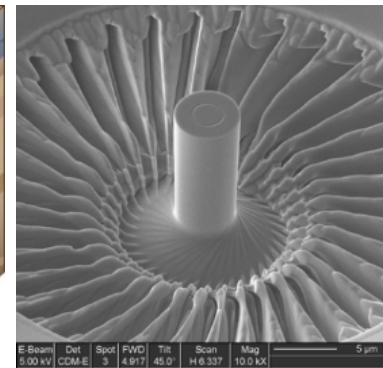
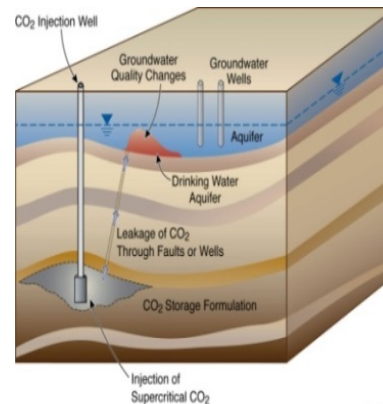
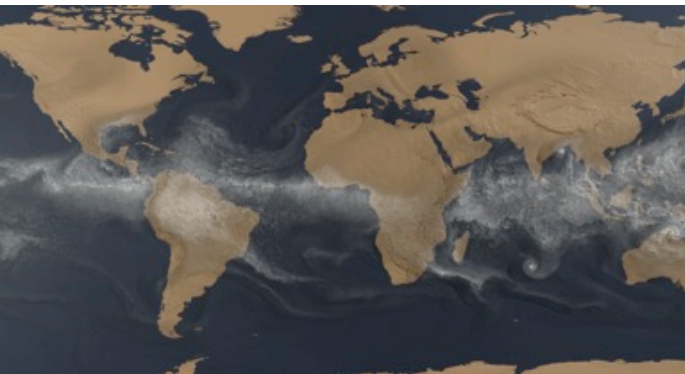


Exceptional service in the national interest



Sandia National Laboratories and Geoscience Research Programs

Lee Moo Yul
April 7, 2015

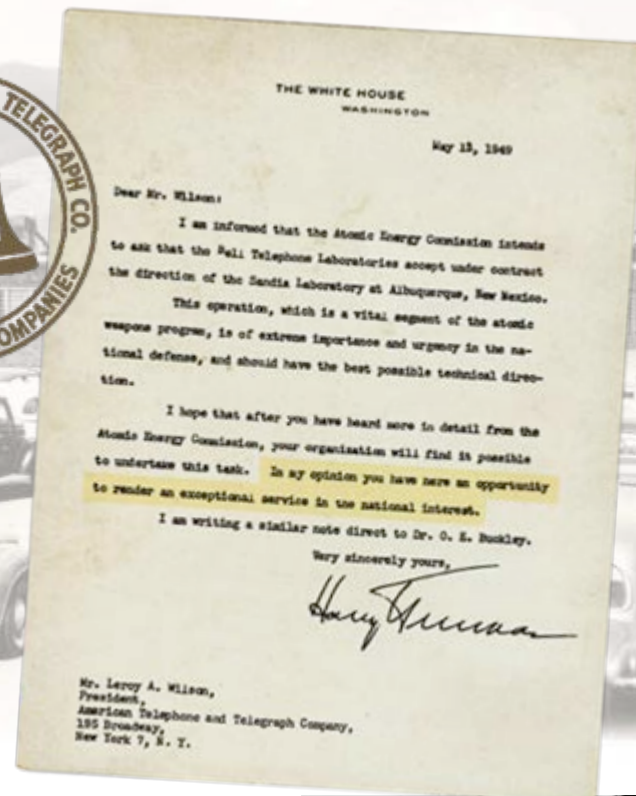
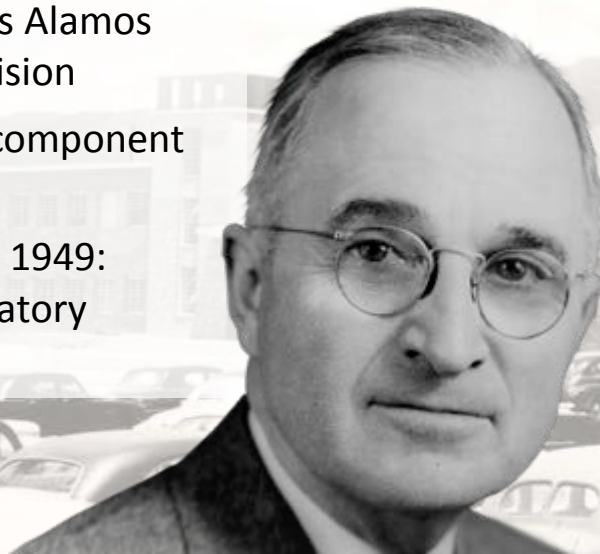


Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND No. SAND2014-17320 PE

Sandia's History

Exceptional service in the national interest

- July 1945: Los Alamos creates Z Division
- Nonnuclear component engineering
- November 1, 1949: Sandia Laboratory established



to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.





Governance of Sandia Laboratories

Sandia Corporation

- AT&T: 1949–1993
- Martin Marietta: 1993–1995
- Lockheed Martin: 1995–present
- Existing contract expires: April 30, 2016, with a one-year contract extension option
- Government owned, Contractor Operated (**GOCO**)

Federally funded
research and development center





Sandia Sites

Albuquerque, New Mexico



Livermore, California



Kauai, Hawaii



*Waste Isolation Pilot Plant,
Carlsbad, New Mexico*



*Pantex Plant,
Amarillo, Texas*



*Tonopah,
Nevada*

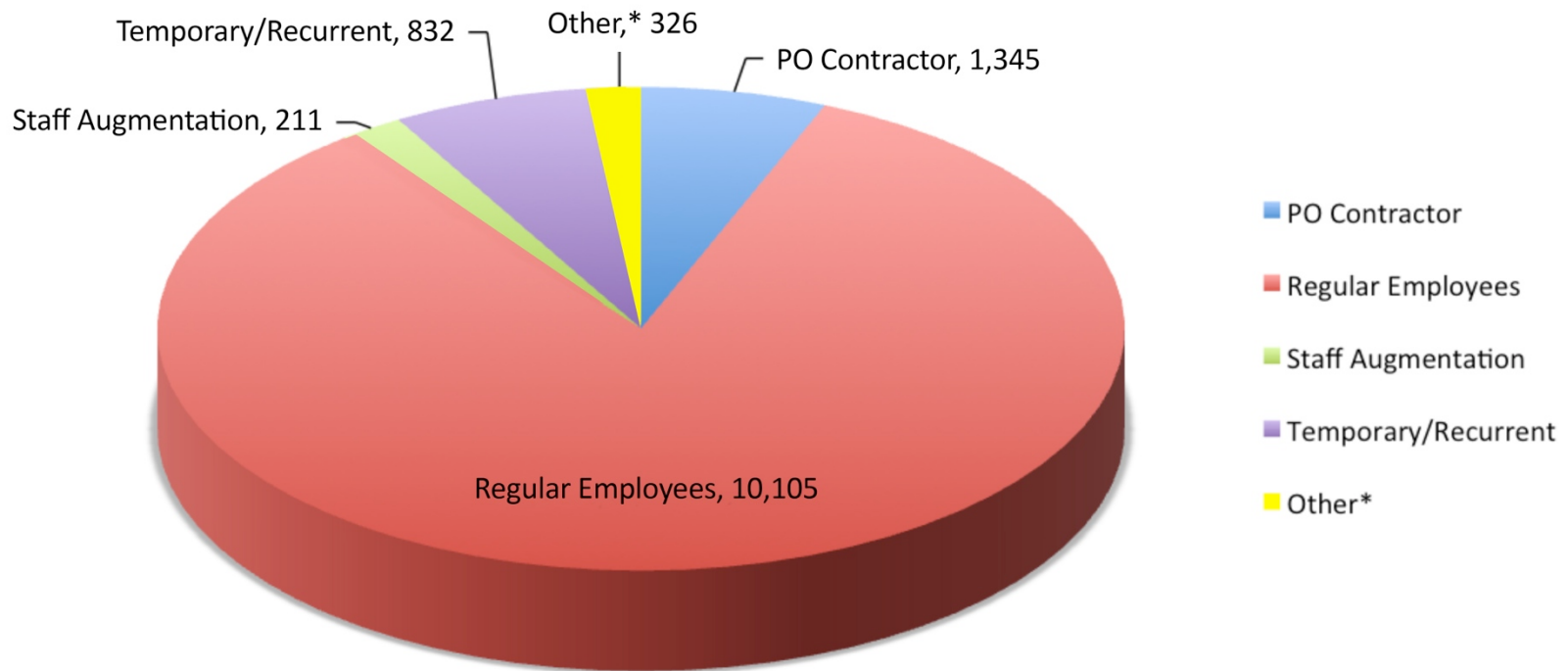




Our Workforce

- Total Sandia workforce: 12,819
- Regular employees: 10,105
- Advanced degrees: 6,054 (59%)

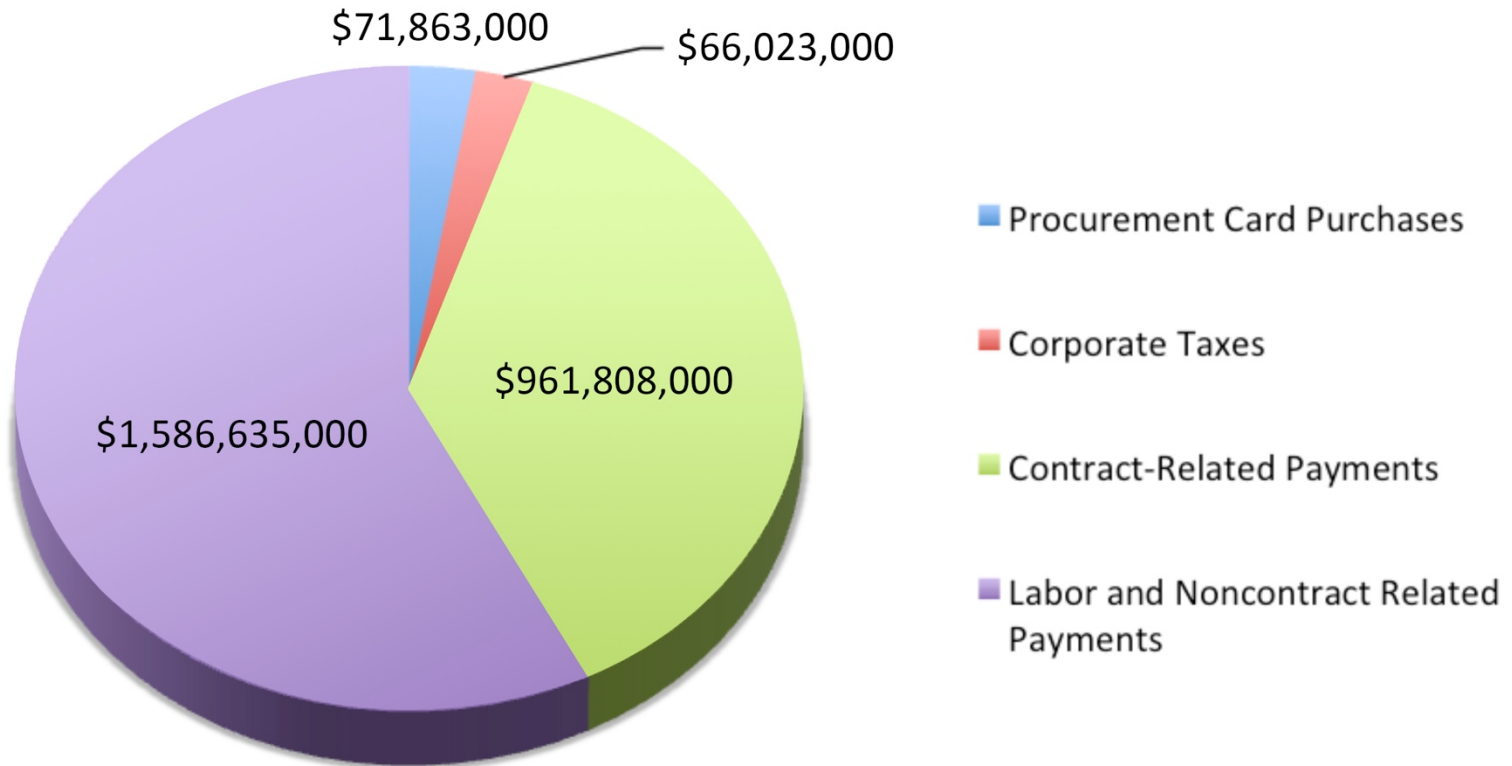
Data as of January 16, 2015



** Other badged personnel*



Sandia's FY 2014 Total Expenditures



Total Laboratory Expenditures

\$2,686,329,000



Sandia Addresses National Security Challenges

1950s

Nuclear weapons

Production and
manufacturing
engineering



1960s

Development
engineering

Vietnam conflict



1970s

Multiprogram
laboratory

Energy crisis



1980s

Missile defense
work

Cold War



1990s

Post-Cold War
transition

Stockpile
stewardship



2000s

START
Post 9/11

National security



2010s

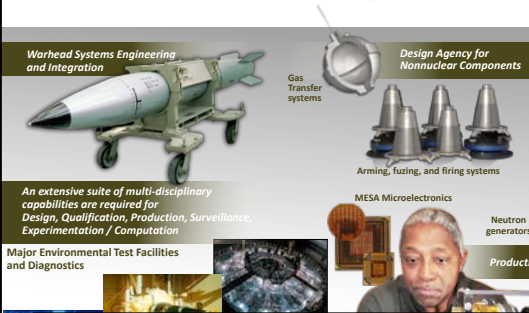
LEPs
Cyber, biosecurity
proliferation

Evolving national
security challenges



Program Management Units

Sandia's Current Nuclear Weapons Activities



Defense Systems & Assessments Program



International, Homeland, & Nuclear Security



Energy & Climate

Energy Research

ARPAe, BES Chem Sciences, ASCR, CINT, Geo Bio Science, BES Material Science

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

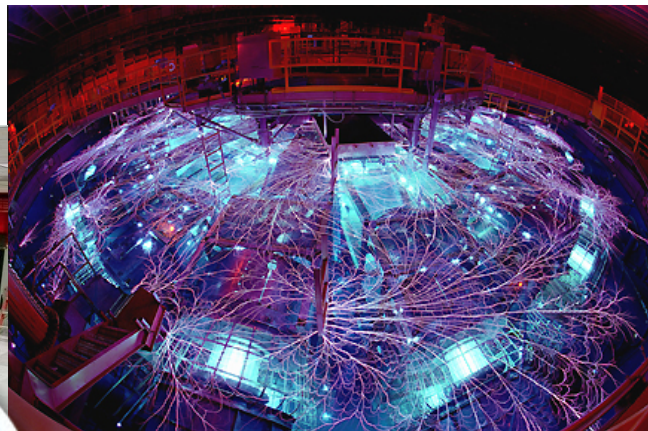




Our Research Framework

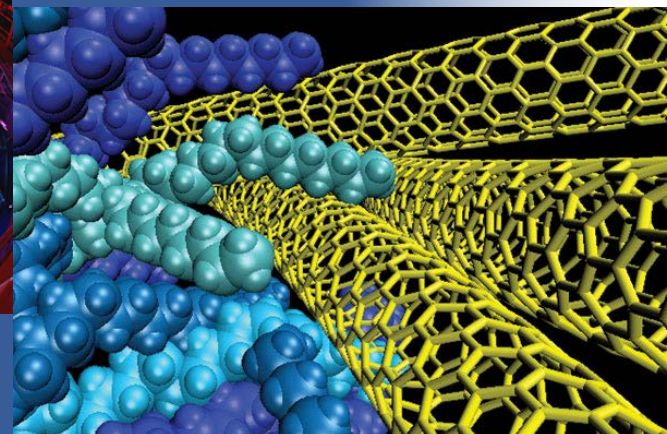
Strong research foundations play a differentiating role in our mission delivery

Computing & Information Sciences

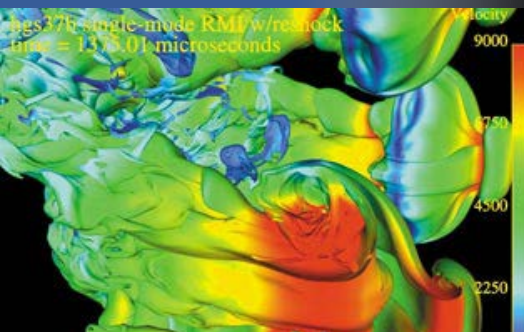


Radiation Effects & High Energy Density Science

Materials Sciences

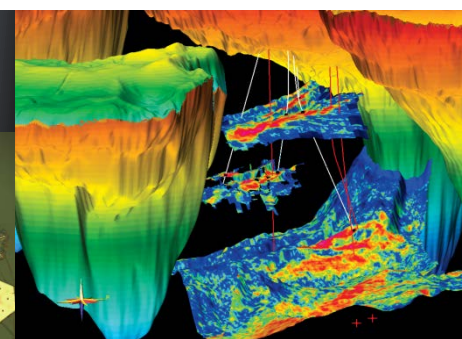
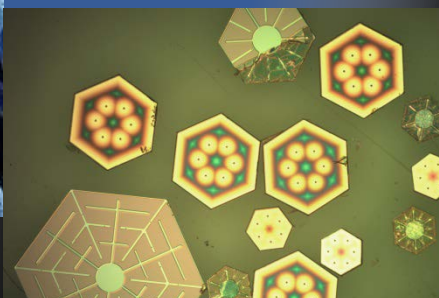


Engineering Sciences



Bioscience

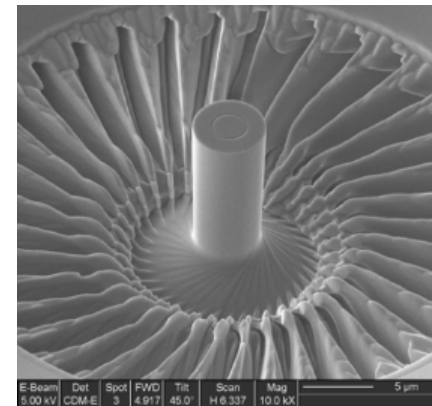
Nanodevices & Microsystems



Geoscience

Geomechanics Testing Capabilities

- Constitutive testing
 - Hydrostatic compression ($< 1 \text{ GPa}$)
 - Uniaxial compression ($< 4.5 \text{ MN}$)
 - Triaxial compression ($< 1 \text{ GPa}$)
 - Uniaxial strain
 - Creep testing ($> 10^{-10}/\text{s}$)
 - SHPB ($< 10^3/\text{s}$)
- Phenomena simulation
 - Compaction band
 - Slurry injection
 - PZT phase transformation (-65 to 150°C)
 - HV breakdown ($< 10 \text{ KV}$)
- Material parameter measurement
 - Density, Porosity, Permeability
 - E and ν or (G and K)
 - Thermal expansion, thermal conductivity
 - V_p , V_s , and AE source location
- Micro-Nano Scale testing
 - FIB/SEM
- Large scale field testing
 - WIPP, YMP



Multiscale Geomechanics Testing



Drift scale test

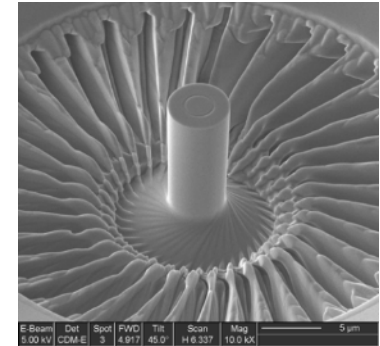
5.5 m

Nano to Micro Scale Testing

DOE Funded Geoscience Research Programs and Partners

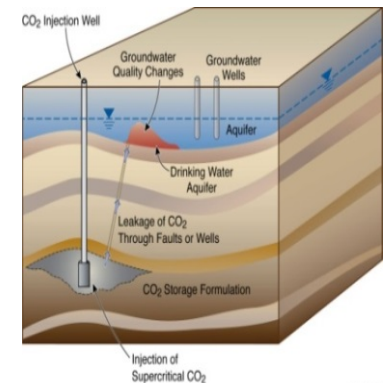
- Basic Energy Science (BES)

- Geochemistry
 - Shale Poromechanics



- Center for Frontiers of Subsurface Energy Security (CFSES)

- CO₂ Sequestration



- Subsurface Technology, Engineering Research (SubTER)

- Intelligent Wellbore Systems
 - Subsurface Stress & Induced seismicity
 - Permeability manipulation
 - New Subsurface Signals

