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APPLICATION OF MINIATURE INTRINSIC THERMOCOUPLES FOR REACTOR TRANSIENT DIAGNOSTICS*

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Samples constructed in the same manner were calibrated on the LRL Fran Reactor at the Nevada Test Site. This reactor has the ability to provide a neutron pulse of $>2 \times 10^{14}$ n/cm² in <40 microseconds. The illustration shows the comparative rise times of the fast burst and those observed on "TNT".

Two exposures were obtained on "TNT" in order to have a wide range of flux. One series of readings were obtained at $\sim 1.1 \times 10^{15}$ fissions/gm (on the reactor shell) and one series at $\sim 2.4 \times 10^{14}$ fissions/gm (in air 2.15' out from the reactor shell).

By using the small pellet as a part of the thermoelectric junction, the actual body of the sample becomes part of the measuring device and thus enables one to achieve microsecond response times. The fine thermocouple wire reduces the thermal heat sink and the signal measured is the actual contact potential created between the thermocouple wire and the pellet.

Since conducting "TNT", further developmental work has shown that .0003" wires of Tungsten/Tungsten-Rhenium can be attached to the fuel pellets. This will enable one to trace the temperature rise well into the 3000°C region with an insignificant time lag.

The energy grouping in a reactor spectrum can be determined rapidly by instrumenting various samples of materials of known cross sections and determining their temperature vs. that of U-235, which in effect can be attributed directly to neutron and/or gamma flux.