

SCATTERING OF MeV NEUTRONS FROM ELEMENTAL IRON*

by

A. Smith and P. Guenther

Argonne National Laboratory
Argonne, Illinois

ABSTRACT

Neutron elastic- and inelastic-scattering cross sections of elemental iron are measured from 1.5 to 4.0 MeV with incident-neutron resolutions of ~ 50 keV and at incident-neutron energy intervals of ~ 50 keV. Cross sections for the excitation of observed levels at 0.853, 1.389, 2.097, 2.579, 2.677, 2.974 and 3.152 MeV are determined. The observed elastic- and inelastic-scattering angular distributions fluctuate strongly with incident energy. The experimental results are averaged over broad energy intervals and interpreted in terms of spherical optical-statistical and coupled-channels models including consideration of direct-vibrational excitations. The importance of a comprehensive data base in such energy-averaged interpretations and of the direct-vibrational excitations is stressed. The present measured and calculated results, combined with those reported in the literature, are used to formulate an evaluated scattered-neutron data file in the ENDF format extending from 1.0 to 4.0 MeV.

*This work supported by the U.S. Department of Energy.