VI.F.2. Input to Produce Files in ENDF File 2 or File 32 Format

SAMMY is capable of converting information obtained from the usual SAMMY INPut and PARameter files (plus a modest amount of additional input) into ENDF File 2 format, in several of the many versions of that format. To invoke this option, the following line must be included in the INPut file:

```
ENDF/B-VI FILE 2 IS wanted
```

(This may be shortened to "ENDF" if desired.)

One additional file is required, denoted the "ndf" file, whose name is supplied to SAMMY in the site in which SAMMY would normally expect the DATa file name (see Section VI.E). Contents of this file are shown in Table VI F2.1.

There is a more convenient version of the ndf file, which is used when the INPut file contains the command line

```
NDF FILE IS IN KEY-Word format
```

This is the preferred version for the ndf file. Formats for the file are key word based; see Table VI F2.2 for details. Below are two examples of key word files:

^{235}U	^{23}Na
Z=92 A=235 Isotope # 1 Spi=7.5 L=0,Group=1,2	Z=11 A=23 Mat=1125 Isotope=1 Spin=1.5 L=0,GROUP=1,2 L=1,GROUP=3,4,5,6,7,8 L=2,GROUP=9,10,11,12,13,14,15,16

In either case, SAMMY will produce a file called SAMMY.NDF, which contains the appropriate lines for ENDF/B File 2. See test cases tr023, tr086, tr126, tr137, tr154 for examples.

In SAMMY.NDF, resonance energies are given in F format, to as many significant digits as possible within the limitation of eleven columns. Widths are given in E format, with, however, the "E" suppressed and the exponent given as one digit if possible.

To produce ENDF File 32 (covariance matrix for resonance parameters), include the command

```
PUT COVARIANCE MATRIx into endf file 32
```

Only the key word version of the ndf file is acceptable for this option. Parameters such as "`LCOmp`", "`DIAgonal`" and "`DEfault uncertainty`" are relevant here; see Table VI F2.2. The output file, to be used as ENDF File 32, is called SAMMY.N32.

When the command DEBUG is given in the INPut file, then additional "annotated" files will be produced by SAMMY, to aid the reader in understanding what is where in the ENDF file. The file SAMMY.NDX is identical to file SAMMY.NDF, except that it also contains annotations (lines beginning with #) describing the information in the file. Similarly, the file SAMMY.N3X is identical to the first portion of SAMMY.N32 except for the annotations.

NOTE: The ENDF File 2 LRF=3 convention for the angular momentum parameter AJ is as follows: AJ is defined as $\pm J$, where the sign denotes the channel spin s; AJ = $-J$ denotes $s = I - i$, with i = 1/2 for neutron; AJ = $+J$ denotes $s = I + i$. This is in compliance with the format change approved by the Cross Section Evaluation Working Group at the 1999 meeting [ENDF 99].

CAUTION: SAMMY's original implementation of the LRF=7 format was not entirely correct for 0^- nuclides; the negative parity was not specified properly. To the best of the author's knowledge, no official ENDF files were created with this version of SAMMY. Nevertheless, anyone using very early examples of LRF=7 ENDF files for 0^- nuclides should check to be certain that the file behaves as expected.

Table VI F2.1. File needed for generating ENDF File 2 output

Card Set	Line number	Variable	Format	Notes
1	1	ZA AWR	F F	These are ENDF variables, and thus follow the ENDF-6 rules for determining their values. Often, but not always, ZA has the value (1000 * Z + A). AWR is the ratio of the mass of the sample to the neutron mass; the default value is AW/*aneutron*, where AW is the mass as given in the SAMMY INPut file and *aneutron* is the mass of the neutron. In general, it is recommended that the default value be used for AWR.
		LRF	I	LRF specifies which ENDF format and which R-matrix approximation are to be used; LRF = 3 (Reich-Moore) is default. Caution: The ENDF LRF=3 format permits only a limited subset of the Reich-Moore capability as implemented in SAMMY.
		MAT	I	ENDF MAT number (default = 9999).
2	1	SPI(1) ZAI(1) ABN(1) AWRI(1)	F	These are also ENDF-6 variables and are defined, respectively, as the ground-state spin, the (Z,A) value, the abundance, and the ratio of the isotopic mass to that of a neutron. Use of the default for AWRI(i) is again recommended: AW/*aneutron*, where AW is the value given in the SAMMY files and *aneutron* is the mass of a neutron.
	2	LENDFG(1,1)	I	Angular momentum for the first ENDF spin group
		KENDFG(1,1,1) KENDFG(2,1,1) . . .	I I	SAMMY spin groups belonging to this ENDF spin group. There may be more than one SAMMY group per ENDF group, since ENDF LRF = 3 groups consist of energy-ordered sets of all resonances with the same *l*, while SAMMY groups are defined by both J and *l*. SAMMY will check that the specified groups have the correct *l*, and print an error message if they do not.
	3	LENDFG(i,1)	I	Angular momentum *l* for ith group (2nd, 3rd, etc.)
		KENDFG(1,i,1) KENDFG(2,i,1) . . .	I I	SAMMY groups belonging to this ENDF group
	4	Repeat Line 3 as many times as necessary		
	Last	(blank)		
3	Repeat card set 2 as many times as necessary, once for each nuclide/isotope			