ER Site No. 71: Moonlight Shot Area

ADS: 1334
Operable Unit: Central Coyote Test Area

Site History 1
Constituents of Concern 3
Current Hazards 3
Current Status of Work 3
Future Work Planned 4
Waste Volume Estimated/Generated 4

Primary Contact: Dick Fate
Office Phone: 284-2568

Site History

ER Site 71 is identified as the Moonlight Shot Area in the Hazardous and Solid Waste Amendments Act (HSWA) Module. Site 71 is an inactive site centered on a concrete and asphalt pad in an open area north of Isleta Road in the southern part of Kirtland AFB (KAFB). The site covers approximately 83.1 acres of federally-controlled land and encloses ER Site 68. Following the Moonlight Shot activities, Site 68 was used for fire-survivability tests.

Between 1956 and 1961 tests were conducted to simulate the extent of radioactive fallout dispersion from a nuclear weapon detonation during a transport accident or an accidental detonation during assembly. The tests were noncriticality explosions and did not yield nuclear fission products. Depleted uranium (DU, U-238) was used in the tests in place of plutonium. The concrete and asphalt pads were thought to encompass ground zero, or near ground zero, for the tests. Fallout collector tray stations were located in the fields surrounding the pads, mainly to the north of the pads. Radial roads, called firing lines, centered around the pads, aided in the placement and retrieval of the fallout collector trays for the tests.

Two separate fallout studies are documented: Project 56, conducted in 1956, and Moonlight Shot, conducted from May 1960 to April 1961. The Project 56 shots used high explosive (HE) and DU assemblies that contained 300 pounds of HE and about 31 pounds of depleted uranium (DU) in aluminum casings, simulating a generic nuclear device. When the HE was detonated, the DU was dispersed. The shots were designed to investigate the role played by point of detonation, height of burst, and burst environment, which simulated the variety of accidental detonations that could occur. Only four shots conducted at ground surface were conducted.

Approximately 800 fallout collector trays were laid out in a radial grid over a 2- by 3-mile area. The collector trays consisted of 8- by 11-in. resin trays supported in a horizontal position by clipboards mounted on a short piece of rebar secured to a cinder block base. They were placed on location about 18 hours before shot time. Approximately 6 hours before the shot, crews applied a

solution of alkyd resin and toluene to the trays with paint sprayers powered by compressed nitrogen cylinders. The trays were collected approximately two hours after the shot and taken to Health Physics for analysis. Airborne, balloon-supported precipitrons, at heights of 500 to 900 ft, were used in the later stages of the testing to collect samples. The mooring point of the balloon was usually 1,000 ft from ground zero and was dependent on wind direction and velocity. Surface winds were monitored during Project 56 shots by conventional anemometers and wind vanes mounted on the former wooden towers at ER Site 57B, Workman Site: Target Area. Anemometer data were telemetered to the shot control point located in Building 9900, adjacent to the concrete gun mounts at ER Site 57A, Workman Site: Firing Area. Wind conditions were also monitored by theodolites and weather balloons.

The Moonlight Shot series of called for 300 pounds of HE and 66 pounds of DU per test. Part of the moonlight Shot program called for fallout cloud sampling using sampling instruments borne aloft by mortar shells. These instruments would allow for "coring of the fallout cloud" both during development and after stabilization. This series was also designed to test the influence of paved surfaces upon particulate dispersion in the cloud by detonations occurring inside railroad cars on or near an asphalt and a concrete pad to simulate a city street and an airport tarmac, respectively. Approximately 21 tests were planned, but no confirmation of any Moonlight Shot series tests is available.

The exact location of ground zeros for Project 56 and Moonlight Shot have not been determined through interviews or historical documents. In fact, ground zero may have been shifted for each test based on wind conditions and weather. All ground zeros are believed to be within the several-acre area at the center of the radial road array. Because several shots took place near concrete and asphalt pads, ground zero locations are believed to be located near the pads that are adjacent to Isleta Road.

The ER Site 71 boundary was established using the radial road patterns expressed on aerial photographs and the fragmentation radius associated with DU fragments found during gamma radiation surveys of the area. The site boundary does not cover the entire area of potential fallout of aerosols and fine particulates.

Previous Investigations - ER Site 71 was first listed as a potential release site based on the Comprehensive Environmental Assessment and Response Program (CEARP) interviews performed in 1985. At the time of the CEARP investigation, it was known weapon mock-ups and weapon components constructed of DU were detonated to study the dispersal of DU. The regulatory disposition of the Solid Waste Management Unit (SWMU) remained uncertain, however, because of a lack of information regarding the nature of the debris. Insufficient information also prevented calculating a Hazard Ranking System score for the SWMU.

Subsequent to the CEARP inspection, the Environmental Protection Agency (EPA) conducted a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA). The RFA identified the site in Section VII, "Other Areas of Concern," which addressed areas that do not meet the regulatory definition of a SWMU.

In November 1993, KAFB Explosive Ordnance Disposal conducted a surface unexploded ordnance (UXO)/ and high explosive (HE) survey of the site in conjunction with ER Site 68. No live ordnance or HE was discovered. Expended ordnance debris associated with the proximity fuze development testing at ER Site 57A was found.

In December 1993, RUST Geotech Inc. conducted a surface gamma radiation survey at the site. Five area-sources and 238 point-source anomalies were detected in 79-acre survey area. The point source anomalies were DU fragments, which remained on the surface from the test activities. Some point source anomalies are thorium fragments that are related to burn testing activities at ER Site 68, which lies within ER Site 71. Removal of the DU and thorium fragments, and further investigation of the five area anomalies, were performed under voluntary corrective measures.

In December 1993, Los Alamos National Laboratory conducted an alpha radiation survey of the site with an electrostatic long-range alpha detector. But because an excessive grid spacing was used, no widespread low-level radiation contamination was detected.

Constituents of Concern

Metals
Depleted Uranium (DU, U-238)

Current Hazards

There are open trenches and an open excavation on the site south of the burn pan structure. These areas are surrounded by orange snow fencing and posted with "soil contamination" signs. Site 68, which lies within Site 71, is still currently an RMMA due to the presence of residual radionuclides in the soil of the overflow basin and VCM excavation (primarily depleted uranium [DU, U-238]). Because of surface disturbance and grading following the Moonlight Shot radioactive fallout dispersion testing at Site 71, DU fragments or DU-contaminated soil may still be present in the subsurface (i.e., below 6-inches.) Because this area is also within the gun fan for munitions testing at Site 57A to the west, UXO is present on the surface and in the subsurface.

Current Status of Work

An administrative No Further Action(NFA) proposal submitted to the U.S. Environmental Protection Agency (EPA) in October 1994 was not approved. Limited sampling for gamma spectrometry radioisotopes, metals, and explosives was performed in August 1995.

Two Voluntary Corrective Measures (VCMs) to remove radiation point and area sources were performed in FY95 and FY96.

A risk-based No Further Action Plan was submitted to the New Mexico Environmental Department (NMED) for Site 71 in September 1998. In March 1999, NMED indicated that the site was acceptableor NFA petition. The NFA was approved by NMED in July 2000 after completing the public review and permit modification process.

Future Work Planned

No further work is planned.

Waste Volume Estimated/Generated

The two surface radiation VCMs generated 17 drums of radioactive waste for the Sites 68/ 71.

Information for ER Site 71 was last updated Nov 7, 2001.