Status Report of the Nuclear Data Project at McMaster University
(April 1, 2002 – September 30, 2003)
(Report prepared by B. Singh October 24, 2003 for US-NDP 2003)

ENSDF RELATED WORK:

Permanent responsibility: **A=31-44, 64, 89, 98, 100, 149, 151, 164, 188, 190, 194.**

During 2002-2003, we worked on other priority A-chains and nuclides also, which are outside our A-chain responsibility.

Mass-chain/Nuclide Evaluations published or submitted since April 2002:

A-chain/nuclide updates:

A=149: B. Singh, NDS (Submitted, September 2003)**.**

A=40: J.A. Cameron and B. Singh, NDS (Submitted, August 2003)**.**

A=73: B. Singh, NDS (Submitted, March 2003; at review stage)**.**

A=98: B. Singh and Z. Hu, NDS 98, 335-514 (2003)
(contribution by the McMaster group is >80%).

A=190: B. Singh, NDS 99, 275-481 (2003)**.**

A=79: B. Singh, NDS 96, 1-176 (2002)**.**

Table of Superdeformed Nuclear Bands and Fission Isomers:
B. Singh, R. Zywina and R.B. Firestone, NDS 97, 241-592 (2002).

^{152}Dy: B. Singh, NDS 95, 995-1036 (2002)**.**

Nuclide updates for ENSDF:

^{94}Pd, ^{94}Ag, ^{125}Nd, ^{125}Pr, ^{135}In, ^{135}Sn, ^{135}Sb, ^{137}Sn (by B. Singh)

Superdeformed structures: Data from primary publications during 2002-2003 for the following **22 nuclides** were evaluated and included in ENSDF (by B. Singh).

$^{80\text{-}83}$Sr, $^{82\text{-}84}$Y, $^{83\text{-}84}$Zr, ^{132}Pr, ^{133}Nd, ^{135}Sb, ^{152}Dy, $^{161\text{-}165}$Lu, ^{167}Lu, ^{170}Hf, ^{174}Hf, ^{192}Pb.

As of October 24, 2003, we are current on the coverage of SD band data in ENSDF.

For the 2002 edition of Table of Superdeformed Nuclear Bands and Fission Isomers, new computer codes were written to generate tables, band drawings, moment of inertia plots, etc., since the programs used for the 1996 edition were no longer available. The normal-deformed data and low-spin data for all nuclides included in this Table were also updated for newer publications since the last NDS evaluations.

Review work: A=126 and 189 were reviewed by B. Singh during 2002-2003.

Compilation of data from recent literature (XUNDL database):

Since April 2002, about **255** compiled (but checked for level-scheme consistency) datasets were prepared by the McMaster group in ENSDF format using semi-automatic coding procedures as described in the last year's meeting. About **30** previous datasets in XUNDL were revised/edited to incorporate newer papers for these nuclides. During summers of 2002 and 2003, we also compiled main high-spin papers for some outdated A-chains in ENSDF. We regularly scan web pages of primary nuclear physics journals (PRL, PR-C, NP-A, PL-B, EPJ-A, JP-G) for current publications in experimental nuclear structure. Presently, we are almost current on the coverage of high-spin papers in XUNDL, except 10 papers published in the last few weeks, which are presently being compiled. A major part of the compilation work since April 2002 has been done by undergraduate students (working part-time) at McMaster: Roy Zywina (since June 2001) and Michelle Lee (since February 2002). Each dataset was checked thoroughly by B. Singh, before submitting it to BNL for inclusion in XUNDL database. We continue to actively communicate

with the authors of original papers to resolve data-related inconsistencies and to request additional data details.

All the e-mail communications (about 100 in all) from the original authors received from 1999 to 2003 have been put together in a single computer file, which has been submitted to BNL for archival storage. The evaluators or the users of XUNDL can request any of these communications from BNL or McMaster.

A new computer code has been written to translate tabular text files to ENSDF format. This code has many additional features than the one written by David Radford (ORNL) in 1999. The compilation work now uses this code on a routine basis.

Work in progress (as of October 1, 2003):

A=39. Complete ENSDF style datasets for all reactions and adopted properties. Several nuclides have already been completed.

A=194, 80. Work is in progress to update all the nuclides in these A-chain. Currently these are at different stages of completion.

A=74: Work in progress in collaboration with the data group in Kuwait. All nuclides of A=74, except 74Se and 74As, have been completed by the McMaster group and submitted to BNL for inclusion in ENSDF.

Collaborative work as a part of training of new ENSDF evaluators:

A=132: Work is in progress in collaboration with the new team of evaluators (Yuri Khazov, Alexandr Rodionov, Sergei Sakharov and Ivan Mitropolsky) at Petersburg Nuclear Physics Institute in Gatchina, Russia. The data files and comments are regularly exchanged through e-mail between the two centers. Ten nuclides of this mass chain have already been completed. We hope to submit this A chain to BNL before the end of this year.

A=165: Work has recently started in collaboration with the new team of evaluators (Ashok Jain and S.S. Malik) at the Department of

Physics, Indian Institute of Technology, Roorkee, India. The work on this A chain is expected to proceed more actively after Drs. Jain and Malik have attended IAEA's Trieste workshop in November 2003.

Update of SD band data: Continuous update will be done as new papers appear.

Compilation of experimental nuclear-structure papers for XUNDL: Work will continue on the compilation of nuclear structure (primarily high-spin) data reported in current publications. If time permits, we also plan to compile selected low-spin papers and high-spin papers for some of the outdated (>7 years or so) A-chains in ENSDF.

Other related activities:
National and International Coordination: The 2003 meetings of the US-NDP and IAEA-NSDD were scheduled to be hosted by McMaster data group from May 1-May 9. All the necessary arrangements and administrative matters were handled at McMaster. Unfortunately, just one week prior to the scheduled dates, both these meetings were postponed due to SARS situation in Toronto. The website for IAEA's NSDD-2003 meeting, now scheduled in November in Vienna, continues to be maintained by the McMaster group. Updated status reports from different data centers and other items received in the last few days are currently being made available on this website.

Personnel and funding:
J.C. Waddington (Professor, PI of the data group at McMaster),
J.A. Cameron (Emeritus-Professor),
B. Singh (Research Scientist-Nuclear Data Evaluator),
R. Zywina and M. Lee (undergraduate students).

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