



**AUSTRALIAN ATOMIC ENERGY COMMISSION
RESEARCH ESTABLISHMENT
LUCAS HEIGHTS**

GYMEA EDITOR USER'S GUIDE

by

G.H. FORD*

***Attached, from IBM Australia Pty. Ltd.**

April 1966

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ABSTRACT

The GYMEA EDITOR prepares standard binary GYMEA cross section library tapes from free format input data cards interspersed with control cards. The library tapes thus created may be input to other EDITOR runs to list, punch, or copy selected nuclides, or, UPDATE runs may be used to create new libraries, alterations being possible in a variety of ways. The output from any successful UPDATE run is always another binary library tape in standard form.

CONTENTS

	Page
1. MACHINE CONFIGURATION	1
2. GENERAL DESCRIPTION	1
2.1 GYMEA	1
2.2 GYMEA EDITOR	2
2.3 GYMEA EDITOR Options	2
3. THE GYMEA LIBRARY TAPE	3
4. MASTER RUN	6
5. THE LIST RUN	8
6. THE PUNCH RUN	9
7. THE COPY RUN	11
8. THE UPDATE RUN	12
9. ERRORS IN FREE INPUT	13
10. REFERENCES	13
Appendix 1 List of Control Cards	
Appendix 2 List of Output Messages and Error Messages	
Appendix 3 MASTER Run with Nuclide Data Arranged Reactionwise Standard	
Appendix 4 MASTER Run with Nuclide Data Arranged Groupwise Non Standard	
Appendix 5 MASTER Run with Nuclide Data Arranged Reactionwise Non Standard	
Appendix 6 MASTER Run with Nuclide Data Arranged Groupwise Standard	
Appendix 7 LIST Runs	
Appendix 8 PUNCH Runs	
Appendix 9 COPY Runs	
Appendix 10 UPDATE Runs	
Appendix 11 Input Data Description for Appendix 10	
Appendix 12 \$FILE Cards Used to Achieve Blocking of FORTRAN IV Records	

1. MACHINE CONFIGURATION

IBM 7040/44

32K WORDS

Extended performance

Single precision floating point

3 IBM 729 or IBM 7330 magnetic tape units in addition to those devices pre-empted for

S.SLIB

S.SIN

S.SOU

S.SPP1

The programme can be run as a \$RELOAD job from a tape unit or it may be included in the library tape and loaded by a \$EXECUTE card.

The programme will call for units 0-4 to be "readied" on exit, as it uses variable unit designation in FORTRAN IV. At the end of the run, if there are not enough units available, units may be dialled as called for to satisfy this standard procedure of closing all FORTRAN files on exit.

The units used are 1, 2, 3 and these are used as follows:

Run	S.SU01	S.SU02	S.SU03
MASTER	ONTO	-	-
LIST	FROM	-	-
COPY	FROM	ONTO	-
UPDATE	FROM	ONTO	USING
PUNCH	FROM	-	-

- indicates not used in that run

2. GENERAL DESCRIPTION

2.1 GYMEA

GYMEA is a zero-dimensional, multigroup (\dagger 120), multinuclide (\dagger 100), burnup and data preparation programme. The code computes neutron spectrum (optionally) and nuclide concentrations to enable spectrum-weighted, group-averaged cross section data and scattering transfer matrix data to be prepared for direct input for a number of neutronics codes.

The code uses two completely binary libraries - one a cross section (and resonance parameter) tape, the other a scattering matrix tape. The scattering matrix tape is outside the scope of this report but further information on its maintenance may be obtained from SCATLD (McGregor 1966).

The cross section library tape contains information for six neutron reactions:

- (1) (n, γ) , (n, α) , or (n, p) , depending on nuclide
- (2) (n, f)
- (3) $(n, \text{absorption})$
- (4) $(n, \nu-f)$ or (n, n) for moderator nuclides
- (5) $(n, \text{transport})$
- (6) $(n, 2n)$

2.2 GYMEA EDITOR

The GYMEA EDITOR is designed to create and update GYMEA cross section library tapes. These tapes are in a standard form, described in Section 3. The EDITOR can perform the initial creation of the binary library tape during a MASTER run, with free format data as input. There are a few restrictions which will be apparent from reading the description of the input data. These are not restrictive to the user, however, as they assist him in most cases to set up the input data string in a way which aids checking and segmentation of the data into logical sections.

In general, a new set of data starts on a new card. The set referred to here may be, for example, the 6 reactions about a particular energy group, the burnup information pertaining to a particular nuclide, or the beginning of the potential scatter information about all nuclides in the library, following the end of the mass data about those nuclides. Arrangement of the data in this way, rather than as a continuous string separated by commas and blanks, aids control by the programme and checking by the user.

As the programme is reading data it looks ahead for cards which are not valid or are out of context. This is achieved by the facility in the free format routines to inspect the input buffer after each card is read and before any scanning begins. In certain cases a dummy read is issued specifically to force a new card and analyse it without returning to the free format routine. Hence all the programming about this card will be in the pre-inspection phase before the scan by the free format routine begins. This technique allows the programme to set an indicator to determine the mode of pre-inspection according to the nature and stage of the edit job selected. For example in one case this indicator may be set to inspect for an ENDJOB control card or a PATCHES control card. If the card read is neither ENDJOB nor PATCHES, the pre-inspection routine returns to the free format routine and allows scanning for data. In another case the pre-inspection routine may be checking for an ENDJOB card. If the card read is not an ENDJOB card, the nuclide names on the card are collected in a vector and without returning to the free format routine another card is read, repeating the process till an ENDJOB card is read. This is the technique used to collect nuclide names to list selected nuclides from the library.

Every library tape produced by the EDITOR programme is a valid entity itself. For example, if a MASTER run was done to create a library, a subsequent COPY run to copy a subset of the nuclides on the master tape would produce a smaller library tape of the same form with its own reduced index contained in file 1 of the tape.

The information which cannot be changed by the user once a library tape has been created is the number of groups in the library, the group boundaries, and the indication of where resonance starts and ends among the energy groups. All other data may be changed by correct choice of control and data cards using an UPDATE run.

The resonance indicator, which a user should not want to change, cannot be changed except by deleting the whole nuclide and inserting it again during an UPDATE run.

2.3 GYMEA EDITOR Options

There are five options which can be done in the EDITOR: MASTER, LIST, COPY, UPDATE, and PUNCH.

A MASTER run reads parameters and index data about a set of nuclides, and writes the index out on tape as the first file. It then reads individual nuclide information about the nuclides mentioned in the index, the data being in one of four forms: arranged by group or reaction, with resonance parameters for resonant nuclides being either in standard form (using a form of resonance data standardised at A.A.E.C.) or non-standard form (where the resonance parameters are accepted as they are, and no computation on them is performed as it is with standard resonance parameters).

The six data entries for the standard resonance card are (i) lethargy, u (not used but is read), (ii) resonance energy, E (eV), (iii) scattering width, Γ_n (eV), (iv) radiation width, Γ_γ (eV), (v) fission width, Γ_f (eV), and (vi) spin factor, g . The corresponding six data entries for the non-standard resonance card are (i) E , (ii) Γ_n , (iii) Γ_γ , (iv) Γ_f , (v) $\nu\Gamma_f$, and (vi) g . The computations performed on standard resonance parameters actually produce non-standard resonance parameters with $\nu\Gamma_f$ determined from Γ_f and ν - see Section 3, file 1, C array. All output from EDITOR runs is arranged by group with resonance parameters in non-standard form. The input data to any given MASTER run must all be in one of the four forms groupwise standard, groupwise non-standard, reactionwise standard, reactionwise non-standard.

Each set of nuclide data (each nuclide) is used to create one file on the library tape, the file consisting of a label record, a search vector, and then the cross section data arranged groupwise. If the nuclide has shielding parameters these follow the group data group by group. The same applies to nuclides with resonance parameters.

A LIST run will list the first file or any selection of the nuclides, or both.

The PUNCH run punches either the first file or selected nuclides, or both. If all nuclides as well as file 1 are selected for punching, the cards produced are in a form suitable to recreate the library using a MASTER run.

The COPY run produces a copy of the whole tape or a subset of it. Copying could be done using an UPDATE run but the COPY run is a more convenient way of copying without change of detail.

The UPDATE allows updating at almost any level. Permitted changes to file 1 may be attempted, and if in error they will be ignored. Whole nuclide changes may be made using DELETE, REPLACE, and AFTER control cards to achieve the desired effect. In addition, patches to a row, column, or particular point of group, resonance, or shielding data of existing nuclides may be achieved using ROW, COL, SPOT, RESON, and SHIELD control cards.

Runs of the five kinds may be stacked; each run must end with an ENDJOB control card. To indicate dependency between the runs, a 1 is punched in column 7 of the first control card (a MASTER, LIST, PUNCH, etc., card) of the following dependent job. This job is then skipped if the previous job was in error. This dependency may be carried on from job to job.

A PAUSE option is provided using a PAUSE control card with an optional message in columns 7 - 72. The PAUSE option would allow tape unit switching or file protection between runs, for example.

3. THE GYMEA LIBRARY TAPE

This section should be read in conjunction with the relevant section of the report on GYMEA (Pollard and Robinson 1966), which describes the detail of the cross section data.

The form of the records on the library tape is summarised here, to enable a user to set up the appropriate FORTRAN IV READ statements to read the tape using his own programme. The records on the tape are blocked and the FILE cards in Appendix 12 show how the data is arranged, but logically the tape may be read using binary READ statements and the following as a guide.

- C NN = NO. OF NUCLIDES AND MUST BE A CONSTANT IN THE
- C COMMON STATEMENT FOLLOWING. NG = NO. OF GROUPS AND
- C MUST ALSO BE CONSTANT IN THE COMMON STATEMENT.

COMMON LABEL (2), NAME, TITLE (9), NG, NN, TEMP, KFIRST, KLAST, BURN (NN, 10),
LETH (NG + 1), FISS (NG), VEL (NG), IND (NN), MASS (NN), DENS (NN), FER (NN),
SHNA (NN), SHNB (NN), SHNC (NN), NUCLID (NG,6), RESON (251,6), C(2,NN),
AB(251,6), MM (NG).

The dimensions for RESON and AB may be changed from 251 to relate to the particular library.
Storage may possibly be shared between RESON and AB.

FILE 1 DATA

LABEL 2-word label = GYMEA bX-Sbb
NAME 1-word library name, for example, bSAM1b
TITLE 9 words of title (any 54 BCD characters)
NG 1 fixed point word giving number of groups
NN 1 fixed point word giving number of nuclides
TEMP 1 floating point word giving temperature °K
KFIRST 1 fixed point word giving group at which resonance theory starts
KLAST 1 fixed point word giving group at which resonance theory finishes
BURN NN vectors of 10 words: one for each of the NN nuclides in the library, giving
burnup information
LETH NG + 1 floating point values of the lethargies at the group boundaries
FISS NG floating point values of the normalized fission spectrum
VEL NG floating point values of the group velocities
IND NN fixed point values giving the resonance indicator for nuclides
MASS NN floating point values giving the masses for nuclides
DENS NN floating point values giving the potential scatter for nuclides
FER NN floating point values giving the fission energy release for nuclides
SHNA NN floating point values to reconstruct shielded cross sections(1)
SHNB NN floating point values to reconstruct shielded cross sections(2)
SHNC NN floating point values to reconstruct shielded cross sections(3)
NUCLID Array of group cross sections for the current nuclide
RESON Array of resonance parameters for the current resonant nuclide
AB Array of shielding parameters for a current nuclide with shielding parameters
C Paired coefficients to calculate resonance $\nu\Gamma_f$ from Γ_f and the formula for ν :

$$\nu = C_{21-1} + C_{21} E_r,$$

where E_r (MeV) is the energy of a resonance of nuclide 1.

MM A search vector containing NG values. The entries in this vector are fixed point numbers showing how many resonances are present for each of the NG groups. For a nuclide with shielding parameters, MM(I) = 1 when the Ith group is resonant. MM values are all zero for light nuclides

To read file 1 the following FORTRAN statements could be used:

```
READ (K) LABEL, NAME, TITLE

READ (K) NG, NN, TEMP, KFIRST, KLAST

DO 1 I = 1, NN

1 READ (K) (BURN (I,J), J = 1, 10)

L = NG + 1

READ (K) (LETH(I), I = 1, L)

READ (K) (FISS (I), I = 1, NG)

READ (K) (VEL (I), I = 1, NG)

READ (K) (IND (I), I = 1, NN)

READ (K) (MASS (I), I = 1, NN)

READ (K) (DENS (I), I = 1, NN)

READ (K) (FER (I), I = 1, NN)

READ (K) (SHNA (I), I = 1, NN)

READ (K) (SHNB (I), I = 1, NN)

READ (K) (SHNC (I), I = 1, NN)
```

Individual nuclide files are of three kinds:

1. Light nuclides and nuclides not affected by resonance theory, IND value = -1 or 0 respectively.
2. Nuclides with shielding parameters, IND value = 1.
3. Nuclides with resonance parameters, IND value ≥ 2 .

To read any file the following FORTRAN statements could be used:

```
C READ LABEL RECORD AND SEARCH VECTOR

READ (K) NAM, MAS, INDI

READ (K) (MM(I), I = 1, NG)

C READ GROUP DATA AND RESONANCES OR SHIELDING PARAMETERS

C 3 KINDS OF ROUTINES COULD BE PROVIDED HERE AS AN ALTERNATIVE

C AB IS ASSUMED EQUIVALENCED WITH RESON.
```

```

KFN = 0
DO 10 I = 1, NG
  READ (K) (NUCLID (I,J), J =1,6)
  IF (MM(I).EQ.0) GO TO 10
  KST = KFN + 1
  KFN = KFN + MM (I)
  DO 12 J = KST, KFN
    12 READ (NT) (RESON (J,K1), K1 = 1, 6)
  10 CONTINUE

```

- C THE GROUP DATA IS IN NUCLID, THE RESONANCE OR SHIELDING PARAMETERS,
- C IF PRESENT ARE IN RESON. MM VECTOR IS USED TO DETERMINE WHICH
- C PARAMETERS BELONG TO WHICH GROUPS.

A means must be provided to skip over the tape mark at the end of every file. A convenient way is to CALL FILEND (K) where FILEND is a small routine designed to skip a file on unit number K. (FILEND is actually a subroutine of the EDITOR programme, but any routine which positions after the next tape mark will suffice). After the nuclide has been read, the value of the resonance indicator may be used to determine further use of the cross section data.

4. MASTER RUN

A MASTER run creates an entire library from card input.

There are four ways of arranging the input for the particular nuclides. For any one MASTER run, one of the four forms must be chosen and all nuclides must be in that form. It is the responsibility of the user to check that the data is in the correct form.

The four forms are combinations of the two sets of alternatives:

Groupwise	Reactionwise	
x	x	Standard
x	x	Non-Standard

Appendices 3 to 6 show examples of the four kinds of run with output. These appendices should be referred to when reading the following description.

The data and control cards in the file 1 data are the same in all four types of MASTER run for the following:

MASTER (control card)

Label card (GYMEA X-S)

Name and title card

PARAMETERS (Control card)

5 values for parameters on a separate card from the PARAMETERS control card.

BURNUP (control card)

BE9,0,NO0, etc. - separate card for each nuclide

-

-

-

GROUP (control card) - new card for each section of group
and nuclide information.

-

-

-

-

From this point the form of the data is a little different depending on the choice of run, as follows:

NUCLIDES (control card, same for all four types)

GROUPWISE (or REACTIONWISE control card)

STANDARD (or NON STANDARD control card)

If a STANDARD card is supplied, a C matrix (2 x NN) must be supplied. This matrix can start on the card punched STANDARD and may use following cards, as needed, punched in free format. The 2 x NN values are read columnwise.

Individual nuclide data then follows in strict order of the nuclide names given in the BURNUP title in file 1 data. The first card of each nuclide contains the name, mass, and resonance indicator values given in file 1. These are all checked against file 1 data.

The data cards following the name card start a new group or new reaction on a new card no matter whether the nuclide is light, one with shielding parameters, or one with resonance values.

For shielding nuclides (IND = 1) a new card is taken for each set of A values and a new card for each set of B values for each group, when the data is arranged REACTIONWISE. When a GROUPWISE input is being used, a new card is taken for the A and B values (shielding coefficients for a particular group) but not necessarily a new card for each, that is, the B values may follow the A values on the same card.

For resonance nuclides when the data is REACTIONWISE, all the resonance parameters for a particular nuclide are given together at the end of the data for the nuclide, followed by a terminating card of six zeros, to test that there are no more resonances. The card containing six zeros must be supplied, even if no resonances are supplied.

The EDITOR does the following for REACTIONWISE resonance data:

1. Checks that the supplied resonance cards are in sequence by lethargy. (The lethargies for this test are computed from the energy values).
2. Does the necessary conversion of STANDARD data to NON STANDARD data using the C matrix, if the run uses STANDARD resonance data.
3. Delimits the resonances into groups according to the group boundary information supplied in file 1.
4. Forms a search table to indicate the number of resonances in each group, across all groups.

For GROUPWISE resonance data, the EDITOR must be supplied with the following (after the label card):

MVECTOR (control card) punched in columns 1 to 7 (no blank between M and VECTOR).

On the same and/or following cards, in fixed point free format, the values of all elements of the search vector.

The EDITOR uses this information in reading the group and resonance data which follows for that nuclide. Each set of group and resonance data starts on a new card (see examples in Appendix 4). **N.B.** The MVECTOR card and search vector data are not to be supplied for resonant nuclides where the resonance data is supplied REACTIONWISE, for nuclides with shielding coefficients, or for light nuclides. Errors will occur if they are supplied in these cases.

The MASTER run, as with all runs, is terminated by an ENDJOB card.

The library tape prepared is in the GROUPWISE/NON STANDARD form.

5. THE LIST RUN

The LIST run lists the library, or portions of it, in its natural form (GROUPWISE, NON STANDARD).

The index (file 1) may be listed alone or with any or all of the nuclides. Also, any or all of the nuclides may be listed without listing the index.

The cards used are as follows:

Column 1 2 3 4 5 6 7

L	I	S	T				
---	---	---	---	--	--	--	--

This card selects the LIST option. If a 1 is punched in column 7 and the previous run (other than a LIST or PUNCH run) failed, this LIST run is skipped. Column 7 is left blank if this LIST run does not depend on the successful execution of another EDIT run. The LIST card is the first card of the data.

Column 1

A	L	L					
---	---	---	--	--	--	--	--

A card punched ALL in columns 1 - 3 indicates that all nuclides are to be listed. If other data cards have selected particular nuclides to be listed, this card overrides the other data cards and causes listing of all nuclides.

Column 1

	B	E	9		,	O	1	6	,		U	2	3	3		T	H	2	3	2	
--	---	---	---	--	---	---	---	---	---	--	---	---	---	---	--	---	---	---	---	---	--

Cards similar to the above select particular nuclides for listing. The nuclide names are punched in any order, separated by either blanks or commas, starting anywhere between columns 1 to 71 (column 72 is left blank). As many of these cards as desired may be used.

If any of the nuclide names given are not in the library, a message is printed saying this, and the listing is carried on for specified names which are in the library. If an ALL card is present among these cards, then all nuclides will be listed. In this case, messages about particular nuclides not being in the library will still be printed.

Column 1

F	I	L	E	1			
---	---	---	---	---	--	--	--

A card punched FILE1 in columns 1 - 5 causes printing of the index of the library.

Cards punched ALL or FILE1 or particular nuclide cards may be arranged in any order. Listing is done in the order ... INDEX, NUCLIDES ..., the nuclides being listed in the order in which they are arranged in the index regardless of the order in which they are requested.

The last card in a LIST run is an ENDJOB card.

Typical runs would be:

```
LIST
FILE1                Lists only file 1 (The library index).
ENDJOB

LIST
FILE1                Lists index and all nuclides.
ALL
ENDJOB

LIST
FILE1                Lists index, selected nuclides BE9, O16, TH232; produces messages
  BE9, TH232, O16, 'FG'          about 'FG', N276.
  N276
ENDJOB

LIST
FILE1                Same as previous, but no messages.
  TH232 O16, BE9
ENDJOB

LIST
ALL                  Lists all nuclides, but not index.
ENDJOB
```

See Appendix 7 for sample runs.

6. THE PUNCH RUN

The index may be obtained on cards either alone or with any or all nuclides. Alternatively, the nuclides may be punched alone in any number without the index. The output obtainable is similar to the LIST run.

Control cards are automatically punched in the index and, if the option to punch the index and all nuclides is chosen, the deck obtained could be used to recreate the binary library tape from whence it was punched. In this case all that would be required would be to place a MASTER control card in front of such a deck, and an ENDJOB control card behind it.

The cards used are as follows:

P	U	N	C	H						
---	---	---	---	---	--	--	--	--	--	--

Cards similar to the above select particular nuclides which will form the COPY tape. The names of the nuclides selected to be on the COPY tape are punched in any order separated by any number of blanks or commas, starting anywhere between columns 1 to 71 (column 72 is left blank). As many of these cards as desired may be used.

If an ALL card is present among these cards, the tape will be copied in its entirety, thus overriding the selection of nuclides.

The index of the copied tape will involve only the nuclides chosen for copying. If any nuclide names are supplied which are not in the library, messages will be produced about them and no COPY tape will be produced.

The last card in a COPY run is an ENDJOB card.

Examples of typical COPY runs are:

COPY

ALL Copies the library tape as it stands.

ENDJOB

COPY Prepares a copy of library tape, the copy containing only H1, BE9, and O16.
H1, BE9, O16 The index of the copied tape is a reduced form of the original library tape and contains only the three nuclides selected.

ENDJOB

COPY Produces a message about the wrongly specified O12 and does not copy
H1, BE9, O12 library tape.

ENDJOB

COPY

NAME SAM2 AAEC SAMPLE LIBRARY CREATED 6/1/65. NO23

ALL The library tape is copied as it stands, but is relabelled with
ENDJOB the information in the name card.

Sample COPY runs are shown in Appendix 9.

8. THE UPDATE RUN

The UPDATE run makes permitted changes at three levels to a GYMEA library tape.

1. File I changes, where these are valid. If any of the change cards are in error, the change will not be made. Errors in free input cause the whole card to be ignored.
2. Whole nuclide changes. With these changes, whole nuclides are replaced in, added to, and deleted from the library.
3. Patches to existing nuclides. The user may change values in group, resonance, and shielding data in the whole nuclide files by using PATCH cards which select by coordinates the places to be changed, and effect a simple substitution with the data values supplied.

Where possible, errors in the UPDATE cards are noted and ignored. If the error is at a stage that is vital for the continuance of the run, either the job will be converted to a check run only of the remaining nuclide data, or, if this is not feasible, the run will be skipped.

The user may obtain a message saying, ENDOF SUCCESSFUL UPDATE RUN. This indicates that a valid updated tape has been prepared. The listings from the UPDATE run must be checked to see if any non-fatal errors have occurred. Subsequent runs can be planned to correct non-fatal errors.

Appendix 10 shows an extensive UPDATE run. The number of control cards and options is sufficient to warrant reproducing the input to Appendix 10 with embedded comment and explanation as Appendix 11. Appendix 11 should therefore be consulted for a detailed description of UPDATE data cards.

9. ERRORS IN FREE INPUT

The free input routines used in the GYMEA EDITOR can detect errors in input data such as mispunchings, which lead to ambiguity in the resulting data, for example, 2.3.6 instead of 2.3E6.

The fate of the run when an error in free input is detected depends on whether the run is a MASTER or UPDATE run and on the stage it has reached.

LIST, COPY, and PUNCH cannot produce free input errors, in the sense that no entry is made to the ERFREE error subroutine from these options.

Three kinds of error are detected:

1. Decimal point or exponent error,
2. Mode error,
3. Scaling error in exponent.

The error number will appear in the message accompanying the error.

The column number may be given as the correct column number or a value to be subtracted from 32768.

For a description of the fate of the run, see the footnotes in Appendices 3 and 10.

10. REFERENCES

McGregor, B. (1966). - SCATLD - a tape editing programme for GYMEA neutron scattering libraries. AAEC/TM310.

Pollard, J.C., and Robinson, G.S. (1966). - GYMEA - a nuclide depletion, space independent, multigroup diffusion, data preparation code. AAEC/E147.

APPENDIX 1
LIST OF CONTROL CARDS

APPENDIX 1

LIST OF CONTROL CARDS

- AFTER** (UPDATE) The AFTER control card is used to indicate additions. Column 6 must be blank.
The reference nuclide is punched left adjusted in columns 7-12. Names of nuclides to be inserted are punched in free form in columns 20-72 in the order in which they are to be inserted.
The word INSERT may be punched in columns 13-19, as these columns are not inspected by the programme; for example AFTER O16 INSERT TH232 PA233 etc.
The burnup and group information about added nuclides and replaced nuclides, as well as the whole nuclide blocks of cross section data, must be in the same order as the names of replaced or added nuclides. This order must be related to the order of the existing old master library, that is, the order of appearance of the reference nuclide names on AFTER cards, and the nuclide names on REPLACE cards, must be the same as that of the nuclides in the old master library.
- ALL** (COPY, LIST, PUNCH) This card will cause all nuclides to be listed or punched. It will create a neat copy of the library in a COPY run.
- BURNUP** (MASTER) This control card must follow the parameter values and precede the burnup cards for the nuclides in this MASTER run. Burnup information for individual nuclides must fit on one card. The burnup data cards follow the BURNUP card, and must be in order of occurrence of the nuclides in the proposed library. It is the user's responsibility to see that the order of the nuclides is valid with regard to light nuclides coming first, etc.
- (UPDATE) The BURNUP control card must precede the burnup data cards in 2 places in an UPDATE run:
1. In making file 1 changes to the existing nuclides on the old master input tape, in which case the data will be substituted in the burnup table.
 2. In making whole nuclide additions or replacements, when burnup data cards must follow the BURNUP control card and their order should be the sequential order of nuclide names appearing on previous REPLACE and AFTER control cards.
- COL** (UPDATE) This control card is used to indicate a change in a complete column of the group data for the particular nuclide. Columns 4-6 must be blank.
Columns 7-72 of the COL card and trailing cards (trailing cards must be blank in columns 1-6) contain the column number (fixed point) followed by NG (number of groups) values for the column (floating point). For example
- | | | | | | |
|-----|-----|-----|----------|-------------------------|-----|
| COL | 5 | 1.0 | 2.0 | 3.0 | 4.0 |
| | 5.0 | 6.0 | etc..... | NG th value. | |
- COPY** (COPY) First control card of a COPY run. See also 'Note on Run Control Cards' in this list.
- DELETE** (UPDATE) The DELETE control card indicates which nuclides are to be deleted. As many DELETE cards as required may be used. All DELETE cards must appear after the FILE CHANGES control card and before any AFTER or REPLACE cards.
Nuclide names are punched in free form in columns 7-72 of each DELETE control card.
- END OF RESONANCES** (MASTER, UPDATE) When whole data is supplied REACTION WISE, the resonances for any nuclide with resonance parameters must end with a card punched with 6 zeros (6*0. will suffice).
If no resonances are given, the card with 6 zeros must still appear.

APPENDIX 1 (continued)

- ENDJOB** This control card must be present as the last card in all runs. It is used to sense the end of data.
- FER** (UPDATE) See File 1 Group Changes in this list.
- FILE CHANGES** (UPDATE) This control card must appear before the first DELETE, AFTER, or REPLACE control cards, which indicate whole file changes.
- FILE1** (LIST, PUNCH) This card comes between the run control card (LIST or PUNCH) and before an ALL control card, a card with selected nuclide names, or an ENDJOB control card. It selects the first file (index) for punching or listing. This control card is ignored in a COPY run.
- FILE1 CHANGES** (UPDATE) If any changes are to be made to file 1, this card must be the first card following the UPDATE control card.

File 1 Group Changes (UPDATE) This describes eight control cards used to make File 1 Changes to group and nuclide information. These fall into 2 categories: group and nuclide.

Group Changes Control Cards

FISSION has the complete fission spectrum (which may be unnormalized) given as a string of floating point numbers in columns 8-72 of the FISSIION control card and columns 7-72 of as many trailer cards (must be blank in columns 1-6) as required to describe the complete spectrum.

VELOCITY has all NG (where NG = number of groups) velocities given as a string of floating point numbers in columns 9-72 of the VELOCITY control card and columns 7-72 of as many trailer cards (blank in columns 1-6) as required to describe all velocities.

Nuclide Changes Control Cards

There are 6 cards used to change file 1 nuclide information. These are all of the same form. The control word is punched in columns 1-6 and is one of the following:

MASSbb
POTLXb
FERbbb
SHNAbb
SHNBbb
SHNCbb

In columns 7-72 of these cards are nuclide names each followed by a patch value. Any number of each of the cards may be used in any order as long as they follow the GROUP control card (for file 1 changes) and come before the FILE CHANGES, or, if no file changes, before the PATCHES, or, if no patches, before the ENDJOB control card. Trailer cards are not permitted with Nuclide Changes control cards - the type of change must always be indicated by one of the above 6 control words in columns 1-6.

MASS changes here will cause changes to the mass in the label record of the chosen nuclide also.

To make a mass change in a replaced whole nuclide, it is necessary to make a mass change at the file 1 level with a value equal to the value in the title card of the supplied whole nuclide data.

APPENDIX 1 (continued)

FISSION

(UPDATE) See File 1 Group Changes in this list.

GROUP

(MASTER) This control card must follow the burnup data cards and precede the group and nuclide information in a MASTER run. Starting with a new card for each set of information, the following sets must be supplied in order following the GROUP control card in a MASTER run.

The values may overflow onto following cards, as long as each set starts on a new card.

GROUP BOUNDARIES	NG + 1 values
FISSION	NG values
GP. VELOCITIES	NG values
RESONANCE INDICATORS	NN values
MASSES	" "
POTL. SCATTER	" "
FISSION ENERGY RELEASE	" "
SHNA	" "
SHNB	" "
SHNC	" "

(NN = number of nuclides, NG = number of groups)

(UPDATE) The GROUP control card may appear in 2 places in an UPDATE run.

1. File 1 changes to group and nuclide information. Here no changes are permitted to GROUP BOUNDARIES. For changes to either group and nuclide information in file 1 see control cards FISSIION, VELOCITY, MASS, POTLX, FER, SHNA, SHNB, SHNC for individual description.

2. Whole nuclide changes. Where nuclide additions and replacements are being made, the group and nuclide information for these added or replaced nuclides must be provided in the order of nuclide names in previous AFTER and REPLACE control cards. Each set of information (for example the masses) must start on a new card. With REPLACE nuclides, although the group information must be provided, it is skipped. If changes are desired they must be made at the FILE1 stage.

GROUP WISE

(MASTER) Whole nuclide data in a MASTER run must all be either by group or by reaction in its presentation. This card sets a switch to process nuclide data by group. The control card comes after a NUCLIDES control card and before either a STANDARD or NON STANDARD control card.

(UPDATE) Same as for MASTER, applying to the whole nuclide data being replaced or added.

=GYMEA X-S

(MASTER) This card must be provided following the MASTER control card. It is used to distinguish a cross section library from a scattering library. When the GYMEA scattering library EDITOR is implemented an =GYMEA SCAT card will be used to distinguish the library types.

Individual Nuclide Cards

(COPY, LIST, PUNCH) During any of these runs, nuclides selected for copying, punching or listing are written in free format on any number of cards before the ENDJOB card. Sensing the ENDJOB card ends the scan for nuclide names.

If an ALL control card is amongst the nuclide name cards, it overrides them to copy, punch, or list all the nuclides from the old master library.

APPENDIX 1 (continued)

- LIST** (LIST) First control card of a LIST run. See also 'Note on Run Control Cards' in this list.
- MASS** (UPDATE) See File 1 Group Changes in this list.
- MASTER** (MASTER) First control card of a MASTER run. See also 'Note on Run Control Cards' in this list.
- MVECTOR** (MASTER, UPDATE) When whole nuclide information is supplied GROUPWISE, all resonance nuclides must have an MVECTOR control card following the Title Card.
On the same or following cards the values of the search vector (NG fixed point values) must be supplied. The data for Group 1, starting on a new card will follow the data for the search vector.
- NAME** (UPDATE) This card will create a new name and title for the updated tape. Both the name and title will be changed. If it is desired to change only one, the other must be supplied in its original form.
Columns 5-6 are blank. The name is punched in columns 7-12 (6 characters). The title is punched in columns 13-66 (54 characters).
The NAME card must appear after the FILE1 CHANGES control card and before either BURNUP, GROUP control cards relating to FILE1 changes or the FILE CHANGES control card.

(COPY) The NAME card is used in a COPY run to give the copy tape a new name and a new title. Both name and title are changed.
- Name and Title** (MASTER) A card with a name punched in columns 1-6 and a title punched in columns 7-60 must be provided following the =GYMEA X-S card in a MASTER run.
- NON STANDARD** (MASTER) This card comes after either the REACTIONWISE or GROUPWISE control card and before the title card for the first nuclide. No. C matrix is provided following this card, since resonances provided with the nuclide data require no further data reduction by the EDITOR.

(UPDATE) Same as for MASTER, applying to the whole nuclide data being replaced or added.
- Note on Run Control Cards** If the MASTER, LIST, PUNCH, COPY, or UPDATE control card is punched with a 1 in column 7, this indicates that this run depends on the previous run. If the previous run set the error indicator on, this job will be skipped. This is a safeguard in stacked jobs against trying to process incorrect libraries. The 1 in column 7 should be punched by the user whenever it is appropriate. The error indication will carry through edit jobs till the EDITOR finds a job without the column 7 punching. At that point the error indicator will be set off and processing resumed.
- NUCLIDES** (MASTER) This control card comes after the group and nuclide data and before either a GROUPWISE card or a REACTIONWISE card. It signifies the beginning of whole nuclide information.

(UPDATE) Same as for MASTER.

APPENDIX 1 (continued)

- PARAMETERS** (MASTER) This card follows the name and title card. Comment cards may precede it but they must come after the name and title card. It is followed by the 5 parameters
- NG (fixed)
 - NN (fixed)
 - TEMP (floating)
 - 1st RES GP (fixed)
 - LAST RES GP (fixed)
- whose values are punched in free form on following cards.
- PATCHES** (UPDATE) This control card signifies the beginning of patch data to existing nuclides. For details of patches see the description of the UPDATE run, and descriptions of the individual patch cards
- ROW
 - COL
 - SPOT
 - RESON
 - SHIELD
- Patches will be made in the order of occurrence of the patch cards.
- PAUSE** This card is used between jobs to allow operator intervention. The contents of columns 7-72 will be typed on the console typewriter and printed on the System Output File.
- POTLX** (UPDATE) See File 1 Group Changes in this list.
- PUNCH** (PUNCH) First control card of a PUNCH run. See also 'Note on Run Control Cards' in this list.
- REACTIONWISE** (MASTER) Whole nuclide data in a MASTER run must all be either by group or by reaction in its presentation. This card sets a switch to process nuclide data by reaction. The control card comes after a NUCLIDES control card and before either a STANDARD or NON STANDARD control card.
- (UPDATE) Same as for MASTER, applying to the whole nuclide data being replaced or added.
- REPLACE** (UPDATE) The REPLACE control card is used for replacements. Nuclide names appear in free form in columns 8-72, in the order the nuclides appear in the old master library.
- See the AFTER control card in this list for discussion of order.

APPENDIX 1 (continued)

RESON

(UPDATE) This card is used to change the resonance data for the particular nuclide. Column 6 must be blank. The group number is punched in fixed point in columns 7-12. Columns 13-18 are punched

bbSPOT
or bbROWb
or bbCOLb

After bbSPOT , columns 19-72 contain two fixed point numbers giving the row and column coordinates within the resonances for that group, followed by one floating point number to indicate the change.

.|RESONb|bbbb2b|bbSPOT| 3 4 17.63E7

After bbROWb , columns 19-72 contain one fixed point number giving the row number within the resonances for that group, followed by six floating point values giving the changes to that row.

RESONb|bb4bbb|bbROWb| 7 1.0 2.0 3.0 4.0 5.0 6.0

After bbCOLb , columns 19-72 contain one fixed point number giving the column number. This is followed by MM(I) floating point numbers for the replacement of resonances in the selected column of the resonances for the Ith group. The MM(I) refers to the value in the search vector. Trailing data cards (which must be blank in columns 1-6) may be used to supply the MM(I) values if they will not fit on the RESON control card itself.

ROW

(UPDATE) This control card is used to indicate a change in a complete row of the group data for the particular nuclide. Columns 4-6 must be blank. Columns 7-72 of the ROW card and trailing cards (trailing cards must be blank in columns 1-6) contain the row number (fixed point) followed by six values for the row (floating point) for example
ROW 3 1.0 , 2.0 3.0 , 4.0 , 5.0 6.0

SHIELD

(UPDATE) This card is used to change shielding parameters for a nuclide with shielding parameters. The group number is punched in columns 7-12. Columns 13-18 are punched

bbSPOT
or bbROWb

A "column" change as with resonance nuclides is achieved by the SPOT option.

After bbSPOT , columns 19-72 contain one fixed point number to identify the column or spot (these are equivalent since there is only one row), followed by one floating point number to indicate the change.

After bbROWb , columns 19-72 contain six floating point numbers to indicate the change. A row number must not be given (as there is only one row and the programme implies row 1)

SPOT

(UPDATE) This control card is used to change one value in the group data for the particular nuclide.

Columns 5-6 must be blank. Columns 7-72 contain two fixed point values (the row and column coordinates of the group data) followed by the new value for the spot in floating point, for example

SPOTbb 3 , 4 1.7E12

SHNA

(UPDATE) See File 1 Group Changes in this list.

APPENDIX 1 (continued)

- SHNB** (UPDATE) See File 1 Group Changes in this list.
- SHNC** (UPDATE) See File 1 Group Changes in this list.
- STANDARD** (MASTER) This control card comes after either the REACTIONWISE or GROUWISE control card and before the 2 x NN (NN = No. of Nuclides) matrix which must be provided to allow data reduction of resonances from standard form to non-standard form. The punching of the 2 x NN C matrix may start after the word STANDARD and can continue freely onto following cards.
- (UPDATE) Same as for MASTER, applying to the whole nuclide data being replaced or added.
- TEMPERATURE** (UPDATE) The TEMPERATURE control card appears in the same place as the NAME control card (their order is not important, see NAME card) and has the new temperature punched as a single floating point value in columns 12-72.
- Title** (MASTER, UPDATE) Each block of nuclide data is headed with a title card punched with nuclide name, mass, resonance indicator, in free form, for example,
- BE9 , 9.0 , -1
- UPDATE** (UPDATE) First control card of an UPDATE run. See also 'Note on Run Control Card' in this list.

APPENDIX 2

LIST OF OUTPUT MESSAGES AND ERROR MESSAGES

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LIST OF OUTPUT MESSAGES AND ERROR MESSAGES

'A DELETE CARD FOLLOWS AN AFTER OR REPLACE. IGNORED'

DELETE control cards must precede AFTER or REPLACE control cards. None of the nuclides specified on the DELETE will be deleted, and the run will continue. To delete the nuclides, the card may be inserted first among the FILE CHANGES cards of a subsequent run.

(UPDATE)

(LHUP)

**'CARD PUNCHED, BURNUP, MISSING OR WRONGLY PUNCHED
IF NOT MISSING, THERE MAY BE INSUFFICIENT OR WRONG PRECEDING DATA
JOB ENDED'**

A card punched BURNUP in columns 1-6 must precede the burnup cards for the nuclides. If this card is not missing, previous reading by the free routines may have read the BURNUP control card because insufficient data was provided to satisfy the previous read. The error indicator is set and the job skipped.

(MASTER)

(READ2)

**'CARD PUNCHED, PARAMETERS, MISSING OR WRONGLY PUNCHED
IF NOT MISSING, THERE MAY BE INSUFFICIENT OR WRONG PRECEDING DATA
JOB ENDED'**

A card punched PARAMETERS in columns 1-10 must precede the 5 pieces of data which indicate the number of groups, number of nuclides, temperature, first resonant group, last resonant group, respectively. The error indicator is set and the job skipped.

(MASTER)

(READ2)

'CHANGE NUCLIDES OUT OF SEQUENCE. CANNOT BE IGNORED'

The burnup data, group and nuclide information, and individual nuclide data supplied for whole nuclide changes in an UPDATE run must all be in the same sequence as each other, and the same sequence as the existing library nuclides, with respect to replacements and the reference nuclides on AFTER control cards. The error indicator is set and the job skipped.

(UPDATE)

(RESET)

'COPY RUN DISCONTINUED DUE TO BAD DATA CARDS'

One or more names requested for copying are not present on the master library tape. Messages about all such error names are produced, the error indicator is set and the job skipped.

(COPY)

(COPY)

'DECAY NAME IN NUCLIDE XXXXX HAS MORE THAN 6 CHARACTERS. JOB ENDED'

One of the decay nuclides on the burnup card corresponding to nuclide number XXXXX has more than 6 characters in its name. Nuclide names must not contain embedded blanks: for example Uranium 233 is punched U233 and not U 233. The error indicator is set and the job discontinued.

(MASTER)

(READ2)

'END OF COPY RUN'

Control is returned to the EDITOR following the printing of this message. Check previous messages and output to see if the desired result was obtained.

(COPY)

(COPY)

APPENDIX 2 (continued)

'END OF LIST RUN'

This message indicates that control has passed back to the EDITOR. It should not be followed by the message 'ENDJOB CARD READ BY EDITOR' as the ENDJOB control card has been used to terminate the reading and analysis of LIST input data cards.

(LIST)

(LIST1)

'END OF PUNCH RUN'

This message indicates that control has passed back to the EDITOR. It should not be followed by the message 'ENDJOB CARD READ BY EDITOR' as the ENDJOB control card has been used to terminate the reading and analysis of PUNCH input data cards.

(PUNCH)

(PUNCH1)

'END OF SUCCESSFUL UPDATE RUN. ALL OUTPUT SHOULD BE CHECKED CAREFULLY NEW FILE 1 IS SHOWN BELOW AND SHOULD BE USED TO SET UP A LIST RUN TO CHECK CHANGES.'

The UPDATE run is successful, subject to interpretation of previous error messages which allow the run to continue. These will all concern non-vital data which is in error (non-vital in the sense that it does not upset the UPDATE run reaching a sensible conclusion). The user should check the output carefully and arrange subsequent runs if necessary to complete the desired updating.

(UPDATE)

(FINAL)

'END OF UPDATE RUN'

Control is with the EDITOR following this message. If the UPDATE run was in error and the next job depends on it, the next job will be skipped.

(UPDATE)

(FINISH)

'ENDJOB AS FIRST CARD. JOB SKIPPED'

An ENDJOB control card follows the UPDATE control card. Check order of control cards.

(UPDATE)

(LHUP)

'ENDJOB CARD READ BY EDITOR'

This message is produced in the normal course of events following a successful MASTER or UPDATE run. If all MASTER or UPDATE input data is correct, the ENDJOB card is waiting to be read when control passes back to the EDITOR at the end of the 2 runs. It will be produced by error runs of MASTER and UPDATE when control is passed back to the EDITOR to scan for the ENDJOB card. Preceding error messages will indicate this. The ENDJOB control card is used in the LIST, PUNCH and COPY runs to terminate the reading of input data cards in these runs. Therefore when control passes back to the EDITOR following these runs, the ENDJOB card will have already been read and the EDITOR will expect either the next job control card or a SIBSYS card. The latter produces 'END OF DATA ENCOUNTERED ON SYSTEM INPUT FILE' which is normal at this stage.

(MASTER, LIST, PUNCH, UPDATE, COPY)

(EDITOR)

'ENDJOB CARD READ READING DATA OF NUCLIDE XXXX'

XXXX is the number of the nuclide being processed when an ENDJOB control card was read prematurely. This number in an UPDATE run is the sequence number of the nuclides being added or replaced. This indicates that insufficient data was supplied for the nuclides. A common source of error is forgetting to supply the card containing six zeros which signals the end of resonance data of a particular nuclide when the resonances are provided reactionwise. The error indicator is set, the run is terminated, and control passes to the EDITOR.

(MASTER, UPDATE)

(LHFREE)

APPENDIX 2 (continued)

'ENDJOB CARD READ, READING FILE1 DATA'

This message is self explanatory, indicating that an ENDJOB card has been read long before it was expected. Check for missing control cards, wrong parameter values (number of groups, number of nuclides). The error indicator is set and the job skipped.

(MASTER)

(LHFREE)

'ENERGY SEQUENCE ERROR AROUND ENERGY VALUE XXXXXX'

The energies in the resonance data must be provided in descending order of magnitude and a sequence check is performed to ensure that they are. The error indicator is set and a check run of remaining nuclides is initiated.

(MASTER, UPDATE)

(REED1)

'ERROR - CONTROL WORD IS NOT ONE OF ALLOWABLE OPERATIONS, JOB DELETED'

This message is produced when the EDITOR has read a card and has attempted to interpret columns 1 to 6 as an option. Either an option card is not punched correctly, or control has passed back to the EDITOR owing to a previous error condition. In the latter case the EDITOR scans for the next ENDJOB control card, prints a message saying it has been found, and proceeds by reading the next card and interpreting it as an option card.

(MASTER, LIST, COPY, UPDATE, PUNCH)

(EDITOR)

'ERROR DATUM AND FOLLOWING DATA ON PATCH CARD WILL BE IGNORED.
DATA PRECEDING ERROR WILL BE STORED.'

During the processing of a patch card in an UPDATE run, if an error in free input is detected, the item in error is ignored, items following it on the same card are also ignored, and processing of patches continues when the next card is read. This may result in partial correction of rows and columns of group and resonance data. The output should always be checked to verify the result.

(UPDATE)

(ERFREE)

'ERROR x IN FREE INPUT IN COL yy OF FOLLOWING CARD'

This message is followed by a print out of columns 1-72 of the card in error. yy is the column in error and x is a code with values as follows

1. Decimal point or exponent error.
2. Mode error (for example a fixed point value has a decimal in it).
3. Scaling error in exponent.

The result of this error depends on the nature of the run (UPDATE or MASTER) and the stage of the run. If it is in vital data, the error indicator will be set and the job skipped. If the run can continue, the error indicator will be set, except in the FILE 1 CHANGES and PATCHES section of an UPDATE run, and a check run of nuclide data will be initiated. See Section 9 in the body of the report for full details.

(MASTER, UPDATE)

(ERFREE)

'ERROR IN NUCLIDE XXXXXX, GROUP YYYYYY, BOUNDARIES GIVEN TTTTTT, WWWWWW
FILE1 LIMITS PPPPPP,QQQQQQ'

In nuclide XXXXXX, the limits of the resonance data for group YYYYYY are outside the permitted range as given by FILE 1 data. The error indicator is set and a check run of remaining nuclides initiated.

(MASTER, UPDATE)

(REED1)

'EXPECTED TITLE CARD XXXXXX
CARD READ WAS YYYYYY
SEARCHING FOR NEXT NUCLIDE'

This indicates that too much data was supplied for the nuclide before XXXXXX. The error indicator is set, and a data check of the remaining nuclides is attempted from this point. YYYYYY is a print out of the first six columns of the data card read instead of the expected nuclide name card.

(MASTER)

(LHFREE)

APPENDIX 2 (continued)

'FATAL ERROR IN MASTER RUN'

An error in free input has been detected at a stage in the MASTER run which involves FILE 1 data. The index to process the individual nuclide data cannot therefore be set up validly. The error indicator is set and the run is skipped.

(MASTER)

(ERFREE)

'FATAL ERROR IN UPDATE RUN'

An error in free input has been detected at a stage in the UPDATE run which involves data vital to the valid continuance of the run. Changes to FILE1 data and patches to existing nuclide data are not vital in an UPDATE run. The worst that happens when there are free input errors here is that the changes are not made either wholly or in part (see discussion of the various UPDATE options for details). However an error in the burnup cards or group and nuclide information pertaining to each nuclide cannot be processed, and hence not even a check run can be initiated. The error indicator is set and the job skipped.

(UPDATE)

(ERFREE)

'FILE1 PUNCHED'

The index of the library has been punched.

(PUNCH)

(PUNCH1)

'FISSION SPECTRUM SUPPLIED SUMS TO ZERO'

In normalizing the fission spectrum supplied, the EDITOR has detected that the spectrum sums to zero. The error indicator is set and the job skipped.

(MASTER)

(READ3)

'FISSION SPECTRUM SUPPLIED SUMS TO ZERO. IGNORED'

The fission spectrum supplied as a File 1 change sums to zero. The card is ignored and the run continues.

(UPDATE)

(LHUP)

'GROUP NO. IN ABOVE CARD IS NOT A RESONANT GROUP. CARD IGNORED'

The group number supplied on the RESON control card is not a resonant group. Check the file listing corresponding to this nuclide, and the layout of the RESON card.

(UPDATE)

(LHUP)

'=GYMEA X-S, OR =GYMEA SCAT CARD MISSING JOB ENDED'

A card punched either

=GYMEAbX-S or,

=GYMEAbSCAT

must follow the MASTER control card in the MASTER run. The error indicator is set and the job terminated.

(MASTER)

(READ1)

'INSUFFICIENT BURNUP INFORMATION. CANT BE IGNORED'

Not enough burnup cards have been supplied to satisfy the list of names from AFTER and REPLACE control cards supplied previously. The error indicator is set on and the job skipped.

(UPDATE)

(LHUP)

'INVALID CONTROL CARD. FILE 1 CHANGES NOT CHECKED'

One of the control cards used to make a change to File 1 is invalid. From this point all other File 1 control change cards are skipped. The programme searches for a FILE CHANGES control card, and, if this is present, it checks the whole nuclide data for validity. Any patches to nuclides, following the whole nuclide data, are ignored, all tapes are rewound, and the run error indicator (KDEP) is set on.

(UPDATE)

(LHUP)

APPENDIX 2 (continued)

'LETHARGY BOUNDARIES IN RESONANCE TABLE XXXXX, YYYY
PERMITTED LIMITS FROM FILE 1 TTTT, ZZZZ
SKIPPING TO NEXT NUCLIDE'

The boundaries for resonance groups are fixed and are laid down at the time of creation of the library. They cannot be changed by the user. Here, the range of energy values in the resonant groups is outside the limits for the resonant groups obtained from File 1. The error indicator is set and a check run of remaining nuclides is initiated.

(MASTER, UPDATE) (REED1)

'MACHINE ERROR'

Machine error in subroutine LHUP.

(UPDATE) (LHUP)

'MACHINE ERROR IN MERGE'

If this message occurs the only apparent interpretation is a machine error in the subroutine MERGE.

(UPDATE) (MERGE)

'MASS OR RESONANCE INDICATOR OF NUCLIDE XXXXXX DONT AGREE WITH FILE 1 DATA
VALUES GIVEN YYYY, ZZZZ
FILE 1 DATA TTTT, WWWW
SKIPPING TO NEXT NUCLIDE'

In a MASTER run the values for mass and resonance indicator must agree with the values given in the label card preceding each body of nuclide data. The error indicator is set and a check run is initiated for the remaining nuclides. In an UPDATE run the message can occur for the following reasons.

1. There is disagreement between File 1 information and label cards for added nuclides.
2. The original File 1 values and label cards for replacement nuclides do not agree. Note here that although burnup cards and nuclide information for replacement nuclides must be provided for ease of checking, the UPDATE programme uses original FILE 1 data.

(MASTER, UPDATE) (NUCLD)

'MISSING GROUP CONTROL CARD OR WRONG SURROUNDING DATA
JOB ENDED'

A card punched GROUP in columns 1-5 must be provided at the head of the cards containing group and nuclide information in FILE 1 data. If the card is present, a previous read of the free routines may have read it to satisfy a data list, indicating that the previous data was in error or was insufficient. The error indicator is set and the job skipped.

(MASTER) (READ3)

'MORE THAN 250 RESONANCES IN NUCLIDE XXXXXX'

The data supplied for nuclide XXXXXX has more than 250 resonances present. The error indicator is set and a check run initiated.

(MASTER, UPDATE) (REED1)

'NEXT NUCLIDE LABEL READ WHILE READING NUCLIDE XXX.
MASTER TAPE REWOUND. CHECK ONLY FROM HERE'

This indicates that insufficient data was supplied for nuclide XXX. In attempting to satisfy the data requirements for nuclide XXX the FREE routines have read the card containing the next nuclide name. The error indicator is set, and a data check of the remaining nuclides is carried out from here. The master tape is rewound.

(MASTER) (LHFREE)

APPENDIX 2 (continued)

'NO M VECTOR CARD FOR NUCLIDE XXXXX CARD READ STARTED YYYYY'

A card punched MVECTOR in columns 1-7 must be provided with every resonant nuclide (resonance indicator greater than or equal to 2) when the data for that nuclide is to be read groupwise. The order of the data for such nuclides is label card, card punched MVECTOR, the search vector (MM vector), and the cards for data, group by group, with a new card being taken for each group and the resonance data cards being interleaved between the group data cards. This is the groupwise arrangement. The error indicator is set and a check run of remaining nuclides initiated. YYYYY helps to identify the point at which the MVECTOR card was missing.

(MASTER)

(REED1)

'NO. NUCLIDES LEFT, PLUS NO. ADDED IS GREATER THAN 100. CANT IGNORE'

The library is designed to hold 100 nuclides. Table sizes are set according to this restriction. The error indicator is set and the job skipped.

(UPDATE)

(LHUP)

'NO PATCHES SUPPLIED'

This is not an error message. It indicates that an ENDJOB control card followed a PATCHES control card. The condition is ignored and the run continues. If patch cards follow the ENDJOB card, they will be ignored in this job, and produce a harmless message when the EDITOR regains control at the end of the run.

(UPDATE)

(LHUP)

'NO WHOLE FILE CHANGES REQUESTED'

This message indicates that the UPDATE run is confined to either File1 changes, or patches, or both, and that no deletions, additions, or replacements of whole nuclides were carried out.

(UPDATE)

(FINAL)

'XXXXXX

NOT ENOUGH TRAILING DATA CARDS. CANT BE IGNORED'

With FISSION and VELOCITY control cards, the values of fission spectrum or of velocities may be supplied on the FISSION or VELOCITY card itself, and as many trailing cards as are required to supply a number of values equal to the number of groups in the library. The trailing data cards must be blank in columns 1 to 6.

The error indicator is set. Any whole file change data will be checked provided the XXXXXX, which is the update data card following the fission or velocity change group of cards, is not FILE C (The first six letters of FILE CHANGES) in which case the programme searches for an ENDJOB control card and terminates the run.

(UPDATE)

(LHUP)

'NUCLIDES CONTROL CARD READ READING GROUP INFORMATION. CANNOT BE IGNORED'

The FREE routines have encountered a NUCLIDES control card while reading necessary group and nuclide information associated with whole file changes. This indicates insufficient group/nuclide information has been supplied. The error indicator is set and the job skipped.

(UPDATE)

(LHUP)

'NUCLIDE ERROR IN RESET'

This error should not occur as the machine has already checked sequence and validity of change nuclide names. It may be interpreted as a machine error.

(UPDATE)

(RESET)

'NUCLIDE XXXXXX IS NOT PRESENT IN FILE1 DATA'

XXXXXX is a nuclide name which has been requested for listing, punching, or copying. This name is not present in the library. In a LIST or PUNCH run, the name is ignored and the run continues. In a COPY run, messages about all such invalid names will be present, but the job is skipped.

(LIST, COPY, PUNCH)

(LHFREE)

APPENDIX 2 (continued)

'NUCLIDE XXXXXX NO. YY HAS RES. INDICATOR = ZZZ VALUE CANT BE LESS THAN -1
SKIPPING TO NEXT NUCLIDE'

Resonance indicators are of three classes

-1 or 0 for light nuclides

1 for nuclides with shielding parameters

2 or greater for resonance nuclides.

This message indicates that nuclide XXXXXX which is number YY on the list of nuclides has an indicator which is outside these limits. The error indicator is set and a check run initiated for the remaining nuclides.

(UPDATE, MASTER)

(NUCLD)

'NUCLIDE NO. ZZZ HAS MORE THAN 6 CHARACTERS IN ITS NAME. JOB ENDED'

Nuclide names cannot be more than 6 characters in length. Embedded blanks are not permitted in nuclide names: for example Uranium 233 is punched U233 and not U 233. The error indicator is set and the job discontinued.

(MASTER)

(READ2)

'XXXXXX

NUCLIDE NOT IN FILE1. CANNOT BE IGNORED'

XXXXXX is the name of a nuclide on a replace card. A valid check run cannot be attempted when this name does not correspond to any name in the library. The error indicator is set on and the run is discontinued.

(UPDATE)

(LHUP)

'NUCLIDES PUNCHED.....'

The names of nuclides requested for punching follow this message. Three control cards are automatically produced and precede the punched output for all the nuclides requested. These are punched

NUCLIDES

GROUP WISE

NON STANDARD

each card starting in column 1. The data for the individual nuclides is in this form, and the cards are included for offline listing and identification. They should be removed in making up subsequent runs.

(PUNCH)

(PUNCH1)

'OVER 30 NUCLIDES BEING REPLACED OR OVER 30 BEING ADDED. CANNOT BE IGNORED'

No more than 30 nuclides can be added and no more than 30 can be replaced. That is, up to 60 changes can be made subject to the restrictions in the previous sentence. The error indicator is set on and the job skipped.

(UPDATE)

(LHUP)

'PATCHES IGNORED DUE TO PREVIOUS ERRORS'

This message is produced when the error indicator has been set previously and the programme encounters the PATCHES control card. The job is terminated.

(UPDATE)

(LHUP)

'PREVIOUS EDIT JOB IN ERROR

THIS JOB DEPENDS ON IT

THIS JOB SKIPPED'

This message is produced when the previous job has set the error indicator on and this job depends on the previous job. The indication of dependency is set by punching a 1 in column 7 of the option card for this job.

(MASTER, LIST, COPY, UPDATE, PUNCH)

(EDITOR)

'XXXXXX

REFERENCE NUCLIDE NOT IN FILE1. CANNOT BE IGNORED'

XXXXXX is the name of the reference nuclide on an AFTER control card. This name is not in the library. The error indicator is set on and the job skipped.

(UPDATE)

(LHUP)

APPENDIX 2 (continued)

'XXXXXX

REF. NUCLIDE ON AFTER CARD HAS BEEN DELETED. CANNOT BE IGNORED'

XXXXXX is the name of the reference nuclide on an AFTER control card. It has appeared previously on a DELETE control card and is set for deletion. This condition cannot be ignored. The error indicator is set on and the job skipped.

(UPDATE)

(LHUP)

'XXXXXX

REPLACE CARD HAS BEEN DELETED. CANT IGNORE'

XXXXXX is a nuclide name which has appeared on a previous DELETE control card. It is set for deletion and this error condition cannot be ignored. The error indicator is set and the job skipped.

(UPDATE)

(LHUP)

'REQUESTED TO READ NUCLIDE XXXXXX READ NUCLIDE YYYYYY SKIPPING TO NEXT EDIT JOB'

This message should not occur from tapes created by the GYMEA EDITOR programme itself using MASTER or UPDATE runs. If it does, the edit programme itself is in error and the condition should be reported with listings and details to the author. However, with tapes created in the form of the GYMEA libraries by other means, errors may have been made. In this case the message indicates a lack of correspondence between the FILE 1 name XXXXXX and the header label name for the particular file, YYYYYY.

(LIST, COPY, PUNCH)

(TAPE3 , TAPE2 , TAPE1)

'REQUESTED TO READ NUCLIDE XXXXXX, READ NUCLIDE YYYYYY, SKIPPING TO NEXT EDIT JOB'

This message should occur only during the testing phase of the EDITOR programme itself. If a user encounters it the results should be reported to the author.

(UPDATE)

(TAPE3)

'ROW OR COLUMN NUMBER ERROR IN THE ABOVE CARD. CARD IGNORED. CHECK COLUMN LAYOUT IF RESON CARD'

The above card referred to is a patch card. The error condition is that the row or column number, or both, given on the card exceeds the permitted maximum value of 6 for column number, the number corresponding to the number of groups in the library for row, and, if a RESON control card, 6 for column number in the resonances and the number of resonances present in the group referred to, for row number. The card is ignored and the run continues without making the patch.

(UPDATE)

(LHUP)

'SUCCESSFUL MASTER RUN'

This message is correct if it is followed by the message 'ENDJOB CARD READ BY THE EDITOR'. If not the output is subject to user interpretation for correctness, and the listing obtained from the run should be examined carefully.

(MASTER, UPDATE)

(EDITOR)

'XXXXXX YYYYYY

TABLE VALUE AND BURNUP CARD DONT AGREE. CANT BE IGNORED'

YYYYYY, the nuclide name on the supplied BURNUP card, does not agree with the name XXXXXX which was supplied on the FILE CHANGES card. The order of the BURNUP cards must be the same as the order of nuclide names appearing on AFTER and REPLACE control cards supplied previously. This may be the trouble.

The error indicator is set on and the job skipped.

(UPDATE)

(LHUP)

APPENDIX 2 (continued)

'THE ABOVE BURNUP CARD IS IN ERROR. CARDS FOLLOWING MAY HAVE BEEN SKIPPED'

This message is produced by a scan routine. Cards following the error card may have been read by the FREE routines. They will appear to the user as having been skipped. The action taken by the programme will be indicated in subsequent messages.

(UPDATE)

(BURNCK)

'THE ABOVE FILE1 CHANGE CARD IS IN ERROR. CARDS MAY HAVE BEEN SKIPPED'

An attempt will have been made to list the error card preceding this message. This is a general message from a scan routine. A following message will determine the fate of the run. The FREE routines may have read following cards to satisfy the read. If so these cards will be skipped as far as the user is concerned.

(UPDATE)

(SCAN1)

'XXXXXX

THIS NUCLIDE NOT IN FILE 1. IGNORED'

XXXXXX specifies a nuclide name on a DELETE control card. The nuclide is not in the library and hence the instruction to delete it is ignored. The run continues.

(UPDATE)

(LHUP)

'THIS NUCLIDE NOT IN LIBRARY. CARD IGNORED'

The BURNUP card supplied to make changes to the File 1 burnup information is valid, but the nuclide name on the card is not in the library. The card is ignored and the run continues.

(UPDATE)

(LHUP)

'XXXXXX YYYYYY

THIS NUCLIDE NOT KNOWN. VALUE IGNORED'

XXXXXX is the FILE 1 control card on which the unknown nuclide name occurs.

YYYYYY is the nuclide name which is not in the library.

The supplied change value for this group or nuclide information is ignored and the run continues. If other valid nuclide names appear on the control card, they will be accepted.

(UPDATE)

(LHUP)

'THIS PUNCH RUN HAS PRODUCED A CARD FILE SUITABLE FOR A MASTER TAPE CREATION RUN

THE OUTPUT DECK NEEDS ONLY A CONTROL CARD PUNCHED MASTER IN COLS. 1-6 AT FRONT, AND AN ENDJOB CARD AT BACK'

This message is self explanatory, but if it is not desired to follow this PUNCH run with a MASTER run, the 3 control cards

NUCLIDES
GROUP WISE
NON STANDARD

may need to be removed in separating the individual nuclide data.

(PUNCH)

(PUNCH1)

'XXXXXX

THIS SHOULD BE A PATCHES OR ENDJOB CONTROL CARD'

XXXXXX is the first six columns of a card which is out of place. At this stage, if whole nuclide data has been supplied, it has all been read and the programme expects to read a PATCHES card which will make row, column, and spot patches to group and resonance data for individual nuclides. If the PATCHES control card is not supplied, the programme expects an ENDJOB control card. The error indicator is set and the job skipped.

(UPDATE)

(LHUP)

APPENDIX 2 (continued)

'UNSUCCESSFUL MASTER RUN'

The error indicator was set owing to some previous error condition. This is simply an indicative message.

(MASTER)

(EDITOR)

'UPDATE RUN TERMINATED DUE TO PREVIOUS ERROR'

This message is printed as a result of the error indicator being set during an UPDATE run. Previous messages will give the reason.

(UPDATE)

(FINISH)

'VALUES OF NN,NG GIVEN XXX, ZZZ

MAXIMUM ALLOWED 100, 120

RUN DISCONTINUED'

100 nuclides and 120 groups are the arbitrary maxima for the number of nuclides (NN) and the number of groups (NG) allowed in the GYMEA libraries. The error indicator is set and the job skipped.

(MASTER)

(READ2)

'WARNING - =GYMEA CARD HAS WRONG SPECIFICATION. X-S ASSUMED. XXXXXYYYYYYY PROVIDED'

XXXXXXXXYYYYYYY is the actual punching on the =GYMEA card. This card must be of the form

=GYMEA X-S or,

=GYMEA SCAT

If the card is not of either form, then the form adopted by the programme is =GYMEA X-S. The error indicator is set and the run terminated. This analysis and action on control cards is only indicative of how errors may be handled when scattering libraries are included. The present net result is that the run is immediately terminated in error.

(MASTER)

(READ1)

'XXXXXX

WRONG BURNUP CARD. CANT BE IGNORED'

XXXXXX is the nuclide name on a supplied BURNUP card in the file changes data. The condition cannot be ignored at this stage, in contrast to the BURNUP cards supplied as File 1 changes. The error indicator is set and the job skipped.

(UPDATE)

(LHUP)

'WRONG BURNUP INFORMATION. CARD IGNORED'

A BURNUP control card supplied to make a change to File 1 burnup information is wrong. If there is too little information on the error card, the FREE routines may have read the next card as well. This will appear as cards having been skipped.

No change will be made to File 1 using the error information, and provided the skipped cards can be ignored by the run, the run will continue. The error cards and skipped cards may be checked and used alone in a subsequent run to complete the job.

(UPDATE)

(LHUP)

'XXXXXX

WRONG FILE CHANGES CARD OR MISSING BURNUP CONTROL CARD. CANT IGNORE'

One of the DELETE, REPLACE, or AFTER control cards has its keyword wrongly specified. XXXXXX is the first six columns of the error card.

The error indicator is set and the run terminated.

Errors detected in scanning the data on the file change control card in question may also produce this condition

(UPDATE)

(LHUP)

APPENDIX 2 (continued)

'XXXXXX

WRONG GROUP/NUCLIDE CHANGE CARD. CARD IGNORED'

The keyword on this FILE 1 control card is in error. XXXXXX is the contents of the first six columns of the error card. The entire card is ignored and the run continues.

(UPDATE)

(LHUP)

APPENDIX 3
MASTER RUN WITH NUCLIDE DATA ARRANGED
REACTIONWISE, STANDARD

INPUT DATA pages 1 - 3

PRINTED OUTPUT pages 4 - 12


```

MASTER
=GYMEA X-S
SAMI SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****
*EXCEPT FOR REQUIRED CONTROL CARDS,
*DATA CAN BE IN FREE FORMAT FROM HERE ON.
*NOTE-COMMENT CARDS (*IN COL.1) MAY APPEAR ANYWHERE IN DECK
*AND DATA MAY CONTAIN NON-NUMERIC WORDS TO ASSIST CHECKING
PARAMETERS
NG=4,NN=6,TEMP=900,K,RES GROUPS 2 TO 3
BURNUP
*
*BURN UP DATA
*
BE9,0,NOO,NOO,L16,5*0.
O16,0,NOO,NOO,NOO,5*0.
TH232,0,NOO,PA233,U232,5*0.
PA233,0,U233,TSO,NOO,2.928+17,4*0.
U233,1,NOO,U234,NOO,5*0.
*FP,0,NOO,YSO,NOO,0,2,3*0.
GROUP
*
*GROUP AND NUCLIDE INFO.
*
GP.BOUNDARIES,U=0.6,9,15,2,17,4,23.0
FISS. SPECT=0.99957,0.00043,2*0.
GP.VEL.=4.27,1.-1,1.23-2,4.37-3
IND.=2*-1,1,0,2,0
MASSES=9.,16.,232.,233.,233.,115.
POT.X=6.,3.8,3*10.,5.
FER.=4*0.,3.14-11,0.
SHNA=4.123-2,4.168-2,2.019-4,3*0.
SHNB=4.123-2,4.168-2,8.-5,3*0.
SHNC=4.123-2,4.168-2,1.-5,3*0.
NUCLIDES
REACTIONWISE
STANDARD C MATRIX= 8*0.,2,5,0.126,2*0.
*
*****
*NUCLEAR DATA
*
*STANDARD RES. DATA WITH C'S=8*0.,2,5,0.126,2*0. AND REACTION-WISE
*
BE9,9.,9-1
*
X(N,G)=2*0.,1.-3,4.-3
X(N,F)=4*0.
X(N,ABS)=-1.5-2,0.,1.-3,4.-3
X(N,N)=4.49,3*6.
X(N,TR)=3.29,3*5.55
X(N,TWO N)=1.2-2,3*0.
*
*****
*
O16,16.,-1
*
X(N,G)=2.962-3,0.,0.,1.827-3
X(N,F)=4*C.
X(N,ABS)=2.962-3,0.,0.,1.827-3

```

```

X(N,G)=3.5,3*3.8
X(N,TR)=2.6,3*3.6
X(N,CB)=4*0.
*
*****
*
TH232,232.,1
*
X(N,G)=4.-1,6.,1.,3.7
A(N,G)=*6.+1,1.,+1,* (*ADDED HERE TO AID CHECKING)
B(N,G)=*6.+2,1.,+2,*
X(N,F)=4*0.
A(N,F)=2*0.
B(N,F)=2*0.
X(N,ABS OR N)=4.-1,2*10.,3.7
X(N,NU-F)=4*0.
A(N,NU-F)=2*0.
B(N,NU-F)=2*0.
X(N,TR)=8.,3*13.
X(N,CB)=4*0.
*
*****
*
PA233,233.,0
*
X(N,G)=1.2,5.5,117.,30.94
X(N,F)=4*0.
X(N,ABS)=1.2,5.5,117.,30.94
X(N,NU-F)=4*0.
X(N,TR)=7.,54.,81.,35.
X(N,CB)=4*0.
*
*****
*
U233,233.,2
*
X(N,G)=0,3,1,-2,1,-3,19.
X(N,F)=2,7,2,-2,2,-3,254.
X(N,ABS OR N)=3.,2*10.,273.
X(N,NU-F)=3.,3.-2,3.-3,285.
X(N,TR)=8.,4,2*10,283.
X(N,CB)=4*0.
*
*****
*
*STANDARD LIB. RESONANCE PARAMETERS
*
12.880 2.548E+01 9.95E-04 4.50E-02 2.90E-01 5.83E-01 17 92 233RRP U233
12.944 2.390E+01 1.64E-03 4.50E-02 9.00E-01 4.16E-01 17 92 233RRP U233
13.005 2.250E+01 2.77E-04 4.50E-02 3.90E-01 5.83E-01 17 92 233RRP U233
13.027 2.200E+01 1.01E-04 4.50E-02 2.05E-01 5.83E-01 17 92 233RRP U233
13.085 2.076E+01 1.04E-04 4.50E-02 4.70E-01 5.83E-01 17 92 233RRP U233
13.169 1.909E+01 1.67E-04 4.50E-02 2.40E-01 5.83E-01 17 92 233RRP U233
13.195 1.860E+01 1.63E-04 4.50E-02 1.15E-01 5.83E-01 17 92 233RRP U233
13.222 1.810E+01 2.77E-04 4.50E-02 1.50E-01 5.83E-01 17 92 233RRP U233
13.304 1.667E+01 4.41E-04 4.50E-02 1.40E-01 5.83E-01 17 92 233RRP U233
13.326 1.632E+01 8.69E-04 4.50E-02 4.50E-01 5.83E-01 17 92 233RRP U233
13.380 1.546E+01 8.93E-04 4.50E-02 1.90E-01 5.83E-01 17 92 233RRP U233
13.487 1.389E+01 3.99E-04 4.50E-02 3.00E-01 5.83E-01 17 92 233RRP U233
13.562 1.288E+01 1.23E-03 4.50E-02 2.50E-01 5.83E-01 17 92 233RRP U233
13.677 1.148E+01 1.02E-04 4.50E-02 1.75E-01 5.83E-01 17 92 233RRP U233

```

```

13.783 1.033E+01 1.54E-03 7.00E-02 2.70E-01 5.00E-01 17 92 233RRP U233
13.915 9.050E+00 7.40E-05 5.60E-02 2.80E-01 5.00E-01 17 92 233RRP U233
14.206 6.770E+00 5.30E-04 5.00E-02 1.60E-01 5.00E-01 17 92 233RRP U233
14.369 5.750E+00 1.20E-04 5.00E-02 3.20E-01 5.00E-01 17 92 233RRP U233
14.549 4.800E+00 3.59E-04 6.00E-02 7.40E-01 5.00E-01 17 92 233RRP U233
14.826 3.640E+00 1.60E-04 4.80E-02 2.12E-01 5.00E-01 17 92 233RRP U233
15.285 2.300E+00 1.76E-04 4.70E-02 4.90E-02 5.00E-01 17 92 233RRP U233
15.553 1.760E+00 3.11E-04 4.90E-02 2.31E-01 5.00E-01 17 92 233RRP U233
15.747 1.450E+00 1.83E-04 5.40E-02 7.16E-01 5.00E-01 17 92 233RRP U233
END OF RES=6*0.

```

```

* *****
*

```

```

* IPI,115,0

```

```

* X(N,CA)=4*0.
* X(N,F)=4*0.
* X(N,ABS)=2*0.,3.8,6.4
* X(N,NU-F)=4*0.
* X(N,TR)=4*5.
* X(N,CR)=4*0.

```

```

* *****
*

```

```

*END OF SAMPLE GYMEA X-S LIB (SAM1)
ENDJOB

```

MASTER RUN

LIBRARY IS
=GYMEA X-S

NAME USED IS
SAHI
TITLE, WRITTEN 9A6 IS
SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****

PARAMETERS READ WERE

NG 4
NN 6
TEMP 900.00
1ST RES GP 2
LAST RES GP 3

NUCLIDE NO.	NAME	FUEL	DECAY	CAPI	CAP2	DECAY CONST	YIELD1	YIELD2	YIELD3	YIELD4
1	BE9	0	N00	N00	LI6	0.	0.	0.	0.	0.
2	O16	0	N00	N00	N00	0.	0.	0.	0.	0.
3	TH232	0	N00	PA233	U232	0.	0.	0.	0.	0.
4	PA233	0	U233	TSO	N00	2.92800E+17	0.	0.	0.	0.
5	U233	1	N00	U234	N00	0.	0.	0.	0.	0.
6	*FP*	0	N00	YSO	N00	0.	2.00000E+00	0.	0.	0.

THIS TABLE IS TO CHECK SPECIFIED NUCLIDES WHICH DONT OCCUR IN THE LIBRARY OR ARENT N00

NUCLIDE NO. DECAY CAPI CAP2

1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

..... BYTE INDICATOR FOR A FORMAT

LI6
U232
TSO
U234
YSO

TABLE SHOWING GROUP AND NUCLIDE INFORMATION

NO	LETHARGIES (NG+1)	NORMLZD-FISS (NG)	VELOCITIES INO (NG)	MASSES (MM)	POTL SEAT (NN)	FISS.EN.REL. (NN)	SHIELD.NS1 (NN)	SHIELD.NS2 (NN)	SHIELD.NS3 (NN)	NO
0	0.									
1	6.900000E+00	9.995700E-01	4.270000E+0C-1	9.000000E+00	6.000000E+00	0.	4.123000E-02	4.123000E-02	4.123000E-02	1
2	1.520000E+01	4.300000E-04	1.000000E-01-1	1.600000E+01	3.800000E+00	0.	4.168000E-02	4.168000E-02	4.168000E-02	2
3	1.740000E+01	0.	1.230000E-02	2.320000E+02	1.000000E+01	0.	2.019000E-04	8.000000E-05	1.000000E-05	3
4	2.300000E+01	0.	4.3/0000E-03	2.330000E+02	1.000000E+01	0.	0.	0.	0.	4
5				2.330000E+02	1.000000E+01	0.	0.	0.	0.	5
6				1.150000E+02	5.000000E+00	0.	0.	0.	0.	6

NUCLIDE CONTROL INFORMATION SUPPLIED WAS

NUCLIDES
REACTION WISE
STANDARD
C MATRIX

0.	1	2	3	4	5	6
0.	0.	0.	0.	0.	2.50000E+00	0.
					1.26000E-01	0.

NUCLIDE NO.	1	BE9	MASS=	9.0	RESONANCE INDICATOR=	-1	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)
GROUP												
1	0.	0.		-1.500000E-02	4.490000E+00	3.290000E+00						1.200000E-02
2	0.	0.		0.	6.000000E+00	5.550000E+00						0.
3	1.000000E-03	0.		1.000000E-03	6.000000E+00	5.550000E+00						0.
4	4.000000E-03	0.		4.000000E-03	6.000000E+00	5.550000E+00						0.

NUCLIDE NO.	2	010	MASS=	16.0	RESONANCE INDICATOR=	-1				
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)				
1	2.962000E-03	0.	2.962000E-03	3.500000E+00	2.600000E+00	0.				
2	0.	0.	0.	3.800000E+00	3.600000E+00	0.				
3	0.	0.	0.	3.800000E+00	3.600000E+00	0.				
4	1.827000E-03	0.	1.827000E-03	3.800000E+00	3.600000E+00	0.				

NUCLIDE NO.	TH232	MASS	232.0	RESONANCE INDICATOR=	I	
GROUP	SIG(GAM)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)*	SIG(CAP2)
	A(1)	A(2)	A(4)	B(1)	B(2)	B(4)
1	4.00000E-01	0.	4.00000E-01	0.	8.00000E+00	0.
2	6.00000E+00	0.	1.00000E+01	0.	1.30000E+01	0.
3	1.00000E+00	0.	0.	6.00000E+02	0.	0.
4	3.70000E+00	0.	1.00000E+01	0.	1.30000E+01	0.
			0.	-1.00000E+02	0.	0.
			3.70000E+00	0.	1.30000E+01	0.

NUCLIDE NO. 4 PA233 MASS= 233.0 RESONANCE INDICATOR= C

GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	1.200000E+00	0.	1.200000E+00	0.	7.000000E+03	0.
2	5.500000E+00	0.	5.500000E+00	0.	5.400000E+01	0.
3	1.170000E+02	0.	1.170000E+02	0.	8.100000E+01	0.
4	3.094000E+01	0.	3.094000E+01	0.	3.500000E+01	0.

NUCLIDE NO. 5 UZ33 MASS= 233.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE UZ33

1 2 3 4
0 20 3 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(Tr)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	3.000000E-01	2.700000E+00	3.000000E+00	3.000000E+00	8.400000E+00	0.	
2	1.000000E-02	2.000000E-02	1.000000E+01	3.000000E-02	1.000000E+01	0.	
1	2.548000E+01	9.949999E-04	4.500000E-02	2.900000E-01	7.250000E-01	5.830000E-01	
2	2.390000E+01	1.640000E-03	4.500000E-02	9.600000E-01	2.250000E+00	4.160000E-01	
3	2.250000E+01	2.770000E-04	4.500000E-02	3.900000E-01	9.750011E-01	5.830000E-01	
4	2.200000E+01	1.010000E-04	4.500000E-02	2.950000E-01	5.125000E-01	5.830000E-01	
5	2.076000E+01	1.040000E-04	4.500000E-02	4.700000E-01	1.175001E+00	5.830000E-01	
6	1.909000E+01	1.670000E-04	4.500000E-02	2.400000E-01	0.000000E-01	5.830000E-01	
7	1.860000E+01	1.630000E-04	4.500000E-02	1.150000E-01	2.875000E-01	5.830000E-01	
8	1.810000E+01	2.770000E-04	4.500000E-02	1.500000E-01	3.750000E-01	5.830000E-01	
9	1.667000E+01	4.410000E-04	4.500000E-02	1.400000E-01	3.500000E-01	5.830000E-01	
10	1.632000E+01	8.690000E-04	4.500000E-02	4.500000E-01	1.125001E+00	5.830000E-01	
11	1.546000E+01	8.929999E-04	4.500000E-02	1.300000E-01	4.750000E-01	5.830000E-01	
12	1.389000E+01	3.990000E-04	4.500000E-02	3.000000E-01	7.500000E-01	5.830000E-01	
13	1.288000E+01	1.230000E-03	4.500000E-02	2.500000E-01	6.250000E-01	5.830000E-01	
14	1.148000E+01	1.020000E-04	4.500000E-02	1.750000E-01	4.375000E-01	5.830000E-01	
15	1.033000E+01	1.540000E-03	7.000000E-02	2.700000E-01	6.750000E-01	5.000000E-01	
16	9.050000E+00	7.399999E-05	5.600000E-02	2.800000E-01	7.000000E-01	5.000000E-01	
17	6.770000E+00	5.300000E-04	5.000000E-02	1.600000E-01	4.000000E-01	5.000000E-01	
18	5.750000E+00	1.200000E-04	5.000000E-02	3.200000E-01	8.000000E-01	5.000000E-01	
19	4.600000E+00	3.590000E-04	6.000000E-02	7.400000E-01	1.850000E+00	5.000000E-01	
20	3.640000E+00	1.600000E-04	4.600000E-02	2.120000E-01	5.300001E-01	5.000000E-01	
3	1.000000E-03	2.000000E-03	1.000000E+01	3.000000E-03	1.000000E+01	0.	
1	2.300000E+00	1.760000E-04	4.700000E-02	4.900000E-02	1.225000E-01	5.000000E-01	
2	1.760000E+00	3.110000E-04	4.900000E-02	2.310000E-01	5.775000E-01	5.000000E-01	
3	1.450000E+00	1.830000E-04	5.400000E-02	7.160000E-01	1.790000E+00	5.000000E-01	
4	1.900000E+01	2.540000E+02	2.730000E+02	2.850000E+02	2.830000E+02	0.	

NUCLIDE NO.	6	FP*	MASS=	115.0	RESONANCE INDICATOR=	0					
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)					
1	0.	0.	0.	0.	5.000000E+00	0.					
2	0.	0.	0.	0.	5.000000E+00	0.					
3	0.	0.	3.800000E+00	0.	5.000000E+00	0.					
4	0.	0.	6.400000E+00	0.	5.000000E+00	0.					

SUCCESSFUL MASTER RUN

ENDJOB CARD READ BY EDITOR

APPENDIX 4
MASTER RUN WITH NUCLIDE DATA ARRANGED
GROUPWISE NON STANDARD

INPUT DATA pages 1 - 2

PRINTED OUTPUT pages 3 - 11

=GYMEA X-S

SAMI SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****
 *EXCEPT FOR REQUIRED CONTROL CARDS,
 *DATA CAN BE IN FREE FORMAT FROM HERE ON.
 *NOTE-COMMENT CARDS (*IN COL.1) MAY APPEAR ANYWHERE IN DECK
 *AND DATA MAY CONTAIN NON-NUMERIC WORDS TO ASSIST CHECKING
 PARAMETERS
 NG=4,NN=6,TEMP=900,K,RES GROUPS 2 TO 3
 BURNUP

*BURN UP DATA
 *

BE9,0,NOO,NOO,L16,5*0.
 O16,0,NOO,NOO,NOO,5*0.
 TH232,0,NOE,PA233,U232,5*0.
 PA233,0,U233,TSC,NOO,2,928+17,4*C.
 U233,1,NOO,U234,NOO,5*0.
 *FP,0,NOO,Y50,NOO,0,2,3*0.
 GROUP

*GROUP AND NUCLIDE INFO.
 *

GP.BOUNDARIES,U=0,6,9,15,2,17,4,23,0
 FISS.SPECT=0.99957,0.00043,2*0.
 GP.VEL.=4.27,1,-1,1,23-2,4,37-3
 IND.=2*-1,1,0,2,0
 MASSES=9,16,232,233,233,115.
 POT.X=6,3,8,3*10,15.
 FER.=4*0,3,14-11,0.
 SHNA=4,123-2,4,168-2,2,019-4,3*0.
 SHNB=4,123-2,4,168-2,8,-5,3*0.
 SHNC=4,123-2,4,168-2,1,-5,3*0.
 NUCLIDES

GROUP WISE
 NON STANDARD
 *

BE9,9,,-1
 *
 *
 2*0,-1,5-2,4,49,3,29,1,2-2
 3*0,6,5,55,0
 1,-3,0,1,-3,6,5,55,0
 4,-3,0,4,-3,6,5,55,0
 *

 *
 O16,16,,-1
 *
 2,962-3,0,2,962-3,3,5,2,6,0.
 0,2*0,3,8,3,6,0.
 0,2*0,3,8,3,6,0.
 1,827-3,0,1,827-3,3,8,3,6,0.
 *

 *

TH232,232,1
 *
 *
 4,-1,0,4,-1,0,8,0.

5.0.0.10.0.0.13.0.0.
 5.0.1.0.0.0.6.0.2.0.0.0.
 1.0.0.10.0.0.13.0.0.
 1.0.1.0.0.0.0.1.0.2.0.0.0.
 3.7.0.0.0.7.0.0.13.0.0.
 *

 *
 PA233,233.0.0
 *
 1.2.0.0.1.2.0.0.7.0.0.
 5.5.0.0.5.5.0.0.54.0.0.
 117.0.0.0.117.0.0.81.0.0.
 30.94.0.0.30.94.0.0.35.0.0.
 *

 *
 U233,233.0.2

M VECTOR 0,20,3,0

* 0.300000E+00	0.270000E+01	0.300000E+01	0.300000E+01	0.300000E+01	0.840000E+01	0.	GROUP 1
* 0.100000E-01	0.200000E-01	0.100000E+02	0.300000E-01	0.300000E-01	0.100000E+02	0.	GROUP 2
* 0.254800E+02	0.995000E-03	0.450000E-01	0.290000E-00	0.290000E-00	0.725001E+00	0.5830	
* 0.239000E+02	0.164000E-02	0.450000E-01	0.900000E+00	0.225000E+01	0.4160		
* 0.225000E+02	0.277000E-03	0.450000E-01	0.390000E-00	0.975001E+00	0.5830		
* 0.220000E+02	0.101000E-03	0.450000E-01	0.205000E-00	0.512501E+00	0.5830		
* 0.207600E+02	0.104000E-03	0.450000E-01	0.470000E-00	0.117500E+01	0.5830		
* 0.190900E+02	0.167000E-03	0.450000E-01	0.240000E-00	0.600001E+00	0.5830		
* 0.186000E+02	0.163000E-03	0.450000E-01	0.115000E-00	0.287500E-00	0.5830		
* 0.181000E+02	0.277000E-03	0.450000E-01	0.150000E-00	0.375000E-00	0.5830		
* 0.165700E+02	0.441000E-03	0.450000E-01	0.140000E-00	0.350000E-00	0.5830		
* 0.163200E+02	0.869000E-03	0.450000E-01	0.450000E-01	0.450000E+01	0.5830		
* 0.154600E+02	0.893000E-03	0.450000E-01	0.190000E-00	0.475000E-00	0.5830		
* 0.138900E+02	0.399000E-03	0.450000E-01	0.300000E-00	0.750000E+00	0.5830		
* 0.128800E+02	0.123000E-02	0.450000E-01	0.250000E-00	0.625000E+00	0.5830		
* 0.114800E+02	0.102000E-02	0.450000E-01	0.175000E-00	0.437500E-00	0.5830		
* 0.103300E+02	0.154000E-02	0.700000E-01	0.270000E-00	0.675000E+00	0.5000		
* 0.905000E+01	0.740000E-04	0.560000E-01	0.280000E-00	0.700000E+00	0.5000		
* 0.677000E+01	0.530000E-01	0.500000E-01	0.160000E-00	0.400000E+00	0.5000		
* 0.575000E+01	0.120000E-03	0.500000E-01	0.320000E-01	0.800000E+00	0.5000		
* 0.480000E+01	0.359000E-03	0.600000E-01	0.740000E+00	0.185000E+01	0.5000		
* 0.364000E+01	0.160000E-03	0.480000E-01	0.212000E-00	0.530000E+01	0.5000		GROUP 3
* 0.100000E-02	0.200000E-02	0.100000E+02	0.300000E-02	0.100000E+02	0.		
* 0.230000E+01	0.176000E-03	0.470000E-01	0.490000E-01	0.122500E-00	0.5000		
* 0.176000E+01	0.311000E-03	0.490000E-01	0.231000E-00	0.577500E+00	0.5000		
* 0.145000E+01	0.183000E-03	0.540000E-01	0.716000E+00	0.179000E+01	0.5000		GROUP 4
* 0.190000E+02	0.254000E+03	0.273000E+03	0.285000E+03	0.283000E+03	0.		
* *****							

* FP,115.0

*
 4*0.5.0.
 4*0.5.0.
 2*0.3.8.0.5.0.0.
 0.0.0.6.4.0.5.0.0.
 *

*END OF GROUPWISE TEST DATA

LIBRARY IS
=GYMEA X-S

NAME USED IS
SAMI

TITLE, WRITTEN 9A6 IS

SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****

PARAMETERS READ WERE

NG 4
NN 6
TEMP 900.00
1ST RES GP 2
LAST RES GP 3

NUCLIDE NO.	NAME	FUEL	DECAY	CAP1	CAP2	DECAY CONST	YIELD1	YIELD2	YIELD3	YIELD4
1	BE9	0	N00	N00	LI6	0.	0.	0.	0.	0.
2	016	0	N00	N00	N00	0.	0.	0.	0.	0.
3	TH232	0	N00	PA233	U232	0.	0.	0.	0.	0.
4	PA233	0	U233	TSO	Y50	2.92800E+17	0.	0.	0.	0.
5	U233	1	N00	U234	N00	0.	0.	0.	0.	0.
6	'FP'	0	N00	Y50	N00	0.	2.00000E+00	0.	0.	0.

THIS TABLE IS TO CHECK SPECIFIED NUCLIDES WHICH DONT OCCUR IN THE LIBRARY OR ARENT N00

NUCLIDE NO.	DECAY	CAP1	CAP2	BYTE INDICATOR FOR A FORMAT
1	LI6
3	U232
4	TSO
5	U234
6	Y50

TABLE SHOWING GROUP AND NUCLIDE INFORMATION

NO	LETHARGIES (NG+1)	NORMLZD.FISS (NG)	VELOCITIES (NG)	IND (NN)	MASSES (NN)	POTL SCAT (NN)	FISS.EN.REL. (NN)	SHIELD.NS1 (NN)	SHIELD.NS2 (NN)	SHIELD.NS3 (NN)	NO
0	0.										
1	6.900000E+00	9.995700E-01	4.270000E+00	1	9.000000E+00	6.000000E+00	0.	4.123000E-02	4.123000E-02	4.123000E-02	1
2	1.520000E+01	4.300000E-04	1.000000E-01	1	1.600000E+01	3.800000E+00	0.	4.168000E-02	4.168000E-02	4.168000E-02	2
3	1.740000E+01	0.	1.230000E-02	1	2.320000E+02	1.000000E+01	0.	2.019000E-04	8.000000E-05	1.000000E-05	3
4	2.300000E+01	0.	4.370000E-03	0	2.330000E+02	1.000000E+01	0.	0.	0.	0.	4
5				2	2.330000E+02	1.000000E+01	0.	0.	0.	0.	5
6				0	1.150000E+02	5.000000E+00	0.	0.	0.	0.	6

NUCLIDE CONTROL INFORMATION SUPPLIED WAS

NUCLIDES
GROUP WISE
NON STANDARD

NUCLIDE NO.	1	BE9	MASS=	9.0	RESONANCE INDICATOR=	-1					
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)					
1	0.	0.	-1.50000E-02	4.49000E+00	3.29000E+00	1.20000E-02					
2	0.	0.	0.	6.00000E+00	5.55000E+00	0.					
3	1.00000E-03	0.	1.00000E-03	6.00000E+00	5.55000E+00	0.					
4	4.00000E-03	0.	4.00000E-03	6.00000E+00	5.55000E+00	0.					

NUCLIDE NO.	Z	DI6	MASS=	16.0	RESONANCE INDICATOR=	-1					
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)					
1	2.962000E-03	0.	2.962000E-03	3.500000E+00	2.600000E+00	0.					
2	0.	0.	0.	3.800000E+00	3.600000E+00	0.					
3	0.	0.	0.	3.800000E+00	3.600000E+00	0.					
4	1.827000E-03	0.	1.827000E-03	3.800000E+00	3.600000E+00	0.					

NUCLIDE NO.	3	TH232	MASS= 232.0	RESONANCE INDICATOR= 1		
GROUP	SIG(GAM) A(1)	SIG(F) A(2)	SIG(A) A(4)	NU-SIG(F) B(1)	SIG(TR)* B(2)	SIG(CAP2) B(4)
1	4.000000E-01	0.	4.000000E-01	0.	8.000000E+00	0.
2	6.000000E+00	0.	1.000000E+01	0.	1.300000E+01	0.
3	1.000000E+00	0.	0.	6.000000E+02	0.	0.
4	3.700000E+00	0.	1.000000E+01	0.	1.300000E+01	0.
			0.	-1.000000E+02	0.	0.
			3.700000E+00	0.	1.300000E+01	0.

GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	1.200000E+00	0.	1.200000E+00	0.	7.000000E+00	0.
2	5.500000E+00	0.	5.500000E+00	0.	5.400000E+01	0.
3	1.170000E+02	0.	1.170000E+02	0.	8.100000E+01	0.
4	3.094000E+01	0.	3.094000E+01	0.	3.500000E+01	0.

NUCLIDE NO. 5 U233 MASS= 233.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U233

1 2 3 4
0 20 3 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(TR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	3.00000E-01	2.70000E+00	3.00000E+00	3.00000E+00	8.40000E+00	0.	
2	9.99999E-03	2.00000E-02	1.00000E+01	3.00000E-02	1.00000E+01	0.	
1	2.54800E+01	9.94999E-04	4.50000E-02	2.90000E-01	7.25001E-01	5.83000E-01	
2	2.39000E+01	1.64000E-03	4.50000E-02	9.00000E-01	2.25000E+00	4.16000E-01	
3	2.25000E+01	2.77000E-04	4.50000E-02	3.90000E-01	9.75001E-01	5.83000E-01	
4	2.20000E+01	1.01000E-04	4.50000E-02	2.05000E-01	5.12501E-01	5.83000E-01	
5	2.07600E+01	1.04000E-04	4.50000E-02	4.70000E-01	1.17500E+00	5.83000E-01	
6	1.90900E+01	1.67000E-04	4.50000E-02	2.40000E-01	6.00001E-01	5.83000E-01	
7	1.86000E+01	1.63000E-04	4.50000E-02	1.15000E-01	2.87500E-01	5.83000E-01	
8	1.81000E+01	2.77000E-04	4.50000E-02	1.50000E-01	3.75000E-01	5.83000E-01	
9	1.66700E+01	4.41000E-04	4.50000E-02	1.40000E-01	3.50000E-01	5.83000E-01	
10	1.63200E+01	8.68999E-04	4.50000E-02	4.50000E-01	1.12500E+00	5.83000E-01	
11	1.54600E+01	8.92999E-04	4.50000E-02	1.90000E-01	4.75000E-01	5.83000E-01	
12	1.38900E+01	3.99000E-04	4.50000E-02	3.00000E-01	7.50000E-01	5.83000E-01	
13	1.28800E+01	1.23000E-03	4.50000E-02	2.50000E-01	6.25000E-01	5.83000E-01	
14	1.14800E+01	1.02000E-03	4.50000E-02	1.75000E-01	4.37500E-01	5.83000E-01	
15	1.03300E+01	1.54000E-03	7.00000E-02	2.70000E-01	6.75000E-01	5.00000E-01	
16	9.05000E+00	7.39999E-05	5.60000E-02	2.80000E-01	7.00000E-01	5.00000E-01	
17	6.77000E+00	5.30000E-04	5.00000E-02	1.60000E-01	4.00000E-01	5.00000E-01	
18	5.75000E+00	1.20000E-04	5.00000E-02	3.20000E-01	8.00000E-01	5.00000E-01	
19	4.80000E+00	3.59000E-04	6.00000E-02	7.40000E-01	1.85000E+00	5.00000E-01	
20	3.64000E+00	1.60000E-04	4.80000E-02	2.12000E-01	5.30000E+00	5.00000E-01	
3	9.99999E-04	2.00000E-03	1.00000E+01	3.00000E-03	1.00000E+01	0.	
1	2.30000E+00	1.76000E-04	4.70000E-02	4.90000E-02	1.22500E-01	5.00000E-01	
2	1.76000E+00	3.11000E-04	4.90000E-02	2.31000E-01	5.77500E-01	5.00000E-01	
3	1.45000E+00	1.83000E-04	5.40000E-02	7.16000E-01	1.79000E+00	5.00000E-01	
4	1.90000E+01	2.54000E+02	2.73000E+02	2.85000E+02	2.83000E+02	0.	

NUCLIDE NO. 6 'FP' MASS= 115.0 RESONANCE INDICATOR= 0

GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	0.	0.	0.	0.	5.000000E+00	0.
2	0.	0.	0.	0.	5.000000E+00	0.
3	0.	0.	3.800000E+00	0.	5.000000E+00	0.
4	0.	0.	6.400000E+00	0.	5.000000E+00	0.

SUCCESSFUL MASTER RUN

ENDJOB CARD READ BY EDITOR

APPENDIX 5
MASTER RUN WITH NUCLIDE DATA ARRANGED
REACTIONWISE NON STANDARD

INPUT DATA pages 1 -3
PRINTED OUTPUT pages 4 - 12


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MASTER
=GYMEA X-5
SAMI SUGGESTED SAMPLE LIBRARY MARCH '65 J.P.*****
*EXCEPT FOR REQUIRED CONTROL CARDS,
*DATA CAN BE IN FREE FORMAT FROM HERE ON.
*NOTE-COMMENT CARDS (*IN COL.1) MAY APPEAR ANYWHERE IN DECK
*AND DATA MAY CONTAIN NON-NUMERIC WORDS TO ASSIST CHECKING
PARAMETERS
NG=4,NN=6,TEMP=900,K,RES GROUPS 2 TO 3
BURNUP
*
*BURN UP DATA
*
BE9,0,NOO,NOO,L16,5*0.
O16,0,NOO,NOO,NOO,5*0.
TH232,0,NOO,PA233,U232,5*0.
PA233,0,U233,TSC,NOO,2,928+17,4*0.
U233,1,NOO,U233,NOO,5*0.
*FP,0,NOO,YSO,NOO,0,2,3*0.
GROUP
*
*GROUP AND NUCLIDE INFO.
*
GP.BOUNDARIES,U=0,6,9,15,2,17,4,23,0
FISS. SPECT=0,99957,0,00043,2*0.
GP.VEL=4,27,1,-1,1,23-2,4,37-3
IND.=2*-1,1,0,2,0
MASSES=9,16,232,233,233,115.
POT.X=6,3,8,3,10,5.
FER.=4*0,3,14-11,0.
SHNA=4,123-2,4,168-2,2,019-4,3*0.
SHNB=4,123-2,4,168-2,8,-5,3*0.
SHNC=4,123-2,4,168-2,1,-5,3*0.
NUCLIDES
REACTIONWISE
NON STANDARD
*
*****
*
*NUCLEAR DATA
*
*STANDARD RES. DATA WITH C'S=8*0,2,5,0,126,2*0. AND REACTION-WISE
*
BE9,9,,-1
*
X(IN,G)=2*0,1,-3,4,-3
X(IN,F)=4*0.
X(IN,ABS)=-1,5-2,0,1,-3,4,-3
X(IN,N)=4,49,3*6.
X(IN,TR)=3,29,3*5,55
X(IN,TWO N)=1,2-2,3*0.
*
*****
*
O16,16,,-1
*
X(IN,G)=2,962-3,0,0,1,827-3
X(IN,F)=4*0.
X(IN,ABS)=2,962-3,0,0,1,827-3

```

```

X(N,N)=3.5,3*3.8
X(N,TR)=2.6,3*3.6
X(N,CB)=4*0.
*
*****
*
TH232,232.,1
*
X(N,G)=4.,-1,6.,1.,2.7
A(N,G)=*6.,+1,1.,+1,* (*ADDED HERE TO AID CHECKING)
B(N,G)=*6.,+2,-1.,+2,*
X(N,F)=4*0.
A(N,F)=2*0.
B(N,F)=2*0.
X(N,ABS OR N)=4.,-1,2*10.,3.7
X(N,NU-F)=4*0.
A(N,NU-F)=2*0.
B(N,NU-F)=2*0.
X(N,TR)=8.,3*13.
X(N,CB)=4*0.
*
*****
*
PA233,233.,0
*
X(N,G)=1.2,5.5,117.,30.94
X(N,F)=4*0.
X(N,ABS)=1.2,5.5,117.,30.94
X(N,NU-F)=4*0.
X(N,TR)=7.,54.,81.,35.
X(N,CB)=4*0.
*
*****
*
U233,233.,2
*
X(N,G)=0.3,1.-2,1.-3,19.
X(N,F)=2.7,2.-2,2.-3,254.
X(N,ABS OR N)=3.,2*10.,273.
X(N,NU-F)=3.,3.-2,3.-3,285.
X(N,TR)=8.,4,2*10,283.
X(N,CB)=4*0.
*

```

*NON STANDARD LIBRARY RESONANCE PARAMETERS

```

*
0.254800E+02 0.995000E-03 0.450000E-01 0.290000E-00 0.725001E+00 0.5830
0.239000E+02 0.164000E-02 0.450000E-01 0.900000E+00 0.225000E+01 0.4160
0.225000E+02 0.277000E-03 0.450000E-01 0.390000E-00 0.975001E+00 0.5830
0.220000E+02 0.101000E-03 0.450000E-01 0.205000E-00 0.512501E+00 0.5830
0.207600E+02 0.104000E-03 0.450000E-01 0.470000E-00 0.117500E+01 0.5830
0.190900E+02 0.167000E-03 0.450000E-01 0.240000E-00 0.600001E+00 0.5830
0.186000E+02 0.163000E-03 0.450000E-01 0.115000E-00 0.287500E-00 0.5830
0.181000E+02 0.277000E-03 0.450000E-01 0.150000E-00 0.375000E-00 0.5830
0.166700E+02 0.441000E-03 0.450000E-01 0.140000E-00 0.350000E-00 0.5830
0.163200E+02 0.869000E-03 0.450000E-01 0.450000E-00 0.112500E+01 0.5830
0.154600E+02 0.893000E-03 0.450000E-01 0.190000E-00 0.475000E-00 0.5830
0.138900E+02 0.399000E-03 0.450000E-01 0.300000E-00 0.750000E+00 0.5830
0.128800E+02 0.123000E-02 0.450000E-01 0.250000E-00 0.625000E+00 0.5830
0.114800E+02 0.102000E-02 0.450000E-01 0.175000E-00 0.437500E-00 0.5830

```

```

0.10300E+02 0.15400E-02 0.70000E-01 0.27000E-00 0.67500E+00 0.5000
0.90500E+01 0.74000E-04 0.56000E-01 0.28000E-00 0.70000E+00 0.5000
0.67700E+01 0.52000E-03 0.50000E-01 0.16000E-00 0.40000E+00 0.5000
0.57500E+01 0.12000E-03 0.50000E-01 0.32000E-00 0.80000E+00 0.5000
0.48000E+01 0.35000E-03 0.60000E-01 0.74000E+00 0.18500E+01 0.5000
0.36400E+01 0.16700E-03 0.48000E-01 0.21200E-00 0.53000E+01 0.5000
0.23000E+01 0.17600E-03 0.47000E-01 0.49000E-01 0.12250E-00 0.5000
0.17600E+01 0.31100E-03 0.46000E-01 0.23100E-00 0.57750E+00 0.5000
0.14500E+01 0.13300E-03 0.54000E-01 0.71600E+00 0.17000E+01 0.5000
END OF RESULTS.

```

```

* *****

```

```

* IFF,115.0.

```

```

* X(N,CA)=4*0.

```

```

* X(N,F)=4*0.

```

```

* X(N,ABS)=2*0.03.0.6.4

```

```

* X(N,NU-F)=4*0.

```

```

* X(N,TR)=4*5.

```

```

* X(N,CR)=4*0.

```

```

* *****

```

```

* *END OF SAMPLE GYMEA X-S LIB (SAM1)

```

```

ENDJOB

```


TABLE SHOWING GROUP AND NUCLIDE INFORMATION

NO	LETHARGIES (NG+1)	NORMLZD.FISS (NG)	VELOCITIES (NG)	IND (NN)	MASSES (NN)	POTL SCAT (NN)	FISS.EN.REL. (NN)	SHIELD.NS1 (NN)	SHIELD.NS2 (NN)	SHIELD.NS3 (NN)	NO
0	0.										
1	6.900000E+00	9.995700E-01	4.270000E+00	0-1	9.000000E+00	6.000000E+00	0.	4.123000E-02	4.123000E-02	4.123000E-02	1
2	1.520000E+01	4.300000E-04	1.000000E-01	0-1	1.600000E+01	3.800000E+00	0.	4.168000E-02	4.168000E-02	4.168000E-02	2
3	1.740000E+01	0.	1.230000E-02	1	2.320000E+02	1.000000E+01	0.	2.019000E-04	8.000000E-05	1.000000E-05	3
4	2.300000E+01	0.	4.370000E-03	0	2.330000E+02	1.000000E+01	0.	0.	0.	0.	4
5				2	2.330000E+02	1.000000E+01	3.140000E-11	0.	0.	0.	5
6				0	1.150000E+02	5.000000E+00	0.	0.	0.	0.	6

NUCLIDE CONTROL INFORMATION SUPPLIED WAS

NUCLIDES
REACTION WISE
NON STANDARD

NUCLIDE NO. 1 BE9 MASS= 9.0 RESONANCE INDICATOR= -1

GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)
1	0.	0.	-1.500000E-02	4.490000E+00	3.290000E+00	1.200000E-02
2	0.	0.	0.	6.000000E+00	5.550000E+00	0.
3	1.000000E-03	0.	1.000000E-03	6.000000E+00	5.550000E+00	0.
4	4.000000E-03	0.	4.000000E-03	6.000000E+00	5.550000E+00	0.

NUCLIDE NO.	2	GROUP	SIG(CAP1)	SIG(F)	MASS=	16.0	RESONANCE INDICATOR=	-1	SIG(S)	SIG(TR)	SIG(CAP2)
1	2.962000E-03	0.	2.962000E-03	0.	0.	0.	0.	3.500000E+00	2.600000E+00	0.	
2	0.	0.	0.	0.	0.	0.	0.	3.800000E+00	3.600000E+00	0.	
3	0.	0.	0.	0.	0.	0.	0.	3.800000E+00	3.600000E+00	0.	
4	1.827000E-03	0.	1.827000E-03	0.	0.	0.	0.	3.800000E+00	3.600000E+00	0.	

NUCLIDE NO.	TH232	MASS= 232.0	RESONANCE INDICATOR= 1	
GROUP	SIG(GAM) A(1)	SIG(F) A(2)	SIG(A) A(4)	
		NU-SIG(F) h(1)	SIG(TR)* S(2)	
			SIG(CAP2) S(4)	
1	4.000000E-01	0.	0.	0.
2	6.000000E+00	0.	8.000000E+00	0.
	6.000000E+01	0.	1.300000E+01	0.
3	1.000000E+00	0.	6.000000E+02	0.
	1.000000E+01	0.	1.300000E+01	0.
	1.000000E+01	0.	-1.000000E+02	0.
4	3.700000E+00	0.	1.300000E+01	0.

NUCLIDE NO.	4	PA233	MASS= 233.0	RESONANCE INDICATOR= 0					
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)			
1	1.200000E+00	0.	1.200000E+00	0.	7.000000E+00	0.			
2	5.500000E+00	0.	5.500000E+00	0.	5.400000E+01	0.			
3	1.170000E+02	0.	1.170000E+02	0.	8.100000E+01	0.			
4	3.094000E+01	0.	3.094000E+01	0.	3.500000E+01	0.			

NUCLIDE NO. 5 U233 MASS= 233.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U233

1 2 3 4
0 20 3 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(TR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	3.000000E-01	2.700000E+00	3.000000E+00	3.000000E+00	8.400000E+00	0.	
2	1.000000E-02	2.000000E-02	1.000000E+01	3.000000E-02	1.000000E+01	0.	
1	2.548000E+01	9.949999E-04	4.500000E-02	2.900000E-01	7.250010E-01	5.830000E-01	
2	2.390000E+01	1.640000E-03	4.500000E-02	9.000000E-01	2.250000E+00	4.160000E-01	
3	2.250000E+01	2.770000E-04	4.500000E-02	3.900000E-01	9.750010E-01	5.830000E-01	
4	2.200000E+01	1.010000E-04	4.500000E-02	2.050000E-01	5.125010E-01	5.830000E-01	
5	2.076000E+01	1.040000E-04	4.500000E-02	4.700000E-01	1.175000E+00	5.830000E-01	
6	1.909000E+01	1.670000E-04	4.500000E-02	2.400000E-01	6.000010E-01	5.830000E-01	
7	1.860000E+01	1.630000E-04	4.500000E-02	1.150000E-01	2.875000E-01	5.830000E-01	
8	1.810000E+01	2.770000E-04	4.500000E-02	1.500000E-01	3.750000E-01	5.830000E-01	
9	1.667000E+01	4.410000E-04	4.500000E-02	1.400000E-01	3.500000E-01	5.830000E-01	
10	1.632000E+01	8.689999E-04	4.500000E-02	4.500000E-01	1.125000E+00	5.830000E-01	
11	1.546000E+01	8.929999E-04	4.500000E-02	1.900000E-01	4.750000E-01	5.830000E-01	
12	1.389000E+01	3.990000E-04	4.500000E-02	3.000000E-02	7.500000E-01	5.830000E-01	
13	1.288000E+01	1.230000E-03	4.500000E-02	2.500000E-01	6.250000E-01	5.830000E-01	
14	1.148000E+01	1.020000E-03	4.500000E-02	1.750000E-01	4.375000E-01	5.830000E-01	
15	1.033000E+01	1.540000E-03	7.000000E-02	2.700000E-01	6.750000E-01	5.000000E-01	
16	9.050000E+00	7.399999E-05	5.600000E-02	2.800000E-01	7.000000E-01	5.000000E-01	
17	6.770000E+00	5.300000E-04	5.000000E-02	1.600000E-01	4.000000E-01	5.000000E-01	
18	5.750000E+00	1.200000E-04	5.000000E-02	3.200000E-01	8.000000E-01	5.000000E-01	
19	4.800000E+00	3.590000E-04	6.000000E-02	7.400000E-01	1.850000E+00	5.000000E-01	
20	3.640000E+00	1.600000E-04	4.800000E-02	2.120000E-01	5.300000E+00	5.000000E-01	
3	1.000000E-03	2.000000E-03	1.000000E+01	3.000000E-03	1.000000E+01	0.	
1	2.300000E+00	1.760000E-04	4.700000E-02	4.900000E-02	1.225000E-01	5.000000E-01	
2	1.760000E+00	3.110000E-04	4.900000E-02	2.310000E-01	5.775000E-01	5.000000E-01	
3	1.450000E+00	1.830000E-04	5.400000E-02	7.160000E-01	1.790000E+00	5.000000E-01	
4	1.900000E+01	2.540000E+02	2.730000E+02	2.850000E+02	2.830000E+02	0.	

NUCLIDE NO.	6	FP	MASS= 115.0	RESONANCE INDICATOR= 0	SIG(CAP1)	SIG(IF)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
GROUP										
1	0.	0.	0.	0.	0.	0.	0.	0.	5.000000E+00	0.
2	0.	0.	0.	0.	0.	0.	0.	0.	5.000000E+00	0.
3	0.	0.	3.800000E+00	0.	0.	0.	0.	0.	5.000000E+00	0.
4	0.	0.	6.400000E+00	0.	0.	0.	0.	0.	5.000000E+00	0.

SUCCESSFUL MASTER RUN

ENDJOB CARD READ BY EDITOR

APPENDIX 6
MASTER RUN WITH NUCLIDE DATA ARRANGED
GROUPWISE STANDARD

INPUT DATA pages 1 - 2

PRINTED OUTPUT pages 3 - 11

MASTER
 =GYMEA X-5
 SAMI SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****
 *EXCEPT FOR REQUIRED CONTROL CARDS,
 *DATA CAN BE IN FREE FORMAT FROM HERE ON.
 *NOTE-COMMENT CARDS (*IN COL.1) MAY APPEAR ANYWHERE IN DECK
 *AND DATA MAY CONTAIN NON-NUMERIC WORDS TO ASSIST CHECKING
 PARAMETERS
 NG=4,NN=6,TEMP=900,K,RES GROUPS 2 TO 3
 BURNUP

*
 *BURN UP DATA
 *
 BE9,0,NOO,NOO,LI6,5*0.
 O16,0,NOO,NOO,NOO,5*0.
 TH232,0,NOO,PA233,U232,5*0.
 PA233,0,U233,T50,NOO,2.928+17.4*0.
 U233,1,NOO,U234,NOO,5*0.
 TFP,0,NOO,YSO,NOO,0,2,3*0.
 GROUP

*
 *GROUP AND NUCLIDE INFO.
 *
 GP.BOUNDARIES,U=0,6,9,15,2,17,4,23,0
 FISS. SPECT=C.99957,0.00043,2*0.
 GP.VEL.=4.27,1.-1,1,23-2,4.37-3
 IND.=2*-1,1,0,2,0
 MASSES=9,16,232,233,233,115.
 POT.X=6,3,8,3*10,5.
 PER.=4*0,3,14-11,0.
 SHNA=4,123-2,4,168-2,2,019-4,3*0.
 SHNB=4,123-2,4,168-2,8,-5,3*0.
 SHNC=4,123-2,4,168-2,1,-5,3*0.
 NUCLIDES

GROUP WISE
 STANDARD C MATRIX= 8*0,2,5,0,126,2*0.
 *
 *
 BE9,9,,-1
 *
 *
 2*0,,-1,5-2,4,49,3,29,1,2-2
 3*0,6,5,55,0
 1,-3,0,1,-3,6,5,55,0.
 4,-3,0,4,-3,6,5,55,0.
 *

*
 O16,16,,-1
 *
 *
 2,962-3,0,2,962-3,3,5,2,6,0.
 0,2*0,3,8,3,6,0.
 0,2*0,3,8,3,6,0.
 1,827-3,0,1,827-3,3,8,3,6,0.
 *

*
 TH232,232,1
 *
 *
 4,-1,0,4,-1,0,8,0,0.

6.0,0,10.0,0,13.0,0
6.1,0,0,0,6.2,0,0,0
1.0,0,10.0,0,13.0,0
1.1,0,0,0,1.2,0,0,0
2.7,0,0,3.7,0,0,13.0,0
*

*
PA233,233,0
*
1.2,0,0,1.2,0,0,7.0,0
5.5,0,0,5.5,0,0,54.0,0
117.0,0,0,117.0,0,0,81.0,0
30.94,0,0,30.94,0,0,35.0,0
*

*
U233,233,0,2,0,3,0
M VECTOR

* STANDARD LIBRARY RESONANCE PARAMETERS

GROUP 1	GROUP 2	GROUP 3	GROUP 4
0.30000E+00	0.27000E+01	0.30000E+01	0.30000E+01
0.10000E-01	0.20000E-01	0.10000E+02	0.30000E+02
12.880	2.548E+01	9.95E-04	4.50E-02
12.944	2.390E+01	1.64E-03	4.50E-02
13.005	2.250E+01	2.77E-04	4.50E-02
13.027	2.200E+01	1.01E-04	4.50E-02
13.085	2.076E+01	1.04E-04	4.50E-02
13.169	1.909E+01	1.67E-04	4.50E-02
13.195	1.860E+01	1.63E-04	4.50E-02
13.222	1.810E+01	2.77E-04	4.50E-02
13.304	1.667E+01	4.41E-04	4.50E-02
13.326	1.632E+01	8.69E-04	4.50E-02
13.380	1.546E+01	8.93E-04	4.50E-02
13.487	1.389E+01	3.99E-04	4.50E-02
13.562	1.288E+01	1.23E-03	4.50E-02
13.677	1.148E+01	1.02E-04	4.50E-02
13.783	1.033E+01	1.54E-03	7.00E-02
13.915	9.050E+00	7.40E-05	5.60E-02
14.206	6.770E+00	5.30E-04	5.00E-02
14.369	5.750E+00	1.20E-04	5.00E-02
14.549	4.800E+00	3.59E-04	6.00E-02
14.826	3.640E+00	1.60E-04	4.80E-02
0.10000E-02	0.20000E-02	0.10000E+02	0.30000E+02
15.285	2.300E+00	1.76E-04	4.70E-02
15.553	1.760E+00	3.11E-04	4.90E-02
15.747	1.450E+00	1.83E-04	5.40E-02
0.19000E+02	0.25400E+03	0.27300E+03	0.28500E+03

*

*
IFP,115,0
*
4*0,0,5,0
4*0,0,5,0
2*0,0,3,8,0,0,5,0,0,0
0,0,0,6,4,0,0,5,0,0,0
*
*END OF GROUPSWISE TEST DATA
ENDJOB

LIBRARY IS
=GYMEA X-S

NAME USED IS

SAMI

TITLE WRITTEN 9A6 IS

SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****

PARAMETERS READ WERE

NG 4
NN 6
TEMP 900.00
1ST RES GP 2
LAST RES GP 3

NUCLIDE NO.	NAME	FUEL	DECAY	CAP1	CAP2	DECAY CONST	YIELD1	YIELD2	YIELD3	YIELD4
1	BE9	0	N00	N00	LT6	0.	0.	0.	0.	0.
2	O16	0	N00	N00	N00	0.	0.	0.	0.	0.
3	TH232	0	N00	PA233	U232	0.	0.	0.	0.	0.
4	PA233	0	U233	TSO	N00	2.92800E+17	0.	0.	0.	0.
5	U233	1	N00	U234	N00	0.	0.	0.	0.	0.
6	'FP'	0	N00	YSO	N00	0.	2.00000E+00	0.	0.	0.

THIS TABLE IS TO CHECK SPECIFIED NUCLIDES WHICH DONT OCCUR IN THE LIBRARY OR ARENT N00

NUCLIDE NO.	DECAY	CAP1	CAP2	BYTE INDICATOR FOR A FORMAT
1
3	LT6	.....
4	U232	.....
5	TSO	U234	.....
6	YSO	.....	.....

TABLE SHOWING GROUP AND NUCLIDE INFORMATION

NO	LETHARGIES (NG+1)	NORMLZD.FISS (NG)	VELOCITIES (NG)	IND (NN)	MASSES (NN)	POTL SCAT (NN)	FISS.EN.REL. (NN)	SHIELD.NS1 (NN)	SHIELD.NS2 (NN)	SHIELD.NS3 (NN)	NO
0	0.										
1	6.900000E+00	9.995700E-01	4.270000E+00	-1	9.000000E+00	6.000000E+00	0.	4.123000E-02	4.123000E-02	4.123000E-02	1
2	1.520000E+01	4.300000E-04	1.000000E-01	-1	1.600000E+01	3.800000E+00	0.	4.168000E-02	4.168000E-02	4.168000E-02	2
3	1.740000E+01	0.	1.230000E-02	1	2.320000E+02	1.000000E+01	0.	2.019000E-04	8.000000E-05	1.000000E-05	3
4	2.300000E+01	0.	4.370000E-03	0	2.330000E+02	1.000000E+01	0.	0.	0.	0.	4
5				2	2.330000E+02	1.000000E+01	3.140000E-11	0.	0.	0.	5
6				0	1.150000E+02	5.000000E+00	0.	0.	0.	0.	6

NUCLIDE CONTROL INFORMATION SUPPLIED WAS

NUCLIDES
GROUP WISE
STANDARD
C MATRIX

0.	1	0.	2	0.	3	0.	4	0.	5	0.	6
0.		0.		0.		0.		2.50000E+00		0.	
								1.26000E-01		0.	

NUCLIDE NO. 1 BE9 MASS= 9.0 RESONANCE INDICATOR= -1

GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)
1	0.	0.	-1.500000E-02	4.490000E+00	3.290000E+00	1.200000E-02
2	0.	0.	0.	6.000000E+00	5.550000E+00	0.
3	1.000000E-03	0.	1.000000E-03	6.000000E+00	5.550000E+00	0.
4	4.000000E-03	0.	4.000000E-03	6.000000E+00	5.550000E+00	0.

NUCLIDE NO.	2	016	MASS=	16.0	RESONANCE INDICATOR=	-1						
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)						
1	2.962000E-03	0.	2.962000E-03	3.500000E+00	2.600000E+00	0.						
2	0.	0.	0.	3.800000E+00	3.600000E+00	0.						
3	0.	0.	0.	3.800000E+00	3.600000E+00	0.						
4	1.827000E-03	0.	1.827000E-03	3.800000E+00	3.600000E+00	0.						

NUCLIDE NO.	3	TH232	MASS= 232.0	RESONANCE INDICATOR= 1								
GROUP	SIG(GAM) A(1)	SIG(F) A(2)	SIG(A) A(4)	NU-SIG(F) B(1)	SIG(TR)* B(2)	SIG(CAP2) B(4)						
1	4.00000E-01	0.	4.00000E-01	0.	8.00000E+00	0.						
2	6.00000E+00	0.	1.00000E+01	0.	1.30000E+01	0.						
3	1.00000E+00	0.	0.	6.00000E+02	0.	0.						
4	3.70000E+00	0.	1.00000E+01	-1.00000E+02	1.30000E+01	0.						
			3.70000E+00	0.	1.30000E+01	0.						

NUCLIDE NO. 4 PA233 MASS= 233.0 RESONANCE INDICATOR= 0

GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	1.200000E+00	0.	1.200000E+00	0.	7.000000E+00	0.
2	5.500000E+00	0.	5.500000E+00	0.	5.400000E+01	0.
3	1.170000E+02	0.	1.170000E+02	0.	8.100000E+01	0.
4	3.094000E+01	0.	3.094000E+01	0.	3.500000E+01	0.

NUCLIDE NO. 5 U233 MASS= 233.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U233

1 2 3 4
0 20 3 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(TR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	3.000000E-01	2.700000E+00	3.000000E+00	3.000000E+00	8.400000E+00	0.	
2	9.999999E-03	2.000000E-02	1.000000E+01	3.000000E-02	1.000000E+01	0.	
1	2.548000E+01	9.949999E-04	4.500000E-02	2.900000E-01	7.250000E-01	5.830000E-01	
2	2.390000E+01	1.640000E-03	4.500000E-02	9.000000E-01	2.250000E+00	4.160000E-01	
3	2.250000E+01	2.770000E-04	4.500000E-02	3.900000E-01	9.750000E-01	5.830000E-01	
4	2.200000E+01	1.010000E-04	4.500000E-02	2.050000E-01	5.125000E-01	5.830000E-01	
5	2.076000E+01	1.040000E-04	4.500000E-02	4.700000E-01	1.175000E+00	5.830000E-01	
6	1.909000E+01	1.670000E-04	4.500000E-02	2.400000E-01	6.000000E-01	5.830000E-01	
7	1.860000E+01	1.630000E-04	4.500000E-02	1.150000E-01	2.875000E-01	5.830000E-01	
8	1.810000E+01	2.770000E-04	4.500000E-02	1.500000E-01	3.750000E-01	5.830000E-01	
9	1.667000E+01	4.410000E-04	4.500000E-02	1.400000E-01	3.500000E-01	5.830000E-01	
10	1.632000E+01	8.690000E-04	4.500000E-02	4.500000E-01	1.125000E+00	5.830000E-01	
11	1.546000E+01	8.929999E-04	4.500000E-02	1.900000E-01	4.750000E-01	5.830000E-01	
12	1.389000E+01	3.990000E-04	4.500000E-02	3.000000E-01	7.500000E-01	5.830000E-01	
13	1.288000E+01	1.230000E-03	4.500000E-02	2.500000E-01	6.250000E-01	5.830000E-01	
14	1.148000E+01	1.020000E-04	4.500000E-02	1.750000E-01	4.375000E-01	5.830000E-01	
15	1.033000E+01	1.540000E-03	7.000000E-02	2.700000E-01	6.750000E-01	5.000000E-01	
16	9.050000E+00	7.399999E-05	5.600000E-02	2.800000E-01	7.000000E-01	5.000000E-01	
17	6.770000E+00	5.300000E-04	5.000000E-02	1.600000E-01	4.000000E-01	5.000000E-01	
18	5.750000E+00	1.200000E-04	5.000000E-02	3.200000E-01	8.000000E-01	5.000000E-01	
19	4.800000E+00	3.590000E-04	6.000000E-02	7.400000E-01	1.850000E+00	5.000000E-01	
20	3.640000E+00	1.600000E-04	4.800000E-02	2.120000E-01	5.300000E-01	5.000000E-01	
3	9.999999E-04	2.000000E-03	1.000000E+01	3.000000E-03	1.000000E+01	0.	
1	2.300000E+00	1.760000E-04	4.700000E-02	4.900000E-02	1.225000E-01	5.000000E-01	
2	1.760000E+00	3.110000E-04	4.900000E-02	2.310000E-01	5.775000E-01	5.000000E-01	
3	1.450000E+00	1.830000E-04	5.400000E-02	7.160000E-01	1.790000E+00	5.000000E-01	
4	1.900000E+01	2.540000E+02	2.730000E+02	2.850000E+02	2.830000E+02	0.	

ISOTOPE NO. 0 MASS= 115.0 RESONANCE INDICATOR= 0

GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	0.	0.	0.	0.	5.000000E+00	0.
2	0.	0.	0.	0.	5.000000E+00	0.
3	0.	0.	3.800000E+00	0.	5.000000E+00	0.
4	0.	0.	6.400000E+00	0.	5.000000E+00	0.

SUCCESSFUL MASTER RUN

ENDJOB CARD READ BY EDITOR

APPENDIX 7

LIST RUNS

INPUT DATA

page 1

The input master binary tape is that tape
created by the runs in Appendices 3 - 6

PRINTED OUTPUT

pages 2 - 17


```
LIST 1  
BE9, TH232, *FP,  
ENDJOB  
LIST  
FILE1  
ALL  
ENDJOB  
LIST 1  
O16, TH236, ZZZ, PA233  
ENDJOB
```

LIST RUN

1953
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NUCLIDE NO. GROUP	1	BE9	MASS=	9.0	RESONANCE INDICATOR=	-1	SIG(S)	SIG(TR)	SIG(CAP2)
	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(S)	SIG(S)	SIG(S)	SIG(S)	SIG(S)
1	0.	0.	-1.500000E-02	4.490000E+00	3.290000E+00	1.200000E-02	0.	0.	0.
2	0.	0.	0.	6.000000E+00	5.550000E+00	0.	0.	0.	0.
3	1.000000E-03	0.	1.000000E-03	6.000000E+00	5.550000E+00	0.	0.	0.	0.
4	4.000000E-03	0.	4.000000E-03	6.000000E+00	5.550000E+00	0.	0.	0.	0.

NUCLIDE NO.	3	TH232	MASS= 232.0	RESONANCE INDICATOR= 1								
GROUP	SIG(GAM) A(1)	SIG(F) A(2)	SIG(A) A(4)	NU-SIG(F) B(1)	SIG(TR)* B(2)	SIG(CAP2) B(4)						
1	4.000000E-01	0.	4.000000E-01	0.	8.000000E+00	0.						
2	6.000000E+00	0.	1.000000E+01	0.	1.300000E+01	0.						
3	6.000000E+01	0.	0.	6.000000E+02	0.	0.						
	1.000000E+00	0.	1.000000E+01	0.	1.300000E+01	0.						
	1.000000E+01	0.	0.	-1.000000E+02	0.	0.						
4	3.700000E+00	0.	3.700000E+00	0.	1.300000E+01	0.						

NUCLIDE NO. GROUP	SIG(CAP1)	'F'1 SIG(F)	MASS= 115.0 SIG(A)	RESONANCE INDICATOR= 0 NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	0.	0.	0.	0.	5.000000E+00	0.
2	0.	0.	0.	0.	5.000000E+00	0.
3	0.	0.	3.800000E+00	0.	5.000000E+00	0.
4	0.	0.	6.400000E+00	0.	5.000000E+00	0.

END OF LIST RUN

LIST RUN

=GYMEA X-S

SAMI

SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****

PARAMETERS READ WERE

NG 4
NN 6
TEMP 900.00
1ST RES GP 2
LAST RES GP 3

NAME	FUEL	DECAY	CAP1	CAP2	DECAY CONST	YIELD1	YIELD2	YIELD3	YIELD4
1 BE9	0	N00	N00	LI6	0.	0.	0.	0.	0.
2 O16	0	N00	N00	N00	0.	0.	0.	0.	0.
3 TH232	0	N00	PA233	U232	0.	0.	0.	0.	0.
4 PA233	0	U233	TSO	N00	2.92800E+17	0.	0.	0.	0.
5 U233	1	N00	U234	N00	0.	0.	0.	0.	0.
6 *FP*	0	N00	YSO	N00	0.	2.00000E+00	0.	0.	0.

THIS TABLE IS TO CHECK SPECIFIED NUCLIDES WHICH DONT OCCUR IN THE LIBRARY OR ARENT N00

NUCLIDE NO. DECAY CAP1 CAP2

1	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	.....

..... BYTE INDICATOR FOR A FORMAT

Li6
U232

TSO
U234
YSO

TABLE SHOWING GROUP AND NUCLIDE INFORMATION

NO	LETHARGIES (NG+1)	NORMALZD.FISS (NG)	VELOCITIES IND (NW)	MASSES (NW)	POTL SCAT (NW)	FISS-EN.REL. (NW)	SHIELD.NS1 (NW)	SHIELD.NS2 (NW)	SHIELD.NS3 (NW)	NO
0	0.									
1	6.900000E+00	9.995700E-01	4.270000E+00-1	9.000000E+00	6.000000E+00	0.	4.123000E-02	4.123000E-02	4.123000E-02	1
2	1.520000E+01	4.300000E-04	1.000000E-01-1	1.600000E+01	3.800000E+00	0.	4.168000E-02	4.168000E-02	4.168000E-02	2
3	1.740000E+01	0.	1.230000E-02 1	2.320000E+02	1.000000E+01	0.	2.019000E-04	8.000000E-05	1.000000E-05	3
4	2.300000E+01	0.	4.370000E-03 0	2.330000E+02	1.000000E+01	0.	0.	0.	0.	4
5			2	2.330000E+02	1.000000E+01	3.140000E-11	0.	0.	0.	5
6			0	1.150000E+02	5.000000E+00	0.	0.	0.	0.	6

NUCLIDE NO. GROUP	1	BE9 SIG(F)	MASS=	9.0 SIG(A)	RESONANCE INDICATOR= -1 SIG(S)	SIG(TR)	SIG(CAP2)
1	0.	0.	-1.500000E-02	4.490000E+00	3.290000E+00	1.200000E-02	0.
2	0.	0.	0.	6.000000E+00	5.550000E+00	0.	0.
3	1.000000E-03	0.	1.000000E-03	6.000000E+00	5.550000E+00	0.	0.
4	4.000000E-03	0.	4.000000E-03	6.000000E+00	5.550000E+00	0.	0.

NUCLIDE NO. GROUP	2 SIG(CAP1)	016 SIG(F)	MASS= 16.0 SIG(A)	RESONANCE INDICATOR= -1 SIG(S)	SIG(TR)	SIG(CAP2)
1	2.962000E-03	0.	2.962000E-03	3.500000E+00	2.600000E+00	0.
2	0.	0.	0.	3.800000E+00	3.600000E+00	0.
3	0.	0.	0.	3.800000E+00	3.600000E+00	0.
4	1.827000E-03	0.	1.827000E-03	3.800000E+00	3.600000E+00	0.

TH232 MASS= 232.0 RESONANCE INDICATOR= 1

NUCLIDE NO. 3

GROUP	SIG(GAM) A(1)	SIG(F) A(2)	SIG(A) A(4)	NU-SIG(F) B(1)	SIG(TR)* B(2)	SIG(CAP2) B(4)
1	4.000000E-01	0.	4.000000E-01	0.	8.000000E+00	0.
2	6.000000E+00	0.	1.000000E+01	0.	1.300000E+01	0.
3	1.000000E+00	0.	0.	6.000000E+02	0.	0.
4	3.700000E+00	0.	1.000000E+01	0.	1.300000E+01	0.
			0.	-1.000000E+02	0.	0.
			3.700000E+00	0.	1.300000E+01	0.

NUCLIDE NO. GROUP	4 SIG(CAP1)	PA233 SIG(F)	MASS= 233.0 SIG(A)	RESONANCE INDICATOR= NU-SIG(F)	0 SIG(TR)	SIG(CAP2)
1	1.200000E+00	0.	1.200000E+00	0.	7.000000E+00	0.
2	5.500000E+00	0.	5.500000E+00	0.	5.400000E+01	0.
3	1.170000E+02	0.	1.170000E+02	0.	8.100000E+01	0.
4	3.094000E+01	0.	3.094000E+01	0.	3.500000E+01	0.

NUCLIDE NO. 5 UZ33 MASS= 233.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE UZ33

1 2 3 4
0 20 3 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(TR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	3.000000E-01	2.700000E+00	3.000000E+00	3.000000E+00	8.400000E+00	0.	
2	9.999999E-03	2.000000E-02	1.000000E+01	3.000000E-02	1.000000E+01	0.	
1	2.548000E+01	9.949999E-04	4.500000E-02	2.900000E-01	7.250009E-01	5.830000E-01	
2	2.390000E+01	1.640000E-03	4.500000E-02	9.000000E-01	2.250003E+00	4.160000E-01	
3	2.250000E+01	2.770000E-04	4.500000E-02	3.900000E-01	9.750011E-01	5.830000E-01	
4	2.200000E+01	1.010000E-04	4.500000E-02	2.050000E-01	5.125005E-01	5.830000E-01	
5	2.076000E+01	1.040000E-04	4.500000E-02	4.700000E-01	1.175001E+00	5.830000E-01	
6	1.909000E+01	1.670000E-04	4.500000E-02	2.400000E-01	6.000005E-01	5.830000E-01	
7	1.860000E+01	1.630000E-04	4.500000E-02	1.500000E-01	2.875003E-01	5.830000E-01	
8	1.810000E+01	2.770000E-04	4.500000E-02	1.500000E-01	3.750003E-01	5.830000E-01	
9	1.667000E+01	4.410000E-04	4.500000E-02	1.400000E-01	3.500003E-01	5.830000E-01	
10	1.632000E+01	8.690000E-04	4.500000E-02	4.500000E-01	1.125001E+00	5.830000E-01	
11	1.546000E+01	8.929999E-04	4.500000E-02	1.900000E-01	4.750003E-01	5.830000E-01	
12	1.389000E+01	3.990000E-04	4.500000E-02	3.000000E-01	7.500005E-01	5.830000E-01	
13	1.288000E+01	1.230000E-03	4.500000E-02	2.500000E-01	6.250004E-01	5.830000E-01	
14	1.148000E+01	1.020000E-04	4.500000E-02	1.750000E-01	4.375002E-01	5.830000E-01	
15	1.033000E+01	1.540000E-03	7.000000E-02	2.700000E-01	6.750003E-01	5.000000E-01	
16	9.050000E+00	7.399999E-05	5.600000E-02	2.800000E-01	7.000003E-01	5.000000E-01	
17	6.770000E+00	5.300000E-04	5.000000E-02	1.600000E-01	4.000001E-01	5.000000E-01	
18	5.750000E+00	1.200000E-04	5.000000E-02	3.200000E-01	8.000002E-01	5.000000E-01	
19	4.800000E+00	3.590000E-04	6.000000E-02	7.400000E-01	1.850000E+00	5.000000E-01	
20	3.640000E+00	1.600000E-04	4.800000E-02	2.120000E-01	5.300001E-01	5.000000E-01	
3	9.999999E-04	2.000000E-03	1.000000E+01	3.000000E-03	1.000000E+01	0.	
1	2.300000E+00	1.760000E-04	4.700000E-02	4.900000E-02	1.225000E-01	5.000000E-01	
2	1.760000E+00	3.110000E-04	4.900000E-02	2.310000E-01	5.775000E-01	5.000000E-01	
3	1.450000E+00	1.830000E-04	5.400000E-02	7.160000E-01	1.790000E+00	5.000000E-01	
4	1.900000E+01	2.540000E+02	2.730000E+02	2.850000E+02	2.830000E+02	0.	

NUCLIDE NO.	6	'FP'	MASS=	115.0	RESONANCE INDICATOR=	0	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)				
1	0.	0.	0.	0.	0.	5.000000E+00	0.				0.
2	0.	0.	0.	0.	0.	5.000000E+00	0.				0.
3	0.	0.	3.800000E+00	0.	0.	5.000000E+00	0.				0.
4	0.	0.	6.400000E+00	0.	0.	5.000000E+00	0.				0.

END OF LIST RUN

LIST RUN

NUCLIDE TH236 IS NOT PRESENT IN FILE1 DATA

NUCLIDE ZZZ IS NOT PRESENT IN FILE1 DATA

NUCLIDE GROUP	ND. 2	SIG(CAP1)	016 SIG(F)	MASS=	16.0 SIG(A)	RESONANCE INDICATOR=	-1 SIG(S)	SIG(TR)	SIG(CAP2)
1		2.962000E-03	0.		2.962000E-03		3.500000E+00	2.600000E+00	0.
2		0.	0.		0.		3.800000E+00	3.600000E+00	0.
3		0.	0.		0.		3.800000E+00	3.600000E+00	0.
4		1.827000E-03	0.		1.827000E-03		3.800000E+00	3.600000E+00	0.

NUCLIDE NO. GROUP	4 SIG(CAP1)	PA233 SIG(F)	MASS= .233.0 SIG(A)	RESONANCE INDICATOR= 0 NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	1.200000E+00	0.	1.200000E+00	0.	7.000000E+00	0.
2	5.500000E+00	0.	5.500000E+00	0.	5.400000E+01	0.
3	1.170000E+02	0.	1.170000E+02	0.	8.100000E+01	0.
4	3.094000E+01	0.	3.094000E+01	0.	3.500000E+01	0.

END OF LIST RUN

APPENDIX 8

PUNCH RUNS

INPUT DATA

page 1

The input master binary tape is that tape
created by the runs in Appendices 3 - 6

PRINTED OUTPUT

pages 2 - 4

LISTING OF PUNCHED OUTPUT pages 5 - 8

PUNCH
FILE1
ALL
ENDJOB
PUNCH
TH232
ENDJOB
PUNCH
FILE1
ENDJOB

PUNCH RUN

FILE1 PUNCHED

NUCLIDES PUNCHED.....

BE9

UI6

TH232

PA233

U233

FP

THIS PUNCH RUN HAS PRODUCED A CARD FILE SUITABLE FOR A MASTER TAPE CREATION RUN
THE OUTPUT DECK NEEDS ONLY A CONTROL CARD PUNCHED MASTER IN COLS. 1-6 AT FRONT, AND AN ENDJOB CARD AT BACK

END OF PUNCH RUN

PUNCH RUN

NUCLIDES PUNCHED.....

016

TH232

•FP•

END OF PUNCH RUN

PUNCH RUN
FILE1 PUNCHED
END OF PUNCH RUN

=GYMEA X-S
SAMI SUGGESTED SAMPLE LIRRARY MARCH 195J.P.*****

PARAMETERS
NG= 4>NN= 6,TEMP= 900,CKK,RES GPS 2 TO 3
BURNUP

```

*
BE9 , 0,N00 ,N00 ,LI6 , , , 0.
0. , 0. , , , , 0.
O16 . , C,N0C ,N0C , , , 0.
0. , 0. , , , , 0.
TH232 , 0,N0C ,PA233 ,U232 , , , 0.
0. , 0. , , , , 0.
PA233 , 0,U233 ,TSC ,N00 , , , 0.
0.29280E+18, 0. , 0. , , , 0.
U233 , 1,N0C ,U234 ,N00 , , , 0.
0. , 0. , , , , 0.
IFP , C,N0C ,YSO ,N0C , , , 0.
0. , C.2C000E+01, 0. , , , 0.
GROUP
*

```

```

LETH= 0. , C.6900E+01, C.1520E+02, C.1740E+02, 0.2300E+02
FISS, 0.9996E+00, 0.4300E-03, C. , 0.
VEL= 0.4270E+01, 0.1000E+00, C.1230E-01, C.4370E-02,
INDE= -1, -1, 1, 0, 2, 0,
YASS= 0.9000E+01, 0.1600E+02, C.2320E+03, 0.2330E+03, 0.2330E+03
C.1150E+03,
POT X= 0.6000E+01, C.3800E+01, 0.1000E+02, 0.1000E+02, 0.1000E+02
0.5000E+01,
FER= 0. , C. , 0. , 0. , 0.3140E-10
C.
SHNA= 0.4123E-01, 0.4168E-01, 0.2019E-03, 0. , 0.
C.
SHNB= 0.4123E-01, 0.4168E-01, 0.8000E-04, 0. , 0.
C.
SHNC= 0.4123E-01, 0.4168E-01, 0.1000E-04, 0. , 0.
0.

```

NUCLIDES
GROUP WISE
NON STANDARD

```

BE9 , 9,00, -1
0. , 0. , -0.1500E-01, 0.4490E+01, 0.3290E+01, 0.1200E-01
0. , 0. , 0. , 0.6000E+01, 0.5550E+01, 0.
0.1000E-02, 0. , C.1000E-02, 0.6000E+01, 0.5550E+01, 0.
0.4000E-02, 0. , 0.4000E-02, 0.6000E+01, 0.5550E+01, 0.
*
*****
O16 , 16,C0, -1
0.2962F-02, 0. , 0.2962E-02, 0.3500E+01, 0.2600E+01, 0.
0. , 0. , 0. , C.3800E+01, C.3600E+01, 0.
0. , 0. , 0. , C.3800E+01, C.3600E+01, 0.
0.1827E-02, 0. , 0.1827E-02, 0.3800E+01, 0.3600E+01, 0.
*
*****
TH232 , 232,C0, 1
0.4000E+00, 0. , 0.4000E+00, 0. , 0.8000E+01, 0.
C.6000E+01, C. , 0.1000E+02, 0. , 0.1300E+02, 0.
0.59999999E+02, 0. , 0.
C.59999999E+03, 0. , 0.

```

```

0.1000E+01, 0., 0.1000E+02, 0., 0.1300E+02, 0.
0.10000000E+02, 0., 0., 0.
-0.10000000E+03, 0., 0., 0.
0.3700E+01, 0., 0.3700E+01, 0., 0.1300E+02, 0.
*
*****
PA233 , 293.00, 0
0.1200E+01, 0., 0.1200E+01, 0., 0.7000E+01, 0.
0.5500E+01, 0., 0.5500E+01, 0., 0.5400E+02, 0.
0.1170E+03, 0., 0.1170E+03, 0., 0.8100E+02, 0.
0.3094E+02, 0., 0.3094E+02, 0., 0.3500E+02, 0.
*
*****
U233 , 233.00, 2
* SEARCH VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U233
MVECTOR
00000.20, 3, 0,
0.3000E+00, 0.2700E+01, 0.3000E+01, 0.3000E+01, 0.8400E+01, 0.
0.1000E-01, 0.2000E-01, 0.1000E+02, 0.3000E-01, 0.1000E+02, 0.
*
0.2548E+02, 0.9950E-03, 0.4500E-01, 0.2900E+00, 0.7250E+00, 0.5830E+00
0.2390E+02, 0.1640E-02, 0.4500E-01, 0.9000E+00, 0.2250E+01, 0.4160E+00
0.2250E+02, 0.2770E-03, 0.4500E-01, 0.3900E+00, 0.9750E+00, 0.5830E+00
0.2200E+02, 0.1010E-03, 0.4500E-01, 0.2050E+00, 0.5125E+00, 0.5830E+00
0.2076E+02, 0.1040E-03, 0.4500E-01, 0.4700E+00, 0.1175E+01, 0.5830E+00
0.1909E+02, 0.1670E-03, 0.4500E-01, 0.2400E+00, 0.6000E+00, 0.5830E+00
0.1860E+02, 0.1630E-03, 0.4500E-01, 0.1150E+00, 0.2875E+00, 0.5830E+00
0.1810E+02, 0.2770E-03, 0.4500E-01, 0.1500E+00, 0.3750E+00, 0.5830E+00
0.1667E+02, 0.4410E-03, 0.4500E-01, 0.1400E+00, 0.3500E+00, 0.5830E+00
0.1632E+02, 0.8690E-03, 0.4500E-01, 0.4500E+00, 0.1125E+01, 0.5830E+00
0.1546E+02, 0.8930E-03, 0.4500E-01, 0.1900E+00, 0.4750E+00, 0.5830E+00
0.1389E+02, 0.3990E-03, 0.4500E-01, 0.3900E+00, 0.7500E+00, 0.5830E+00
0.1288E+02, 0.1230E-02, 0.4500E-01, 0.2500E+00, 0.6250E+00, 0.5830E+00
0.1148E+02, 0.1020E-03, 0.4500E-01, 0.1750E+00, 0.4375E+00, 0.5830E+00
0.1033E+02, 0.1540E-02, 0.7000E-01, 0.2700E+00, 0.6750E+00, 0.5000E+00
0.9050E+01, 0.7400E-04, 0.5600E-01, 0.2800E+00, 0.7000E+00, 0.5000E+00
0.6770E+01, 0.5300E-03, 0.5000E-01, 0.1600E+00, 0.4000E+00, 0.5000E+00
0.5750E+01, 0.1200E-03, 0.5000E-01, 0.3200E+00, 0.8000E+00, 0.5000E+00
0.4800E+01, 0.3590E-03, 0.6000E-01, 0.7400E+00, 0.1850E+01, 0.5000E+00
0.3640E+01, 0.1600E-03, 0.4800E-01, 0.2120E+00, 0.5300E+00, 0.5000E+00
*
0.1000E-02, 0.2000E-02, 0.1000E+02, 0.3000E-02, 0.1000E+02, 0.
*
0.2300E+01, 0.1760E-03, 0.4700E-01, 0.4900E-01, 0.1225E+00, 0.5000E+00
0.1760E+01, 0.3110E-03, 0.4900E-01, 0.2310E+00, 0.5775E+00, 0.5000E+00
0.1450E+01, 0.1830E-03, 0.5400E-01, 0.7160E+00, 0.1790E+01, 0.5000E+00
*
0.1900E+02, 0.2540E+03, 0.2730E+03, 0.2850E+03, 0.2830E+03, 0.
*
*****
FP, 115.00, 0
0., 0., 0., 0., 0.5000E+01, 0.
0., 0., 0., 0., 0.5000E+01, 0.
0., 0., 0., 0.3800E+01, 0.
0., 0., 0., 0.6400E+01, 0.
*
NUCLIDES
GROUP WISE
NON STANDARD

```

```

*****
O16 , 16.00, -1
0.2962E-02, 0. , 0.2962E-02, 0.3500E+01, 0.2600E+01, 0.
0. , 0. , 0.3800E+01, 0.3600E+01, 0.
0. , 0. , 0.3800E+01, 0.3600E+01, 0.
0.1827E-02, 0. , 0.1827E-02, 0.3800E+01, 0.3600E+01, 0.
*

```

```

*****
TH232 , 232.00, 1
0.4000E+00, 0. , 0.4000E+00, 0. , 0.8000E+01, 0.
0.6000E+01, 0. , 0.1000E+02, 0. , 0.1300E+02, 0.
0.599999999E+02, 0. , 0. , 0.
0.599999999E+03, 0. , 0. , 0.
0.1000E+01, 0. , 0.1000E+02, 0. , 0.1300E+02, 0.
0.100000000E+02, 0. , 0. , 0.
-0.100000000E+03, 0. , 0. , 0.
0.3700E+01, 0. , 0.3700E+01, 0. , 0.1300E+02, 0.
*

```

```

*****
'FP1 , 115.00, 0
0. , 0. , 0. , 0. , 0.5000E+01, 0.
0. , 0. , 0. , 0. , 0.5000E+01, 0.
0. , 0. , 0.3800E+01, 0. , 0.5000E+01, 0.
0. , 0. , 0.6400E+01, 0. , 0.5000E+01, 0.
*

```

=GYMEA X-S
SAMI SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****

PARAMETERS
NG= 4, NN= 6, TEMP= 900.00K, RES GPS 2 TO 3
BURNUP

```

*
BE9 , 0.000 , NOO , LI6 , 0. , 0. , 0.
0. , 0. , 0. , 0. , 0.5000E+01, 0.
O16 , 0.000 , NOC , NOO , 0. , 0. , 0.
0. , 0. , 0. , 0. , 0.5000E+01, 0.
TH232 , 0.000 , PA233 , U232 , 0. , 0. , 0.
0. , 0. , 0. , 0. , 0.5000E+01, 0.
PA233 , 0.000 , TSO , NOO , 0. , 0. , 0.
0.29280E+18, 0. , 0. , 0. , 0.5000E+01, 0.
U233 , 1.000 , U234 , NOO , 0. , 0. , 0.
0. , 0. , 0. , 0. , 0.5000E+01, 0.
'FP1 , 0.000 , YSO , NOO , 0. , 0. , 0.
0. , 0.20000E+01, 0. , 0. , 0.
GROUP
*
LETH= 0. , 0.6900E+01, 0.1520E+02, 0.1740E+02, 0.2300E+02
FISS= 0.9996E+00, 0.4300E-03, 0. , 0. , 0.
VEL= C.4270E+01, 0.1000E+00, 0.1230E-01, 0.4370E-02,
IND= -1, -1, 1, 0, 2, 0,
MASS= 0.9000E+01, 0.1600E+02, 0.2320E+03, 0.2330E+03, 0.2330E+03
0.1150E+03,
POT X= 0.6000E+01, 0.3800E+01, 0.1000E+02, 0.1000E+02, 0.1000E+02
0.5000E+01,
FER= 0. , 0. , 0. , 0. , 0.3140E-10
0. , 0. , 0. , 0. , 0.
SHNA= 0.4123E-01, 0.4168E-01, 0.2019E-03, 0. , 0.
0. , 0. , 0. , 0. , 0.
SHNB= 0.4123E-01, 0.4168E-01, 0.8000E-04, 0. , 0.
0. , 0. , 0. , 0. , 0.

```

SHNC= 0.4123E-01, 0.4168E-01, 0.1000E-04, 0. , 0.
0.

APPENDIX 9

COPY RUNS

INPUT DATA

page 1

Input master binary tape is tape from runs in Appendices 3 - 6
2 COPY runs are shown.

The first copies BE9 and U233 from the 6 nuclides on the master input tape. A PAUSE allows a LIST run to be done on the copied tape. A further PAUSE makes the original binary tape the input again. The second COPY run copies all six nuclides. A PAUSE sets up the COPY tape for a LIST run.

PRINTED OUTPUT

pages 2 - 12

The LIST runs shown here are used (with appropriate PAUSES) to proof list the copied tapes.


```
COPY
BE9          U233
ENDJOB
PAUSE DIAL 1 TO 2 , 2 TO 1 HIT START.
LIST 1
FILE1
ALL
ENDJOB
PAUSE DIAL 1 TO 2 , 2 TO 1 . HIT START.
COPY 1
ALL
ENDJOB
PAUSE DIAL 1 TO 2 , 2 TO 1. HIT START.
LIST 1
FILE1
ALL
ENDJOB
```

COPY RUN

INPUT LIBRARY TAPE WAS

SAMI

SUGGESTED. SAMPLE LIBRARY MARCH '65J.P.*****

OUTPUT COPY TAPE HAS NAME

SAMI

SUGGESTED. SAMPLE LIBRARY MARCH '65J.P.*****

THE FOLLOWING NUCLIDES ARE ON THE COPY TAPE

BE9 U233

END OF COPY RUN

PAUSE OPTION
DIAL 1 TO 2 , 2 TO 1 WITH START.

LIST RUN

=GYMEA X-S
SAMI
SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****

PARAMETERS READ WERE

NG 4
NN 2
TEMP 900.00
1ST RES GP 2
LAST RES GP 3

NAME	FUEL	DECAY	CAP1	CAP2	DECAY CONST	YIELD1	YIELD2	YIELD3	YIELD4
1 BE9	0	NDO	NDO	LI6	0.	0.	0.	0.	0.
2 U233	1	NDO	U234	NDO	0.	0.	0.	0.	0.

THIS TABLE IS TO CHECK SPECIFIED NUCLIDES WHICH DONT OCCUR IN THE LIBRARY OR ARENT NDO

NUCLIDE NO.	DECAY	CAP1	CAP2	BYTE INDICATOR FOR A FORMAT
1	LI6
2	U234		

NUCLIDE NO. GROUP	1 SIG(CAP1)	BE9 SIG(F)	MASS=	9.0 SIG(A)	RESONANCE INDICATOR= -1 SIG(S)	SIG(STR)	SIG(CAP2)
1	0.	0.	-1.50000E-02	4.49000E+00	3.29000E+00	1.20000E-02	0.
2	0.	0.	0.	6.00000E+00	5.55000E+00	0.	0.
3	1.00000E-03	0.	1.00000E-03	6.00000E+00	5.55000E+00	0.	0.
4	4.00000E-03	0.	4.00000E-03	6.00000E+00	5.55000E+00	0.	0.

NUCLIDE NO. 2 U233 MASS= 233.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U233

1 2 3 4
0 20 3 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(TR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	3.00000E-01	2.70000E+00	3.00000E+00	3.00000E+00	8.40000E+00	0.	
2	9.99999E-03	2.00000E-02	1.00000E+01	3.00000E-02	1.00000E+01	0.	
1	2.54800E+01	9.94999E-04	4.50000E-02	2.90000E-01	7.25000E-01	5.83000E-01	
2	2.39000E+01	1.64000E-03	4.50000E-02	9.00000E-01	2.25000E+00	4.16000E-01	
3	2.25000E+01	2.77000E-01	4.50000E-02	3.90000E-01	9.75001E-01	5.83000E-01	
4	2.20000E+01	1.01000E-04	4.50000E-02	2.05000E-01	5.12500E-01	5.83000E-01	
5	2.07600E+01	1.04000E-04	4.50000E-02	4.70000E-01	1.17500E+00	5.83000E-01	
6	1.90900E+01	1.67000E-04	4.50000E-02	2.40000E-01	6.00000E-01	5.83000E-01	
7	1.86000E+01	1.63000E-01	4.50000E-02	1.15000E-01	2.87500E-01	5.83000E-01	
8	1.81000E+01	2.77000E-04	4.50000E-02	1.50000E-01	3.75000E-01	5.83000E-01	
9	1.66700E+01	4.41000E-04	4.50000E-02	1.40000E-01	3.50000E-01	5.83000E-01	
10	1.63200E+01	8.69000E-04	4.50000E-02	4.50000E-01	1.12500E+00	5.83000E-01	
11	1.54600E+01	8.92999E-01	4.50000E-02	1.90000E-01	4.75000E-01	5.83000E-01	
12	1.38900E+01	3.99000E-04	4.50000E-02	3.00000E-01	7.50000E-01	5.83000E-01	
13	1.28800E+01	1.23000E-03	4.50000E-02	2.50000E-01	6.25000E-01	5.83000E-01	
14	1.14800E+01	1.02000E-04	4.50000E-02	1.75000E-01	4.37500E-01	5.83000E-01	
15	1.03300E+01	1.54000E-03	7.00000E-02	2.70000E-01	6.75000E-01	5.00000E-01	
16	9.05000E+00	7.39999E-05	5.60000E-02	2.80000E-01	7.00000E-01	5.00000E-01	
17	6.77000E+00	5.30000E-04	5.00000E-02	1.60000E-01	4.00000E-01	5.00000E-01	
18	5.75000E+00	1.20000E-04	5.00000E-02	3.20000E-01	8.00000E-01	5.00000E-01	
19	4.80000E+00	3.59000E-04	6.00000E-02	7.40000E-01	1.85000E+00	5.00000E-01	
20	3.64000E+00	1.60000E-04	4.80000E-02	2.12000E-01	5.30000E-01	5.00000E-01	
3	9.99999E-04	2.00000E-03	1.00000E+01	3.00000E-03	1.00000E+01	0.	
1	2.30000E+00	1.76000E-04	4.70000E-02	4.90000E-02	1.22500E-01	5.00000E-01	
2	1.76000E+00	3.11000E-04	4.90000E-02	2.31000E-01	5.77500E-01	5.00000E-01	
3	1.45000E+00	1.83000E-04	5.40000E-02	7.16000E-01	1.79000E+00	5.00000E-01	
4	1.90000E+01	2.54000E+02	2.73000E+02	2.85000E+02	2.83000E+02	0.	

END OF LIST RUN

PAUSE OPTION
DIAL 1 TO 2 , 2 TO 1 . HIT START .

COPY RUN

INPUT LIBRARY TAPE WAS

SAMI

SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****

OUTPUT COPY TAPE HAS NAME

SAMI

SUGGESTED SAMPLE LIBRARY MARCH '65J.P.*****

THE FOLLOWING NUCLIDES ARE ON THE COPY TAPE

BE9 016 TH232 PA233 U233 'FP'

COPY TAPE IS AN EXACT COPY OF INPUT MASTER TAPE

END OF COPY RUN

PAUSE OPTION
DIAL 1 TO 2; 2 TO 1. HIT START.

LIST RUN

TABLE SHOWING GROUP AND NUCLIDE INFORMATION

NO	LETHARGIES (NG+1)	NORMLZD.FISS (NG)	VELOCITIES (NG)	IND (NN)	MASSES (NN)	POTL SCAT (NN)	FISS.EN.REL. (NN)	SHIELD.NS1 (NN)	SHIELD.NS2 (NN)	SHIELD.NS3 (NN)	NO
0	0.										
1	6.900000E+00	9.995700E-01	4.270000E+00-1	9.000000E+00	9.000000E+00	6.000000E+00	0.	4.123000E-02	4.123000E-02	4.123000E-02	1
2	1.520000E+01	4.300000E-04	1.000000E-01-1	1.600000E+01	1.600000E+01	3.800000E+00	0.	4.168000E-02	4.168000E-02	4.168000E-02	2
3	1.740000E+01	0.	1.230000E-02	2.320000E+02	2.320000E+02	1.000000E+01	0.	2.019000E-04	8.000000E-05	1.000000E-05	3
4	2.300000E+01	0.	4.370000E-03	2.330000E+02	2.330000E+02	1.000000E+01	0.	0.	0.	0.	4
5				2	2.330000E+02	1.000000E+01	3.140000E-11	0.	0.	0.	5
6				0	1.150000E+02	5.000000E+00	0.	0.	0.	0.	6

NUCLIDE NO. GROUP	1	BE9	MASS=	9.0	RESONANCE INDICATOR=	-1	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)
1	0.	0.	-1.500000E-02	4.490000E+00	3.290000E+00	1.200000E-02						
2	0.	0.	0.	6.000000E+00	5.550000E+00	0.						
3	1.000000E-03	0.	1.000000E-03	6.000000E+00	5.550000E+00	0.						
4	4.000000E-03	0.	4.000000E-03	6.000000E+00	5.550000E+00	0.						

NUCLIDE NO. GROUP	2 SIG(CAP1)	016 SIG(F)	MASS= 16.0 SIG(A)	RESONANCE INDICATOR= -1 SIG(S)	SIG(TR)	SIG(CAP2)
1	2.962000E-03	0.	2.962000E-03	3.500000E+00	2.600000E+00	0.
2	0.	0.	0.	3.800000E+00	3.600000E+00	0.
3	0.	0.	0.	3.800000E+00	3.600000E+00	0.
4	1.827000E-03	0.	1.827000E-03	3.800000E+00	3.600000E+00	0.

NUCLIDE NO.	3	TH232	MASS= 232.0	RESONANCE INDICATOR= 1				
GROUP	SIG(GAM) A(1)	SIG(F) A(2)	SIG(A) A(4)	NU-SIG(F) B(1)	SIG(TR)* B(2)	SIG(CAP2) B(4)		
1	4.000000E-01	0.	4.000000E-01	0.	8.000000E+00	0.		
2	6.000000E+00	0.	1.000000E+01	0.	1.300000E+01	0.		
3	1.000000E+00	0.	0.	6.000000E+02	0.	0.		
4	1.000000E+00	0.	1.000000E+01	0.	1.300000E+01	0.		
	3.700000E+00	0.	0.	-1.000000E+02	0.	0.		
			3.700000E+00	0.	1.300000E+01	0.		

NUCLIDE NO.	4	P4233	MASS=	233.0	RESONANCE INDICATOR=	0	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
1				1.200000E+00	0.		1.200000E+00	0.		0.	7.000000E+00	0.
2				5.500000E+00	0.		5.500000E+00	0.		0.	5.400000E+01	0.
3				1.170000E+02	0.		1.170000E+02	0.		0.	8.100000E+01	0.
4				3.094000E+01	0.		3.094000E+01	0.		0.	3.500000E+01	0.

NUCLIDE NO. 5 U233 MASS= 233.0 RESONANCE INDICATOR= 2
M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U233

1 2 3 4
0 20 3 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(TR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	3.000000E-01	2.700000E+00	3.000000E+00	3.000000E+00	8.400000E+00	0.	
2	9.999999E-03	2.000000E-02	1.000000E+01	3.000000E-02	1.000000E+01	0.	
1	2.548000E+01	9.949999E-04	4.500000E-02	2.900000E-01	7.250009E-01	5.830000E-01	
2	3.900000E+01	1.640000E-03	4.500000E-02	9.000000E-01	2.250003E+00	4.160000E-01	
3	2.250000E+01	2.770000E-04	4.500000E-02	3.900000E-01	9.750011E-01	5.830000E-01	
4	2.200000E+01	1.010000E-04	4.500000E-02	2.050000E-01	5.125005E-01	5.830000E-01	
5	2.076000E+01	1.040000E-01	4.500000E-02	4.700000E-01	1.175001E+00	5.830000E-01	
6	1.909000E+01	1.670000E-04	4.500000E-02	2.460000E-01	6.000005E-01	5.830000E-01	
7	1.860000E+01	1.630000E-04	4.500000E-02	1.150000E-01	2.875003E-01	5.830000E-01	
8	1.810000E+01	2.770000E-04	4.500000E-02	1.500000E-01	3.750003E-01	5.830000E-01	
9	1.667000E+01	4.410000E-04	4.500000E-02	1.400000E-01	3.500003E-01	5.830000E-01	
10	1.632000E+01	8.690000E-04	4.500000E-02	4.500000E-01	1.125001E+00	5.830000E-01	
11	1.546000E+01	8.929999E-04	4.500000E-02	1.900000E-01	4.750003E-01	5.830000E-01	
12	1.389000E+01	3.990000E-04	4.500000E-02	3.000000E-01	7.500005E-01	5.830000E-01	
13	1.288000E+01	1.230000E-03	4.500000E-02	2.500000E-01	6.250004E-01	5.830000E-01	
14	1.148000E+01	1.020000E-04	4.500000E-02	1.750000E-01	4.375002E-01	5.830000E-01	
15	1.033000E+01	1.540000E-03	7.000000E-02	2.700000E-01	6.750003E-01	5.000000E-01	
16	9.050000E+00	7.399999E-05	5.600000E-02	2.800000E-01	7.000003E-01	5.000000E-01	
17	6.770000E+00	5.300000E-04	5.000000E-02	1.600000E-01	4.000001E-01	5.000000E-01	
18	5.750000E+00	1.200000E-04	5.000000E-02	3.200000E-01	8.000002E-01	5.000000E-01	
19	4.800000E+00	3.590000E-04	6.000000E-02	7.400000E-01	1.850000E+00	5.000000E-01	
20	3.640000E+00	1.600000E-04	4.800000E-02	2.120000E-01	5.300001E-01	5.000000E-01	
3	9.999999E-04	2.000000E-03	1.000000E+01	3.000000E-03	1.000000E+01	0.	
1	2.300000E+00	1.760000E-04	4.700000E-02	4.900000E-02	1.225000E-01	5.000000E-01	
2	1.760000E+00	3.110000E-04	4.900000E-02	2.310000E-01	5.775000E-01	5.000000E-01	
3	1.450000E+00	1.830000E-04	5.400000E-02	7.160000E-01	1.790000E+00	5.000000E-01	
4	1.900000E+01	2.540000E+02	2.730000E+02	2.850000E+02	2.830000E+02	0.	

NUCLIDE NO. GROUP	6 SIG(CAP1)	'FP' SIG(F)	MASS= 115.0 SIG(A)	RESONANCE INDICATOR= 0 NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	0.	0.	0.	0.	5.000000E+00	0.
2	0.	0.	0.	0.	5.000000E+00	0.
3	0.	0.	3.800000E+00	0.	5.000000E+00	0.
4	0.	0.	6.400000E+00	0.	5.000000E+00	0.

END OF LIST RUN

**APPENDIX 10
UPDATE RUN**

(The input for this **UPDATE** run is described fully as **APPENDIX 11**)

INPUT DATA

pages 1 - 3

There is a **PAUSE** to dial tape unit 1 to 2 and 2 to 1 at the end of the **UPDATE** run. A **LIST** run follows the **PAUSE** and the user should see the listing which comes from that **LIST** run to see how the requested updating has been carried out.

PRINTED OUTPUT

pages 4 - 27

UPDATE
 FILE1 CHANGES
 NAME SAM3 THIS IS A TEST OF THE UPDATE RUN.SHOULD BE 1 ASTERISK***
 TEMPERATURE 899.937
 BURNUP
 TH232,0,PB231,PA233,PA234,3*1.,2*0.
 U233,1,N00,U234,O16,4*2.,0.
 *PROVIDE COMPLETE INFORMATION FOR GROUPS. INDIVIDUAL NUCLIDE INFO. FOR NUCLIDES.
 GROUP

FISSION 1.5 2.6
 4.8
 6.1
 VELOCITY 2.3
 1.6 1.7
 1.8

*CHANGES TO MASS DATA ARE REFLECTED ALSO IN THE LABEL REC.OF THAT NUCLIDE'S FILE
 MASS TH232 231.0 , 'FP' , 173.2
 POTLX U233 17.5 , U234 18.7, BE9 12.5
 FER 'FP' 12.7 , O16,13.7
 SHNA B09 1.75, U233 11.75, U232 4.68
 SHNB U233 4.56
 SHNC 'FP' 17.63
 FILE CHANGES
 DELETE PA233
 REPLACE BE9 O16
 AFTER TH232 INSERT U232 PB232
 AFTER U233 INSERT U235 U236
 *BURNUP TABLE FOR ABOVE NUCLIDES.

*
 *BURNUP
 BE9, -2,FP,O16 , U236,26,27,27,28,29,30
 O16, -1,5E17,BE9, G19, 21, 22,23,24,25
 U232, 1,N00,B18, D19, 1, 2, 3, 4, 5
 PB232, 0,U235,A20,N00, 6, 7, 8, 9, 10
 U235, 1,U237,U233,N00, 11,12,13,14,15
 U236, 1,N00,TH232,PA233,16,17,18,19,20
 *

GROUP
 *
 *GROUP AND NUCLIDE INFORMATION CARDS FOR NUCLIDES IN THE ABOVE BURNUP TABLE

IND 1,1,1,0,0,0,2
 MASS 9EI, 16, 232.0, 232.0 235.0,236.0
 POTLX 7,8,9,10,11,12
 FER 13,14,15,16,17,18
 SHNA 19,20,21,22,23,24
 SHNB 25,26,27,28,29,30
 SHNC 31,32,33,34,35,36
 NUCLIDES
 REACTIONWISE
 STANDARD CMATRIX = 8*0.,2.5,0.126, 2*0.

*
 BE9, 9.0, -1
 *
 12,13,14,15
 13,14,15,16
 14,15,16,17
 15,16,17,18
 16,17,18,19


```

* PATCHES
  TH232
  SHIELD GP 3 SPOT 5 13.333
  SHIELD GP 2 ROW 2 3 4
  5 6.5
  7.6
  ROW 4 2 3.5 4 5 6 7
*
U233
  ROW 2 .15E-1 .25E-1 .15E+2 .35E-1 .15E2 .5
  COL 5 .85 .11E2 .16E2 .2835E3
  SPOT 3 3 .17E2
  RESON GP 2 SPOT 13 5 626.0
  RESON GP 2 ROW 10 0.1633E2 1.2.3.4.5
  RESON GP 3 COL 4 31.32.33.
  VFP
  COL 5 1.1 2.3 3.4
  4.4
  ENDJOB
  PAUSE DIAL 1 TO 2 , 2 TO 1 HIT START.
  LIST 1
  FILE1
  ALL
  ENDJOB

```

UPDATE RUN

POTLX U234
THIS NUCLIDE NOT KNOWN.VALUE IGNORED

SHNA B09
THIS NUCLIDE NOT KNOWN.VALUE IGNORED

SHNA U232
THIS NUCLIDE NOT KNOWN.VALUE IGNORED

NUCLIDE CONTROL INFORMATION SUPPLIED WAS

NUCLIDES
REACTION WISE
STANDARD
C MATRIX

	1	2	3	4	5	6
0.	0.	0.	0.	0.	2.50000E+00	0.
0.	0.	0.	0.	0.	1.26000E-01	0.

TYPICAL 'NON FATAL' ERRORS



BE9 MASS= 9.0 RESONANCE INDICATOR= -1

NUCLIDE NO.	1								
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)			
1	1.200000E+01	1.300000E+01	1.400000E+01	1.500000E+01	1.600000E+01	1.700000E+01			
2	1.300000E+01	1.400000E+01	1.500000E+01	1.600000E+01	1.700000E+01	1.800000E+01			
3	1.400000E+01	1.500000E+01	1.600000E+01	1.700000E+01	1.800000E+01	1.900000E+01			
4	1.500000E+01	1.600000E+01	1.700000E+01	1.800000E+01	1.900000E+01	2.000000E+01			

NUCLIDE NO.	2	016	MASS=	16.0	RESONANCE INDICATOR=	-1						
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)						
1	2.100000E+01	2.200000E+01	2.300000E+01	2.400000E+01	2.500000E+01	2.600000E+01						
2	2.200000E+01	2.300000E+01	2.400000E+01	2.500000E+01	2.600000E+01	2.700000E+01						
3	2.300000E+01	2.400000E+01	2.500000E+01	2.600000E+01	2.700000E+01	2.800000E+01						
4	2.400000E+01	2.500000E+01	2.600000E+01	2.700000E+01	2.800000E+01	2.900000E+01						

NUCLIDE NO.	3	U232	MASS= 232.0	RESONANCE INDICATOR= 0						
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)				
1	2.000000E-01	2.700000E+00	3.100000E+00	3.000000E+00	8.400000E+00	0.				
2	1.000000E-02	2.000000E-02	1.000000E+01	3.000000E-02	1.000000E+01	0.				
3	1.000000E-03	2.000000E-03	1.000000E+01	3.000000E-03	1.000000E+01	0.				
4	1.900000E+01	2.540000E+02	2.730000E+02	3.500000E+01	2.830000E+02	0.				

NUCLIDE NO.	5	U235	MASS= 235.0	RESONANCE INDICATOR= 0						
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)				
1	1.000000E+00	5.000000E+00	9.000000E+00	1.300000E+01	1.700000E+01	2.100000E+01				
2	2.000000E+00	6.000000E+00	1.000000E+01	1.400000E+01	1.800000E+01	2.200000E+01				
3	3.000000E+00	7.000000E+00	1.100000E+01	1.500000E+01	1.900000E+01	2.300000E+01				
4	4.000000E+00	8.000000E+00	1.200000E+01	1.600000E+01	2.000000E+01	2.400000E+01				

NUCLIDE NO. 6 U236 MASS= 236.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U236

1 2 3 4
0 4 2 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(IR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	5.100000E+01	5.200000E+01	5.600000E+01	6.000000E+01	6.400000E+01	6.500000E+01	
2	5.200000E+01	5.300000E+01	5.700000E+01	6.100000E+01	6.500000E+01	6.600000E+01	
1	2.548000E+01	9.949999E-04	4.500000E-02	2.900000E-01	0.	5.830000E-01	
2	2.076000E+01	1.040000E-04	4.510000E-02	4.700000E-01	0.	5.840000E-01	
3	5.750000E+00	1.200000E-04	5.000000E-02	3.200000E-01	0.	5.040000E-01	
4	3.640000E+00	1.600000E-04	4.800000E-02	2.120000E-01	0.	5.030000E-01	
3	5.300000E+01	5.400000E+01	5.800000E+01	6.200000E+01	6.600000E+01	6.700000E+01	
1	2.300000E+00	1.760000E-04	4.700000E-02	4.900000E-02	0.	5.020000E-01	
2	1.450000E+00	1.830000E-04	5.400000E-02	7.160000E-01	0.	5.010000E-01	
4	5.400000E+01	5.500000E+01	5.900000E+01	6.300000E+01	6.700000E+01	6.800000E+01	

LISTING OF PATCH CARDS

TH232

SHIELD GP 3 SPOT 5 13.333

SHIELD GP 2 ROW 2 3 4

5 6.5

7.6

ROW 4 2 3.5 4 5 6 7

U233

ROW 2 .15E-1 .25E-1 .15E+2 .35E-1 .15E2 .5

COL 5 .85 .11E2 .16E2 .2835E3

SPOT 3 3 .17E2

RESON GP 2 SPOT 13 5 626.0

RESON GP 2 ROW 10 0.1633E2 1,2,3,4,5

RESON GP 3 COL 4 31.,32.,33.

FP

COL 5 1.1 2.3 3.4

4.4

FILE CHANGES WERE AS FOLLOWS

DELETIONS	REPLACEMENTS	ADDITIONS
PA233	8E9	U232
	016	P8232
		U235
		U236

END OF SUCCESSFUL UPDATE RUN. ALL OUTPUT SHOULD BE CHECKED CAREFULLY
NEW FILE 1 IS SHOWN BELOW AND SHOULD BE USED TO SET UP A LIST RUN TO CHECK CHANGES.

=GYMEA X--S
SAM3

THIS IS A TEST OF THE UPDATE RUN-SHOULD BE 1 ASTERISK*

PARAMETERS READ WERE

NG 4
NN 9
TEMP 899.94
1ST RES GP 2
LAST RES GP 3

NAME	FUEL	DECAY	CAP1	CAP2	DECAY CONST	YIELD1	YIELD2	YIELD3	YIELD4
1 BE9	0	N00	N00	L16	0.	0.	0.	0.	0.
2 O16	0	N00	N00	N00	0.	0.	0.	0.	0.
3 TH232	0	PB231	PA233	PA234	1.00000E+00	1.00000E+00	1.00000E+00	4.00000E+00	5.00000E+00
4 U232	1	N00	B18	D19	1.00000E+00	2.00000E+00	3.00000E+00	9.00000E+00	1.00000E+01
5 PB232	0	U235	A20	N00	6.00000E+00	7.00000E+00	8.00000E+00	9.00000E+00	1.00000E+01
6 U233	1	N00	U234	O16	2.00000E+00	2.00000E+00	2.00000E+00	2.00000E+00	0.
7 U235	1	U237	U233	N00	1.10000E+01	1.20000E+01	1.30000E+01	1.40000E+01	1.50000E+01
8 U236	1	N00	TH232	PA233	1.60000E+01	1.70000E+01	1.80000E+01	1.90000E+01	2.00000E+01
9 YFP	0	N00	YSO	N00	0.	2.00000E+00	0.	0.	0.

THIS TABLE IS TO CHECK SPECIFIED NUCLIDES WHICH DONT OCCUR IN THE LIBRARY OR ARENT N00

NUCLIDE NO.	DECAY	CAP1	CAP2	BYTE INDICATOR FOR A FORMAT
1	.....	.....	.....	.....
3	PB231	PA233	PA234	L16
4		B18	D19	
5		A20		
6		U234		
7	U237			
8			PA233	
9		YSO		

TABLE SHOWING GROUP AND NUCLIDE INFORMATION

NO	LETHARGIES (NG+1)	NORMLZD.FISS (NG)	VELOCITIES IND (NG)	MASSES (NN)	POTL SCAT (NN)	FISS.EN.REL. (NN)	SHIELD.NS1 (NN)	SHIELD.NS2 (NN)	SHIELD.NS3 (NN)	NO
0	0.									
1	6.900000E+00	1.000000E-01	2.300000E+00-1	9.000000E+00	1.250000E+01	0.	4.123000E-02	4.123000E-02	4.123000E-02	1
2	1.520000E+01	1.733333E-01	1.600000E+00-1	1.600000E+01	3.800000E+00	1.370000E+01	4.168000E-02	4.168000E-02	4.168000E-02	2
3	1.740000E+01	3.200000E-01	1.700000E+00	2.310000E+02	1.000000E+01	0.	2.019000E-04	8.000000E-05	1.000000E-05	3
4	2.300000E+01	4.066667E-01	1.800000E+00	2.320000E+02	9.000000E+00	1.500000E+01	2.100000E+01	2.700000E+01	3.300000E+01	4
5			0	2.320000E+02	1.000000E+01	1.600000E+01	2.200000E+01	2.800000E+01	3.600000E+01	5
6			2	2.330000E+02	1.750000E+01	3.140000E-11	1.175000E+01	4.560000E+00	0.	6
7			0	2.350000E+02	1.100000E+01	1.700000E+01	2.300000E+01	2.900000E+01	3.500000E+01	7
8			2	2.360000E+02	1.200000E+01	1.800000E+01	2.400000E+01	3.000000E+01	3.500000E+01	8
9			0	1.732000E+02	5.000000E+00	1.270000E+01	0.	0.	1.763000E+01	9

END OF LIST RUN

PAUSE OPTION
DIAL 1 TO 2 , 2 TO 1 HIT START.

LIST RUN

=GYMEA X-S
SAMS

THIS IS A TEST OF THE UPDATE RUN.SHOULD BE 1 ASTERISK*

PARAMETERS READ WERE

NG 4
NN 9
TEMP 899.94
1ST RES GP 2
LAST RES GP 3

NAME	FUEL	DECAY	CAP1	CAP2	DECAY CONST	YIELD1	YIELD2	YIELD3	YIELD4
1 BE9	0	N00	N00	L16	0.	0.	0.	0.	0.
2 O16	0	N00	N00	N00	0.	0.	0.	0.	0.
3 TH232	0	PB231	PA233	PA234	1.00000E+00	1.00000E+00	4.00000E+00	5.00000E+00	0.
4 U232	1	N00	B18	D19	1.00000E+00	2.00000E+00	9.00000E+00	1.00000E+01	0.
5 PB232	0	U235	A20	N00	6.00000E+00	7.00000E+00	2.00000E+00	0.	0.
6 U233	1	N00	U234	D16	2.00000E+00	2.00000E+00	1.40000E+01	1.50000E+01	0.
7 U235	1	U237	U233	N00	1.10000E+01	1.20000E+01	1.30000E+01	1.40000E+01	0.
8 U236	1	N00	TH232	PA233	1.60000E+01	1.70000E+01	1.80000E+01	1.90000E+01	0.
9 *FP:	0	N00	Y50	N00	0.	2.00000E+00	0.	0.	0.

THIS TABLE IS TO CHECK SPECIFIED NUCLIDES WHICH DONT OCCUR IN THE LIBRARY OR ARENT N00

NUCLIDE NO.	DECAY	CAP1	CAP2	BYTE INDICATOR FOR A FORMAT
1	.....	.....	.....	.....
3	PB231	PA233	PA234	LI6
4		B18	D19	
5		A20		
6		U234		
7	U237			
8			PA233	
9		Y50		

TABLE SHOWING GROUP AND NUCLIDE INFORMATION

NO	LETHARGIES (NG+1)	NORMLZD.FISS (NG)	VELOCITIES IND (NN)	MASSES (NN)	POTL SCAT (NN)	FISS.EN.REL. (NN)	SHIELD.NS1 (NN)	SHIELD.NS2 (NN)	SHIELD.NS3 (NN)	NO
0	0.									
1	6.900000E+00	1.000000E-01	2.300000E+00-1	9.000000E+00	1.250000E+01	0.	4.123000E-02	4.123000E-02	4.123000E-02	1
2	1.520000E+01	1.733333E-01	1.600000E+00-1	1.600000E+01	3.800000E+00	1.370000E+01	4.168000E-02	4.168000E-02	4.168000E-02	2
3	1.740000E+01	3.200000E-01	1.700000E+00	2.310000E+02	1.000000E+01	0.	2.019000E-04	8.000000E-05	1.000000E-05	3
4	2.300000E+01	4.066667E-01	1.800000E+00	2.320000E+02	9.000000E+02	1.500000E+01	2.100000E+01	2.700000E+01	3.300000E+01	4
5			0	2.320000E+02	1.000000E+01	1.600000E+01	2.200000E+01	2.800000E+01	3.400000E+01	5
6			2	2.330000E+02	1.750000E+01	3.140000E-11	1.175000E+01	4.560000E+00	0.	6
7			0	2.350000E+02	1.100000E+01	1.700000E+01	2.300000E+01	2.900000E+01	3.500000E+01	7
8			2	2.360000E+02	1.200000E+01	1.800000E+01	2.400000E+01	3.000000E+01	3.600000E+01	8
9			0	1.732000E+02	5.000000E+00	1.270000E+01	0.	0.	1.763000E+01	9

NUCLIDE NO.	1	BE9	MASS=	9.0	RESONANCE INDICATOR=	-1	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(TR)	SIG(CAP2)
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	SIG(S)	SIG(S)	SIG(TR)	SIG(CAP2)					
1	1.200000E+01	1.300000E+01	1.400000E+01	1.500000E+01	1.600000E+01	1.700000E+01	1.800000E+01					
2	1.300000E+01	1.400000E+01	1.500000E+01	1.600000E+01	1.700000E+01	1.800000E+01	1.900000E+01					
3	1.400000E+01	1.500000E+01	1.600000E+01	1.700000E+01	1.800000E+01	1.900000E+01	2.000000E+01					
4	1.500000E+01	1.600000E+01	1.700000E+01	1.800000E+01	1.900000E+01	2.000000E+01						

NUCLIDE NO. GROUP	2 SIG(CAP1)	016 SIG(F)	MASS= SIG(A)	16.0 SIG(A)	RESONANCE INDICATOR= -1 SIG(S)	SIG(TR)	SIG(CAP2)
1	2.100000E+01	2.200000E+01	2.300000E+01	2.400000E+01	2.500000E+01	2.600000E+01	2.700000E+01
2	2.200000E+01	2.300000E+01	2.400000E+01	2.500000E+01	2.600000E+01	2.700000E+01	2.800000E+01
3	2.300000E+01	2.400000E+01	2.500000E+01	2.600000E+01	2.700000E+01	2.800000E+01	2.900000E+01
4	2.400000E+01	2.500000E+01	2.600000E+01	2.700000E+01	2.800000E+01	2.900000E+01	

NUCLIDE NO.	3	TH232	MASS= 231.0	RESONANCE INDICATOR= 1		
GROUP	SIG(GAM) A(1)	SIG(F) A(2)	SIG(A) A(4)	NU-SIG(F) B(1)	SIG(TR)* B(2)	SIG(CAP2) B(4)
1	4.000000E-01	0.	4.000000E-01	0.	8.000000E+00	0.
2	6.000000E+00	0.	1.000000E+01	0.	1.300000E+01	0.
3	2.000000E+00	3.000000E+00	4.000000E+00	5.000000E+00	6.500000E+00	7.600000E+00
	1.000000E+00	0.	1.000000E+01	0.	1.300000E+01	0.
	1.000000E+01	0.	0.	-1.000000E+02	1.333300E+01	0.
4	2.000000E+00	3.500000E+00	4.000000E+00	5.000000E+00	6.000000E+00	7.000000E+00

NUCLIDE NO.	4	U232	MASS=	232.0	RESONANCE INDICATOR=	0	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
GROUP	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)						
1	2.000000E-01	2.700000E+00	3.100000E+00	3.000000E+00	8.400000E+00	0.						
2	1.000000E-02	2.000000E-02	1.000000E+01	3.000000E-02	1.000000E+01	0.						
3	1.000000E-03	2.000000E-03	1.000000E+01	3.000000E-03	1.000000E+01	0.						
4	1.900000E+01	2.540000E+02	2.730000E+02	8.500000E+01	2.830000E+02	0.						

NUCLIDE NO.	5	PB232	MASS=	232.0	RESONANCE INDICATOR=	0	SIG(CAP1)	SIG(F)	SIG(A)	NU-SIG(F)	SIG(TR)	SIG(CAP2)
GROUP												
1							3.400000E+01	3.500000E+01	3.600000E+01	3.700000E+01	3.800000E+01	3.900000E+01
2							3.500000E+01	3.600000E+01	3.700000E+01	3.800000E+01	3.900000E+01	4.000000E+01
3							3.600000E+01	3.700000E+01	3.800000E+01	3.900000E+01	4.000000E+01	4.100000E+01
4							3.700000E+01	3.800000E+01	3.900000E+01	4.000000E+01	4.100000E+01	4.200000E+01

NUCLIDE NO. 6 U233 MASS= 233.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U233

1 2 3 4
0 20 3 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(TR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	3.000000E-01	2.700000E+00	3.000000E+00	3.000000E+00	8.500000E-01	0.	
2	1.500000E-02	2.500000E-02	1.500000E+01	3.500000E-02	1.100000E+01	5.000000E-01	
1	2.548000E+01	9.949999E-04	4.500000E-02	2.900000E-01	7.250009E-01	5.830000E-01	
2	2.390000E+01	1.640000E-03	4.500000E-02	9.000000E-01	2.250003E+00	4.160000E-01	
3	2.250000E+01	2.770000E-04	4.500000E-02	3.900000E-01	9.750011E-01	5.830000E-01	
4	2.200000E+01	1.010000E-04	4.500000E-02	2.050000E-01	5.125005E-01	5.830000E-01	
5	2.076000E+01	1.040000E-04	4.500000E-02	4.700000E-01	1.175001E+00	5.830000E-01	
6	1.909000E+01	1.670000E-04	4.500000E-02	2.400000E-01	6.000005E-01	5.830000E-01	
7	1.860000E+01	1.630000E-04	4.500000E-02	1.150000E-01	2.875003E-01	5.830000E-01	
8	1.810000E+01	2.770000E-04	4.500000E-02	1.500000E-01	3.750003E-01	5.830000E-01	
9	1.667000E+01	4.410000E-04	4.500000E-02	1.400000E-01	3.500003E-01	5.830000E-01	
10	1.633000E+01	1.000000E+00	2.000000E+00	3.000000E+00	4.000000E+00	5.000000E+00	
11	1.546000E+01	8.929999E-04	4.500000E-02	1.900000E-01	4.750003E-01	5.830000E-01	
12	1.389000E+01	3.990000E-04	4.500000E-02	3.000000E-01	7.500005E-01	5.830000E-01	
13	1.288000E+01	1.230000E-03	4.500000E-02	2.500000E-01	6.260000E+02	5.830000E-01	
14	1.148000E+01	1.020000E-04	4.500000E-02	1.750000E-01	4.375002E-01	5.830000E-01	
15	1.033000E+01	1.540000E-03	7.000000E-02	2.700000E-01	6.750003E-01	5.000000E-01	
16	9.050000E+00	7.399999E-05	5.600000E-02	2.800000E-01	7.000003E-01	5.000000E-01	
17	6.770000E+00	5.300000E-04	5.000000E-02	1.600000E-01	4.000001E-01	5.000000E-01	
18	5.750000E+00	1.200000E-04	5.000000E-02	3.200000E-01	8.000002E-01	5.000000E-01	
19	4.800000E+00	3.590000E-04	6.000000E-02	7.400000E-01	1.850000E+00	5.000000E-01	
20	3.640000E+00	1.600000E-04	4.800000E-02	2.120000E-01	5.300001E-01	5.000000E-01	
3	9.999999E-04	2.000000E-03	1.700000E+01	3.000000E-03	1.600000E+01	0.	
1	2.300000E+00	1.760000E-04	4.700000E-02	3.100000E-01	1.225000E-01	5.000000E-01	
2	1.760000E+00	3.110000E-04	4.900000E-02	3.200000E+01	5.775000E-01	5.000000E-01	
3	1.450000E+00	1.830000E-04	5.400000E-02	3.300000E+01	1.790000E+00	5.000000E-01	
4	1.900000E+01	2.540000E+02	2.730000E+02	2.850000E+02	2.835000E+02	0.	

NUCLIDE NO. GROUP	7 SIG(CAP1)	U235 SIG(F)	MASS= 235.0 SIG(A)	RESONANCE INDICATOR= 0 NU-SIG(F)	SIG(TR)	SIG(CAP2)
1	1.000000E+00	5.000000E+00	9.000000E+00	1.300000E+01	1.700000E+01	2.100000E+01
2	2.000000E+00	6.000000E+00	1.000000E+01	1.400000E+01	1.800000E+01	2.200000E+01
3	3.000000E+00	7.000000E+00	1.100000E+01	1.500000E+01	1.900000E+01	2.300000E+01
4	4.000000E+00	8.000000E+00	1.200000E+01	1.600000E+01	2.000000E+01	2.400000E+01

NUCLIDE NO. 8 U236 MASS= 236.0 RESONANCE INDICATOR= 2

M (SEARCH) VECTOR FOR RESONANCE TRAILER RECORDS OF NUCLIDE U236

1 2 3 4
0 4 2 0

GROUP	SIG(GAM)* E(R)	SIG(F)* GAM(N)	SIG(A) GAM(GAM)	NU-SIG(F)* GAM(F)	SIG(TR)* NU-GAM(F)	SIG(CAP2) G	(TRAILER RECORDS)
1	5.100000E+01	5.200000E+01	5.600000E+01	6.000000E+01	6.400000E+01	6.500000E+01	
2	5.200000E+01	5.300000E+01	5.700000E+01	6.100000E+01	6.500000E+01	6.600000E+01	
1	2.548000E+01	9.949999E-04	4.500000E-02	2.900000E-01	0.	5.830000E-01	
2	2.076000E+01	1.040000E-04	4.510000E-02	4.700000E-01	0.	5.840000E-01	
3	5.750000E+00	1.200000E-04	5.000000E-02	3.200000E-01	0.	5.040000E-01	
4	3.640000E+00	1.600000E-04	4.800000E-02	2.120000E-01	0.	5.030000E-01	
3	5.300000E+01	5.400000E+01	5.800000E+01	6.200000E+01	6.600000E+01	6.700000E+01	
1	2.300000E+00	1.760000E-04	4.700000E-02	4.900000E-02	0.	5.020000E-01	
2	1.450000E+00	1.830000E-04	5.400000E-02	7.160000E-01	0.	5.010000E-01	
4	5.400000E+01	5.500000E+01	5.900000E+01	6.300000E+01	6.700000E+01	6.800000E+01	

NUCLIDE NO. GROUP	9 SIG(CAP1)	*FP* SIG(F)	MASS= 173.2 SIG(A)	RESONANCE INDICATOR= NU-SIG(F)	0 SIG(TR)	SIG(CAP2)
1	0.	0.	0.	0.	1.100000E+00	0.
2	0.	0.	0.	0.	2.300000E+00	0.
3	0.	0.	3.800000E+00	0.	3.400000E+00	0.
4	0.	0.	6.400000E+00	0.	4.400000E+00	0.

END OF LIST RUN

APPENDIX 11

DESCRIPTION OF DATA FOR THE UPDATE RUN IN APPENDIX 10

UPDATE
FILE1 CHANGES
*NECESSARY IF THERE ARE ANY FILE 1 CHANGES
NAME SAV3 THIS IS A TEST OF THE UPDATE RUN. SHOULD RE 1 ATERISK***
*OPTIONAL CARD DESIGNED TO GIVE THE NEW TAPE A SELECTED NAME AND TITL
TEMPERATURE 899.937
*CARD USED TO CHANGE THE TEMPERATURE
BURNUP
*NECESSARY IF ANY BURNUP CHANGES ARE TO BE MADE
TH232,U,PB231,PA233,PA234,3*1.2*0.
U233,1,NO,U234*016,4*2.,C.
*THE ABOVE ARE TYPICAL BURNUP DATA CARDS WITH ENTRIES SEPARATED BY BLANKS
*OR COMMAS
*PROVIDE COMPLETE INFORMATION FOR GROUPS. INDIVIDUAL NUCLIDE INFO. FOR NUCLIDES.
*COMMENTS CAN BE PROVIDED ANYWHERE
GROUP
*NECESSARY IF THERE ARE ANY CHANGES TO GROUJ OR NUCLIDE INFORMATION
*IN FILE 1
FISSION 1.5 2.6
4.8
VELOCITY 6.1 2.3 1.6 1.7
1.8
*CHANGES TO MASS DATA ARE REFLECTED ALSO IN THE LABEL REC.OF THAT NUCLIDE'S FILE
MASS TH232 231.0 , 'FP1 , 173.2
POTLX U233 17.5 , U234 18.7, BE9 12.5
FER 'FP1 12.7 , 016,13.7
SHNA B09 1.75, U233 11.75, U232 4.68
SHNB U233 4.56
SHNC 'FP1 17.63
*THESE DATA CARDS ARE TYPICAL GROUP AND NUCLIDE CHANGES.
*IF THERE ARE ANY CHANGES TO FISSIONS AND/OR VELOCITIES, THEN ALL OF
*THE FISSIONS AND/OR ALL OF THE VELOCITIES MUST BE PROVIDED. TRAILING
*CARDS MAY BE USED HERE. IF USED, TRAILING CARDS MUST BE BLANK IN COLUMNS
*1 TO 6
*DATA FOR CHANGES IN NUCLIDE INFORMATION IS GIVEN IN COLUMNS 7 TO 72
*OF THE APPROPRIATE CONTROL CARD, MASS,POTLX,...,SHNC ETC., BY NAMING
*THE NUCLIDE, AND GIVING THE NEW VALUE IN FREE FORM. IF MORE THAN ONE CARD
*OF A PARTICULAR TYPE IS NEEDED(SIMPLY PROVIDE ANOTHER ONE WITH THE TYPE
*PUNCHED IN COLUMNS 1 TO 6 E.G. MASS
* POTLX
* FER
* ETC.
FILE CHANGES
*NECESSARY IF THERE ARE ANY WHOLE FILE CHANGES
DELETE PA233
O16
REPLACE BE9
AFTER TH232 INSERT U232 PB232
AFTER U233 INSERT U235 U236
*THESE CONTROL CARDS SET THE WHOLE FILE CHANGES
*DELETE CARDS COME FIRST
*THE REFERENCE NUCLIDE TH232 IS PUNCHED IN COLUMNS 7 TO 12 STARTING IN 7
*THE NUCLIDE NAMES TO BE ADDED ARE IN COLUMNS 20 TO 72 SEPARATED BY COMMAS
*OR BLANKS. TRAILING CARDS CANNOT BE USED.
*BURNUP TABLE FOR ABOVE NUCLIDES.
*
BURNUP
*NECESSARY CONTROL CARD TO DISTINGUISH THE BEGINNING OF THE BURNUP
*DATA CARDS FOR WHOLE NUCLIDE CHANGES

```

BE9, -2,FP,O16, U236,26,27,27,28,29,30
O16, -1,E17,BE9, Q19, 21, 22,23,24,25
U232, 1,NOU,B18, D19, 1, 2, 3, 4, 5
PB232, 0,U235,A20,NOO, 6, 7, 8, 9, 10
U235, 1,U237,U233,NOO, 11,12,13,14,15
U236, 1,NOU,TH232,PA233,16,17,18,19,20
*THESE ARE 6 STANDARD BURNUP DATA CARDS FOR THE 6 NUCLIDES BEING
*REPLACED OR ADDED IN THE EXAMPLE. THESE MUST BE PROVIDED IN THE ORDER
*ABOVE. THERE IS A RESTRICTION THAT THE ORDER OF REPLACEMENTS AND OF
*THE REFERENCE NUCLIDES ON AFTER CARDS, MUST BE THE SAME ORDER AS THE
*NUCLIDES ON THE OLD MASTER TAPE. E.G. HERE THE OLD MASTER IS BE9
*
* O16
* TH232
* PA233
* U233
* IFP
*
*NOTE THAT BE9, O16, TH232 AND U233 ARE IN THE SAME ORDER.

```

```

* GROUP
*
*NECESSARY CONTROL CARD TO INDICATE THE BEGINNING OF THE GROUP AND
*
*GROUP AND NUCLIDE INFORMATION CARDS FOR NUCLIDES IN THE ABOVE BURNUP TABLE
*
-1,-1,0,0,0,2 232.0 235.0,236.0
IND .9E1,16, 232.0
MASS POTLX 7,8,9,10,11,12
FER 13,14,15,16,17,18
SHNA 19,20,21,22,23,24
SHNB 25,26,27,28,29,30
SHNC 31,32,33,34,35,36
*NUCLIDE INFORMATION FOR THE NUCLIDES BEING ADDED AND REPLACED
*THE WORDS IND, MASS ETC PUNCHED HERE, ARE NOT NECESSARY. THE INFORMATION
*MUST BE IN THE ORDER SHOWN BY THESE LABELS I.E. RESONANCE INDICATOR,MASS
*POTENTIAL SCATTERING ETC. AND MUST BE COMPLETE FOR INSERTION AND
*REPLACEMENTS. IT MUST BE PROVIDED IN THE SAME ORDER AS THE BURNUP DATA
*AND A NEW CARD MUST BE TAKEN FOR EACH CLASS IND V. MASS V. POTLX ETC.
*****
*THE FOLLOWING CARDS ARE IDENTICAL TO THE CARDS PROVIDED FOR A TYPICAL
*MASTER RUN. THE NUCLIDE DATA CAN BE IN ANY FORM.....
* REACTIONWISE V GROUPWISE
* STANDARD V NON STANDARD
* BUT IT MUST ALL BE OF THE ONE FORM.

```

```

NUCLIDES
REACTIONWISE
STANDARD CMATRIX = 8*0.,2.5,0.126, 2*0.
*
BE9, 9.0, -1
*
12,13,14,15
13,14,15,16
14,15,16,17
15,16,17,18
16,17,18,19
17,18,19,20
*
O16, 16.0, -1
*
21,22,23,24
22,23,24,25

```

23,24,25,26
24,25,26,27
25,26,27,28
26,27,28,29

*
* U232, 232.0, 0

*
* 0.2,1,-2,1,-3,19,
2,7,2,-2,2,-3,254,
3,1, 2*10, 273,
3,3,-2,3,-3,85,
8,4,2*10,283,
4*0.

*
*
* PB232, 23.2E1,0

*
* 34, 35,36,37
35,36,37,38
36,37,38,39
37,38,39,40
38,39,40,41
39,40,41,42

*
* U235, 235,0

*
* 1,2,3,4
5,6,7,8
9,10,11,12
13,14,15,16,
17,18,19,20
21,22,23,24

*
* U236, 236.0,2

*
* 51,52,53,54
52,53,54,55
56,57,58,59
60,61,62,63
64,65,66,67
65,66,67,68

12.88 2.548E1 9.95E-4 4.50E-2 2.90E-1 5.83E-1
13.09 2.076E1 1.04E-4 4.51E-2 4.70E-1 5.84E-1
14.37 5.750 1.20E-4 5.00E-2 2.20E-1 5.04E-1
14.83 3.640 1.60E-4 4.80E-2 2.12E-1 5.02E-1
15.29 2.300 1.76E-4 4.70E-2 4.90E-2 5.02E-1
15.74 1.450 1.83E-4 5.40E-2 7.16E-1 5.01E-1
*
* END OF RES 6*0.

*
* PATCHES

*NECESSARY CONTROL CARD IF ANY PATCHES ARE TO BE MADE
*NUCLIDE NAME CARDS IDENTIFY THE NUCLIDE FOR PATCHING. THE NUCLIDE
* NAME CARD AND ITS ACCOMPANYING PATCHES ARE PROVIDED IN THE SAME ORDER
*OF APPEARANCE AS ON THE MASTER TAPE

TH232
SHIELD GP 3 SPOT 5 13.333

```

SHIELD GP 2 ROW 2 3 4
5 6.5
7.6
ROW 4 2 3.5 4 5 6 7
*
U233
ROW 2 .15E-1 .25E-1 .15E+2 .35E-1 .15E2 .5
COL 5 .85 .11E2 .16E2 .2835E3
SPOT 3 .17E2
RESON GP 2 SPOT 13 5 626.0
RESON GP 2 ROW 10 0.1633E2 1.2.3.4.5
RESON GP 3 COL 4 31.32.33.
'FP'
COL 5 1.1 2.3 3.4
4.4

```

- *THE NUCLIDE NAME CARD COMES FIRST WITH THE NUCLIDE NAME PUNCHED IN COLUMNS 1 TO 6
- *ROW .COL .SPOT CARDS ARE USED TO MAKE THOSE 3 TYPES OF CHANGE.
- *THE FIXED POINT NUMBERS IN THESE EXAMPLES ARE COORDINATES, AND THESE THREE TYPES OF CARDS ARE USED FOR CHANGING GROUP (V RESONANCE OR SHIELDING) DATA IN EACH NUCLIDE.
- *THE RESON CARD IS PUNCHED SPOT ROW COL IN COLUMNS 15 TO 18 TO INDICATE THE COORDINATES OF THE DATA IN THE RESONANCES OF THE GROUP NUMBER SHOWN
- *A TYPICAL RESON CARD WOULD BE PUNCHED
 - * RESON IN COLUMNS 1 TO 6, STARTING IN 1
 - * 2 (A GROUP NUMBER) SOMEWHERE IN COLUMNS 7 TO 11
 - * SPOT OR ROW OR COL IN COLUMNS 15 TO 18, STARTING IN 15
 - * 13 5 626.0
 - * OR
 - * 10 (WITH 6 VALUES FOLLOWING THE VALUE 10)
 - * OR
 - * MM(I) VALUES, WHERE MM REFERS TO THE SEARCH VECTOR AND I IS THE ITH. ELEMENT OF THAT VECTOR
 - * IF DATA VALUES OVERFLOW, TRAILING CARDS ARE USED, BUT THEY MUST BE BLANK
 - * IN COLUMNS 1 TO 6 WITH DATA IN COLUMNS 7 TO 72.

ENDJOB

APPENDIX 12

**\$FILE CARDS USED TO ACHIEVE BLOCKING OF
FORTRAN IV RECORDS**


```
$USE  
$FILE  
$SETC  
$FILE  
$SETC  
$FILE  
$SETC  
P18FRE (FR)  
'FTC01.', 'U01, U01, SINGLE, BLOCK=0256, REEL, HIGH,  
RCT=0032, TYPE3, ERR=RERRX, EOF=REOFX, EOR=REORX.  
'FTC02.', 'U02, U02, SINGLE, BLOCK=0256, REEL, HIGH,  
RCT=0032, TYPE3, ERR=RERRX, EOF=REOFX, EOR=REORX.  
'FTC03.', 'U03, U03, SINGLE, BLOCK=0256, REEL, HIGH,  
RCT=0032, TYPE3, ERR=RERRX, EOF=REOFX, EOR=REORX.
```

