

Exceptional service in the national interest



Sandia's Nuclear Weapons Mission

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

Nuclear Weapons Systems Engineering

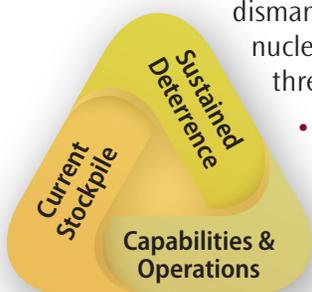
Sandia, the engineering arm of the nation's nuclear weapons enterprise, is responsible for the non-nuclear components of U.S. nuclear weapons. Sandia integrates these components with the nuclear explosives package to maintain a militarily effective and sustainable U.S. nuclear deterrent. The nation's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

Nuclear weapons must remain immediately available for decades in extremely complex conditions and survive in harsh environments. This requires systems engineering underpinned by rigorous science and technology and demonstrated product delivery. The foundation of Sandia's work is world-class science-based engineering, in which basic 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 the key to mission success, from World War II and the Cold War through today's challenging era of dynamic global threats and an aging stockpile that requires Life Extension Programs (LEPs).

Stockpile Readiness and Assessment

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

- take care of the current U.S. stockpile through surveillance and other programs and address the impacts of components that have limited life;

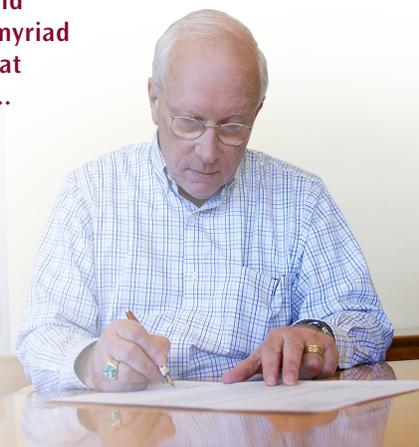


- sustain U.S. deterrence into the future through LEPs and Alterations (ALTs) by replacing aging technology and avoiding strategic surprise; and
- maintain and advance Sandia's engineering and science capabilities, facilities and operations, and recruit and retain the next generation of talented, innovative technical experts.

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 Energy and Defense and the chairman of the Nuclear Weapons Council. Reports from the directors of all three U.S. weapons labs, along with the assessment of the commander of the U.S. Strategic Command, form the basis for the annual formal report to the president on the overall condition of the nuclear weapons stockpile.

“Signing this letter represents the culmination of work extending over many months and engaging every division at Sandia. ... The foundation of the process is a set of exhaustive reviews by experts on each weapon system, supported by scientists and engineers knowledgeable in the myriad science and engineering issues that can affect safety and reliability. ... Completion of my letter is one of my principal responsibilities as laboratories director.”

*Laboratories Director
Stephen Younger*



Sandia is executing several major programs including the B61-12 LEP, W88 ALT-370, W76-1 LEP and Mk21 Fuze Replacement, and is conducting W80-4 LEP concept assessment for the air-launched cruise missile. All programs are on schedule and within budget.

Nuclear Weapons Products and Essential Capabilities

At the core of Sandia’s nuclear weapons responsibilities 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 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 critical national security work. At the same time, the nuclear weapons enterprise benefits from strong programs in these other national security areas and from Sandia’s fundamental research.

Examples include:

- global monitoring systems for nuclear material detection;

- tools for the warfighter to safely disable improvised explosive devices, made possible by expertise in explosives required in the nuclear weapons mission;
- small, lightweight, high-resolution all-weather synthetic aperture radar — SAR — that benefits conventional military and civilian operations, enabled by expertise in nuclear weapons work in radar-related areas; and
- cyber defense applications based on decades of work in the command and control of nuclear weapons.

Special Mission in Safety and Surety

Sandia’s responsibility for ensuring the safety and security of the stockpile is vital to national security. Nuclear weapons are designed to be safe in all environments. Science-based principles support 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.

Securing weapons against use by adversaries relies on denying access and on internal features to ensure weapons cannot be detonated. Sandia’s fundamental expertise has helped develop formidable physical security systems provided by the military and Department of Energy’s National Nuclear Security Administration to deter adversaries. Sandia applies nuclear weapons design principles to achieve assured security, regardless of changing threats.

