				Spe
PROGRAM	SPECT	ГRА		Spe
======				Spe
			inearize ALl MF=5 spectra.	Spe
			utron induced, photon spectra.	Spe
00/20/2	012	naaca nii 10 ne	acton inaacca, photon spectra.	Spe
First r	elease	ed in 2010 - Ea	rlier below dates refer to LINEAR.	Spe
11100 1	SICUBO	,a 111 2010	THE DELOW GREEN FOLLY	Spe
VERSION	74-1	(MAY 1974)		Spe
		(APRIL 1975)		Spe
		(OCTOBER 1976)		Spe
		(JANUARY 1977)		Spe
		(JULY 1978)		Spe
			C-7600 AND CRAY-1 VERSION.	Spe
			, CDC AND CRAY VERSION.	Spe
		(DECEMBER 1980		Spe
		(MARCH 1981)	,	Spe
			IMPROVED COMPUTER COMPATIBILITY.	Spe
			*MAJOR RE-DESIGN.	Spe
VERGION	00 1	(OTHIVOTHICE 1900)	*PAGE SIZE INCREASED - 1002 TO 3006.	Spe
			*ELIMINATED COMPUTER DEPENDENT CODING.	_
			*NEW, MORE COMPATIBLE I/O UNIT NUMBER.	-
			*ADDED OPTION TO KEEP ALL ORIGINAL	Spe
			ENERGY POINTS FROM EVALUATION.	Spe
			*ADDED STANDARD ALLOWABLE ERROR OPTION	-
			(CURRENTLY 0.1 PER-CENT).	Spe
VERSION	83-2	(OCTOBER 1983)	IMPROVED BASED ON USER COMMENTS.	Spe
		(APRIL 1984)	IMPROVED BASED ON USER COMMENTS.	Spe
			*UPDATED FOR ENDF/B-VI FORMATS.	Spe
VERGION	012		*SPECIAL I/O ROUTINES TO GUARANTEE	Spe
			ACCURACY OF ENERGY.	Spe
			*DOUBLE PRECISION TREATMENT OF ENERGY	Spe
			(REQUIRED FOR NARROW RESONANCES).	Spe
VERSION	85-1	(Aligher 1985)	*FORTRAN-77/H VERSION	Spe
			*ENDF/B-VI FORMAT	Spe
			*DOUBLE PRECISION TREATMENT OF CROSS	Spe
VERGION	0, 1	(OTHIOTHICE 1507)	SECTION	Spe
VERSION	88-1	(JULY 1988)	*OPTIONINTERNALLY DEFINE ALL I/O	Spe
1210101	00 =	(0021 1300)	FILE NAMES (SEE, SUBROUTINE FILEIO	Spe
			FOR DETAILS).	Spe
			*IMPROVED BASED ON USER COMMENTS.	Spe
VERSION	89-1		*PSYCHOANALYZED BY PROGRAM FREUD TO	Spe
		(,	INSURE PROGRAM WILL NOT DO ANYTHING	Spe
			CRAZY.	Spe
			*UPDATED TO USE NEW PROGRAM CONVERT	Spe
			KEYWORDS.	Spe
			*ADDED LIVERMORE CIVIC COMPILER	Spe
			CONVENTIONS.	Spe
VERSTON	90-1	(JUNE 1990)	*EXTENDED TO LINEARIZE PHOTON	Spe
		=====/	INTERACTION DATA, MF=23 AND 27	Spe
			*ADDED FORTRAN SAVE OPTION	Spe
			*UPDATED BASED ON USER COMMENTS.	Spe
			*NEW MORE CONSISTENT ENERGY OUTPUT	Spe
			ROUTINE.	Spe
			*WARNINGINPUT PARAMETER FORMAT	Spe
			HAS BEEN CHANGEDSEE DESCRIPTION	Spe
			BELOW.	Spe
VERSION	91-1	(JULY 1991)	*ADDED INTERPOLATION LAW 6 - ONLY USED	Spe
			FOR CHARGED PARTICLE CROSS SECTIONS	Spe
			FOR COULOMB PENETRABILITIES.	Spe
VERSTON	92-1	(JANUARY 1992)	*ADDED NU-BAR (TOTAL, DELAYED, PROMPT)	Spe
	I	(3111,0111(1 1332)	POLYNOMIAL OR TABULATED ALL CONVERTED	Spe
			TO LINEARLY INTERPOLABLE	Spe
			*INCREASED PAGE SIZE FROM 3006 TO 5010	Spe
			POINTS.	Spe
				Spe
			*ALL ENERGIES INTERNALLY POINDED PRIOR	
			*ALL ENERGIES INTERNALLY ROUNDED PRIOR TO CALCULATIONS	
			TO CALCULATIONS.	Spe
				Spe

ORIGINALLY WF	RITTEN BY		Spectra Spectra
EUROPE	TUMBN DY		Spectra Spectra
INTERNATIONAL P.O. BOX 100 A-1400, VIENN	ATOMIC ENERGY IA, AUSTRIA	AGENCY	Spectra Spectra Spectra
THE NUCLEAR D			Spectra Spectra
OWNED, MAINTA	AINED AND DISTRI	BUTED BY	Spectra Spectra
		SEND between sub-sections. *Deleted unused parts, e.g., NUBAR.	Spectra Spectra
		*Corrected MF=15 Data - it was adding	Spectra
VERS. 2015-1	(Jan. 2015)	*Extended OUT9. *Replaced ALL 3 way IF Statements.	Spectra Spectra
TEDO 0015 1	/ Tam 2015)	*Added ERROR stop	Spectra
		*Added CODENAME *32 and 64 bit Compatible	Spectra Spectra
		spectra.	Spectra
VERS. 2012-1	(Aug. 2012)	*Added MF=15, neutron induced photon	Spectra
		TO PREVENT CONFLICT WITH LINEAR THINNING.	Spectra Spectra
		*ONLY PROCESS MF=5 - SKIP ALL OTHERS	Spectra
vERG. ZUIU-I	(OONE ZOIO)	*72 CHARACTER FILE NAMES.	Spectra
VERS. 2010-1	(.TIME 2010)	600,000 POINTS *ADDED MF = 5 - MF = 6 STILL PLANNED.	Spectra Spectra
	,,,,,,,	*INCREASED PAGE SIZE FROM 60,000 TO	Spectra
VERS. 2007-1	(JAN. 2007)	*NO SUBDIVIDE BELOW MINIMUM XCMIN *CHECKED AGAINST ALL ENDF/B-VII.	Spectra Spectra
VERS. 2006-1	(FEB. 2006)	*CORRECTED INT=6 NEAR THRESHOLD	Spectra
vĿK5. ∠UU5-1	(UAN. 2005)	*ALWAYS KEEP ORIGINAL TABULATED NU-BAR POINTS.	Spectra Spectra
VERS. 2004-1 VERS. 2005-1		*GENERAL UPDATE BASED ON USER FEEDBACK *ALWAYS KEEP ORIGINAL TABULATED	
VERS. 2002-1		*OPTIONAL INPUT PARAMETERS	Spectra
		*GENERAL IMPROVEMENTS BASED ON USER FEEDBACK	Spectra Spectra
VERS. 2000-1	(FEBRUARY 2000)	*ADDED MF = 9 AND 10 LINEARIZATION	Spectra
		MF=1, MT-451.	Spectra
VERSION 99-2	(JUNE 1999)	USER FEEDBACK *ASSUME ENDF/B-VI, NOT V, IF MISSING	Spectra Spectra
		*GENERAL IMPROVEMENTS BASED ON	Spectra
		*UPDATED TEST FOR ENDF/B FORMAT VERSION BASED ON RECENT FORMAT CHANGE	Spectra Spectra
		POINT READ FOR MORE DIGITS	Spectra
VERSION 99-1	(MARCH 1999)	*CORRECTED CHARACTER TO FLOATING	Spectra
		*INCREASED PAGE SIZE FROM 30000 TO 60000 POINTS	Spectra Spectra
		*ALWAYS INCLUDE THERMAL VALUE *INCREASED PAGE SIZE FROM 30000 TO	Spectra
		*DEFINED SCRATCH FILE NAMES	Spectra
		*UNIFORM TREATMENT OF ENDF/B I/O *IMPROVED OUTPUT PRECISION	Spectra Spectra
		*ON SCREEN OUTPUT	Spectra
		*IMPROVED COMPUTER INDEPENDENCE *ALL DOUBLE PRECISION	Spectra Spectra
VERSION 96-1	(JANUARY 1996)	*COMPLETE RE-WRITE	Spectra
		(SEE, SUBROUTINE ENDIT)	Spectra
	*	HAS BEEN CHANGED) CLOSE ALL FILES BEFORE TERMINATING	Spectra Spectra
		(WARNING - INPUT PARAMETER FORMAT	Spectra
VERSION 94-1	(JANUARY 1994)*	VARIABLE ENDF/B DATA FILENAMES TO ALLOW ACCESS TO FILE STRUCTURES	Spectra Spectra
INDUITON 04 1	/ TANITA DIZ 1004) 4	30000 POINTS	Spectra
	*	FINCREASED PAGE SIZE FROM 5010 TO	Spectra
VERSION 93-1	(MARCH 1993) *	*UPDATED FOR USE WITH LAHEY COMPILER ON IBM-PCS.	Spectra Spectra
		ENERGY DEPENDENT QUANTITY).	Spectra
		SPONTANEOUS NU-BAR (BY DEFINITION THE SPONTANEOUS NU-BAR IS NOT AN	Spectra Spectra
		POLYNOMIAL TO TABULATED - COPY	Spectra
VERSION 92-2	(JULY 1992) *	*CORRECTED CONVERSION OF NU-BAR FROM	Spectra

Dermott E. Cullen Spectra Spectra PRESENT CONTACT INFORMATION Spectra Spectra Dermott E. Cullen Spectra 1466 Hudson Way Spectra Livermore, CA 94550 Spectra Spectra Telephone 925-443-1911 Spectra RedCullen1@Comcast.net E. Mail Spectra http://home.comcast.net/~redcullen1 Website Spectra Spectra AUTHORS MESSAGE Spectra Spectra THE REPORT DESCRIBED ABOVE IS THE LATEST PUBLISHED DOCUMENTATION Spectra FOR THIS PROGRAM. HOWEVER, THE COMMENTS BELOW SHOULD BE CONSIDERED Spectra THE LATEST DOCUMENTATION INCLUDING ALL RECENT IMPROVEMENTS. PLEASE Spectra READ ALL OF THESE COMMENTS BEFORE IMPLEMENTATION. Spectra AT THE PRESENT TIME WE ARE ATTEMPTING TO DEVELOP A SET OF COMPUTER Spectra INDEPENDENT PROGRAMS THAT CAN EASILY BE IMPLEMENTED ON ANY ONE OF A WIDE VARIETY OF COMPUTERS. IN ORDER TO ASSIST IN THIS PROJECT Spectra IT WOULD BE APPECIATED IF YOU WOULD NOTIFY THE AUTHOR OF ANY Spectra COMPILER DIAGNOSTICS, OPERATING PROBLEMS OR SUGGESTIONS ON HOW TO Spectra IMPROVE THIS PROGRAM. HOPEFULLY, IN THIS WAY FUTURE VERSIONS OF Spectra THIS PROGRAM WILL BE COMPLETELY COMPATIBLE FOR USE ON YOUR COMPUTER. Spect.ra Spectra PURPOSE Spectra Spectra THIS PROGRAM IS DESIGNED TO CONVERT ENDF/B FILE 3, 23 AND 27 DATA Spectra TO LINEAR-LINEAR INTERPOLABLE FORM. ANY SECTION THAT IS ALREADY Spectra LINEAR-LINEAR INTERPOLABLE WILL BE THINNED. Spectra IN THE FOLLOWING DISCUSSION FOR SIMPLICITY THE ENDF/B TERMINOLOGY Spectra ---ENDF/B TAPE---WILL BE USED. IN FACT THE ACTUAL MEDIUM MAY BE Spectra TAPE, CARDS, DISK OR ANY OTHER MEDIUM. Spectra Spectra ENDF/B FORMAT Spectra Spectra THIS PROGRAM ONLY USES THE ENDF/B BCD OR CARD IMAGE FORMAT (AS Spect.ra OPPOSED TO THE BINARY FORMAT) AND CAN HANDLE DATA IN ANY VERSION Spectra OF THE ENDF/B FORMAT (I.E., ENDF/B-I, II, III, IV, V OR VI FORMAT). Spectra Spectra IT IS ASSUMED THAT THE DATA IS CORRECTLY CODED IN THE ENDF/B Spectra FORMAT AND NO ERROR CHECKING IS PERFORMED. IN PARTICULAR IT IS Spectra ASSUMED THAT THE MAT, MF AND MT ON EACH LINE IS CORRECT. SEQUENCE Spectra NUMBERS (COLUMNS 76-80) ARE IGNORED ON INPUT, BUT WILL BE Spectra CORRECTLY OUTPUT ON ALL LINES. THE FORMAT OF SECTION MF=1, MT=451Spectra AND ALL SECTIONS OF MF=3 MUST BE CORRECT. THE PROGRAM COPIES ALL Spectra OTHER SECTION OF DATA AS HOLLERITH AND AS SUCH IS INSENSITIVE TO Spectra THE CORRECTNESS OR INCORRECTNESS OF ALL OTHER SECTIONS. Spectra Spectra OUTPUT FORMAT Spectra Spectra IN THIS VERSION OF LINEAR ALL ENERGIES WILL BE OUTPUT IN F (INSTEAD OF E) FORMAT IN ORDER TO ALLOW ENERGIES TO BE WRITTEN Spectra WITH UP TO 9 DIGITS OF ACCURACY. IN PREVIOUS VERSIONS THIS WAS AN Spectra OUTPUT OPTION. HOWEVER USE OF THIS OPTION TO COMPARE THE RESULTS Spectra OF ENERGIES WRITTEN IN THE NORMAL ENDF/B CONVENTION OF 6 DIGITS Spectra TO THE 9 DIGIT OUTPUT FROM THIS PROGRAM DEMONSTRATED THAT FAILURE Spectra TO USE THE 9 DIGIT OUTPUT CAN LEAD TO LARGE ERRORS IN THE DATA Spectra DUE TO TRUNCATION OF ENERGIES TO 6 DIGITS DURING OUTPUT. Spectra Spect.ra CONTENTS OF OUTPUT Spectra Spectra

ENTIRE EVALUATIONS ARE OUTPUT, NOT JUST THE LINEARIZED DATA

CROSS SECTIONS, E.G. ANGULAR AND ENERGY DISTRIBUTIONS ARE ALSO

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DOCUMENTATION

INCLUDED.

THE FACT THAT THIS PROGRAM HAS OPERATED ON THE DATA IS DOCUMENTED BY THE ADDITION OF 3 COMMENT LINES AT THE END OF EACH HOLLERITH SECTION IN THE FORM

******* PROGRAM SPECTRA (2015-1) ********* FOR ALL DATA GREATER THAN 1.00000-10 IN ABSOLUTE VALUE DATA LINEARIZED TO WITHIN AN ACCURACY OF 0.1 PER-CENT

THE ORDER OF SIMILAR COMMENTS (FROM RECENT, SIGMA1 AND GROUPIE) REPRESENTS A COMPLETE HISTORY OF ALL OPERATIONS PERFORMED ON THE DATA BY THESE PROGRAMS.

THESE COMMENT LINES ARE ONLY ADDED TO EXISTING HOLLERITH SECTIONS, Spectra I.E., THIS PROGRAM WILL NOT CREATE A HOLLERITH SECTION. THE FORMAT Spectra OF THE HOLLERITH SECTION IN ENDF/B-V DIFFERS FROM THE THAT OF EARLIER VERSIONS OF ENDF/B. BY READING AN EXISTING MF=1, MT=451 IT IS POSSIBLE FOR THIS PROGRAM TO DETERMINE WHICH VERSION OF THE ENDF/B FORMAT THE DATA IS IN. WITHOUT HAVING A SECTION OF MF=1, MT=451 PRESENT IT IS IMPOSSIBLE FOR THIS PROGRAM TO DETERMINE WHICH VERSION OF THE ENDF/B FORMAT THE DATA IS IN, AND AS SUCH IT IS IMPOSSIBLE FOR THE PROGRAM TO DETERMINE WHAT FORMAT SHOULD BE USED TO CREATE A HOLLERITH SECTION.

REACTION INDEX

THIS PROGRAM DOES NOT USE THE REACTION INDEX WHICH IS GIVEN IN SECTION MF=1, MT=451 OF EACH EVALUATION.

THIS PROGRAM DOES NOT UPDATE THE REACTION INDEX IN MF=1, MT=451. THIS CONVENTION HAS BEEN ADOPTED BECAUSE MOST USERS DO NOT REQUIRE A CORRECT REACTION INDEX FOR THEIR APPLICATIONS AND IT WAS Spectra NOT CONSIDERED WORTHWHILE TO INCLUDE THE OVERHEAD OF CONSTRUCTING A CORRECT REACTION INDEX IN THIS PROGRAM. HOWEVER, IF YOU REQUIRE A REACTION INDEX FOR YOUR APPLICATIONS, AFTER RUNNING THIS PROGRAM Spectra YOU MAY USE PROGRAM DICTIN TO CREATE A CORRECT REACTION INDEX.

SECTION SIZE

SINCE THIS PROGRAM USES A LOGICAL PAGING SYSTEM THERE IS NO LIMIT TO THE NUMBER OF POINTS IN ANY SECTION, E.G., THE TOTAL CROSS SECTION MAY BE REPRESENTED BY 200,000 DATA POINTS.

FOR ANY LINEARIZED SECTION THAT CONTAINS 60000 OR FEWER POINTS THE ENTIRE OPERATION WILL BE PERFORMED IN CORE AND THE LINEARIZED DATA WILL BE OUTPUT DIRECTLY TO THE ENDF/B FORMAT. FOR ANY SECTION Spectra THAT CONTAINS MORE POINTS THE DATA WILL BE LINEARIZED A PAGE AT A TIME (1 PAGE = 60000 POINTS) AND OUTPUT TO SCRATCH. AFTER THE ENTIRE SECTION HAS BEEN LINEARIZED THE DATA WILL BE READ BACK FROM Spectra SCRATCH AND OUTPUT TO THE ENDF/B FORMAT.

SELECTION OF DATA

THE PROGRAM SELECTS DATA TO BE LINEARIZED BASED EITHER ON EITHER MAT (ENDF/B MAT NO.) OR ZA AS WELL AS MF AND MT NUMBERS. THIS PROGRAM ALLOWS UP TO 100 MAT/MF/MT OR ZA/MF/MT RANGES TO BE SPECIFIED BY INPUT PARAMETERS. THE PROGRAM WILL ASSUME THAT THE ENDF/B TAPE IS IN MAT ORDER, REGARDLESS OF THE CRITERIA USED TO RETRIEVE MATERIALS. IF RETRIEVAL IS BY MAT RANGE THE PROGRAM WILL TERMINATE WHEN A MAT IS FOUND THAT IS ABOVE ALL REQUESTED MAT RANGES. IF RETRIEVAL IS BY ZA RANGE THE PROGRAM WILL SEARCH THE ENTIRE ENDF/B TAPE.

PROGRAM OPERATION

EACH SECTION OF DATA IS CONSIDERED SEPARATELY. EACH SECTION OF ENDF/B DATA TO LINEARIZE IS REPRESENTED BY A TABLE OF ENERGY VS. CROSS SECTION AND ANY ONE OF FIVE ALLOWABLE INTERPOLATION LAWS Spectra BETWEEN ANY TWO TABULATED POINTS. THIS PROGRAM WILL REPLACE EACH SECTION OF DATA CROSS SECTIONS BY A NEW TABLE OF ENERGY VS. CROSS SECTION IN WHICH THE INTERPOLATION LAW IS ALWAYS LINEAR IN

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ENERGY AND CROSS SECTION BETWEEN ANY TWO TABULATED POINTS.

DATA IS READ AND LINEARIZED A PAGE AT A TIME (ONE PAGE CONTAINS 60000 DATA POINTS). IF THE FINAL LINEARIZED SECTION CONTAINS TWO PAGES OR LESS, DATA POINTS IT WILL BE ENTIRELY CORE RESIDENT AFTER IT HAS BEEN LINEARIZED AND WILL BE WRITTEN DIRECTLY FROM CORE TO THE OUTPUT TAPE. IF THE LINEARIZED SECTION IS LARGER THAN TWO PAGES, AFTER EACH PAGE IS LINEARIZED IT WILL BE WRITTEN TO SCRATCH. AFTER THE ENTIRE SECTION HAS BEEN LINEARIZED IT WILL BE READ BACK FROM SCRATCH, TWO PAGES AT A TIME, AND WRITTEN TO THE OUTPUT TAPE.

KEEP EVALUATED DATA POINTS

SOMETIMES IT IS CONVENIENT TO KEEP ALL ENERGY POINTS WHICH WERE PRESENT IN THE ORIGINAL EVALUATION AND TO MERELY SUPPLEMENT THESE POINTS WITH ADDITIONAL ENERGY POINTS IN ORDER TO LINEARIZE THE CROSS SECTIONS. FOR EXAMPLE, IT IS OFTEN CONVENIENT TO KEEP THE THERMAL VALUE (AT 0.0253 EV) OR THE VALUE AT 14.1 MEV.

THE CURRENT VERSION OF THIS PROGRAM WILL ALLOW THE USER TO KEEP ALL ORIGINAL EVALUATED DATA POINTS BY SPECIFYING 1 IN COLUMNS 34-44 OF THE FIRST INPUT LINE. THIS WILL TURN OFF THE BACKWARD THINNING (SEE UCRL-50400, VOL. 17, PART A FOR EXPLANATION) AND RESULT IN ALL ORIGINAL ENERGY POINTS BEING KEPT. CAUTION SHOULD BE EXERCISED IN USING THIS OPTION SINCE IT CAN RESULT IN A CONSIDERABLE INCREASE IN THE NUMBER OF DATA POINTS OUTPUT BY THIS CODE.

FOR ALL USERS WHO ARE NOT INTERESTED IN THIS OPTIONS NO CHANGES ARE REQUIRED IN THE INPUT TO THIS PROGRAM, I. E. IF COLUMNS 34-44 ARE BLANK (AS FOR ALL PREVIOUS VERSIONS OF THIS CODE) THE PROGRAM WILL OPERATE EXACTLY AS IT DID BEFORE.

ALLOWABLE ERROR

ALLOWABLE ERROR MUST ALWAYS BE SPECIFIED IN THE INPUT TO THIS PROGRAM AS A FRACTION, NOT A PER-CENT. FOR EXAMPLE, INPUT THE ALLOWABLE FRACTIONAL ERROR 0.001 IN ORDER TO OBTAIN DATA THAT IS ACCURATE TO WITHIN 0.1 PER-CENT.

THE CONVERSION OF THE DATA FROM THE GENERAL INTERPOLATION FORM TO Spectra LINARLY INTERPOLABLE FORM CANNOT BE PERFORMED EXACTLY. HOWEVER, IT Spectra CAN BE PERFORMED TO VIRTUALLY ANY REQUIRED ACCURACY AND MOST IMPORTANTLY CAN BE PERFORMED TO A TOLERANCE THAT IS SMALL COMPARED Spectra TO THE UNCERTAINTY IN THE CROSS SECTIONS THEMSELVES. AS SUCH THE Spectra CONVERSION OF CROSS SECTIONS TO LINEARLY INTERPOLABLE FORM CAN BE Spectra PERFORMED WITH ESSENTIALLY NO LOSE OF INFORMATION.

THE ALLOWABLE ERROR MAY BE ENERGY INDEPENDENT (CONSTANT) OR ENERGY Spectra DEPENDENT. THE ALLOWABLE ERROR IS DESCRIBED BY A TABULATED FUNCTION OF UP TO 20 (ENERGY, ERROR) PAIRS AND LINEAR INTERPOLATION Spectra BETWEEN TABULATED POINTS. IF ONLY ONE TABULATED POINT IS GIVEN THE Spectra ERROR WILL BE CONSIDERED CONSTANT OVER THE ENTIRE ENERGY RANGE. WITH THIS ENERGY DEPENDENT ERROR ONE MAY OPTIMIZE THE OUTPUT FOR ANY GIVEN APPLICATION BY USING A SMALL ERROR IN THE ENERGY RANGE OF INTEREST AND A LESS STRINGENT ERROR IN OTHER ENERGY RANGES.

DEFAULT ALLOWABLE ERROR

IN ORDER TO INSURE CONVERGENCE OF THE LINEARIZING ALGORITHM THE ALLOWABLE ERROR MUST BE POSITIVE. IF THE USER INPUTS AN ERROR THAT IS NOT POSITIVE IT WILL AUTOMATICALLY BE SET TO THE DEFAULT VALUE (CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT) AND INDICATED AS SUCH IN THE OUTPUT LISTING.

COULOMB PENETRABILITY (INTERPOLATION LAW = 6)

INTRODUCED FOR ENDF/B-VI. THIS IS DEFINED AS,

SIG(E) = C1*EXP(-C2/SQRT(E - T))

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Spectra THIS PROGRAM ONLY CONSIDERS EXOTHERMIC REACTIONS - T = 0Spectra Spectra SIG(E) = C1*EXP(-C2/SORT(E))Spectra WARNING...THIS INTERPOLATION LAW SHOULD ONLY BE USED FOR REACTIONS Spectra WHICH HAVE A POSITIVE Q-VALUE (EXOTHERMIC REACTIONS), Spectra SINCE HERE WE ONLY CONSIDER T = 0.0 IN THE FORMALISM. Spectra IN ALL OTHER CASES A WARNING MESSAGE WILL BE PRINTED. Spectra Spectra INPUT FILES Spectra _____ Spectra UNIT DESCRIPTION Spectra Spectra 2 INPUT LINES (BCD - 80 CHARACTERS/RECORD) Spectra 10 ORIGINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD) Spectra Spectra OUTPUT FILES Spectra -----Spectra UNIT DESCRIPTION Spectra _____ Spectra 3 OUTPUT REPORT (BCD - 120 CHARACTERS/RECORD) Spectra 11 FINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD) Spectra Spectra SCRATCH FILES Spectra Spectra UNIT DESCRIPTION Spectra -----Spectra 12 SCRATCH FILE (BINARY - 180000 WORDS/RECORD Spectra Spectra OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINE FILEIO) Spectra Spectra UNIT FILE NAME Spectra -----Spectra SPECTRA.INP Spectra 3 SPECTRA.LST Spectra 10 ENDFB.IN Spectra 11 ENDFB.OUT Spectra (SCRATCH) 12 Spectra Spectra Spectra INPUT PARAMETERS Spectra FOR VERSIONS EARLIER THAN 90-1 THIS PROGRAM ONLY ALLOWED THE USER Spectra TO SPECIFY BY INPUT PARAMETERS WHICH MATERIALS (MAT) TO PROCESS. Spectra FOR EACH REQUESTED MATERIAL NEUTRON INTERACTION CROSS SECTIONS Spectra (MF=3) WOULD BE LINEARIZED AND THE REMAINDER OF THE MATERIAL WOULD BE COPIED. Spectra Spectra FOR VERSIONS 90-1 AND LATER THIS PROGRAM WILL ALLOW THE USER TO Spectra TO SPECIFY BY INPUT PARAMETERS EXACTLY WHAT SECTIONS OF DATA Spectra TO PROCESS. FOR EACH SECTION OF DATA, SPECIFIED BY MAT, MF, MT Spectra RANGES, SECTIONS OF MF=3, 23 AND 27 WILL BE LINEARIZED AND ALL Spectra OTHER REQUESTED SECTIONS WILL BE COPIED. ALL SECTIONS WHICH ARE Spectra NOT EXPLICITLY REQUESTED WILL BE SKIPPED AND WILL NOT APPEAR ON Spectra ENDF/B FILE OUTPUT BY THIS PROGRAM. Spectra WITH THIS NEW PROCEDURE YOU CAN MINIMIZE THE SIZE OF THE ENDF/B Spectra FILE OUTPUT BY THIS PROGRAM, E.G., IF YOU ONLY WANT NEUTRON Spectra CROSS SECTIONS FOR SUBSEQUENT PROCESSING YOU NEED ONLY REQUEST Spectra ONLY MF=3 DATA. Spectra Spectra HOWEVER, YOU MUST UNDERSTAND THAT ONLY THOSE SECTIONS WHICH YOU Spectra EXPLICITLY REQUEST WILL APPEAR ON THE ENDF/B FILE OUTPUT BY Spectra THIS PROGRAM. FOR EXAMPLE, IF YOU WISH TO DOCUMENT EXACTLY Spectra HOW YOU LINEARIZED THE DATA BY INCLUDING COMMENTS IN MF=1, MT=451 Spectra THEN YOU MUST EXPLICITLY REQUEST THAT MF=1, MT=451 BE PROCESSED Spectra FOR EACH MATERIAL THAT YOU REQUEST. SIMILAR IF YOU WANT THE Spectra ENTIRE EVALUATION YOU MUST REQUEST ALL MF AND MT TO BE OUTPUT. Spectra

LINE COLS. DESCRIPTION

Spectra

1 1-11 SELECTION CRITERIA (0-MAT, 1-ZA) 12-22 MONITOR MODE SELECTOR = 0 - NORMAL OPERATION = 1 - MONITOR PROGRESS OF LINEARIZING OF THE DATA. EACH TIME A PAGE OF DATA FOINTS IS WRITTEN TO THE SCRATCH FILE PRINT OUT THE TOTAL NUMBER OF POINTS ON SCRATCH AND THE LOWER AND UPPER ENERGY LIMITS OF THE PAGE (FITS) OPPION MAY BE USED IN ORDER TO MONITOR THE EXECUTION SPEED OF LOW. RUNNING JOBS). 23-33 MINIMUM CROSS SECTION OF INTEREST (BARNS). (If 0.0 oR LESS IS INFUT THE PROGRAM WILL USE 1.0E-10). ENERGY INTERVALS WILL BE SUB-DIVIDED IF THE ABSOLUTE VALUE OF THE CROSS SECTION WITHIN THE INTERVAL WILL NOT BE SUB-DIVIDED IF THE ABSOLUTE VALUE OF THE CROSS SECTION WITHIN THE INTERVAL IS LESS THAN THIS VALUE. AN EXCEPTION TO THIS ROLL IS NEAR THRESHOLDS ENERGY INTERVALS WILL BE SUB-DIVIDED UNTIL CONVERGENCE REGARDLESS OF THE MAGNITURE OF THE CROSS SECTION. 34-44 KEEP ORIGINAL EVALUATED DATA FOINTS. 2 1-72 ENDE'S INPUT DATA FILENAME (STANDARD OPPION = SUBJECT AND ADDRESS OF THE MAGNITUR OF THE CROSS SECTION. 3 1-72 ENDE'S INPUT DATA FILENAME (STANDARD OPPION = SUBJECT AND ADDRESS OF THE MAGNITUR OF THE CROSS SECTION. 3 1-72 ENDE'S INPUT DATA FILENAME (STANDARD OPPION = SUBJECT AND ADDRESS OF THE ADDRESS				
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TO BE ENERGY DEPENDENT (NOTE, ENERGY INDEPENDENT Spectra FORM WILL RUN FASTER THAN THE EQUIVALENT ENERGY Spectra DEPENDENT FORM). FOR AN ENERGY DEPENDENT ERROR LAW ALL ENERGIES MUST BE ASCENDING ENERGY ORDER. FOR Spectra CONVERGENCE OF THE LINEARIZING ALGORITHM ALL ERRORS MUST BE POSITIVE. IF AN ALLOWABLE ERROR IS NOT Spectra POSITIVE IT WILL BE SET EQUAL TO THE STANDARD OPTION (CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT). Spectra IF THE FIRST ERROR LINE IS BLANK IT WILL TERMINATE SPECTRA ENERGY INDEPENDENT, EQUAL TO THE STANDARD OPTION Spectra (CURRENTLY 0.1 PER-CENT). (SEE EXAMPLE INPUT 4). Spectra Sp				Spectra
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DEPENDENT FORM). FOR AN ENERGY DEPENDENT ERROR LAW ALL ENERGIES MUST BE ASCENDING ENERGY ORDER. FOR CONVERGENCE OF THE LINEARIZING ALGORITHM ALL ERRORS MUST BE POSITIVE. IF AN ALLOWABLE ERROR IS NOT POSITIVE IT WILL BE SET EQUAL TO THE STANDARD OPTION (CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT). Spectra IF THE FIRST ERROR LINE IS BLANK IT WILL TERMINATE THE ERROR LAW AND THE ERROR WILL BE TREATED AS ENERGY INDEPENDENT, EQUAL TO THE STANDARD OPTION (CURRENTLY 0.1 PER-CENT). (SEE EXAMPLE INPUT 4). EXAMPLE INPUT NO. 1 Spectra Spectra Spectra Spectra Spectra			· ·	_
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MUST BE POSITIVE. IF AN ALLOWABLE ERROR IS NOT POSITIVE IT WILL BE SET EQUAL TO THE STANDARD OPTION (CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT). Spectra IF THE FIRST ERROR LINE IS BLANK IT WILL TERMINATE THE ERROR LAW AND THE ERROR WILL BE TREATED AS ENERGY INDEPENDENT, EQUAL TO THE STANDARD OPTION (CURRENTLY 0.1 PER-CENT). (SEE EXAMPLE INPUT 4). Spectra Spectra EXAMPLE INPUT NO. 1 EXAMPLE INPUT NO. 1 Spectra Spectra Spectra				Spectra
POSITIVE IT WILL BE SET EQUAL TO THE STANDARD OPTION Spectra (CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT). Spectra IF THE FIRST ERROR LINE IS BLANK IT WILL TERMINATE Spectra THE ERROR LAW AND THE ERROR WILL BE TREATED AS Spectra ENERGY INDEPENDENT, EQUAL TO THE STANDARD OPTION Spectra (CURRENTLY 0.1 PER-CENT). (SEE EXAMPLE INPUT 4). Spectra Spectra EXAMPLE INPUT NO. 1 Spectra Spectra				Spectra
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ENERGY INDEPENDENT, EQUAL TO THE STANDARD OPTION Spectra (CURRENTLY 0.1 PER-CENT). (SEE EXAMPLE INPUT 4). Spectra Spectra EXAMPLE INPUT NO. 1 Spectra Spectra			·	Spectra
(CURRENTLY 0.1 PER-CENT). (SEE EXAMPLE INPUT 4). Spectra Spectra EXAMPLE INPUT NO. 1 Spectra Spectra				Spectra
Spectra EXAMPLE INPUT NO. 1 Spectra Spectra			· · ·	_
EXAMPLE INPUT NO. 1 Spectra Spectra			(CONNENTED V.1 FER-CENT). (SEE EARMFLE INFUT 4).	_
opection.	EXAMPI	LE INPU	T NO. 1	Spectra
RETRIEVE DATA BY ZA IN ORDER TO FIND ALL URANIUM ISOTOPES AND Spectra				Spectra
	KETRII	EVE DAT	A BY ZA IN ORDER TO FIND ALL URANIUM ISOTOPES AND	Spectra

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(MF=3). ALL ENERGY INTERVALS IN WHICH THE CROSS SECTION IS
                                                                        Spectra
    AT LEAST 1 MICRO-BARN (1.0E-06 BARNS) WILL BE SUBDIVIDED.
                                                                        Spectra
    BACKWARD THINNING WILL BE PERFORMED. FROM 0 TO 100 EV LINEARIZE
                                                                        Spectra
    TO WITHIN 0.1 PER-CENT ACCURACY. FROM 100 EV TO 1 KEV VARY
                                                                        Spectra
    ACCURACY BETWEEN 0.1 AND 1.0 PER-CENT. ABOVE 1 KEV USE 1
                                                                        Spectra
    PER-CENT ACCURACY.
                                                                        Spectra
                                                                        Spectra
    EXPLICITLY SPECIFY THE STANDARD FILENAMES.
                                                                        Spectra
                                                                        Spectra
    IN THIS CASE THE FOLLOWING 11 INPUT LINES ARE REQUIRED
                                                                        Spectra
                                                                        Spectra
                   0 1.00000- 6
                                                                        Spectra
ENDFB.IN
                                                                        Spectra
ENDFB.OUT
                                                                        Spectra
92000 3 0 92999 3999
                                                                        Spectra
                         (UPPER LIMIT AUTOMATICALLY SET TO 90232 3999) Spectra
             0 3 0
90232 3 0
                         (END OF REQUEST LIST)
                                                                        Spectra
0.00000+ 0 1.00000-03
                                                                        Spectra
1.00000+ 2 1.00000-03
                                                                        Spectra
1.00000+ 3 1.00000-02
                                                                        Spectra
1.00000+ 9 1.00000-02
                                                                        Spectra
                         (END OF ERROR LAW)
                                                                        Spectra
                                                                        Spectra
    EXAMPLE INPUT NO. 2
                                                                        Spectra
                                                                        Spectra
    SAME AS THE ABOVE CASE, EXCEPT LINEARIZE ALL DATA TO WITHIN THE
                                                                        Spectra
    STANDARD ACCURACY (CURRENTLY 0.1 PER-CENT). IN ORDER TO USE THE
                                                                        Spectra
    STANDARD ACCURACY YOU NEED NOT SPECIFY ANY ERROR LAW AT ALL. IN
                                                                        Spectra
   THIS CASE INCLUDE THE HOLLERITH SECTION, MF=1, MT=451, FOR EACH
                                                                        Spectra
    MATERIAL.
                                                                        Spectra
                                                                        Spectra
    LEAVE THE DEFINITION OF THE FILENAMES BLANK - THE PROGRAM WILL
                                                                        Spectra
    THEN USE STANDARD FILENAMES.
                                                                        Spectra
                                                                        Spectra
    IN THIS CASE THE FOLLOWING 9 INPUT LINES ARE REQUIRED
                                                                        Spectra
                                                                        Spectra
                  0 1.00000- 6
                                          Ω
                                                                        Spectra
                         (USE DEFAULT FILENAME = ENDFB.IN)
                                                                        Spectra
                          (USE DEFAULT FILENAME = ENDFB.OUT)
                                                                        Spectra
92000 1451 92999 1451
                                                                        Spectra
92000 3 0 92999 3999
                                                                        Spectra
90232 1451 0 1451
                                                                        Spectra
                         (UPPER LIMIT AUTOMATICALLY SET TO 90232 3999) Spectra
90232 3 0
              0 3 0
                         (END OF REQUEST LIST)
                                                                        Spectra
                         (0.1 PER-CENT ERROR, END OF ERROR LAW)
                                                                        Spectra
                                                                        Spectra
    EXAMPLE INPUT NO. 3
                                                                        Spectra
    ______
                                                                        Spectra
    LINEARIZE ALL MATERIALS ON AN ENDF/B TAPE TO WITHIN AN ACCURACY
                                                                        Spectra
    OF 0.5 PER-CENT (0.005 AS A FRACTION). IN THIS CASE YOU NEED NOT
                                                                        Spectra
    SPECIFY THE MAT, MF, MT RANGES.
                                                                        Spectra
                                                                        Spectra
    READ THE ENDF/B DATA FROM \ENDFB6\ZA092238 AND WRITE THE ENDF/B
                                                                        Spectra
    DATA TO \ENDFB6\LINEAR\ZA092238.
                                                                        Spectra
    IN THIS CASE THE FOLLOWING 6 INPUT LINES ARE REQUIRED
                                                                        Spectra
                                                                        Spectra
                                            (MAT, 1.0E-10 BARNS, THIN) Spectra
\ENDFB6\ZA092238
                                                                        Spectra
\ENDFB6\LINEAR\ZA092238
                                                                        Spectra
                         (RETRIEVE ALL DATA, END REQUEST LIST)
                                                                        Spectra
           5.00000-03
                                                                        Spectra
                         (END OF ERROR LAW)
                                                                        Spectra
                                                                        Spectra
    NOTE THAT IN THIS CASE IF THE INPUT HAD SPECIFIED AN EQUIVALENT
                                                                        Spectra
    ENERGY DEPENDENT ERROR LAW BY GIVING A NUMBER OF ENERGY POINTS
                                                                        Spectra
   AT EACH OF WHICH THE ERROR IS 0.5 PER-CENT THE PROGRAM WOULD TAKE
                                                                        Spectra
    LONGER TO RUN (I.E., ONLY USE AN ENERGY DEPENDENT ERROR LAW WHEN
                                                                        Spectra
    IT IS NECESSARY).
                                                                        Spectra
                                                                        Spectra
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THORIUM 232. RETRIEVE ALL NEUTRON INTERACTION CROSS SECTIONS

EXAMPLE INPUT NO. 4	Spec
	Spec
IN ORDER TO LINEARIZE ALL MATERIALS ON AN ENDF/B TAPE TO THE	Spec
STANDARD OPTION OF 0.1 PER-CENT IT IS ADEQUATE TO INPUT A SET	Spec
OF COMPLETELY BLANK LINES WHICH WILL AUTOMATICALLY INVOKE ALL	Spec
OF THE STANDARD OPTIONS.	Spec
	Spec
LEAVE THE DEFINITION OF THE FILENAMES BLANK - THE PROGRAM WILL	Spec
THEN USE STANDARD FILENAMES.	Spec
	Spec
IN THIS CASE THE FOLLOWING THREE INPUT LINES ARE REQUIRED	Spec
	Spec
(MAT, 1.0E-10 BARNS, THIN)	Spec
(USE DEFAULT FILENAME = ENDFB.IN)	Spec
(USE DEFAULT FILENAME = ENDFB.OUT)	Spec
(RETRIEVE ALL DATA, END REQUEST LIST)	Spec
(0.1 PER-CENT ERROR, END OF ERROR LAW)	Spec
	Spec
	Spec