



Nuclear Data Section Status Report

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This report summarises the Nuclear Structure and Decay Data (NSDD) related activity of the IAEA Nuclear Data Section (NDS) for the period October 1998 to September 2000.

1. Online NSDD user service.

For the online retrievals from NSDD, the NDS uses the Telnet and Web services developed by the National Nuclear Data Center, BNL. After the initiation of Web access to NSDD, the number of NSDD retrievals through Telnet has dropped down to a level of about one thousand per year. Many users, especially beginners, prefer now to use the friendly Web access rather than the more complex, but sometimes more reliable, Telnet access. The major databases, NSR and ENSDF, were regularly updated. The table below shows the statistics of user online retrievals through Telnet/NDIS and Web for ENSDF, NSR, Nuclear Wallet Cards, NUDAT, MIRD and XRAY databases, libraries computer packages. For preparation of the statistics of the Web retrievals in the same definitions as for existing statistics of Telnet/NDIS, a new program was developed. This program allows also the analysis of the geographical distribution of retrievals. This analysis shows that the relative number of retrievals from users of developing countries, NDS service area, is continuing to increase. For NUDAT, for example, the percentage of retrievals from developing countries was 7.2% in 1998, 23.4% in 1999, and 47.4% in 2000.

	NSR	Nuclear Wallet Cards	ENSDF	NUDAT	MIRD	XRAY	Sum
Telnet/NDIS retrievals (Oct1998-Sep1999)	304	-	211	383	23	29	950
Telnet/NDIS retrievals (Oct1999-24 Sep2000)	268	-	180	324	20	11	803
Web Retrievals (Oct1998-Sep1999)	-	3427	-	2735	553	-	6715
Web Retrievals (Oct1999-24 Sep2000)	-	3279	399	3052	550	-	7280

2. Offline NSDD user service.

In the last two years NDS distributed to users 87 copies of the Nuclide Wall Charts (Knolls, Karlsruhe or JAERI), 108 copies of Nuclear Wallet Cards by J. Tuli (Sixth edition) and 51 copies of PC NUDAT on CD-ROM by R. Kinsey with updated data.

3. NSDD development programs and projects.

3.1 NDS contribution to the IAEA Analytical Quality Control Services program (Report AQCS 2000-2001).

Half-life decay data for 30 nuclides included in the AQCS list (1998) have been analysed taking into account the experimental and evaluated data obtained since 1990. Half-lives for 16 decay modes were updated to maintain consistency and according to the latest evaluations included in ENSDF or obtained in the framework of the international project on decay data (M.M. Bé, E. Browne, V. Chechev, R. Helmer, E. Schönfeld, J. Lamé, F. Piton, C. Morillon, NUCLÉIDE, Table de Radionucléides vol. 5, ISBN 2 7272 0200 8, CEA/LNHB, 91191 Gif-sur-Yvette, France).

A Web version of the Report AQCS 2000–2001 is in preparation now. It should contain full information (half-lives and decay radiation data) needed for Analytical Control Quality measurements. The preliminary version of these Web pages was prepared. For this, pages prepared by NUDAT in HTML format were taken as a basis. In cases where revision of ENSDF decay data was needed for particular radionuclide, according to the latest recommendations of the groups of international experts, these pages were easily edited and the references were added. If users should need data for radionuclides not included in the AQCS, they can retrieve them from NUDAT through a supplied hyperlink.

3.2 Co-ordinated Research Project on Nuclear Model Parameter Testing for Nuclear Data Evaluation (Reference Input Parameter Library: Phase II).

The Reference Input Parameter Library (RIPL) is a collection of reference input parameters for theoretical calculations of nuclear reaction cross sections. The second phase of the project was initiated in 1999 in order to test and improve recommended RIPL data and to create interfaces between RIPL and commonly used nuclear reaction codes. The files include such nuclear structure and decay data as nuclear masses, reaction Q-values and nuclear ground state deformations, energies, spins and parities of the excited levels and characteristics of gamma transitions between these levels, mean square deformation parameters for levels of a vibrational nature. Overall, five Research Co-ordination Meetings have been held by the NDS on this subject.

3.3 Co-ordinated Research Project on Updating of X- and Gamma-ray Decay Data Standards for Detector Calibration.

The project includes the evaluation of the half-lives, x-ray and gamma-ray energies and emission probabilities for 68 radionuclides selected as reference standards for gamma-ray spectroscopy or gamma-ray calibrations for environmental monitoring, safeguards, medical applications and material analysis. Two Research Co-ordination Meetings have been held by the NDS. 24 evaluations are completed (May 2000) with other evaluations underway. The project will be finished in 2001.

3.4 Co-ordinated Research Project on Development of Database for Prompt-Gamma Neutron Activation Analysis.

The project was started in 1999 with a first Research Co-ordination Meeting held by the NDS in November 1999. It includes the evaluation of data needed in cold and thermal

neutron-induced Prompt Gamma Activation Analysis (PGAA) of materials in chemistry, geology, mining, archaeology, environment, food analysis, medicine and other areas. The CRP will produce recommended database for thermal and sub-thermal neutron capture cross sections for the dominant isotopes of each chemical element, correction factors to account for cross-section deviations from the $1/v$ law, and the energies of gamma-ray transitions and absolute intensities.

3.5 IAEA/ICTP Workshop on Evaluation of Nuclear Structure and Decay Data.

The Workshop was recommended by the IAEA AGM on International Network of NSDD Evaluators, 14 – 17 December 1998. The proposal to hold this three week Workshop in 2001 at ICTP, Trieste, was prepared in January 2000 and submitted for inclusion in the ICTP programme for 2001. The Workshop topics included nuclear structure physics, methods of nuclear structure data evaluation and also the training of 30 participants in retrievals, analysis and applications of the NSDD. After long process of selection, the Workshop on Evaluation of NSDD was not included in the final ICTP programme for 2001. One of the possible reasons is an extremely strong competition from side of other projects proposed to the ICTP by the IAEA for the calendar year 2001 including the NDS Workshop on Nuclear Data for Science and Technology: Accelerator Driven Waste Incineration (approved, 2 weeks in September 2001), part of a recurring series of NDS workshops on non-power nuclear applications.

The next opportunity to hold the Workshop on Evaluation of NSDD at the ICTP, Trieste will be in 2003. NDS included this workshop in programme for 2003, subject to later bilateral IAEA/ICTP consideration and approval. To partially compensate for this delay, NDS has a proposal to organise one-week mini-workshop at the IAEA in 2002. The proposal is included in the NDS/IAEA plans for 2002 – 2003. The subject of this mini-Workshop could be limited only to training of young scientists in the evaluation of the nuclear structure and decay data. Participation of four young scientists from developing countries selected by the network and having a good background in nuclear structure theory and experiment could be sponsored by the IAEA on the condition that they will continue the work in the NSDD evaluation after the workshop. Four participants from developed countries for no cost to the IAEA could be also invited. Two lecturers with large practical experience in the NSDD evaluation could provide training with the technical assistance of NDS programmers and physicists. For exercises, well formulated, realistic evaluation tasks could be prepared. The experience accumulated during this mini-workshop can be later used in the organization of the larger scale ICTP workshop planned for 2003.

In a related area of activity, the NDS is planning to invite in 2001 a consultant for preparation of a manual of ENSDF Evaluators. This manual should contain all information needed to the ENSDF evaluator, including definitions and constants, rules for values assignment and evaluation, description of the formats and computer codes used for theoretical model calculations, data treatment, data analysis, data normalisation, data checking and data visualisation. This manual could be distributed between participants of the workshops and help them later in the NSDD evaluation work. Most parts of this manual exist now as separate documents prepared by different groups of evaluators (methods of half-life evaluation, J^π assignment rules, introduction to Table of Radionuclides, report CEA-ISBN 2-7272-02010-6 with definitions and major relations and so on).