



International Atomic Energy Agency

**IAEA: International Initiatives and
Collaboration in Nuclear Structure and
Decay Data**

D. Abriola

Nuclear Data Section

Department of Nuclear Sciences and Applications

USNDP, NNDC, November 2008

International Collaborations and Initiatives in Nuclear Structure and Decay Data Sponsored by the IAEA

IAEA's Nuclear Data Section (NDS)

Section Head:

A.L. Nichols, Nuclear Data
Physicist

Deputy Section Head:

D. Abriola, Nuclear Data
Physicist

Section Secretary:

J. Roberts, Clerk

Atomic & Molecular Data Unit	Nuclear Data Services Unit	Nuclear Data Development Unit	Systems Development Unit
<p><u>R.E.H. Clark</u> (Head) Atomic Physicist</p> <p><u>D. Humbert</u> Atomic Physicist/ Programmer</p> <p><u>K. Sheikh</u> Database Clerk</p>	<p><u>A. Mengoni</u> (Head) Nuclear Data Physicist</p> <p><u>V. Zerkin</u> Nuclear Physicist/ Programmer</p> <p><u>N. Otsuka</u> Nuclear Data Physicist</p> <p><u>S. Dunaeva</u> Nuclear Physicist</p> <p><u>G. Bush</u> Production Programmer</p> <p><u>L. Vrapcenjok</u> Secretary/Clerk (temp)</p>	<p><u>D. Abriola</u> (Head) Nuclear Data Physicist</p> <p><u>R. Capote Noy</u> Nuclear Physicist</p> <p><u>M. A. Kellett</u> Nuclear Physicist</p> <p><u>K. Nathani</u> Secretary/Clerk (temp)</p>	<p><u>W. Costello</u> (Head) Systems Analyst</p> <p><u>M. Verpelli</u> Database Analyst/ Programmer</p> <p><u>K. Nathani</u> Secretary/Clerk (temp)</p> <p><u>[M. O'Connell (25%)]</u> Applications Programmer</p>



IAEA: International Initiatives and Collaboration in Nuclear Structure and Decay Data

- **Technical Work**
- **Coordinated Research Projects (CRPs), Data Development Projects (DDP), Technical Meetings (TM) ...**
- **Collaboration within the International Network of Nuclear Structure and Decay Data Evaluators (NSDD)**
- **Training**
- **Reference data libraries for nuclear applications - ENSDF (TM)**

IAEA: International Initiatives and Collaboration in Nuclear Structure and Decay Data Technical Work

- **ENSDF mass-chain evaluations**
D. Abriola in collaboration with A. Sonzogni (NNDC)
(2007, A=96; 2008, A=72)
- **NSR compilations, M.A. Kellett** (since September 2005)
 - a) Nuclear Physics A
 - b) European Physical Journal A
 - c) Physics Letters B

2008: 465 papers referenced, 266 *keyworded*
(c.f. 869 and 494 in **2007**; 479 and 348 in **2006**)
- **DDEP evaluations, A.L. Nichols** (as part of CRP)
- **JEFF Project, M.A. Kellett** Radioactive Decay Data Library
A.L. Nichols new decay data evaluations for fusion/activation

IAEA: International Initiatives and Collaboration in Nuclear Structure and Decay Data

Coordinated Research Projects (CRP)

CRP on Updated Decay Data Library for Actinides, 2005 – 2009

Final meeting, 8-10 October 2008, IAEA HQ, Vienna

Evaluations carried out using DDEP methodology (with review)

Includes usual decay parameters, conversion electron and X-ray data

Final database also to be made available in ENSDF and ENDF formats (Q4 2009)

IAEA: International Initiatives and Collaboration in Nuclear Structure and Decay Data

Participant	Actinides (40)	Decay daughters (45)
M.-M. Bé (France)	^{243}Am , 234 , ^{238}U , ^{252}Cf	^{210}Tl , 210 , ^{214}Pb , 210 , ^{214}Bi , 210 , 214 , ^{218}Po , ^{218}At , $^{218,222}\text{Rn}$, ^{226}Ra
V. P. Chechev (Russia)	^{233}Th , ^{233}Pa , 237 , ^{239}U , 236 , $^{236\text{m}}$, 237 , 238 , ^{239}Np , 238 , 239 , 240 , 241 , ^{242}Pu , ^{241}Am , 242 , ^{244}Cm	^{227}Ac
F. G. Kondev (USA)	243 , 245 , ^{246}Cm	^{206}Hg , 206 , 207 , ^{209}Tl , 209 , ^{211}Pb
A. Luca (Romania)	^{234}Th , ^{236}U	^{211}Bi , ^{211}Po , ^{228}Ra
G. Mukherjee (India)	^{229}Th , ^{233}U	
A. L. Nichols (IAEA)	^{228}Th , 242 , $^{242\text{m}}$, 244 , $^{244\text{m}}\text{Am}$	^{208}Tl , ^{212}Pb , 212 , ^{215}Bi , 212 , ^{216}Po , 211 , ^{219}At , $^{219,220}\text{Rn}$, ^{224}Ra
A. Pearce (UK)	^{232}Th , ^{231}Pa , ^{232}U	^{228}Ac , ^{223}Ra
Huang Xiaolong (China)	^{231}Th , 234 , $^{234\text{m}}\text{Pa}$, ^{235}U	221 , ^{223}Fr , ^{217}At , ^{217}Rn , ^{213}Bi , ^{213}Po , ^{225}Ra , ^{225}Ac
Unallocated, Oct 2008		^{215}Po , ^{215}At



IAEA: International Initiatives and Collaboration in Nuclear Structure and Decay Data

Collaboration Activities: International Network of Nuclear Structure and Decay Data Evaluators (NSDD)*

responsible for the evaluation and updating of nuclear structure data contained within the Evaluated Nuclear Structure Data File (ENSDF)
- data also published in *Nuclear Data Sheets*



Alan Nichols

NSDD meetings are held biennially, and are organized by the IAEA-NDS

- meetings in Hamilton, Canada, on 6-10 June 2005, and St. Petersburg, Russian Federation, on 11-15 June 2007.

Next NSDD meeting - Vienna, Austria, on 23-27 March 2009:

seeking improved input from Europe;

NDS assists in preparation of NSR compilations;

IAEA-NDS organisation and sponsorship of workshops at ICTP-Trieste

* NSDD: 16 centres, coordinated by IAEA-NDS; NNDC/BNL custodian of ENSDF

Training: Nuclear Structure and Decay Data: Theory and Evaluation



IAEA

International Atomic Energy Agency



United Nations
Educational, Scientific and
Cultural Organization



IAEA: International Initiatives and Collaboration in Nuclear Structure and Decay Data

Most recent ICTP-IAEA workshop, April 2008:

Training of 32 participants was successfully achieved (25 selected + 7 ICTP affiliates) - nuclear theory and modelling, relevant experimental techniques, statistical analyses, and the philosophy and methodology for comprehensive mass chain evaluations

- further training of 4 participants already involved in mass-chain evaluations
- 9 potential candidates identified
- 2 participants to visit NNDC
- one participant recruited to postdoc position at NNDC

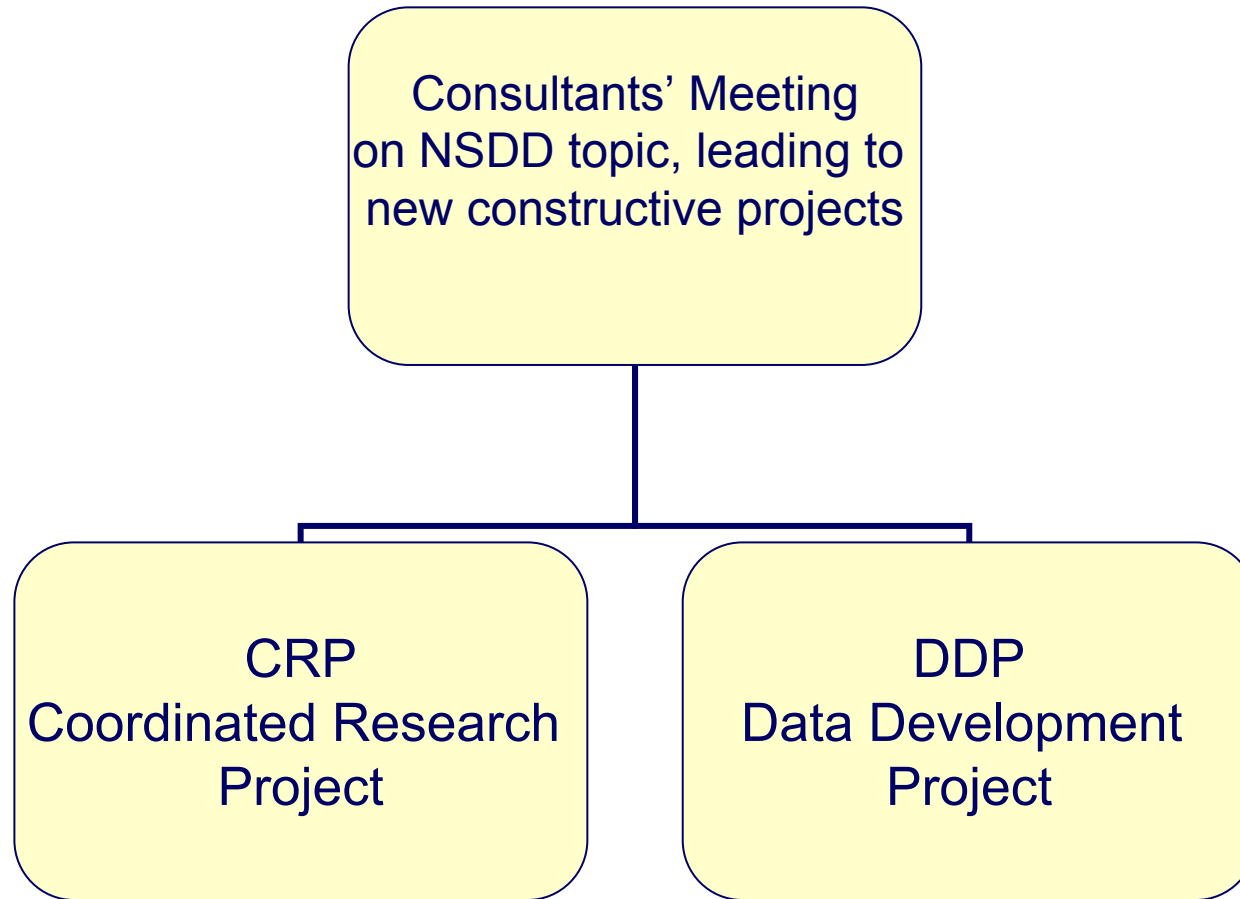
IAEA: International Initiatives and Collaboration in Nuclear Structure and Decay Data

Success due to three outstanding directors (**A.L. Nichols**, **J.K. Tuli** and **A. Ventura**) + 10 conference lecturers, including some of the most experienced ENSDF evaluators in the world

Next NSDD workshop: planned for April-May 2010



Could IAEA Nuclear Data Section be of service in the organization of technical meetings to address NSDD topics?



IAEA: International Initiatives and Collaboration in Nuclear Structure and Decay Data

Reference Data Libraries for Nuclear Applications - ENSDF

10 - 11 November 2008, IAEA, Vienna, Austria
~ 27 participants from 13 countries + 3 from IAEA

- (i) assess decline in European nuclear structure evaluations for ENSDF over previous 20 years**
- (ii) identify European scientists and research institutes interested in taking part in nuclear structure evaluations**
- (iii) discuss possible strategies to fund these activities in Europe**

REFERENCE DATA LIBRARIES FOR NUCLEAR APPLICATIONS – ENSDF (and Europe)

European participants include:

- Stefaan Pommé, EC - DG Joint Research Centre, **Belgium**
- Dimiter Balabanski, University of Sofia, **Bulgaria**
- Heikki Penttilä, University of Jyväskylä, **Finland**
- Sydney Gales, Directeur, GANIL, **France**
- Christoph Scheidenberger, GSI, **Germany**
- Janos Timár, ATOMKI, Inst. Nuclear Research, **Hungary**
- Adam Maj, Instytut Fizyki Jądrowej PAN, **Poland**
- Jerzy Jastrzebski, Warsaw Cyclotron, Inst. Nuclear Research, **Poland**
- Victor Zamfir, National Inst. Physics Nucl. Eng. (IFIN-HH), **Romania**
- Jose Maria Los Arcos, CIEMAT, **Spain**
- Melih Bostan, Istanbul University, **Turkey**
- Sefa Erturk, Nigde University, **Turkey**
- Nizam Erduran, Turkish Atomic Energy Authority, **Turkey**
- Jon Billowes, Dalton Nuclear Institute, **United Kingdom**
- Zsolt Podolyak, University of Surrey, **United Kingdom**



Thank you

IAEA Headquarters, Vienna, Austria

