Stockpile Stewardship

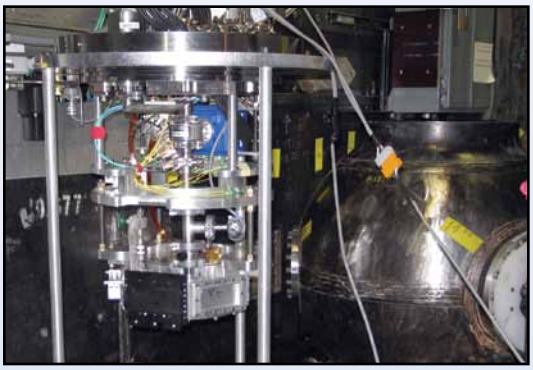
U1a Facility

Introduction

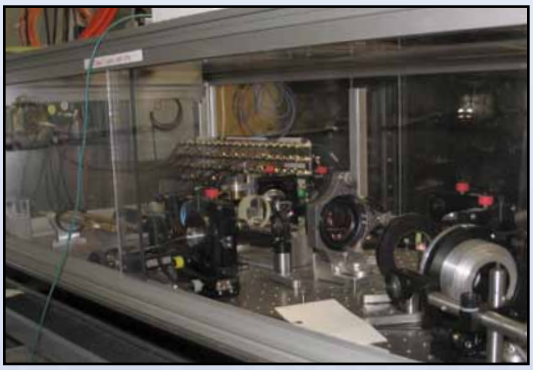
The U1a Complex is an underground laboratory used for subcritical experiments; physics experiments that obtain technical information about the U.S. nuclear weapons stockpile. These experiments support the U.S. Department of Energy, National Nuclear Security Administration's (NNSA) Stockpile Stewardship Programs, created to maintain the safety and reliability of the U.S. nuclear weapons stockpile.

U1h Facilities

The U1a borehole was originally excavated in the 1960s for an underground nuclear test that was later cancelled. In 1988, the U1a shaft was constructed and the Ledoux nuclear test was conducted in 1990 in a horizontal tunnel mined south from its base, 963 feet below ground surface. The current U1a Complex is mined at the base of two vertical shafts, the original U1a shaft and the U1h shaft, which was constructed in 2004. The vertical shafts are equipped with mechanical hoists for personnel and equipment access. A third vertical shaft, U1g, is located between the two main shafts and provides cross ventilation, instrumentation and utility access, and emergency exit. The underground complex is on one level, at the depth of the Ledoux test, and consists of horizontal tunnels and alcoves which collectively are approximately 1.4 miles in length. The complex provides a high degree of safety for Nevada National Security Site workers and the public, exceptional security for the experiments, and minimizes environmental impacts.



Experiment Diagnostic Rack and Vessel



Velocity Interferometer System for Any Reflector (VISAR)

Subcritical Experiments

Subcritical experiments are conducted underground at the U1a Complex by the National Weapons Laboratories (NWLs). Kismet, a proof-of-concept experiment, which did not include special nuclear material, was conducted in March of 1995 and subsequently led to the current subcritical experiments. Los Alamos National Laboratory (LANL) conducted the first subcritical experiment, Rebound, on July 2, 1997. The second subcritical experiment, Holog, was conducted by Lawrence Livermore National Laboratory (LLNL) on September 18, 1997. To date, both NWLs have completed 23 subcritical experiments at the U1a Complex. LANL continues to conduct subcritical experiments at the U1a Complex; the Thermos experiment series being the most recent in 2007. LANL is expecting to execute the Barolo experiment series in 2010. In addition, LANL is working toward fielding in the near future a single-stage gun that will fire large-diameter projectiles at targets of special nuclear materials, such as plutonium, to obtain data like that obtained in other subcritical experiments.

Subcritical experiments use chemical high explosives to generate high pressures that are applied to special nuclear materials. The configuration and quantities of explosives and special nuclear materials are such that a self-sustaining nuclear chain reaction, or criticality, cannot occur. Because there is no criticality, the subcritical experiments are consistent with the U.S. nuclear testing moratorium. Scientific data are obtained on the behavior of nuclear weapon materials by the use of complex, high-speed diagnostic instruments.

Cygnus X-ray Diagnostic Machines

The explosive assemblies for the subcritical experiments are placed in small alcoves mined in the sidewalls of the tunnels or in vertical boreholes in the floor of the underground complex. More recently, the explosive assemblies have been placed in confinement vessels in underground alcoves allowing for the reuse of the alcoves.

Prospective Missions

Proposed projects for the U1a Complex include nuclear weapons dismantlement; plutonium weapon component staging and surveillance; and plutonium processing and heat source production.

The current infrastructure and proposed improvements maintain and expand the Complex's ability to support specialized missions and projects in a secure, protected, environmentally controlled, and well-managed facility. The Complex continues to strengthen its existing rigor in conduct of operations to support future subcritical experiments and other nuclear projects and missions.

Alcove for a Single-Stage Gun

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For more information, contact:
U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Office of Public Affairs
P.O. Box 98518
Las Vegas, NV 89193-8518
phone: 702-295-3521
fax: 702-295-0154
envmgt@nv.energy.gov
http://www.nv.energy.gov

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