

Status Report of JAERI/NDC and JNDC

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1. JAERI/NDC Activity

Nuclear Data Center of Japan Atomic Energy Research Institute (JAERI/NDC) plays a role of national nuclear data center in Japan besides research activities. Its recent activities are reviewed.

The most important activity is the evaluation and compilation of Japanese Evaluated Nuclear Data Library (JENDL) in cooperation with Japanese Nuclear Data Committee (JNDC). The revision 2 of JENDL-3 General Purpose File will be released soon as JENDL-3.2. The evaluation is going on for various JENDL Special Purpose Files such as JENDL High Energy File, JENDL Fusion File, Minor Actinoid File, Covariance File, Activation Cross Section File, Dosimetry File, PKA Spectrum File, (α,n) Reaction Data File, Photo Reaction Data File.

Integrated Nuclear Data Evaluation System (INDES) is being developed, in order to keep experiences accumulated in JENDL-3, to store basic data of nuclear physics used for the JENDL-3 evaluation, and to support new evaluations. Roughly classified, INDES functions are of three categories; to select the most suitable set of theoretical calculation codes by applying knowledge engineering technology, to retrieve basic data described above, and to set up input data of theoretical calculation codes automatically.

Recently data needs for the high energy nuclear data increase. A code to calculate the cross section up to a few GeV is being developed on the basis of the quantum molecular dynamics in cooperation with a group in the Advanced Science Research Center in JAERI.

The nuclear structure and decay data are evaluated under the international network of ENSDF. Japan is in charge of the mass numbers from 118 to 129.

JAERI/NDC has experimental activities by itself and collaborating with universities and laboratories in Japan. Measurements of nuclear data, such as activation cross sections and double differential alpha-particle emission spectrum for neutron induced reactions of structural materials, and cross sections and double differential particle emission spectra for charged particle induced reactions were performed.

Atomic and molecular data for fusion reactor applications are also evaluated and compiled in international format by JAERI/NDC.

One of JAERI/NDC functions as the national center is collection and service of databases for experimental and evaluated nuclear data. As to the experimental database, the retrieval systems of NESTOR2 for neutron incident reactions, and of CHESTOR for charged particles and gamma-ray incident reactions have been developed. The international collaborations and data exchange are made basically through JAERI/NDC. JAERI/NDC also serves as the secretariat of JNDC.

2. JNDC Activity

Japanese Nuclear Data Committee (JNDC) has about 150 members in Atomic Energy Society of Japan and JAERI. JNDC consists of three subcommittees, which are on nuclear data, on reactor constants and on fuel cycle, six standing groups, steering and counseling committees. JAERI/NDC serves as the secretariat. The schematic diagram is attached. Recent activities on the subcommittees and standing groups of JNDC are reported below.

2.1 Subcommittee on Nuclear Data

Subcommittee on nuclear data has 11 working groups (WGs).

(1) High Energy Nuclear Data Evaluation WG

Methods of the intermediate nuclear data evaluation are discussed and the evaluation work for JENDL High Energy File is mainly performed by this WG. Actual work is separated into two energy region of up to 50 MeV and of up to a few GeV. Comparison of several theoretical codes was done for this work.

(2) Covariance Data Evaluation WG

This WG was organized to evaluate error data for JENDL. Different evaluation methods of covariance matrices proposed by Japan, the United States and Europe were compared and it was concluded to adopt Japanese method, which evaluates them from physical parameters of calculations.

(3) Evaluation and Calculation System WG

Integrated Nuclear Data Evaluation System (INDES) is under development with knowledge engineering technology. INDES keeps data and experience of JENDL-3 evaluation work and economize the evaluation in future. Two temperature Madland-Nix model was developed to calculate fission neutron spectra.

(4) Fission Product Nuclear Data WG

The evaluations and benchmark tests for JENDL-3 FP Data File were done by this WG. The revision works for JENDL-3.2 were also performed.

(5) Activation-Cross-Section Data WG

The preliminary version of JENDL Activation Cross Section File was produced and benchmark testing is now planned.

(6) PKA Spectrum WG

ESPERANT code, which creates the PKA/KERMA file from the evaluated nuclear data file, was developed. This WG will also evaluate the intermediate energy neutron nuclear data up to 50 MeV for lighter nuclei.

(7) Charged Particle Nuclear Data WG

The data related (α, n) and fusion reactions were researched. The experimental data of thick target neutron and proton yields for proton and alpha-particle induced reactions on several elements were collected and stored in EXFOR format.

(8) Photo-Reaction Data WG

The photo reaction data were evaluated at the incident gamma-ray energy up to 140 MeV for 31 nuclei as a phase I evaluation.

(9) WG on Revision of JENDL-3 Neutron Data

The revision work for JENDL-3.2 was performed except for the γ -ray production data.

(10) WG on Revision of JENDL-3 Gamma-ray Production Data

The problems of JENDL-3.1 about gamma-ray data were made clear and re-evaluation for the important nuclei such as Fe and Ni was done.

2.2 Subcommittee on Reactor Constants

(1) *Fission Reactor Integral Test WG*

The benchmark tests for the thermal and fast reactors were performed with the various group constants and calculating codes.

(2) *Shielding Integral Test WG*

Various shielding benchmark tests were performed and its final report (JAERI-1330) is under printing. The benchmark test for secondary gamma-ray is in progress. The research of group constants and benchmark tests for intermediate energy nuclear data related to the accelerator applications has been started.

(3) *Dosimetry Integral Test WG*

The JENDL Dosimetry File was produced and JAERI-1325 was published.

(4) *Fusion Neutronics Integral Test WG*

The benchmark tests related to the fusion neutronics are being performed.

(5) *Standard Group Constants WG*

The system of the standard group constants, which is called JSSTD and consists of neutron and gamma-ray cross sections made from JENDL-3, was improved. The utility codes were developed.

2.3 Subcommittee on Fuel Cycle

(1) *Decay Heat Evaluation WG*

The JNDC Decay Data Library has been finished. In order to expand the functions, the preliminary research work for spectrum calculation of beta-ray heating and calculation of delayed neutrons were performed.

(2) *WG on Evaluation of Nuclide Generation and Depletion*

The isotope yield data of spent fuel were collected and published as JAERI-M 93-061. The data book, JAERI-1324, on neutron yields and its spectra caused by (α ,n) reaction and spontaneous fission was published.

2.4 Standing Groups

(1) *JENDL Compilation Group*

The compilation works for JENDL general and special purpose files are performed.

(2) *CINDA Group*

The bibliographic data of neutron nuclear data published in Japan are collected and sent to NEA Data Bank.

(3) *WRENDA Group*

The experimental request data of Japan are collected and sent to IAEA.

(4) *ENSDF Group*

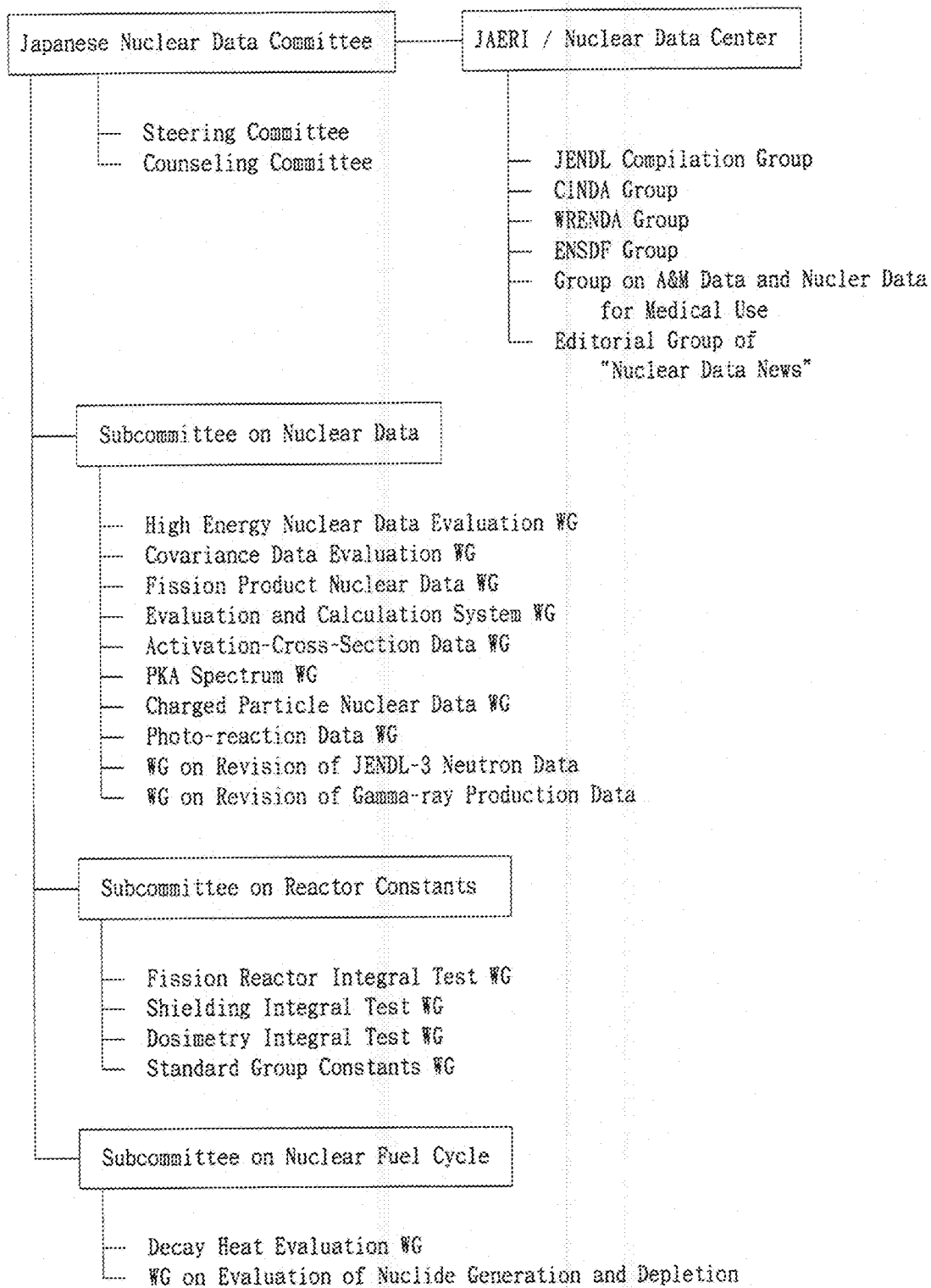
The evaluations of nuclear structure data for nuclei whose mass numbers are from 118 to 129 are performed. The data except for mass numbers of 120 and 124 have been revised until 1992.

(5) *Group on Atomic, Molecular and Nuclear Data for Medical Use*

This is newly re-organized group in 1993. Data needs from medical use are surveyed.

(6) *Editorial Group of "Nuclear Data News"*

This group publishes three issues of "Nuclear Data News" in Japanese in a year.



WG : Working Group