Minutes of Meeting of Working Group on Nuclear Structure and Decay Data of the

U. S. Nuclear Data Program
April 27, 1998, Brookhaven National Laboratory

Contents

The Working Group on Nuclear Structure and Decay Data of the newly reorganized U. S. Nuclear Data Program met on April 27, 1998 at Brookhaven National Laboratory. The meeting was chaired by Richard Helmer. The agenda, as amended at the meeting is Attachment 1, included oral and written reports by each Center doing structure or decay data evaluations and about twenty items which had been submitted by the various evaluators in the United States and Canada. The persons attending this meeting include those in Attachment 2. The written versions of the Center reports are in Attachment 3.

The agenda items that were discussed are given in Attachment 4 and are numbered 5-17, 19, 21-23. As circulated before the meeting, these items were made up of a Proposal, a Purpose, and a Discussion; these Discussions have been deleted to save space. A summary of the results of the discussions at the meeting are given below.

General comments

The meetings of the former U. S. Nuclear Data Network usually consisted of two parts. One was a small group called the Formats and Proceedures Subcommittee that discussed detailed items related to the data as it is stored in the Evaluated Nuclear Structure Data File (ENSDF) and the second was a Network meeting of including all of the U. S. and Canadian evaluators as well as the ENSDF system management people, involving broader policy issues. This meeting of the Working Group included both functions. The meeting lasted about eight hours and this constraint meant that some broader issues were discussed only in a narrow context, rather than a context which would have required more time.

This meeting progressed quite well and all attendees were interested in having a cooperative and productive meeting.

The decreased level of manpower available for evaluations of A-cahins and nuclides was commented on at several points, but was not discussed as a specific item. The Chair indicated he would collect some data on this matter.

Specific agenda items

It was agreed that the National Nuclear Data Center, NNDC, will continue to prepare lists of priority A-chains and priority nuclides for the guidance of evaluators in deciding on the order of their evaluation efforts (item #5). There was discussion of how the priorities are set, especially as to the influence of subject areas (e.g., astrophysics and high-spin data) as against the number of new papers with experimental data. It is assumed that the criteria for setting priorities may develop over the next year.

In the past there were problems with the long times that it took to get reviews done for the A-chains. To determine whether this is still a problem, NNDC provided a tally, Attachment 5, of the review times taken by the reviewer (item #6). It was pointed out that these times do not count the delay caused in several cases by the retirement of the person who originally was going to do the review. It is clear from the tally that the review time is not a general problem now. With the retirement of Murray Martin, most reviews will be less extensive as described in Nndc policy statements on reviews; therefore, it is necessary that the evaluator take full responsibility for the accurate entry of all numbers from the literature.

Several details related to the ENSDF processing codes (item #9) were discussed. (a) For the code LOGFT (which computes log *ft* and related values) , the Lawrence Berkeley National Laboratory, LBNL, group agreed to supply the coding they are using to compute the log *ft* values for unique 3rd and 4th forbidden transitions, NNDC will have it reviewed by John Millener, a theorist, and it will be added to LOGFT. (b) For RADLST (which computes atomic data quantities from the nuclear data), NNDC will supply to all evaluators a more modern set of atomic data, from Eckart Schönfeld of Physikalish-Technische Bundesanstalt, PTB, in Germany. The RADLST code will remain the same; it is just run with the newer atomic data. (c) There are some PC codes that are not as up-to-date as the VAX versions; NNDC plans to supply new PC versions in the near future. They will be made available electronically rather than via disk, except where a disk is necessary. (d) Changes in ENSDF by NNDC to accommodate the year 2000 and beyond were authorized. (e) The need for improvements in the printing of complex level schemes, including those of high-spin data, was discussed and NNDC will explore several possible improvements.

Three items related to analysis methods were discussed, but not adopted; these were (1) use of code to provide interpolated internal-conversion coefficients from Hager and Seltzer tables, Rősel et al., tables, and Band tables (item #13); (2) use of a code to provide the weighted average of a group of values by the Limitation of Relative Statistical Weight (LRSW) method (item #15); and (3) estimation of the most probable β^- or EC+β^+ intensity for branches whose characteristics known but intensity is not otherwise determined from new log *ft* systematics by B. Singh (item #14). (1) In the next few years there may be one or two new sets of theoretical internal-conversion coefficients calculated, so any change in the current Network policy of using the Hager and Seltzer tables was deferred. New calculations may be done by S. Raman, Oak Ridge National Laboratory (ORNL) and by a Russian-French group. The need to verify the quality of any new set of internal-conversion coefficients and the associated interpolation scheme was discussed. LBNL is to contact S. Raman about his efforts and to indicate to him what is needed if the results are to be useful to the Network. (2) An LRSW average code may be circulated later so that evaluators can become familiar with it. (3) Since log *ft* distributions are always skewed by the inability to observe very weak branches, there is a technical question about the proper use of such systematics as well as the possibility that the distributions are so wide that the results would not be useful.

Three items that would involve the changing of some ENSDF formats were discussed. The first involved a method to store data for ionized atoms when they differ from the data for neutral atoms (item #17). It was agreed that the needed additions would be made. These changes are the first step in accommodating structure data for the astrophysics community since they will deal with highly ionized atoms. The suggested format modifications were discussed and a revised format will be circulated for comments before the ENSDF file format is modified. The first data to be entered into the file may be for the decays of ^{188}Re and ^{163}Dy; the later neutral atom is stable, but the fully stripped atom decays by β^-emission.

The two other proposals for changing the ENSDF formats involved storing additional quantities related to converting the stored γ-ray intensities to γ rays per 100 spontaneous fissions (items #10 and #22) and converting measured γ-ray emission rates to the number of atoms in a sample (item #23). It was suggested for item #22 and agreed for item #23 that these situations should be handled by having separate files available containing the spontaneous fission yields, the thermal-neutron-capture cross sections, the Westcott g-factors, the isotopic abundances, etc. These data are not of the type considered by the ENSDF evaluators and they would be much easier to up-date or modify for special situations (e.g., abundances which vary between geographic locations), if they are separate from ENSDF. The quality of the spontaneous fission yields was questioned and needs discussion.

The advisability of adding flags to the entries in ENSDF to indicate whether a reference has been used in ENSDF was discussed (item #11). The difficulties of imp[lementing this and its usefulness were discussed. Rather than this, it was suggested that there be added character-strings on which searches can be made to look for new papers in a particular subject area and the NNDC will explore the ideas discussed. .

A presentation was made concerning the types of data that the astrophysics community needs that fit into the categories in ENSDF (item #7). Since ENSDF is a file for measured data, or at least for atoms that are observed, the new data in this field may be quite limited. The atoms of interest will often be ionized and, therefore, will be studied in stripped beams. The first modifications of ENSDF to handle these data have been agreed to (see item #17 discussed above). The Chair will continue this dialogue with the new astrophysics group.

The data needs of the high-spin community were also discussed (item #8) by the evaluators present. This need appears to be primarily for a web-site where the experimenter can post her/his level scheme results before publication. It was reported that ORNL is developing such a web site. The chair will ascertain the details of the plans for this web site in order to determine if there are needs, in addition to the regular need to evaluate the published data and get it into ENSDF.

The complexity of the incorporation of horizontal evaluations into ENSDF and their value for ENSDF were discussed. The specific proposal suggested that all horizontal evaluation results be given to the responsible A-chain evaluator to approve before entry into ENSDF, if such an evaluator in available and willing (item #12). The lack of a definite A-chain evaluator, the need to submit the whole nuclide as minimum unit and resolving related data in related nuclides, the possibility of putting horizontal evaluations in separate files, and the difference in evaluation procedures were all discussed. It was suggested that all horizontal evaluations done by ENSDF evaluators be approved by the Network before they are initiated; this has been done in some cases and not in others. The question of whether horizontal evaluations reduce the effort invested in A-chain and nuclide evaluations was raised. A web bulletin board where evaluators post their current activities was suggeted to reduce the cases where two evaluators are working on the same nuclide at the same time, especially in this time of a manpower shortage. These issues were not resolved, but the Chair indicated he would gather some information on present and future horizontal evaluations and the related manpower.

The existing horizontal evaluations that are being carried out by the people who are evaluators included:

decay data for selected nuclides (coordinated by R. G. Helmer, and including six non-network evaluators).
super-deformed band data (carried out by B. Singh and R. B. Firestone).
new nuclides (carried out by R. B. Firestone and including one non-network person)
α-decay data of even-even nuclei with no γ decay (carried out by Y. Akovali)

The minutes were prepared by R. G. Helmer, Working Group Chair, in part, from notes provided by C. Baglin and C. W. Reich.