
1K YRS	1.70E-05	1.54E-05	1.51E-05	1.77E-05	1.64E-05	1.56E-05	1.68E-05	1.84E-05	2.01E-05	1.71E-05
2K YRS	1.49E-05	1.35E-05	1.33E-05	1.55E-05	1.44E-05	1.37E-05	1.48E-05	1.62E-05	1.79E-05	1.50E-05
5K YRS	1.10E-05	1.01E-05	9.89E-06	1.16E-05	1.07E-05	1.02E-05	1.10E-05	1.21E-05	1.36E-05	1.12E-05

IMPACTS OF CLASS D2
VOLS= 8.51E+02 AREA= 1.99E+02
DPT = 2.00E+00 DTK = 5.70E+00
TSUM= 2.54E+00 DISN= 2.31E-01

SCENARIO: DRILLING

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	1.05E+02	9.66E+01	9.60E+01	1.11E+02	1.04E+02	1.00E+02	1.06E+02	1.13E+02	1.31E+02	1.08E+02
20 YRS	1.09E+01	1.00E+01	9.94E+00	1.16E+01	1.08E+01	1.10E+01	1.10E+01	1.19E+01	1.36E+01	1.12E+01
60 YRS	1.55E+00	1.43E+00	1.40E+00	1.66E+00	1.52E+00	1.74E+00	1.57E+00	1.75E+00	1.95E+00	1.62E+00
100 YRS	6.02E-01	5.56E-01	5.44E-01	6.44E-01	5.89E-01	6.79E-01	6.11E-01	6.81E-01	7.55E-01	6.27E-01
200 YRS	6.10E-02	5.64E-02	5.51E-02	6.52E-02	5.97E-02	6.86E-02	6.19E-02	6.89E-02	7.65E-02	6.35E-02
300 YRS	7.33E-03	6.77E-03	6.62E-03	7.83E-03	7.18E-03	7.99E-03	7.42E-03	8.26E-03	9.20E-03	7.61E-03
500 YRS	1.46E-03	1.35E-03	1.32E-03	1.55E-03	1.44E-03	1.37E-03	1.47E-03	1.62E-03	1.84E-03	1.50E-03
1K YRS	1.37E-03	1.27E-03	1.24E-03	1.46E-03	1.35E-03	1.28E-03	1.39E-03	1.52E-03	1.73E-03	1.41E-03
2K YRS	3.29E-02	3.05E-02	2.98E-02	3.50E-02	3.24E-02	3.07E-02	3.33E-02	3.64E-02	4.13E-02	3.38E-02
5K YRS	3.66E-02	3.40E-02	3.32E-02	3.89E-02	3.60E-02	3.42E-02	3.71E-02	4.05E-02	4.60E-02	3.76E-02

SCENARIO: DISCOVERY

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.33E+06	2.14E+06	2.13E+06	2.47E+06	2.32E+06	2.20E+06	2.35E+06	2.50E+06	2.90E+06	2.38E+06
20 YRS	1.80E+05	1.65E+05	1.64E+05	1.90E+05	1.79E+05	1.72E+05	1.82E+05	1.98E+05	2.24E+05	1.84E+05
60 YRS	3.81E+03	3.09E+03	3.04E+03	3.65E+03	3.43E+03	4.69E+03	3.80E+03	8.95E+03	4.20E+03	3.86E+03
100 YRS	1.37E+03	8.86E+02	8.67E+02	1.10E+03	1.06E+03	2.05E+03	1.34E+03	5.80E+03	1.21E+03	1.35E+03
200 YRS	4.37E+02	1.00E+02	9.85E+01	1.76E+02	2.11E+02	9.32E+02	4.18E+02	4.07E+03	1.42E+02	4.02E+02
300 YRS	3.07E+02	2.43E+01	2.40E+01	8.03E+01	1.17E+02	7.31E+02	2.94E+02	3.47E+03	3.84E+01	2.77E+02
500 YRS	2.49E+02	1.92E+01	1.89E+01	6.38E+01	9.27E+01	5.80E+02	2.34E+02	2.78E+03	3.04E+01	2.22E+02
1K YRS	2.02E+02	2.76E+01	2.70E+01	5.97E+01	7.67E+01	3.94E+02	1.70E+02	1.87E+03	4.03E+01	1.68E+02
2K YRS	1.79E+02	4.15E+01	4.05E+01	6.61E+01	7.41E+01	2.74E+02	1.34E+02	1.24E+03	5.80E+01	1.39E+02
5K YRS	1.59E+02	3.98E+01	3.89E+01	6.03E+01	6.52E+01	2.18E+02	1.11E+02	9.73E+02	5.53E+01	1.19E+02

SCENARIO: CONSTRCTN

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	1.94E+08	1.79E+08	1.78E+08	2.05E+08	1.93E+08	1.84E+08	1.96E+08	2.08E+08	2.42E+08	1.99E+08
20 YRS	1.50E+07	1.38E+07	1.37E+07	1.59E+07	1.49E+07	1.43E+07	1.51E+07	1.65E+07	1.87E+07	1.54E+07
60 YRS	3.17E+05	2.58E+05	2.53E+05	3.04E+05	2.86E+05	3.91E+05	3.17E+05	7.46E+05	3.50E+05	3.22E+05
100 YRS	1.14E+05	7.38E+04	7.23E+04	9.15E+04	8.87E+04	1.71E+05	1.12E+05	4.84E+05	1.01E+05	1.12E+05
200 YRS	3.64E+04	8.35E+03	8.21E+03	1.47E+04	1.76E+04	7.77E+04	3.49E+04	3.40E+05	1.19E+04	3.35E+04
300 YRS	2.56E+04	2.03E+03	2.00E+03	6.69E+03	9.72E+03	6.09E+04	2.45E+04	2.89E+05	3.20E+03	2.31E+04
500 YRS	2.08E+04	1.60E+03	1.57E+03	5.32E+03	7.72E+03	4.83E+04	1.95E+04	2.32E+05	2.53E+03	1.85E+04
1K YRS	1.68E+04	2.30E+03	2.25E+03	4.97E+03	6.39E+03	3.29E+04	1.41E+04	1.56E+05	3.36E+03	1.40E+04
2K YRS	1.50E+04	3.46E+03	3.38E+03	5.51E+03	6.17E+03	2.29E+04	1.11E+04	1.04E+05	4.83E+03	1.16E+04
5K YRS	1.32E+04	3.32E+03	3.24E+03	5.02E+03	5.44E+03	1.82E+04	9.27E+03	8.11E+04	4.61E+03	9.88E+03

SCENARIO: AGRICULTR

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	4.12E+08	3.79E+08	3.77E+08	4.37E+08	4.10E+08	3.90E+08	4.16E+08	4.41E+08	5.14E+08	4.22E+08
20 YRS	3.13E+07	2.88E+07	2.86E+07	3.31E+07	3.11E+07	2.97E+07	3.16E+07	3.35E+07	3.90E+07	3.20E+07
60 YRS	4.09E+05	3.75E+05	3.69E+05	4.33E+05	4.01E+05	4.34E+05	4.14E+05	4.85E+05	5.08E+05	4.23E+05
100 YRS	9.90E+04	8.89E+04	8.72E+04	1.04E+05	9.51E+04	1.15E+05	1.00E+05	1.42E+05	1.21E+05	1.03E+05
200 YRS	1.41E+04	1.11E+04	1.10E+04	1.34E+04	1.25E+04	1.86E+04	1.43E+04	4.12E+04	1.52E+04	1.45E+04
300 YRS	5.76E+03	3.71E+03	3.74E+03	4.82E+03	4.53E+03	8.80E+03	5.95E+03	2.86E+04	5.13E+03	5.92E+03
500 YRS	5.08E+03	3.41E+03	3.38E+03	4.41E+03	4.07E+03	7.29E+03	5.27E+03	2.35E+04	4.67E+03	5.23E+03
1K YRS	5.72E+03	4.40E+03	4.30E+03	5.43E+03	4.89E+03	6.87E+03	5.91E+03	1.83E+04	5.91E+03	5.85E+03
2K YRS	5.96E+03	4.94E+03	4.81E+03	5.81E+03	5.27E+03	6.40E+03	6.23E+03	1.47E+04	6.48E+03	6.02E+03
5K YRS	5.41E+03	4.54E+03	4.40E+03	5.21E+03	4.79E+03	5.61E+03	5.55E+03	1.21E+04	5.94E+03	5.39E+03

IMPACTS OF CLASS TOTAL
VOLS= 9.79E+05 AREA= 4.68E+05
DPT = 7.00E+00 DTK = 1.00E+09
TSUM= 4.02E+01 DISN= 6.34E+02

SCENARIO: DRILLING

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	8.64E-01	7.95E-01	7.90E-01	9.16E-01	8.58E-01	8.32E-01	8.72E-01	9.28E-01	1.08E+00	8.86E-01
20 YRS	1.09E-01	1.01E-01	9.95E-02	1.16E-01	1.08E-01	1.13E-01	1.11E-01	1.20E-01	1.37E-01	1.13E-01
60 YRS	2.15E-02	1.99E-02	1.95E-02	2.30E-02	2.11E-02	2.42E-02	2.18E-02	2.43E-02	2.70E-02	2.24E-02
100 YRS	8.45E-03	7.80E-03	7.63E-03	9.03E-03	8.27E-03	9.53E-03	8.57E-03	9.55E-03	1.06E-02	8.80E-03
200 YRS	8.55E-04	7.90E-04	7.73E-04	9.14E-04	8.37E-04	9.61E-04	8.67E-04	9.66E-04	1.07E-03	8.90E-04
300 YRS	1.09E-04	1.00E-04	9.82E-05	1.16E-04	1.06E-04	1.19E-04	1.10E-04	1.22E-04	1.35E-04	1.13E-04
500 YRS	1.86E-05	1.72E-05	1.69E-05	1.98E-05	1.83E-05	1.76E-05	1.88E-05	2.07E-05	2.24E-05	1.91E-05
1K YRS	1.62E-05	1.50E-05	1.47E-05	1.72E-05	1.60E-05	1.52E-05	1.64E-05	1.80E-05	1.96E-05	1.66E-05
2K YRS	4.12E-05	3.82E-05	3.74E-05	4.38E-05	4.06E-05	3.86E-05	4.18E-05	4.57E-05	5.13E-05	4.24E-05
5K YRS	5.18E-05	4.81E-05	4.70E-05	5.51E-05	5.11E-05	4.85E-05	5.26E-05	5.74E-05	6.50E-05	5.33E-05

SCENARIO: DISCOVERY

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	3.12E+03	2.87E+03	2.85E+03	3.30E+03	3.10E+03	2.96E+03	3.15E+03	3.36E+03	3.88E+03	[illegible]
20 YRS	2.77E+02	2.52E+02	2.50E+02	2.91E+02	2.72E+02	2.73E+02	2.79E+02	3.22E+02	3.42E+02	[illegible]
60 YRS	2.24E+01	1.81E+01	1.78E+01	2.13E+01	1.99E+01	2.67E+01	2.17E+01	4.56E+01	2.46E+01	[illegible]
100 YRS	9.82E+00	6.76E+00	6.61E+00	8.17E+00	7.73E+00	1.27E+01	9.09E+00	2.99E+01	9.21E+00	[illegible]
200 YRS	2.86E+00	7.06E-01	6.92E-01	1.11E+00	1.23E+00	4.60E+00	2.20E+00	1.93E+01	9.86E-01	2.26E+00
300 YRS	1.98E+00	1.07E-01	1.05E-01	3.86E-01	5.42E-01	3.44E+00	1.38E+00	1.66E+01	1.69E-01	1.42E+00
500 YRS	1.65E+00	4.32E-02	4.28E-02	2.71E-01	4.05E-01	2.82E+00	1.10E+00	1.39E+01	7.83E-02	1.15E+00
1K YRS	1.38E+00	4.81E-02	4.75E-02	2.25E-01	3.20E-01	2.12E+00	8.42E-01	1.06E+01	7.99E-02	9.09E-01
2K YRS	1.19E+00	5.86E-02	5.77E-02	2.00E-01	2.67E-01	1.64E+00	6.65E-01	8.25E+00	9.07E-02	7.46E-01
5K YRS	1.06E+00	5.09E-02	5.00E-02	1.72E-01	2.26E-01	1.38E+00	5.62E-01	7.00E+00	7.90E-02	6.42E-01

SCENARIO: CONSTRCTN

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	2.60E+05	2.39E+05	2.37E+05	2.75E+05	2.58E+05	2.47E+05	2.62E+05	2.80E+05	3.24E+05	2.66E+05
20 YRS	2.31E+04	2.10E+04	2.08E+04	2.42E+04	2.27E+04	2.27E+04	2.32E+04	2.68E+04	2.85E+04	2.36E+04
60 YRS	1.86E+03	1.51E+03	1.48E+03	1.78E+03	1.65E+03	2.23E+03	1.81E+03	3.80E+03	2.05E+03	1.86E+03
100 YRS	8.19E+02	5.63E+02	5.51E+02	6.81E+02	6.44E+02	1.05E+03	7.58E+02	2.49E+03	7.68E+02	7.79E+02
200 YRS	2.38E+02	5.88E+01	5.76E+01	9.27E+01	1.03E+02	3.83E+02	1.83E+02	1.61E+03	8.21E+01	1.88E+02
300 YRS	1.65E+02	8.90E+00	8.77E+00	3.22E+01	4.52E+01	2.87E+02	1.15E+02	1.38E+03	1.41E+01	1.18E+02
500 YRS	1.38E+02	3.60E+00	3.57E+00	2.26E+01	3.37E+01	2.35E+02	9.18E+01	1.16E+03	6.53E+00	9.58E+01
1K YRS	1.15E+02	4.01E+00	3.96E+00	1.87E+01	2.66E+01	1.77E+02	7.01E+01	8.84E+02	6.66E+00	7.57E+01
2K YRS	9.93E+01	4.89E+00	4.81E+00	1.67E+01	2.22E+01	1.37E+02	5.55E+01	6.88E+02	7.56E+00	6.22E+01
5K YRS	8.80E+01	4.24E+00	4.16E+00	1.43E+01	1.88E+01	1.15E+02	4.69E+01	5.83E+02	6.58E+00	5.35E+01

SCENARIO: AGRICULTR

TIMES	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
0 YRS	5.28E+05	4.86E+05	4.84E+05	5.59E+05	5.25E+05	5.00E+05	5.33E+05	5.65E+05	6.58E+05	5.41E+05
20 YRS	4.36E+04	4.02E+04	4.01E+04	4.62E+04	4.33E+04	4.21E+04	4.41E+04	4.70E+04	5.44E+04	4.48E+04
60 YRS	2.07E+03	1.91E+03	1.88E+03	2.20E+03	2.02E+03	2.31E+03	2.09E+03	2.46E+03	2.57E+03	2.15E+03
100 YRS	7.43E+02	6.72E+02	6.60E+02	7.80E+02	7.16E+02	8.49E+02	7.49E+02	9.71E+02	9.12E+02	7.69E+02
200 YRS	9.04E+01	7.11E+01	6.99E+01	8.48E+01	7.87E+01	1.12E+02	8.82E+01	2.15E+02	9.73E+01	9.02E+01
300 YRS	2.49E+01	1.21E+01	1.21E+01	1.63E+01	1.58E+01	3.65E+01	2.23E+01	1.29E+02	1.72E+01	2.25E+01
500 YRS	1.67E+01	6.09E+00	6.10E+00	8.96E+00	8.85E+00	2.51E+01	1.42E+01	1.03E+02	8.87E+00	1.43E+01
1K YRS	1.56E+01	6.77E+00	6.70E+00	9.32E+00	8.85E+00	2.06E+01	1.31E+01	8.00E+01	9.65E+00	1.33E+01
2K YRS	1.44E+01	6.96E+00	6.85E+00	8.96E+00	8.49E+00	1.72E+01	1.20E+01	6.33E+01	9.74E+00	1.21E+01
5K YRS	1.24E+01	5.86E+00	5.73E+00	7.39E+00	7.09E+00	1.43E+01	9.98E+00	5.28E+01	8.33E+00	1.01E+01

D.7 ECONOMY Output

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ECONOMY PROGRAM : IMPACTS RUN OF REGION 4 + SOURCES
IR  =  4  OVFL=  0  IBUF=  0  NBRN=  0  NBES=  0
ICLS=    1  IOBS=    5  IINS=  100
IBEG= 1991  IEND= 2020  ILFE=   30

COMBINATION INDICES ARE:     1   4   4   4   4   1

MINIMUM DEPTHS ARE:     2.0   2.0   2.0   5.0  10.0  10.0

DISPOSAL CONFIGURATION

 NO ID IU IT IC IE IB IX IS    EFF        SEF        DPT        DTK        VOLE       AREA
  1  4  1  1  1  1  1  3  1 5.25E+00 6.90E-01 2.00E+00 7.00E+00 3.53E+03 6.00E+02
  2  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  3  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  4  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  5  3  2  2  2  1  2  2  1 1.14E+01 8.80E-01 2.00E+00 1.30E+01 6.55E+04 5.40E+03
  6 10  6  6  1  2  3  1  1 5.70E+00 4.40E-01 2.00E+00 5.70E+00 5.03E+03 8.60E+02

INPUTS STREAMS: NAME, REGN, BKLG, FRAC - OLD NSTR =  215
P-IXRESIN  4 0 1.00 P-CONCLIQ  4 0 1.00 P-FSLUDGE  4 0 1.00 P-FCARTRG  4 0 1.00
B-IXRESIN  4 0 1.00 B-CONCLIQ  4 0 1.00 B-FSLUDGE  4 0 1.00 P-COTRASH  4 0 1.00
P-NCTRASH  4 0 1.00 B-COTRASH  4 0 1.00 B-NCTRASH  4 0 1.00 L-NFRCOMP  4 0 1.00
L-DECONRS  4 0 1.00 F-PROCESS  4 0 1.00 F-COTRASH  4 0 1.00 F-NCTRASH  4 0 1.00
U-PROCESS  4 0 1.00 L-PUDECON  4 0 1.00 L-BURNUPS  4 0 1.00 I-COTRASH  4 0 1.00
I+COTRASH  4 0 1.00 I-ABSLIQD  4 0 1.00 I+ABSLIQD  4 0 1.00 I-LIQSCVL  4 0 1.00
I+LIQSCVL  4 0 1.00 I-BIOWAST  4 0 1.00 I+BIOWAST  4 0 1.00 N-SSTRASH  4 0 1.00
N+SSTRASH  4 0 1.00 N-SSWASTE  4 0 1.00 N-LOTRASH  4 0 1.00 N+LOTRASH  4 0 1.00
N-LOWASTE  4 0 1.00 N-ISOPROD  4 0 1.00 N-ISOTRSH  4 0 1.00 N-SORMFG1  4 0 1.00
N-SORMFG2  4 0 1.00 N-SORMFG3  4 0 1.00 N-SORMFG4  4 0 1.00 N-NECOTRA  4 0 1.00
N-NEABLIQ  4 0 1.00 N-NESOLIQ  4 0 1.00 N-NEVIALS  4 0 1.00 N-NENCGLS  4 0 1.00
N-NEWOTAL  4 0 1.00 N-NETRGAS  4 0 1.00 N-NETRILI  4 0 1.00 N-NECARLI  4 0 1.00
N-MWTRASH  4 0 1.00 N-MWABLIQ  4 0 1.00 N-MWSOLIQ  4 0 1.00 N-MWWASTE  4 0 1.00
N-TRIPLAT  4 0 1.00 N-TRITGAS  4 0 1.00 N-TRISCNT  4 0 1.00 N-TRILIQD  4 0 1.00
N-TRITRSH  4 0 1.00 N-TRIFOIL  4 0 1.00 N-HIGHACT  4 0 1.00 N-TRITSOR  4 0 1.00
N-CARBSOR  4 0 1.00 N-COBLSOR  4 0 1.00 N-NICKSOR  4 0 1.00 N-STROSOR  4 0 1.00
N-CESISOR  4 0 1.00 N-PLU8SOR  4 0 1.00 N-PLU9SOR  4 0 1.00 N-AMERSOR  4 0 1.00
N-PUBESOR  4 0 1.00 N-AMBESOR  4 0 1.00 N-RANEEDS  4 0 1.00 N-RACELLS  4 0 1.00
N-RAPLAQU  4 0 1.00 N-RANPAPP  4 0 1.00 N-RABESOR  4 0 1.00 N-RAMISCL  4 0 1.00
N-CARBSOR  1 0 1.00 N-COBLSOR  1 0 1.00 N-NICKSOR  1 0 1.00 N-STROSOR  1 0 1.00
N-CESISOR  1 0 1.00 N-PLU8SOR  1 0 1.00 N-PLU9SOR  1 0 1.00 N-AMERSOR  1 0 1.00
N-PUBESOR  1 0 1.00 N-AMBESOR  1 0 1.00 N-RANEEDS  1 0 1.00 N-RACELLS  1 0 1.00
N-RAPLAQU  1 0 1.00 N-RANPAPP  1 0 1.00 N-RABESOR  1 0 1.00 N-RAMISCL  1 0 1.00
N-CARBSOR  2 0 1.00 N-COBLSOR  2 0 1.00 N-NICKSOR  2 0 1.00 N-STROSOR  2 0 1.00
N-CESISOR  2 0 1.00 N-PLU8SOR  2 0 1.00 N-PLU9SOR  2 0 1.00 N-AMERSOR  2 0 1.00
N-PUBESOR  2 0 1.00 N-AMBESOR  2 0 1.00 N-RANEEDS  2 0 1.00 N-RACELLS  2 0 1.00
N-RAPLAQU  2 0 1.00 N-RANPAPP  2 0 1.00 N-RABESOR  2 0 1.00 N-RAMISCL  2 0 1.00
N-CARBSOR  3 0 1.00 N-COBLSOR  3 0 1.00 N-NICKSOR  3 0 1.00 N-STROSOR  3 0 1.00
N-CESISOR  3 0 1.00 N-PLU8SOR  3 0 1.00 N-PLU9SOR  3 0 1.00 N-AMERSOR  3 0 1.00
N-PUBESOR  3 0 1.00 N-AMBESOR  3 0 1.00 N-RANEEDS  3 0 1.00 N-RACELLS  3 0 1.00
N-RAPLAQU  3 0 1.00 N-RANPAPP  3 0 1.00 N-RABESOR  3 0 1.00 N-RAMISCL  3 0 1.00
N-RARESIN  4 0 1.00 M-NAVYWET  4 0 1.00 M-NAVYDRY  4 0 1.00 P-DECORES  4 0 1.00
P-DEACINT  4 0 1.00 P-DEACVES  4 0 1.00 P-DEACTCO  4 0 1.00 P-DECONME  4 0 1.00
P-DECONCO  4 0 1.00 P-DETRASH  4 0 1.00 P-DERESIN  4 0 1.00 P-DEFILCR  4 0 1.00
P-DEEVAPB  4 0 1.00 B-DECORES  4 0 1.00 B-DEACINT  4 0 1.00 B-DEACVES  4 0 1.00
B-DEACTCO  4 0 1.00 B-DECONME  4 0 1.00 B-DECONCO  4 0 1.00 B-DETRASH  4 0 1.00
B-DERESIN  4 0 1.00 B-DEEVAPB  4 0 1.00 N-TRITSOR  1 0 1.00 N-TRITSOR  2 0 1.00
N-TRITSOR  3 0 1.00            0 0  .00            0 0  .00            0 0  .00
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ECONOMY Output

```
*** DEPTH PROBLEM ***
CLASS:   D2   DMIN: 10.0  ID: 10  DPT:  2.0  DTK:  5.7

OPTIONS FOLLOW
STOP                    : 1
DO NOT CONSIDER CLASS: 2
MODIFY DMIN TO 2M       : 3
SELECT FROM ABOVE       :

OPTION 3 HAS BEEN SELECTED, PROGRAM CONTINUING

BASIC WASTE STREAM DATA

   A = 9.32E+05     SA = 4.80E+03      B = 2.28E+04
   C = 1.70E+04     D1 = 1.03E+03     D2 = 8.51E+02  TOTAL= 9.79E+05

NAME,VOLM,CVOL,DENS,CON/ACT,ISPC NDX
P-IXRESIN  1.16E+04 6.05E-01 9.00E-01 2.36E-01 1200001  100   100 0 1
P-CONCLIQ  9.83E+04 1.36E+00 1.70E+00 3.11E-01 1201101  100   140 0 1
P-FSLUDGE   .00E+00 8.44E-01 9.00E-01 1.09E+00 1200001  100   100 0 1
P-FCARTRG  4.38E+03 1.00E+00 1.30E+00 4.48E+00  700001  100   100 0 1
B-IXRESIN  8.21E+03 5.88E-01 9.00E-01 6.01E-01 1200001  100   100 0 1
B-CONCLIQ  8.00E+04 1.28E+00 1.70E+00 3.24E-01 1201101  100   140 0 1
B-FSLUDGE  1.23E+04 6.85E-01 9.00E-01 9.21E-01 1200001  100   100 0 1
P-COTRASH  2.98E+04 3.33E-01 4.00E-01 1.65E-01 1410101  300   100 0 1
P-NCTRASH  1.00E+05 9.87E-01 4.00E-01 3.31E-01 1500001  100   100 0 1
B-COTRASH  4.20E+04 5.00E-01 3.00E-01 3.95E-02 1310101  200   100 0 1
B-NCTRASH  3.27E+04 1.00E+00 4.00E-01 8.52E-02 1500001  100   100 0 1
L-NFRCOMP  1.87E+04 9.43E-01 7.80E+00 7.30E+00  800001  100   100 0 1
L-DECONRS  9.28E+02 1.40E+00 1.70E+00 1.67E+01 1201101  100   140 0 2
F-PROCESS  2.54E+04 1.00E+00 1.00E+00 1.08E-04  700002  100   100 0 1
F-COTRASH  5.11E+04 6.67E-01 2.00E-01 8.37E-06  710102  150   100 0 1
F-NCTRASH  1.36E+04 1.00E+00 4.00E-01 5.33E-06  500002  100   100 0 1
U-PROCESS  1.52E+04 1.00E+00 1.00E+00 3.80E-04  700002  100   100 0 1
L-PUDECON   .00E+00 1.00E+00 1.60E+00 4.17E+00  504002  100   100 0 5
I-COTRASH  2.70E+04 5.00E-01 3.00E-01 2.26E-01  710102  200   100 0 1
I+COTRASH  5.39E+04 1.00E+00 1.00E-01 1.13E-01  700002  100   100 0 1
I-ABSLIQD  6.36E+03 3.00E+00 1.00E+00 6.65E-02  700002  100   300 0 1
I+ABSLIQD  6.36E+03 3.00E+00 1.00E+00 6.65E-02  700002  100   300 0 1
I-LIQSCVL  3.38E+03 3.00E+00 9.00E-01 3.20E-03  700002  100   300 0 1
I+LIQSCVL  3.38E+03 3.00E+00 9.00E-01 3.20E-03  700002  100   300 0 1
I-BIOWAST  2.17E+03 1.92E+00 1.10E+00 1.07E-01  700002  100   192 0 1
I+BIOWAST  2.17E+03 1.92E+00 1.10E+00 1.07E-01  700002  100   192 0 1
N-SSTRASH  4.59E+04 6.67E-01 2.00E-01 1.67E-05  710102  150   100 0 1
N+SSTRASH  6.88E+04 1.00E+00 1.00E-01 1.12E-05  700002  100   100 0 1
N-SSWASTE  2.43E+04 1.00E+00 1.00E+00 2.17E-04  700002  100   100 0 1
N-LOTRASH  9.72E+03 5.00E-01 3.00E-01 7.05E-02  710102  200   100 0 1
N+LOTRASH  1.94E+04 1.00E+00 1.00E-01 3.53E-02  700002  100   100 0 1
N-LOWASTE  2.31E+04 1.00E+00 5.00E-01 2.11E-02  700002  100   100 0 1
N-ISOPROD   .00E+00 1.00E+00 1.70E+00 2.26E+01  704001  100   100 0 3
N-ISOTRSH   .00E+00 1.00E+00 6.00E-01 1.14E-03  500001  100   100 0 1
N-SORMFG1   .00E+00 1.14E-02 2.00E+00 9.51E-05  700002  100   100 0 1
N-SORMFG2  7.51E+03 9.90E-01 4.00E-01 9.36E-02 1100001  100   100 0 1
N-SORMFG3   .00E+00 2.00E+00 4.00E-01 3.00E+03  704001  100   200 0 4
N-SORMFG4   .00E+00 1.00E+00 4.00E-01 6.04E-01  500002  100   100 0 1
N-NECOTRA   .00E+00 5.00E-01 3.00E-01 8.41E-01  710102  200   100 0 1
N-NEABLIQ   .00E+00 4.10E+00 9.00E-01 1.36E+01  700002  100   410 0 1
N-NESOLIQ   .00E+00 1.40E+00 1.70E+00 1.87E+01  701102  100   140 0 1
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ECONOMY Output

N-NEVIALS	.00E+00	3.00E+00	1.00E+00	1.06E+01	700002	100	300	0	1
N-NENCGLS	.00E+00	1.00E+00	1.00E+00	1.99E+01	700002	100	100	0	1
N-NEWOTAL	.00E+00	1.00E+00	1.00E+00	5.66E-01	700002	100	100	0	1
N-NETRGAS	.00E+00	5.35E+00	1.00E-03	8.64E+03	704002	100	535	0	3
N-NETRILI	.00E+00	5.35E+00	9.00E-01	8.64E+03	704002	100	535	0	3
N-NECARLI	.00E+00	5.35E+00	9.00E-01	7.68E+01	704002	100	535	0	5
N-MWTRASH	.00E+00	1.00E+00	4.00E-01	1.84E+00	700002	100	100	0	1
N-MWABLIQ	.00E+00	5.50E+00	1.00E+00	3.76E+01	704002	100	550	0	4
N-MWSOLIQ	.00E+00	1.40E+00	1.70E+00	7.21E+02	701102	100	140	0	3
N-MWWASTE	.00E+00	1.00E+00	4.00E-01	3.50E+01	704002	100	100	0	5
N-TRIPLAT	5.94E+01	7.25E-01	1.00E+00	1.61E+01	700002	100	100	0	1
N-TRITGAS	8.90E+00	3.00E-02	1.00E-03	2.61E+01	700002	100	100	0	1
N-TRISCNT	4.16E+00	1.91E+00	9.00E-01	5.30E+00	700002	100	300	0	1
N-TRILIQD	3.37E+02	2.04E+00	1.00E+00	5.08E+00	700002	100	300	0	1
N-TRITRSH	1.62E+01	7.79E-01	1.00E-01	7.76E+00	700002	100	100	0	1
N-TRIFOIL	2.35E-01	1.23E-01	4.00E-01	8.25E+00	700002	100	100	0	1
N-HIGHACT	1.00E+03	1.00E+00	7.80E+00	2.11E+02	700002	100	100	0	1
N-TRITSOR	4.33E+01	8.68E-01	4.00E-01	8.10E-01	700002	100	100	1	1
N-CARBSOR	2.50E+01	1.00E+00	4.00E-01	1.00E-02	700002	100	100	2	1
N-COBLSOR	7.77E+01	6.22E-01	4.00E-01	9.10E+00	700002	100	100	3	1
N-NICKSOR	2.50E+01	1.00E+00	4.00E-01	1.00E-02	700002	100	100	4	1
N-STROSOR	2.64E+00	5.28E-02	4.00E-01	1.02E-03	700002	100	100	5	1
N-CESISOR	3.46E+01	2.78E-01	4.00E-01	2.32E-02	700002	100	100	6	1
N-PLUBSOR	5.54E-04	1.48E-05	1.70E+00	4.60E-06	701102	100	100	7	4
N-AMERSOR	6.99E-04	1.40E-05	4.00E-01	4.08E-07	700002	100	100	9	1
N-PUBESOR	4.99E-04	1.33E-05	1.70E+00	1.34E-04	701102	100	10010		5
N-RANEEDS	1.20E-01	3.00E-05	1.70E+00	3.00E-05	701102	100	10012		4
N-RACELLS	3.14E-02	1.80E-05	4.00E-01	2.76E-06	700002	100	10013		1
N-RAPLAQU	3.03E-02	1.80E-04	4.00E-01	2.10E-07	700002	100	10014		1
N-RAMISCL	4.14E+02	4.63E-01	4.00E-01	9.88E-07	700002	100	10017		1
N-RARESIN	2.77E+03	1.40E+00	1.70E+00	2.50E-02	801102	100	140	0	4
M-NAVYDRY	5.61E+02	1.00E+00	4.00E-01	2.00E-02	700001	100	100	0	1
M-NAVYWET	3.40E+03	9.42E-01	1.70E+00	2.15E-01	701101	100	100	0	1
R-FUEHARD	.00E+00	1.00E+00	7.80E+00	1.50E+05	805101	100	100	0	6
R-SILIGEL	.00E+00	1.00E+00	8.00E-01	3.73E+00	704001	100	100	0	6
R-MPCOTRH	.00E+00	3.33E-01	4.00E-01	2.94E+00	714101	300	100	0	6
R-MPCOTRL	.00E+00	3.33E-01	4.00E-01	8.98E-04	710101	300	100	0	1
R-MPNCTRA	.00E+00	1.00E+00	4.00E-01	1.19E+00	504001	100	100	0	6
R-SBRESIN	.00E+00	1.40E+00	1.70E+00	3.58E+01	901101	100	140	0	3
R-SBCOLIQ	.00E+00	1.40E+00	1.70E+00	4.98E+01	901101	100	140	0	3
R-SBCOTRA	.00E+00	3.33E-01	4.00E-01	1.03E-01	710101	300	100	0	1
R-SBNCTRA	.00E+00	1.00E+00	4.00E-01	1.50E-02	500001	100	100	0	1
R-UFFINES	.00E+00	1.00E+00	1.50E+00	6.62E+00	704001	100	100	0	6
R-UFK2MUD	.00E+00	1.00E+00	1.20E+00	1.73E-02	700001	100	100	0	1
R-UFCOTRA	.00E+00	3.33E-01	4.00E-01	2.60E-02	710101	300	100	0	1
R-UFNCTRA	.00E+00	1.00E+00	4.00E-01	5.15E-03	500001	100	100	0	1
P-DECORES	4.79E+01	1.00E+00	7.80E+00	3.10E+05	805101	100	100	0	6
P-DEACINT	4.88E+02	4.45E-01	7.80E+00	5.30E+01	800001	100	100	0	1
P-DEACVES	7.59E+02	8.31E-01	7.80E+00	5.65E+01	800001	100	100	0	1
P-DEACTCO	2.39E+03	1.00E+00	4.50E+00	2.80E+00	500001	100	100	0	1
P-DECONME	2.05E+04	1.00E+00	2.00E+00	1.57E-01	500001	100	100	0	1
P-DECONCO	3.58E+04	1.00E+00	3.00E+00	9.40E-03	500001	100	100	0	1
P-DETRASH	1.84E+03	3.33E-01	4.00E-01	1.59E+00	710101	300	100	0	1
P-DEFILCR	3.43E+01	1.00E+00	1.70E+00	5.59E+02	701101	100	100	0	6
P-DEEVAPB	7.20E+02	1.40E+00	1.70E+00	7.42E+01	901101	100	140	0	6
B-DECORES	4.84E+01	1.00E+00	7.80E+00	1.29E+05	805101	100	100	0	6

ECONOMY Output

B-DEACINT	1.84E+01	2.15E-01	7.80E+00	6.22E+01	800001	100	100	0	1
B-DEACVES	8.12E+00	1.00E+00	7.80E+00	2.70E+02	800001	100	100	0	1
B-DEACTCO	7.93E+01	1.00E+00	4.50E+00	1.90E+00	500001	100	100	0	1
B-DECONME	1.19E+04	1.00E+00	2.00E+00	5.70E-01	500001	100	100	0	1
B-DECONCO	4.51E+03	1.00E+00	3.00E+00	4.39E-02	500001	100	100	0	1
B-DETRASH	1.21E+03	3.33E-01	4.00E-01	1.59E+00	710101	300	100	0	1
B-DERESIN	6.28E+01	1.40E+00	1.70E+00	3.86E+00	901101	100	140	0	3
B-DEEVAPB	6.55E+02	1.40E+00	1.70E+00	5.36E+01	901101	100	140	0	4
W-COTRASH	.00E+00	3.33E-01	4.00E-01	1.93E-03	510101	300	100	0	1
W-NCSOLID	.00E+00	1.00E+00	4.00E-01	2.80E-03	500001	100	100	0	1
W-LLWTFRE	.00E+00	1.00E+00	9.00E-01	1.48E-02	700001	100	100	0	1
W-FRSRESN	.00E+00	4.33E-03	9.00E-01	9.15E-02	800001	100	100	0	1
W-FRSLIQD	.00E+00	1.40E+00	1.70E+00	2.67E+00	701101	100	140	0	3
W-RTSRESN	.00E+00	5.71E-02	9.00E-01	2.15E-01	700001	100	100	0	1
W-LTTRASH	.00E+00	1.40E-01	4.00E-01	2.16E-02	510101	300	100	0	1
W-HTTRASH	.00E+00	1.49E-02	4.00E-01	3.87E-03	510101	300	100	0	1
W-LTEQUIP	.00E+00	1.48E-03	2.00E+00	8.19E-03	500001	100	100	0	1
W-HTEQUIP	.00E+00	3.65E-04	2.00E+00	8.43E-03	500001	100	100	0	1
W-PDWLIQD	.00E+00	1.40E+00	1.70E+00	3.60E+01	701101	100	140	0	4
W-VITSUPR	.00E+00	1.40E+00	1.70E+00	6.73E-01	701101	100	140	0	3
W-VITWASH	.00E+00	1.40E+00	1.70E+00	2.61E+01	701101	100	140	0	6
W-VITSCRB	.00E+00	1.40E+00	1.70E+00	5.05E+01	701101	100	140	0	4
W-VITMELT	.00E+00	1.40E+00	1.70E+00	1.98E+03	701101	100	140	0	4
W-VITFRAC	.00E+00	1.40E+00	1.70E+00	4.45E-02	701101	100	140	0	1
W-VITZEOL	.00E+00	1.40E+00	1.70E+00	2.70E+00	701101	100	140	0	3
W-DDRACKS	.00E+00	1.48E-01	2.00E+00	1.64E-02	500001	100	100	0	1
W-DDLTRUB	.00E+00	9.15E-01	2.00E+00	1.06E-02	500001	100	100	0	1
W-DDHTRUB	.00E+00	2.10E-02	2.00E+00	2.84E-03	500001	100	100	0	1
W-DDLTLQD	.00E+00	1.40E+00	1.70E+00	1.00E+02	701101	100	140	0	6
W-DDHTLQD	.00E+00	6.47E-05	1.70E+00	1.96E-02	701101	100	140	0	1
W-DDRESIN	.00E+00	1.40E+00	1.70E+00	2.81E+02	701101	100	140	0	6
L-FUEHARD	.00E+00	1.00E+00	7.80E+00	1.50E+05	805101	100	100	0	6
P-IXRESIN	2.03E+03	1.05E-01	1.70E+00	6.24E-01	1201101	100	140	0	2
P-CONCLIQ	1.69E+03	2.34E-02	1.70E+00	2.70E+00	1201101	100	140	0	3
P-FSLUDGE	.00E+00	1.26E-01	1.70E+00	7.30E+00	1201101	100	140	0	2
B-IXRESIN	1.17E+03	8.40E-02	1.70E+00	1.25E+00	1201101	100	140	0	2
B-CONCLIQ	1.60E+03	2.57E-02	1.70E+00	8.64E-01	1201101	100	140	0	3
B-FSLUDGE	6.68E+02	3.71E-02	1.70E+00	5.55E-01	1201101	100	140	0	2
P-NCTRASH	1.27E+03	1.26E-02	4.00E-01	4.04E+00	1504001	100	100	0	4
L-NFRCOMP	1.06E+03	5.33E-02	7.80E+00	1.00E+03	805101	100	100	0	3
N-SORMFG1	.00E+00	1.08E-01	2.00E+00	9.36E-04	704002	100	100	0	4
N-SORMFG2	3.59E+01	4.72E-03	4.00E-01	1.67E+02	1104001	100	100	0	3
N-TRIPLAT	2.25E+01	2.75E-01	1.00E+00	1.74E+03	704002	100	100	0	3
N-TRITGAS	2.88E+02	9.70E-01	1.00E-03	6.12E+02	704002	100	100	0	3
N-TRISCNT	8.60E-02	3.94E-02	1.20E+00	4.38E+00	753112	452	200	0	2
N-TRILIQD	7.45E+01	4.50E-01	1.70E+00	1.56E+03	701102	100	140	0	3
N-TRITRSH	4.60E+00	2.21E-01	1.00E-01	2.86E+02	704002	100	100	0	3
N-TRIFOIL	1.67E+00	8.77E-01	4.00E-01	8.89E+02	704002	100	100	0	3
N-TRITSOR	6.58E+00	1.32E-01	1.70E+00	2.25E+00	701102	100	100	1	3
N-COBLSOR	4.71E+01	3.78E-01	1.70E+00	1.31E+03	701102	100	100	3	3
N-STROSOR	4.58E+01	9.17E-01	1.70E+00	6.78E-01	701102	100	100	5	3
N-CESISOR	5.89E+01	4.72E-01	1.70E+00	6.97E-01	701102	100	100	6	3
N-PLUBSOR	4.99E-03	1.33E-04	1.70E+00	4.14E-05	701102	100	100	7	5
N-AMERSOR	6.29E-03	1.26E-04	1.70E+00	3.68E-06	701102	100	100	9	4
N-RANEEDS	2.37E+00	5.95E-04	1.70E+00	2.84E-04	701102	100	100	12	5
N-RACELLS	2.83E-01	1.62E-04	1.70E+00	2.51E-05	701102	100	100	13	4

ECONOMY Output

N-RAPLAQU	2.73E-01	1.62E-03	1.70E+00	2.01E-06	701102	100	10014		4
N-RAMISCL	2.58E+02	2.88E-01	1.70E+00	5.56E-06	701102	100	10017		4
M-NAVYWET	9.62E+01	2.66E-02	1.70E+00	4.57E+00	701101	100	100	0	3
P-DEACINT	5.52E+02	5.03E-01	7.80E+00	7.07E+03	805101	100	100	0	3
P-DEACVES	1.55E+02	1.69E-01	7.80E+00	2.35E+02	805101	100	100	0	3
B-DEACINT	5.24E+01	[illegible]	7.80E+00	1.33E+03	805101	100	100	0	3
W-FRSRESN	.00E+00	2.43E-03	1.70E+00	2.79E-02	801101	100	140	0	2
W-RTSRESN	.00E+00	3.20E-02	1.70E+00	1.12E-01	701101	100	140	0	2
W-LTTRASH	.00E+00	9.81E-03	1.20E+00	9.87E-01	763121	8000	200	0	3
W-HTTRASH	.00E+00	1.39E-03	1.20E+00	7.33E-02	763121	8000	200	0	4
W-LTEQUIP	.00E+00	1.56E-01	2.00E+00	8.68E-01	504001	100	100	0	3
W-HTEQUIP	.00E+00	3.74E-03	2.00E+00	8.68E-02	504001	100	100	0	3
W-DDRACKS	.00E+00	8.52E-01	2.00E+00	1.58E-01	504001	100	100	0	3
W-DDLTRUB	.00E+00	8.46E-02	2.00E+00	1.01E-01	504001	100	100	0	3
W-DDHTRUB	.00E+00	1.89E-01	2.00E+00	2.68E-02	504001	100	100	0	4
W-DDHTLQD	.00E+00	2.08E-02	1.70E+00	6.32E+00	701101	100	140	0	3
P-IXRESIN	3.60E+03	1.87E-01	1.70E+00	2.36E+00	1201101	100	140	0	3
P-CONCLIQ	1.14E+03	1.58E-02	1.70E+00	1.65E+01	1201101	100	140	0	4
P-FSLUDGE	.00E+00	4.64E-03	1.70E+00	2.71E+00	1201101	100	140	0	3
B-IXRESIN	6.62E+03	4.74E-01	1.70E+00	7.83E+00	1201101	100	140	0	3
B-CONCLIQ	5.61E+03	9.01E-02	1.70E+00	4.76E+00	1201101	100	140	0	4
B-FSLUDGE	6.71E+03	3.73E-01	1.70E+00	8.06E+00	1201101	100	140	0	3
L-NFRCOMP	6.57E+01	3.32E-03	7.80E+00	8.83E+03	805101	100	100	0	4
N-SORMFG1	.00E+00	4.84E-01	2.00E+00	9.78E-02	704002	100	100	0	5
N-SORMFG2	3.92E+01	5.17E-03	4.00E-01	5.16E+02	1104001	100	100	0	4
N-TRISCNT	2.66E-01	1.22E-01	1.20E+00	2.49E+01	753112	452	200	0	3
N-STROSOR	1.51E+00	3.02E-02	1.70E+00	1.25E+01	701102	100	100	5	4
N-CESISOR	2.12E+01	1.70E-01	1.70E+00	4.97E+01	701102	100	100	6	4
N-AMERSOR	6.29E-02	1.26E-03	1.70E+00	3.70E-05	701102	100	100	9	5
N-RACELLS	2.83E+00	1.62E-03	1.70E+00	2.80E-04	701102	100	10013		5
N-RAPLAQU	9.32E-01	5.53E-03	1.70E+00	1.23E-04	701102	100	10014		5
N-RAMISCL	4.37E+01	4.88E-02	1.70E+00	1.26E-04	701102	100	10017		5
M-NAVYWET	1.15E+02	3.18E-02	1.70E+00	1.46E+01	701101	100	100	0	4
P-DEACINT	5.75E+01	5.24E-02	7.80E+00	4.03E+04	805101	100	100	0	4
B-DEACINT	1.47E+01	1.72E-01	7.80E+00	1.26E+04	805101	100	100	0	4
W-FRSRESN	.00E+00	9.25E-01	1.70E+00	1.04E+01	801101	100	140	0	3
W-RTSRESN	.00E+00	1.29E+00	1.70E+00	2.53E+00	701101	100	140	0	3
W-LTTRASH	.00E+00	4.72E-03	1.20E+00	3.38E+00	763121	8000	200	0	4
W-HTTRASH	.00E+00	1.15E-01	4.00E-01	4.04E-02	514101	300	100	0	4
W-LTEQUIP	.00E+00	7.59E-01	2.00E+00	6.49E+00	504001	100	100	0	4
W-HTEQUIP	.00E+00	3.69E-02	2.00E+00	8.87E-01	504001	100	100	0	4
W-DDHTRUB	.00E+00	6.93E-01	2.00E+00	1.73E-01	504001	100	100	0	6
W-DDHTLQD	.00E+00	1.88E-01	1.70E+00	6.60E+01	701101	100	140	0	4
P-IXRESIN	4.12E+03	2.14E-01	1.70E+00	1.12E+01	1201101	100	140	0	4
P-CONCLIQ	9.63E+01	1.33E-03	1.70E+00	7.10E+01	1201101	100	140	0	5
P-FSLUDGE	.00E+00	7.88E-02	1.70E+00	4.96E+01	1201101	100	140	0	4
B-IXRESIN	2.61E+02	1.87E-02	1.70E+00	7.64E+01	1201101	100	140	0	4
B-FSLUDGE	5.42E+02	3.01E-02	1.70E+00	5.49E+01	1201101	100	140	0	4
L-NFRCOMP	3.07E+00	1.55E-04	7.80E+00	1.89E+04	805101	100	100	0	5
W-FRSRESN	.00E+00	4.67E-01	1.70E+00	2.58E+01	801101	100	140	0	4
W-HTTRASH	.00E+00	6.83E-03	1.20E+00	1.65E+00	763121	8000	200	0	6
W-LTEQUIP	.00E+00	8.35E-02	2.00E+00	7.28E+01	504001	100	100	0	6
W-HTEQUIP	.00E+00	2.54E-01	2.00E+00	9.57E+00	504001	100	100	0	6
W-DDHTLQD	.00E+00	8.62E-01	1.70E+00	6.23E+02	701101	100	140	0	6
P-IXRESIN	1.92E+01	9.99E-04	1.20E+00	8.05E-01	1202101	100	200	0	4
P-FSLUDGE	.00E+00	1.06E-03	1.20E+00	1.72E+01	1202101	100	200	0	4

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B-FSLUDGE  3.83E+00 2.13E-04 1.20E+00 3.92E+01 1202101  100  200 0 4
W-HTTRASH   .00E+00 5.36E-02 4.00E-01 3.56E-01  514101  300  100 0 6
P-IXRESIN  8.69E+02 4.52E-02 1.70E+00 9.60E+01 1201101  100  140 0 5
P-FSLUDGE   .00E+00 7.95E-03 1.70E+00 2.42E+02 1201101  100  140 0 5
B-FSLUDGE  1.35E+01 7.47E-04 1.70E+00 3.93E+02 1201101  100  140 0 5
P-IXRESIN  2.68E+00 1.39E-04 1.20E+00 1.72E+01 1202101  100  200 0 5
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TOTAL INCIN/POP (P-MREM) - REGION = 1

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

TOTAL INCIN/POP (P-MREM) - REGION = 2

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

TOTAL INCIN/POP (P-MREM) - REGION = 3

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
B	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

TOTAL INCIN/POP (P-MREM) - REGION = 4

CLASS	LUNGS	S. WALL	LLI WALL	T. BODY	KIDNEYS	LIVER	RED MAR	BONE	THYROID	ICRP
A	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
SA	3.50E+00	4.37E+00	5.65E+00	3.48E+00	3.59E+00	3.47E+00	3.46E+00	2.75E+00	3.47E+00	3.73E+00
B	1.99E+01	2.49E+01	3.21E+01	1.98E+01	2.04E+01	1.97E+01	1.97E+01	1.56E+01	1.97E+01	2.12E+01
C	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D1	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
D2	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
TOTAL	2.34E+01	2.92E+01	3.78E+01	2.33E+01	2.40E+01	2.32E+01	2.32E+01	1.84E+01	2.32E+01	2.49E+01

TOTAL TRANS POP (P-MREM)

CLASS	IRI= 1	IRI= 2	IRI= 3	IRI= 4
A	1.13E+04	3.02E+03	2.35E+04	5.32E+06
SA	.00E+00	.00E+00	.00E+00	6.64E+04
B	5.65E+04	1.51E+04	1.17E+05	3.96E+05
C	4.84E+03	1.30E+03	1.01E+04	2.45E+05
D1	2.70E-01	7.23E-02	5.61E-01	4.34E+04
D2	.00E+00	.00E+00	.00E+00	1.99E+04

ECONOMY Output

ANNUAL IMPACTS	A	SA	B	C	D1	D2	TOTAL
PRCS COSTS ($)	2.92E+07	2.73E+05	1.31E+06	1.10E+06	4.09E+04	8.90E+04	3.21E+07
PRCS ODOSE-PMR	4.14E+04	1.09E+02	4.34E+02	2.09E+02	2.65E+00	6.95E+01	4.22E+04
LOAD ODOSE-PMR	1.29E+04	1.98E+02	1.17E+03	7.20E+02	9.79E+01	5.62E+01	1.51E+04
TRAN ODOSE-PMR	1.51E+06	1.92E+04	1.16E+05	7.12E+04	1.26E+04	5.75E+03	1.73E+06
TRAN COSTS ($)	1.45E+07	2.13E+05	1.37E+06	8.53E+05	1.56E+05	7.33E+04	1.72E+07
SHIP ODOSE-PMR	1.18E+04	1.47E+02	8.77E+02	5.44E+02	9.62E+01	4.40E+01	1.35E+04
EMPL ODOSE-PMR	1.13E+04	1.69E+02	1.00E+03	6.46E+02	8.66E+01	6.18E+01	1.33E+04

AREAS OF THE FACILITY (M**2)
DISPOSAL= 9.23E+05
ADMINIST= 3.68E+04
BUFFER = 1.24E+05
CONTINGY= 3.14E+05

WORKERS

LABEL	NUMBER	LABEL	NUMBER	LABEL	NUMBER
RADTECH	13.292	QA TECH	5.455	HE OPS	6.725
SKILLED	7.520	LABORER	9.411	SURVEYR	.048
AD NBGD	13.000	AD BGD	16.000	GUARDS	6.000

EQUIPMENT

LABEL	NUMBER	LABEL	NUMBER	LABEL	NUMBER
BULLDOZ	1.139	FE LOAD	.662	DMP TRU	2.666
PAN SCR	.474	MOTOR G	.226	BACKHOE	.000
40-TN C	4.547	100-TN	3.855	S-FRKLI	5.669
L-FRKLI	2.835	H2O TRU	.000	AUGER H	.000
STEMMER	.000	PAVING	.000	TANDEM	.000
COMPACT	.173	H. TAMP	.000	CEM TRU	.067
CEM BCK	.000	CEM PU&	.000	PICKUP	4.000
4WD TRU	4.000	SEDAN	2.000	YARD TR	2.000
FLATBED	2.000	ACCESSO	.000	FARM TR	.000

DISPOSAL CONFIGURATION - ANNUAL VALUES

NO	EFF	SEF	DPT	DTK	TSUM	AREA	DISN	VBAK
1	5.25E+00	6.90E-01	2.00E+00	7.00E+00	5.29E+00	1.26E+04	2.11E+01	1.23E+04
2	1.14E+01	8.80E-01	2.01E+00	1.21E+00	2.87E-01	2.86E+01	5.30E-03	2.56E+02
3	1.14E+01	8.80E-01	3.22E+00	6.18E+00	8.26E+00	1.36E+02	2.52E-02	.00E+00
4	1.14E+01	8.80E-01	9.41E+00	5.25E+00	1.33E+01	1.01E+02	1.87E-02	.00E+00
5	1.14E+01	8.80E-01	1.47E+01	3.43E-01	1.05E+01	6.17E+00	1.14E-03	.00E+00
6	5.70E+00	4.40E-01	2.00E+00	5.70E+00	2.54E+00	6.64E+00	7.71E-03	.00E+00

PREOPERATIONAL COSTS

ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
LAND COSTS	1.38E+02	1.38E+01	1.38E+01	1.38E+01	5.11E+02
LICENSING COSTS	1.15E+03	1.96E+03	4.57E+02	1.11E+03	3.50E+02
ADMINISTRATION	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02
STARTUP OVERHD	.00E+00	.00E+00	.00E+00	.00E+00	1.16E+03
HEAVY EQPT PURC	.00E+00	.00E+00	.00E+00	.00E+00	3.77E+03
LIGHT EQPT PURC	.00E+00	.00E+00	.00E+00	.00E+00	2.50E+02
LAND DEVELPMNT	.00E+00	1.13E+02	.00E+00	1.13E+02	9.05E+02
BUILDINGS COSTS	.00E+00	.00E+00	.00E+00	.00E+00	2.23E+03
UTILITIES	.00E+00	.00E+00	.00E+00	.00E+00	2.00E+02
ENG & DESIGN	.00E+00	1.13E+01	.00E+00	1.13E+01	3.33E+02
CONTINGENCY	3.87E+02	5.48E+02	2.23E+02	3.79E+02	2.07E+03
TOTALS	2.32E+03	3.29E+03	1.34E+03	2.27E+03	1.24E+04

ECONOMY Output

OPERATIONAL COSTS

ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8
SALARIES + OH	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03
DIS CELL MATRS	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01
ENV MONITORING	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02
PER TRN & MON	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02
HEAVY EQPT OPS	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02
QA AND CONTROL	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00
CONSTANT COSTS	1.53E+03	1.53E+03	1.53E+03	1.53E+03	1.73E+03	1.53E+03	1.53E+03	1.53E+03
HEAVY EQPT REPL	.00E+00	.00E+00	.00E+00	.00E+00	1.24E+02	.00E+00	.00E+00	.00E+00
LIGHT EQPT REPL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
MAINTENANCE	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01
CONTINGENCY	9.80E+02	9.80E+02	9.80E+02	9.80E+02	1.05E+03	9.80E+02	9.80E+02	9.80E+02
TOTALS	5.88E+03	5.88E+03	5.88E+03	5.88E+03	6.27E+03	5.88E+03	5.88E+03	5.88E+03

ITEM	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16
SALARIES + OH	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03
DIS CELL MATRS	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01
ENV MONITORING	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02
PER TRN & MON	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02
HEAVY EQPT OPS	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02
QA AND CONTROL	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00
CONSTANT COSTS	1.53E+03	1.73E+03	1.53E+03	1.53E+03	1.53E+03	1.53E+03	1.73E+03	1.53E+03
HEAVY EQPT REPL	.00E+00	3.77E+03	.00E+00	.00E+00	.00E+00	.00E+00	1.24E+02	.00E+00
LIGHT EQPT REPL	.00E+00	2.50E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
MAINTENANCE	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01
CONTINGENCY	9.80E+02	1.82E+03	9.80E+02	9.80E+02	9.80E+02	9.80E+02	1.05E+03	9.80E+02
TOTALS	5.88E+03	1.09E+04	5.88E+03	5.88E+03	5.88E+03	5.88E+03	6.27E+03	5.88E+03

ITEM	YEAR 17	YEAR 18	YEAR 19	YEAR 20	YEAR 21	YEAR 22	YEAR 23	YEAR 24
SALARIES + OH	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03
DIS CELL MATRS	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01
ENV MONITORING	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02
PER TRN & MON	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02
HEAVY EQPT OPS	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02
QA AND CONTROL	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00
CONSTANT COSTS	1.53E+03	1.53E+03	1.53E+03	1.73E+03	1.53E+03	1.53E+03	1.53E+03	1.53E+03
HEAVY EQPT REPL	.00E+00	.00E+00	.00E+00	3.77E+03	.00E+00	.00E+00	.00E+00	.00E+00
LIGHT EQPT REPL	.00E+00	.00E+00	.00E+00	2.50E+02	.00E+00	.00E+00	.00E+00	.00E+00
MAINTENANCE	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01
CONTINGENCY	9.80E+02	9.80E+02	9.80E+02	1.82E+03	9.80E+02	9.80E+02	9.80E+02	9.80E+02
TOTALS	5.88E+03	5.88E+03	5.88E+03	1.09E+04	5.88E+03	5.88E+03	5.88E+03	5.88E+03

ITEM	YEAR 25	YEAR 26	YEAR 27	YEAR 28	YEAR 29	YEAR 30	YEAR 31	YEAR 32
SALARIES + OH	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	2.33E+03	.00E+00	.00E+00
DIS CELL MATRS	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	2.31E+01	.00E+00	.00E+00
ENV MONITORING	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	1.65E+02	.00E+00	.00E+00
PER TRN & MON	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	1.29E+02	.00E+00	.00E+00
HEAVY EQPT OPS	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	6.80E+02	.00E+00	.00E+00
QA AND CONTROL	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00	.00E+00	.00E+00
CONSTANT COSTS	1.73E+03	1.53E+03	1.53E+03	1.53E+03	1.53E+03	1.73E+03	.00E+00	.00E+00
HEAVY EQPT REPL	1.24E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
LIGHT EQPT REPL	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
MAINTENANCE	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	4.02E+01	.00E+00	.00E+00
CONTINGENCY	1.05E+03	9.80E+02	9.80E+02	9.80E+02	9.80E+02	1.02E+03	.00E+00	.00E+00
TOTALS	6.27E+03	5.88E+03	5.88E+03	5.88E+03	5.88E+03	6.12E+03	.00E+00	.00E+00

ECONOMY Output

```
CLO/OBS/INS COSTS
ITEM                COSTS
SALARIES         4.45E+02
EQPT EXPENSES    5.24E+01
OTHER COSTS      1.54E+03
SALARIES         6.94E+01
ENV&PER MONITRG  3.82E+02
EQPT EXPENSES    1.29E+02
OTHER COSTS      7.40E+02
VARIABLE COSTS   6.96E+02
OTHER COSTS      3.96E+02

ENTER AND/OR CONFIRM ECONOMIC PARAMETERS
DISCOUNT RATE =  .15
TAX RATE      =  .50
INTEREST RATE =  .08
F-SUB-PREOPS  =  .04
F-SUB-OPERTNS =  .04
F-SUB-CLOSURE =  .05
F-SUB-SURVEIL =  .05
F-SUB-INSTIT  =  .06
SURETY/CLOSUR =  .01
SURETY/INSTIT =  .01
ITC RATE      =  .08
ADJUSTMNT FAC =  .04

ALL COSTS ARE BEING DISCOUNTED TO 1986

CLOSURE PERIOD= 1 CALCULATED COSTS= 2.20E+03
OPTION SELECTED: 0=CALCULATED, 1=OVERRIDE - 0

SURVEIL PERIOD= 5 CALCULATED COSTS= 1.43E+03
OPTION SELECTED: 0=CALCULATED, 1=OVERRIDE - 0

INSTITU PERIOD= 100 CALCULATED COSTS= 1.18E+03
OPT SELCTD: 0=CALC, 1=LUMP SUM, 2=OVERRIDE - 1
 $ 5.00E+02 HAS BEEN ADDED TO YEAR  25
 $ 5.00E+02 HAS BEEN ADDED TO YEAR  50
 $ 5.00E+02 HAS BEEN ADDED TO YEAR  75

   PVPOE     PVPOC     PVOE      PVOC      PVCC      PVSC
 4.88E+03  6.28E+03  1.74E+04  1.66E+03  2.98E+01  7.41E+01

   PVSBC     PVSBI     PVOB      PVDE      PVICP     PVICO
 6.23E+01  8.85E+02  1.65E+02  1.23E+03  5.02E+02  1.46E+02

   PVITC     PVR       USC       UCI       UCA
 6.48E+02  8.87E+04  4.83E-02  3.30E-01  6.41E-01
```

Summary of Abbreviations for ECONOMY Output

Radiological Impacts

INCIN/POP: population impacts (person-mrem/yr) due to waste incineration
TRANS POP: population impacts (person-mrem/yr) due to waste transportation
PRCS COSTS: costs ($) associated with waste processing prior to disposal
PRCS ODOSE: worker impacts (person-mrem/yr) associated with waste processing
LOAD ODOSE: worker impacts (person-mrem/yr) associated with loading waste transport vehicles
TRAN ODOSE: worker impacts (person-mrem/yr) associated with waste transport
TRAN COSTS: costs ($) associated with waste transport
SHIP ODOSE: worker impacts (person-mrem/yr) associated with checking waste transport vehicles into and out of the disposal facility
EMPL ODOSE: worker impacts (person-mrem/yr) associated with waste emplacement at the disposal facility

Areas (m^2 - see "Land", Section C.4.2.1, Vol. 1)

DISPOSAL: disposal area
BUFFER: buffer area
ADMINIST: administration area
CONTINGY: contingency area

Workers (numbers - see Table C-9, Vol. 1)

RADTECH: radiation safety technician
QA TECH: quality assurance technician
HE OPS: heavy equipment operator
SKILLED: skilled laborer
LABORER: unskilled laborer
SURVEYR: surveyor
AD NBGD: administration personnel
AD BGD: support personnel less guards
GUARDS: security guards

Equipment (numbers - see Tables C-5 & C-6, Vol. 1)

BULLDOZ: bulldozer
PAN SCR: pan scraper
40-TN C: 40-ton crane
L-FRKLI: large forklift
STEMMER: stemming unit
COMPACT: compactor
CEM BCK: cement bucket
4WD TRU: 4WD truck
FLATBED: flatbed trailer
FE LOAD: front end loader
MOTOR G: motor grader
100-TN: 100-ton crane
H2O TRU: water truck
PAVING: paving machine
H. TAMP: hand tamper
CEM PU&: cement pump & pipes
SEDAN: sedan
ACCESSO: accessories
DMP TRU: dump truck
BACKHOE: backhoe
S-FRKLI: small forklift
AUGER R: auger rig
TANDEM: tandem roller
CEM TRU: cement truck
PICKUP: pickup truck
YARD TR: yard tractor
FARM TR: farm tractor

Disposal Configuration - Annual Values

EFF: volumetric disposal efficiency (m)
SEF: surface utilization efficiency
DPT: disposal cell depth (m)
DTK: disposal cell thickness (m)
TSUM: intermediate value (see Chapter 5, Vol. 1)
AREA: disposal cell surface area (m^2)
DISN: number of disposal cells
VBAK: plug backfill volume (m^3)

Summary of Abbreviations for ECONOMY Output

Preoperational Costs ($1000 - see Table C-7, Vol. 1)

LAND COSTS: land costs
LICENSING COSTS: licensing costs
ADMINISTRATION: administration costs
STARTUP OVERHD: startup overhead costs
HEAVY EQPT PURC: heavy equipment costs
LIGHT EQPT PURC: light equipment costs
LAND DEVELPMNT: land development costs
BUILDINGS COSTS: buildings costs
UTILITIES: utilities installation costs
ENG & DESIGN: engineering & design costs
CONTINGENCY: contingency costs

Operational Costs ($1000 - see Table C-8, Vol. 1)

SALARIES + OH: salaries, including 30% overhead for benefits
DIS CELL MATRS: costs for disposal cell materials
ENV MONITORING: environmental monitoring costs
PER TRN & MON: sum of costs for personnel training and personnel monitoring
HEAVY EQPT OPS: heavy equipment operating expenses
QA AND CONTROL: quality assurance and compliance testing
CONSTANT COSTS: sum of costs for administration, regulatory, consulting and studies, legal fees, public outreach, and insurance
HEAVY EQPT REPL: heavy equipment replacement costs (periodic)
LIGHT EQPT REPL: light equipment replacement costs (periodic)
MAINTENANCE: maintenance expenses for buildings and other facility components
CONTINGENCY: contingency costs

Closure/Observation and Surveillance/Institutional Control Costs ($1000)

Closure (see Section C.5.1, Vol. 1)
- SALARIES: salaries, including contingency and 30% overhead for benefits
- EQPT EXPENSES: equipment expenses, including contingency
- OTHER COSTS: sum of costs for nonradiological demolition, administration, regulatory, consulting and studies, legal, public outreach, disposal cell materials, environmental monitoring, personnel monitoring, miscellaneous expenses, utilities, insurance, QA and compliance testing, and contingency

Observation and Surveillance (see Section C.5.2, Vol. 1)
- SALARIES: salaries, including contingency and 30% overhead for benefits
- ENV&PER MONITRG: sum of costs for environmental and personnel monitoring, including contingency
- EQPT EXPENSES: equipment expenses, including contingency
- OTHER COSTS: sum of administration, regulatory, other, and contingency costs

Institutional Control (see Section C.5.3, Vol. 1)
- VARIABLE COSTS: sum of costs for salaries, environmental and personnel monitoring, equipment, and contingency
- OTHER COSTS: sum of administration, regulatory, other and contingency costs

Summary of Abbreviations for ECONOMY Output

Economic Parameters (see Chapter C.6, Vol. 1)

DISCOUNT RATE: (d) discount rate applied by disposal facility operator
TAX RATE: (T) overall tax rate
INTEREST RATE: (i) average interest rate of revenues placed in escrow for institutional control fund
F-SUB-PREOPS: (f_p) inflation rate during preoperational period
F-SUB-OPERTNS: (f_o) inflation rate during operational period
F-SUB-CLOSURE: (f_c) inflation rate during closure period
F-SUB-SURVEIL: (f_s) inflation rate during observation and surveillance period
F-SUB-INSTIT: (j) inflation rate during institutional control period
SURETY/CLOSUR: (sc) surety fraction for closure surety bond
SURETY/INSTIT: (si) surety fraction for institutional control surety bond
ITC RATE: investment tax credit rate fraction
ADJUSTMNT FAC: (h) adjustment factor to discount to years other than 1984

Present Value Parameters ($1000 - See Chapter C.6, Vol. 1)

PVPOE: present value of preoperational expenses
PVPOC: present value of preoperational costs
PVOE: present value of operational expenses
PVOC: present value of operational costs
PVCC: present value of closure costs
PVSC: present value of surveillance costs
PVSBC: present value of surety bond premium (closure)
PVSBI: present value of surety bond premium (institutional control)
PVDB: present value of depreciation expenses for buildings and other site components
PVDE: present value of depreciation expenses for heavy and light equipment
PVICP: present value of investment credits for preoperational costs
PVICO: present value of investment credits for operational costs
PVITC: total present value of investment credits (PVICP + PVICO)
PVR: present value of operational revenues

Unit Disposal Costs ($1000 - See Chapter C.6, Vol. 1)

USC: unit surcharge ($\$/m^3$) for institutional control period fund
UC1: unit cost ($\$/m^3$) for disposal service during the first year of the operational period
UCA: average unit cost ($\$/m^3$) for disposal service over the operational period, as inflated

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

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

SEE INSTRUCTIONS ON THE REVERSE

1. REPORT NUMBER (Assigned by TIDC, add Vol. No., if any)
NUREG/CR-4370
Volume 2

2. TITLE AND SUBTITLE
Update of Part 61 Impacts Analysis Methodology
Volume 2: Codes and Example Problems

3. LEAVE BLANK

4. DATE REPORT COMPLETED

MONTH	YEAR
October	1985

5. AUTHOR(S)
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G. W. Roles (USNRC)

6. DATE REPORT ISSUED

MONTH	YEAR
January	1986

7. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)
Envirosphere Company
Two World Trade Center
New York, NY 10048

8. PROJECT/TASK/WORK UNIT NUMBER

9. FIN OR GRANT NUMBER
FIN D1013

10. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, DC 20555 (SS-623)

11a. TYPE OF REPORT
Final Report

b. PERIOD COVERED (Inclusive dates)

12. SUPPLEMENTARY NOTES

13. ABSTRACT (200 words or less)
Under contract to the U. S. Nuclear Regulatory Commission, the Envirosphere Company has expanded and updated the impacts analysis methodology used during the development of the 10 CFR Part 61 rule to allow improved consideration of the costs and impacts of treatment and disposal of low-level waste that is close to or exceeds Class C concentrations. These modifications principally include: (1) an update of the low-level radioactive waste source term, (2) consideration of additional alternative disposal technologies, (3) expansion of the methodology used to calculate disposal costs, (4) consideration of an additional exposure pathway involving direct human contact with disposed waste due to a hypothetical drilling scenario, and (5) use of updated health physics analysis procedures (ICRP-30).

Volume 1 of this report describes the calculational algorithms of the updated analysis methodology, while Volume 2 describes the computer codes written to implement the updated analysis methodology plus provides some example problems.

14. DOCUMENT ANALYSIS - a. KEYWORDS/DESCRIPTORS
low-level waste disposal
disposal costs
impacts analysis methodology
Class C concentrations
10 CFR Part 61

b. IDENTIFIERS/OPEN ENDED TERMS

15. AVAILABILITY STATEMENT
Unlimited

16. SECURITY CLASSIFICATION
(This page)
Unclassified
(This report)
Unclassified

17. NUMBER OF PAGES

18. PRICE

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

SPECIAL FOURTH CLASS RATE
POSTAGE & FEES PAID
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WASH. D.C.
PERMIT No. G-67

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POLICY & PUB MGT BR-PDR NUREG
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