THE EFFECT OF TRANSDUCER RATE ON THERMAL RADIATION DATA

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The Thermal Radiation Source (TRS) at ARL is used as a research tool to develop a reliable TRS unit for integration with the 2.44 in probative tube. Part of this study includes measuring the rise and fall times as
well as the extent of flux variation of the TRS events. The Gardon type gauge is the primary transducer used to measure the flux output. 7-his gauge consists of a constantan diaphragm welded to a copper wire and body.
This creates two thermocouple junctions. The electrical output of the gauge is linearly related to the incident thermal radiation on the face of the diaphragm. The response rate of these gages is of concern. The typical gauge used in TRS work has a response rate of one time constant within 50 ms. In the
past, the transient output of the TRS was considered slow. A faster acting gauge was not thought to be necessary. To test this theory, a mathematical correction formula was applied to existing TRS data. The correction formulation was to demonstrate the actual incident radiation on the gauge face by assuming . a response rate. The data were processed using the correction formula. 777e results of the correction processing yielded a higher rise and fall time, as expected, but also demonstrated a much higher flux variation during a TRS event. The overall fluence remained the same.

To verify, the correction formula is accurate, a special gauge was constructed. It has a response rate of 6 ms to the first time constant. An experiment was conducted by placing the special gauge next to a regular
gauge. The results show the faster acting gauge produces a signal that matches the corrected signal of the slower gauge, with one exception. The overall fluence increased. The most profound effect of using this gauge is realized when one tries to improve the performance of a TRS system. By realizing the capabilities of the gages, a person can more accurately asses the thermal output of future TRS systems. This will have direct impact on future nuclear survivability, criterion by realizing the true capabilites of TRS systems.