

The Nuclear Data Section: 50 Years of *New Beginnings*

Presentation on the occasion of
the 50th anniversary of the
Nuclear Data Section

IAEA Headquarters
Vienna, Austria
2 June 2014

D.W. Muir



Memories of the Section

To begin, I'd like to share with you a few of my own personal memories of the Nuclear Data Section, some of which date back to the earliest days of the Section.

In the early 1970s, my Los Alamos colleague Jim Lemley was serving in the NDS. When I learned that Jim would be returning to the US in the summer of 1975, I eagerly applied for the soon-to-be-open P-3 position.

Unfortunately for me, Dick Lessler, an expert on neutron activation data from Livermore, was chosen to fill the post. However, later on, when Dick finished his contract, I tried again.

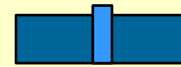
I did better this time. As a result, in June 1978, my wife Janice and I, along with our young children Laura (9) and Mike (6), landed at Schwechat Airport in Vienna. We were met there by Jim Phillips, a Los Alamos plasma physicist serving as Head of the IAEA Physics Section. Jim drove us straight to the Ringstrasse. Soon, the four of us were staring out in wonder at the old IAEA Headquarters, the Staatsoper, the Hofburg, Café Landtmann, and on to the very green 19th district.

Jim delivered us safely, although jet-lagged and a bit dazed, to Hotel Casino Zögernitz near the northern terminus of the "G-2" (later "37") tram line. There, we waited for our apartment in the Agency complex on Hofzeile to be painted.

After a few days at Casino Zögernitz (vintage 1837), I was sitting one morning with our son Mike in the hotel's breakfast room, with its several chandeliers and rich Biedermeier décor. I asked him how he liked Austria so far, and, looking around, he said "It's older, but it's fancier."

My Personal Timeline, 1968 – 2014

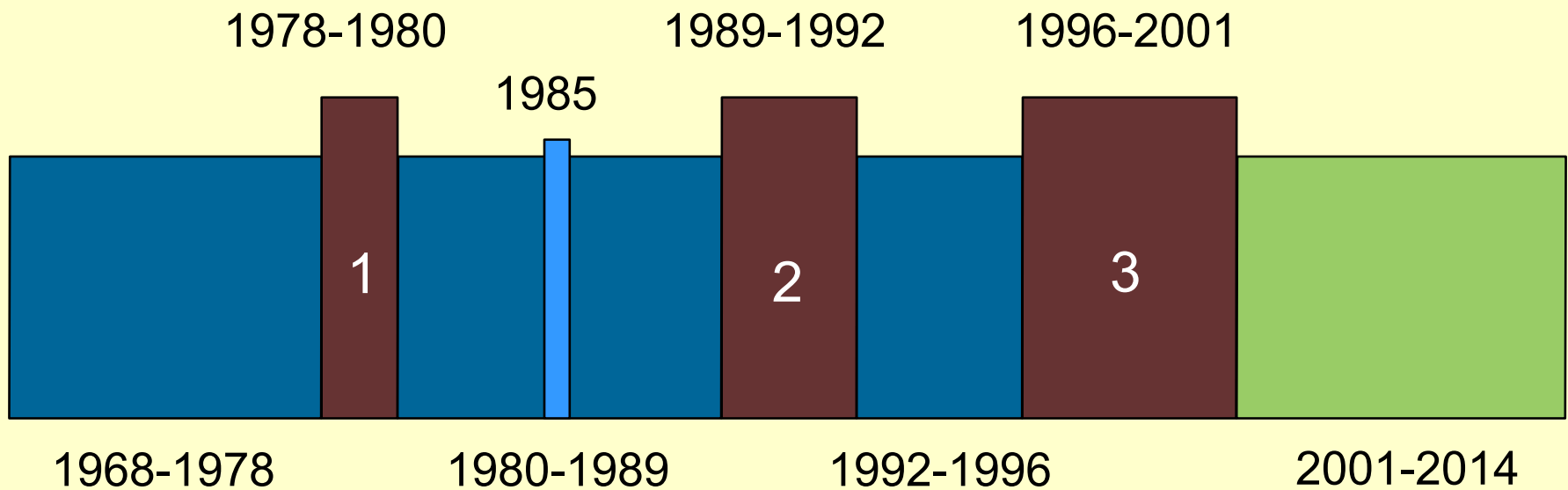
Los Alamos National Laboratory



IAEA Nuclear Data Section



Consultant to ANL, BNL, IAEA



NDS-1, 1978-1980

Nuclear Data Physicist, P-3
My supervisor, Hans Lemmel

On my arrival in the Section in 1978, the NDS was still housed in the Wasagasse branch of the IAEA.

One vivid memory is that, at lunchtime, we would crowd into a VW shuttle bus for a wild ride down Herrengasse to the old Headquarters. There we would enjoy a cafeteria meal overlooking Kärntner Ring, go to the bank, or shop at the commissary.

Just four months after my arrival in the Section, the Agency moved across the Donau to the newly completed "UN City."

The U-1 crossing of the river was not yet finished, so at first we were taken to work by chartered buses. They took an odd route past the Franz-Josef-Bahnhof, down Augartenstrasse and past Praterstern.



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INTERNATIONAL NUCLEAR DATA COMMITTEE

NDS LIBRARY COPY

IAEA Advisory Group Meeting on Nuclear Data

for Fusion Reactor Technology

Vienna, 11-15 December 1978

SUMMARY REPORT

Edited by

A. Lorenz and D.W. Muir
Nuclear Data Section
International Atomic Energy Agency

May 1979

IAEA NUCLEAR DATA SECTION, KÄRNTNER RING 11, A-1010 VIENNA

NDS-1, 1978-1980 (cont.)

My first work assignment was to assist Alex Lorenz in the organization of the Advisory Group Meeting on Nuclear Data for Fusion Reactor Technology, held at the new Headquarters from 11-15 December 1978.

Following the recommendations of this AGM, and those of a series of subsequent meetings, Joe Schmidt pushed vigorously for the creation of an entirely new, fusion-relevant nuclear reaction database, which came to be known as FENDL.

My second work assignment was to edit and publish WRENDA-79/80. Collecting and analyzing these data requests for WRENDA stimulated my career-long interest in the development of objective methods to help in the setting of measurement priorities. The provision of such methods is one of the goals of the Section's current GANDR project.



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INDC(SEC)-73/URSF

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INTERNATIONAL NUCLEAR DATA COMMITTEE

WRENDA 79/80

World Request List for Nuclear Data

D.W. Muir, IAEA, Editor

Published on behalf of

National Nuclear Data Center, Brookhaven, USA (C.L. Dunford, coordinator)
NEA Data Bank, Saclay, France (N. Tubbs and P. Johnston, coordinators)
Nuclear Data Section, Vienna, Austria (P.M. Smith and D.W. Muir, coordinators)
Nuclear Data Center, Obninsk, USSR (O.D. Kazachkovskij, coordinator)

October 1979

IAEA NUCLEAR DATA SECTION, KÄRNTNER RING 11, A-1010 VIENNA

NDS-2, 1989-1992

Senior Nuclear Data Physicist, P-5
My supervisor, Joe Schmidt

A major focus of my effort in my second IAEA contract was working to bring a modern decentralized computer architecture to the NDS (and to the Agency). Early on, I worked with NESI staff on the successful application for a "Class-B" internet license, which granted the IAEA the authority to use IP addresses from 161.5.1.1 to 161.5.255.255.

With support from Charlie Dunford (then Head of the US-NNDC and subsequently NDS Section Head) and the forward-looking leadership of Joyce Amenta, DIR-NESI, a VAX-VMS server was acquired, in order to provide convenient online access to Nuclear Data Section services in Member States.

Later NDS initiatives led to the installation of mirror servers in Brazil, India, and more recently in China.

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Access to NDIS
(interactive online Nuclear Data Information System)
via INTERNET (TCP/IP):

Sample login:
TELNET      IAEAND.IAEA.or.at
            (or 161.5.2.2)

IAEA VAX-VMS V5.4-3
Username:   IAEANDS

Welcome to VAX/VMS version V5.4-3 on node M4300
.....

Enter NDS assigned authorization code (or GUEST): GUEST
(or your authorization code if you have one)

Enter your last name (or DEFAULT or?) _ _ _ _ _

Authorization:
As a "GUEST", you will have 30 seconds of CPU time allocated. At
the end of a GUEST session, you may sign up directly for an
authorization code for full access service. (This code still
needs to be activated by the NDIS manager before you can use it
for future access.) Or, you may contact the IAEA Nuclear Data
Section for assignment of an authorization code.

Retrieval system:
A user-friendly system provides ample help to the user who
specifies the retrieval criteria in response to step-by-step
prompts by the system. It also provides interactive assistance
through HELP files. More detailed documentation on the system may
be obtained by contacting the IAEA Nuclear Data Section.

Access to open areas for FTP file transfer:

Sample login:
FTP      IAEAND.IAEA.or.at
Username: FENL (if FENL files are wanted)
          NDSOPEN (for retrieving other available files or for
          sending files to IAEA)

No password required.
Then choose one of the available subdirectories, where you may find
AAREADME.TXT files for further information.
```

Printed by the IAEA in Austria
November 1996

Nuclear Data Section e-mail: INTERNET:SERVICES@IAEAND.IAEA.OR.AT
International Atomic Energy Agency fax: (43-1)20607
P.O. Box 100 cable: INATOM VIENNA
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Austria telephone: (43-1)2060-21710

online: TELNET or FTP: IAEAND.IAEA.OR.AT
username: IAEANDS for interactive Nuclear Data Information System
username: ANONYMOUS for FTP file transfer
username: FENL for FTP file transfer of FENL files
For users with web-browsers: <http://www-nds.or.at>

NDS-2, 1989-1992 (cont.)

At the exact mid-point of my 9-year-long “home leave” between my first and second NDS contracts, I had spent a sabbatical year in Harwell and Oxford, UK. There, I was introduced to the theory and use of statistical reaction-theory programs such as GNASH.

During that sabbatical, it became very clear to me that there was need for a more structured relationship between nuclear-theory codes and their “input parameters” (optical model well-depths and radii, level densities, etc.), something like the relationship between the NJOY processing code and the large evaluated cross section libraries such as ENDF/B, JENDL and JEFF.

With this goal in mind, I organized two small consultants' meetings in Vienna in 1990 and 1991 to explore the idea. Enthusiasm spread rapidly through the reaction-theory community, leading to the creation of the highly regarded Reference Input Parameter Library, or RIPL. This effort has been led by Pavel Oblozinsky, Mike Herman and Roberto Capote.



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INTERNATIONAL NUCLEAR DATA COMMITTEE

REFERENCE NUCLEAR PARAMETER LIBRARY FOR NUCLEAR DATA COMPUTATION

Summary Report of a Consultants' Meeting
organized by the International Atomic Energy Agency
and held in Vienna, Austria, 13-15 November 1991

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NDS-3, 1996-2001

Section Head, P-5

My supervisor, Din Sood

During my third and final Agency contract, I continued to look for opportunities for “new beginnings” in the realm of nuclear data development and nuclear data services, but this time more as a facilitator, rather than as a “do-er.”

One of my more pleasant duties as Section Head to recruit a significant number of new staff members into the Section, including

Liam Costello

Mike Herman

Scott Miller (short term)

Alan Nichols

Raquel Paviotti

Vladimir Pronyaev

Andrej Trkov

Viktor Zerkin

These excellent additions have amply displayed their own brand of creativity. To quote just two specific examples:

Vladimir Pronyaev has led the development of the International Evaluation of Neutron Cross-Section Standards. The Standards file provides the starting point for all of the major reaction data “regional” evaluations.

Viktor Zerkin has made major contributions to the modernization of the widely used EXFOR library of compiled experimental reaction data, and he has led the expansion and refinement of the NDS web site, as shown in the next slide.



International Atomic Energy Agency

Nuclear Data Services

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CD/DVD with documentation, data, codes, etc.

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[EMPIRE-3.2](#)
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[ENDF-6 Codes](#)
[ENDF-6 Format](#)
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[EXFOR](#)
[FENDL 3.0](#)
[Fission Yields](#)
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NEW
JEFF-3.2 - Joint Evaluated Fission and Fusion File, coord. by NEA Data Bank, 2014 [\[page\]](#) [\[archive\]](#) [\[retrieve\]](#)
IRDFF - International Reactor Dosimetry and Fusion File v1.03 [\[page\]](#) [\[archive\]](#) [\[retrieve\]](#)
CD/DVD-ROMs available for on-line downloading [\[page\]](#)
Portable Empire-3.2.2 for Windows - nuclear reaction model code system for data evaluation [\[page\]](#) [\[download\]](#)
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**EXFOR**

Experimental nuclear reaction data

**LiveChart of Nuclides**

Interactive Chart of Nuclides

**CINDA**

Nuclear reaction bibliography

**ENDF**

Evaluated nuclear reaction libraries

**ENSDF**

evaluated nuclear structure and decay data (+XUNDL) **

**NSR**

Nuclear Science References *

NuDat 2.6

selected evaluated nuclear structure data **

RIPL

reference parameters for nuclear model calculations

IBANDL

Ion Beam Analysis Nuclear Data Library

Charged particle reference cross section

Beam monitor reactions

PGAA

Prompt gamma rays from neutron capture

FENDL 3.0

Fusion Evaluated Nuclear Data Library, Version 3.0

Photonuclear

cross sections and spectra up to 140MeV

IRDFF

International Reactor Dosimetry and Fusion File

NAA

Neutron Activation Analysis Portal

Safeguards Data

recommendations, August 2008

Medical Portal

Data for Medical Applications

Standards
 - Neutron cross-sections, 2006
 - Decay data, 2005

*Database at the IAEA, Vienna

**Database at the US NNDC

IAEA Nuclear Data Section



Mirrors

Partners

Events <15:16>


 28th Symposium on Fusion Technology (SOFT2014)
 Sept. 29 - Oct. 3, 2014
 San Sebastián, Spain

 Workshop on elastic and Inelastic Neutron Scattering (WINS2014)
 Dec. 3-5, 2014
 Dresden, Germany

50 Years of Innovation

In summary, the Nuclear Data Section is a place where many new ideas and approaches have been given a chance to germinate and grow. Below are listed four factors that help explain why innovation has played such a large role in the history of the Section.

1. Meeting the Needs of Tomorrow --- Valid and relevant nuclear data for a specific application is most urgently needed when the targeted technology (for example, nuclear fusion) is young and still developing. In meeting these needs, innovation is not just desirable, it's a necessity.

2. Strength through Diversity --- It has been my experience that nuclear data programs at the national level have some difficulty in sustaining projects that

- cut across national borders,
- serve the needs of multiple technological programs, and
- have an intrinsically long time frame.

In contrast, the diverse, international setting of the NDS makes it very well-placed to address data needs with exactly these characteristics (EXFOR, FENDL, RIPL, Standards, etc.).

3. Quality of Advice --- It is important to mention the role that the International Nuclear Data Committee has played in sustaining the growth of programmatic start-ups. The INDC has consistently recognized that nuclear data development projects with widespread benefits (like those above) may take considerable time to reach maturity.

4. Quality of the Staff --- Last, but not least, the successes of the Section would not have been possible without the vision, the professionalism, and the hard work of the NDS staff.