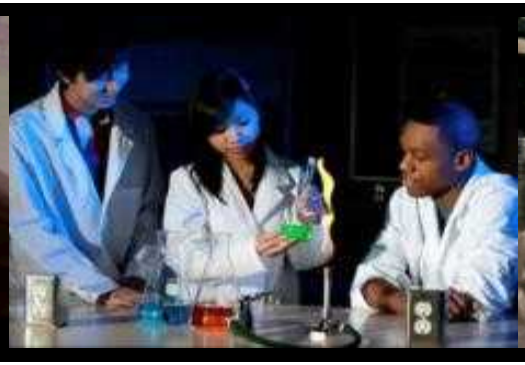
SAND2015-9181PE

Exceptional service in the national interest

Sandia National Laboratories


Sandia National Laboratories

Mission Overview & Non-Proliferation

Jill Hruby, President and Laboratories Director

October 27, 2015

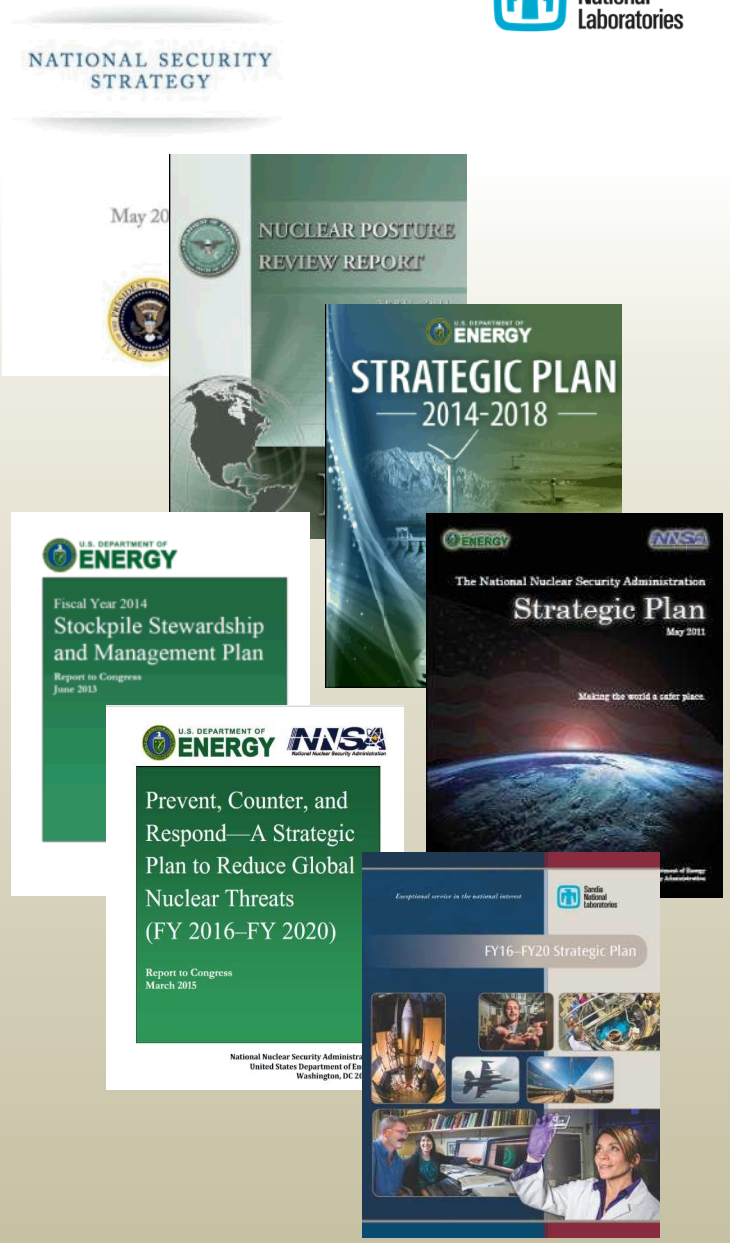
U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

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. SAND2015-2004 PE.

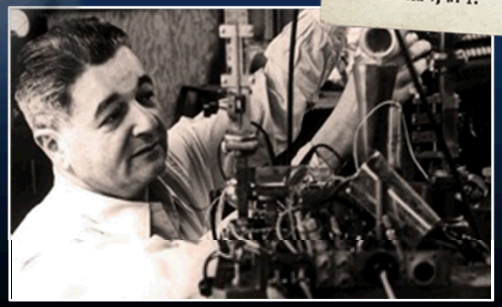
Sandia's mission work supports and furthers U.S. policy

"… as long as nuclear weapons exist, the United States must maintain a safe, secure, and effective nuclear arsenal – to maintain strategic stability with our other major nuclear powers, deter potential adversaries, and reassure our allies and partners of our security commitment to them."

2010 Nuclear Posture Review Report



Sandia's history



- **July 1945:** Los Alamos creates Z Division
- **November 1, 1949:** Sandia Laboratory established
- **Key responsibilities:** Nonnuclear component engineering
- **March 1956:** Sandia's California Laboratory is officially established in Livermore

Sandia's mission work has evolved to meet national security challenges

Sandia National Laboratories

1950s	1960s	1970s	1980s	1990s	2000s	2010s
NW production engineering & manufacturing engineering	Development engineering	Multiprogram laboratory	Missile defense work	Post–Cold War transition	Expanded national security role post 9/11	LEPs Cyber, Biosecurity Proliferation
	Vietnam conflict	Energy crisis	Cold War	Stockpile stewardship		Evolving national security challenges

Sandia's national security mission areas reflect the changing security environment

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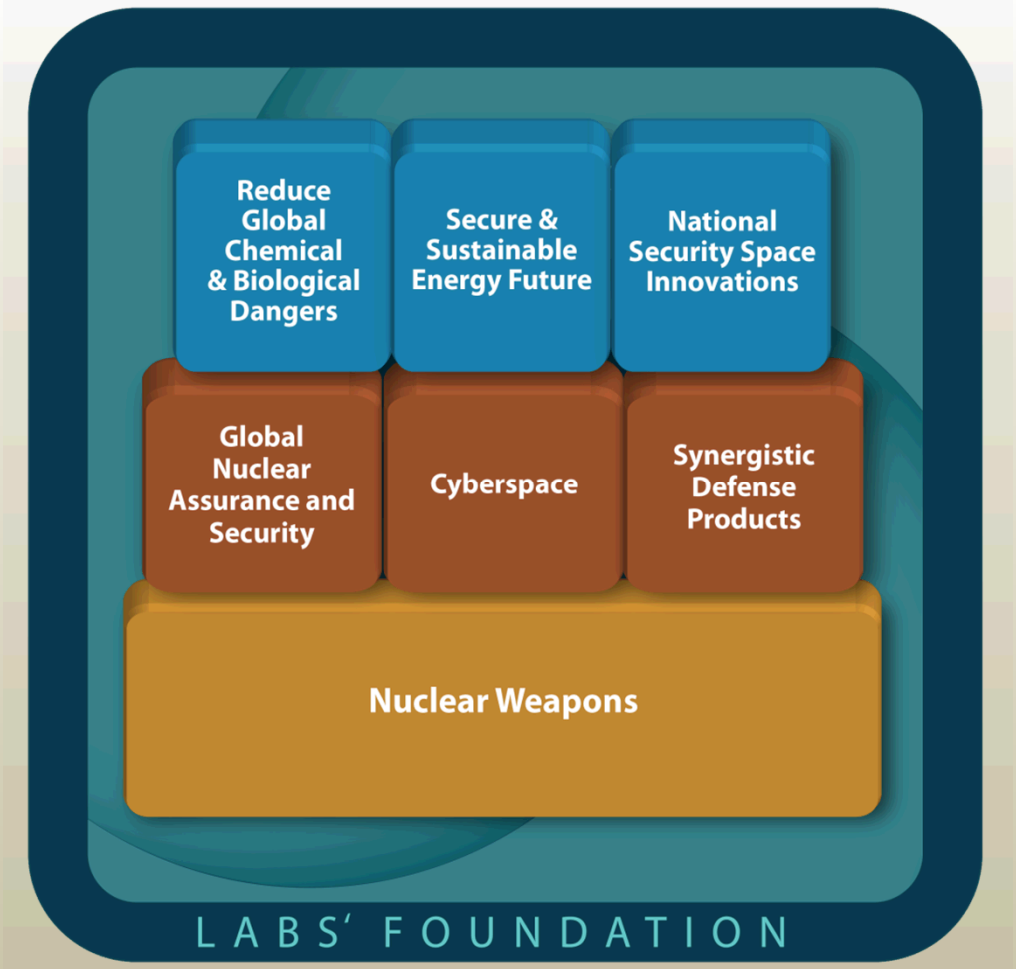

Our mission areas support the major tenets of the Treaty on the Non-Proliferation of Nuclear Weapons

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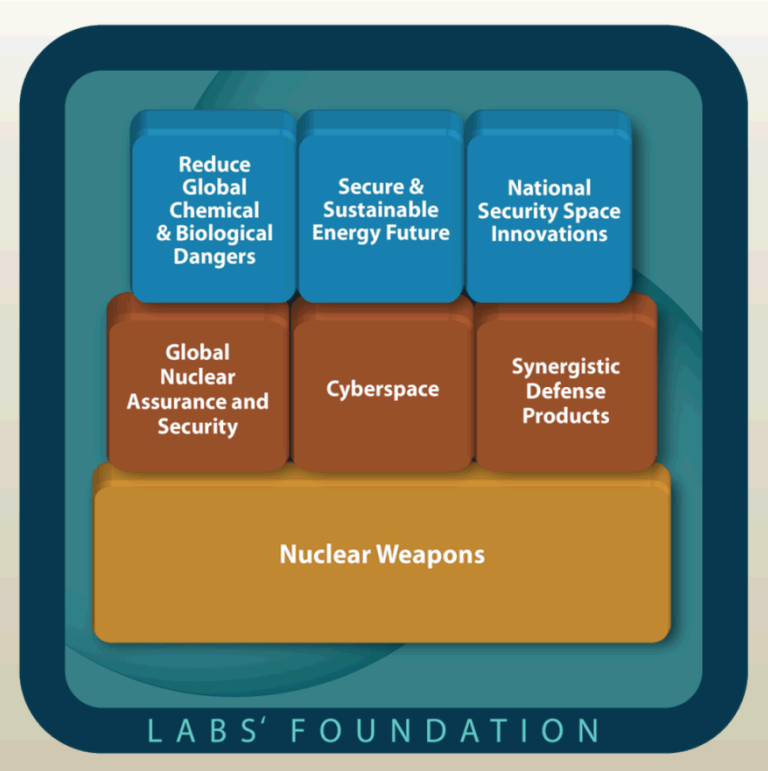
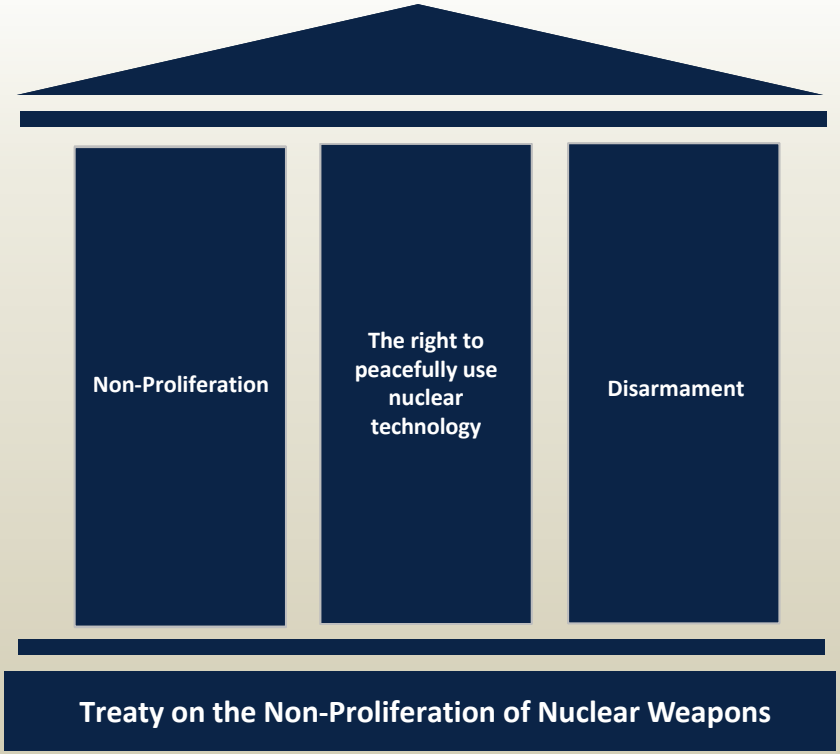
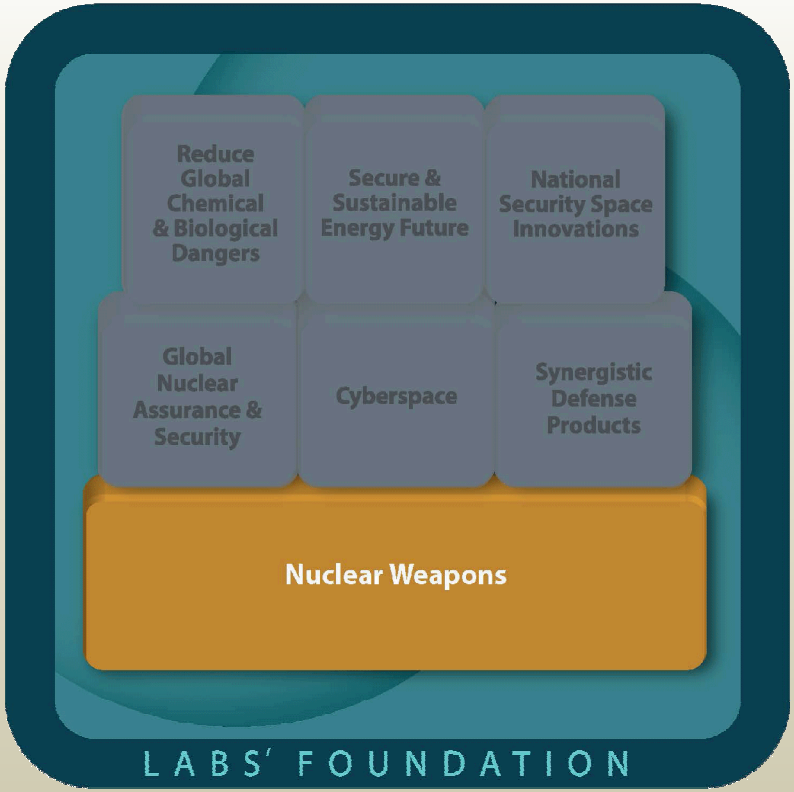




Sandia's nuclear weapons mission

Central to U.S. national security

- Ensure that the nation's nuclear weapons meet the highest standards for safety, security, and reliability.
- Steward the long-term vitality of our capabilities, infrastructure, and operations.



Sandia's current nuclear weapons activities

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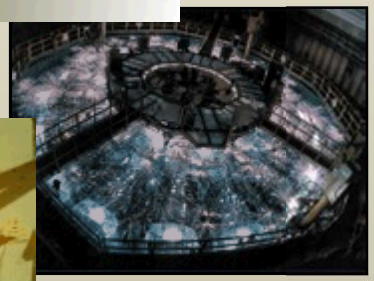
Warhead Systems Engineering and Integration

An extensive suite of multi-disciplinary capabilities are required for Design, Qualification, Production, Surveillance, Experimentation / Computation

Major Environmental Test Facilities and Diagnostics



Z Machine

Light Initiated High Explosive

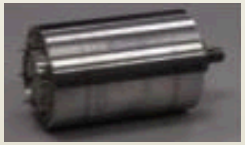
Annular core research reactor

Gas Transfer systems

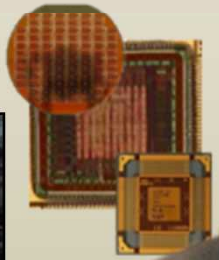
Design Agency for Nonnuclear Components

Arming, fuzing, and firing systems

Safety systems

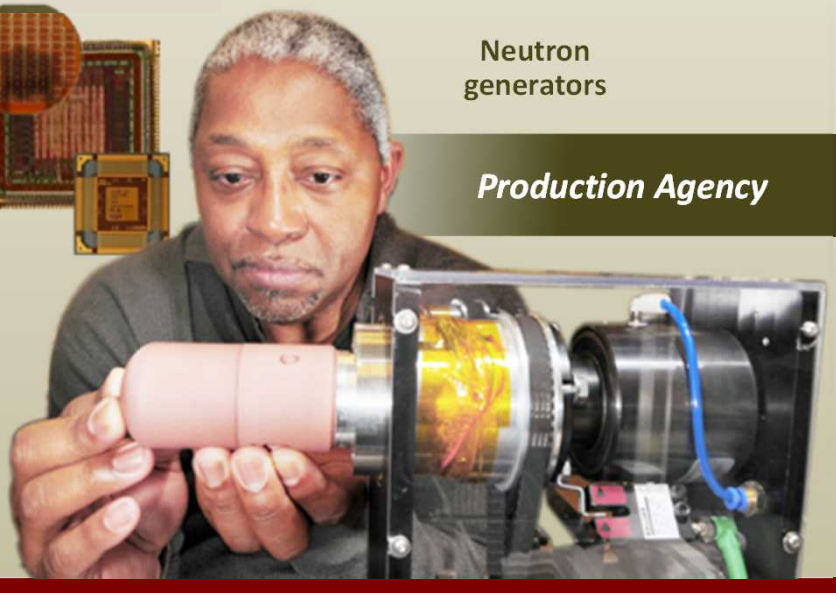


MESA Microelectronics



Neutron generators

Production Agency



Experience in nuclear weapons enables our significant contributions to non-proliferation efforts

Sandia is a leader in nuclear security solutions

Sandia National Laboratories

Our engineering support ensures nuclear weapon safety and security

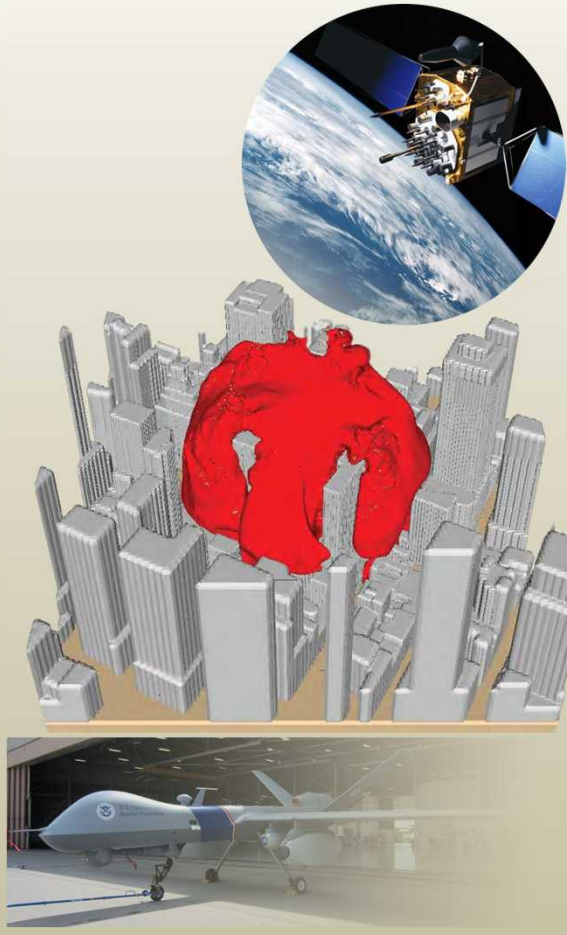
Secure ground transporters

Perimeter detection and alarm systems for fixed sites

Sandia's systems solutions improve the security of radioactive sources

Delivering functional alternatives to isotopic sources

We support national detection and response systems



Systems to observe, detect, and characterize nuclear events

Our nuclear security expertise enables us to help reduce international threats

Sandia National Laboratories

For over 25 years, Sandia has supported securing weapons-grade materials

We also support securing civilian source material around the world

Former Soviet Union—Improved security at 110 Russian NW and material sites

Kazakhstan—Secured enough material for 775 weapons

South Africa—Physical security for quarter-ton of HEU

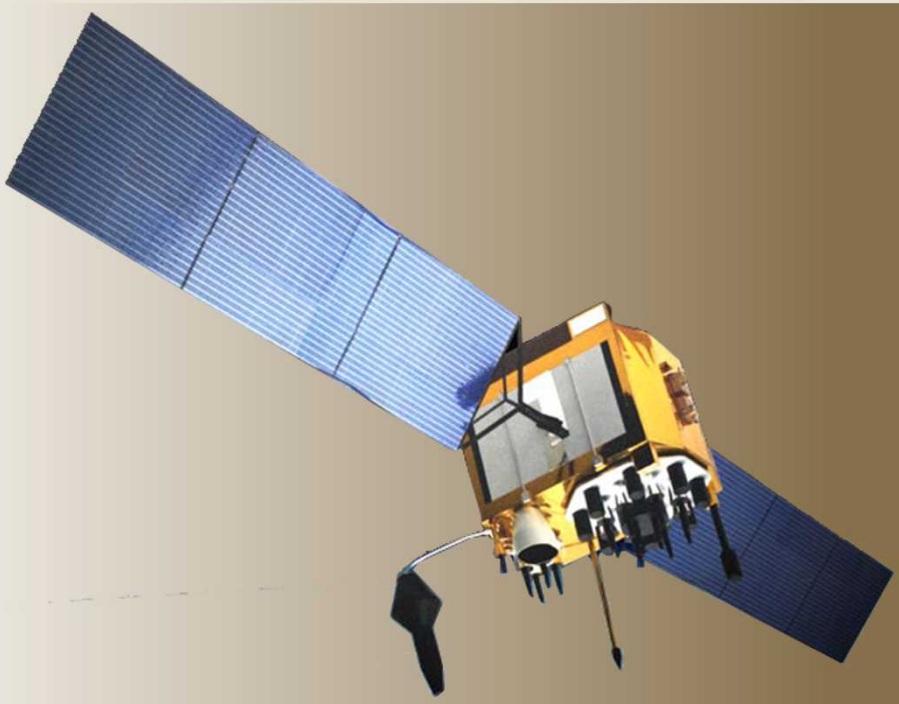
The Egyptian Atomic Energy Authority chairman signed an MOU with Sandia in 2014

Physical protection basics training by Sandia in Peru

Rad waste storage facility in South America

Sandia develops and maintains tools for arms control treaties with monitoring provisions

Partial Test Ban Treaty
Intermediate Nuclear Forces Treaty
START
New START



Sandia supports technology development of monitoring approaches to enable potential treaties

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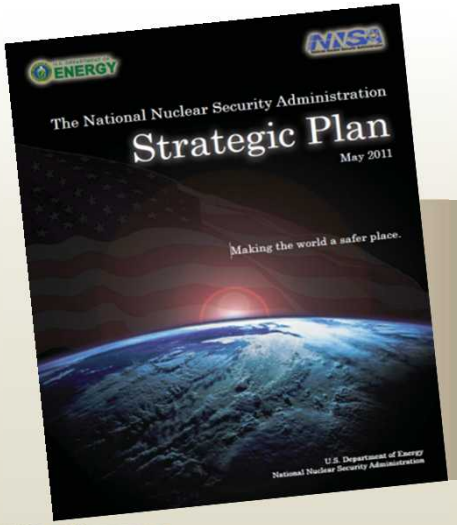
Warhead monitoring

- Isotopic ID
- Chain of custody

Integrity of containers

- Tags
- Seals



"…develop warhead monitoring and chain-of-custody capabilities for end-to-end field demonstrations in support of new arms control commitments."

Sandia's technical support for the CTBT continues to mature and expand

Sandia National Laboratories

Support of data center computing infrastructure

New seismic monitoring approaches

International exercises

Operations Centre

FACT site

Onsite Inspection: Integrated Field Exercise 2014

We have a growing portfolio of projects dedicated to the responsible expansion of nuclear power

Sandia National Laboratories

Systems engineering, education, and training in nuclear power safeguards and security

- Physical and cyber
- Regulatory framework
- Response requirements
- Waste disposition

Physical protection systems

China Center of Excellence

Gulf Nuclear Energy Infrastructure Institute (GNEII)

We promote safe use of nuclear power and respond to nuclear incidents internationally

Sandia National Laboratories

Sandia's reactor safety technologies contribute to the safety of the nation's nuclear fleet and support emergency response to accidents.

Sandia develops large-scale containment failure tests and uses modeling and analysis of severe accidents

Sandia responded to the Fukushima reactor meltdown accidents

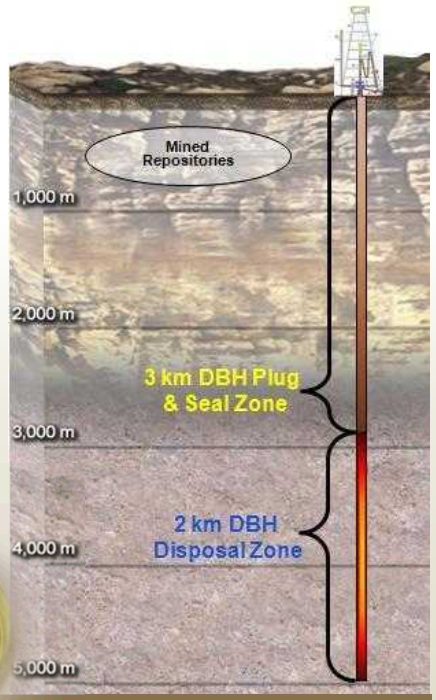
We work to reduce global nuclear dangers through research

Improving radiation detection
- Advanced materials
- Signal processing
- Standoff detection
- Precision location

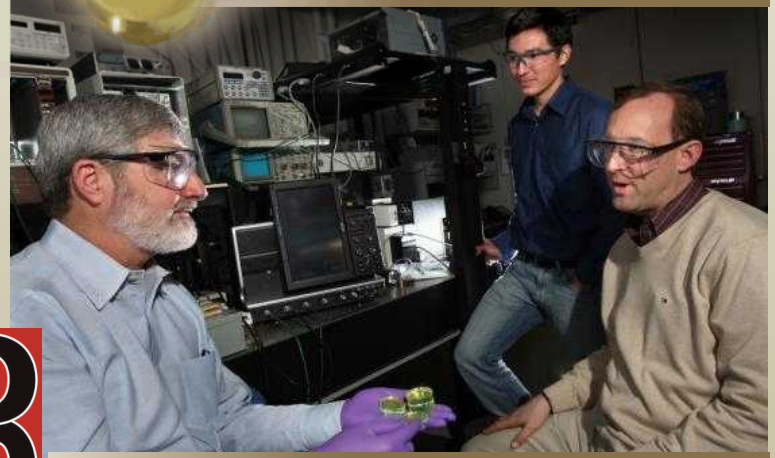
Nuclear waste repository science

Lower cost and more effective perimeter security

Consequence management for public safety



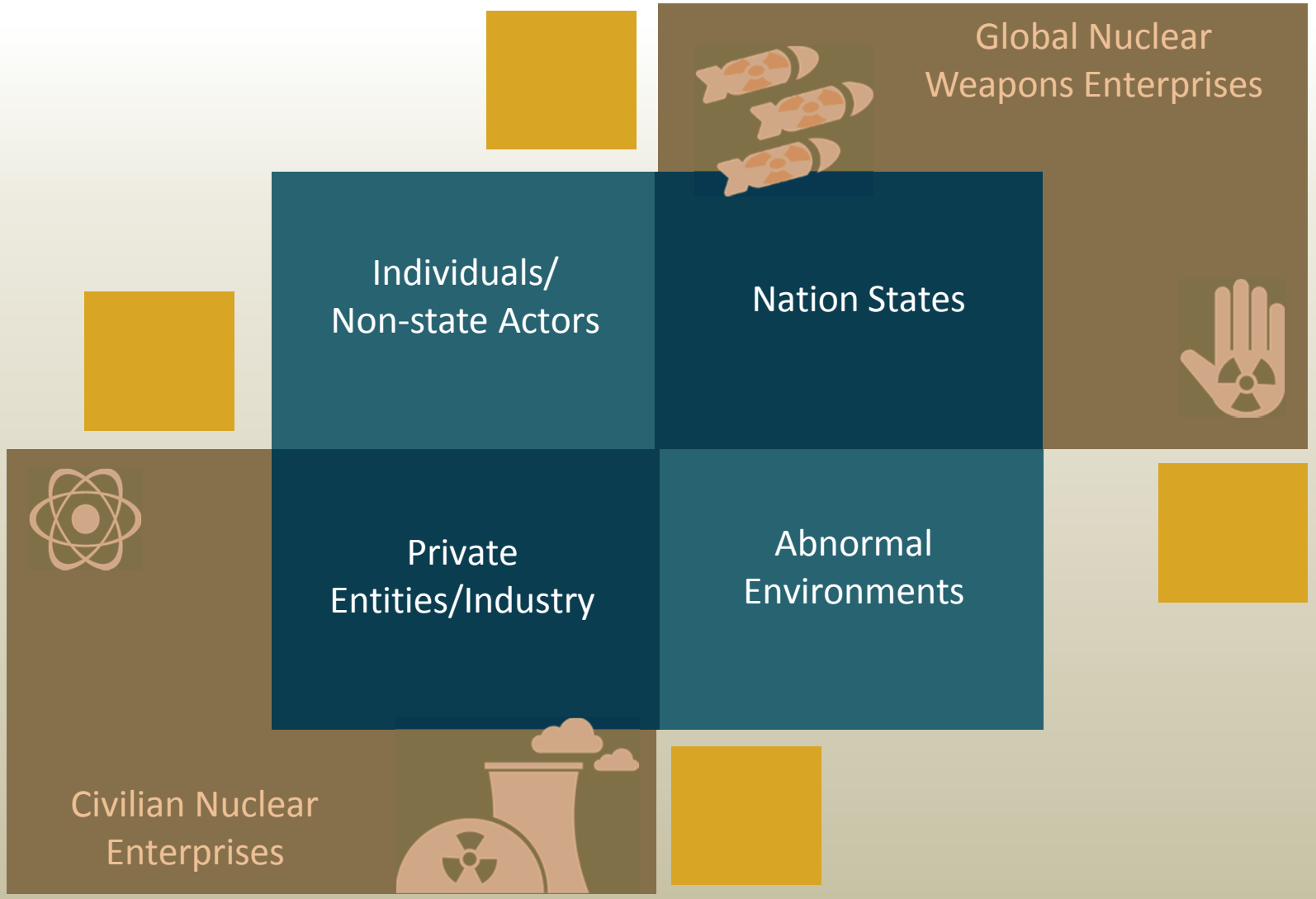
Deep borehole disposal



Triplet-harvesting plastic scintillators

2014 R&D 100

We view nuclear dangers holistically



In addition to our nuclear programs, we have made key contributions to energy and climate

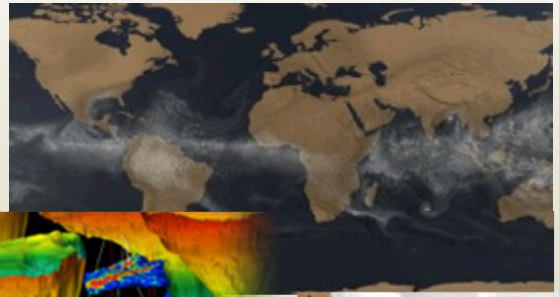
Sandia National Laboratories

Energy Research

American Recovery and Reinvestment Act Project Portfolio Management, Basic Energy Sciences, Advanced Scientific Computing Research, Center for Integrated Nanotechnology

Climate & Environment

Measurement & Modeling, Carbon Management, Water & Environment, and Biofuels

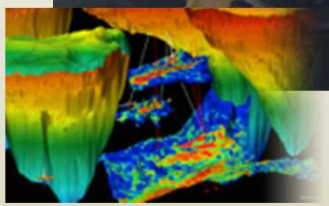


Nuclear Energy & Fuel Cycle

Commercial Nuclear Power & Fuel, Nuclear Energy Safety & Security, DOE Managed Nuclear Waste Disposal

Renewable Systems & Energy Infrastructure

Renewable Energy, Energy Efficiency, Grid and Storage Systems



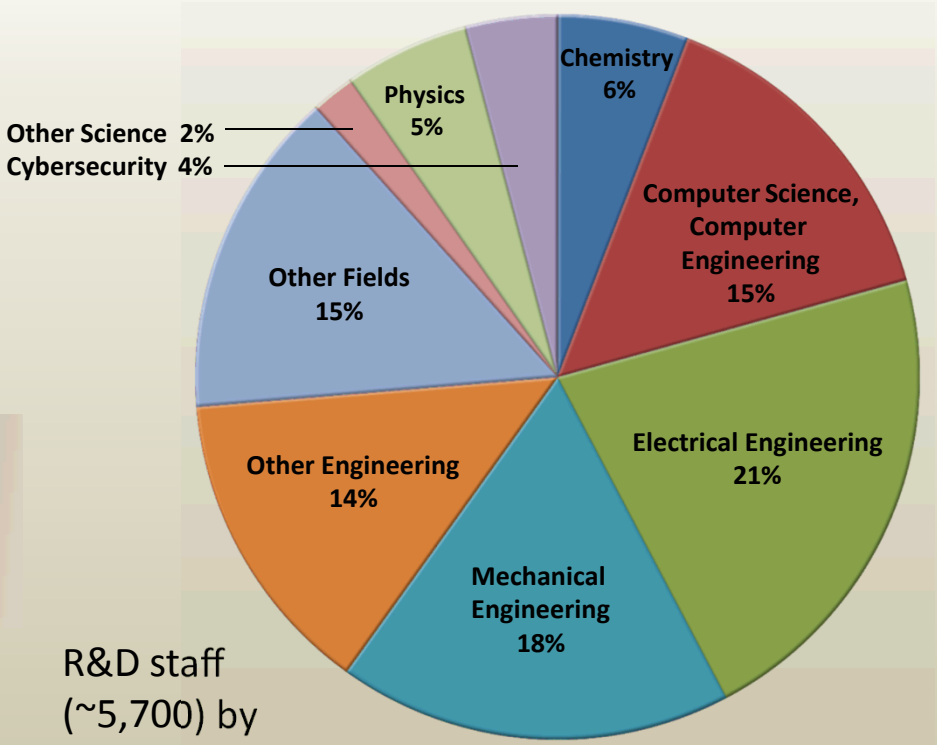
Transportation Energy & Systems

Vehicle Technologies, Biomass, Fuel Cells & Hydrogen Technology

Sandia's people: Our most important asset

- Strategically managed, highly educated workforce of diverse skills and competencies
- Modern business practices and operations in support of our missions

- **On-site workforce: 12,600**
- **Regular employees: 10,300**
- **Advanced degrees: 5,790**

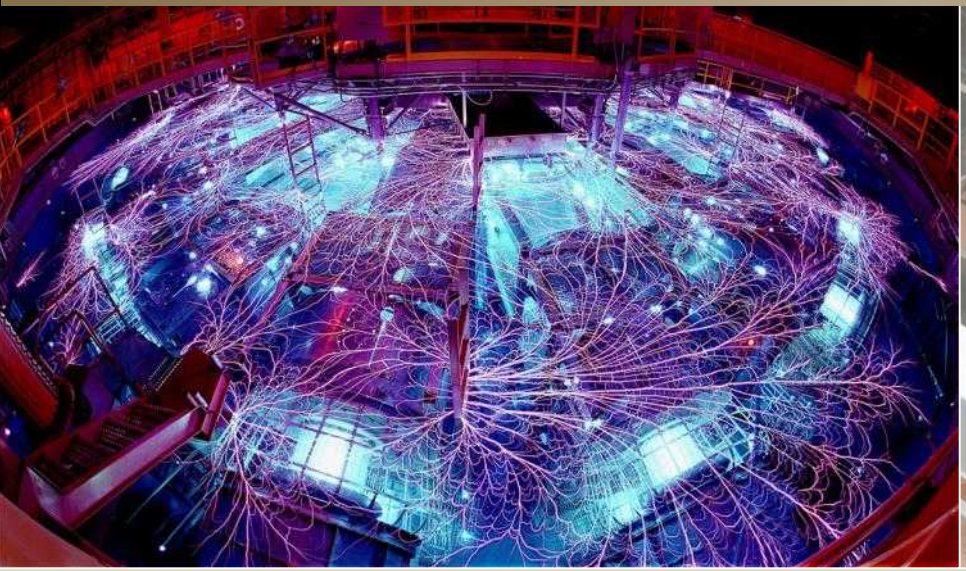


R&D staff (~5,700) by discipline

Nuclear weapons facilities you will visit today

Sandia National Laboratories

The Z Machine



Thermal Test Complex (TTC)

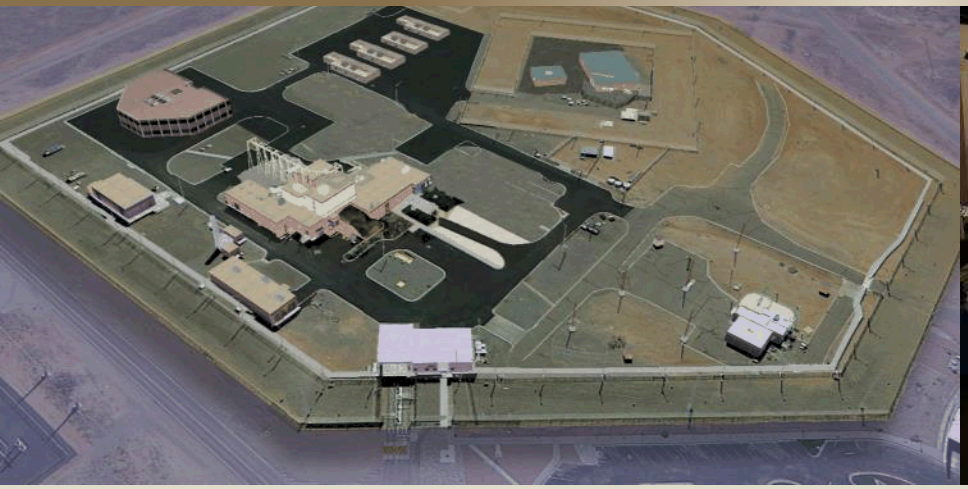
Z is crucial to ensuring the reliability and safety of our nuclear stockpile as it ages. It allows studying materials under conditions similar to those produced by the detonation of a nuclear weapon. It also produces key data for validating physics models in computer simulations.

At the TTC, component and system performance is demonstrated under many abnormal thermal conditions. This controlled environment is ideal for developing and validating response models. The simulated fire setup allows a “dial-a-fire” approach to thermal testing.

Nonproliferation facilities you will visit today

Sandia National Laboratories

Integrated Security Facility (ISF)



The ISF is the only facility in the world with the highest rigor nuclear security systems for developing next-generation security systems and for training security engineers and technologists.

Training and Technology Demonstration (TTD) Area

Showcased at the TTD Area are technologies applicable to a suite of monitoring applications in nonproliferation, international security, and arms control across the globe. Training is often conducted with international partners. This area is also used for testing certain technologies in an open environment.

We are committed to science-based stewardship

Sandia National Laboratories

- Sandia's core capabilities in engineering and science enable stockpile management without explosive testing.
- Our R&D work contributes to meeting national and international verification requirements.
- As a multimission laboratory, Sandia anticipates and solves the most challenging problems that threaten U.S. and world security in the 21st century.