LA-5629-MS

Informal Report

UC-32 and 34c

Reporting Date: May 1974

Issued: June 1974

LINX: Library Interpretation of Neutron X-Sections

by

Patrick D. Soran

los alamos
scientific laboratory
of the University of California
LOS ALAMOS, NEW MEXICO 87544

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

UNITED STATES
ATOMIC ENERGY COMMISSION
CONTRACT W-7405-ENG. 3C

MASTER

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Atomic Energy Commission, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

This work supported by the U.S. Atomic Energy Commission, Division of Reactor Research and Development.

In the interest of prompt distribution, this LAMS report was not edited by the Technical Information staff.

Printed in the United States of America. Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151
Price: Printed Copy \$4.00 Microfiche \$1.45

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Atomic Energy Commission, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

LINK - LIBRARY INTERPRETATION OF NEUTRON X-SECTIONS

by

Patrick D. Soran

ABSTRACT

The LINK code is used to merge single and multi-isotope libraries into a single master library. The code is written in FORTRAN and produces a binary library for both ISOTXS and BRKOXS files of the CCCC interface system.

I. INTRODUCTION

LINK is a computer code for merging neutron multigroup data libraries which have been written in the CCCC¹ interface file format. The present version of LINK only processes version II of the ISOTXS¹ interface file and both versions II and III of the BRKOXS¹ interface file. The code was designed to operate on a CDC 7600 machine.

II. DISCUSSION

When calculating neutron multigroup cross sections from the ENDF/B² data system, one generally performs such operations a nuclide of material at a time. Because of the larger turn-around times associated with processing more than one nuclide, as well as a desire to scrutinize the output from such a multigroup calculation, processing the point-wise one nuclide at a time makes good sense. After one has completed a set of such calculations the various multigroup data sets reside on tapes which are not in a format suitable for direct CCCC interface utilization in such codes as TRIPLET³. To help the user create a single multigroup library for either the ISOTXS (infinite dilution and 0°K multigroup data) or BRKOXS (self-shielded or f-factor tables) data files, the LINK code has been developed.

The LINK code operates from one master disk or tape and merges the ISOTXS or BRKOXS data file onto the master tape. (There is a separate master library

for the ISOTXS and BRKOXS data file.) LINK thus produces the correct file data and manipulation of various multigroup cross sections set with a minimum of user intervention. LINK was designed primarily to be used with the Los Alamos Scientific Laboratory code MINX.⁴

III. GUIDE TO USER APPLICATION

The present version of LINK requires five input/output units, one of which is a card input unit (unit 5) and one which is a printer output unit (unit 6). The remaining three units concern the manipulation of the data:

Unit 3	Old master unit to which data will be added
Unit 4	Unit which contains data that is to be added
Unit 8	New master unit containing the information of unit 3 with unit 4 information added.

The user input requirements to the code are minimal. The only complicated input parameter to LINK is that which specifies the number of records to be skipped to reach the end of information of a particular isotope. At this point it is assumed that the user of LINK is somewhat familiar with CCCC interface files and in particular the LOCA vector. The skip parameter does have a default value that is quite commonly used.

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

Number of Word on Card	Name of Variable	Comments
Control	Integers (415)	
1	NTYPE	1 - wish to merge ISOTXS file 2 - wish to merge BRKOXS file
2	ICHM	0 - Do <u>not</u> merge fission spectrum data 1 - Do merge fission spectrum data
3	IEDIT	0 - Do <u>not</u> edit old master unit (unit 8) 1 - Do edit old master unit (unit 8)
4	NRSP	Number of records to be skipped as described in reference 1. The default value is equal to the number of isotopes times [2 + number of scatter- ing types (e.g. elastic, n,2n, inelastic, and total)].

The entire program resides in core of a CDC
7600 and requires 5 to 15 seconds to execute. The
code at LASL exists as an UPDATE file (LINX) with a
back-up checksum tape XX010452 assigned to P. D.
Soran, T-1.

LASL IDENTIFICATION:
LP-0299

REFERENCES

1. B. M. Carmichael, D. A. Menley, and D. R. Vondy, "Report of the Subcommittee on Standard Interface Files," prepared for the committee on Computer Code Coordination and issued as Los Alamos Scientific Laboratory report LA-5324-MS.
2. M. K. Drake, "Data Formats and Procedures for ENDF/B Neutron Cross Section Library," Brookhaven National Laboratory report BNL 50274(T-601) (TID-4500) ENDF-102, Vol. I (October 1970).
3. Wm. H. Reed, T. R. Hill, F. W. Brinkley and K. D. Lathrop, "TRIPLET: A Two-Dimensional, Multigroup, Triangular Mesh, Planar Geometry, Explicit Transport Code," Los Alamos Scientific Laboratory report LA-5428-MS (October 1973).
4. C. R. Weisbin, P. D. Soran, R. J. LaBauve, D. R. Harris, and J. S. Hendricks, "MINX - A Multigroup Interpretation of Nuclear Cross Sections from ENDF/B," Los Alamos Scientific Laboratory report, to be published.

```

PROGRAM CCCMRG (INP,OUT,PUN,FILM,FSET3,FSET4,FSET8,FSET9,FSET10,FS LINX      2
  LET3=INP,FSET4=OUT,FSET7=PUN) LINX      3
  THIS PROGRAM MERGES ISOTXS AND BRKOXS CCCC FILES LINX      4
C      COMMON A(30000) LINX      5
C      COMMON /XTYPE/ NTYPE,ICHM,IEDIT,NRSP,IRU(10) LINX      6
2      COMMON /XTYPE/ NTYPE,ICHM,IEDIT,NRSP,IRU(10) LINX      7
C      DEFINE UNITS LINX      8
C      LINX      9
C      LINX     10
2      CALL UDEFIN (IU3,IU4,IU5,IU6,IU7,IU8,IU9,IU10) LINX     11
C      LINX     12
C      NOW READ THE IDENTIFICATION FILE CONTROL FILE DATA AND CHI DATA OF LINX     13
C      FILE OF BOTH THE MASTER AND NEW TAPE TO BE ADDED. CHECK THE DATA LINX     14
C      AND WRITE ON THE NEW MASTER LINX     15
12     CALL PISOID (IU3,IU4,IU5,IU6,IU8) LINX     16
16     CALL RWIN (IU3) LINX     17
20     CALL RWIN (IU4) LINX     18
22     CALL RWIN (IU8) LINX     19
24     IF (NTYPE.EQ.2) GO TO 10 LINX     20
26     CALL PISOTX (IU6,IU8) LINX     21
30     STOP LINX     22
32 10    CALL PBRKS (IU6,IU8) LINX     23
35     STOP LINX     24
37     END LINX     25

```

	SUBROUTINE UDEFIN(IU3,IU4,IU5,IU6,IU7,IU8,IU9,IU10)	LINK	26
C	DEFINE UNITS	LINK	27
20	IU3=3	LINK	28
20	IU4=4	LINK	29
21	IU5=5	LINK	30
22	IU6=6	LINK	31
23	IU7=7	LINK	32
24	IU8=8	LINK	33
25	IU9=9	LINK	34
26	IU10=10	LINK	35
C	IU3 IS OLD MASTER TAPE. IU4 IS DATA TO BE ADDED. IU5 AND IU6 ARE	LINK	36
C	STANDARD I/O UNITS. IU7 PUNCH UNIT. IU8 IS NEW MASTER TAPE. IU9 AND I	LINK	37
C	ARE SCRATCH UNITS	LINK	38
30	CALL RWIN (3)	LINK	39
32	CALL RWIN (4)	LINK	40
34	CALL RWIN (8)	LINK	41
36	RETURN	LINK	42
37	END	LINK	43
		LINK	44
	SUBROUTINE RWIN(IX)	LINK	45
3	REWIND IX	LINK	46
5	RETURN	LINK	47
6	END	LINK	48
	SUBROUTINE STYP(IU5,IU6)	LINK	49
6	COMMON /ATYPE/ NTYPE,ICHH,IEDIT,NRSKP,IRU(10)	LINK	50
6	READ (IU5,10) NTYPE,ICHH,IEDIT,NRSKP,(IRU(I),I=1,10)	LINK	51
24	WRITE (IU6,20) NTYPE,ICHH,IEDIT,NRSKP,(IRU(I),I=1,10)	LINK	52
44	RETURN	LINK	53
C		LINK	54
C		LINK	55
10	FORMAT (14I5)	LINK	56
20	FORMAT (I NTYPE-1/2=ISOTXS/BRKXAS*,IS,SA,*MERGE CHI DATA I/O=YES/	LINK	57
	INO*,IS/1H *,IEDIT-1/0=YES/NO(OLD MASTER)*,IS,SA,*RECORD SKIP*,IS/1	LINK	58
	2H *,IRD(1)*,IS/1H *,IRD(2)*,IS/1H *,IRU(3)*,IS/1H *,IRU(4)*,IS/1H	LINK	59
	3*,IRD(5)*,IS/1H *,IRD(6)*,IS/1H *,IRD(7)*,IS/1H *,IRU(8)*,IS/1H *,	LINK	60
	IRU(9),IS/1H *,IRD(10)*,I4)	LINK	61
45	END	LINK	62
	SUBROUTINE PYSOID(IU3,IU4,IU5,IU6,IU8)	LINK	63
14	DIMENSION A(15000), B(15000), IA(1), IB(1)	LINK	64
14	DIMENSION C(85000), IC(1)	LINK	65
14	COMMON A,B,C	LINK	66
14	COMMON /ATYPE/ NTYPE,ICHH,IEDIT,NRSKP,IRU(10)	LINK	67
14	EQUIVALENCE (A(1),IA(1)), (B(1),IB(1))	LINK	68
14	EQUIVALENCE (C(1),IC(1))	LINK	69
C	HEAD OPTIONS	LINK	70
14	CALL STYP (IU5,IU6)	LINK	71
15	IREC=1	LINK	72
16	IF (NTYPE.EQ.2) GO TO 40	LINK	73
C	WORK ON ISOTXS FILES	LINK	74
C	HEAD AND COPY FILE IDENTIFICATION	LINK	75
23	CALL REED (IU3,IREC,A(1),*,1)	LINK	76
30	CALL REED (IU4,IREC,B(1),*,1)	LINK	77
41	CALL WTE (IU8,IREC,A(1),*,1)	LINK	78
C	READ FILE CONTROL FROM MASTER AND NEW TAPE	LINK	79
51	IREC=IREC+1	LINK	80
53	CALL REED (IU3,IREC,A(1),*,1)	LINK	81
63	NI=0+IA(2)	LINK	82
64	NG=0+IA(1)	LINK	83
66	NS=MAX=IA(7)	LINK	84
67	IF (NRSKP.EQ.0) NRSKP=NI*50*(2+NS*MAX)	LINK	85
77	NNUJ=(IA(6)*(1/IA(8))+2)*IA(1)+2*IA(2)+13	LINK	86

111		CALL REED (IU4,IREC,B(1),9,1)	LINX	A7
116		NWU4=(IB(6))*(1/IB(8))+2*IB(1)+2*IB(2)+13	LINX	A8
127		IF (IA(1),NE,IB(1)) GO TO 50	LINX	A9
135		IA(2)=IA(2)+1	LINX	90
136		IA(3)=MAX0(IA(3),IB(3))	LINX	91
142		IA(4)=MAX0(IA(4),IB(4))	LINX	92
145		IA(5)=MAX0(IA(5),IB(5))	LINX	93
150		IA(7)=MAX0(IA(7),IB(7))	LINX	94
	C	NOW WRITE NEW FILE CONTROL ON NEW MASTER TAPE	LINX	95
153		CALL RTE (IUB,IREC,A(1),9,1)	LINX	96
	C		LINX	97
	C	READ FILE DATA FROM MASTER AND NEW TAPE	LINX	98
	C		LINX	99
160		IREC=IREC+1	LINX	100
162		CALL REED (IU3,IREC,A(1),NWD3,1)	LINX	101
172		CALL REED (IU4,IREC,B(1),NWD4,1)	LINX	102
203		CALL STOW (A(1),C(1),12)	LINX	103
210		DO 10 I=1,NISO	LINX	104
221	10	C(I+12)=A(I+12)	LINX	105
223		C(NISO+13)=B(13)	LINX	106
225		NEA3=14+NISO	LINX	107
226		NEA4=13+1	LINX	108
230		IF (ICM,EO,n) GO TO 30	LINX	109
235		DO 20 I=1,NGROUP	LINX	110
244		J=NEX3+I-1	LINX	111
246		JJ=NEX4+I-1	LINX	112
247		C(J)=B(JJ)	LINX	113
250	20	CONTINUE	LINX	114
256	30	CONTINUE	LINX	115
	C		LINX	116
	C	NO TEST PRESENTLY ON CONSISTENT GROUP STRUCTURE	LINX	117
	C		LINX	118
256		NEX3=13+NGROUP+NISO	LINX	119
	C	NEUTRON VELOCITY	LINX	120
261		CALL STOW (A(NEX3),C(NEX3+1),NGROUP)	LINX	121
266		NEA3=NEX3+NGROUP	LINX	122
	C	MAX ENERGY BOUNDARIES	LINX	123
270		CALL STOW (A(NEX3),C(NEX3+1),NGROUP)	LINX	124
	C	MINIMUM ENERGY	LINX	125
275		NEA3=NEX3+NGROUP	LINX	126
277		CALL STOW (A(NEX3),C(NEX3+1),1)	LINX	127
304		NEX3=NEX3+1	LINX	128
	C	RECORDS TO BE SKIPPED	LINX	129
306		CALL STOW (A(NEX3),C(NEX3+1),NISO)	LINX	130
313		NWUS=NWD3+2	LINX	131
315		IC(NWDS)=NRSKP	LINX	132
320		CALL RTE (IUB,IREC,C(1),NWDS,1)	LINX	133
	C		LINX	134
	C	NOW COPY OLD MASTER TO NEW MASTER THEN ADD	LINX	135
330		CALL COPYF (IU3,IUB)	LINX	136
335		CALL COPYF (IU4,IUB)	LINX	137
342		RETURN	LINX	138
343	40	CONTINUE	LINX	139
	C	WORK ON BRK0XS FILES	LINX	140
	C		LINX	141
	C	FILE CONTROL	LINX	142
	C		LINX	143
343		CALL REED (IU3,IREC,A(1),4,1)	LINX	144
350		CALL REED (IU4,IREC,B(1),4,1)	LINX	145
361		CALL RTE (IUB,IREC,A(1),4,1)	LINX	146
	C		LINX	147
	C	FILE CONTROL	LINX	148
	C		LINX	149
371		IREC=IREC+1	LINX	150
373		CALL REED (IU3,IREC,A(1),4,1)	LINX	151
403		CALL REED (IU4,IREC,B(1),4,1)	LINX	152
414		NGROUP=IA(1)	LINX	153
415		NISO=IA(2)	LINX	154
417		NSIGPT=IA(3)	LINX	155
420		NTCMT=IA(4)	LINX	156

422	IA(2)=IA(2)+1	LINX	147
423	CALL RITE (IUA,IREC,A(1),4,1)	LINX	148
435	NWU3=5*NISOSH+NSIGPT+NTEMP+NGROUP+1	LINX	149
441	NWU4=5*IB(2)+IB(3)+IB(4)+NGROUP+1	LINX	160
C		LINX	161
C	FILE DATA	LINX	162
C		LINX	163
444	IREC=IREC+1	LINX	144
446	CALL REED (IU3,IREC,A(1),NWD3,1)	LINX	145
456	CALL REED (IU4,IREC,B(1),NWD4,1)	LINX	146
C	HIDONM	LINX	167
467	CALL STOW (A(1),C(1),NISOSH)	LINX	148
474	NEA3=NISOSH+1	LINX	169
476	CALL STOW (B(1),C(NEX3),1)	LINX	170
503	NEA4=NEX3+1	LINX	171
C	X	LINX	172
505	CALL STOW (A(NEX3),C(NEX4),NSIGPT)	LINX	173
512	NEA3=NEX3+NSIGPT	LINX	174
514	NEA4=NEX4+NSIGPT	LINX	175
C	IB	LINX	176
515	CALL STOW (A(NEX3),C(NEX4),NTEMP)	LINX	177
522	NEA3=NEX3+NTEMP	LINX	178
524	NEA4=NEX4+NTEMP	LINX	179
C	EMAX	LINX	180
525	CALL STOW (A(NEX3),C(NEX4),NGROUP)	LINX	181
532	NEA3=NEX3+NGROUP	LINX	182
534	NEA4=NEX4+NGROUP	LINX	183
C	EMIN	LINX	184
535	CALL STOW (A(NEX3),C(NEX4),1)	LINX	185
542	NEA3=NEX3+1	LINX	186
544	NEA4=NEX4+1	LINX	187
C	NO* FIND THE B LOCATION	LINX	188
545	NEAB=NWD4-3	LINX	189
C	JBFL	LINX	190
547	CALL STOW (A(NEX3),C(NEX4),NISOSH)	LINX	191
554	NEA3=NEX3+NISOSH	LINX	192
556	NEA4=NEX4+NISOSH	LINX	193
557	CALL STOW (B(NEXB),C(NEX4),1)	LINX	194
564	NEAB=NEXB+1	LINX	195
566	NEA4=NEX4+1	LINX	196
C	JBFLH	LINX	197
567	CALL STOW (A(NEX3),C(NEX4),NISOSH)	LINX	198
574	NEA3=NEX3+NISOSH	LINX	199
576	NEA4=NEX4+NISOSH	LINX	200
577	CALL STOW (B(NEXB),C(NEX4),1)	LINX	201
604	NEAB=NEXB+1	LINX	202
606	NEA4=NEX4+1	LINX	203
C	NTABP	LINX	204
607	CALL STOW (A(NEX3),C(NEX4),NISOSH)	LINX	205
614	NEA3=NEX3+NISOSH	LINX	206
616	NEA4=NEX4+NISOSH	LINX	207
617	CALL STOW (B(NEXB),C(NEX4),1)	LINX	208
624	NEAB=NEXB+1	LINX	209
626	NEA4=NEX4+1	LINX	210
C	NTABT	LINX	211
627	CALL STOW (A(NEX3),C(NEX4),NISOSH)	LINX	212
634	NEA3=NEX3+NISOSH	LINX	213
636	NEA4=NEX4+NISOSH	LINX	214
637	CALL STOW (B(NEXB),C(NEX4),1)	LINX	215
644	NWUS=NEX4	LINX	216
646	CALL RITE (IUA,IREC,C(1),NWD5,1)	LINX	217
C		LINX	218
C	FINISHING COPYING TAPE	LINX	219
C		LINX	220
656	CALL COPYF (IU3,IU8)	LINX	221
663	CALL COPYF (IU4,IU8)	LINX	222
670	RETURN	LINX	223
671	CONTINUE	LINX	224
671	WRITE (IU6,60,IA(1),IA(10))	LINX	225
701	STOP	LINX	226
C		LINX	227

60	FORMAT (*1 OLD GROUP NUMBER*,15,* NEW GROUP NUMBER*,15)	LINX	228
706	END	LINX	229
	SUBROUTINE PISOTX(NOUT,N4)	LINX	230
C	CONTROLS PRINTING OF THE ISOTXS FILE.	LINX	231
6	DIMENSION MODE(3)	LINX	232
6	COMMON A(1)	LINX	233
6	DIMENSION IA(1)	LINX	234
6	COMMON /XTYPE/ NTYPE,ICHM,IEDIT,NHSKIP,IRD(10)	LINX	235
6	EQUIVALENCE (A(1),IA(1))	LINX	236
	DATA TOTAL,ELAS,AINEL,AN2N/6HTOTAL ,6HELASTC,6MINELAS,6H N2N/	LINX	237
	DATA MODE(1),MODE(2),MODE(3)/1,1,1/	LINX	238
	DATA M0,M1,M9/0,1,9/	LINX	239
6	CALL REED (N4,1,A(1),4,1)	LINX	240
11	FN=A(1)	LINX	241
12	HU=A(2)	LINX	242
14	MS=A(3)	LINX	243
15	IVER=IA(4)	LINX	244
17	WRITE (NOUT,450)FN,IVER,N4	LINX	245
33	WRITE (NOUT,460)HU,MS	LINX	246
C		LINX	247
C	---	LINX	248
C	FILE CONTROL	LINX	249
45	IREC1=IREC1+1	LINX	250
47	CALL REED (N4,IREC1,A(1),M9,MODE(1))	LINX	251
55	NGROUP=IA(1)	LINX	252
56	NISO=IA(2)	LINX	253
60	MAAUP=IA(3)	LINX	254
61	MAADN=IA(4)	LINX	255
63	MAAORD=IA(5)	LINX	256
64	ICHIST=IA(6)	LINX	257
66	NSCMAX=IA(7)	LINX	258
67	NCBLOK=IA(8)	LINX	259
71	NSBLOK=IA(9)	LINX	260
72	IF (IRD(1),NE,1) GO TO 10	LINX	261
76	WRITE (NOUT,240) (IA(I),I=1,9)	LINX	262
C		LINX	263
C	---	LINX	264
C	FILE DATA	LINX	265
106	10 NWUS=(ICHIST*(1/NCBLOK)+2)*NGROUP+2*NISO+13	LINX	266
117	IREC1=IREC1+1	LINX	267
121	CALL REED (N4,IREC1,A(1),NWUS,MODE(1))	LINX	268
126	IF (IRD(2),NE,1) GO TO 40	LINX	269
132	WRITE (NOUT,250) (A(I),I=1,12)	LINX	270
140	WRITE (NOUT,260)	LINX	271
146	DO 20 I=1,NISO	LINX	272
151	J=1+12	LINX	273
152	20 WRITE (NOUT,270) I,A(J)	LINX	274
167	NEAT=13+NISO	LINX	275
170	IF (NCBLOK,GT,1) GO TO 30	LINX	276
174	WRITE (NOUT,280)	LINX	277
200	CALL WOT (A(NEXT),ICHIST,NGROUP,M1,6HIN GP ,6HOUT GP,M1,NOUT)	LINX	278
213	NEAT=NEAT+NGROUP*ICHIST	LINX	279
220	30 WRITE (NOUT,290)	LINX	280
224	CALL WOTB (A(NEXT),NGROUP,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,MU,NOUT)	LINX	281
250	NEAT=NEAT+NGROUP	LINX	282
252	WRITE (NOUT,300)	LINX	283
257	CALL WOTB (A(NEXT),NGROUP,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,MU,NOUT)	LINX	284
303	NEAT=NEAT+NGROUP	LINX	285
305	WRITE (NOUT,310) A(NEXT)	LINX	286
315	NEAT=NEAT+1	LINX	287
317	WRITE (NOUT,320)	LINX	288
324	CALL WOTB (A(NEXT),NISO,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,MU,NOUT)	LINX	289
C		LINX	290
C	---	LINX	291
C	SET CHI DATA	LINX	292
352	40 IF (NCBLOK,EQ,1) GO TO 60	LINX	293
354	NWUS=((NGROUP-1)/NCBLOK+1)*ICHIST	LINX	294
361	NPI=1	LINX	295
363	DO 50 I=1,NCBLOK	LINX	296

364		IREC1=IREC1+1	LINX	297
365		CALL REED (N4,IREC1,A(NPT),NWDS,MODE(1))	LINX	298
375	50	NP!=NPT*NWDS	LINX	299
401		IF (IRD(3),NE.1) GO TO 60	LINX	300
403		WRITE (NOUT,330)	LINX	301
407		CALL WOT (A(1),ICHIST,NGROUP,M1,6HIN GP ,6HOUT GP,M1,NOUT)	LINX	302
	C		LINX	303
	C	---ISOTOPE CONTROL AND GROUP INDEPENDENT DATA	LINX	304
	C		LINX	305
423	60	DO 220 I=1,NISO	LINX	306
425		NWUS=(2*NGROUP+2)*NSCMAX+15	LINX	307
431		WRITE (6,230)NWDS	LINX	308
437		IREC1=IREC1+1	LINX	309
441		CALL REED (N4,IREC1,A(1),NWDS,MODE(1))	LINX	310
447		JREAD=1+NWDS	LINX	311
451		NCIBLK=IA(8)	LINX	312
452		ICHI=IA(9)	LINX	313
454		IFIS=IA(10)	LINX	314
455		IALF=IA(11)	LINX	315
457		INP=IA(12)	LINX	316
460		INCN=IA(13)	LINX	317
462		IND=IA(14)	LINX	318
463		INI=IA(15)	LINX	319
465		IF (IRD(4),NE.1) GO TO 70	LINX	320
470		WRITE (NOUT,340)I	LINX	321
476		WRITE (NOUT,350) (A(J),J=1,6), (IA(J),J=7,9)	LINX	322
510		WRITE (NOUT,360) (IA(J),J=10,15)	LINX	323
520		NEA1=16	LINX	324
521		WRITE (NOUT,370)	LINX	325
527		CALL WOT8 (A(NEX1),NSCMAX,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NOUT)	LINX	326
553		NEA2=NSCMAX+16	LINX	327
555		WRITE (NOUT,380)	LINX	328
563		CALL WOT8 (A(NEX2),NSCMAX,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NOUT)	LINX	329
607		J1=NEX2+NSCMAX	LINX	330
611		WRITE (NOUT,390)	LINX	331
617		CALL WOT1 (A(J1),NGROUP,NSCMAX,M1,6H GRP ,6H BLUCK,M1,NOUT)	LINX	332
632		J1=J1+NGROUP+NSCMAX	LINX	333
635		WRITE (NOUT,400)	LINX	334
643		CALL WOT1 (A(J1),NGROUP,NSCMAX,M1,6H GROUP,6H BLUCK,M1,NOUT)	LINX	335
	C		LINX	336
	C	---PRINCIPAL CROSS SECTIONS	LINX	337
	C		LINX	338
660	70	NWUS=(4*IFIS*(ICHI*(1/NCIBLK)+2)+IALF+INP+INCN+IND+INT)*NGROUP	LINX	339
676		IREC1=IREC1+1	LINX	340
700		CALL REED (N4,IREC1,A(JREAD),NWDS,MODE(1))	LINX	341
705		IF (IRD(5),NE.1) GO TO 80	LINX	342
711		WRITE (NOUT,410)	LINX	343
715		NTYPE=NWDS/NGROUP	LINX	344
721		CALL WOT (A(JREAD),NGROUP,NTYPE,M1,6H GROUP,6H TYPE ,M1,NOUT)	LINX	345
	C		LINX	346
	C	---ISOTOPE CHI DATA	LINX	347
	C		LINX	348
735	80	IF (NCIBLK,EQ.1) GO TO 100	LINX	349
737		IF (IFIS,LT.1) GO TO 100	LINX	350
741		IF (ICHI,LT.1) GO TO 100	LINX	351
743		NWUS=((NGROUP-1)/NCIBLK+1)*ICHI	LINX	352
750		NP!=JREAD	LINX	353
752		DO 90 N=1,NCIBLK	LINX	354
754		IREC1=IREC1+1	LINX	355
755		CALL REED (N4,IREC1,A(NPT),NWDS,MODE(1))	LINX	356
765	90	NP!=NPT*NWDS	LINX	357
771		IF (IRD(6),NE.1) GO TO 100	LINX	358
773		WRITE (NOUT,420)	LINX	359
777		CALL WOT (A(JREAD),ICHI,NGROUP,M1,6HIN GP ,6HOUT GP,M1,NOUT)	LINX	360
	C		LINX	361
	C	---SCATTERING CROSS SECTIONS	LINX	362
	C		LINX	363
1014	100	DO 220 N=1,NSCMAX	LINX	364
1016		K=N+15	LINX	365
1017		IDUCT=IA(K)	LINX	366
1021		K=N+NSCMAX	LINX	367

1022		LORDN=IA(K)	LINX	348
1024		IDSCY=IDSCY/100+1	LINX	349
1031		GO TO (110,120,130,140), IDSCY	LINX	370
1040	110	BLUCK=TOTAL	LINX	371
1042		GO TO 150	LINX	372
1042	120	BLUCK=ELAS	LINX	373
1044		GO TO 150	LINX	374
1044	130	BLUCK=AINEL	LINX	375
1046		GO TO 150	LINX	376
1046	140	BLUCK=AN2N	LINX	377
1050	150	IF (LORDN.NE.0) GO TO 160	LINX	378
1051		WRITE (NOUT,430)N,BLOCK	LINX	379
1061		GO TO 220	LINX	380
1063	160	KMAX=0	LINX	381
1064		K=2*NSCMAX+15+(N-1)*NGROUP	LINX	382
1071		INC=(NGROUP-1)/NSBLCK+1	LINX	383
1075		NPJ=JREAD	LINX	384
1077		DO 180 J=1,NSBLCK	LINX	385
1100		JL=(J-1)*INC+1	LINX	386
1103		JU=J*INC	LINX	387
1104		NWDS=0	LINX	388
1105		DO 170 JJ=JL,JU	LINX	389
1114		L=K+JJ	LINX	390
1115		NWDS=NWDS+IA(L)	LINX	391
1116	170	KMAX=KMAX+IA(L)	LINX	392
1121		NWDS=NWDS*LORDN	LINX	393
1123		IREC1=IREC1+1	LINX	394
1125		CALL REED (N4,IREC1,A(NPT),NWDS,MODE(1))	LINX	395
1136	180	NPJ=NPT+NWDS	LINX	396
1142		IF (IRD(7).NE.1) GO TO 220	LINX	397
1144		JRITE=JREAD+KMAX*LORDN	LINX	398
1147		DO 210 L=1,LORDN	LINX	399
1151		WRITE (NOUT,440)N,BLOCK,L	LINX	400
1163		JBAND=MAXUP+MAXDN+1	LINX	401
1165		IJJ=MAXUP+1	LINX	402
1166		KM=0	LINX	403
1167		JRITE=JRITE+NGROUP*JBAND	LINX	404
1173		LAST=JRITE+NGROUP*JBAND-1	LINX	405
1175		DO 190 M=JRITE,LAST	LINX	406
1203	190	A(M)=0.0	LINX	407
1205		DO 200 J=1,NGROUP	LINX	408
1206		J1=JREAD+(L-1)*KMAX+KM	LINX	409
1212		K=2*NSCMAX+15+(N-1)*NGROUP+J	LINX	410
1220		JBAND1=IA(K)	LINX	411
1221		KM=KM+JBAND1	LINX	412
1222		K=K+NSCMAX+NGROUP	LINX	413
1224		IJJ1=IA(K)	LINX	414
1226		J2=JRITE+(J-1)*JBAND+IJJ-IJJ1	LINX	415
1234	200	CALL STON (A(J1),A(J2),JBAND1)	LINX	416
1244	210	CALL WOT (A(JRITE),JBAND,NGROUP,M1,6H POSN ,6H GROUP,M1,NOUT)	LINX	417
1261	220	CONTINUE	LINX	418
1266		RETURN	LINX	419
C			LINX	420
C			LINX	421
C			LINX	422
230		FORMAT (1H0,*,NWDS*,I12)	LINX	423
240		FORMAT (24H0FILE CONTROL PARAMETERS//51H NGROUP NUMBER OF ENER	LINX	424
		16Y GROUPS IN SET I12/51H NISO NUMBER OF ISOTOPES IN	LINX	425
		25E1 I12/51H MAXUP MAXIMUM NUMBER OF UPSCATTER GR	LINX	426
		30UPS I12/51H MAXDN MAXIMUM NUMBER OF DOWNSCATTER GROUPS	LINX	427
		4 I12/51H MAXORD MAXIMUM SCATTERING ORDER I12/51H	LINX	428
		5 ICHIST SET FISSION SPECTRUM FLAG I12/51H	LINX	429
		6 ICHIST=1 SET VECTOR /51H	LINX	430
		7 *NGROUP SET MATRIX /51H NSCMAX MAXIMUM NUMBER OF	LINX	431
		8BLUCKS OF I12/51H SCATTERING DATA	LINX	432
		9 /51H NCBLOCK BLOCKING CONTROL FOR SET CHI DATA	LINX	433
		5 I12/51H NSHLOK BLOCKING CONTROL FOR SCATTERING DATA I12)	LINX	434
250		FORMAT (1H0,I2(A6))	LINX	435
260		FORMAT (1H0,4X,7HISOTOPE,4X,4HNAME)	LINX	436
270		FORMAT (3X,I3,6X,A6)	LINX	437
280		FORMAT (17H0FISSION SPECTRUM)	LINX	438

290	FORMAT (33H0MEAN NEUTRON VELOCITY IN GROUP J/9X,1HJ)	LINX	439
300	FORMAT (21H0MAXIMUM ENERGY BOUND/3X,6HGROUP,1HJ)	LINX	440
310	FORMAT (28H0MINIMUM ENERGY BOUND OF SET//16X,E12.5)	LINX	441
320	FORMAT (32H0NUMBER OF RECORDS TO BE SKIPPED//5X,7HISOTOPE,2X,6HNUM	LINX	442
	BER)	LINX	443
330	FORMAT (21H0SET FISSION SPECTRUM)	LINX	444
340	FORMAT (8H0ISOTOPE,I3)	LINX	445
350	FORMAT (27H0ISOTOPE CONTROL PARAMETERS//51H HABSID ABSOLUTE ISOT	LINX	446
	1UPE LABEL 7X,A6/51H AMASS GRAM ATOMIC WEIGHT	LINX	447
	E12.5/51H EFISS TOTAL THERMAL ENERGY YI	LINX	448
	SELU/FISSION E12.5/51H (W.SEC/FISS)	LINX	449
	4 /51H TEMP TEMPERATURE (DEG K) E	LINX	450
	512.5/51H SIGPOT AV POTENTIAL SCATTERING (BARN/ATOM) E12.5/5	LINX	451
	61H ADENS REFERENCE ATOM DENSITY E12.5/51H KB	LINX	452
	7R ISOTOPE CLASSIFICATION I12/51H	LINX	453
	8 U=UNDEFINED /51H 1=FISSILE	LINX	454
	9 /51H 2=FERTILE	LINX	455
	3 /51H 3=OTHER ACTIVE	LINX	456
	3 /51H 4=FISSION PRODUCT /51H	LINX	457
	3 5=STRUCTURE /51H	LINX	458
	3 6=COOLANT /51H 7=CONTROL	LINX	459
	3 /51H NCIBLK ISOTOPE CHI BLOCKING FAC	LINX	460
	3TOR I12/51H ICHI ISOTOPE FISSION SPECTRUM FLAG	LINX	461
	3 I12/51H ICHI=0 USE SET CHI	LINX	462
	3)	LINX	463
360	FORMAT (51H =1 CHI VECTOR /51H	LINX	464
	1 =NGROUP, CHI MATRIX /51H 1PIS	LINX	465
	2 (N,F) X-SECTION PRESENT (1=YES/0=NO) I12/51H IALF (N,ALPHA)	LINX	466
	3 X-SECTION PRESENT (1=YES/0=NO) I12/51H INP (N,P) X-SECTION	LINX	467
	4PRESENT (1=YES/0=NO) I12/51H IN2N (N,2N) X-SECTION PRESENT	LINX	468
	5 (1=YES/0=NO) I12/51H IND (N,U) X-SECTION PRESENT (1=YES/0	LINX	469
	6=NO) I12/51H INT (N,T) X-SECTION PRESENT (1=YES/0=NO)	LINX	470
	7I12)	LINX	471
370	FORMAT (28H0SCATTERING TYPE FOR BLOCK N/9X,1HN,6X,4HTYPE)	LINX	472
380	FORMAT (39H0NUMBER OF SCATTERING ORDERS IN BLOCK N/9X,1HN,6X,4HTYP	LINX	473
	LE)	LINX	474
390	FORMAT (53H0SCATTERING BANDWIDTH FOR GROUP J, SCATTERING BLOCK N)	LINX	475
400	FORMAT (97H0POSITION OF IN-GROUP SCATTERING CROSS SECTION IN SCATT	LINX	476
	IERING DATA FOR GROUP J, SCATTERING BLOCK N)	LINX	477
410	FORMAT (25H0PRINCIPAL CROSS-SECTIONS)	LINX	478
420	FORMAT (25H0ISOTOPE FISSION SPECTRUM)	LINX	479
430	FORMAT (6H0BLOCK,I3,2X,A6,19H SCATTERING OMITTED)	LINX	480
440	FORMAT (6H0BLOCK,I3,2X,A6,18H SCATTERING, ORDER,I3)	LINX	481
450	FORMAT (9H0*** FILE,A6,11H -- VERSION,I3,8H -- UNIT,I3,3H0**)	LINX	482
460	FORMAT (24H **USER IDENTIFICATION**,A6,3X,A6)	LINX	483
	END	LINX	484

1267

	SUBROUTINE PHRKS(NOUT,N4)	LINX	485
C	CONTROLS PRINTING OF THE BRKXOS FILE.	LINX	486
6	DIMENSION A(1), IA(1)	LINX	487
6	DIMENSION MODE(3)	LINX	488
6	COMMON /XTYPE/ NTYPE,ICHM,IEDIT,NRSKP,IRD(10)	LINX	489
6	COMMON A	LINX	490
6	EQUIVALENCE (A(1),IA(1))	LINX	491
	DATA M0,M4/0.4/	LINX	492
	DATA MODE(1),MODE(2),MODE(3)/1,1,1/	LINX	493
6	CALL REED (N4,1,A(1),4,1)	LINX	494
11	FN=A(1)	LINX	495
12	HU=A(2)	LINX	496
14	HS=A(3)	LINX	497
15	IVER=IA(4)	LINX	498
17	WRITE (NOUT,320)FN,IVER,N4	LINX	499
33	WRITE (NOUT,330)HU,HS	LINX	500
C		LINX	501
C	---FILE CONTROL	LINX	502
C		LINX	503

Line	Code	Address
45	IREC1=IREC1+1	544
47	CALL REED (N4,IREC1,A(1),M4,MODE(1))	545
55	NGROUP=IA(1)	546
56	NISOSH=IA(2)	547
60	NSIGPT=IA(3)	548
61	NTEMPT=IA(4)	549
63	IF (IRD(1),NE.1) GO TO 10	510
66	WRITE (NOUT,120) (IA(I),I=1,4)	511
	C	512
	C	513
	C	514
76	10 NWDS=5*NISOSH+NSIGPT+NTEMPT+NGROUP+1	515
103	IREC1=IREC1+1	516
104	CALL REED (N4,IREC1,A(1),NWDS,MODE(1))	517
111	IF (IRD(2),NE.1) GO TO 80	518
115	WRITE (NOUT,130)	519
121	WRITE (NOUT,140) (I,A(I),I=1,NISOSH)	520
141	NEAT=NISOSH+1	521
143	WRITE (NOUT,150)	522
151	LL=NEXT+NSIGPT-1	523
153	NM=1	524
155	DO 20 J=NEXT,LL	525
157	WRITE (NOUT,160) NM,A(J)	526
172	20 NM=NM+1	527
176	NEXT=NEXT+NSIGPT	528
177	LL=NTEMPT+J+NEXT	529
202	WRITE (NOUT,170)	530
206	NM=1	531
207	DO 30 J=NEXT,LL	532
212	WRITE (NOUT,180) NM,A(J)	533
225	30 NM=NM+1	534
231	NEXT=NEXT+NTEMPT	535
232	WRITE (NOUT,180)	536
236	CALL WOT8 (A(NEXT),NGROUP,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NOUT)	537
262	NEAT=NEXT+NGROUP	538
264	WRITE (NOUT,190) A(NEXT)	539
274	NEX1=NEXT+1	540
276	LL=NISOSH-1+NEX1	541
300	WRITE (NOUT,200)	542
306	NM=1	543
307	DO 40 J=NEX1,LL	544
312	WRITE (NOUT,210) NM,IA(J)	545
325	40 NM=NM+1	546
331	NEX2=NEX1+NISOSH	547
332	LL=NISOSH-1+NEX2	548
334	WRITE (NOUT,220)	549
340	NM=1	550
341	DO 50 J=NEX2,LL	551
344	WRITE (NOUT,210) NM,IA(J)	552
357	50 NM=NM+1	553
363	NEX3=NEX2+NISOSH	554
364	LL=NISOSH-1+NEX3	555
366	WRITE (NOUT,230)	556
372	NM=1	557
373	DO 60 J=NEX3,LL	558
376	WRITE (NOUT,210) NM,IA(J)	559
411	60 NM=NM+1	560
415	NEX4=NEX3+NISOSH	561
416	LL=NISOSH-1+NEX4	562
420	WRITE (NOUT,240)	563
424	NM=1	564
425	DO 70 J=NEX4,LL	565
430	WRITE (NOUT,210) NM,IA(J)	566
443	70 NM=NM+1	567
447	GO TO 90	568
447	80 NEAT=NISOSH+1+NSIGPT+NTEMPT+NGROUP	569
453	NEX1=NEXT+1	570
454	NEX2=NEX1+NISOSH	571
454	NEX3=NEX2+NISOSH	572
455	NEX4=NEX3+NISOSH	573

457	90	CONTINUE	LINE	574
	C		LINE	575
	C	---SELF-SHIELDING FACTORS	LINE	576
	C		LINE	577
457		JSDP=NEX4*NISOSH	LINE	578
461		DO 110 I=1,NISOSH	LINE	579
463		K=NEX3-1+I	LINE	580
465		NBINT=IA(K)	LINE	581
466		K=NEX4-1+I	LINE	582
470		NBTEM=IA(K)	LINE	583
471		K=NEX1-1+I	LINE	584
473		JBFLL=IA(K)	LINE	585
474		K=NEX2-1+I	LINE	586
476		JBFHI=IA(K)	LINE	587
477		NDIFF=JBFHI-JBFLL+1	LINE	588
501		NPRO=NBINT*NBTEM*NDIFF	LINE	589
504		NWUS=5*NPRO	LINE	590
506		IF (NWDS.LE.0) GO TO 100	LINE	591
510		IREC1=IREC1+1	LINE	592
512		CALL REED (N4,IREC1,A(JSSF),NWUS,MODE(1))	LINE	593
517		IF (IRD(3).NE.1) GO TO 100	LINE	594
523		J2=JSSF*NPRO	LINE	595
524		J3=J2*NPRO	LINE	596
525		J4=J3*NPRO	LINE	597
526		J5=J4*NPRO	LINE	598
530		WRITE (NOUT,250)I	LINE	599
536		CALL WOT (A(JSSF),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NOUT)	LINE	600
551		WRITE (NOUT,260)I	LINE	601
561		CALL WOT (A(J2),NBINT,NBTEM,NDIFF,1KN,1KK,1KJ,NOUT)	LINE	602
574		WRITE (NOUT,270)I	LINE	603
604		CALL WOT (A(J3),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NOUT)	LINE	604
617		WRITE (NOUT,280)I	LINE	605
627		CALL WOT (A(J4),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NOUT)	LINE	606
642		WRITE (NOUT,290)I	LINE	607
652		CALL WOT (A(J5),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NOUT)	LINE	608
667	100	CONTINUE	LINE	609
	C		LINE	610
	C	---CROSS SECTIONS	LINE	611
	C		LINE	612
667		NWUS=6*NGROUP	LINE	613
671		IREC1=IREC1+1	LINE	614
673		CALL REED (N4,IREC1,A(JSSF),NWUS,MODE(1))	LINE	615
700		IF (IRD(4).NE.1) GO TO 110	LINE	616
704		J2=JSSF*NGROUP	LINE	617
705		J3=J2*NGROUP	LINE	618
706		J4=J3*NGROUP	LINE	619
707		J5=J4*NGROUP	LINE	620
710		J6=J5*NGROUP	LINE	621
712		WRITE (NOUT,300)	LINE	622
716		WRITE (NOUT,310)(I1,I1=1,6)	LINE	623
731		CALL WOT8 (A(JSSF),NGROUP,A(J2),NGROUP,A(J3),NGROUP,A(J4),NGROUP,A(J5),NGROUP,A(J6),NGROUP,A(M0),A(M0),NOUT)	LINE	624
771	110	CONTINUE	LINE	625
774		RETURN	LINE	626
	C		LINE	627
	C		LINE	628
	C		LINE	629
	C		LINE	630
120		FORMAT (24H0FILE CONTROL PARAMETERS//51H NGROUP NUMBER OF ENH	LINE	631
		16Y GROUPS IN SET I12/51H NISOSH NUMBER OF ISOTOPES WIT	LINE	632
		2H SELF- /51H SHIELDING FACTORS	LINE	633
		3 I12/51H NSIGHT TOTAL NUMBER OF VALUES OF VARIABLE X /5	LINE	634
		41H WHICH ARE GIVEN. NSIGHT IS EQUAL TO /51H	LINE	635
		5 THE SUM FROM 1 TO NISOSH OF NTABP(I) I12/51H NTEMPT TOTAL	LINE	636
		6 NUMBER OF VALUES OF VARIABLE TB /51H WHICH ARE GIVE	LINE	637
		7N. NTEMPT IS EQUAL TO /51H THE SUM FROM 1 TO NISOSH	LINE	638
		8OF NTABT(I) I12)	LINE	639
130		FORMAT (1H0,4X,7HISOTOPE,4X,4HNAME)	LINE	640
140		FORMAT (5X,13,7X,A6)	LINE	641
150		FORMAT (41H0LN(SIGPO)/LN(10) VALUES FOR ALL ISOTOPES/5X,7HISOTOPE,	LINE	642
		17X,5HVALUE)	LINE	643

160	FORMAT (7X,13.6X,E12.5)	LINA	644
170	FORMAT (30H0TEMPERATURES FOR ALL ISOTOPES/5X,7HISOTOPE,5X,YHUEONEE	LINA	645
	IS C)	LINA	646
180	FORMAT (21H0MAXIMUM ENERGY BOUND/3X,6HGROUP,1MJ)	LINA	647
190	FORMAT (28H0MINIMUM ENERGY BOUND OF SET//14X,E12.5)	LINA	648
200	FORMAT (69H0NUMBER OF LOWEST ENERGY GROUP FOR WHICH SELF-SHIELDING	LINA	649
	IS FACTORS GIVEN/5X,7HISOTOPE,7X,6HGROUP)	LINA	650
210	FORMAT (7X,13.8X,13)	LINA	651
220	FORMAT (70H0NUMBER OF HIGHEST ENERGY GROUP FOR WHICH SELF-SHIELDING	LINA	652
	IS FACTORS GIVEN/5X,7HISOTOPE,7X,6HGROUP)	LINA	653
230	FORMAT (66H0NUMBER OF SIGPO VALUES FOR WHICH SELF-SHIELDING FACTOR	LINA	654
	IS ARE GIVEN/5X,7HISOTOPE,6X,6HNUMBER)	LINA	655
240	FORMAT (72H0NUMBER OF TEMPERATURE VALUES FOR WHICH SELF-SHIELDING	LINA	656
	IFACTORS ARE GIVEN/5X,7HISOTOPE,6X,6HNUMBER)	LINA	657
250	FORMAT (29H0TOTAL SELF-SHIELDING FACTORS,14X,7HISOTOPE,13)	LINA	658
260	FORMAT (31H0CAPTURE SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)	LINA	659
270	FORMAT (31H0FISSION SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)	LINA	660
280	FORMAT (33H0TRANSPORT SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)	LINA	661
290	FORMAT (31H0ELASTIC SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)	LINA	662
	90 FORMAT (15H0CROSS SECTIONS)	LINA	663
310	FORMAT (9H0POSITION,4X,13HCROSS SECTION//4X,1H1,4X,20HPOTENTIAL SC	LINA	664
	LATERING/4X,1H2,4X,9HINELASTIC/4X,1H3,4X,7HRELASTIC/4X,1H4,4X,4CHAV	LINA	665
	2ERAGE COSINE OF ELASTIC SCATTERING ANGLE/4X,1H5,4X,4HRELASTIC DOWN	LINA	666
	3-SCATTERING TO ADJACENT GROUP/4X,1H6,4X,4SHAVENAGE ELASTIC SCATTER	LINA	667
	ING LETWARGY INCREMENT//4X,5HGROUP,39X,8HPOSITION/14X,6(12,11A))	LINA	668
320	FORMAT (9H0*** FILE,46,11H -- VERSION,13,8H -- UNIT,13,3H0**)	LINA	669
330	FORMAT (24H 00USER IDENTIFICATION00,46,3X,46)	LINA	670
775	END	LINA	671
	SUBROUTINE WOT(X,II,JJ,KK,TOP1,TOP2,TOP3,NOU)	LINA	672
C	PRINTS A SINGLE ONE-, TWO-, OR THREE-DIMENSIONAL REAL ARRAY.	LINA	673
C		LINA	674
C	--WOT PRINTS 1,2, OR 3-DIMENSIONAL ARRAYS	LINA	675
C		LINA	676
20	DIMENSION X(II,JJ,KK)	LINA	677
20	DO 100 K=1,KK	LINA	678
21	J02=0	LINA	679
21	J03=(JJ+8)/9	LINA	680
25	IF (KK.LE.1) GO TO 10	LINA	681
30	WRITE (NOU,12n)TOP3,K	LINA	682
44	DO 100 JK=1,J03	LINA	683
46	J01=J02+1	LINA	684
47	J04=MIN(J01+K,JJ)	LINA	685
53	WRITE (NOU,13n)TOP1,(TOP2,J,J=J01,J02)	LINA	686
72	NFLAG=0	LINA	687
73	DO 90 I=1,II	LINA	688
100	SSUM=0.0	LINA	689
101	DO 20 J=J01,J02	LINA	690
115	SSUM=SSUM+ABS(X(I,J,K))	LINA	691
120	IF (SSUM.NE.0.0) GO TO 30	LINA	692
125	NFLAG=NFLAG+1	LINA	693
126	IF (I.LT.II) GO TO 90	LINA	694
130	IF (NFLAG=1) A0=60.40	LINA	695
133	N=1-NFLAG	LINA	696
135	IM1=I-1	LINA	697
136	IF ((I.LT.II).OR.(SSUM.NE.0.0)) GO TO 50	LINA	698
146	N=N+1	LINA	699
147	IM1=I	LINA	700
151	WRITE (NOU,14n)N,IM1,(X(IM1,J,K),J=J01,J02)	LINA	701
201	GO TO 70	LINA	702
205	IF (SSUM.LE.0.0) GO TO 80	LINA	703
207	IM1=I-1	LINA	704
211	WRITE (NOU,14n)IM1,(X(IM1,J,K),J=J01,J02)	LINA	705
243	CONTINUE	LINA	706
243	NFLAG=0	LINA	707
244	IF (SSUM.LE.0.0) GO TO 90	LINA	708
246	WRITE (NOU,14n)I,(X(I,J,K),J=J01,J02)	LINA	709
274	WRITE (NOU,15n)	LINA	710
310	CONTINUE	LINA	711
313	CONTINUE	LINA	712
315	CONTINUE	LINA	713

320	RETURN	LINX	714
C		LINX	715
C		LINX	716
C		LINX	717
120	FORMAT (/1H0.6X,A6,I5)	LINX	718
130	FORMAT (/1H0.6X,A6,9(4X,A6,I3))	LINX	719
140	FORMAT (1H ,I10.4X,1P9E13.5)	LINX	720
150	FORMAT (1H)	LINX	721
160	FORMAT (1H ,I7.3H TO,I4.1P9E13.5)	LINX	722
321	END	LINX	723
	SUBROUTINE WOT8(A,L1,B,L2,C,L3,D,L4,E,L5,F,L6,G,L7,H,L8,NOU)	LINX	724
C		LINX	725
C	--SUBROUTINE WOT8 PRINTS UP TO 8 ONE-DIMENSIONAL ARRAYS.	LINX	726
C		LINX	727
31	DIMENSION FPT(19), FNT(6), L(8), Z(8), M(8), A(1), B(1), C(1), D(1)	LINX	728
	1), E(1), F(1), G(1), H(1)	LINX	729
31	EQUIVALENCE (Z,M)	LINX	730
	DATA X,K,FPT(1),FPT(2),FPT(19)/4H ,100000.4H(1PI.4H10 ,4H) /	LINX	731
	DATA FNT(1),FNT(2),FNT(3),FNT(4),FNT(5),FNT(6)/4H.E13.4H.5 ,4H.18	LINX	732
	1.,4H5X ,4H.9X.,4HA4 /	LINX	733
31	L(1)=L1	LINX	734
31	L(2)=L2	LINX	735
32	L(3)=L3	LINX	736
33	L(4)=L4	LINX	737
35	L(5)=L5	LINX	738
36	L(6)=L6	LINX	739
40	L(7)=L7	LINX	740
41	L(8)=L8	LINX	741
43	NOU	LINX	742
44	DO 10 I=1,8	LINX	743
51	N=MAX0(N,L(I))	LINX	744
54 10	CONTINUE	LINX	745
55	DO 120 I=1,N	LINX	746
62	DO 110 J=1,8	LINX	747
63	IF (L(J).GE.I) GO TO (2J,3J,4J,5J,6J,7J,8J,9J), J	LINX	748
104	Z(J)=X	LINX	749
106	FPT(2*J+1)=FNT(5)	LINX	750
110	FPT(2*J+2)=FNT(6)	LINX	751
111	GO TO 110	LINX	752
112 20	Z(J)=A(I)	LINX	753
115	GO TO 100	LINX	754
116 30	Z(J)=B(I)	LINX	755
121	GO TO 100	LINX	756
122 40	Z(J)=C(I)	LINX	757
125	GO TO 100	LINX	758
126 50	Z(J)=D(I)	LINX	759
132	GO TO 100	LINX	760
132 60	Z(J)=E(I)	LINX	761
136	GO TO 100	LINX	762
136 70	Z(J)=F(I)	LINX	763
142	GO TO 100	LINX	764
142 80	Z(J)=G(I)	LINX	765
146	GO TO 100	LINX	766
146 90	Z(J)=H(I)	LINX	767
154 100	FPT(2*J+1)=FNT(1)	LINX	768
156	FPT(2*J+2)=FNT(2)	LINX	769
157	IF (K.LE.IABS(M(J))) GO TO 110	LINX	770
163	IF (Z(J).EQ.0.0) M(J)=0	LINX	771
167	FPT(2*J+1)=FNT(3)	LINX	772
171	FPT(2*J+2)=FNT(4)	LINX	773
173 110	CONTINUE	LINX	774
175	WRITE (NOU,FPT) I,(Z(J),J=1,8)	LINX	775
212 120	CONTINUE	LINX	776
214	RETURN	LINX	777
215	END	LINX	778

		SUBROUTINE WOTI(IX,II,JJ,KK,TOPI,TOP2,TOP3,NOU)	LINE	779
	C	PRINTS A SINGLE ONE-, TWO-, OR THREE-DIMENSIONAL INTEGER ARRAY.	LINE	780
20		DIMENSION IX(II,JJ,KK)	LINE	781
20		DO 20 K=1,KK	LINE	782
21		JOC=0	LINE	783
21		JO2=(JJ+24)/25	LINE	784
25		IF (KK.LE.1) GO TO 10	LINE	785
30		WRITE (NOU,30)TOP3,K	LINE	786
44	10	DO 20 JK=1,J03	LINE	787
46		J01=J02+1	LINE	788
47		JOC=MIND(J01+24,JJ)	LINE	789
53		WRITE (NOU,40)TOP1,TOP2,(J,J=J01,J02)	LINE	790
71		DO 20 I=1,II	LINE	791
76		WRITE (NOU,50)I,(IX(I,J,K),J=J01,J02)	LINE	792
130	20	CONTINUE	LINE	793
137		RETURN	LINE	794
	C		LINE	795
	C		LINE	796
	C		LINE	797
30		FORMAT (/1H0.6X,A6,I5)	LINE	798
40		FORMAT (/1H0.A6.1H/.A6.25I4)	LINE	799
50		FORMAT (1H .I6.7X.25I4)	LINE	800
140		END	LINE	801
		SUBROUTINE REED(N,IREC,X,L,MODE)	LINE	802
14		DIMENSION X(L)	LINE	803
14		READ (N)(X(I),I=1,L)	LINE	804
24		RETURN	LINE	805
25		END	LINE	806
		SUBROUTINE RITE(N,IREC,X,L,MODE)	LINE	807
14		DIMENSION X(L)	LINE	808
14		WRITE (N)(X(I),I=1,L)	LINE	809
24		RETURN	LINE	810
25		END	LINE	811
		SUBROUTINE STOW(A,B,NWDS)	LINE	812
10		DIMENSION A(NWDS), B(NWDS)	LINE	813
10		IF (NWDS.LE.0) RETURN	LINE	814
12		DO 10 N=1,NWDS	LINE	815
16	10	B(N)=A(N)	LINE	816
20		RETURN	LINE	817
21		END	LINE	818
		SUBROUTINE STOWI(IA,IB,NWDS)	LINE	819
10		DIMENSION IA(NWDS), IB(NWDS)	LINE	820
10		IF (NWDS.LE.0) RETURN	LINE	821
12		DO 10 N=1,NWDS	LINE	822
16	10	IB(N)=IA(N)	LINE	823
20		RETURN	LINE	824
21		END	LINE	825
		SUBROUTINE COPYP(N4,N8,NGROUP,NSCMAX,NISO,IREC1)	LINE	826
16		DIMENSION A(1), IA(1), MODE(3)	LINE	827
16		COMMON A	LINE	828
16		EQUIVALENCE (A(1),IA(1))	LINE	829
		DATA MODE(1),MODE(2),MODE(3)/1,1,1/	LINE	830
16		NSDLOK=1	LINE	831
17		DO 60 I=1,NISO	LINE	832
20		NWDS=(2*NGROUP+2)*NSCMAX+15	LINE	833
23		IREC1=IREC1+1	LINE	834
25		CALL REED (N4,IREC1,A(1),NWDS,MODE(1))	LINE	835

33		CALL RITE (NB,IREC1,A(1),NWDS,MODE(1))	LINA	836
51		JREAD=1+NWDS	LINA	837
52		NCIBLK=IA(8)	LINA	838
54		ICHI=IA(9)	LINA	839
55		IFIS=IA(10)	LINA	840
57		IALF=IA(11)	LINA	841
60		INP=IA(12)	LINA	842
62		INCN=IA(13)	LINA	843
63		INUS=IA(14)	LINA	844
65		IN=IA(15)	LINA	845
	C		LINA	846
	C	--PRINCIPAL CROSS SECTIONS	LINA	847
	C		LINA	848
66		NWUS=14+IFIS*(ICHI*(1/NCIBLK)+2)*IALF+INP*IN2N+INQ+INT)*NGRUP	LINA	849
103		IREC1=IREC1+1	LINA	850
105		CALL RITE (NB,IREC1,A(JREAD),NWDS,MODE(1))	LINA	851
	C		LINA	852
	C	--ISOTOPE CMT DATA	LINA	853
	C		LINA	854
114		IF (NCIBLK.EQ.1) GO TO 20	LINA	855
122		IF (IFIS.LT.1) GO TO 20	LINA	856
124		IF (ICHI.LT.1) GO TO 20	LINA	857
126		NWUS=((NGRUP-1)/NCIBLK+1)*ICHI	LINA	858
133		NP1=JREAD	LINA	859
135		DO 10 N=1,NCIBLK	LINA	860
136		IREC1=IREC1+1	LINA	861
137		CALL REED (N4,IREC1,A(NPT),NWDS,MODE(1))	LINA	862
146		CALL RITE (NB,IREC1,A(NPT),NWDS,MODE(1))	LINA	863
165	10	NP1=NP1+NWDS	LINA	864
	C		LINA	865
	C	--SCATTERING CROSS SECTIONS	LINA	866
	C		LINA	867
171	20	DO 60 N=1,NSCMAX	LINA	868
173		K=N+15	LINA	869
174		K=N+NSCMAX	LINA	870
175		LOMDN=IA(K)	LINA	871
177		IF (LOMDN.NE.6) GO TO 30	LINA	872
201		GO TO 60	LINA	873
201	30	KMAX=N	LINA	874
202		K=2*NSCMAX+15+(N-1)*NGROUP	LINA	875
206		INC=(NGROUP-1)/NSBLOK+1	LINA	876
212		NP1=JREAD	LINA	877
214		DO 50 J=1,NSBLOK	LINA	878
215		JL=(J-1)*INC+1	LINA	879
220		JU=J+INC	LINA	880
221		NWUS=N	LINA	881
222		DO 40 JJ=JL,JU	LINA	882
231		L=N+JJ	LINA	883
232		NWUS=NWUS+IA(L)	LINA	884
233	40	KMAX=KMAX+IA(L)	LINA	885
242		NWUS=NWUS+LOMDN	LINA	886
244		IREC1=IREC1+1	LINA	887
245		CALL REED (N4,IREC1,A(NPT),NWDS,MODE(1))	LINA	888
254		CALL RITE (N4,IREC1,A(NPT),NWDS,MODE(1))	LINA	889
273	50	NP1=NP1+NWDS	LINA	890
277	60	CONTINUE	LINA	891
304		RETURN	LINA	892
305		END	LINA	893
		SUBROUTINE PIFID(NOUT,NIN)	LINA	894
6		RETURN	LINA	895
7		END	LINA	896