THERMAL RESPONSE TEST METHODOLOGY (TRTM)

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The survivability of military equipment under thermal radiation loads similar to those produced by a nuclear detonation is necessary and critical to the maintenance of a credible defense capability. The need for
thermal radiation testing lies in the continuing history of failures and surprises in previous experiments, much of it employing sources that were not capable of simulating the nuclear environments. The current simulators lack one or more of the following desired properties; sufficient flux and fluence, adequate pulse shape, correct thermal radiation spectrum, large target radiation capability, correct incident radiation angle, uniform thermal radiation on targets and predictable collateral and synergistic effects. Although improved simulators are needed to resolve some of the existing simulator inadequacies, improved methods to best utilize the existing simulators are urgently needed. Therefore the objective is to develop a scientific TRTM to interpret the result of tests performed with existing simulators to determine the system failure under nuclear environments.

There are many unpredictable collateral effects that occur during a nuclear bursts that cannot be modeled or reproduced. A methodology has been developed to account for the upper bounds of the uncertainties involved during such events.
Two approaches have been selected to meet the stated objective. The first one is to provide near correct total absorbed energy to the target. The second one is to provide near correct thermal effect at a point of interest on/in the target. These approaches will be discussed.

The thermal response test methodology has been broken down into six distinct steps: survivability requirement determination, target's thermal characteristic assessment, target preparation, test set-up definition, testing and data reduction. These steps will be discussed.