Exceptional service in the national interest

Sandia National Laboratories

Sandia's Nuclear Weapons Mission

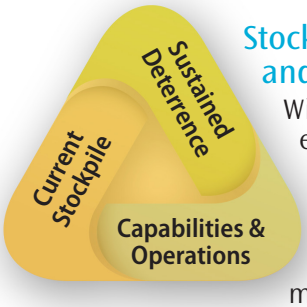
Ensuring the nation's stockpile is safe, secure and effective and meets military requirements

Nuclear Weapons Systems Engineering

Sandia, the engineering arm of the nation's nuclear weapons complex, is responsible for the non-nuclear components of U.S. nuclear weapons, including integrating these components with the nuclear explosives package to maintain a militarily effective and logistically sustainable nuclear deterrent. The nation's nuclear weapons meet the highest reliability requirements: They must always work if needed and authorized by the president of the United States. They must meet equally stringent safety and security requirements: They must never work if not authorized.

Sandia evaluates the reliability and safety of every active stockpile weapon type annually, and documents its findings in a letter from its director to the secretaries of the Energy and Defense departments and chairman of the Nuclear Weapons Council. Reports from the directors of all three U.S. weapons labs, along with the assessment from the commander of the U.S. Strategic Command, form the basis for the annual formal report to the president of the United States on the overall condition of the nuclear weapons stockpile. Sandia's latest message is that the stockpile is safe, secure and effective, with new approaches required for stockpile evaluation given the reduction in numbers of nuclear weapons over recent decades.

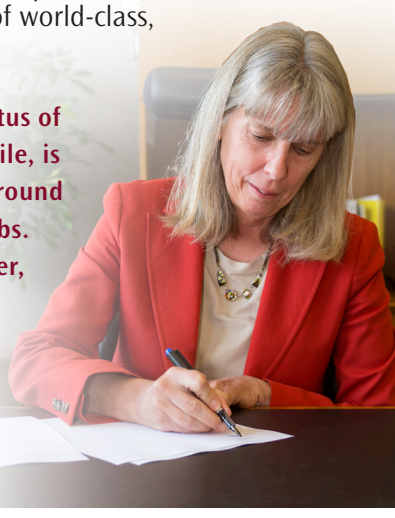
Nuclear weapons must survive extremely complex and often harsh environments. They must remain dormant for decades, yet be immediately available. These challenges require systems engineering underpinned by science and technology and demonstrated product delivery. As a Federally Funded Research and Development Center, Sandia is one of a select group of U.S. institutions that focus science, technology and engineering expertise on a broad range of national security issues. The foundation of Sandia's work is world-class science-based engineering, in which science, computer models and unique experimental, test and production facilities come together to enable researchers to understand, predict and verify weapons systems performance. People are Sandia's most important resource and key to mission success — and have been for the 60-plus years of U.S. nuclear deterrence from World War II and the Cold War through today's challenging era of dynamic global threats and an aging stockpile requiring life extension programs (LEPs).



Stockpile Readiness and Assessment

Within the U.S. national security enterprise, Sandia is responsible for nuclear weapons systems, including thousands of components, from original design through final dismantlement and disposition. Sandia's nuclear weapons mission is focused on three imperatives:

- maintain the U.S. stockpile through surveillance and changing out weapon components that have limited life;
- sustain U.S. deterrence into the future through LEPs and Alterations (ALTs) by replacing aging technology and avoiding being surprised strategically; and
- maintain and advance Sandia's required engineering and science capabilities, facilities and operations, and recruit and retain the next generation of world-class, innovative people.



"This letter, which addresses the status of the nation's nuclear weapons stockpile, is the culmination of an ongoing year-round effort by organizations across the labs. Although my signature is on the letter, I am really signing for all of us, expressing two of our key Sandia values: We serve the nation and we team to deliver with excellence."

— Jill Hruby
President and Laboratories Director

Sandia is executing three full-scale engineering development efforts, the B61-12 LEP, W88 ALT-370 and Mk21 Fuze Replacement, and is in the concept assessment stage for the air-launched cruise missile W80-4 LEP. All the programs are on schedule and within budget.

Nuclear Weapons Products and Essential Capabilities

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

- warhead systems engineering and integration;
- arming, fuzing and firing systems;
- neutron generators to initiate nuclear fission;
- gas transfer systems; and
- safety and surety systems.

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

- environmental shock, vibration and temperature testing;
- materials science;
- nanodevices and microsystems;
- engineering sciences;
- high-performance computing, information sciences and simulation;
- radiation effects and high energy-density science; and
- bioscience and geoscience.

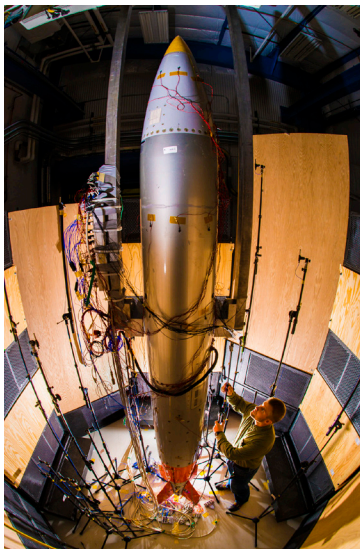
While nuclear weapons represent Sandia's core mission, the science, technology, engineering and program management required for this mission enable other key national security efforts. These include global nuclear assurance and security, cyberspace, defense products, reducing global chemical and biological dangers, developing secure and sustainable energy and national security space innovations. At the same time, the nuclear weapons enterprise benefits from strong programs in these other national security areas and from fundamental research.

Examples include:

- developing tools to safely disable Improvised Explosive Devices, made possible by the deep expertise in explosives required for our nuclear weapons mission;
- benefits from global monitoring systems for nuclear material detection; and
- cyberdefense applications based on our long-standing work in the command and control of nuclear weapons.

Special Mission in Safety and Surety

Ensuring the safety and security of the stockpile is Sandia's key mission. Nuclear weapons are designed to be safe in all environments. Science-based principles underpin the design of safety subsystems that prevent energy from reaching the nuclear explosives components through physical barriers, unique energy requirements that require compatibility for activation and systems that become inoperable in an accident.



Weapons security against use by adversaries relies both on denying access and on internal features so weapons cannot be detonated. Formidable physical security systems provided by the military and Department of Energy's National Nuclear Security Administration (NNSA) deter adversaries. Sandia applies nuclear weapons design principles to achieve assured security, regardless of changing threats.

Evolving Policy Landscape

The United States continues to play a critical role in international efforts to reduce nuclear arsenals, prevent nuclear proliferation and secure nuclear materials, and appropriately size nuclear forces that are essential in protecting U.S. and allied security interests. This underscores Sandia's ongoing role in ensuring that the U.S. nuclear deterrent continues to remain safe, secure and effective.

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

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