The MX Factor

A Peacekeeper missile being test-launched from Vandenberg Air Force Base, CA. The Peacekeeper, also known as the MX missile (for Missile-eXperimental), was a land-based, intercontinental ballistic missile deployed starting in 1986. The Peacekeeper carried up to 10 re-entry vehicles, each armed with a nuclear warhead. The last of the Peacekeeper missiles was decommissioned in 2005.
(Photo: U.S. Air Force.)

Test films played a strategic-planning role in the debates of the late 1970s and early 1980s about where and how to deploy the MX intercontinental ballistic missile (LGM-118 Peacekeeper). The deployment would have to ensure that the missiles could survive a first strike by an adversary. Military planners were considering placing the missiles in clusters of hardened concrete shelters in the hot, dry Great Basin Desert of Nevada and Utah.

Films of atmospheric tests at the Nevada Test Site had something important to show about such a location. That something is called a "thermal" precursor, an additional shock wave that can race ahead of the main shock wave, battering objects in its path with highly destructive pressures exceeding those of the main wave. A precursor is far more likely in a hot, dry environment.

Rod Whitaker, Los Alamos physicist participating in the film project, explains: "In a desert or arid environment, vegetation is sparse, so a nuclear explosion heats the ground and the air just above the ground, creating a thermal layer, which can then generate this precursor. The only data we have on thermal layers, precursors, and the damage they can cause came from films of aboveground nuclear testing in Nevada."

A Peacekeeper test missile re-entering the atmosphere at the Kwajalein Atoll in the Marshall Islands. This long exposure photo shows the paths of the multiple re-entry vehicles deployed by the missile. Each of the missile's 10 nuclear warheads could be aimed to destroy a different target and packed a yield that was many times greater than Fat Man or Little Boy. (Photo: U.S. Army.)

The Nevada films also showed that a precursor was even more likely as detonations occurred closer to the ground. The May 25, 1953, Grable test is a case in point. Grable's 15-kiloton explosion surprisingly produced greater destruction than did the higher-yield (27 kilotons), higher-altitude Encore test held earlier the same month in the same place. Objects that Encore left untouched, Grable destroyed. Film revealed the reason: Grable produced a precursor, while Encore did not. Both tests took place in the same hot, dry environment, but Grable was detonated closer to the ground.

Because the precursor phenomena would increase the uncertainties of how destructive a Soviet air-burst-detonation against the MX base might be, there were problems with engineering adequate defenses and, even if they could be engineered, the economic costs of putting them in place would certainly be steep.

Information like that revealed in the atmospheric test films ultimately meant that the MX missiles would not be based in the Great Basin Desert.

~Eileen Patterson