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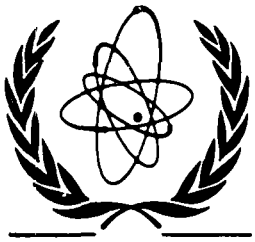

International Atomic Energy Agency

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

THE NUCLEAR DATA CENTRE AT THE INSTITUTE OF PHYSICS AND POWER ENGINEERING, OBNINSK (CJD)

L.N. Usachev

Translated by the IAEA from the
Information Bulletin No. 3 (1976)
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THE NUCLEAR DATA CENTRE

L.N. Usachev
Doctor of Physical and Mathematical Sciences

The long-term planning of nuclear power and the justification for choosing a reactor concept - fuel, coolant, fuel cycle and working parameters - require accurate nuclear data. Such data are used in other branches of sciences as well, for example, in geophysics and geology and also in industry.

More than 500 institutes in 40 countries are engaged in refining nuclear data in nuclear physical experiments. International co-operation is carried out under the aegis of the Internatonal Atomic Energy Agency (IAEA).

In the Soviet Union, the Nuclear Data Commission under the State Committee on the Utilization of Atomic Energy is responsible for determining requirements in respect of nuclear data and preparing plans for obtaining them. Its working organ is the Nuclear Data Centre at Obninsk.

As will be seen from diagram 1, the Centre's functions include:

- Determination of the optimum set of the accuracies required for nuclear data;
- Compilation of the results of microscopic and integral experiments performed in the USSR;
- Acquisition of nuclear data through the international centres of the IAEA;
- Calculation of reactor constants with the combined use of evaluated neutron data and the results of integral experiments by the methods of mathematical statistics.

The ultimate objective of the Centre's activities is to provide the different branches of science and technology with evaluated neutron data recommended for reactor calculations.

During 10 years of activity, the Centre has published 19 issues of "Yadernye Konstanty" (Nuclear Constants) in a total edition of over 6000 copies, and 20 issues of the collection of abstracts entitled "Yaderno-fizicheskie issledovaniya v SSSR" (Nuclear Physical Research in the USSR) in a total edition of 5000 copies.

Machine data carriers are used for the transfer of large data sets. The channels of transfer in use are shown in diagram 2.

The transfer between punched data carriers and the M-222 computer magnetic tape is carried out by the regular devices of the M-222; transfer involving magnetic tapes of Western standard made it necessary to attach a British magnetic tape unit to the computer. The software for transfer has been developed specially in the ALGOL language by introducing the operator "format" which, when addressed, performs conversion from the internal machine representation into any of the indicated symbolic representations and vice versa.

Any organization in the USSR can obtain data from the Centre's computer library, which contains:

1. About two million experimental points for the interaction probabilities of neutrons of up to 15 MeV for some 400 isotopes of elements in the periodic table;

2. Detailed sets of evaluated data on 90 isotopes and elements listed below, including for each of them all known types of interaction of neutrons with nuclei in the entire energy range from 0.001 eV to 15 MeV: H, D, T, ^{3}He, ^{4}He, ^{6}Li, ^{7}Li, ^{9}Be, ^{10}B, ^{11}B, ^{12}C, ^{14}N, ^{16}O, ^{19}F, ^{23}Na, Mg, ^{27}Al, Si, ^{32}P, S, Cl, Ar, Ca, Ti, ^{51}V, Cr, ^{50}Cr, ^{52}Cr, ^{53}Cr, ^{54}Cr, ^{55}Mn, Fe, ^{54}Fe, ^{56}Fe, ^{57}Fe, ^{58}Fe, ^{58}Ni, ^{60}Ni, ^{61}Ni, ^{62}Ni, ^{64}Ni, Cu, Ca, Zr, ^{93}Nb, Mo, ^{92}Mo, ^{94}Mo, ^{95}Mo, ^{96}Mo, ^{97}Mo, ^{98}Mo, ^{100}Mo, ^{107}Ag, ^{109}Ag, Cd, Sn, Ba, Eu, Gd, ^{165}Ho, Er, ^{162}Er, ^{164}Er, ^{166}Er, ^{167}Er, ^{168}Er, ^{170}Er, ^{181}Ta, W, Pt, ^{197}Au, Pb, ^{232}Th, ^{233}U, ^{234}U, ^{235}U, ^{236}U, ^{237}U, ^{238}U, ^{239}U, ^{240}U, ^{237}Np, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu, ^{242}Am, ^{243}Am.

3. Calculated sets of data in the same energy range for 192 isotopes from ^{72}Zn to ^{157}Gd on the following interaction cross-sections: total, elastic and inelastic scattering, transport, radiative capture and the cross-section for all inelastic processes;

4. Evaluated data on 36 threshold reactions used for in-pile dosimetry;

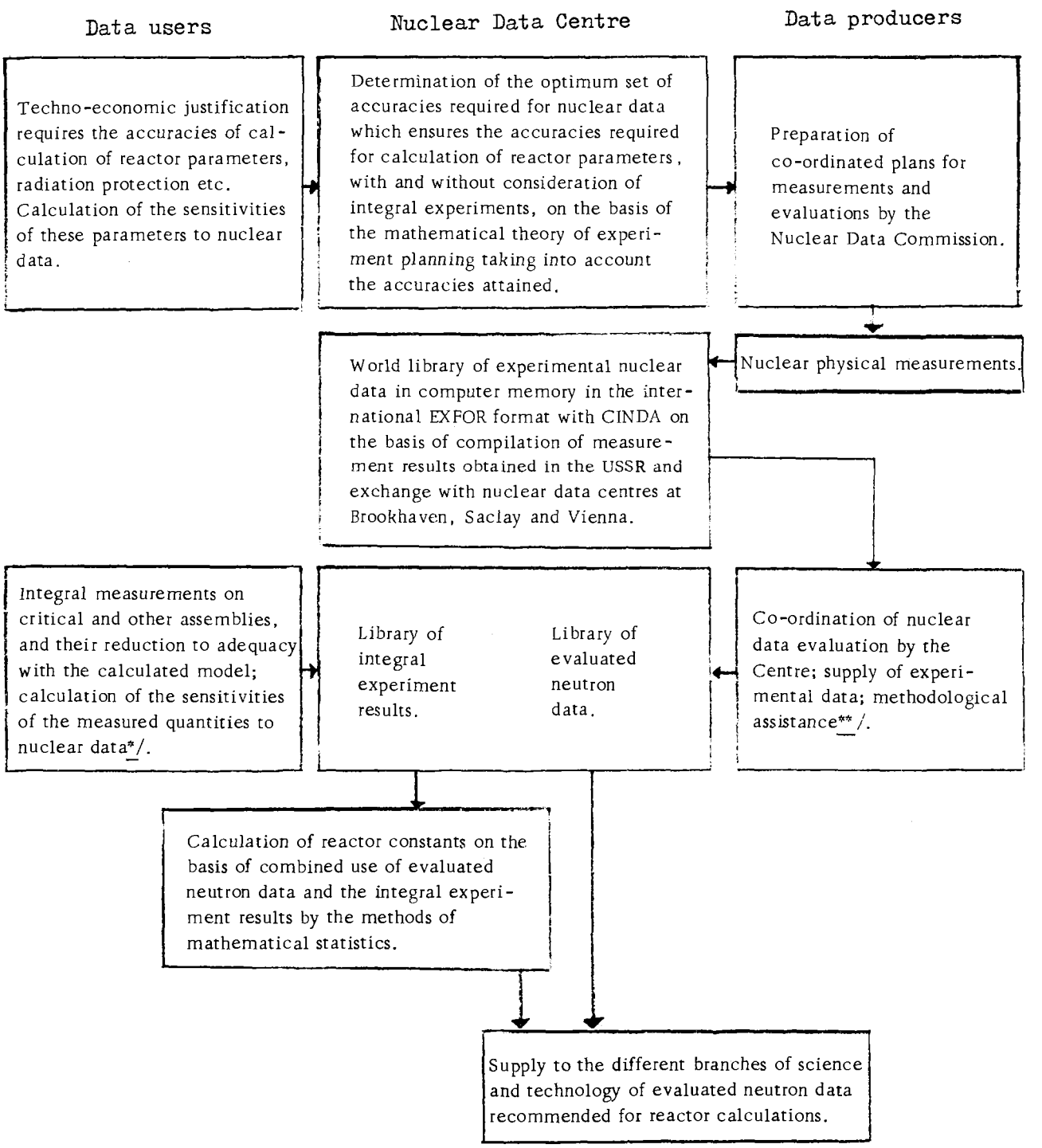
5. A system of group constants for fast-reactor calculations with a minimum of difference from the latest evaluated data and with the best possible description of 78 integral experiments. The constant components of the calculation error in this system of constants for the effective multiplication factor and the breeding ratio of plutonium fast reactors are 1.5 and 3% respectively.

The Centre's address

Nuclear Data Centre
Institute of Physics and Power Engineering
Obninsk
249020 Kaluzhskaya Oblast'
USSR

Diagram 1

Functional diagram of compilation of nuclear data and calculation of evaluated neutron data



*/ The sensitivity coefficients for fast reactors and critical assemblies are calculated with the help of the set of programmes in use at the Centre.

**/ The evaluation of a part of elements is performed at the Centre.

Diagram 2

Neutron data transfer channels in use