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UCID-16514
Addendum



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TO: USNDC Members

FROM: John D. Anderson
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SUBJECT: Addendum to USNDC Status Report

September 17, 1974

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LAWRENCE LIVERMORE LABORATORY

The purpose of this addendum to the LLL status report to the USNDC is to update information concerning the ^{235}U fission cross-section measurements and the fission cross-section ratio measurements currently being performed at the LLL linac.

A. STANDARDS

1. ^{235}U Fission Cross-Section Measurement.
(J.B. Czirr and G.S. Sidhu)

A measurement of the ^{235}U fission cross section has been completed for the 3- to 20-MeV range. Analysis of the data is complete and the results are described in a report UCRL-76041. The abstract from this report is listed below.

"The energy dependence of the ^{235}U fission cross section has been measured relative to the n,p scattering reaction for neutron energies from 3 to 20 MeV. The LLL Linac provided a pulsed source of neutrons, and energies were measured by neutron time-of-flight. The flux monitor consisted of an annular polyethylene proton radiator with a shielded recoil detector. The total error in the relative $^{235}\text{U}(n,f)$ cross section is $\pm 1\%$ from 3 to 7 MeV and increases to $\pm 2\%$ at 14 MeV."

B. NEUTRON DATA APPLICATIONS

1. Fission Cross-Section Ratios.
(J. W. Behrens and G. W. Carlson)

A report (UCID-16548) has been prepared which discusses preliminary results for fission cross-section ratios involving ^{233}U , ^{235}U , ^{238}U and ^{239}Pu . The abstract from this report is listed below.

"Fission cross-section measurements for a wide collection of uranium and plutonium isotopes are being conducted at LLL using the 100-MeV electron linear accelerator (Linac) as a pulsed neutron source. The cross-section ratios are measured as a function of neutron energy from 1 keV to 30 MeV using the time-of-flight technique.

To obtain fission cross-section ratios above 1 MeV, we used the threshold cross-section method. This method allows us to obtain the ratios without depending on normalizations to absolute cross-section measurements. Knowledge of neither the amount of fissionable mass nor the efficiency for detecting fissions in the fission chambers is required for the analysis. This advantage eliminates a potentially large uncertainty in our ratio measurements.

Preliminary results for the fission cross-section ratios $^{238}\text{U}/^{233}\text{U}$, $^{238}\text{U}/^{235}\text{U}$, and $^{238}\text{U}/^{239}\text{Pu}$ extend from 1 to 30 MeV with an energy resolution of at least 5% and counting uncertainties less than 5% over most of the energy range. Additional preliminary measurements of the fission cross-section ratios $^{233}\text{U}/^{235}\text{U}$ from 1 keV to 30 MeV, $^{238}\text{U}/^{235}\text{U}$ from 750 keV to 30 MeV, and $^{239}\text{Pu}/^{235}\text{U}$ from 10 keV to 30 MeV are reported with an energy resolution of at least 5% and counting uncertainties less than 3% over most of the energy range. These ratios were normalized using the threshold cross-section method.

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