Exceptional service in the national interest

Sandia National Laboratories

Sandia's Nuclear Weapons Mission

Ensuring that the nation's stockpile is safe, secure and effective, and that it meets military requirements

America's Nuclear Weapons Systems Engineering Laboratory

We weaponize the nuclear explosive package to create a militarily effective and logistically sustainable U.S. nuclear deterrent.

The nation's nuclear weapons meet the highest reliability requirements: they must always work when needed and authorized. They must meet equally stringent safety and security requirements: they must never detonate when not authorized. Nuclear weapons must survive extremely complex and often harsh environments. They must remain dormant for up to 30 years, yet be immediately available when they are on high alert/readiness levels. The utmost confidence in the nuclear weapons enterprise is required for presidential command and control. These challenges require systems engineering underpinned by deep science along with demonstrated product delivery.

The foundation of Sandia's work is science-based engineering, in which fundamental science, computer models and unique experimental facilities come together so researchers can understand, predict and verify weapon systems performance. Our people are the key to the successful achievement of our mission and are our most important resource.

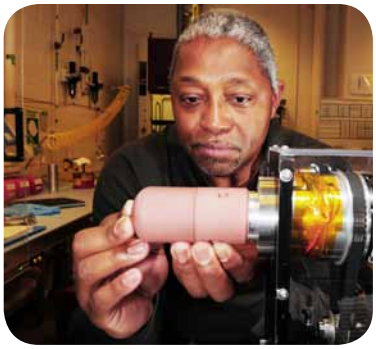
Sandia's Role in Stockpile Assessment

Sandia is responsible for nuclear weapon systems and components over their entire lifecycle, from original design through final dismantlement and disposition. While the weapons are deployed, Sandia rigorously monitors their state of health. Each year, Sandia assesses the reliability and safety of every active stockpile weapon type, and documents its findings in a letter from the laboratory director to the secretaries of Energy and Defense. The reports from all three weapons lab directors, along with the assessment from the commander of the U.S. Strategic Command, form the basis for the formal report to the president of the United States on the overall condition of the stockpile.

Sandia's Nuclear Weapons Products and Essential Capabilities

At the core of Sandia's nuclear weapons program are these key elements of weaponization:

- Warhead systems engineering and integration;
- Arming, fuzing and firing systems;
- Neutron generators;
- Gas transfer systems; and
- Surety systems.



These supporting science and engineering capabilities underpin Sandia's nuclear weapons program:

- Environmental testing
- Materials science
- Microelectronics and microsystems
- Engineering sciences
- Computational simulation
- Radiation effects sciences

A Special Mission in Surety

Nuclear weapon surety, with an emphasis on safety and security, is a key mission for Sandia and is an important part of stockpile transformation. Surety originates in the engineering of fundamental, science-based design principles and architectures.

Nuclear weapons are designed to be safe in all environments. Science-based principles underpin the design of the safety subsystems that prevent energy from reaching the nuclear explosive components through the use of:

- Isolation (barriers)
- Incompatibility (unique energy requirements); and
- Inoperability (assured safe failure of components under accident conditions).

Weapon security relies upon denying adversaries access to the weapon and its internal features so that nuclear detonation cannot be achieved. Formidable physical security systems provided by the military and the National Nuclear Security Administration (NNSA) deter adversaries. Sandia applies nuclear weapon design principles to achieve assured security in all situations, regardless of changes in the threat environment.

Evolving Policy Landscape

President Obama outlined his vision for reducing the role of nuclear weapons in the national security strategy in his 2009 speech in Prague. He stated, "... as long as these weapons exist, the United States will maintain a safe, secure, and effective arsenal to deter any adversary, and guarantee that defense to our allies...". His vision was spelled out in the Nuclear Posture Review of April 2010, and the subsequent detailed plans developed by the NNSA and the Department of Defense. The president has requested significant increases in funding for the nuclear weapons program, targeted largely at life extension programs for key weapon systems, as well as recapitalization of the nuclear weapons infrastructure. The New START Treaty solidifies the nation's commitment to a smaller nuclear arsenal, which increases the importance of an effective deterrent. Sandia is instrumental in maintaining the health of the stockpile, the underlying infrastructure, science and engineering capabilities and an expert workforce.

Broad National Security Impact

The nuclear weapons enterprise cannot be sustained without strong programs in other national security mission areas and fundamental research. Sandia continues to support key capabilities that result in breakthroughs to benefit the nuclear weapons program and to help solve other important national security problems. This model for sustaining capabilities creates mutual benefit for all Sandia's customers.

U.S. DEPARTMENT OF ENERGY
NNSA National Nuclear Security Administration

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND No. 2011-4698P. MV.

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