Update on Standards Activities

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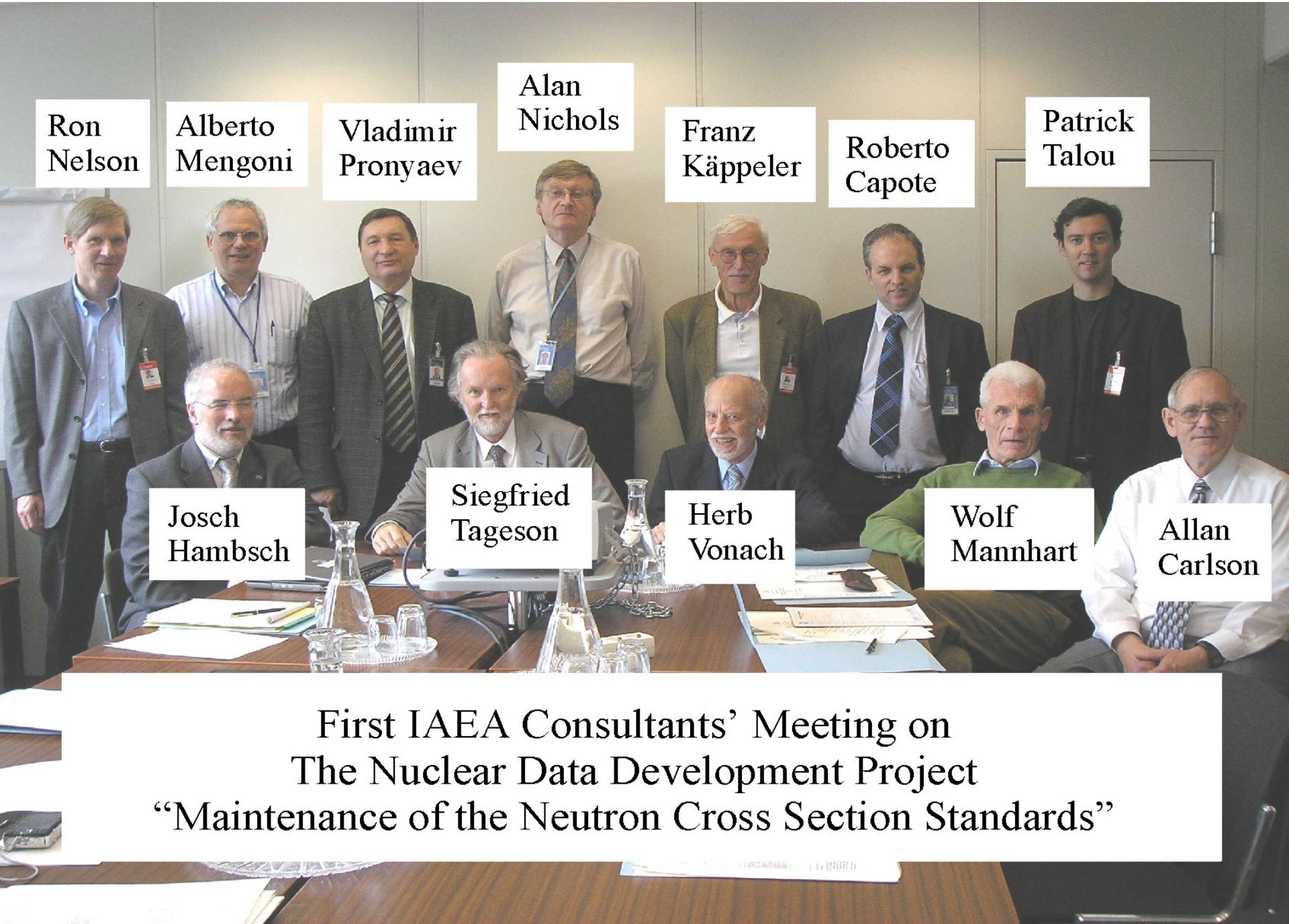
A Proposal for the Standards Sublibrary

There is an understanding that there should not be any changes to the standards for a given version of ENDF/B. However it appears that additions should be allowed. Consider the following proposal for additions to the standards:

- Allow covariances to be added.
- Allow the the energy range to be extended for some standards.

Approving this proposal would allow, for example:

- Covariances to be added to the hydrogen standard.
- The energy range of the hydrogen standard to be extended to 150 or 200 MeV.
- Possible extensions in energy of the ^{6}Li(n,t) or ^{10}B(n,α) standards.



First IAEA Consultants' Meeting on The Nuclear Data Development Project "Maintenance of the Neutron Cross Section Standards"

Summary of the First IAEA Consultants' Meeting (Oct. 2008) on the Nuclear Data Development Project "Maintenance of the Neutron Cross Section Standards".

The topics of the meeting were:

- Updating of the standards database.
  - More than 20 experiments completed or underway since the completion of the standards evaluation were reviewed. In most cases there is good agreement with the standards evaluation.
- Neutron spectra
  - Update for an evaluation of the ^{252}Cf spontaneous fission neutron spectrum.
    - Of the experiments done since the ENDF/B-VI evaluation, only 2 appear to be acceptable for inclusion in a new evaluation and they differ at high energies. These data do not resolve the spectra shape above 15 MeV. A new evaluation is not encouraged at this time. Improved measurements needed for calculations.
  - Update for an evaluation of the ^{235}U(n_{th},f) neutron spectrum.
    - Only a few experiments recent experiments are acceptable. There are problems at high energies with these data. A new evaluation should only be considered after the completion of the analysis of a new measurement performed at IRMM. Comprehensive measurements needed for model work.

Summary of the First IAEA Consultants' Meeting (cont)

- Neutron spectra (cont.).
  - Accelerator produced spectra, e.g. Al(d,n), B(d,n).
    - Difficulties getting reasonable ^{252}Cf deposits and thermal neutrons for obtaining $^{235}U(n,f)$ spectra suggest that other methods for obtaining spectra be used. Ohio University has characterized the spectra for a number of (d,n) sources. Such sources should be investigated as possible standards.

- Adding "Reference" cross section to our evaluation effort. These are not standards but they are used in some applications as pseudo-standards. It is preferred that the standards community review and evaluate them.
  - Reference cross sections for measurements of prompt gamma-ray production cross sections.
    - Several candidates were investigated taking into account factors such as structure and magnitude of the cross section, status of the database, sample properties, and evaluations performed. Both (n,n'γ) and (n,2nγ) reactions were considered. It is recommended that the Fe (n,n'γ) cross section be used since considerable work has been done on this reaction, however work should be done on the inherently better reference cross section, Nb(n,n'γ).

Summary of the First IAEA Consultants' Meeting (cont)

- Adding "Reference" cross sections (cont.)
  - Au(n,γ) reference cross section for capture cross section measurements for astrophysics (below the standards energy region).
    - Due to the evaluation process used for the standards evaluation, data for the Au(n,γ) cross section were obtained for energies below 200 keV. These results are consistently higher than the Ratynski evaluation (by about 5-7% from 15 to 25 keV) which is used in astrophysics applications. The Ratynski evaluation relies on Macklin capture data and Karlsruhe Maxwellian capture data. The standards evaluation uses a large database of various types of data. An examination of the database is now underway. New experiments underway by Wallner of the ^{238}U(n,γ)/Au(n,γ) cross section ratio and Schillebeeckx of the Au(n,γ) cross section should be helpful.
      The results of WPEC Subgroup 4 support the standards evaluation.

Summary of the First IAEA Consultants' Meeting (cont)

- Developing a procedure to improve the smoothing process.
  - The objective is to remove non-physical fluctuations (statistical structure) and maintain real structure such as the cusps that occur from competition with inelastic scattering. In the standards evaluation, a 3-point smoothing was used. The present effort used statistical model calculations for the Au(n,γ) and ^{238}U(n,γ) cross sections as shape data, with high correlation between neighboring points, in the GMAP code. The procedure appears to have been successful.

Summary of the First IAEA Consultants' Meeting (cont)

- Additional work on covariances related to the standards.
  - Covariances were obtained for the ^{235}U(n,f), ^{238}U(n,f), ^{239}Pu(n,f), Au(n,γ), and ^{238}U(n,γ) cross sections for those energy ranges necessary to cover the entire ENDF/B-VII energy range, when the standards energy range is included, using a number of methods.
    - By merging these covariances with those from the standards evaluation, covariances are now available for the entire ENDF/B-VII energy range.
    - These covariances could be put into the next mod of ENDF/B-VII thus allowing the very well determined covariances from the standards evaluation to be used more easily.
    - The cross sections for these nuclides are actively used in the dosimetry community. They are required to have covariances for the "full energy range" for their dosimetry applications. These covariances have been submitted to them for approval.