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INDC International Nuclear Data Committee

**Summary Report from the
Technical Meeting on
Nuclear Data for Neutron Activation Analysis and Dosimetry**

15-18 July 2019

Vienna, Austria

A. Trkov

IAEA, Nuclear Data Section

Vienna, Austria

August 2019

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MINUTES

The technical meeting is the culmination of many years of effort to create the International Reactor Dosimetry Fission Fusion file IRDFF-II. The purpose of the technical meeting was to discuss the comprehensive documentation of all the neutron cross sections and supporting documentation contained in IRDFF-II. The discussions focused on the preparation of a sizeable paper to be submitted to Nuclear Data Sheets around the end of July, for publication in January 2020.

The agenda for the technical meeting and the list of attendees are attached as appendices to this summary report. The agenda was very open, generally without any presentations by the attendees, so that the draft publication could be discussed in detail. Patrick Griffin was elected as chairman of the meeting and Larry Greenwood was elected as the rapporteur. All of the sections of the draft publication were reviewed and specific actions were assigned to the attendees to facilitate the completion of the text, tables and figures.

The neutron cross sections contained in IRDFF-II were evaluated in a series of Research Coordination Meetings held in July 2013 (INDC(NDS)-0639), March 2015 (INDC(NDS)-0682), and March 2017 (INDC(NDS)-0731). The original cross section file for activation and dosimetry from 0 to 20 MeV was called the International Reactor Dosimetry File, IRDF-2002 (Technical Reports Series No. 452) issued in 2006. The name was changed to IRDFF (International Reactor Dosimetry Fission Fusion file) to include reactions used for fusion reactor research up to 60 MeV. The first version of IRDFF V1.02 was subsequently revised to V1.03 and V1.04 to add more reactions and correct known problems. IRDFF V1.05 was issued in October 2014 and is currently being updated to IRDFF-II.

A number of additional activation reactions were added to the IRDFF-II library. One of the most important additions to IRDFF-II is the creation of elemental cross sections that include contributions from all isotopes that produce a given activation product. Elemental activation cross sections are pivotal for fusion related dosimetry above 20 MeV since many different reaction channels can contribute to the production of a specific activation product. Many familiar single isotope reactions commonly used for reactor dosimetry are no longer useful for higher energy applications using natural elemental dosimetry materials. For example, below 20 MeV, the $^{54}\text{Fe}(n,p)^{54}\text{Mn}$ cross section is sufficient to determine the production of ^{54}Mn from an elemental iron sample. However, above 20 MeV many reactions are possible on the other iron isotopes and must be included to accurately predict the production of ^{54}Mn using the $\text{Fe}(n,x)^{54}\text{Mn}$ cross section. Generally all elements with multiple isotopes were revised to create elemental cross sections. When possible, cross sections in the range from 20 to 60 MeV were based on evaluations of experimental data in EXFOR. However, due to the lack of experimental data in this energy regions, many cross sections were adopted from TENDL 2015 (ref).

The discussions during the meeting focused on all sections of the draft publication including which reactions to include, ENDF formats, recommended nuclear data, evaluations of nuclear data, neutron benchmark fields used for validation, validation data, and consistency of cross sections in standard and reference fields. The paper includes numerous tables to describe the content of the library and to supply recommended nuclear data as well as many figures chosen to illustrate the benchmarks and validation of the data. The validation and consistency testing of the cross sections are documented using benchmark and reference neutron spectra, which are also included in the documentation.

Supporting data in the paper includes nuclear decay data, atomic masses, and fission yields. Benchmark and reference neutron fields used for the validation and testing of IRDFF-II cross sections include ^{252}Cf , ^{235}U , well-characterized fission reactor spectra, critical assemblies, 14 MeV neutron generators, and Be(d,n) neutron time-of-flight spectra. The IRDFF-II library is expected to become the international reference in neutron activation and dosimetry for multiple applications.

F4-TM-1805433**Technical Meeting on the Nuclear Data for Neutron Activation Analysis
and Dosimetry****Vienna, Austria**IAEA Headquarters, Vienna, Austria
15 to 18 July 2019
Meeting Room MOE27**AGENDA****Monday, 15 July****08:30 – 09:00** **Registration** (IAEA Registration desk, Gate 1)**09:00 - 09:30** **Opening Session**Welcoming address –
Introduction – A. Trkov
Election of Chairman and Rapporteur
Adoption of Agenda
Administrative matters**09:30 - 12:30** **Presentations by participants** (~ 30 min' each)**12:30 – 14:00** *Lunch***14:00 – 17:30** **Discussion on the draft document for NDS IRDFF-II)***Coffee breaks as needed***Tuesday, 16 July****09:00 - 12:30** **Discussion on the draft document for NDS IRDFF-II (Cont.)****12:30 – 14:00** *Lunch***14:00 – 17:30** **Discussion on the draft document for NDS IRDFF-II (Cont.)***Coffee breaks as needed***19:00** *Dinner at a restaurant (see separate information sheet)*

Wednesday, 17 July

09:00 - 12:30 **Actions and recommendations**

12:30 – 14:00 **Lunch**

14:00 – 17:30 **REAL-2019 exercise**

Coffee breaks as needed

Thursday, 18 July

09:00 - 16:00 **Drafting of the summary report**

Finalisation of the Summary Report and Action List

16:00 **Closing of the meeting**

Coffee break(s) and lunch in between

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