

**NNDC Status Report to the
IAEA Technical Meeting on the
Network of Nuclear Reaction Data Centers
17-19 June 2003**

General

Since the last meeting of the Nuclear Reaction Data Centers in May 2002, we have had the following personnel changes: I. Sirakov, completed his term in September 2002. J. Tallarine (support staff,) retired and has been replaced by J. Totans. M. Herman was hired in March 2003, with primary responsibility for nuclear reaction data evaluation and ENDF management. There are currently 10 FTE scientific/professional and three support staff. One additional retirement is expected within the coming year.

See Table 1 for list of visitors for this period. Also, attached is a list of NNDC visits to other centers (Table 2).

Computer Facilities

The main work of the NNDC continues to be performed on our Compaq Alpha Server 4100. We are currently in the process of migrating to a multi-server environment:

1. a dual-processor Intel Xeon Red Hat Advanced Server (2.8 GHz) as our working server;
2. two database servers (Intel Itanium-2 HP-UX (1 GHz) currently planned);
3. a Web server (Intel Xeon single processor (2.0GHz MP) currently planned. This server will be owned by us, but operated by the BNL Information Technology Division.

NNDC replaced six PC's running on 466-MHz Intel Celeron with PC's having INTEL Pentium 4 precessors. An additional Intel Pentium 4-based workstation was purchased to handle compute-intensive activities. The remaining NNDC staff PC's are being upgraded to Windows XP.

Bibliographies

The NSR compilation activity has continued. Over 4,200 references were entered in FY2002.

The CINDA compilation activity continues with respect to those references associated with the experimental data compiled at the Center. In the period from June 2002 to May 2003, 7 CINDA transmissions were sent (see Table 3) containing a total of 1380 records.

Experimental Nuclear Reaction Data

The NNDC continues to compile neutron and charged-particle reaction data produced in the U. S. and Canada. In the period from June 2001 through May 2002, 10 final neutron data transmission tapes and 7 charged-particle transmission tapes were sent containing new and corrected entries; one preliminary transmission has been sent (see Table 4).

Evaluated Nuclear Reaction Data

NNDC continues to coordinate the work of the Cross Section Evaluation Working Group. Version 6.13 of the ENDF Utility codes has been distributed and is available on the Web.

Collaboration with LANL (Chadwick) and IAEA Vienna (Trkov and Zerkin) on the development of a modular nuclear reaction model code EMPIRE (principle author M. Herman) for nuclear reaction data evaluations continued. Validation of the Monte Carlo Hybrid Monte Carlo code DDHMS (authors M. Chadwick and M. Blann, LANL) is underway. Several improvements of the code EMPIRE were done, including new graphic user interface shown in Fig. 1, merging of resonance and fast energy region into single ENDF-6 file, and plotting of particle spectra and angular distributions.

Collaboration with the Korean Atomic Energy Research Institute (KAERI) on 19 fission product cross-section evaluations reached its final stage. Evaluations for 15 materials were submitted to ENDF/B-VII. The remaining evaluations for 4 deformed nuclei are under revision.

Review of all available fission product cross sections from 5 international data files (ENDF/B, JEF, JENDL, BROND and CENDL) continued as an international project (NEA WPEC Subgroup 21, chaired by P. Oblozinsky). The project intends to review all 211 evaluations in the fission products region ($Z = 31 - 68$), to focus on the bulk of evaluations and to recommend the best evaluations for inclusion into ENDF/B-VII. After completion of trial reviews for 18 materials in 2001, SG21 reviewed another 65 materials including 15 by the NNDC.

Photonuclear data on ^{14}N were evaluated for 9.17 MeV resonance photons, to be used in MCNP simulations of the Gamma Resonance Technique to detect explosives. Preliminary evaluation of $^{74}\text{Ge}+n$ was performed with a focus on complete discrete and continuous photon production data that are needed for MCNP simulations of detector systems using Germanium. To validate EMPIRE procedures for gamma production, the well-measured $^{56}\text{Fe}+n$ was compared with calculations.

The NNDC, in cooperation with Russian Nuclear Data Center VNIIEF, Russia, and Michael Smith (ORNL), has been awarded a grant from the Civilian Research and Development Foundation (CRDF) for the "Compilation and Evaluation of Alpha-Induced Nuclear Reaction Cross Sections for Astrophysics". Work has begun on collecting references and compiling the data. So far, a "complete" list of references for ^{16}O , ^{20}Ne and ^{24}Mg has been obtained.

Nuclear Structure Data

NNDC continues to publish the *Nuclear Data Sheets*. As of April 2002, issues through Volume 99, #1 have been sent to Academic Press.

The experimental nuclear structure and decay data database (XUNDL) now contains more than 1000 data sets, compared to 857 one year ago).

Nuclear Data Base Migration

During the coming year, it is expected that administrative functions for CSISRS(EXFOR), CINDA, ENDSDF, and NSR will be transferred to the new Linux/Sybase system. This involves installation of new software and modification of legacy codes, where appropriate, to work with the relational database. Once this is accomplished, the VMS-based version of the database will function as a mirrored copy of the data, updated on a weekly basis. Similar steps will be taken for the other databases in the following year, and the database migration is expected to be completed by December 2004.

Customer Services

The number of online retrievals continues to increase, primarily due to the availability of most databases on the Web. There are about 30,000 retrievals per month from the combined Online Service, Web site, and anonymous ftp (97% of retrievals are from Web). A chart of statistics for the combined online retrievals is attached.

The NNDC continues to host the USNDP Web site, CSEWG Web site, and International Nuclear Structure and Decay Data Network Web site. The IAEA Nuclear Data Section has taken over maintenance of the Web site for the Nuclear Reaction Data Centers (NRDC) Network.

Table 1.
Visitors to NNDC from June 2002 to May 2003

Visitor	Host	Duration	Topic
Viktor Zerkin, NDS	D. Winchell V. McLane	2 weeks	Nuclear reaction database migration
Yong-Deok Lee, KAERI	P. Oblozinsky	1 month	Fission product nuclei evaluation
He Dong Choi, Seoul National Univ., Korea	S. Mughabghab	1 year	1-year sabbatical: capture gamma ray evaluation.
Viktor Zerkin, NDS	V. McLane	2 weeks	Nuclear Reaction Database migration

Table 2.
Visits by NNDC Personnel to Other Centers

Staff Member	Host	Duration	Topic
Jagdish Tuli	IAEA/NDS	1 week	NSDD Evaluators' Training Workshop
Thomas Burrows	IAEA/NDS	1 week	
Victoria McLane	IAEA/NDS	3 days	Database migration; EXFOR training session.

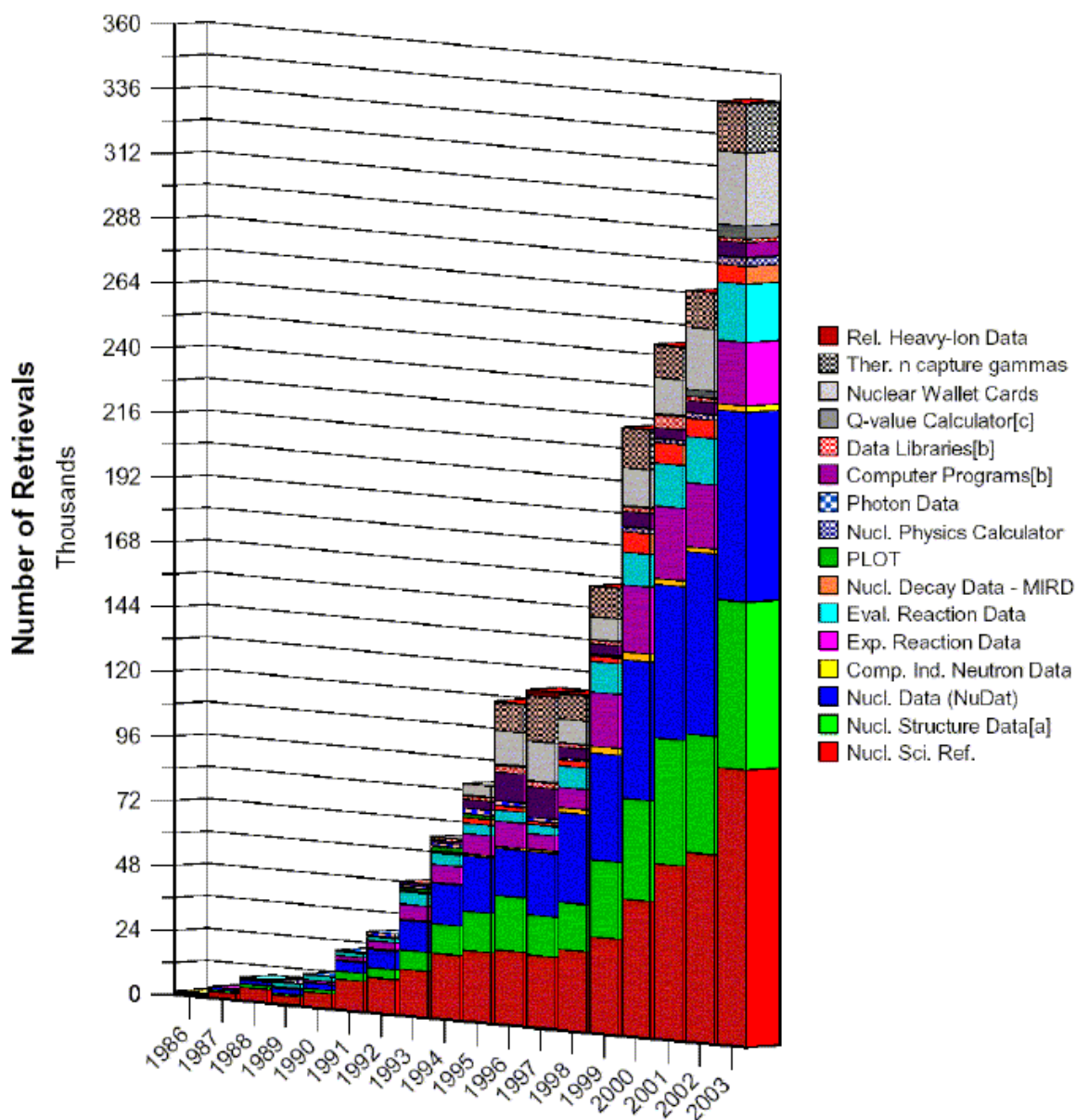
Table 3. NNDC CINDA Transmissions (June 2002 – May 2003)

Transmission			Lines In database	Blocks in database
	Date	# lines		
172	20020611	164		
173	20020614	45		
174	20020626	26		
175	20021108	51		
176	20021218	332		
177	20030220	198		
178	20030516	564		
NNDC Totals			90,708	39,865

Table 4. NNDC Transmissions (June 2002 – May 2003)

Tape	Preliminary posted	Final			Change in	
		Posted	# data points	# entries	# data points	# subentries
Area 1 (neutron)						
*1305	20020408	20020515	2,991	13		
1306	20020607	20020711	13,845	20		
1307	20020823	20020924	24,070	32		
1308	20021018	20021119	79,772	21		
1309	20021202	20030106	30,276	26		
1310	20021211	20030203	88,390	28		
1311	20030103	20030203	19,336	24		
1312	20030207	20030305	19,385	25		
1313	20030304	20030411	58,363	36		
1314	20030411	20030530	51,230	28		
1315	20030530					
Area 1 Total			333,437	212	152,227	318
Area C (charged particle_						
C056	20020617	20020722	15,425	94		
C057	20020827	20021018	7,919	19		
C058	20030225	20030328	4,924	10		
Area C Total			28,268	123	19,444	175
Area T (charged particle - originally compiled at another center)						
T011	20020726	20020827	24,091	16		
T012	20030127	20030225	3,539	13		
Area T Total			27,630	29	22,709	214
NNDC Total					194,380	707

*NNDC On-Line Data Service, Web, & FTP Retrievals 1986-2003**



* Extrapolated as of May 31, 2003.

^a Includes proton emitters (added to Web February 21, 2002).

^b Removed from Online Data Services June 25, 2002.

^c Added to Web September 11, 2001.