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# A STUDY INTO THE RELIABILITY OF COLLAPSING SAND-II 640 MULTIGROUP DATA INTO VITAMIN-J 175 MULTIGROUP CROSS SECTIONS

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## Abstract

VITAMIN-J 175 multigroup cross sections for the $^{55}Mn(n,\gamma)$, $^{58}Fe(n,\gamma)$ and $^{58}Ni(n,p)$ reactions, obtained by collapsing SAND-II 640 multigroup data, were compared with the VITAMIN-J 175 multigroup cross sections obtained by directly processing the pointwise cross sections for these reactions. The results showed significant discrepancies.

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## Introduction

In the working group on production and interfacing of FENDL libraries to the ITER design the following discussion was recorded (Ref. 1): "The dosimetry data are based on IRDF-90 version 2 data provided in SAND-II multi-group form with 640 energy groups. The question of providing the data in continuous energy format was addressed. If the data are available in pointwise form from the original source (e.g. $^{197}$Au from ENDF/B-VI), they will be processed from the point-wise data. Otherwise they will be processed from histogram representation". S. Ganesan suggested that it would be desirable to see if there is any effect of collapsing the 640 group IRDF data instead of going from the point data. The present report, which is an outcome of this suggestion, documents the results of an investigation into the reliability of collapsing SAND-II 640 multigroup data into VITAMIN-J 175 multigroup cross sections. The procedures and results of the calculations and the inter-comparisons, which have been made for some reaction cross sections, are presented.

## Details of Calculations

Pointwise cross section data in ENDF-6 format for the $^{55}$Mn(n,$\gamma$), $^{58}$Fe(n,$\gamma$) reactions were derived from ENDF/B-VI with the NJOY code RECONR (Ref. 2). From these pointwise cross sections and from the ENDF/B-VI data for the $^{58}$Ni(n,p) reaction multigroup cross sections were derived in 640 energy group SAND-II and in 175 energy group VITAMIN-J structure with the NJOY code GROUPR (Ref. 2) using a flat weighting spectrum (IWT=2 in GROUPR). Then the multigroup cross sections in SAND-II structure were collapsed into 175 energy group VITAMIN-J format using GROUPR again. Therefore these cross sections, which originally were in the GROUPR output (GENDF) format, were first converted into ENDF-6 histogram format (interpolation law 1), using a conversion code developed at the Nuclear Data Section, and then into ENDF-6 linear-linear interpolable format (interpolation law 2) using RECONR again, as GROUPR only accepts linear-linear interpolable cross section data as input. The thus obtained collapsed cross section data in 175 energy group VITAMIN-J structure and the VITAMIN-J multigroup cross sections obtained with GROUPR directly from the pointwise cross sections were also converted from GENDF format into ENDF-6 histogram format and plotted with the ENDF plotting and intercomparison code COMPLOT written by D.E. Cullen (Ref. 3). Figures 1-3 show the comparison plots for above mentioned reactions. The input parameters for NJOY are given in the appendix.