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(TECHNICAL SESSIONS)

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TECHNICAL SESSIONS

1. Advances in Nuclear Data Measurements and Newer Facilities

The national progress reports for the year ending 1981 have either been published or will be published shortly. The highlights of those reports, some other recent data measurements, and the newer facilities are described by representatives of each country. Special attention is paid to data for fission and fusion reactors, as well as for other applied purposes.

Germany

Cierjacks highlights the nuclear data activities relevant to fission reactors. At the 3 MeV Van de Graaff-Accelerator of the KFK Karlsruhe determination of the capture widths for s-wave resonances in ^{56}Fe, ^{58}Ni, ^{60}Ni and ^{27}Al, and capture cross sections of ^{56,58}Fe, ^{80,86}Kr, ^{243}Am (in the range 10-300 keV), ^{178,179,180}Hf and ^{180}Ta (in the range 2 keV to 2 MeV) have been completed. Further activities at this facility in the fission reactor nuclear data field are decreasing. At the isochronous cyclotron in Karlsruhe neutron total and elastic scattering work on light mass nuclei is continuing. At PTB Braunschweig neutron cross section work in the MeV region is progressing. Of special interest are the measurements on the ^{93}Nb(n,n')^{93m}Nb reaction and fast neutron scattering from ^{12}C in the energy region of 6 to 14 MeV. Furthermore, work on characterization of ^{252}Cf spontaneous fission neutron spectrum is in progress.

Qaim outlines the recent nuclear data activities relevant to fusion reactor technology. Extensive radiochemical studies on (n,n'x) type reactions have been going on at Jülich for several years and recently it has been shown that at 14 MeV the (n,n'p) reaction is very strong for nuclei with neutron separation energies higher than proton separation energies ($S_n > S_p$). Measurements with 30 MeV d(Be) break-up neutron spectrum have shown that both (n,n'p) and (n,n'α) reactions have appreciable cross sections.

The cross section data for the important tritium breeding reaction ^{7}Li(n,n't)^{4}He have been rather discrepant. Qaim reports that the Jülich-Geel collaboration has resulted in very extensive measurements in the energy region from threshold to 8 MeV, and from 13 to 16 MeV. The discrepancy is now solved. The cross section values are about 15 % lower than the ENDF/B-IV and are in agreement with the newest Los Alamos evaluation.

Regarding data for other applied purposes, Cierjacks mentions the Stuttgart work with polarized neutrons to study analyzing powers of various elements. Furthermore, extensive work on spectra and yields of neutrons as well as charged particles emitted in the interactions of 590 and 1000 MeV protons with various elements (between carbon and uranium) has been performed by a KfK group at the SIN cyclotron, and calculational methods are being tested to predict unknown cross sections. Qaim gives a brief account of the charged particle induced reaction cross section measurements relevant to the production of medically important radioisotopes. Recently, at Jülich data for the ^{75}As(^{3}He,3n)^{75}Br and ^{122}Te(d,n)^{123}I reactions have been extensively investigated.

As far as newer facilities are concerned, Cierjacks reports that a new cyclotron is being installed at Karlsruhe. Qaim mentions that a dd gas target has been constructed at the Jülich compact cyclotron (CV 28) to measure activation cross section data in the energy region of 4 to 10 MeV. First results were reported at the Antwerp conference.

USA

Chrien mentions that the Progress Report from USA has already been distributed (NEANDC(US)-212/U) and gives a comprehensive survey of the work being done in 21 laboratories. He gives highlights of the work at BNL. The power of the HFBR has been raised from 40 to 60 MW and the present flux of 10^{15} ncm^{-2}sec^{-1} is comparable to that of the reactor at Grenoble.

The TRISTAN on-line isotope separator facility at the reactor is being used to provide sources of mass separated fission products for various studies. An improvement in the capability of the TRISTAN facility was achieved by implementing a 4-detector, fixed angle, angular correlation apparatus. By the simultaneous data taking among the six possible pairs from 4 detectors, the measurement of angular correlations in $\gamma\gamma$-coincidences has been improved with respect to both statistical and systematic errors.

Considerable interest has developed recently in the details of the delayed neutron spectra. Such studies are carried out using the TRISTAN facility. The detection methods used are the Cutler-Shalev ^{3}He spectrometer and a TOF spectrometer. The study of such spectra represents the only way to obtain parameters for neutron resonances in nuclides far off the line of stability, and hence is of interest in the extrapolation of strength functions and level densities. Gamma spectra in coincidence with delayed neutrons are being measured. From the energies and intensities of gamma rays one deduces the partial neutron emission probabilities to the excited states. These probabilities provide a sensitive test of various models for delayed neutron emission.

The (n,γ) work is continuing as usual. For example, using the filtered beam technique a study of resonance-averaged neutron capture γ-ray spectra at $E_n \approx 2$ keV was carried out for the $I^n = 1/2^+$ target nucleus ^{239}Pu.

Chrien mentions further that at BNL presently there is no data activity relevant to fusion reactor technology.

Motz reports on some recent work at LANL. The $D(t,\alpha)n$ reaction cross section has been measured from 10 to 120 keV triton energy (values were contained in the Antwerp paper by Jarmie et al). A gaseous target without windows was used in order to have a negligible target thickness correction. Values obtained are in agreement with earlier Los Alamos data (Arnold et al 1953) and are a few percent higher than the present ENDF/B evaluation. Measurements on $t(t,t)t$ are planned.

The thermal neutron capture cross section of deuterium has been reported to be 508 $\pm$ 15 microbarns (cf. Phys.Rev. C25, 2810 (1982)). Reference to the hydrogen cross section was employed. This new value is in agreement with Merritt (NSE 34, 195 (1968)) who obtained 521 $\pm$ 9 µb and replaces an earlier capture value reported in 1963.

An extensive paper entitled "New Calculation of Prompt Fission Neutron Spectra and Average Prompt Neutron Multiplicities" has appeared in Nucl.Sci.Eng. 81, 213-71 (1982). Results depend only on basic assumptions concerning evaporation theory and optical model parameters. No fits are employed to actual measured spectra. Such fitting would be useful and will probably improve the excellent predictions even further. Spectra from unstable (or short-lived) isotopes undergoing fission can be estimated using this calculation as well as neutron energy dependence.

Perey describes very briefly some recent work at ORNL. A new measurement on the 1.15 keV resonance in ^{56}Fe has been completed. Measurement of the gamma production yields in the $^{57}Fe(n,n'\gamma)$ reaction has been done for incident neutron energies between 0.2 and 2 MeV. Some studies on the elastic scattering of neutrons from ^{58}Ni are in progress.

Whetstone mentions some recent work at other laboratories. In general research programmes have the same support as last year. The (n,charged particle) work at Livermore and Ohio is continuing. Mass spectrometric measurements of (n,α) reaction cross sections are proceeding further at the Rockwell International. It is now planned to extend those studies to energies above and below 15 MeV. The development of polarized neutron beams at TUNL is progressing.

Italy

Coceva reports on nuclear data activities in Italy. Most of the work is carried out at ENEA (formerly CNEN) in Bolgona. Here the experimental activities are concerned with neutron capture gamma ray measurements to obtain data on the spectroscopy of low-lying levels and on the strength of dipole gamma-transitions. Studies are made to improve efficiency and precision of reduction methods of resonance data from neutron time-of-flight spectrometers. The threshold photo-neutron facility in Bologna is now fully operational with four flight-paths and has yielded electric dipole gamma-strength data.

Calculations have been performed on the radiative neutron capture process using the direct-semidirect model, and the valence model. Characteristics of particle emission have been studied with pre-equilibrium model. Methods for the calculation of nuclear level densities and for the evaluation of average resonance parameters have been continued.

Integral measurements of neutron capture in a fast-reactor spectrum have been carried out for Ni, Cr, Fe and stainless steel. Of interest is the work carried out at the "Politecnico di Milano" on delayed neutrons and at the University of Florence on decay properties of low-lying levels in several nuclei.

Coceva mentions further that the high-energy Tandem accelerator at Catania is under construction.

Canada

Cross highlights some recent measurements in Canada. Effective cross sections for Maxwellian distributions were determined with neutron temperatures from -190 °C to 300 °C, for ^{233}U, ^{235}U and ^{239}Pu fission, and ^{238}U, ^{232}Th, ^{115}In, ^{176}Lu and ^{197}Au capture. The agreement between measured and ENDF/B-IV results was found to be good, indicating that the shape or the energy dependence of the cross sections in the ENDF/B-IV files is correct. The 2 % discrepancy in the ^{235}U fission cross section at thermal energies does not appear to be due to the shape of the cross section.

Total neutron yields from 100 MeV protons on Li and Pb targets were measured and compared with yields calculated using the NMTC/MORSE computer codes.

Photofission cross section spectrum of ^{232}Th was measured between 4.95 and 6.76 MeV with a resolution of 12-14 keV. This cross section, which on the average increases exponentially with increasing photon energy, shows three plateaus 5.20 to 5.80, 5.90 to 6.15 and above 6.30 MeV, respectively. Considerable structure is observed on each plateau.

Under facilities Cross mentions that a heavy ion cyclotron is under construction.

Sweden

Condé gives an account of the recent nuclear data measurements in Sweden. At Studsvik Science Research Laboratory (NFL) an extensive measurement programme on the fission product yields in the thermal fission of ^{235}U is in progress using the OSIRIS facility. A six group representation of delayed-neutron energy spectra has been derived by Rudstam. The work is reported in Nucl.Sci.Eng., March 1982. The new 100-picosecond bunching system at the Van de Graaff accelerator will be used for high energy resolution measurement of neutron elastic and inelastic scattering at around 20 MeV. A time compensated neutron detector with high efficiency is under development.

At Studsvik Energiteknik (AB) reactor physics aspects of the use of thorium in Sweden's first 12 light water reactors have been studied in burn-up calculations and showed a large saving of resources if thorium was used. Feasability studies on transmutation of waste have been made both for thermal and fast reactors.

At the Tandem Accelerator Laboratory, Uppsala, the neutron capture experiments have been extended to higher energies, between 20 and 30 MeV, to look for quadrupole giant resonances, in particular the iso-vector E2 resonance. The contribution to the total strength from this resonance shows up in the for-aft asymmetry of the gamma-ray angular distribution. Results on $^{40}Ca(n,\gamma)$ give a contribution of about 50 % at 25 MeV from the iso-vector E2 resonance. Accurate measurements of the (n,d) elastic cross section at 10 MeV give a 10 % discrepancy with Faddeev calculations. More measurements at other energies are in progress to about 1 % accuracy. The triton angular distribution measurement of the $^{6}Li(n,t)^{4}He$ reaction between 1.5 and 3.5 MeV neutron energy is now finalized. The results are in qualitative agreement with R-matrix calculations.

At Lund University capture cross section measurements by the activation method have continued for ^{115}In and ^{197}Au between 1 and 8 MeV.

Regarding the facilities, the reconstruction of the synchrocyclotron at the Gustaf Werner Institute of the University of Uppsala is underway. It will be possible to run the machine in two different modes: (i) As a frequency modulated cyclotron giving p from 110 to 200 MeV, 20 μA beam, (ii) as an isochronous cyclotron giving p from 10 to 110 MeV, 40 μA, d from 25 to 100 MeV, 40 μA, and also ^{3}He and α-particles. Additional programmes being discussed are heavy ions and polarized beams. Thermal and fast neutron beams are planned. The machine is scheduled for experiments in late 1984.

UK

Sowerby reviews briefly the status of newer facilities in UK. The Harwell Linac worked until about 3 months ago reasonably well and a considerable amount of scheduled running was performed particularly into the condensed matter cell. 3 months ago a fault developed, RF power would not propagate through the first section of the accelerator. The fault only occurs at high power which makes the cause difficult to find. Thus, there has been a period of running (7 sections) at reduced power with section 8 in the position of section 1. Now the machine is

in the middle of a shut down of 4 to 5 weeks, which had been scheduled for a long time. A large number of outstanding jobs are scheduled - shielding, safety, etc. A replacement section 1 is available from the manufacturers and it will be installed during the shut down if the fault in the original 1st section cannot be rectified.

So far there have been beams into 3 out of 4 cells (CMT, FNT, LE Cell) but it has not been possible to use the Booster because the beam transport system was found to be deficient (pole pieces of magnets needed remachining and additional focussing is required). Equipment is now being reinstated and it is hoped that beam will be available into the Booster by Easter 1983 (depends on priorities).

The sustained running has mainly been into the CMT (for financial reasons). Beam powers have been 25 kW routinely, 45 kW on occasions; the limitation is activation of beam lines (apertures of collimator and scrapers will be increased.

First experimental runs at the Nuclear Structures Laboratory in Daresbury have been done. As of June 1982, the voltage without beam was 18 MV and with C beam 16.3 MV. Much remains to be done before regular operation. However, progress is encouraging.

The time schedule for the Spallation Neutron Source (SNS) at the Rutherford Laboratory is as follows:

January 1983:	70 MeV H^- beam from Linac
July 1983:	70 MeV H^- beam available for injection into accelerator ring
October 1983:	Injection, trapping and acceleration studies with complete accelerator ring
April 1984:	Extraction studies with 600 MeV proton beam
July 1984:	600 MeV proton beam onto target
November 1984:	800 MeV proton beam available
1986:	Full intensity operation

Rowlands describes some of the recent measurements at Winfrith. Absolute fission rates of ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu, ^{241}Am, ^{243}Am and ^{244}Cm were determined in the fissile and fertile regions of a heterogeneous fast reactor core in ZEBRA. Preliminary results show a very small dependence on the incident neutron energy. Measurements of the beta decay power from fragments from the fast fission of ^{235}U and 239Pu were done after a 43 day irradiation in ZEBRA, and the results were found to be in good agreement with values calculated using the FISPIN code. Measurements of the total gamma ray power from ^{239}Pu and ^{235}U fission fragments following the 43 day irradiation in ZEBRA were made using the large liquid scintillation tank at Harwell; high-resolution gamma ray spectrum measurements were also done. A comparison of the total power results with values calculated using the FISPIN code showed that the calculated values are in general $\sim$ 8 % lower than the measured values.

Rowlands mentions further an activation measurement of the $^{93}Nb(n,n')^{93m}Nb$ reaction cross section. This has been done in the energy region of 0.5 to 4.0 MeV using the 3 MV Dynamitron at the Birmingham Radiation Centre.

France

Michaudon describes some of the recent measurements at Bruyères-le-Châtel. A study of fast neutron scattering from ^{24}Mg, ^{28}Si, ^{32}S, ^{63}Cu, ^{65}Cu and ^{208}Pb in the energy range of 10 to 15 MeV has been completed. The results about fast neutron scattering on actinide nuclei were presented during the Specialists' Meeting held at Paris. Neutron capture cross sections were measured for isotopes of the elements Cu, La, Bi and Pb in the neutron energy range of 0.5 to 3.0 MeV. Fission cross section for ^{237}Np at 2.5 MeV has been redetermined. $\bar{\nu}$ measurements have been performed for the fission of ^{232}Th and ^{237}Np induced by neutrons in the energy range from threshold to 15 MeV. In the case of ^{232}Th a strong increase in ν is observed just above the second chance fission threshold. Some fission yields with high kinetic energy have also been observed in thermal-neutron induced fission of ^{235}U and ^{233}U using the High-Flux Grenoble Reactor. These results provide evidence for cold fragmentation

Michaudon suggests that following areas should be given more attention:

(i) Solid state effects in cross section measurements as a function of temperature.
(ii) More importance to fission products and secondary actinides due to higher fuel burn-up in PWR.
(iii) Newer measurements due to the lack of agreement between evaluations and experimental data for transport calculations in fast reactors.

Regarding the facilities Michaudon mentions the following: The pulsing system at the Van de Graaff machine in Bruyères-le-Châtel is being improved. The Grenoble reactor continues to serve as a source of thermal neutrons and the contract has been extended for another ten years. The heavy ion beam at GANYL was extracted last June and the experimental work is expected to be started in early 1983. A booster is being built at the Tandem Van de Graaff accelerator in Saclay and should be ready within the next 3 to 4 years. The Grenoble Heavy-Ion Facility called SARA is now in operation.

Japan

Igarasi gives an account of the recent nuclear data measurements in Japan, pertaining both to fission and fusion reactors.

The JAERI Linac Laboratory Group has performed many experiments and obtained the following data:

(i) Average total cross sections of ^{181}Ta and ^{238}U from 24 keV to 1 MeV. Covariance matrices were also obtained.
(ii) Resonance parameters of ^{79}Br and ^{81}Br from the transmission and capture measurements.
(iii) Resonance parameters of ^{107}Ag and ^{109}Ag by analyzing transmission data with the multilevel Breit-Wigner formula. Resonance energies and neutron widths were determined below 7 keV.
(iv) Resonance parameters of ^{123}Sb from the high resolution transmission measurements.
(v) Transmission and capture measurements were performed to obtain the resonance parameters of ^{133}Cs. Resonance analyses are now in progress.

At the Research Reactor Institute, Kyoto University, measurements on the delayed neutron emission probability for neutron rich nuclides have been done with an on-line isotope separator of helium-jet type. In this experiment, the delayed neutron emission probability of ^{94}Rb was tentatively determined as 10.1 ± 1.0 %. The total cross section of ^{232}Th below 300 eV has been measured with the KUR linac facility. Results are still preliminary.

At the Tohoku University, the inelastic scattering and gamma-ray production cross sections of ^{232}Th have been measured by using the Dynamitron accelerator.

Tokyo Institute of Technology Group has measured gamma-ray spectra and capture cross sections for several nuclides with the T.I.T. 3 MV Pelletron accelerator. Capture gamma-ray spectra were measured for Nb and Mo at 420 keV neutron energy. The results are in good agreement with the statistical model calculations. Experiments are underway to measure the capture cross sections of ^{165}Ho from 200 to 610 keV. The capture gamma-ray spectra of ^{197}Au und Pd have been measured using the KUR electron linac, at 3 to 80 keV neutron energy. The results were compared with the statistical model calculations and the agreement is generally good.

Regarding data for fusion, some experiments have been done in Japan with 14 MeV neutrons. Activation cross section measurements of molybdenum isotopes were performed at Nagoya University with reference to the ^{27}Al(n,α) and ^{27}Al(n,p) reactions. Data for (n,2n), (n,p) and (n,α) reactions were obtained for Mo isotopes; the (n,n'p) reaction cross section was measured for ^{98}Mo. Rikkyo University group has been measuring the ^{6}Li(n,d)^{5}He and ^{6}Li(n,t)^{4}He reaction cross sections using a counter telescope. Preliminary results were obtained at 143° in the center of mass system, and compared with the DWBA calculations. Double differential cross sections for molybdenum and iron were measured at Tohoku University with the Dynamitron accelerator. Measurements were made at eight angles from 30 to 150 degrees. The results were compared with the pre-equilibrium calculations.

Regarding the facilities, Igarasi gives the following status report. Installation of all equipment at the JAERI Tandem Accelerator System was completed including the beam pulsing devices in the low energy beam line and the high voltage terminal by June 1982. All specifications of ion beam performance were also satisfied at the terminal voltages below 18 MV. Now the accelerator can run stably enough with both continuous and pulsed ion beams for heavy ion experiments. The terminal voltage can reach 18.5 MV without very intensive conditioning. Considering the present status of experimental equipment and the accelerator, the contract of the accelerator was terminated in August 1982. Continuous operation of the accelerator for experiments started on September 1, 1982.

At the JAERI a Fusion Neutronics Source Facility (FNS) was recently installed to investigate the neutronic characteristics of various components in a fusion reactor system, especially of blanket and shield. The FNS consists of a high current 400 keV electrostatic deuteron accelerator of Cockcroft-Walton type, four types of tritium metal target assemblies, tritium handling and processing devices, and various experimental equipment, such as a TOF tube facility with detector stations at 11 m and 36 m, a movable deck, a dual rotatable measuring deck and so on. Two blanket experiments and a shield experiment have been performed since the initial D-T neutron operation in August 1981. Tritium production rate and other reaction rate distributions were measured in a pseudo-spherical lithium oxide system with a graphite reflector in a series of blanket benchmark experiment. A time-of-flight measurement is conducted for the angular dependent flux spectra of the fast neutrons emitted from the surface of lithium-oxide slab assemblies of different thicknesses.

CBNM, Geel

Böckhoff highlights some recent measurements at Geel. The neutron capture cross section and α of ^{235}U have been determined between 2 and 85 keV. The capture data are on the average about 10 % lower than the ENDF/B-V values.

The determination of the resonance parameters of ^{54}Fe, ^{56}Fe and ^{57}Fe has been completed and the data presented at the Antwerp conference. The large discrepancy between the Γ_n values of ^{56}Fe, obtained from transmission measurements on one hand and capture measurements employing small C_6D_6 detectors (weighting technique) on the other, was emphasized and called to the attention of the Committee (see also report of the Subcommittee on Discrepancies).

Average neutron capture experiments have been done on the fission products ^{105}Pd and ^{108}Pb up to 600 keV. For ^{105}Pd the CBNM data agree with the ORNL data within ~ 10 %. For ^{108}Pd, however, the CBNM data are 40 % higher than the ORNL data in the energy range below 15 keV, and 20 % higher at higher energies.

The $^{6}Li(n,\alpha)^{4}He$ cross section was determined between 80 and 500 keV using for normalisation the n-p cross section of hydrogen. Data are in good agreement with other recent results which normalise to low energy cross section data of the $^{6}Li(n,\alpha)^{4}He$ reaction. The differential data of this reaction show excellent agreement with those obtained at LANL from the inverse reaction.

Regarding the facilities Böckhoff mentions that pulse compression systems are being installed at both the Van de Graaff and the LINAC of CBNM.

2. Separated Isotopes

Whetstone gives a short status report on the separation and availability of stable isotopes which is reproduced in Appendix 2. A meeting of the users was held at Washington, D.C. in February 1982 and the various needs were spelt out in detail. A few European delegates also attended. Chrien mentions that the availability of some stable isotopes is vital for the production of medically important radioisotopes. Qaim elaborates some of the needs further and says that many of the nuclear reactions can be investigated with high accuracies only through the use of highly enriched isotopes. As far as medical radioisotope production is concerned, to date the highly enriched isotopes needed are: ^{76}Se, ^{77}Se, ^{122}Te, ^{124}Te and ^{201}Tl. Whetstone adds that the DOE is following with interest the feasibility study being carried out at Geel on the commissioning of a mass separator for the separation of actinides. It would like to be informed on the outcome of the feasibility study.

3. Advances in Nuclear Data Evaluations

i) Regional Activities

The evaluation work being done in various laboratories is given in the respective national progress reports, and there are no more additions.

Chrien mentions that the staff of the National Nuclear Data Center at BNL is being reduced, and presently there is little activity in the field of neutron data evaluation. Whetstone adds that the Nuclear Structure and Decay Data (NSDD) activities are supported adequately, whereas the neutron data activity supported at a bare minimum level; fusion data are presently not receiving much support. Regarding the time schedule of the ENDF/B-VI, Whetstone reckons that there will

probably be change of format to allow to enter further data in the file; the file will not be issued before 1986. In reply to a question from Rowlands whether updating of ENDF/B-V will also occur, the US delegates reply in the affirmative. Major deficiencies will be removed and the list of the actinides will be changed.

Igarasi reports on some evaluation activities in Japan. Members of the Japanese Nuclear Data Committee worked in co-operation with the JAERI Nuclear Data Centre to evaluate nuclear cross section data, to test reliability of the JENDL, and to evaluate nuclear structure and decay data. Evaluation work for JENDL-3 was started in April 1982.

Schmidt mentions that the NDS of the IAEA does not do any evaluation work. It only co-ordinates the intercomparison of evaluations under the auspices of a co-ordinated research programme (cf. Report of the NDS given as Appendix 3).

ii) Joint Evaluated File (JEF)

Nordborg gives a brief account of the progress made in the assembling of the Joint Evaluated File (JEF). He refers to the paper presented at the Antwerp conference and the Summary Record of the Second Meeting of the Scientific Co-ordinating Group (NEANDC-162 "A") and reports that the compilation and format translation of the approximately 80 special selected isotopes for JEF was almost completed and discussions on the testing phase of the file had already started.

Tubbs explains the formal status of the JEF project. A pilot project covering construction of the JEF-1 "starter file" would be completed at the NEA Data Bank in 1982, and NEA secretariat had prepared a proposal for a three-year second phase during which JEF-1 would be put through extensive benchmark testing, while in parallel an extended and improved JEF-2 file will be compiled. This proposal was prepared in consultation with the Data Bank Committee and the JEF Scientific Coordination Group, and will be submitted in October 1982 to the OECD Steering Committee for Nuclear Energy. As before, assembly and minor testing work will be carried out by the Data Bank, in cooperation with laboratories in participating countries, and under the control of the Scientific Coordination Group.

Chairman asks whether the US delegates are satisfied with the information. Perey replies that he is personally very satisfied and feels that the reactor physicists in USA find it a very healthy development. Rowlands remarks that the NEACRP is more concerned with data priorities whereas the NEANDC deals with the data contents. Uncertainties, for example, are of interest but not an essential part of the data content. Perey observes that this is a very crucial issue: reactor physicists are not so much interested in numbers, they need uncertainties. Uncertainty is a vital part of data reporting and this should constitute part of JEF-2. Whetstone asks whether the reactor physicists could define long term needs. Garvey replies that there is a long term requirement of data for solid cores. It is, however, hard to identify the specific areas. Chairman shows satisfaction at the fact that the NEACRP is changing its attitude towards nuclear data needs.

Perey proposes that ENDF/B and JEF try to create contacts and collaboration in areas of mutual interest, e.g. "Standards". This Committee could try to establish communication with the CSEWG Standards Subcommittee. Condé is of the opinion that JEF is a very new activity and one should probably wait. The area of Standards is, however, perhaps a good area to start collaboration. Whetstone

suggests that the possibility should be explored for the NEANDC Standards Subcommittee Chairman to participate in the 1982/83 Meeting of the CSEWG Standards Subcommittee. Tubbs mentions that at the 4 Data Centres' Meeting held in May 1982 it was made clear that the CSEWG will decide about the "Formats" itself. He feels that we have a long way to go before being able to influence the CSEWG. Perey is of the opinion that it is as yet premature to discuss about the "Formats".

Rowlands points out that the INDC proposed to update the dosimetry file. He would like to know if the IAEA listing is significantly different from the CSEWG or JEF listings. Schmidt replies that in the IAEA listing (IRDF) some further reactions have been added to the ENDF/B-V dosimetry file, but no major changes have been made.
Chairman observes that time now seems to be suitable for a modest level exchange of information between JEF and ENDF/B groups on Standards and Formats.

4. Activities of Nuclear Data Centres

Schmidt gives a brief review of the activities of the Nuclear Data Section (NDS) of the IAEA. Details are given in Appendix 3.

Chrien reports on the activities of the National Nuclear Data Center (NNDC) at BNL, USA. The full report is given as Appendix 4.

Igarasi describes some of the activities of the JAERI Nuclear Data Center. The Center (JAERI/NDC) has continued to work in cooperation with the Working Groups of the Japanese Nuclear Data Committee (JNDC). During the period April 1981 to March 1982, evaluations were performed of photon production nuclear data for some selected nuclides, fission product nuclear data and actinide nuclear data. Evaluation of the nuclear structure data was promoted, and the results of mass chain evaluation for A = 128 were submitted to the NNDC (BNL). Evaluation for A = 124 and 129 has been continued further. Nuclear Data Library and its processing code were made for summation calculation of the decay heat. Benchmark tests for the JENDL-2 were carried out. Sensitivity analyses were also made in order to investigate a cause of overestimate of the sodium void coefficients. Double differential group cross sections were made from the JENDL-2 data, and the experimental data by the JAERI-FNS were analyzed using the group cross sections.

Some endeavours were made to develop computer systems for plotting nuclear decay data, and for processing atomic and molecular data. Evaluations of A and M data were also performed.

As domestic nuclear data center, the JAERI/NDC has served users with the experimental and evaluated nuclear data. In fiscal year 1981, there were fifty-five requests for the evaluated data and fourteen requests for the experimental data from the users. The JAERI/NDC requested the NEA Data Bank to supply the experimental data five times in this period. It received numerical data and computer codes on seventeen volumes of magnetic tape from the NEA Data Bank and IAEA/NDS, and sent abroad seven magnetic tapes of the domestic numerical data and computer codes.

The activities of the NEA Data Bank are described in the document NEANDC-163 "A". Tubbs mentions only a few salient features. The Data Bank has continued with its regular work on compilation of experimental and evaluated neutron data, and collection and testing of computer programmes. As additional activities,

it has concentrated on work in cooperation with national laboratories or carried out at NEACRP and NEANDC recommendation: JEF is its most important single new activity. In discussing the Data Bank computer program services, Tubbs noted that code service to non-OECD countries was increasing. He felt that distribution of a single version through the existing NEA/IAEA service was important in maintaining consistency and comparability of results, and that in particular the distribution of data processing codes should be brought back into this channel as soon as possible.

The Committee takes note of the increasing scope of the NNDEN Evaluation Newsletter and endorses its limited distribution to IAEA member countries actively engaged in evaluation work.

5. Report on Recent NEA-Meetings

Since the 22nd NEANDC Meeting in April 1981 two Specialists' Meetings and an International Conference were held. The first Specialists' Meeting was on "Fast Neutron Scattering of Actinides" and was held in the fall of 1981 at Paris. The details have already been given in the document NEANDC-155 "A". The second Specialists' Meeting was on "Fast Neutron Capture" and was held in March 1982 at the Argonne National Laboratory. It is believed that this meeting was very interesting. More details were, however, not available since none of the Committee members participated in that meeting.

Böckhoff gives a brief report on the "International Conference on Nuclear Data for Science and Technology" held on 6 to 10 September 1982 at Antwerp, Belgium. It was the largest nuclear data conference in recent years. The total number of papers presented was 231 (10 invited papers, 1 keynote address, 1 summary talk, 76 papers with oral and 153 papers with poster presentations).
Almost all the aspects of nuclear data and their applications were dealt with. The number of participants amounted to 279 (with delegates from 35 countries). The Committee is very satisfied with the organization of the conference and congratulates Böckhoff, the Chairman of the Organizing Committee, for arranging such a successful meeting.

6. Technical Discussions

Technical discussions are held on the following topics:

a) Results and follow-up of the benchmark on derived average resonance parameters.
b) Comparison of nuclear model codes.
c) Comparison of nuclear data processing codes..
d) International intercomparisons of neutron flux measurements.
e) International intercomparisons of fission foils.
f) High priority list of nuclear data requirements.
g) Treatment of uncertainties in measured and evaluated data.

Although the whole Committee participates, this session is treated as part of the meeting of the Subcommittee on Technical Activities, with Rowlands as Chairman. A summary of the discussions is therefore given in the report of the Subcommittee on Technical Activities (see Appendix 8).

7. Topical Conference

A topical conference on "High Intensity Neutron Sources and their Applications" was held in the afternoon of 29 September 1982. The programme of the meeting is given in Appendix 5.

8. Subcommittee Reports

The five subcommittees met on various occasions during the week. Detailed written reports are presented to the Committee. Following comments and recommendations are made by the Committee on those reports.

i) Discrepancies

The report of this subcommittee is given in Appendix 6.

The Committee supports the proposal of setting up a task force on the 1.15 keV resonance of ^{56}Fe, and another one on ^{238}U. The various national assignments for providing updated entries to the Discrepancies File are approved. In connection with the INDC/NEANDC cooperation, the Committee endorses the proposal that a bound volume of the Discrepancies File is published by the NEA.

ii) Standards

The report of this subcommittee is given in Appendix 7.

Regarding the INDC/NEANDC cooperation, the Committee agrees that a bound volume of the Standards File is published by the IAEA. The Committee endorses the proposal that the Chairman NEANDC Standards Subcommittee consults the Chairman CSEWG Standards Subcommittee regarding the exchange of information between the two Standards Subcommittees.

The Committee agrees to Condé being the new Chairman of the Standards Subcommittee. Chairman NEANDC thanks Perey, the outgoing Chairman of Standards Subcommittee, for his valuable work over several years.

iii) Technical Activities

The report of this subcommittee is given in Appendix 8.

The Committee appreciates the hard work put in by this subcommittee and endorses all the proposals. Members are urged to provide more information on nuclear data programmes running in their respective countries.

iv) Monographs

The Committee discusses matters relevant to this subcommittee in two parts: firstly, to take stock of the progress achieved, and secondly, to streamline the working procedure for future books.

On the first occasion Böckhoff asks Michaudon to take the chair. Michaudon mentions briefly that the first book in the NEA Series entitled "Nuclear Fission and Neutron Induced Fission Cross Sections" has been reviewed in several journals, and that all those reviews were favourable. Several members report that the book is being received well in various laboratories. The Committee feels that, as far as this book is concerned, the goal has been achieved.

Cierjacks describes his experience with the second book entitled "Neutron Sources" which is now in press. Considerable delays occurred due to two reasons: (i) some of the contributions needed extensive revisions, (ii) several difficulties arose in the production of the manuscript in the final form. The manuscript was sent to the Pergamon Press in July 1982 and the book is expected to be published by the end of 1982. Cierjacks emphasizes the tremendous amount of work needed to bring a manuscript to the final form, and urges that any future editor embarking on such an endeavour must keep this in mind.

Chrien reports on the status of the third book entitled "Neutron Radiative Capture". All the material was received by November 1981 but due to typing difficulties the edited version was not ready till March 1982. Chrien received some comments from Michaudon on the manuscript and made some necessary changes. The subject index and glossary of symbols have yet to be prepared. Though Chrien does not find the latter as important, in order to maintain the uniformity of the Series he is going to make the desired glossary of symbols. He adds further that in his opinion fundamentals of the subject are more important, and his manuscript reflected this approach. However, in view of Michaudon's comments, to emphasize the applied nature of the Series, he has modified the manuscript and brought in more applied aspects. He hopes that the manuscript will now conform to the general character of the Series and agrees to show the latest version to Cierjacks, Michaudon and the Chairman for further comments.

On the second occasion Böckhoff chairs the session himself. In this session a draft version of a document entitled: "General Information and Code of Practice", prepared by the Subcommittee for prospective editors and authors, is discussed. Since the production of future volumes in the Series will constitute initiation of a second phase, i.e. transfer of the editorial responsibility from the General Editors to an Editor chosen by the NEANDC for each book, the Subcommittee found it imperative to define the role and responsibilities of the persons concerned. The Committee considers this document critically. The final version of the document entitled "NEANDC Series on Neutron Physics and Nuclear Data in Science and Technology - General Information and Code of Practice" is given in Appendix 9. Furthermore, Michaudon is asked to contact Pergamon Press to formalise the respective responsibilities of the NEANDC, editors and authors concerning the future books.

The lengths of the future books should be redefined. The Committee therefore asks Michaudon to clarify this with the Pergamon Press.

As regards future books, the Committee asks the General Editors to make proposals on titles and their potential editors before the next meeting.

v) Meetings

The subcommittee report is given in Appendix 10. The Committee endorses all the proposed meetings.

A list of the meetings planned by the IAEA/NDS is given in Appendix 11.

CONCLUDING SESSION

The list of documents distributed during this Meeting is presented by the Secretary (Nordborg) and is given in Appendix 12.

i) Actions endorsed at the 23rd Meeting of the Committee

The Scientific Secretary (Qaim) reads out the Actions endorsed at this meeting. Since the list is not complete, it is suggested that it may be distributed as soon as possible. A complete list of the Actions endorsed is now given in Appendix 13.

ii) New Office-Bearers of the Committee

The Committee elects unanimously Michaudon as Chairman, Sowerby as Vice-Chairman and Cross as Scientific Secretary. The 3-year term of office shall start in the fall of 1983. Each one of them accepts the respective new office, subject, however, to the condition that the home authorities will agree. In Michaudon's case the Committee asks the NEA to request agreement of the French Authorities directly.

As Chairman-Elect, Michaudon thanks the outgoing office-bearers, especially Chairman (Böckhoff) and Scientific Secretary (Qaim) for their work during the current term of office.

iii) Plans for the 24th Meeting of the Committee

The Committee asks Igarasi to explore the possibility of holding the 24th Meeting in Japan, and to inform the Chairman and the Secretariat, if possible, by the end of March 1983.

The Chairman thanks the AECL, W.G. Cross, the local staff, and the Local Secretary (M.A. Lone) for making the various local arrangements and declares the Meeting closed.

APPENDIX 1

NEANDC Code of Practice

(October 1982 Version)

Composition of the Committee

1. The Nuclear Energy Agency Nuclear Data Committee (NEANDC) holds its terms of reference from the OECD Steering Committee for Nuclear Energy, and has seventeen sitting members representing between them the member countries and the Nuclear Energy Agency. A copy of the terms of reference as approved in 1979 is annexed to this document. The Committee meets at intervals of approximately 18 months.

Committee Officers

2. The Chairman is elected by the Committee to serve for a term of three years, covering two meetings of the Committee. During this time, in cooperation and consultation with the NEA Secretariat and the vice-chairman, he will coordinate the activities of the Committee and of individual members acting on behalf of the Committee. The Secretariat should be kept informed about Committee activities.

   Copies of all letters concerning the Committee as a whole, or involving the interests and responsibility of the Committee, should be sent to the (NEA) Secretary of the Committee.

   The Chairman is responsible for drawing up the agenda well in advance of the meeting, and ensuring that it is distributed in good time.

3. The Vice-Chairman is elected to serve for the same period as the Chairman, and should work with and on behalf of the Chairman as agreed between them.

4. The Scientific Secretary is responsible for producing detailed technical and administrative minutes of meetings. These minutes will be reproduced and distributed by the Secretariat using a corrected typescript copy supplied by the Scientific Secretary after previous circulation in draft form to members for their comments and corrections.

5. The changeover between incoming and outgoing Committee officers will normally take place at three-year intervals, so that officers serve for two meetings. The cycle should be timed so that the incoming Chairman takes office some six months before his first meeting; the outgoing chairman will thus remain in office for the twelve months following his second meeting, and the two Chairmen will cooperate in making detailed arrangements for the coming meeting.

Duties of NEANDC Members

6. Members are responsible in general for presenting their country's or organisation's contribution to the technical and administrative discussion at the meetings of the Committee, and for ensuring that Committee actions affecting their countries or organisations are carried out between meetings. In particular they are responsible for:

   a. Official nomination to NEA Secretariat of all participants from their country in specialist meetings, seminars and conferences sponsored by NEA in the nuclear data field.

   b. Their country's contribution to WRENDA and other request lists for nuclear data measurement and evaluation. Ensuring that nuclear data measured in their country are made available to data centres, and for the inclusion of new data measurements, evaluations and computer programs in the Committee's field of interest in national progress reports to NEANDC. An index of measurements and evaluations in a form similar to CINDA should appear in these progress reports.

   c. Maintaining distribution/address lists for the distribution within their countries of NNDEN, restricted and unrestricted Committee documents and (in cooperation with national representatives on the NEA Data Bank Committee) CINDA and other Data Bank documents concerning nuclear data.

Corresponding Members

7. Member countries of NEA not directly represented by one of the seventeen sitting members have in practice nominated corresponding members, who have the same responsibilities within their country as sitting members, but do not normally attend Committee meetings. Their interests are represented by one or more regular sitting members on the Committee, chosen by mutual agreement between the group of countries concerned. Although they do not attend its meetings, corresponding members should receive promptly all the information made available to sitting members.

Observers

8. Individual scientists may be invited by the Chairman to attend meetings of the Committee as observers and invitations are issued according to the following procedure:

   a. Members wishing to propose observers should contact the Chairman at least four weeks before the meeting. If the Chairman then decides to issue an invitation, the Committee should be informed before the meeting. Observers proposed at short notice may exceptionally be invited by the Chairman, who will justify his decision to the Committee meeting, or be admitted by Committee vote to the meeting itself.

   b. The one-day "topical meeting" normally arranged by the laboratory organising the Committee meeting will be open, and outside contributions welcomed. The member responsible for organising it should, however, give the Chairman a list of outside scientists attending.

   c. Representatives of NEACRP and IAEA are normally invited by the Secretariat to attend the technical sessions of the meeting.

Codes of Practice

9. Other specific duties of Committee members will as far as practicable be set out in "codes of practice" to be included with the full minutes of meetings or distributed separately to members. At present such "check lists" exist for:

   a. Organisers of NEACRP and NEANDC specialist meetings (Appendix 1a)

   b. Reproduction and distribution of NEANDC documents (Appendix 1b)

N. Tubbs

APPENDIX 1a

GUIDELINES FOR ORGANISERS OF NEACRP AND NEANDC SPECIALIST MEETINGS

(October 1982 Version)

Topics for specialist meetings are normally proposed and discussed at a meeting of the Committee, who in adopting the proposal will nominate the member or other person directly responsible for arranging the meeting. The other Committee may be asked to co-sponsor it.

Scientists deputed by NEACRP or NEANDC to organise specialist meetings are asked to observe the following simple steps, starting when the meeting is in the early stages of planning. If in doubt, please consult NEA Secretariat.

1. NEA sponsorship of a meeting must be granted by the NEA Steering Committee. As soon as the title, general programme and the approximate time and place are known, the Secretariat should be told, so that the proposal can be submitted to the Steering Committee.

2. The normal place for meetings held under the auspices of NEA is Chateau de la Muette, Paris, and exceptions to this rule must be justified by operational advantage or necessity (rather than mere desirability). Special approval to this effect has to be obtained from the Secretary General of OECD before any proposals or offers received from or on behalf of potential host organisations can be accepted. Local arrangements, including, if possible, some help with participants' hotel reservations, would then be the responsibility of the organising laboratory.

3. The Organising Committee should be set up in agreement with NEA Secretariat, and after consulting NEACRP or NEANDC about its composition. The Committees will be concerned to ensure that reasonable contact and consultation with competent people in other NEA member countries takes place before the programme is finally decided.

4. The Organising Committee may wish to contact key contributors and possible session chairmen at an early stage in planning the meeting. For NEA member countries this should be done through national representatives on NEACRP or NEANDC, or with their prior approval, and the Secretariat should be informed. For IAEA member countries contact should be taken only through NEA Secretariat, who will pass the invitation on through IAEA. Failure to use these correct channels early on has normally resulted in the person invited being unable to attend the meeting.

5. Where possible, a draft programme of the meeting should be circulated to NEACRP or NEANDC members for advance information and comment.

6. Participants in the meeting must be nominated by national representatives on NEACRP or NEANDC: nominations should be sent to the NEA Secretary of the Committee. When the programme of the meeting has been agreed, the Secretariat will send out a detailed announcement of the meeting to all members and corresponding members, together with registration forms. Participant registration forms should normally be returned to NEA, with a copy to the local organiser of the meeting.

7. When a meeting is jointly sponsored by NEA and IAEA, nominations of participants from NEA member countries should pass through national representatives on NEACRP or NEANDC and the NEA Secretariat. Where IAEA is not directly associated with the meeting, the Secretariat may make arrangements for nomination through IAEA of participants from countries which are not members of NEA.

8. The NEACRP or NEANDC name should appear clearly with the title of the meeting on all material circulated.

9. Proceedings of the meeting will normally be edited and published by the laboratory or organisation where the meeting is held. The format of the cover is subject to certain general conditions agreed by the Steering Committee for Nuclear Energy, and concerning the way in which the OECD/NEA is to be credited. If for reasons of economy the size or distribution of the proceedings must be restricted (inclusion of invited papers only, or distribution to participants plus NEACRP/NEANDC "A" lists, with only a small number of extra copies for distribution on request), the restrictions should be announced in the circular and adhered to as fairly as possible. Try to publish within 6 months.

10. The conclusions of the meeting should be submitted to the sponsoring Committee before being made public at other fora. Normally a short summary of the conclusions of the meeting will be prepared by the local organiser for distribution as an "A" document as soon as possible after the meeting.

APPENDIX 1b

REPRODUCTION AND DISTRIBUTION OF THE DOCUMENTS OF THE NUCLEAR ENERGY AGENCY NUCLEAR DATA COMMITTEE

(October 1982 Version)

1. Classification of Documents

The documents of the Nuclear Energy Agency Nuclear Data Committee fall into two categories:

"A" (Administrative)

"A" documents concern internal Committee matters or contain information of a preliminary or private nature; they are intended for members and corresponding members of the Committee. It is emphasized that "A" documents are of a confidential character and should be treated with discretion. The following restrictive sentence should appear on all NEANDC "A" documents:

> "This document contains information of a preliminary or private nature and is intended for use within the OECD Nuclear Energy Agency Nuclear Data Committee. Its contents may not be quoted, abstracted, reproduced, transmitted to libraries or societies or formally referred to without the explicit permission of the originator."

"U" (Unrestricted)

"U" documents are technical and scientific documents of more general interest. They are intended for wide distribution (but are not necessarily available for publication); a limited number of extra copies of these documents can be obtained through application to the NEA Secretariat. Generally, copies may be made after requesting permission from the originator.

An annual index of Unrestricted documents will be distributed by the NEA Secretariat to an "Index" distribution list comprising about 400 addresses. Recipients of this index who do not automatically receive "U" documents should request copies of those documents of immediate interest from the NEA Secretariat. Such requests will be satisfied from a stock of additional copies supplied to the Secretariat by the originators of "U" documents.

2. Numbering Conventions

Document numbers are assigned in several geographical series as follows:

NEANDC (US) 123 "U" or "A" for the United States
NEANDC (CAN) 456 "U" or "A" for Canada
NEANDC (J) 789 "U" or "A" for Japan

NEANDC (E) 123 "U" or "A" for Member countries of the European Communities other than the U.K.

NEANDC (UK) 456 "U" or "A" for the United Kingdom
NEANDC (OR) 789 "U" or "A" for other NEA Member countries
NEANDC 123 "U" or "A" for documents issued or numbered by the NEA Secretariat

Numbers in the NEANDC (no suffix) series and NEANDC (OR) series are assigned by the NEA Secretariat and numbers can be obtained by telex (No. 690920 NEADATA) from the Secretary. Other numbers are assigned by national representatives of NEANDC, and in the NEANDC (E) series by the Member for the European Communities.

Members responsible for assigning numbers should send in to the Secretariat once a year a complete list of all documents issued during the year, for inclusion in the overall index of NEANDC documents for that year which will be distributed by the Secretariat.

3. Mailing Arrangements for Documents

The author or originator of a document is responsible for its distribution on either "A" or the Unrestricted list. However, in order to avoid the high cost of posting documents individually between the U.S., Canada, Europe and Japan, the copies required for an unrestricted "U" distribution in the too far distant locations should be sent in bulk (by air mail or air freight) to the following addresses for individual local dispatch:

U.S.A.: Document Management Branch
(Attention: Mr. T.B. Abernathy)
U.S. Dept. of Energy
Technical Information Center
P.O. Box 62, Oak Ridge, Tenn. 37830

CANADA: Atomic Energy of Canada Ltd. (Dr. W. Cross)
Chalk River Nuclear Laboratories
Chalk River, Ontario K0J 1J0

JAPAN: Nuclear Data Centre (Dr. S. Igarasi)
JAERI Tokai Mura Establishment
Tokai-Mura, Naka-gun, Ibaraki-ken 319-11

EUROPE: The Secretary of NEANDC
OECD Nuclear Energy Agency
38 Boulevard Suchet
75016 Paris, France

Thus the author of a document produced in Europe would send bulk parcels to the U.S.A., Canada and Japan and would mail copies individually to addresses in Europe. Documents should be sent individually to Australia.

"A" documents should be mailed directly to the Committee members in the U.S.A., Canada and Japan, but bulk parcels may be sent from these countries to the NEA Secretariat if individual dispatch to Europe would prove excessively expensive for heavy documents.

4. Documents distributed at NEANDC Committee Meetings

Where possible advance copies of documents for discussion at the meeting should be sent to members and corresponding members (i.e. "A" distribution) at least three weeks in advance, with an indication of the agenda item to which the document refers. However, some Committee documents make their first appearance at the 18-monthly meetings of the Committee, when they are presented during technical sessions. In order that a list of documents distributed at the meeting can be included in the minutes, and copies of all relevant papers sent to corresponding members, it is important that members should:

a. Number all documents in the "A" or "U" series if possible before the meeting. Otherwise mark the document "A" or "U" so that it can be assigned a number in the Secretariat series during the meeting. Enough extra copies of "A" documents should be brought to the meeting for sending to corresponding members. Please ensure that one copy of each document is given to the Secretary (NEA) and the Scientific Secretary directly. They may not get copies of documents simply laid out on a table for distribution.

b. The Secretary will assign numbers to unnumbered "A" and "U" documents, and will number unmarked documents as 'Notes' for temporary identification. Copies of selected 'Notes' from a meeting may be sent out to corresponding members at the discretion of the Chairman, or may alternatively be included as appendices in the summary record of the meeting.

c. The laboratory hosting the NEANDC meeting will collect all documents ("A", "U" and selected 'Notes') newly distributed at the meeting, make extra copies as necessary, and send these sets to the corresponding members. This should ensure that they are kept informed with a minimum of delay.

5. Maintenance of Distribution Lists

The address lists for distribution for the Committee "A" list, the limited regular "U" distribution, and for circulation of the annual list of documents, are maintained by the Secretariat, and printed address labels for any of these distributions can be supplied on request.

It is the responsibility of members to revise these lists from time to time as requested by the Committee or by the Secretariat, and to inform the Secretariat of changes of addresses or of names on the lists. The regular "U" distribution should include two copies for IAEA.

6. Distribution Requirements (October 1982)

	U.S.A.	Canada	Europe	Japan	Australia	NEANDC Secr.	TOTAL
"A"	4	1	22	4	-	2	33
"U"	53	5	127	25	4	2	216

"U" requirements include "A" requirements. The numbers of copies required for both categories are given below, and include a small surplus for unforeseen demands and for subsequent distribution on request ("U" documents) to the "Index" list. After the regular distribution has been made, spare copies should accordingly be sent to the NEA Secretariat.

The minutes of the NEACRP and NEANDC meetings will be sent out to the "A" lists of the two Committees. An extra 30 copies should be printed of the secretariat minutes and the full technical minutes ("A" distribution) of each committee.

Print orders	"A" = 35	(65 for "A" versions of minutes)
	"U" = 250	

7. Indexing of "U" Reports in INIS

Because they were restricted, very few NEANDC reports were previously indexed in INIS. The Committee members responsible for assigning "U" report numbers are asked to ensure that a copy is sent directly to the centre responsible for making INIS abstracts for the country of origin, with NEANDC (E) documents originating in Community research centres going to the Euratom documentation centre. "U" documents issued by the NEA Secretariat will by agreement be indexed at CEN Saclay. Inclusion of "U" documents in INIS will not involve members or the originating laboratories in extra work, since all requests from countries not members of NEA will be handled by IAEA, who normally send out such documents in microfiche form.

APPENDIX 2

Stable Isotopes Separations and Availability

1) Facility continues to run two segments (16 tanks). The current separations schedule for FY 83 includes the isotopes of Ca, Os, Cd, Fe, Te, Zn, Yb, and Tl which will be primarily designated for the sales inventory. Samples will be provided to the Research Materials Collection as the schedule and funding permit.

2) Expansion of the operation to better serve the needs of other sales customers and the RMC still awaits adequate supplemental funding or a suitably modified budgeting, accounting, and pricing procedure.

3) Concerning the needs for sales and loans, the US National Academy of Sciences conducted a Workshop on Stable Isotopes and Derived Radioisotopes February 3 and 4, 1982 at which representatives of the four* primary user communities presented summaries of their needs and interests. Recommendations resulting from the Workshop were for increased production, stable prices and an equitable distribution mechanism, and research and development for process improvement and other separation schemes. Copies of the 279 page Workshop report are available from the Office of Chemistry and Chemical Technology, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

4) The procedure for obtaining samples on loan from the RMC remains the same, however loan fees are to be increased in the near future because of increased costs of operating the loan program. A loan renewal fee will be initiated.

5) The DOE is very much interested in the progress of GEEL's feasibility study of an actinide mass separator.

* Physical research, biomedical research, clinical and commercial use.

APPENDIX 3

CONTRIBUTION TO THE NEANDC MEETING

HELD AT CHALK RIVER, CANADA, 27 SEPTEMBER - 1 OCTOBER 1982

Nuclear Data Section

International Atomic Energy Agency

1. EXFOR

The exchange of experimental neutron data in EXFOR format continues to work smoothly and with a high degree of completeness and reliability. Improved documentation of error analysis information was implemented in the case of high-precision data, in particular standard and dosimetry data.

NDS compiled more than 70 data sets from the People's Republic of China.

After the Karlsruhe Kachapag center was closed down for budgetary reasons, additional compilation efforts for charged-particle data (for activation analysis, radioisotope production, etc.) are needed.

2. CINDA

The production of CINDA continues as a routine operation.

3. WRENDA

WRENDA 81/82 was issued. The preparation for WRENDA 83/84 has started.

4. Evaluated data

IAEA-NDS and NEA-DB have started similar activities to produce ENDF/B formatted evaluated data files, INDL and JEF respectively. During the May 1982 data centers meeting in Vienna, the technical matters involved (ENDF/B checking codes, processing codes, data definitions, format conventions, etc.) have been thoroughly discussed, and future work will be coordinated.

The IAEA Nuclear Data Library, INDL, as distributed in May 1982, contained about 150 materials, grouped in three parts:

- INDL/V, a collection of various available evaluations, documented in IAEA-NDS-31 Rev. 2. This includes primarily contributions from USSR including the SOKRATOR library converted into ENDF/B format, but also evaluations from Austria, GDR, Poland, and others.
- IRDF, the International Reactor Dosimetry File, documented in IAEA-NDS-48 (point data version) and in IAEA-NDS-41, Rev. 1 (group data version). This file is presently being tested, and an improved version is scheduled for 1983.
- INDL/A, neutron data evaluations of several secondary actinides contributed from France, Germany F.R., India, Israel, Italy, Japan, Romania, UK, USSR, documented in IAEA-NDS-12, Rev. 6. Intercomparisons and testing of these data are now planned.

5. Request statistics

Number and complexity of requests for data, documents and data handling codes are strongly increasing over the past few years as illustrated by the following statistics.

Year	No. of requests for			Data handling codes	Total no. of requests
	Experimental data	Evaluated data	Documents		
1979	63	93	95	18	269
1980	42	86	238	41	407
1981	61	185	367	31	644
Jan-August 1982	53	130	318	57	558

6. Project for verification of nuclear cross section processing codes

Objectives:

(1) to test the accuracy of different nuclear cross section processing codes;

(2) to understand and eliminate sources of discrepancies;

(3) to arrive at accurate processing codes for use in a variety of applications.

Project started with following simplest benchmark case for intercomparison of different processing codes:

ENDF/B-V Dosimetry Library (mod. 1), to calculate flat-weighted, 0 Kelvin, unshielded cross sections using the SAND-II 620 group structure.

Particular discrepancy areas: resolved and unresolved resonance cross sections, threshold ranges.

Project described in report INDC(NDS)-134; see also invited paper by D.E. Cullen, W.L. Zijp and R.E. MacFarlane at the 1982 Kiamesha Lake Topical Meeting of the American Nuclear Society.

7. Meetings, Courses and Publications

(i) Consultants Meeting on Uranium and Plutonium Isotope Resonance Parameters, in co-operation with NEANDC, Vienna, 28 September- 2 October 1981.

Proceedings published as report INDC(NDS)-129/GJ.

(ii) Advisory Group Meeting on Nuclear Data for Radiation Damage Assessment and Safety Aspects, Vienna, 12-16 October 1981.

Proceedings published as document IAEA-TECDOC-263; summary report published as report INDC(NDS)-128/GR.

(iii) Course on Advances in Nuclear Theory and Nuclear Data for Reactor Applications, ICTP Trieste, 25 January - 19 February 1982.

Proceedings to be published in the IAEA-SMR-Series.

(iv) Sixth NRDC Meeting, Vienna, 3-7 May 1982.

Minutes to be published shortly as INDC-report. Conclusions and recommendations contained in Memo CP-D/108 of 12 July 1982.

(v) Fifth Advisory Group Meeting on Nuclear Structure and Decay Data, Zeist near Utrecht, Netherlands, 11-14 May 1982.

Meeting proceedings published as report INDC(NDS)-133/NE.

(vi) Interregional Training Course on Utilization of Neutron Generators, Debrecen, Hungary, 7 June - 9 July 1982.

Report: document INDC/P(82)-5, August 1982.

(vii) Progress report no. 8 on fission product nuclear data, INDC(NDS)-130/G+P, July 1982.

Contributions by 93 institutes from 30 countries.

(viii) Fifth Research Coordination Meeting on the Measurement and Evaluation of Transactinium Isotope Nuclear Decay Data, CBNM Geel, 1-3 September 1982.

Minutes to be published as report INDC(NDS)-136/NE.

(ix) Fifth Research Coordination Meeting on the Intercomparison of Actinide Neutron Nuclear Data Evaluations, CBNM Geel, 2-3 September 1982.

Minutes to be published as INDC report.

(x) Consultants Meeting on ^{235}U Fast Fission Cross Sections, Bratislava, Czechoslovakia, 29 November - 1 December 1982.

Objective: Agreement on best ^{235}U fast fission cross section values to be used as international reference standard.

Proceedings to be published as INDC report.

8. Interregional Project TC/INT/1/018 on Nuclear Data Techniques and Instrumentation

Present status: Fellowships and scientific visits to developed laboratories were arranged for scientists from 7 developing countries. Targets and samples and some auxiliary equipment were supplied to nine laboratories in eight developing countries. Project is at present planned to be continued through 1985.

J.J. Schmidt

CONTRIBUTION TO THE NEANDC MEETING

HELD AT CHALK RIVER, CANADA, 27 SEPTEMBER TO 1 OCTOBER 1982

National Nuclear Data Center, BNL

Status Report

1. Cross Section Evaluation Working Group (CSEWG) Activities

Revision 2 to ENDF/B-V will be released in the spring of 1983. Included will be revisions to B^{10}, Ca, Fe, ^{232}Th and ^{233}U, ^{239}Pu, new evaluations for ^{7}Li, W isotopes, Ag isotopes and Rb isotopes. Natural element evaluations for B, Kr, Ag, Eu, Xe, Gd and Zr will be generated from existing isotopic evaluations.

The planning for ENDF/B-VI continues. The ENDF/B formats should be fixed in spring 1983, and the "standards" evaluations completed in spring of 1984.

A report "ENDF/B-V Cross Section Measurement Standards" describing the evaluation of the eight standards is ready to go to press.

The National Nuclear Data Center (NNDC) has provided the Electric Power Research Institute (EPRI) with a convenient reference/guidebook to nuclear data derived from the Evaluated Nuclear Data File, Version V (ENDF/B-V), EPRI-NP-2510.

The main part of the edition consists of plots of the major cross sections for each of the General Purpose Nuclides. These plots are reconstructed from the resonance parameters and background cross sections given in the library. The resolution and display format have been selected to show general trends in the data.

Following the section for individual nuclides, an intercomparison of cross section ratios (plots of η and α values) is provided for the major fissile nuclei.

The final section contains a table of nuclide properties derived from the data files. Included are thermal (2200m/sec and maxwellian averaged) cross sections, "g" factors, infinitely dilute resonance integrals and fission spectrum averages.

2. BNL-325 Vol 1

The fourth edition of BNL-325 Vol 2 Part A, "Neutron Cross Sections" for Z=1-60 was published by the Academic Press Inc. in January 1982. Work is in progress for part B for Z=61-100. In addition to the thermal cross sections, average resonance properties, and tabulated resonance parameters, this part will include the following:

a. a consistent fit to the thermal data of fissile elements.
b. neutron energy standards, gamma ray energy standards and intensities.
c. a tabulation of energy ordered listing of strong resonances as an aid to experimentalists to identify inpurities in samples.
d. an overall description via graphs of the systematics of s-and p-wave strength functions, radiation widths, and scattering radii.

The evaluations for elements Z=61-82 $^{235,238}U$, $^{239,240,241,242}Pu$ are completed. It is expected that work on part B will be finished by the close of 1982 and that it will appear in print in early 1983.

3. Nuclear Data Sheets

On October 27, 1981, NNDC sent the June 1981 (Vol. 33, No. 2) issue of the Nuclear Data Sheets to the Academic Press. This was the first issue of NDS produced with the NNDC publication system. Since then, on an average, one issue of the Nuclear Data Sheets has been produced every month.

The U.S. is part of an international network of mass-chain evaluators contributing recommended values of nuclear structure information to the Evaluated Nuclear Data File (ENSDF) maintained by the NNDC. The Nuclear Data Sheets are produced directly from this computerized data file. Members of the international network are USA, United Kingdom, Kuwait, West Germany, France, Belgium, Japan, USSR, Sweden, Canada, and the Netherlands.

It is planned to bring out a new edition of the Nuclear Wallet Cards (last published in January 1979) in Spring 1983. A microfiche computerized chart of nuclides called Computope Chart was distributed in March 1982. Both these publications represent a subset of data extracted from the computerized ENSDF file and are therefore consistent and current with the Nuclear Data Sheets. An article on the Nuclear Physics Section of the Physics Vade Mecum published on the 50th anniversary of the American Institute of Physics was contributed by NNDC.

4. Seminar on Thermal Reactor Data

The National Nuclear Data Center hosted a two-day Seminar/Workshop entitled "Thermal Reactor Benchmark Calculations, Techniques, Results and Applications." The meeting was held May 17 and 18, 1982. The Electric Power Research Institute (EPRI) sponsored the meeting and will publish the proceedings. The topics included reactor physics and nuclear data, analysis of thermal reactor benchmarks, and utility and vendor needs.

APPENDIX 5

Topical Conference

"Intense Neutron Sources and their Applications"

held on 29 September 1982 at Chalk River, Canada, during the 23rd NEANDC Meeting

PROGRAMME

Chairman: H.T. Motz

14^{00} - Design Characteristics and Research Plans for the WNR/PSR
C. Bowman, Los Alamos, New Mexico, USA

14^{30} - The German Project for a High Power Spallation Source for Fundamental Research
S. Cierjacks, Karlsruhe, West Germany

15^{00} - Canadian Accelerator Breeder System Development
S. Schriber, CRNL/AECL, Canada

15^{30} - Prospects for Intense Neutron Sources from the Accelerator Breeder Program at CRNL
M.A. Lone, CRNL/AECL, Canada

16^{00} - The U.K. Spallation Neutron Source
M. Sowerby, Harwell, England

16^{30} - Upgrading of ORELA
F. Perey, Oak Ridge, USA

Report of the Subcommittee on Discrepancies to the 23rd NEANDC Meeting

The Subcommittee met on the morning of 29 September 1982.

Members: K.H. Böckhoff, R.E. Chrien, S. Cierjacks, C. Coceva, H. Condé, W. Cross, P. Garvey, S. Igarasi, A. Michaudon, H. Motz, C. Nordborg, F. Perey, J.L. Rowlands, S.M. Qaim, J.J. Schmidt, M.G. Sowerby (Chairman), N. Tubbs, S.L. Whetstone

I. List of Discrepancies Considered

	Discrepancy	National Responsibility
(1)	$^{7}Li(n,n'\alpha)T$	Germany (Qaim)
(2)	Cr, Ni and Fe, capture cross sections	CEC (Böckhoff)
(3)	Cr and Ni, total and inelastic scattering cross sections	USA (Motz)
(4)	$^{93}Nb(n,n')^{93m}Nb$ cross section	Austria (Vonach)
(5)	^{232}Th capture cross section	USA (Motz)
(6)	^{232}Th fission cross section	USA (Motz)
(7)	^{233}U fission cross section	France (Fort)
(8)	^{235}U fission cross section	UK (Sowerby)
(9)	^{238}U capture cross section	USA (?)
(10)	^{238}U inelastic scattering cross section	USA (Motz)
(11)	$^{237}Np(n,2n)$ cross section	France (Fort)
(12)	^{239}Pu decay power	USA (Motz)
(13)	^{241}Am fission resonance integral	UK (Sowerby)
(14)	^{235}U, ^{239}Pu resonance parameters	France (Fort)
(15)	$^{103}Rh(n,n')^{103m}Rh$ cross section	Austria (Vonach)
(16)	Minimum in σ_{nT} for Sc at 2 keV	USA (Chrien)
(17)	Delayed neutrons from fission	Sweden (Condé)
(18)	^{91}Zr and ^{96}Zr resonance parameters	Italy (Coceva)
(19)	^{23}Na, Γ_γ 2.85 keV resonance	UK (Sowerby)
(20)	^{239}Pu fission cross section	Germany (Cierjacks)
(21)	^{109}Ag capture cross section	Japan (Igarasi)
(22)	^{243}Am capture resonance integral	Sweden (Condé)
(23)	^{237}Np, $\bar{\nu}$	

Items (5), (6) and (7) have been removed from the INDC discrepancy list for policy reasons. The Subcommittee decided that they should be retained in the NEANDC list. Items (3) and (23) are new items proposed by the INDC Discrepancy subcommittee at its meeting on the 9th October 1981. It was agreed that item (3) should be included in the list but item (23) was not included following the comment by Motz that the measurements by Frehaut (Bruyeres le Châtel) were superior to the other data and the differences between all the measurements were not significant. Items (21) and (22) were added to the list on the recommendation of Igarasi and Condé respectively. They agreed to provide entries to the discrepancy file on these items.

II. Discussion of the Discrepancies

(i). Parameters of 1.15 keV resonance in ^{56}Fe

Böckhoff reported on the discrepancies in the neutron width or capture area of the 1.15 keV resonance. The values obtained from the capture measurements at Geel and Oak Ridge using total energy detectors appear to be ∿ 30 % higher than the values obtained from transmission measurements and from measurements with other capture detectors. It was felt that the data from the transmission measurements are unlikely to be wrong and it is suspected that the total energy detectors are not always working properly when the capture gamma-ray spectrum is hard. It was agreed that a task force be set up to resolve the problem with membership drawn from Oak Ridge, Geel and Harwell and Perey was asked to be leader (cf. Actions 26 to 30).

(ii) ^{238}U resonance parameters above 1.4 keV and the ^{238}U capture cross section

The Subcommittee noted (a) the discrepancies in the neutron width of ^{238}U above 1.4 keV reported by De Saussure at the Antwerp Conference, (b) the need to obtain the parameters of the large resonances between the 4 and 10 keV and (c) the continuing discrepancy in the capture cross section below ∿ 100 keV.
It was reported that Olsen et al had extended their resonance analysis up to 6 keV (cf. ANS meeting, Los Angeles, June 1982).
It was agreed to set up a task force to solve these discrepancies and Sowerby was asked to be its leader (cf. Actions 31 to 37).

(iii) Some comments on the other discrepancies

$^{7}Li(n,n'\alpha)T$ - Qaim reported on the results of the Jülich-Geel measurements. He considered that the discrepancy had been solved and that it could be removed from the NEANDC list. He agreed to provide an up-dated entry to the discrepancy file to confirm this.

^{232}Th capture cross section - It was reported that Olsen et al had made measurements and that a Specialists' Meeting on the Th-cycle is to be held in Japan in mid-October.
Jones reported on the integral measurements on ^{232}Th thermal capture cross section made at Chalk River which are consistent with the ENDF/B-V evaluation.

^{237}Np(n,2n) - Michaudon reported that Frehaut had planned measurements of this cross section but could not proceed because he could not obtain a suitable sample (10-20 g).

Decay heat - A number of measurements and calculations were presented at the Antwerp Conference from Japan, France and U.K. Condé reported that some measurements were in progress at Studsvik on ^{239}Pu and ^{238}U.

Minimum in σ_{nT} for Sc at 2 keV - Chrien reported on the present position and provided an entry to the discrepancy file. The problem seems to be one of sample purity. It was agreed that this discrepancy should be removed from the NEANDC list.

Delayed neutrons from fission - Condé reported that the present entry in the file does not require updating. This problem is to be considered at the NEANDC Specialists' Meeting to be held at Brookhaven in 1983.

^{236}U cross sections - Though this is not a discrepancy Garvey reported the increasing interest in ^{236}U cross sections due to uranium recycle in thermal reactors.

III. General

It was agreed that the NEANDC would produce a bound copy of the Discrepancy File after the present meeting since the INDC are at present producing a bound volume on the Standards File. Actions 38 to 47 were endorsed to obtain the necessary updated entries to the file before 1 January 1983. Sowerby agreed to combine these and prepare them for publication as a bound volume by the NEA.

M.G. Sowerby

APPENDIX 7

Report of the Subcommittee on Standards to the 23rd NEANDC Meeting

The Subcommittee met in the evening of 27 September 1982.

Members: K.H. Böckhoff, R.E. Chrien, H. Condé, W.G. Cross, S. Igarasi, C. Nordborg, F.G. Perey (Chairman), S.M. Qaim, J.J. Schmidt, M.G. Sowerby, N. Tubbs, S.L. Whetstone

I. Summary of Discussions

A. NEANDC/INDC subcommittee cooperation

H. Condé transmitted the desire of the INDC Standards Subcommittee for this subcommittee to formally endorse their decision to publish the current version of the NEANDC/INDC Standards Data File. The subcommittee gave its approval and agrees to undertake the next publication of the Standards Data File.

B. Impact of JEF and ENDF/B-VI on Subcommittee

The creation of JEF and the planned update of the ENDF/B-V Standards data were discussed to find out if these activities should affect the operation of the subcommittee. If the subcommittee is to play any role in the revision of ENDF/B-V Standards data, time is of essence since the target date for their update is the spring of 1984 when the subcommittee would next meet.
The subcommittee recognizes that one of its important functions is to facilitate communication among experts in the Standards area from the different member countries in order to obtain better recommended values and to promote their use.
The general consensus was that the Subcommittee Chairman should contact the CSEWG Standards Subcommittee Chairman to explore ways in which the role of this subcommittee, and the corresponding INDC subcommittee, could help in the update of the ENDF/B-V Standards data.

II. Other Business

1. Standards data review responsibilities

Responsibilities for review of the data in the Standards data files of the subcommittee, adopted at the last meeting, were left unchanged. These are:

Austria:	$^{27}Al(n,\alpha)$
EEC:	$^{10}B(n,\alpha)$, actinide half-lives
France:	$^{237}Np(n,f)$, γ-ray standards
Japan:	$^{238}U(n,f)$
U.K.:	H(n,n), $^{239}U(n,f)$, neutron energies
USA:	$^{6}Li(n,\alpha)$, C(n,n), $^{197}Au(n,\gamma)$, $^{252}Cf(\bar{\nu})$ and X(E), thermal count rate

No decision was taken as to when the various experts should provide their input to the subcommittee chairman. The chairman of the subcommittee was asked to select an appropriate time and communicate it to the subcommittee members following his discussion with the CSEWG Standards Subcommittee Chairman.

2. Election of new Chairman

H. Condé was elected the new Chairman of the subcommittee.

F.G. Perey

Report of the Subcommittee on Technical Activities to the 23rd NEANDC Meeting

The Subcommittee met on the afternoon of 28 September 1982.

Members: K.H. Böckhoff, R.E. Chrien, S. Cierjacks, C. Coceva, H. Condé, W. Cross, S.I. Igarasi, A. Michaudon, H. Motz, C. Nordborg, F. Perey, S.M. Qaim, J.L. Rowlands (Chairman), J.J. Schmidt, M. Sowerby, N. Tubbs, S.L. Whetstone

1. The High Priority Request List

The list (distributed as NEACRP/A 500, NEANDC/A 156) has been endorsed by the NEACRP Meeting (which met earlier in September) with the request that the status should be reviewed by NEANDC and a status report submitted to each NEACRP annual meeting. Rowlands had agreed to compile the status reports, which would be based on replies to a questionnaire which he would distribute to members. Members were asked to circulate the High Priority Request List (in their respective countries) and to ensure that the questionnaire was completed and returned to Rowlands by the end of March 1983.

Rowlands proposed that the questionnaire should take the following form:
Each member country which has made a request, and laboratory carrying out measurements or evaluations, should:

(a) Provide an estimate of the accuracy already achieved in either measured or evaluated data. In particular, countries making a request should endeavour to provide an estimate of the accuracy already achieved for their request, or which could be achieved by a nuclear model calculation.
(b) Give information about measurements or evaluations recently completed and the accuracy achieved.
(c) List measurements in progress or planned and the expected accuracy.
(d) Comment if it is considered that the requested accuracy is unattainable at present and estimate the achievable accuracy.

2. Compilation of Simple Integral Nuclear Data

Rowlands said that simple integral data (such as spectrum averaged cross sections and ratios) are of value for testing evaluations, and some integral data are used directly in reactor calculations. For example, thermal Maxwellian averaged values and resonance integrals for some secondary actinide isotopes and material activation reactions are used in irradiated material inventory and activity calculations. Reactor spectrum averaged values of reactions with high energy thresholds can be derived approximately from fission spectrum averaged values.

References to such simple integral measurements are not always easy to trace.

Tubbs and Schmidt asked Rowlands to give an indication of the magnitude of the work which would be involved in producing such a bibliography and in compiling the data and also to say what the relative importance of such an activity was compared with other work being undertaken by the Data Centres. Rowlands said that he thought that the bibliography would be only a few percent of the size of CINDA and that some integral data were more important than some of the differential data compiled at the Data Centres. However, it was not of greater importance than the JEF project.

(Nordborg has now made an analysis of EXFOR entries and this shows that about 10 % of the datasets are integral measurements, such as thermal Maxwellian averages, fission spectrum averages and pile spectrum measurements. However, it was thought that the neutron spectra described in detail were not in EXFOR.)

Concern was also expressed by some members about the adequacy of the documentation and characterisation of some published integral data and the problems involved in interpreting the data. It was also said that the dosimetry benchmark field measurements are well documented and that further referencing and tabulation was not required.

It was agreed to undertake an exploratory exercise. Rowlands agreed to write to members of the NEANDC and NEACRP asking them to provide references to simple integral data. Tubbs agreed to look into the possibility of compiling:

(a) a bibliography of integral nuclear data, and
(b) a file of integral data comprising the measured values, the neutron spectra and uncertainty information.

3. Compilation of Reference Data endorsed by the NEANDC

The question was raised whether the NEANDC should recommend or select data for standardization or reference purposes. The NEACRP had asked for guidance on decay data, required for decay heat calculations and on delayed neutron data (total yields, time dependence of emission and neutron spectra). It was agreed that these two nuclear data topics be reviewed at the proposed Brookhaven Meeting on "Yields and Decay Properties of Fission Products".

Concerning reference values for the 2200 m/sec cross sections of the principal actinide isotopes (which are required, for example, as standards to normalize integral cross-section measurements) it was noted that a new evaluation had been presented at the Antwerp Conference by Stehn and that Volume 2 of BNL-325, Fourth Edition, was now being prepared for publication.

4. Special Series of Important Documents sponsored by NEANDC

Members agreed to consider topics which might be suitable for a "Special Series of Important Documents" to be issued under the sponsorship of the NEANDC and make proposals for consideration at the next meeting. These topics could include measurements of special importance (documented in detail), and methods of analysis of data.

5. ENDF/B-V Format and Processing Codes

ENDF/B-IV or B-V formats have now been adopted in most countries. Processing codes developed in the USA are now implemented and in use in many countries, and some countries have developed their own processing codes or extended the codes from the USA. For example, processing codes have been developed in Japan and Italy, and in France the code RECENT has been extended to process the Reich-Moore formalism.

In the USA the ENDF/B-V format is being reviewed with a view to introducing a modified format in the Spring of 1983. Because of the desire for international standardizations this would have implications for all evaluators and users. It was asked if it would be possible for the Data Centres (NEADB and IAEANDS) to be informed of the proposed revisions and to have an opportunity to comment before the new format is adopted. Chrien agreed to ask S. Pearlstein whether they could be sent the information and possibly also participate in the meeting of the codes and formats subcommittee which would finalize the new format. It was also considered desirable that users who had encountered problems or found limitations in the ENDF/B-V format should communicate these quickly to the Data Centres and that the Centres should forward these, together with their own views, and experiences (gained, for example, when converting data from other formats to ENDF/B-V) to Pearlstein.

It was reported that ENDF/B-V processing codes would be a topic at the next 4 Centres Meeting (in Moscow). Tubbs said that he would enquire whether this part of the Meeting could be opened to a wider participation, and inform members.

Tubbs reported that a Workshop on the code NJOY was to be held at the NEADB and also a Workshop on the Monte-Carlo codes TRIPOLI and MONK. He agreed to inform members of the details of these.

6. Interlaboratory Intercomparison Projects

(i) Intercomparison of methods used to determine average parameters from resolved resonance parameters

Conclusions drawn from this exercise are reported in NEA Data Bank Newsletter No. 27, and a brief report on the Workshop is given in NEANDC-151 "A". The work is also described in a paper to the Antwerp Conference.

The exercise was done in four stages. In the first stage it was shown that the performance of most codes was much less accurate than the authors had estimated. The second stage showed that only two codes (by Moore and Weigman) provided good estimates of p-wave strength functions and only one (BAYESX by Moore) requires little physics judgement to be made by the user. The third stage involved the use of the codes by an independent user and showed that many codes were not in a portable form, were not well documented and required a deep understanding of the methods to select appropriate code parameters. Only the codes BAYESZ* and ESTIMA were considered to be fully portable and suitable for general use at present. The fourth stage will involve a wider use of these codes. All the codes have been improved as a consequence of the exercise and it is expected that other codes will also be made portable and achieve a comparable accuracy.

The intercomparison exercise had involved a lot of work and taken about 2 to 3 years to reach the present stage. Coceva expressed reservations about the range of validity of the exercise.

(ii) Data reduction and resonance parameter analysis of transmission data in the resolved resonance region

It was agreed that methods used in data reduction and resonance parameter analysis of transmission data in the resolved resonance region should be critically examined and intercompared. The first stage should be a meeting at which workers in this field present descriptions of their methods and codes, and experiences in analyzing data, and consider how best to evaluate the consistency and reliability of the methods in use. The Chairman of NEANDC agreed to write to P. Ribon asking him if he would be willing to organize such a meeting to be held in Paris in the Spring of 1983 (subject to the approval of this meeting by the Committee and the NEA).

(iii) Nuclear model code intercomparison exercise

A note was distributed by the Secretariat describing the present status of this exercise. Draft versions of reports on the two completed exercises have been distributed to participants and a final report will be issued when replies have been received. These are the coupled channel exercise and the spherical optical model and statistical model exercise. The pre-equilibrium model exercise was now being formulated and a specification would be distributed at the end of 1982.

* BAYESZ is an enhanced and faster version of BAYESX.

(iv) The BIPM flux intercomparison exercise

This exercise involves intercomparison of

(a) indium foil activation
(b) measurements using a counter developed at Harwell.

It was decided that the Committee should await the outcome of this exercise before considering any additional possible intercomparisons. Böckhoff was requested to keep members informed on progress of the BIPM indium foil activation intercomparison and Sowerby was requested to inform members of progress with the fission chamber intercomparison.

7. Treatment of Uncertainties in Measured and Evaluated Data

It was reported that an annotated bibliography on the treatment of uncertainties had been produced by CSEWG. Recent reports on this subject include documents by D.L. Smith (ANL).

In a separate, ad hoc subcommittee (Cierjacks, Perey, Rowlands and Sowerby) production of a document giving guidelines on the information to be included in reports on nuclear data measurements and criteria to be applied in refereeing such reports was discussed. Sowerby agreed to organize production of this document, in consultation with others. An adequate characterization of sources of uncertainty was regarded as an essential requirement.

J.L. Rowlands

APPENDIX 9

NEANDC SERIES ON NEUTRON PHYSICS AND NUCLEAR DATA IN SCIENCE AND TECHNOLOGY

General Information and Code of Practice

The first book (on Fission) in the NEANDC Series was issued in 1981. Another book (in two parts) is in press (on Neutron Sources) and a third one is in preparation (on Neutron Radiative Capture). More books are envisaged for the future but as of September 1982 no official commitment has been made about their launching.

Before embarking on issuing more books it is perhaps timely to recall the conditions agreed upon between the publisher (Pergamon Press) and the NEANDC on one hand and to take stock of the experience gained since then on the other. Methods of work are also proposed to reach our goals.

The general character of the Series has been clearly defined.(1) It is because of the special features of the Series that Pergamon Press accepted to publish it. This character must be preserved by all means unless a new negotiation with the publisher decides otherwise. Mainly oriented towards applications, especially fission energy, the Series aims at presenting all aspects of well-identified and relevant subjects. Balance is essential between various aspects : fundamental and applied, theoretical and experimental. (A Series on Basic Neutron Physics alone was rejected by the publisher). All these aspects must be clearly reflected in the organization of each book. The basic physics, pertinent to the subject, should be clearly explained and the applications well presented and justified. The relevant nuclear data situation should be thoroughly assessed : how are these data obtained from theory or experiments or both, what are the present limitations of these methods, how do these data compare with the needs and what are the prospects for the future.

The scientific level of the book should be that of a graduate student. Not written for the layman, the books should not be written for a small circle of experts either. They should be like textbooks, not invited papers grouped together, with the objective of reaching a wide audience.

The length of each book, as set by the publisher, should be about 120-150 pages. Though not achieved for the first books, it remains the goal for future books unless specified otherwise by the publisher.

Quality is absolutely essential and this demands consideration of several points :

The style should accomodate a wide range of readers. The various aspects of the subject should be explained in simple terms, whenever possible. A good level of popularisation is desirable, that of Scientific American for example. Esoteric jargon should be avoided. When specialized words or expressions are necessary, they should be clearly defined at their first use.

The presentation should be clear, interesting and appealing. People should find pleasure in reading the book, not get bored.

Unity and homogeneity should appear not only within each book but also within the whole Series. Consistency of symbols should be ensured throughout the Series whenever possible. Each book should have a complete and up-to-date list of references, a list of abbreviations, a glossary of symbols and a subject index. Books with similar subjects should have a similar organization as described in the General Information Sheet.

The writing of each book usually requires contributions from several authors in order to cover all aspects of the subject. Therefore a very important and extensive phase of editing is necessary to obtain books fulfilling the requirements recalled above. This constitutes a lot of work and is much more difficult than editing Conference Proceedings, especially since no editorial help is available either from the NEA or from the publisher at least for the time being. This task is the responsibility of an Editor who should be an excellent physicist, an authority in the subject, with a good command of English. The Editor is responsible both to the Committee and to the publisher for the quality of the work, its conformity to the goals described above and for the date of completion. The NEANDC has the ultimate responsibility of the Series in itself and to the publisher.

To achieve these goals, the following procedure is proposed :

1) The contents and the quality of the Series as well as all important relevant matters are under the supervision of three General Editors, normally members of the NEANDC. One of these Editors is chairman of the Subcommittee on Monographs.

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(1) General Information Sheet issued by Pergamon Press.

2) All the correspondence between the NEANDC and the publisher (Pergamon Press) is done by the Chairman of the Subcommittee on Monographs.

3) Subjects of the various books and their Editors, one Editor for each book, are chosen by the Committee upon proposals from the General Editors who gather suggestions from Committee members and other scientists.

4) The Editor of each book, in consultation with the General Editors acting together, must prepare a detailed outline with a list of possible authors and submit it to the Committee for approval. Proposals of authors should be accompanied with references as to their competence and their capability to achieve the work requested. Formal commitments about the editors, authors and subjects can be made only with the explicit approval from the NEANDC Chairman after consultation with the members.

5) The Editor, after approval from the General Editors, gives detailed instructions to the authors on the preparation of their contributions : general character, scientific level, presentation, style, references, symbols, etc. A time schedule is also given for the various steps to come.

6) When agreement is obtained about the Editor, the authors, the title, the length and the date of submission of each contribution, Pergamon Press is informed by the Chairman of the Subcommittee on Monographs. Contracts are then issued to the Editor and the authors.

7) A draft version is supplied in due time by each author to the Editor who sends a copy of the whole draft to all authors for information and to the General Editors for information and comments. These comments are made by the General Editors acting together.

8) The Editor sends to each author a copy of his (or her) contribution with comments and proposed modifications. Flexibility on the part of the authors is essential to modify their chapters.

9) The revised versions, as close as possible to the final ones, are sent in due time by the authors to the Editor who, in the same manner as for the draft version, sends the whole version to all authors and the General Editors.

10) The Editor, in close contact with the authors, carries out the last phase of the editing, which should not be underestimated. From past experience it can easily last about six months.

11) The final document is sent to Pergamon Press by the Chairman of the Subcommittee on Monographs, after consultation with the other General Editors and with the NEANDC Chairman who should refer the matter to the members if necessary.

12) Copies of correspondence relevant to the monographs (including the contracts) are sent to the NEANDC Chairman and the Chairman of the Subcommittee on Monographs.

13) Any serious difficulty arising during the writing of a book which cannot be solved by the General Editors is brought to the attention of the NEANDC Chairman by the Chairman of the Subcommittee on Monographs.

14) The above procedure may be reviewed at the initiative of the NEANDC Chairman after consultation with the Chairman of the Subcommittee on Monographs and the other Committee members.

A. MICHAUDON
Chairman - Subcommittee on Monographs

Members of the Subcommittee on Monographs: K.H. Böckhoff, R. Chrien, S. Cierjacks, C. Coceva, A. Michaudon (Chairman), H.T. Motz, S.M. Qaim, S.L. Whetstone

APPENDIX 10

Report of the Subcommittee on Meetings to the 23rd NEANDC Meeting

The Subcommittee met in the afternoon of 28 September 1982 and reported to the full Committee on 30 September 1982.

Members: K.H. Böckhoff, R.E. Chrien, S. Cierjacks, C. Coceva, A. Michaudon, C. Nordborg, S.M. Qaim, J. Rowlands, J.J. Schmidt, M.G. Sowerby, N. Tubbs, S.L. Whetstone (Chairman)

A. Major Conferences

The Subcommittee Chairman reported on the status of the proposals received from U.S. laboratories offering to host the next Nuclear Data Conference in the Fall of 1984. Brookhaven has offered to defer to the other two proposals received: from Los Alamos and from the NBS. The Subcommittee members expressed no preference for one over the other, but recognized both as appropriate hosts for the Conference.

Future meetings in the series, including the possibility of initiating new "cyles", were discussed in the full Committee meeting. It was reported that informal discussions by attendees at the recent Antwerp Meeting led to a suggestion that a six-year cycle be set up involving subsequent meetings in Kiev (1986) and in Europe (1988).

B. Proposed IAEA/NDS Meetings

From the list provided by J.J. Schmidt, one meeting was selected by the Committee for possible joint support. This was the "Advisory Group Meeting on Nuclear Standard Reference Data" to be held tentatively at Geel in September 1984. This was in view of the fact that the responsibility for preparing the next issue of the joint INDC/NEANDC Standards Review resides with NEANDC during the 1983-84 period.

C. Previously Approved NEA Specialists' Meeting

The meeting on "Yields and Decay Properties of Fission Products" will be held at Brookhaven National Laboratory on 24-27 October 1983.

D. Proposed New NEA Specialists' Meetings

An action was placed on the NEA Secretariat to secure NEA approval for these meetings.

A meeting on "Data Reduction and Resonance Parameter Analysis of Transmission Data in the Resolved Resonance Region" is proposed for the Spring of 1983 to be held in Paris. An Action was placed on the Chairman to invite P. Ribon to assist in its organization. (Ribon has recently completed a fruitful exercise involving interlaboratory intercomparison of such data reduction methods.)

A meeting on "The Use of the Optical Potential for the Prediction of Neutron Cross Sections" is proposed for the Spring of 1985 to be held in Paris.
An Action was placed on Michaudon to organize this meeting.

Stanley L. Whetstone

Meetings planned by the IAEA/NDS

1983		
1.	Advisory Group Meeting on Basic and Applied Nuclear Level Densities, 11-15 April, Brookhaven National Laboratory, USA	Pronyaev
2.	13th Meeting of the International Nuclear Data Committee, May, Rio de Janeiro, Brasil	Schmidt/Lorenz
3.	Consultants' Meeting on the Cf-252 Fission-Neutron Spectrum, (early) June, Vienna (tentative)	Lemmel
4.	Research Coordination Meeting on the Measurement and Evaluation of Transactinium Isotope Decay Data, (end) June, Idaho Falls, USA	Lorenz
5.	Research Coordination Meeting on Atomic Collision Data for Diagnostics of Magnetic Fusion Plasmas, (1st week) September, Munich, FRG	Katsonis/Lorenz
6.	7th Meeting of the Nuclear Reaction Data Centres, September, Moscow, USSR	Lemmel
7.	Interregional Training Course and Study Tour on Neutron Physics and Nuclear Data Measurements with Accelerators and Research Reactors, 4-30 September, USSR	(Kocherov)
8.	Consultants' Meeting on the Evaluation of Radiation Damage Nuclear Data for Structural Materials, October, Vienna	Cullen
9.	Consultants' Meeting on Nuclear Data for Borehole and Bulkmedia Assay Using Nuclear Techniques, October, Cracow, Poland	Okamoto
10.	Consultants' Meeting on the Evaluation of High Priority A+M Collision Data for Fusion, October, Vienna (meeting tentative)	Lorenz
11.	Research Coordination Meeting on the Measurement and Analysis of 14 MeV Neutron Cross-Sections, November, Gaussig/Dresden, GDR	Schmidt
12.	Research Coordination Meeting on the Validation and Benchmark Testing of Actinide Nuclear Data, November, Vienna	Lemmel
1984	(The time and place for all meetings are tentative)	
1.	Interregional Training Course on the Methodology of Evaluation and Processing of Nuclear Data for Nuclear Reactor Applications, (4 weeks), Spring, IAEA, Vienna	Cullen
2.	6th Meeting of the Nuclear Structure and Decay Data Network, May, Karlsruhe	Lorenz
3.	Advisory Group Meeting on Transactinium Isotope Nuclear Data, June, Sweden	Lorenz/Lemmel
4.	Advisory Group Meeting on Nuclear Standard Reference Data, September, Geel	Okamoto
5.	14th Meeting of the International Nuclear Data Committee, October, Vienna	Schmidt
6.	Consultants' Meeting on Nuclear Data for Safeguards, or Nuclear Safety	Lammer
7.	Research Coordination Meeting on the Measurement and Evaluation of Transactinium Isotope Decay Data	Lorenz
8.	Research Coordination Meeting on the Validation and Benchmark Testing of Actinide Nuclear Data	Lemmel
9.	Research Coordination Meeting on the Measurement and Analysis of 14 MeV Neutron Cross-Sections	Schmidt
10.	Research Coordination Meeting on Atomic Collision Data for Diagnostics of Magnetic Fusion Plasmas	Katsonis/Lorenz
11.	4th Meeting of the A+M Data Centre Network	Lorenz
12.	3rd Meeting of the IFRC Subcommittee on Atomic and Molecular Data for Fusion	Lorenz

APPENDIX 12

LIST OF PAPERS DISTRIBUTED DURING THE 23RD NEANDC MEETING - SEPTEMBER 1982

NEANDC-156"A"	High Priority Nuclear Data Measurements Requirements for the Reactor Programme
NEANDC-162"A"	Summary Record of the Second Meeting of the Scientific Co-ordinating Group of the Joint Evaluated File Project, Antwerp, Belgium, 8th September, 1982
NEANDC-163"A"	NEA Data Bank Activity Report, September 1982
NEANDC-164"A"	NEANDC Code of Practice, Version 1.0, October 1982
NEANDC-165"A"	Triennial Report on the Activities of the NEANDC 1978-1981
NEANDC-166"A"	Notes on the 24th NEACRP Meeting by the NEANDC Observer
NEANDC-167"A"	23rd Meeting of NEANDC, CRNL, Canada, 27th September to 1st October, 1982, Report on NEACRP Activities
NEANDC-168"A"	Contribution to the NEANDC Meeting held at Chalk River, Canada, 27th September to 1st October, 1982, Nuclear Data Section, International Atomic Energy Agency
NEANDC-169"A"	Activities of JAERI Nuclear Data Center and Japanese Nuclear Data Committee, April 1981 to July 1982
NEANDC-170"A"	National Nuclear Data Center Status Report
NEANDC930-83/U	Progress Report, July 1981 to June 1982 inclusive, Japanese Nuclear Data Committee
NE(82)19	Steering Committee for Nuclear Energy, Proposal for a Second Phase of the Joint Programme on Neutron Data Evaluation
NEANDC(CAN)-52/L	Canadian Progress Report to the NEANDC, March 1981 to September 1982
FYS-STEK-MEMO-110	Progress Report on Neutron Cross Section Evaluation Activities in the Netherlands for the period April 1981 to September 1982
NEANDC90R)-157"U"	Progress Report on Nuclear Data Activities in Sweden for 1981
TIB-FICS-DATINU(82)2	TIB/FICS - Laboratorio Dati Nucleari Summary Report of Activities in 1981

Committee Notes:

1. Status of the nuclear model code intercomparion exercises
2. Nuclear data measurements pertaining to fusion devices
3. NEANDC scope and programme, letter from Tubbs to Böckhoff dated 6th August, 1982
4. Summary of discussions on agenda item A.1.1
5. Present status of the JAERI fusion neutronics source facility
6. Present status of the JAERI tandem accelerator
7. Steering committee on nuclear energy - list of members
8. Notes for the Chalk River NEANDC meeting on stable isotopes separations and availability

Research Papers:

1. MeV neutron production from thermal neutron capture in Li and B compounds by M.A. Lone, D.C. Santry and W.M. Inglis
2. Dependence of effective cross sections on thermal neutron temperatures by R.T. Jones and A. Okazaki
3. Radiation fluxes and currents over a plane, circular aperture due to direct contributions from a plane, circular source by S.A. Kushneriuk and M.A. Lone
4. Low energy $^{7}Li(p,n)^{7}Be$ neutron source (CANUTRON) by M.A. Lone, A.M. Ross, J.S. Fraser, S.O. Schriber, S.A. Kushneriuk and W.N. Selander
5. Prompt gamma rays from thermal-neutron capture by M.A. Lone, R.A. Leavitt and D.A. Harrison
6. The German Project for a high power spallation neutron source for fundamental research by G.S. Bauer and J.E. Vetter
7. Determination of $^{6}Li(n,n't)^{4}He$ cross sections by H. Liskien, R. Wölfle and S.M. Qaim
8. Cross sections for hydrogen and helium producing reactions induced by fast neutrons on potential first wall materials of fusion reactor technology by S.M. Qaim, R. Wölfle and G. Stöcklin
9. Nuclear data relevant to cyclotron produced short-lived medical radioisotopes by S.M. Qaim
10. Plans for a high-resolution measurement of the tritium beta-spectrum end point to determine the neutrino mass by R.L. Graham, M.A. Lone, H.R. Andrews, J.S. Geiger, J.L. Gallant, J.W. Knowles, H.C. Lee and G.E. Lee-Whiting
11. Facilities for (n,γ) and related topics, neutron capture gamma-ray newsletter CGN/30 (special) by M.A. Lone and E.D. Earle
12. The prompt response of bismuth germanate and NaI(Tl) scintillation detectors to fast neutrons by O. Häusser, M.A. Lone, T.K. Alexander and J. Gascon
13. Characteristics of neutrons from Be targets bombarded with protons, deuterons and alpha particles by M.A. Lone, A.J. Ferguson and B.C. Robertson