IMPELL CORPORATION

January 15, 1988

Engineering Branch
Division of Waste Management
United States Regulatory Commission
Washington, DC 20555

ATTENTION: Gary Roles

SUBJECT: WASTETRAK Version 5C

Dear Gary:

Enclosed for your use is WASTETRAK Version 5C which is provided to you under the terms of our software maintenance agreement. This version includes the current Chem Nuclear manifest and other improvements described in the release notes. Many of these improvements were a result of suggestions you made at the last WASTETRAK Users Group meeting. The U.S. Ecology manifest will be updated in the next release. The PC version has also been numbered as 5C for consistency with the mainframe version number.

Should you have any questions on this release, please do not hesitate to call Ms. Carole Davis or me.

Very truly yours,

Royce M. Reinecke

Royce M. Reinecke
Applied Technology Division

RMR:nka

Enclosures

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IMPELL CORPORATION

MEMORANDUM

File: WASTETRAK-Maint

TO: WASTETRAK Users, Regional QA Managers

Copy: Corp QA Manager

FROM: RMReinecke RMR

DATE: January 15, 1988

SUBJECT: WASTETRAK Version 5C (VAX/IBM/PC) Program Release

The computer program WASTETRAK Version 5C (VAX-VMS/IBM-MVS,VM/PC-DOS) is released for use. This version should replace your current version of WASTETRAK. It has been verified as a standard program in accordance with Impell's Quality Assurance Program. Differences between this and prior versions are described in the attached release notes. Changes required to implement this new version are described in the programmers guide. Note that certain files used with previous versions need to be modified as described in the Programmers Guide in order to be compatible with this version. There are no outstanding user notices on WASTETRAK.

WASTETRAK is a low level radioactive waste tracking and shipping optimization program. It performs the lengthy calculations required to meet shipping regulations and to generate shipping papers.

Approved for Release: Roger K. Reinecke Date: 1/6/88

Regional QA Manager Robert T. McGuire for Date: 1/15/88

The following provides a description of the changes made in version 5C of WASTETRAK. The PC version has now been named 5C in order to make it consistent with the mainframe version.

File Changes

1- The CID.DAT file, chemical form description field, has been expanded. For waste streams involving resins, the users should expand the data in this field to identify the type of resins. For example files which say oxides on resin should say oxides on bead resin, or oxides on powdex resin, or oxides on ecodex resin.

2- The PARAM.DAT file has been modified to include the S.C. permit number assigned to the generator which is to be printed on the Chem-Nuclear manifest. This entry is found near the top of the file. A parameter has also been added in part two to allow the user to turn off the "ENTER VOLUME IN GALLONS INSTEAD OF CU-FT" prompt if desired. If the prompt is disabled the input is assumed in Cu-Ft.

3- The NUC.DAT file has been revised to include SN113 and HF181. This file has also been revised to include a curies/GM value for the RQ calculation. Users should replace their current NUC.DAT file with this new file. The curie/GM values in the file have been obtained from 10CFR70 and values have not been provided for isotopes which do not appear in the 10CFR70 table. Users should print the nuclide library using the library options menu item and verify the accuracy of these values and make any additions desired.

4- The COS.DAT file has been updated to reflect the Hanford and Barnwell cost structure as of July 1, 1987. Users wishing to take advantage of this update should replace their current COS.DAT file with this new COS.DAT file.

5- Users wishing to scale tritium based on a coolant sample activity can update their NON.DAT file to take advantage of this new feature. No change is necessary if it is not desired to change the tritium scaling methodology.

Manifest Changes

1- The Chem Nuclear form has been revised to reflect the most current requirements. These include:

A - RQ quantity
B - Liner type prompt (users should specify the specific liner type here: For example: HN-100 LVMU
C - Waste description
D - Calculations of GMS of SNM
E - Calculation of GMS of source
F - Prompt for number and type of containers
G - The number of significant digits printed has beer increased to four
H - Prompt for solidification agent if a code of 99 (other) is entered

2- The U.S. Ecology manifest has been revised to print either liner, box or drum under container type instead of STC, TYPE7A or HIC.

3- The curie total on the U.S. Ecology manifest printed in the PAP.DAT file has been revised to report curie total very accurately in order to account for the way U.S. Ecology counts curies. This total now matches what you would get by summing the individual isotope curie values for all containers. The curie totals on each continuation page may still reflect rounding error due to the limitation in space on the forms.

4- For both the U.S. Ecology and Chem Nuclear manifests, container dose rates less than 1 MR/HR are reported as 1 MR/HR. The maximum container surface dose rate that can be reported is 999.999 R/HR. The maximum container 1 meter dose rate that can be reported is 99.999 R/HR.

5- For U.S. Ecology, if the response to whether an agent/broker is used is no, then "NONE" is printed on the manifest cover page in PAP.DAT for agent/broker.

Container Entry/Tracking

1- The user may now scale tritium in waste to tritium in coolant if desired. For example, the tritium in waste could be said to be 10% of that in coolant. The way to do this is to scale H3 to H3D in the NON.DAT file (E.G. 0.10). At the time the isotopic data for the container is entered the user should enter the concentration in the coolant as isotope H3D (E.G. H3D=1.3E-3 UCI/CC). The program will then scale to this value and for this example, make the concentration in the waste 1.3E-4 UCI/cc

2- A prompt for storage location date has been added to the change storage location function in order to allow update of this value.

Shipment Preparation

1- The DOT transport group classification basis has been revised to report if advanced notification is required. Columns have been added to separate isotopes with A2 values < =4 and > 4 and the totals are checked versus the reporting limits of 20 and 200 curies.

2- Up to 200 containers may now be entered in one shipment.

Reports

1- The individual curie values on the R.G. 1.21 report have been corrected (User Notice 30).

WASTETRAK

A Low Level Radioactive Waste Tracking
and Shipping Optimization Program

Programmer's Guide, Version 5C, 10/30/87

For Version: 5C VAX/IBM/PC

Approved by: _____ Date: 1/11/88

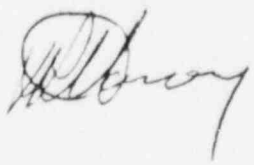
WASTETRAK PROGRAMMER'S GUIDE

VERSION LOG

VERSION	DATE	PREPARED BY	SUMMARY OF CHANGES
2B	11/15/83	C. C. Davis	Original Issue
2C	12/16/83	C. C. Davis	Code performs forced reporting of 10CFR61,55 isotopes and Waste form/container compatibility check.
3A	01/06/84	C. C. Davis	Changed Disposal and Shipping Cost Library, Shipment Data File and Facility Data File.
3B	02/17/84	C. C. Davis	Provided dose-to-Curie calculations for all waste streams. Provided capability to enter all waste streams using Enter A Batch.
3C	05/04/84	C. C. Davis	Created burial site approved computer generated shipping papers.
3D	11/07/84	M. A. Carman	Corrected programming errors and added enchancements for user convenience.
4A	04/01/85	C. C. Davis	Added mixed waste container capability and radiological analysis sheet. Updated shipping papers.
4B	07/01/85	C. C. Davis	Error corrections and minor enhancements, including option to enter volumes in gallons. A version compatible with FORTRAN VS is now available.
4C	04/07/86	C. C. Davis	Changes to US Ecology and Barnwell shipping manifests.
5A	10/28/86	C. C. Davis	Added capability to consolidate containers
5B	2/17/87	C. C. Davis	System Conversion
5C	10/30/87	C. C. Davis	Updated Barnwell RSM; added ability to scale H3 and C14; error corrections

WASTETRAK PROGRAMMER'S GUIDE

REVISION LOG

VERSION ID/ MANUAL REV.	MANUAL DATE	PREPARED BY	APPROVED BY	SUMMARY OF CHANGES
4C/8	4/7/86	C.C.Davis		Revised Pages: 2-1, 2-2, 2-3, 2-4, 2-5, 4-7, A-2, A-3, A-4, A-12, A-15, A-26, A-27
5A	10/28/86	C.C. Davis		Entire Manual re-issued
5A/Rev. 1	2/17/87	C.C. Davis		Revised Pages: T of C, 2-1, 2-2, 2-3, 2-4, 2-5, 4-1, 4-3, A-5, A-7, A-10, A-11, A-12, A-13, A-14, A-32
5C	10/30/87	C.C. Davis		Revised Pages: 2-1, 2-2, 2-3, 2-4 2-5, 2-6, 2-7, 4-4, 4-5, A-1, A-2, A-3, A-4, A-6, A-7, A-8, A-9, A-12, A-15

2.0 PROGRAM INSTALLATION

2.1 Implementation Instructions for IBM

INTRODUCTION

WASTETRAK Version 5C has been tested and verified at CE's IBM computer center.

TAPE CONTENTS

The enclosed tapes are written with no label at 1600 BPI. Each tape file is written with 80 character ASCII records, blocked 10 records per block. The file contents are as follows:

Tape 1:

1	First portion of WASTETRAK Source	5CSRC1.FORT

Tape 2:

1	Second portion of WASTETRAK Source	5CSRC2.FORT
2	Container ID Library	CID.DATA
3	DAW Isotope Set Library	ISO.DATA
4	Non-gamma Emitter Library	NON.DATA
5	Nuclide Library	NUC.DATA
6	Parameter File	PARAM.DATA
7	Cask Library	CAS.DATA
8	Cost Library	COS.DATA
9	Trucking Co. Library	TRK.DATA
10	User Data File	USER.DATA
11	10CFR61 Classification File	P61.DATA
12	Trans. Log for Program Verification	TRAN.DATA
13	Initial Source	INITIAL.FORT

The above data files (labeled .DATA) should not replace your current plant data files. They are supplied only for the purpose of running the benchmark verification tests. Included in this package is a copy of the verification test results to compare against after completion of installation and your verification test.

Your installations' current version of SUBROUTINE CLRSCR, SUBROUTINE DATE, SUBROUTINE TIME, and FUNCTION RAN will be needed to run the verification test and WASTETRAK.

2.0 PROGRAM INSTALLATION

2.1 Implementation Instructions for IBM

STEPS TO INSTALL WASTETRAK IBM VERSION 5C

1. Copy files from the magnetic tape to a test area on disk.

2. Merge the above-mentioned function and subroutines, plus the two source files from the tapes, into one file.

3. Compile, link, and execute the INITIAL.FORT program supplied on tape 2 to initialize the data files CON.DATA, FAC.DATA, ISS.DATA, LSR.DATA, and SHP.DATA.

4. Execute the program with TRAN.DATA as input for the verification test.

5. Compare the output from the verification test with the test results provided by Impell to verify that the program is functioning properly.

6. Transfer the new executable code into a production area. Include plant data files if this is a new WASTETRAK installation.

7. The Nuclide Library (NUC.DATA) has been modified to add a Curies/gram field to the second record for each nuclide. The easiest way to incorporate this change is to simply substitute the NUC.DATA file on the tape for the plant Nuclide Library. NOTE: If plant-specific changes have been made, such as adding nuclides, these changes must be made again.

8. Modify the plant Container ID Library (CID.DATA) if desired. The changes apply to the last portion of the file, where there is one record for each waste stream.

   The chemical form description has been expanded to 28 characters (columns 46-73). For shipments to Barnwell, you may wish to add more detail, such as "BEAD" or "POWDEX" for resins.

9. Make the following changes to the Parameter File (PARAM.DATA) - refer to the PARAM.DATA on the tape:

   A. Add a new record 5 containing the US Ecology permit number (a maximum of 40 characters, the first 16 of which will be printed on the US Ecology RSM)

   B. Add a new record 6 containing the SC Permit number for the Barnwell RSM (a maximum of 40 characters)

   C. In Part 2, after the record for IUNITS, add a record for IGPROM. The value will be 0 for don't and 1 for do give a prompt to allow the user to enter volumes in gallons.

   D. Change MXSHIP to 200 to allow up to 200 containers in a shipment.

10. The following change should probably be made to the CAS.DATA file (Cask Library) for users who ship to Barnwell:

    Change the DOT specification of the HN-100 SERIES 1 Cask to just "A" (instead of "A/LSA"). This description is put into the Cask identification number on the Barnwell RSM, and Chem-Nuclear has requested that the "/LSA" not appear.

2.2 Implementation Instructions DEC/VAX

INTRODUCTION

WASTETRAK Version 5C has been tested and verified at Impell Corporation (SER), Atlanta, Georgia.

TAPE CONTENTS

The enclosed tape is written at 6250 BPI in VAX backup format. The file contents are as follows:

1.	WASTETRAK Executable Code File	WASTRAK.EXE
2.	Container ID Library	CID.DAT
3.	Isotope Set Library	ISO.DAT
4.	Non-gamma	NON.DAT
5.	Nuclide Library	NUC.DAT
6.	Parameter File	PARAM.DAT
7.	Cask Library	CAS.DAT
8.	Cost Library	COS.DAT
9.	Trucking Co. Library	TRK.DAT
10.	User Data File	USER.DAT
11.	10CFR61 Classification File	P61.DAT
12.	Trans. Log for Program Verification	TRAN.DAT
13.	Initial Executable	INITIAL.EXE
14.	Source Files are Included	*.FOR

The above data files (labeled .DAT) should not replace your current plant data files. They are supplied only for the purpose of running the benchmark verification tests. Included in this package is a copy of the verification test results to compare against after completion of installation and your verification test.

STEPS TO INSTALL WASTETRAK VAX VERSION 5C

1. Copy all files from the magnetic tape to disk in a test area.

2. Run the 'INITIAL.EXE' program supplied on the tape to initialize the data files 'CON.DAT', 'FAC.DAT', 'SHP.DAT', 'LSR.DAT', and 'ISS.DAT'.

3. Execute the 'TRAN.DAT' file for the verification test.

4. Compare the output from of the verification test to the test results provided by Impell to verify that the program is functioning properly.

5. Transfer new executable code into a production area. Include plant data files if this is a new WASTETRAK installation.

6. The Nuclide Library (NUC.DAT) has been modified to add a Curies/gram field to the second record for each nuclide. The easiest way to incorporate this change is to simply substitute the NUC.DAT file on the tape for the plant Nuclide Library. NOTE: If plant-specific changes have been made, such as adding nuclides, these changes must be made again.

7. Modify the plant Container ID Library (CID.DAT) if desired. The changes apply to the last portion of the file, where there is one record for each waste stream.

   The chemical form description has been expanded to 28 characters (columns 46-73). For shipments to Barnwell, you may wish to add more detail, such as "BEAD" or "POWDEX" for resins.

8. Make the following changes to the Parameter File (PARAM.DAT) - refer to the PARAM.DAT on the tape:

   A. Add a new record 5 containing the US Ecology permit number (a maximum of 40 characters, the first 16 of which will be printed on the US Ecology RSM)

   B. Add a new record 6 containing the SC Permit number for the Barnwell RSM (a maximum of 40 characters)

   C. In Part 2, after the record for IUNITS, add a record for IGPROM. The value will be 0 for don't and 1 for do give a prompt to allow the user to enter volumes in gallons.

   D. Change MXSHIP to 200 to allow up to 200 containers in a shipment.

9. The following change should probably be made to the CAS.DATA file (Cask Library) for users who ship to Barnwell:

   Change the DOT specification of the HN-100 SERIES 1 Cask to just "A" (instead of "A/LSA"). This description is put into the Cask identification number on the Barnwell RSM, and Chem-Nuclear has requested that the "/LSA" not appear.

2.3 Implementation Instructions for the IBM PC

INTRODUCTION

WASTETRAK-PC Version 5C has been tested and verified on an IBM PC/XT. The program requires 640K of RAM and a math co-processor chip.

DISK CONTENTS

WASTETRAK is supplied on 4 floppy disks that are double-sided, double density. The disks are in backup format.

Disks 1-3:

WASTETRAK executable	WASTRAK.EXE

Disk 4:

1.	Nuclide Library	NUC.DAT
2.	BASIC program to print papers	PAPERS.BAS
3.	Cask libray	CAS.DAT
4.	File to run WASTETRAK	RW.BAT
5.	TRAN file for verification	TRAN.DAT
6.	File to run the TRAN file	RTRAN.BAT
7.	Cost library	COS.DAT
8.	Non-gamma emitter library	NON.DAT
9.	10CFR61 Classification File	P61.DAT
10.	Trucking Company Library	TRK.DAT
11.	User Data File	USER.DAT
12.	File to run INITIAL	DELINI.BAT
13.	INITIAL executable	INITIAL.EXE
14.	Container ID Library	CID.DAT
15.	Parameter File	PARAM.DAT
16.	Isotope Set Library	ISO.DAT

STEPS TO INSTALL WASTETRAK-PC VERSION 5C

1. Your CONFIG.SYS must contain the following:
   FCBS=6,4
   FILES=25
   BUFFERS=30

2. MKDIR WTRAK — Create a separate area for installation and verification.

3. CD WTRAK

4. RESTORE A: C: — Restore WASTRAK.EXE (3 disks)

5. COPY A: *.* — Copy the data files (1 disk)

6. DELINI — Execute INITIAL to create CONT.DAT, FAC.DAT, ISS.DAT, LSR.DAT and SHP.DAT

7. RTRAN — Execute WASTETRAK with TRAN.DAT as input to produce verification output.

8. Compare the verification output with output provided by Impell to verify that the program is functioning properly.

9. Transfer the new executable into a production area. Include plant data files if this is a new WASTETRAK installation.

10. The Nuclide Library (NUC.DAT) has been modified to add a Curies/gram field to the second record for each nuclide. The easiest way to incorporate this change is to simply substitute the NUC.DAT file on the tape for the plant Nuclide Library. NOTE: If plant-specific changes have been made, such as adding nuclides, these changes must be made again.

11. Modify the plant Container ID Library (CID.DAT) if desired. The changes apply to the last portion of the file, where there is one record for each waste stream.

    The chemical form description has been expanded to 28 characters (columns 46-73). For shipments to Barnwell, you may wish to add more detail, such as "BEAD" or "POWDEX" for resins.

12. Make the following changes to the Parameter File (PARAM.DAT) - refer to the PARAM.DAT on the disk:

    A. Add a new record 5 containing the US Ecology permit number (a maximum of 40 characters, the first 16 of which will be printed on the US Ecology RSM)

    B. Add a new record 6 containing the SC Permit number for the Barnwell RSM (a maximum of 40 characters)

    C. In Part 2, after the record for IUNITS, add a record for IGPROM. The value will be 0 for don't and 1 for do give a prompt to allow the user to enter volumes in gallons.

    D. Change MXSHIP to 200 to allow up to 200 containers in a shipment.

13. The following change should probably be made to the CAS.DATA file (Cask Library) for users who ship to Barnwell:

    Change the DOT specification of the HN-100 SERIES 1 Cask to just "A" (instead of "A/LSA"). This description is put into the Cask identification number on the Barnwell RSM, and Chem-Nuclear has requested that the "/LSA" not appear.

2.4 File Space Requirements

Special Note: These space requirements were derived from the DEC VAX 11/780. As a result of machine-dependent differences in interblock gaps and overhead space requirements, other computers may require more space for these files. The requirements specified here are only approximations to give the programmer some idea of space requirements when creating the files for WASTETRAK.

1. Fixed-length files

Files on the tape

File	No. of Records	No. of 512/byte blocks on disk
WASTRAK.EXE		601
CID.DAT	140	15
ISO.DAT	20	2
NON.DAT	55	8
NUC.DAT	1617	222
PARAM.DAT	171	27
CAS.DAT	116	10
COS.DAT	74	5
TRK.DAT	20	2
USER.DAT	49	4
P61.DAT	40	5
TRAN.DAT	246	20
INITIAL.EXE		17

2. Variable-length files

File	No. of 512/byte blocks as created by 'INITIAL'	Notes
CON.DAT	336	4000 bytes/container
FAC.DAT	402	Set up to handle 10 years of facility data
SHP.DAT	168	Should be adequate for most applications
LSR.DAT	1	Program will handle changes and growth
ISS.DAT	1	On 80/byte record per container

3. Other files

PAP.DAT	For a shipment this output file requires 60/132 byte records per container plus 180/132 byte records for the shipment information pages.
PAP2.DAT	This file contains the continuation pages for shipments to US Ecology. It must be printed at 17 characters per inch on pre-printed forms supplied by US Ecology.
Scratch file	Should be as large as 'PAP2.DAT' or PAP.DAT, whichever is larger.
PRINT.DAT	This output file is extremely variable - 200 512/byte blocks should be adequate for most applications.

TABLE 2 - (continued)

Administrative Routines

BATFIL	Enter a batch
CONFIL	Enter a Container
CONSOL	Consolidate containers
MIXFIL	Enter a Mixed-Waste Container
SELCSK	Select a cask
MULLIN	Select multiple liners
SELLIN	Select a liner
SELSUR	Select liners for surveillance
PRESHP	Prepare shipment Associated Routines: SHANAL, SHDATA, PIKCAS, PIKSIT, PIKTRK
PAPERS	Generate shipping papers Associated Routines: PAPB, PAPU, PHEAD, PHDUS, PAGE2, PAGE3, PG2US, PTOTB, PTOTU
UPDATE	Update dose rates in container inventory file
REPCHK	Determine if isotope is to be reported
CONEND	Save container
LOGCON	Update Facility File data

Date Processing Routines

Dates are manipulated in WASTETRAK in "packed" form YYYYMMDD.

READAT	Read date from keyboard
DATPAK	Pack date into single integer
DATUPK	Unpack date into three integers
IFINDQ	Find quarter number for a date
SYSDAT	Find system date
IDATQU	Find date for a quarter
IDDIFF	Find difference between two dates

Engineering Calculations

WCLASS	Determines 10CFR61 classification
SUMCI	Determines 49CFR173 classification
LABEL	Determines shipping label
NOGAMA	Determines quantity of non-gamma isotopes
REPCHK	Determines which isotopes to report and include in total activity calculations

Decay Calculation Routines

DECAY	Decay calculation main routine
DKPARM	Calculate parameters for decay chain
TABLES	Load arrays for calculations
EXPF	Radioactive decay function
XTRCTD	Extract number of daughters
XTRCTG	Extract number of gammas

Table 2 (continued)

Dose Rate Calculation Routines

CALDOS	Dose calculation main routine
CYLDOS	Calculate dose rate
FUNCYL	Cylinder dose rate function
CSKDOS	Calculate dose rate for a liner in a cask
SOURCE	Compute gamma source
FUNMU	Function for mass attenuation coefficient
FUNBU	Function for buildup factor

Cost Calculations

COST	Calculate all costs (Items 1-12)
DCOST	Calculate disposal costs (Items 1-4)
SCOST	Calculate shipping costs (Items 5-12)

Cask/Container Shipment Compatibility Routines

CHKDOS	Check in cask dose rate
CHKFIT	Check fit of liner in cask
CHKWGT	Check for overweight shipment

Reports

PRCONT	Container data report
PRCIVN	Curie inventory report
PRCTYP	Waste by Container Type
PRSSUM	Shipping summary report
PRSTAT	Facility status report
PRWGEN	Waste generation report
PR121	Reg. Guide 1.21 report
PRACTV	Activity concentration report
PRIVEN	Facility inventory report
PRCSUM	Cost summary report menu and cost breakdown report
PRC2SM	Cost summary report by waste stream and site
PRC3SM	Cost summary report by waste stream
PRC4SM	Cost summary report by site
PRSHIP	Shipment Data File report
PRSLOW	Container Inventory Report II

Library Routines

PRCASK	Print cask library
PRCID	Print container ID library
PRNUCL	Print nuclide library
EDTISO	Edit isotope set
EDTPAR	Edit parameter file

APPENDIX A - DATA FILE FORMATS

The following sections detail the formats used for the radwaste libraries and container data management files described in Section 2.0 of the User's Manual.

Parameter File

The Parameter File is divided into four parts:

1. An initial section contains the plant's name, address, and phone number (40 characters per line), and the generator number (for U.S. Ecology, maximum 20 characters), the U.S. Ecology permit number (40 characters), and the SC permit number (40 characters).
2. Part 1 contains user-modifiable parameters.
3. Part 2 contains parameters that must be modified by the system programmer user. Note: modifying the parameters in this file alone may not change program operation. Coding changes and recompilation may also be necessary.
4. Part 3 contains the debug feature, which will only be used if the purchaser modifies the source code.

Part 1 contains a record for each user-modifiable parameter in the following format (only the parameter value is actually used by the program):

COLS.	FORMAT	COMMENT
1-10	I10	Parameter value
11-12	blank	
13-18	A6	Parameter name
19-23	blank	
24-80	A57	Parameter description

Part 2 contains a record for each logical unit and its associated file name.

COLS.	FORMAT	COMMENT
1-10	I10	Parameter value
11-12	blank	
13-18	A8	Parameter name
19-23	blank	
24-80	A57	Parameter description

Part 3 contains debug flags used only in program development or when the source code is modified. This part consists of a single record of 70 columns, each of which refers to a single subroutine and can have one of the following values:

0 or blank - turns debug off
1 - sends debug output to the terminal
2 - sends debug output to the hardcopy device

The subroutines that are available for the debug feature and their associated columns are commented within the Parameter File and are subject to change.

Figure A-1

Parameter File

UTILITY NAME
PLANT NAME
ADDRESS
PHONE NUMBER
US ECOLOGY GENERATOR NUMBER
US ECOLOGY PERMIT NUMBER
SC PERMIT NUMBER

6 NUMBER OF LINES OF DESCRIPTIVE TEXT THAT FOLLOW. THIS FILE CONTAINS THE PROGRAM PARAMETERS. IT CONSISTS OF THREE PARTS. THE FIRST PART CONTAINS USER MODIFIABLE PARAMETERS. THE SECOND PART CONTAINS PARAMETERS THAT MUST BE MODIFIED BY THE PROGRAM MANAGER. THE THIRD PART CONTROLS THE DEBUG FEATURE.

PART 1:

VALUE	VARIABLE	DESCRIPTION
21	NPART1	NUMBER OF PART 1 PARAMETERS BELOW
5	MAXDK	MAXIMUM NUMBER OF NUCLIDES IN BRANCH OF DECAY CHAIN
500.	STABLE	NUCLIDES WITH HALFLIVES F STABLE GENERATE NO DAUGHTERS
14.	XMINDK	MINIMUM DECAY TIME IN DAYS
10.	THESDK	HALF-LIFE THRESHOLD FOR REPORTING OF DAUGHTERS IN DAYS
20.	ASMEAR	DEFAULT ALPHA CONTAMINATION VALUE
1000.	BSMEAR	DEFAULT BETA/GAMMA CONTAMINATION VALUE
5.	CONERR	DEFAULT ACTIVITY CONCENTRATION ERROR
1.00	RATIO1	TUNING FACTOR FOR DRUM DOSE RATE CALC.
1.	RATIO2	TUNING FACTOR FOR BOX DOSE RATE CALC.
1.00	RATIO3	TUNING FACTOR LINER DOSE RATE CALC.
1.00	RATIO4	TUNING FACTOR FOR LINER IN-CASK DOSE RATE CALC.
300	NPRDAT	PRE-DATING PERIOD IN DAYS FOR FILL AND SHIP DATES
30	LISCUT	LIST LENGTH FOR SELECT-A-LINER ROUTINE OUTPUT
3	ISO121	NO. OF "MAJOR NUCLIDES" REPORTED IN RG 1.21 REPORT
6	MONAVG	MONTHS OF DATA AVERAGED FOR FACILITY STATUS REPORT
90	IWARNP	CRITICAL STORAGE WARNING PERIOD IN DAYS
790.	PWCAP	FACILITY CAPACITY FOR NUMBER OF LINERS
300000.	DWCAP	FACILITY CAPACITY FOR CUBIC FEET OF DRY WASTE
1.E-03	SHPCUT	ISOTOPE CONCENTRATION CUTOFF FOR SHIPPING
110000.	WGTLIM	ROAD WEIGHT LIMIT FOR SHIPPING IN LBS
75000.	WTOVER	ROAD OVERWEIGHT LIMIT FOR SHIPPING IN LBS

NUMBER OF LINES OF DESCRIPTIVE TEXT THAT FOLLOW

Part 2:

VALUE	VARIABLE	DESCRIPTION
0	IUNITS	UNITS FLAG, 0 = UCI/CC AND 1 = UCI/GM
0	IGPROM	0=DON'T/ AND 1 = DO GIVE PROMPT FOR VOLUMES IN GALLONS
4	SCR.DAT	ISCR = LOGICAL UNIT FOR SCRATCH FILE
5		IKEYBD = LOGICAL UNIT FOR KEYBOARD
6		ITERM = LOGICAL UNIT FOR TERMINAL OUTPUT
7	PRINT.DAT	IREPRT = LOGICAL UNIT FOR HARDCOPY OUTPUT
8	USER.DAT	IUSER = LOGICAL UNIT FOR USER ACCESS DATA
9	PAP.DAT	IPAPER = LOGICAL UNIT FOR SHIPPING PAPER OUTPUT
10	PAP2.DAT	IPAP2 = LOGICAL UNIT FOR US ECOLOGY CONTINUATION PAGES
11	NUC.DAT	ILIB = LOGICAL UNIT FOR SCRATCH FILE
12	CID.DAT	ICONID = LOGICAL UNIT FOR CONTAINER ID LIBRARY
13	ISO.DAT	ISOTOP = LOGICAL UNTI FOR DAW STANDARD ISOTOPE SET
14	NON.DAT	INGAM = LOGICAL UNIT FOR 10CFR61 SCALING FACTORS
15	CON.DAT	ICTAIN = LOGICAL UNIT FOR CONTAINER STORAGE FILE
16	FAC.DAT	IFAC = LOGICAL UNIT FOR FACILITY DATA
17	CAS.DAT	ICASK = LOGICAL UNIT FOR CASK DATA FILE
18	COS.DAT	ICOST = LOGICAL UNIT FOR COST DATA
19	ISS.DAT	ISSTOR = LOGICAL UNIT FOR SHORT STORAGE FILE
20	TRK.DAT	ITRUCK = LOGICAL UNIT FOR TRUCK COMPANY NAMES
21	LSR.DAT	ISURV = LOGICAL UNIT FOR SURVEILLANCE REPORTS
22	SHP.DAT	ISHIP = LOGICAL UNIT FOR SHIPMENT FILE
23	P61.DAT	IPRT61 = LOGICAL UNIT FOR 10CFR61 ISOTOPE LIBRARY
24	ARCH.DAT	IARCH = LOGICAL UNIT FOR CONTAINER ARCHIVE FILE
25	TRAN.LOG	ITRANS = LOGICAL UNIT FOR TRANSACTION LOG FILE
6	MAXHSH	DIMENSIONED SIZE OF "KHASH"
16384	KHASH(1)	THE FOLLOWING "MAXHSH" ENTRIES ARE TUNING
65536	KHASH(2)	PARAMETERS FOR THE FUNCTION "IHASH".
16384	KHASH(3)	THE PARAMETERS ARE USED TO EXTRACT CHARACTERS
65536	KHASH(4)	FROM THE NUCLIDE NAME, PERFORM ARITHMETIC
31416	KHASH(5)	OPERATIONS ON THE CHARACTERS TO PROVIDE
4096	KHASH(6)	A PREDICTABLE PSEUDO-RANDOM NUMBER.
11	MAXDOS	NUMBER OF ENERGY GROUPS IN DOSE LIBRARY
18	MAXGRP	NUMBER OF ENERGY GROUPS IN GAMMA LIBRARY (21)
1.00E-2	ENERGY(1)	THE FOLLOWING "MAXGRP" ENTRIES CONTAIN THE AVERAGE
2.50E-2	ENERGY(2)	ENERGY OF THE GAMMAS IN THE NUCLIDE GAMMA
3.75E-2	ENERGY(3)	LIBRARY STRUCTURE. "ENERGY(I) CONTAINS THE
5.75E-2	ENERGY(4)	AVERAGE ENERGY OF GAMMA GROUP "I".
8.50E-2	ENERGY(5)	
1.25E-1	ENERGY(6)	
2.25E-1	ENERGY(7)	
3.75E-1	ENERGY(8)	
5.75E-1	ENERGY(9)	
8.50E-1	ENERGY(10)	
1.25	ENERGY(11)	
1.75	ENERGY(12)	
2.25	ENERGY(13)	
2.75	ENERGY(14)	
3.5	ENERGY(15)	
5.	ENERGY(16)	
7.	ENERGY(17)	
9.5	ENERGY(18)	

1	LGRP(1)	THE FOLLOWING "MAXGRP" ENTRIES CONTAIN A TRANSLATION
1	LGRP(2)	TABLE THAT ALLOWS THE LIBRARY GAMMA ENERGY
1	LGRP(3)	STRUCTURE TO BE COMPRESSED INTO A DIFFERENT
1	LGRP(4)	ENERGY STRUCTURE FOR DOSE CALCULATIONS.
1	LGRP(5)	THE INTERPRETATION OF LGRP(I)=J IS
1	LGRP(6)	GAMMAS FOR GAMMA ENERGY GROUP "I" ARE
2	LGRP(7)	TO BE INCLUDED IN DOSE ENERGY GROUP "J"
3	LGRP(8)	
4	LGRP(9)	
5	LGRP(10)	
6	LGRP(11)	
7	LGRP(12)	
8	LGRP(13)	
9	LGRP(14)	
10	LGRP(15)	
11	LGRP(16)	
11	LGRP(17)	
11	LGRP(18)	
4	MAXCOL	SECOND DIMENSION OF "NAMES", "DKKON", "FRACTD", "INDX"
250	MAXDAW	DIMENSIONED SIZE OF "DAWTRS" AND "DFRACT"
50	MAXKEY	DIMENSIONED SIZE OF "KEYNUC", "KEYPTR"
75	MAXKPT	DIMENSIONED SIZE OF "NONGAM", "RATNG", "NOGPTR", "CINOG"
60	MAXLIN	MAXIMUM PRINTED LINES ON PAGE FOR UNIT "IREPRT"
20	MXTERM	MAXIMUM LINES ON TERMINAL SCREEN
350	MAXNUC	DIMENSIONED SIZE OF "DKCON", "LOCDAW", "LOCGAM"
20	MAXROW	FIRST DIMENSION OF "NAMES", "DKKON", "FRACTD", "INDX"
3	MXDAW	MAXIMUM NUMBER OF DAUGHTERS GENERATED BY ANY NUCLIDE
512	NENTRY	DIMENSIONED SIZE OF "NAME" AND "LOCATE"
10	NSTRMS	NUMBER OF DIFFERENT WASTE STREAMS IN NON-GAMMA FILE
100	NUCMAX	DIMENSIONED SIZE OF "NUCLDS", "CIIN", "CIOUT", "IFOUND"
1.E6	RATIO	TRUNCATION CONTROL FOR FUNCTION "EXPF"
100	MAXISO	MAXIMUM ISOTOPES IN STANDARD ISOTOPE SET
30	MAXP61	MAXIMUM ISOTOPES IN 10CFR61 ISOTOPE LIBRARY
5000	MAXSTO	MAXIMUM NUMBER OF CONTAINERS STORED ON DISK
5	MXCONT	MAXIMUM NUMBER OF CONTAINER TYPES
25	MXSUBT	MAXIMUM NUMBER OF CONTAINER SUBTYPES
10	MXWFRM	MAXIMUM NUMBER OF WASTE FORMS
10	MXWSTR	MAXIMUM NUMBER OF WASTE STREAMS
25	MAXCAS	MAXIMUM NUMBER OF CASKS IN LIBRARY
5	MAXSIT	MAXIMUM NUMBER OF BURIAL SITES
200	MXSHIP	MAXIMUM NUMBER OF CONTAINERS IN ONE SHIPMENT
20	MXCTAB	SIZE LIMIT FOR COST LIBRARY TABLES
20	NWTYPE	NUMBER OF WASTE TYPES IN FACILITY FILE
72	NUMMON	NUMBER OF MONTHS OF TRENDING DATA STORED

User Id Data File

There is a record for each authorized user of the WASTETRAK program, plus a record for the system programmer. Each record consists of a user authorization code, password, and 43 security keys used by the program.

COLS.	FORMAT	COMMENT
1-8	2A4	User authorization code
9-10	Blank	
11-18	2A4	Password
19-20	Blank	
21	I1	Access to container menu
22	I1	Access to shipping menu
23	I1	Access to library menu
24	I1	Access to surveillance menu
25	I1	Access to report menu
26	I1	Enter/consolidate containers
27	I1	Reserved
28	I1	Change dummy container to real
29	I1	Change storage location
30	I1	Reserved
31	I1	Reserved
32	I1	Recall a container
33	I1	Enter a batch
34	I1	Delete a container
35	I1	Prepare shipments/make shipments final
36	I1	Select a liner
37	I1	Select a cask
38	I1	Generate shipping papers
39	I1	Recall shipped container
40	I1	Enter burial site allocation
41	I1	Select multiple liners
42	I1	Print container library
43	I1	Print cask library
44	I1	Print nuclide library
45	I1	Edit isotope library
46	I1	Edit program parameters
47	I1	Select containers for surveillance
48	I1	Enter surveillance test results
49	I1	Retrieve surveillance test results
50	I1	Container data report
51	I1	Container inventory report/container report II
52	I1	Search routine
53	I1	Waste generation/Waste by container type report
54	I1	Shipping summary report
55	I1	Reg. Guide 1.21 report
56	I1	Facility status report
57	I1	Curie inventory report
58	I1	Activity concentration report
59	I1	Cost summary report
60	I1	Cask selection override
61	I1	Print shipment data file summary
62	I1	Enter shipping/disposal cost budget
63	I1	Change shipping/disposal costs for shipped containers

Figure A-2
User I.D. Data File

```
45
THE SECURITY KEYS ARE DEFINED AS FOLLOWS:
 1=ACCESS TO CONTAINER MENU
 2=ACCESS TO SHIPPING MENU
 3=ACCESS TO LIBRARY MENU
 4=ACCESS TO SURVEILLANCE MENU
 5=ACCESS TO REPORT MENU
 6=ENTER/CONSOLIDATE CONTAINERS
 7=RESERVED
 8=CHANGE DUMMY CONTAINER TO REAL
 9=CHANGE STORAGE LOCATION
10=RESERVED
11=RESERVED
12=RECALL A CONTAINER
13=ENTER A BATCH
14=DELETE A CONTAINER
15=PREPARE SHIPMENTS/MAKE SHIPMENTS FINAL
16=SELECT A LINER
17=SELECT A CASK
18=GENERATE SHIPPING PAPERS
19=RECALL SHIPPED CONTAINER
20=ENTER BURIAL SITE ALLOCATION
21=SELECT MULTIPLE LINERS
22=PRINT CONTAINER LIBRARY
23=PRINT CASK LIBRARY
24=PRINT NUCLIDE LIBRARY
25=EDIT ISOTOPE LIBRARY
26=EDIT PROGRAM PARAMETERS
27=SELECT CONTAINERS FOR SURVEILLANCE
28=ENTER SURVEILLANCE TEST RESULTS
29=RETRIEVE TEST RESULTS
30=CONTAINER DATA REPORT
31=CONTAINER INVENTORY REPORT/CONTAINER REPORT II
32=SEARCH ROUTINE
33=WASTE GENERATION/WASTE BY CONTAINER REPORT
34=SHIPPING SUMMARY REPORT
35=REG. GUIDE 1.21 REPORT
36=FACILITY STATUS REPORT
37=CURIE INVENTORY REPORT
38=ACTIVITY CONCENTRATION REPORT
39=COST SUMMARY REPORT
40=CASK SELECTION OVERRIDE
41=PRINT SHIPMENT DATA FILE SUMMARY
42=ENTER SHIPPING/DISPOSAL COST BUDGET
43=CHANGE SHIPPING/DISPOSAL COST BUDGET
              KEYS:12345678901234567890123456789012345678901234567890123456789012345678901234567890
USER     PASS      11111111111111111111111111111111111111111111111111
```

The Nuclide Library

For each isotope in the nuclide library, the format for the data is as follows:

COLS.	VARIABLE	FORMAT	COMMENT
Record #1:			
1-6	NUCLID	A4, A2	nuclide name
7-16	THALF	E10.3	half-life (numerical value)
17-19	UNITS	A3	half-life (units, i.e. - SEC, MIN, DYS, YRS)
20		IX	blank
21	MTRU	I1	1 if transuranic; otherwise blank
22-24		3X	blank
25	NDAW	I1	number of daughter products
26-29		4X	blank
30-35	DAW(1)	A4, A2	name of first daughter product
36-45	FRACT(2)	F10.5	daughter fraction (production per disintegration of parent)
46-51	DAW(2)	A4, A2	name of second daughter
52-61	FRACT(2)	F10.5	daughter fraction for second daughter
62-67	DAW(3)	A4, A2	name of third daughter
68-77	FRACT(3)	F10.5	daughter fraction for third daughter
Record #2:			
1-6	NUCLID	A4, A2	name of isotope
7-10	ITGRP	I4	transport group number (old 49CFR173)
11-20	SHPLIM(1)	E10.2	value of A_1 (new 49CFR173)
21-30	SHPLIM(2)	E10.2	value of A_2 (new 49CFR173)
31-40	CIPGM	E10.2	Specific activity (Curies per gram)
Record #3			
1-6	NUCLID	A4, A2	name of isotope
7-15		9X	blank
16-19	NGRP(1)	I4	energy group number for first photon
20-28	GAM(1)	E9.2	photon fraction (photons per disintegration)
29-32	NGRP(2)	I4	energy group number for second photon
33-41	GAM(2)	E9.2	photon fraction for second photon
42-45	NGRP(3)	I4	energy group number for third photon
46-54	GAM(3)	E9.2	photon fraction for third photon
55-58	NGRP(4)	I4	energy group number for fourth photon
59-67	GAM(4)	E9.2	photon fraction for fourth photon
68-71	NGRP(5)	I4	energy group number for fifth photon
72-80	GAM(5)	E9.2	photon fraction for fifth photon

Records #4,5,6:

Same format as record #3. Photon groups and photon fractions are read until a '-1' is read for the photon energy group.

The file end is indicated by a blank line. That is, when a blank is read for the isotope name.

Figure A-3

Nuclide Library

```
H3      12.33 YRS        0
H3      7  1.00E+03  1.00E+03  9.70E+03
H3              1 2.02E-05  -1 0.00E+00   0 0.00E+00     0 0.00E+00     0 0.00E+00
H3D     12.33  YRS      0
H3D     7  1.00E+03  1.00+03
H3D             1 2.02E-05  -1 0.00E+00   0 0.00E+00     0 0.00E+00     0 0.00E+00
BE7     53.0   DYS      0
BE7     0  3.00E+02  3.00E+02  3.50E+05
BE7             9 1.03E-01  -1 0.00E+00
BE10    1.6  E6YRS      0
BE10    0
BE10            1 9.18E-03   2 1.80E-03   3 1.11E-03     4 1.45E-03     5 7.43E-04
BE10            6 3.99E-04   7 3.26E-04   8 3.70E-05     9 3.74E-07    -1 0.00E+00
C14     5730.  YRS      0
C14     4  1.00E+03  6.00E+01  4.6
C14             1 1.69E-03   2 2.38E-04   3 1.12E-04     4 8.63E-05     5 1.37E-05
C14             6 1.03E-06   7 1.06E-10  -1 0.00E+00     0 0.00E+00     0 0.00E+00
C14D    5730.  YRS      0
C14D    4  1.00E+03  6.00E+01
C14D            1 1.69E-03   2 2.38E-04   3 1.12E-04     4 8.63E-05     5 1.37E-05
C14D            6 1.03E-06   7 1.06E-10  -1 0.00E+00     0 0.00E+00     0 0.00E+00
N13     9.96   MIN      0
N13     0  2.00E+01  1.00E+01   1.50E+09
N13             1 5.04E-02    2 1.11E-02  3 7.42E-03     4 1.11E-02     5 7.04E-03
N13             6 4.81E-03    7 7.03E-03  8 3.44E-03     9 2.00E+00    10 6.74E-04
N13            11 2.46E-04   12 2.04E-05 13 7.32E-12    -1 0.00E+00     0 0.00E+00
N16     7.13   SEC      0
N16     0
N16             1 1.53E-01   2 3.52E-02   3 2.43E-02     4 3.77E-02     5 2.54E-02
N16             6 1.84E-02   7 3.04E-02   8 1.84E-02     9 1.43E-02    10 7.67E-03
N16            11 6.08E-03  12 5.48E-03  13 1.00E-03    14 8.46E-03    15 1.54E-03
N16            16 6.54E-04  17 7.40E-01  18 6.60E-04    -1 0.00E+00     0 0.00E+00
NA22    2.602  YRS      0
NA22    3  8.00E+00  8.00E+00   6.30E+03
NA22            1 3.02E-02    2 6.47E-03  3 4.29E-03     4 6.27E-03     5 3.87E-03
NA22            6 2.57E-03    7 3.50E-03  8 1.50E-03     9 1.80+00     10 1.53E-04
NA22           11 1.00E+00   12 1.38E-07 13 1.60E-08    14 3.73E-10    -1 0.00E+00
NA24    15.02  HRS      0
NA24    4  5.00E+00  5.00E+00  8.70E+06
NA24            1 2.80E-02   2 5.96E-03   3 3.92E-03     4 5.66E-03     5 3.44E-03
NA24            6 2.24E-03   7 2.94E-03   8 1.17E-03     9 4.79E-04    10 9.35E-05
NA24           11 1.00E+00  12 2.95E-08  13 7.80E-09    14 1.00E+00    15 6.85E-04
NA24           16 7.12E-06  -1 0.00E+00   0 0.00E+00     0 0.00E+00     0 0.00E+00
```

Part 4:

This part contains the waste stream information. One record per waste stream is required.

Waste Stream Record:

COLS.	VARIABLE	FORMAT	COMMENT
1-24	CLWSTR	6A4	name of waste stream
25	CLWSSY	A1	one character symbol for waste stream
26-35	CLPWF	10A1	array of compatible waste forms for this waste stream (e.g. - dry active waste can only be either compacted or uncompacted; so this entry would be 'CU')
36	CLFLTR	I1	"1" if radiological analysis sheet should be printed
38	CLWTYP	I1	waste stream Type Index (0 = Process Waste, 1 = DAW, 2 = activated metals, 3 = spent filters, > 3 = other
39-40	CLSNUM	I2	waste stream number for numerical recognition of the waste stream by the code; this value is compared to the values in the Parameter file to identify DAW and Irradiated Components)
42	CLISO	I1	ISO File Flag (0,blank=don't use, 1=use,>1=prompt)
44-45	CLFRAT	I2	Dose-to-Curie Index (0 = No Dose-to-Curie, -1 = Contact, -2 = 1 meter, 1 = Average Contact, 2 = average 1 meter, X > 2 = average dose rate at X inches)
46-73	CLCFRM	7A4	chemical form of this waste stream

NOTE: The order in which the waste stream records appear must not be changed. If new waste streams are added, add them after the existing records.

Figure A-4 Sample Container ID Library (continued)

```
         13              NUMBER OF LINES OF DESCRIPTIVE TEXT TO FOLLOW
WASTE STREAM TYPES:
         FIELD COLS.     DESCRIPTION
          1-24            WASTE STREAM NAME
          25              SYMBOL
          26-35           SYMBOLS OF POSSIBLE WASTE FORMS
          36              RADIOLOGICAL ANALYSIS SHEET (1 = yes, 0 or blank = no)
          38              WASTE STREAM TYPE (0=PW, 1=DAW, 2=ACT.MET., 3=SP.FIL.
                          >3=OTHER)
          39-40           STREAM NUMBER
          42              ISO FLAG (0=DON'T USE, 1=USE, > 1=PROMPT)
          44-45           DOSE-TO-CURIE INDEX
          46-73           CHEMICAL FORM OF WASTE STREAM
12345678901234567890123456789012345678901234567890123456789012345678901234567890123
RADWASTE RESINS           ADS         1 0 1 0      2OXIDES ON BEAD RESIN
RCS FILTERS               BDE         1 3 2 0     -2METAL OXIDES
EVAPORATOR BOTTOMS        CDS           0 3 0     12METAL OXIDES
RWCU RESINS               DDS         1 0 4 0     36OXIDES ON POWDEX RESIN
RADWASTE SLUDGE           ES          1 0 5 0      1METAL OXIDES
DRY ACTIVE WASTE (DAW)    FCU           1 6 1     -1PLASTIC/CLOTH/WOOD
RADWASTE FILTERS          GDE         1 3 7 0     12METAL OXIDES
CELLULOSE FILTERS         HD          1 3 8 0     36METAL OXIDES
IRRADIATED COMPONENTS     IUC           2 9 0     12ACTIV. METAL
SRT RESINS                JDS         1 010 0     72OXIDES ON ECODEX RESIN
```

WASTETRAK

A Low Level Radioactive Waste Tracking
and Shipping Optimization Program

User's Manual, Version 5C, 10/30/87

For Version: 5C VAX/IBM/PC

Revision 0

Approved by: _____ Date: 1/11/88

WASTETRAK USER'S MANUAL
VERSION LOG

VERSION	DATE	PREPARED BY	SUMMARY OF CHANGES
-	07/25/83	T. Bolian	Original Issue
2B	11/15/83	C. C. Davis	Enhanced search options, added archive data file, removed programmer information to separate programmer's guide.
2C	12/16/86	C. C. Davis	Code performs forced reporting of 10CRF61.55 isotopes and waste form/container compatibility check.
3A	01/06/84	C. C. Davis	Expanded cost summary reports added cost budget, added ability to change shipping disposal costs for shipped containers.
3B	02/17/84	C. C. Davis	Provided dose-to-Curie calculations for all waste streams. Provided capability to enter all waste streams using Enter A Batch. Deleted shipping capability from Enter A Batch.
3C	05/04/84	C. C. Davis	Created burial site approved computer generated shipping papers.
3D	11/07/84	M. A. Carman	Corrected programming errors and added enchancements for user convenience.
4A	04/01/85	C. C. Davis	Added mixed waste container capability and radiological analysis for ion exchange resins/filter media. Updated shipping papers.
4B	07/01/85	C. C. Davis	Error corrections and minor enhancements, including option to enter volumes in gallons.
4C	04/07/86	C. C. Davis	Changes to US Ecology and Barnwell shipping manifests.
5A	10/28/86	C. C. Davis	Added consolidation of containers.
5B	02/17/87	C. C. Davis	System Conversion
5C	10/30/87	C. C. Davis	Updated Barnwell RSM; added ability to scale H3 and C14; error corrections

WASTETRAK USER'S MANUAL

REVISION LOG

VERSION ID/ MANUAL REV.	MANUAL DATE	PREPARED BY	APPROVED BY	SUMMARY OF CHANGES
4C	04/7/86	C.C.Davis		Revised Pages: 2-1, 2-2, 2-3, 2-4, 2-6, 2-7, 2-8, 2-9, 2-12, 2-17, 2-18, 3-6, 5-1, 5-2, 5-4, 5-6
5A	10/28/86	C. C. Davis		Entire Manual re-issued
5A/Rev. 1	02/17/87	C. C. Davis		Revised Pages: 2-2, 2-9, 3-4, 3-6, 3-8, 4-11, A-9, A-18, A-19
5C/Rev. 0	10/30/87	C.C. Davis		Revised Pages: 2-3, 2-9, 2-12, 3-4, 3-5, 3-8, 4-2, 4-8, 5-2

2.2 Radwaste Libraries

2.2.1 Nuclide Library

The Nuclide Library contains the isotope information necessary to perform radioactive decay calculations. It contains data on radioactive isotopes expected to be produced by the processes of a uranium-235 fueled nuclear power plant. In addition to the decay data, the nuclide library contains data associated with the shipping of such materials under U.S. law.

For each isotope, the library contains fields for:

a. decay half-life
b. names of daughter products and decay fraction
c. photon decay fraction for 18 energy groups in gammas/disintegration
d. 49CFR173 shipping transport group
e. A_1 and A_2 curie limits for 49CFR173 compliance.
f. Curies/gram

2.2.2 Container ID Library

The Container ID Library contains the data necessary for WASTETRAK to interpret a container identification number entered by the user. The data in this library includes:

a. symbols for container types, subtypes, waste forms, and waste streams
b. container dimensions (diameter, height, inside and outside volume, etc.)
c. container DOT specification
d. waste form density
e. name of waste stream physical form
f. name of waste stream chemical form

With this library, the program user need only enter the container ID number and WASTETRAK will assign the proper attributes to the package without further data entry. An example of the Container ID Library is shown in Figure 2-2.

2.2.3 Isotope Set

The Isotope Set contains the isotopic input information to be applied to a given container. The Isotope Set can be used to interface WASTETRAK with gamma analysis equipment or to store isotopic information which is static such as for DAW. Whenever a user enters a container he may directly enter the isotopic data at the keyboard or he/she may configure WASTETRAK to read the data directly from the Isotope Set file.

An example of an isotope set is shown in Figure 2-3. Each record contains the isotope name, concentration (in any consistent units), and percent error associated with the concentration.

Figure 2-1 Parameter File Part 1

```
UTILITY NAME
PLANT NAME
ADDRESS
PHONE NUMBER
GENERATOR NO.
US ECOLOGY GENERATOR NUMBER
US ECOLOGY PERMIT NUMBER
SC PERMIT NUMBER

    6    NUMBER OF LINES OF DESCRIPTIVE TEXT THAT FOLLOW.  THIS FILE CONTAINS
    THE PROGRAM PARAMETERS.  IT CONSISTS OF THREE PARTS.  THE FIRST PART
    CONTAINS USER MODIFIABLE PARAMETERS.  THE SECOND PART CONTAINS PARAMETERS
    THAT MUST BE MODIFIED BY THE PROGRAM MANAGER.  THE THIRD PART CONTROLS THE
    DEBUG FEATURE.

PART 1:

    VALUE     VARIABLE  DESCRIPTION

       21     NPART1    NUMBER OF PART 1 PARAMETERS BELOW
       20     MAXDK     MAXIMUM NUMBER OF NUCLIDES IN BRANCH OF DECAY CHAIN
     500.     STABLE    NUCLIDES WITH HALFLIVES > STABLE GENERATE NO
                        DAUGHTERS
      14.     XMINDK    MINIMUM DECAY TIME IN DAYS
      10.     THESDK    HALF-LIFE THRESHOLD FOR REPORTING OF DAUGHTERS IN DAYS
      20.     ASMEAR    DEFAULT ALPHA CONTAMINATION VALUE
    1000.     BSMEAR    DEFAULT BETA/GAMMA CONTAMINATION VALUE
       5.     CONERR    DEFAULT ACTIVITY CONCENTRATION ERROR
 1.00         RATIO1    TUNING FACTOR FOR DRUM DOSE RATE CALC.
       1.     RATIO2    TUNING FACTOR FOR BOX DOSE RATE CALC.
 1.00         RATIO3    TUNING FACTOR LINER DOSE RATE CALC.
 1.00         RATIO4    TUNING FACTOR FOR LINER IN-CASK DOSE RATE CALC.
      300     NPRDAT    PRE-DATING PERIOD IN DAYS FOR FILL AND SHIP DATES
       30     LISCUT    LIST LENGTH FOR SELECT-A-LINER ROUTINE OUTPUT
        3     ISO121    NO. OF "MAJOR NUCLIDES" REPORTED IN RG 1.21 REPORT
        6     MONAVG    MONTHS OF DATA AVERAGED FOR FACILITY STATUS REPORT
       90     IWARNP    CRITICAL STORAGE WARNING PERIOD IN DAYS
     790.     PWCAP     FACILITY CAPACITY FOR NUMBER OF LINERS
  300000.     DWCAP     FACILITY CAPACITY FOR CUBIC FEET OF DRY WASTE
   1.E-03     SHPCUT    ISOTOPE CONCENTRATION CUTOFF FOR SHIPPING
  110000.     WGTLIM    ROAD WEIGHT LIMIT FOR SHIPPING IN LBS
   75000.     WTOVER    ROAD OVERWEIGHT LIMIT FOR SHIPPING IN LBS
```

Figure 2-2 Sample Container ID Library (continued)

```
         11                  NUMBER OF LINES OF DESCRIPTIVE TEXT TO FOLLOW
WASTE STREAM TYPES:
         FIELD COLS.        DESCRIPTION
          1-24               WASTE STREAM NAME
          25                 SYMBOL
          26-35              SYMBOLS OF POSSIBLE WASTE FORMS
          36                 RADIOLOGICAL ANALYSIS SHEET (1 = YES, 0 or BLANK = NO)
          38                 WASTE STREAM TYPE (0=PW, 1=DAW, 2=ACT.MET., 3=SP.F L.
                            >3=OTHER)
          39-40              STREAM NUMBER
          42                 ISO FILE FLAG (0 = DON'T USE, 1 = USE, > 1 = PROMPT)
          43-45              DOSE-TO-CURIE INDEX (-1 = CONTACT, -2 = 1 METER, >2
                            = DISTANCE IN INCHES)
          46-73              CHEMICAL FORM OF WASTE STREAM
12345678901234567890123456789012345678901234567890123456789012345678901234567890123
RADWASTE RESINS          ADS        1 0 1 0      20XIDES ON BEAD RESIN
RCS FILTERS              BDE        1 3 2 0     -2METAL OXIDES
EVAPORATOR BOTTOMS       CDS          0 3 0     12METAL OXIDES
RWCU RESINS              DDS        1 0 4 0     36OXIDES ON POWDEX RESIN
RADWASTE SLUDGE          ES         1 0 5 0      1METAL OXIDES
DRY ACTIVE WASTE (DAW)   FCU          1 6 1     -1PLASTIC/CLOTH/WOOD
RADWASTE FILTERS         GDE        1 3 7 0     12METAL OXIDES
CELLULOSE FILTERS        HD         1 3 8 0     36METAL OXIDES
IRRADIATED COMPONENTS    IUC          2 9 0     12ACTIV. METAL
SRT RESINS               JDS        1 010 0     72OXIDES ON ECODEX RESIN
```

3.3.5 Consolidate Containers

This option allows the user to consolidate existing containers in the data base into a new container. The existing containers are deleted and the new container is stored. This option can be used where a supercompactor is used to compact 2 or more containers into one. It is also useful for the user who wishes to use the dose to curie model to classify individual filters and estimate their activities; and then combine all of these filters into a HIC or similar container.

3.3.6 Change Dummy to Real

In some special cases the user may desire to change a dummy container that has the right attributes to a real container to avoid re-entering data.

3.3.7 Delete a Container

If a container has been logged into the Container Data File and the user desires to change the data for any reason, he can delete it from the Container Data File using this option provided the container is not part of a shipment. The container can then be re-entered using option 1. This option is also useful to delete unwanted dummy containers from disk storage. Containers that are part of a final shipment cannot be deleted. Containers that are "pre-ship" must be deleted from the shipment before they are deleted from the Container Data File.

3.3.8 Change Storage Location

This option is used for containers that already exist in the Container Data File. If all that has changed about a container is that is has been moved in the IOS facility, this option can be used to change the storage location, item 2 of the list given in section 3.3.1. The user will also be asked to enter a new storage date.

3.4 Shipping Options

The second option in the Function Menu transfers program control to the Shipping Menu. The options in this menu provide the capability for assembling shipment data, printing shipping papers, entering burial site allocations, and performing shipping cost optimization studies. The Shipping Menu is shown below.

*** SHIPPING MENU ***

TYPE	FUNCTION	TYPE	FUNCTION
0	RETURN TO FUNCTION MENU	6	ENTER BURIAL SITE ALLOCATION
1	PREPARE A SHIPMENT	7	SELECT MULTIPLE LINERS
2	SELECT A LINER	8	ENTER SHIPPING AND DISPOSAL BUDGET
3	SELECT A CASK	9	UPDATE COSTS FOR SHIPPED CONTAINERS
4	GENERATE SHIPPING PAPERS	10	MAKE A SHIPMENT FINAL
5	RECALL SHIPPED CONTAINER		

3.4.1 Prepare a Shipment

A shipment of low level radwaste consists of from one to many containers placed on a truck destined for a particular burial site. The containers may be shielded in a van or cask, or under certain provisions of the federal regulation can be secured on the truck without shielding. The Prepare Shipment option in WASTETRAK allows the user to associate from 1 to 200 containers with a unique shipment number. In this way, certain data associated with a shipment is automatically associated with every container in that shipment. This option processes a shipment in three parts.

First, general information about the shipment is entered as follows.

- Shipment Number
- Date of Shipment
- Destination of Shipment
- Name of Trucking Company
- Trailer Number

This information is necessary to complete the shipping documentation and estimate shipment costs. Following the entry of the general shipment information, the containers that are to be included in the shipment are identified along with the measured dose rate and contamination data at the time the shipment is prepared. In the final step of shipment preparation, WASTETRAK performs an evaluation of possible shipping methods (i.e. - cask selection) and a cost estimate for acceptable shipping methods. Once the shipment preparations are complete, the container data base is updated to indicate that those containers are being prepared for shipment.

3.4.2 Select a Liner

In the event that a particular cask is available for a shipment, the Select a Liner routine in WASTETRAK can be used to find the most cost effective liner that can be shipped in that cask. Drums are not included in the selection process. This process involves the following steps.

3.5.2 Print Cask Library

This option displays data for all the casks in the cask library including DOT specification, NRC certification, all physical dimensions and rental fees. The output can be routed to the terminal or to hardcopy. It is the responsibility of the User to update the Cask Library as cask specifications change (See Section 2.2.5).

3.5.3 Print Nuclide Library

The Nuclide Library contains data for over 300 isotopes including half lives, daughter products, gammas produced during decay, shipping limits, and transport groups. This data can be routed to hardcopy using the Print Nuclide Library option in the Library Menu. The nuclide library is reduced to 117 isotopes on the PC version.

3.5.4 Edit Isotope Library

Option 4 of the Library Menu will display on the terminal the current contents of the Isotope Library. Optionally, the user can replace this data by entering a new isotope set.

3.5.5 Edit Program Parameters

This option allows the user to modify Part 1 of the Parameter File (Section 2.1.1.1). When the option is initiated, the user modifiable parameters are displayed at the terminal along with the variable names associated with each value. The user can then specify the variable name of the parameter to be changed and provide the new value. The updated Parameter File is then displayed.

3.6 Liner Surveillance Options

Plants that have interim storage of liners at the plant site are required to periodically select liners at random for inspection and keep records of the inspection reports. Liner Surveillance function allows the user to store and retrieve liner surveillance reports and provides a method of random selection of liners for surveillance. The Surveillance Menu is shown below.

*** SURVEILLANCE MENU ***

TYPE	FUNCTION
0	RETURN TO FUNCTION MENU
1	LINER SELECTION
2	ENTER SURVEILLANCE RESULTS
3	RECALL SURVEILLANCE RESULTS

4.1.1.2 Enter Container Empty Weight

If the container was weighed before it was filled with waste, that weight is entered here. Entry of a blank line will cause this value to default to the empty weight for the appropriate container type from the Container ID Library. Weight of the solidification agent should be included here.

4.1.1.3 Enter Storage Location

The storage location field in the container data base is used to track containers that are stored in an Interim On-site Storage Facility (IOS). This entry can be from 0 to 24 characters in length and will appear on displays and printouts for this container. Another use of this field is to provide a tag for containers that will later be consolidated into a single container.

4.1.1.4 Enter Fill Date

The fill date is the date the container was filled with waste. The variable NFRDAT in the Parameter File determines the predating period. If the user enters a blank line by pressing the "ENTER" key on the keyboard, the fill date will default to today's date. If a date is entered, it must be in the form mm/dd/yy where "mm", "dd", and "yy" are the numerical representations for the month, day, year. The month, day, and year must be separated by one of the appropriate delimiters (slash (/), dash (-), comma (,), or space). It is recommended that the fill date correspond to the date the isotope sampling was done since the decay calculation starts from this date.

4.1.1.5 Enter Storage Date

This entry is identical in form to the fill date and defaults to the fill date if a blank line is entered. It is provided to give the user the flexibility of specifying a different date for the time when the container is moved into a storage location, but it can not pre-date the fill date.

4.1.1.6 Volumes in Gallons or Cubic Feet

A prompt may appear as to whether you wish to input volumes in gallons or cubic feet. This prompt will only appear if 'IGPROM' in the parameter file is set to 1. The default choice is cubic feet. The user may choose to enter the product volume and waste volume in gallons; however, the volumes will still be stored and displayed in summaries in cubic feet.

4.1.3.7 Enter Storage Date

The user is also requested to enter a storage date to be assigned to new containers to be entered at this time. (See Section 4.1.1.5.)

4.1.3.8 Storage Location Entry Option

For plants utilizing interim onsite storage, WASTETRAK allows entry of a storage location for each container. If no storage locations are to be entered, the user answers "N" or "No" to the question, "Do you want to enter storage locations?" If the user answered "Yes" to the question, a prompt will appear requesting the storage location for the current container.

4.1.3.9 Contamination Data Entry Option

The parameter file contains default values for contamination survey. The user can override the use of these values by answering "Y" or "Yes" to the question, "Do you want to enter contamination survey values?". The contamination values are entered on one line separated by spaces or a comma.

4.1.3.10 Option to Enter Volumes in Gallons

The program defaults to volumes in cubic feet. The user can override this by setting 'IGPROM' in the parameter file to 1 so that the following prompt will appear: "Do you want to enter volumes in gallons instead of cubic feet?" Answering yes allows the user to enter the product volume and waste volume in gallons; however, the volumes will still be stored and displayed in summaries in cubic feet.

4.1.3.11 Container Data Entry

The remainder of the data entry is for each new container to be added to the current batch. Throughout data entry, the ID number of the current container appears at the top of the terminal screen. At any time, the user can type "Quit" to terminate batch data entry and return to the container menu.

4.1.3.12 Gross Container Weight, Density, and Volume (Process Waste Only)

This entry is the gross container weight in lbs., product density in $lbs./ft.^3$, and the product volume in $ft.^3$ or gallons. This is the same entry as in Enter a Container described in Section 4.1.1.7. Refer to that section for a more detailed description.

4.1.3.13 Waste Volume Transferred to Container

This entry is the same as that described in Section 4.1.1.12 for the Enter a Container option. However, in this case, the user can set the waste volume equal to the final waste product volume by entering a blank line.

$$ngc = (kge)^{(Exp)}\ (ratio)$$

where
- ngc = non-gamma emitter concentration
- kge = key gamma emitter concentration
- ratio = ratio from library for waste stream
- Exp = variable exponent

The combined set of gamma and non-gamma emitters is decayed by the program for a five year period beginning on the fill date for the container. Starting with the first day of the next calendar quarter, a calculated activity concentration for each isotope is determined for the next four quarters and annually for the following four years. This table of values is stored with the container for reporting purposes. At the same time, a dose rate calculation at contact and one meter is performed for each quarter. The first time WASTETRAK is executed after the beginning of a new quarter, the code automatically updates the current dose rate values in the Container Inventory File for all unshipped containers in the data base.

A by-product of the decay calculation is the inclusion of isotopes that are daughter products of the decay. These isotopes are added to the isotope inventory as they are produced. Initial concentrations of daughters are determined using a minimum decay period (variable MINDK from Parameter File) for the parent isotopes.

WASTETRAK calculates the total activity or curie content of a container in the following manner. The total curies associated with each isotope (except daughter products with a half-life less than 10 days) is determined by multiplying the activity concentration (uCi/cc) by the product volume. The container total curie content is then equal to the sum of all the individual isotopes activities.

The final step in container processing is the determination of the 10CFR61 waste classification. This calculation is done at the time the container is filled and again when the container is processed for shipment. The PART61 data file contains the isotope names and concentration limits from the 10CFR61.55 tables in the format shown in Figure 2-8. WASTETRAK calculates the ratio of the current isotope concentrations to the values in the tables and sums the results per column. The results are compared to the guidelines in 10CFR61 and a waste classification of A, B, C, or greater than C is assigned.

All of the entered and calculated data discussed above is held in arrays in memory until user verification of the input is complete. The user can call for the transfer of the data to the Container Data File by selecting an option to store the data as a real container or as a dummy. The process of transferral is analogous to a paperwork filing system where the filling of the data arrays is similar to filling out a file on a container and the Container Data File is the file cabinet. Anytime WASTETRAK requires data from the data base, the file of data on the particular container is located and copied into the TEMP DATA array for local data access and manipulation. The Container Inventory File serves as a