

## **ARE WE UNDERPREDICTING NUCLEAR WEAPON THERMAL RADIATION THREATS?**

**The application of modern information and technologies to a review of nuclear weapon thermal radiation, laboratory simulators and material vulnerability testing during the period of 1945 to 1965.**

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During the past several years, formerly classified documents have become available to the public. Some of these documents allow access to thermal radiation measurements and experiments conducted during the US atmospheric test era. Further, the bibliographies of those documents along with modern search engines and digitized unclassified research papers have allowed a full review of thermal radiation research conducted during the period from 1945 to 1965.

Measurements and test results, along with laboratory experiments conducted during the same period, form the basis of most information used to evaluate thermal radiation vulnerability to personnel and hardware. An examination of the data reveals the possibility that interpretations of the test results and extrapolations there from may have resulted in a significant level of error in prediction of threats from nuclear weapon thermal radiation. In many cases the data appears to underestimate the threat.

This paper addresses the atmospheric weapon tests and laboratory experiments used to develop the basis of prediction of the thermal radiation threat. Examinations of the test procedures and their limitations indicate places where modern computational modeling and new knowledge of material properties will greatly extend our capabilities to evaluate this threat and improve survivability and vulnerability testing of modern systems. An example of the application of these technologies to the thermal threat to exposed personnel is provided. The example utilizes data collected from 1946 to 1963 on both atmospheric and laboratory tests, coupled with modern measurements of skin properties and simple current computational capabilities, to reevaluate the threat to humans. While additional research using more complex modeling capabilities is indicated, the threat appears to be significantly greater than listed in Glasstone's "Effects of Nuclear Weapons".