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Applied Sciences Laboratory

Case Study

Missile Detonation Gas Sampling



US Air Force personnel prepare two missile segments for open detonation in a desert location West of Salt Lake City, Utah.



Blimps were used to loft sampling equipment into the cloud of combustion gases immediately after detonation of the missiles.

One of the legacies of the US/Soviet arms race is a huge stockpile of aging, unstable, missile segments. Whether by treaty, or by the risk they pose, these decommissioned rocket motors must be destroyed. After the missile payload has been removed, the missile bodies, containing highly explosive rocket propellant, are shipped off to storage facilities in Utah, Nevada, California, and elsewhere. The missile segments are eventually destroyed by either a wash-out process, where high pressure streams of water cut the solid propellant out of the missile casing, or by open-detonation, where the missile segment is placed in a remote location and detonated.

CH2M HILL scientists and engineers were contracted by Hill Air Force Base in Salt Lake City, Utah, to develop ways to capture the particulate and gases generated during the open detonation of missile segments. ASL chemists were undaunted by the challenges faced in this project. They developed clever and unique sampling systems to obtain representative gas or particulate samples from the detonation. The explosive forces from the detonation of 23,000 pounds of propellant are enough to bend fence posts and crush gas canisters placed 500 feet or even 1000 feet from the detonation. Over several years of testing under a variety of open detonation conditions, ASL chemists developed sampling equipment which could both withstand the destructive forces of the explosion and get close enough to capture actual combustion gases. Equipment was lofted into the air using helium-filled blimps immediately following the detonation, or buried deep beneath the ground using only a small tube extending above ground.

Combustion gas data collected from the detonations was compared to computer models developed by US Navy scientists. The data correlated well, and provided reassurance to State Agencies, military branches, and the public that combustion of the missile propellant, while creating quite a spectacle to observe, was not causing the release of any dangerous chemicals.

Contacts

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