

Ancho Canyon Fire Response

Causal Analysis, Suppression Response, Health Analysis, and Lessons Learned

Large-Bore Powder Gun Experiment of June 11, 2008

The experiment conducted on June 11, 2008 at LANL's Technical Area 39 (commonly known as Ancho Canyon) was an engineering test of a fast-closing valve that is part of a large-bore powder gun. This gun is similar to any traditional gun in that it accelerates a projectile by means of hot, high-pressure gases from a burning propellant. The gun is a three-piece assembly consisting of the breech and barrel portion, a fast closing valve, and a projectile catch tank. Unlike conventional guns, this system includes the target.

The expected path of the inert projectile is through the barrel, past the valve, and into the catch tank, where the projectile comes to rest. The valve is timed to close after the projectile passes and to seal the projectile and any associated propellant gases into the containment tank.

The post-test analysis of this experiment clearly showed that the fast-closing valve failed; it closed too hard and broke the valve body. The three-part system is sealed and the experiment begins under vacuum. This breach in the mechanical system allowed the hot gun-propellant gases to escape the three-part assembly.

Our reconstruction of the events shows that hot gases sprayed onto some short native grass several feet from the valve. The grass ignited, and the slow-moving fire also consumed some shrubs. Personnel immediately called the Los Alamos County Fire Department (LAFD) and then attempted to extinguish the fire using shovels and dirt available in the test area. But high winds that afternoon caused the fire to spread under a stand of trees, and the experimenters withdrew to let the Fire Department and LANL Emergency Management & Response (LANL EM&R) manage the response.

The Laboratory follows rigorous procedures at all firing sites, both open-air and contained sites. The Laboratory does not conduct open-air operations during adverse weather conditions, such as high winds or a "red-flag" designation (the short-term presence of dangerous combinations of temperature, wind, relative humidity, fuel, or drought conditions). A red-flag designation can be issued by the National Weather Service at any Fire Danger level. Open-air operations include open burns and open detonation of explosives. Procedures in effect on June 11 allowed for the experiment to proceed since it was to be conducted inside a vessel.

After the Laboratory completed its critique of the experiment, personnel implemented corrective actions. The principal changes include even more conservative procedures to focus on weather and fire-related parameters in the "readiness reviews" for experiments. Newly implemented additional controls require upper-level management review and approval and that fire department resources be on site when firing contained or confined shots during Red Flag or Extreme conditions. These controls will remain in place until an engineering evaluation team completes a full review of various containment and confinement systems.

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Fire Response

At approximately 3 p.m. June 11, a multiagency wildland fire team responded to the small grass and shrub fire in Ancho Canyon. By 10 p.m., the fire was fully contained.

Approximately 40 firefighters from the LAFD, the U.S. Forest Service, the U.S. Park Service, Santa Clara Pueblo, and the Laboratory responded to the fire with a variety of equipment, including Forest Service air tankers that made two precautionary drops of fire retardant. All agencies helped suppress the fire with the LAFD and LANL EM&R serving as Unified Command. Emergency notification was completed according to existing emergency plans.

The fire was brought under control within a few hours. Fire crews monitored the situation throughout the night, putting out hot-spot fires as they occurred. An over-flight Thursday morning revealed no hot spots outside the 15-acre burned area. A back burn was conducted on that afternoon to reduce the area's fuel load.

The event was categorized as a Non-Emergency Significant Event per DOE Order 151. Information was then disseminated to responding agencies, New Mexico Department of Homeland Security Emergency Management, DOE, and LANL. No "shelter in place" order was issued by Incident Command to White Rock or any other area as a result of this fire.

Employee and Responder Safety

During the incident, LANL employees and emergency responders used standard LANL worker safety and response protocols. Responders did not enter any areas where hazardous levels of contamination were present. Industrial hygiene managers provided all responders with standard field and emergency briefings upon their arrival on scene. Incident Command determined that personal protective gear to be worn by responders should consist of typical wildland fire gear – principally Nomex[®] flame-resistant pants and shirts, hardhats, leather boots, and safety glasses. Following standard site procedures, all responders, vehicles, and equipment were surveyed for radiological contamination prior to leaving the scene. During the first hours of the response, technicians studied soil-contaminant data from previous sampling and concluded there would be no air emissions or concentrations of concern for worker or public health.

Air Monitoring

An air monitoring plan was requested by Incident Command within the first four hours of the event. The plan was developed and fully implemented within 24 hours of the request. Part of LANL's response was to monitor ambient air in the vicinity of the fire. As an extra precaution, the technical team began an air-monitoring regimen. Filters from air monitoring stations were analyzed based on the review of soil-monitoring data for contaminants present above background levels in the areas adjacent to the fire. Air concentration results were compared to applicable worker or public standards.

AIRNET is a permanent 24-hour-a-day air monitoring network with stations inside and surrounding the Laboratory to a distance of up to 40 miles. The AIRNET monitoring station at the corner of NM 4 and Monte Rey Drive South in Pajarito Acres was operating throughout the initial flare-up. It is situated downwind from the fire and is near the residence closest to TA-39. Its filter was removed for analysis and a replacement filter was installed before the back burn was conducted.

In addition, two high-volume samplers were deployed in and near Ancho Canyon at TA-39. One was about 75 meters from the burned and back burn areas; the other was on NM 4 on a ridge to the east of Ancho Canyon and downwind from the fire area. Both high-volume samplers operated continuously through the weekend, and the filters were removed for analysis on Friday, June 13 and on Monday, June 16, 2008.

Filter Analyses

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The AIRNET filter was analyzed for the routine set of radionuclides: uranium, plutonium, and americium. The high-volume sampler filters were analyzed for contaminants that have been measured above background in TA-39 soils: uranium, lead, beryllium, copper, silver, zinc, mercury, americium-241, and plutonium.

Based on the history of Laboratory operations in the vicinity of the fire, cesium (Cs) 137 and strontium (Sr) 90 are not expected to be significant soil contaminants. There are a few soil measurements in Ancho Canyon that were analyzed for Cs-137. The results were at background levels. There are no soil samples analyzed for Sr-90. Therefore, air filters were not specifically analyzed for Cs-137 or Sr-90.

However, gamma-counting capabilities of the four AIRNET filters in White Rock that operated throughout the fire provided information on Cs-137 levels. In addition, the gross-beta counting of the four AIRNET filters in White Rock that operated throughout the fire were reviewed to determine if elevated beta counts exist that should be analyzed specifically for Sr-90. Based on the current set of air concentration measurements, we anticipate both these measurements will be consistent with routine background measurements.

Results and Analysis

From the samplers in the two public locations, all radionuclide analyses except one were nondetections or below detection limits: U-234 was detected on NM 4, between Ancho and Water Canyons, from Friday, June 13 to Monday, June 16. This single detection is similar to other U-234 concentrations measured during windy conditions, when soils are resuspended into the air. The concentration is less than 1 percent of applicable public exposure limits.

In samples collected on-site, U-234 and U-238 measurements were typical of other uranium measurements made during windy conditions, when soils are resuspended into the air. These measurements indicate naturally occurring uranium, based on an evaluation of the isotopic uranium concentrations. The uranium values are well below applicable worker safety limits, less than 2 one-hundredths of a percent (0.02%) of applicable worker exposure limits. Americium and plutonium measurements were either less than detection limits or not detected in the samples collected on-site.

Beryllium, silver, and mercury were not detected in any samples collected on-site or off-site. Measurements of lead were well below all applicable worker and public health standards. Measurements of zinc and copper also were well below applicable worker standards. No public standards exist for zinc or copper. Measurements of lead, zinc, and copper are consistent with previous air measurements taken at Los Alamos.

Conclusions

There were no adverse health effects on workers or members of the public resulting from any Laboratory contaminants that could have potentially been rendered airborne by the fire.

The fire was fully contained with neither immediate nor ensuing environmental, worker or public health hazards.

For more information see <http://www.lanl.gov/emergency/fire/>