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# vapor containment structures

## Effective protection from agent vapor during removal of chemical weapons

*Often, unexploded munitions found on formerly used defense sites contain hazardous chemical agents. Because the downwind hazard poses added risk when chemical weapons are removed, precautions must be taken to protect the public in case of an accidental detonation.*

A VCS, along with a high-efficiency particulate air filter and an activated charcoal filtration system, has the potential to reduce substantially the required downwind safety arc, as one test demonstrated. Huntsville Center initiated a VCS prototype test program to determine the containment capabilities of a 14-gauge steel-arch structure with an I-beam base. The Livens projector and 4.7-inch artillery projectile—munitions used exclusively in World War I—were tested by Southwest Research Institute (SwRI) in San Antonio, Texas, at the SwRI testing facility.

After prototype testing, the structure contained 99.47 percent of the simulant agent resulting from a detonation of the Livens projector and 99.777 percent of the simulant agent from the 4.7-inch projectile. After detonation, the contained simulant agent was extracted from the structure by the air-handling system.

The reduction in the NOSE was significant, from 329 meters to 50 meters for the Livens and to 20 meters for the 4.7-inch projectile. That is an overall evacuation area reduction of 97.69 percent for the Livens and 99.63 percent for the 4.7-inch projectile. Furthermore, there was no structural damage to the VCS, and the explosive blast pressures were contained within the structure. If munition fragments should perforate the structure, their velocity would be significantly reduced, and fragments would fall well within the exclusion zone radius of 75 feet.

The results were outstanding, considering that the prototype was tested under “worst-case” conditions, with extremely conservative fragmentation and overpressure exposures. Actual field conditions would have been much less severe. The prototype tests show that the VCS increases safety to the public while it cuts Government costs.