

# National Institute of Standards and Technology

## Nuclear Data Verification and Standardization Program

### STATUS REPORT

It has been more than 13 years since the last evaluation of the neutron cross section standards. Work has been done on developing a new international evaluation of those standards. This work is being performed through the activities of the NEANSC Working Party on International Evaluation Cooperation which has a Subgroup which promotes international cooperation on measurements and evaluations of the nuclear data standards. The procedure for doing the comprehensive evaluation has been defined. The first step in this process is an R-matrix evaluation of the hydrogen scattering cross section using EDA. This evaluation is underway at LANL. The results of that evaluation will be used to convert measurements in the standards database which were made relative to that standard. The basic evaluation process involves combining the results of R-matrix analyses for the  ${}^6\text{Li}$  and  ${}^{10}\text{B}$  standards using EDA with a simultaneous evaluation of the cross sections for  ${}^6\text{Li}(n,t)$ ,  ${}^{10}\text{B}(n,\alpha_0)$ ,  ${}^{10}\text{B}(n,\alpha_1)$ ,  $\text{Au}(n,\gamma)$ ,  ${}^{235}\text{U}(n,f)$ ,  ${}^{238}\text{U}(n,f)$ ,  ${}^{238}\text{U}(n,\gamma)$ , and  ${}^{239}\text{Pu}(n,f)$  using GMA. Two codes which could be used for performing the combining procedure, GLUCS and KALMAN, are now being considered. Plans have been made to make comparison tests of the codes to be used for this international evaluation with similar codes using a limited database. These comparisons will involve EDA, SAMMY, GMA, KALMAN and GLUCS. Special consideration must be paid to the limitations of the programs in selecting the database to be used for the comparisons. Some work on the definition of the database has been done. Work continues on adding the experimental standards data obtained since the ENDF/B-VI standards evaluation to the database to be used for the standards evaluation. 42 data sets have been identified which should be added to the standards database. 11 of these have been reviewed, 13 are available and are in the review process, and 18 are not available (either in the process of being obtained from the experimenters or not final data). Evaluation of these experiments has revealed cases where corrections or changes in uncertainties should be made. This project now includes involvement at some level from Austria, France, Germany, Japan and the USA. This activity is done under the auspices of the U.S. CSEWG and the NEANSC. Efforts continue to be made to form an IAEA Coordinated Research Program which will focus on the important problem concerning the uncertainties which have been obtained from standards evaluations.

An important part of the activity associated with this program is suggesting, motivating and monitoring measurements for use in standards evaluations, largely through the NEANSC Working Party on International Evaluation Cooperation. This effort has led to new measurements which are now being made of the  ${}^{10}\text{B}$  branching ratio at IRMM in the 100 keV to MeV neutron energy region. Also concerns have arisen about solid state effects below 1 eV effecting the  ${}^{10}\text{B}(n,\alpha)$  standard which will require further investigation. A paper was presented at a dosimetry meeting on the NIST collaborative

measurements with Ohio University and LANL of the hydrogen angular distribution at 10 MeV neutron energy. A journal paper is now being written on this work. Due to the differences compared with the ENDF/B-VI hydrogen evaluation, an experiment at 15 MeV neutron energy is now being designed.