



U.S. ARMY CHEMICAL MATERIALS AGENCY

M55 Rocket Stability Testing

In the early to mid-1960s, the United States produced more than 400,000 M55 chemical rockets for military use. However, none of the rockets were ever used in combat. In 1981, they were declared obsolete and of no military value.

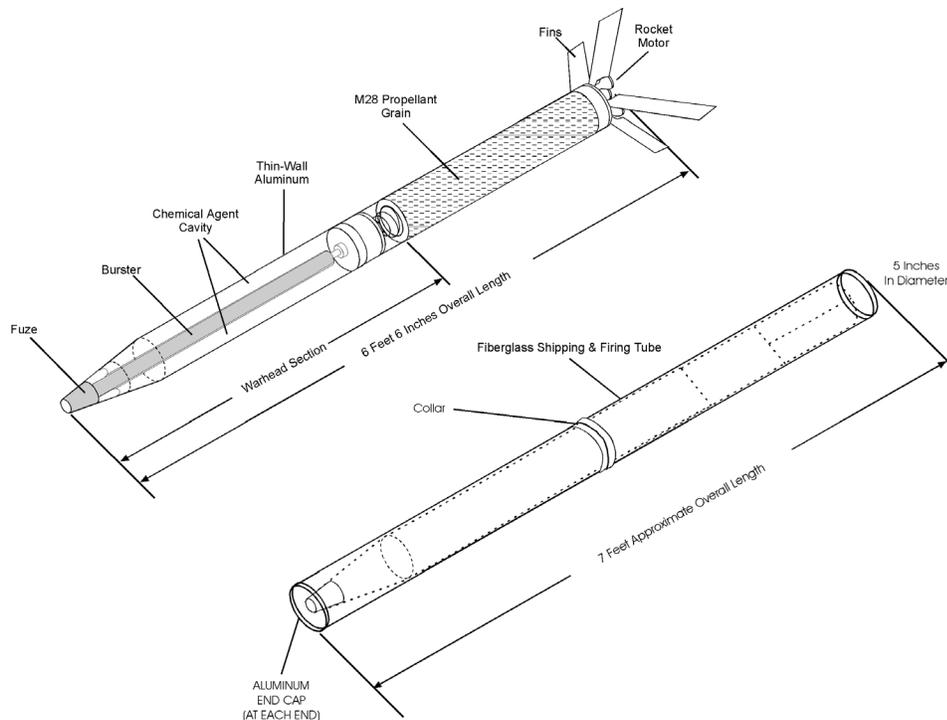
The chemical rockets currently are in storage and awaiting destruction at the U.S. Army stockpile site in Blue Grass, Ky. The M55 rockets that were once stored at Anniston, Ala.; Pine Bluff, Ark.; Tooele, Utah; Umatilla, Ore.; and Johnston Atoll in the Pacific have been safely destroyed.

Each rocket weighs nearly 60 pounds, is almost seven feet long, and contains approximately 10 pounds of chemical nerve agent (GB or VX). In addition, the rockets

also contain M28 propellant, which, over time, deteriorates through a series of chemical reactions that generate heat. To control the rate of these reactions, chemical compounds called stabilizers were added to the propellant during manufacturing.

The stabilizer is consumed over time as the propellant ages. As the stabilizer is depleted, the propellant could generate additional heat, rapidly enough to lead to autoignition. The chance of this so-called "autoignition" has been the subject of many studies on the rockets' safety.

Army scientists began testing and monitoring the chemical munitions in the early 1970s. Between 1985 and 1989, they sampled propellant from M55 rockets in storage.



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M55 Rocket Stability Testing (continued)

In addition, agent-contaminated propellant samples were collected from the Johnston Atoll Chemical Agent Disposal System (JACADS) in 1995 and from Tooele, Utah, in 1999.

Comprehensive laboratory testing on the stability of the propellant and stabilizers has now been completed. The testing included exposure of propellant samples to chemical agent, investigation of the effects of chemical agent on the propellant, and assessment of heat removal from stored rockets.

These laboratory tests were performed using the field samples collected in the 1980s. The results were compared to the contaminated samples taken from JACADS and Tooele.

The laboratory tests determined that uncontaminated propellant is stable for at least 100 years, but that agent contamination accelerates propellant degradation and stabilizer depletion. The tests also demonstrated that the rockets dissipate heat effectively. The JACADS and Tooele samples confirmed the laboratory results and further

demonstrated that only small portions of the propellant showed effects from agent contamination.

Detailed computer models were developed to evaluate the likelihood of rocket autoignition based on the test results. Army scientists were able to form predictions regarding propellant autoignition. The results of this evaluation conclude that autoignition of the aging rockets is very unlikely and the rockets can continue to be stored safely until they are destroyed.

While these studies have demonstrated that the storage of the M55 rocket presents no immediate threat of autoignition, the rockets still present a risk of initiation from external events such as lightning and earthquakes. The only way to ensure the complete safety of the surrounding public and environment is to destroy the munitions in a safe and efficient manner.