

ICARE EXPERIMENTS FOR THE QUALIFICATION OF CAPTURE CROSS-SECTIONS
IN THE NEUTRON SPECTRUM OF UNDERMODERATED REACTORS

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Abstract: In the framework of the studies concerning the undermoderated Pu lattices, the France Energy Commission (C.E.A.) in collaboration with the national electric power utility (E.D.F.) launched a neutronic validation program in 1984 /1/.

Due to the low moderator ratio and the utilization of mixed oxide fuel (UO₂-PuO₂) in such designs, the hardening of the neutron spectrum increases and induces many consequences on neutronic parameters. In particular, most of the fission and capture reactions occur in the epithermal range and it was necessary to reduce the uncertainties of the cross-sections library in this energy range.

Among others, this objective was reached through the ICARE experiments in the MELUSINE reactor situated in the Nuclear Center of GRENOBLE.

These irradiation experiments aim to measure capture rate of main heavy nuclides, important fission products and burnable poison nuclides in undermoderated lattices. The principle of the method used in the SHERWOOD irradiation /2/ was extended to the ICARE experiments: depleted UO₂ pellets with small quantities of nuclides (about 0.1 % weighted) were irradiated in the center of an experimental undermoderated assembly and analyzed after that. The ratio "daughter produced by capture/parent" measured at the beginning and at the end of the irradiation allows us to obtain the capture rates of the nuclides.

The first irradiation experiment, the so-called ICARE/S, was carried out from April to October 1986. The experimental subassembly was located in the center of the MELUSINE core and consisted of 261 UO₂-PuO₂ fuel pins (11 % Pu weighted) with a 0.5 moderator ratio.

A part of the experimental results are now available and the interpretation is in progress.

A second irradiation, ICARE/R, with a moderator ratio equal to 0.9 has been defined and is planned for the beginning of 1988.

Coupled with the ERASME irradiation experiments /1/ performed in the EOLE reactor in Cadarache, the ICARE irradiation experiments constitute a very powerful tool to answer the requirements of the future PWR's.

Paper is not available.

REFERENCES

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