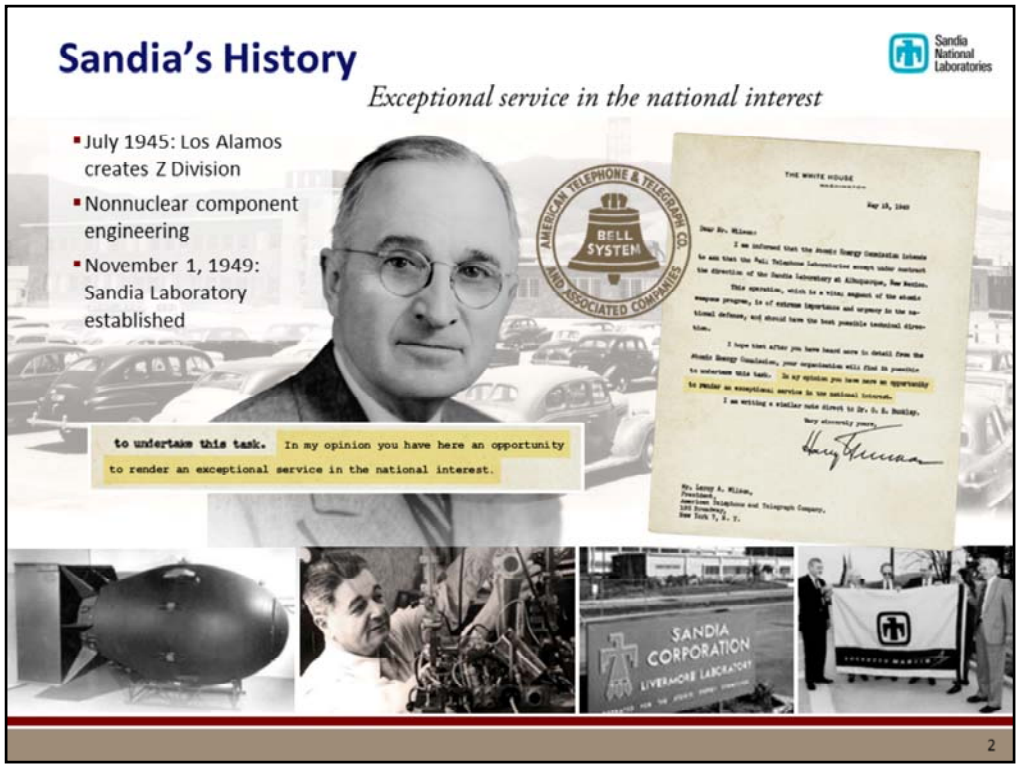
Good Morning! I'm Mike Duvall, the Deputy Manager of the Sandia Field Office. The Sandia Field Office is located on Kirtland Air Force Base and is comprised of approximately 80 National Nuclear Security Administration employees. The Sandia Field Office provides federal oversight and direction for the Sandia National Laboratories Management and Operating Contract.

This morning I will provide you a high level overview of the scope of work at Sandia National Laboratories. This briefing serves to provide the context for the additional information you will receive during your tour this afternoon.



Sandia's roots can be traced to the Manhattan Project and Los Alamos.

In July 1945, J. Robert Oppenheimer established "Z Division" at Sandia Base to perform stockpile development activities and non-nuclear component engineering.

In 1949, at the urging of the Atomic Energy Commission, President Truman encouraged the American Telephone and Telegraph Company, AT&T, to accept management and operating responsibility for the Sandia operation. In his letter to AT&T President Leroy Wilson, Truman (pictured) captured the ethos of Sandia that has remained relevant to this day: "In my opinion, you have here an opportunity to render an exceptional service in the national interest."

AT&T Bell Laboratories operated Sandia from November 1949 through 1992.

Sandia established a laboratory facility in Livermore, California, in 1956 to the support the nuclear weapon development activities of the University of California Radiation Laboratory—now Lawrence Livermore National Laboratory.

In 1993 Martin Marietta Corporation became the management and operating contractor for Sandia National Laboratories. (Martin Marietta later merged with Lockheed to form Lockheed Martin Corporation.)

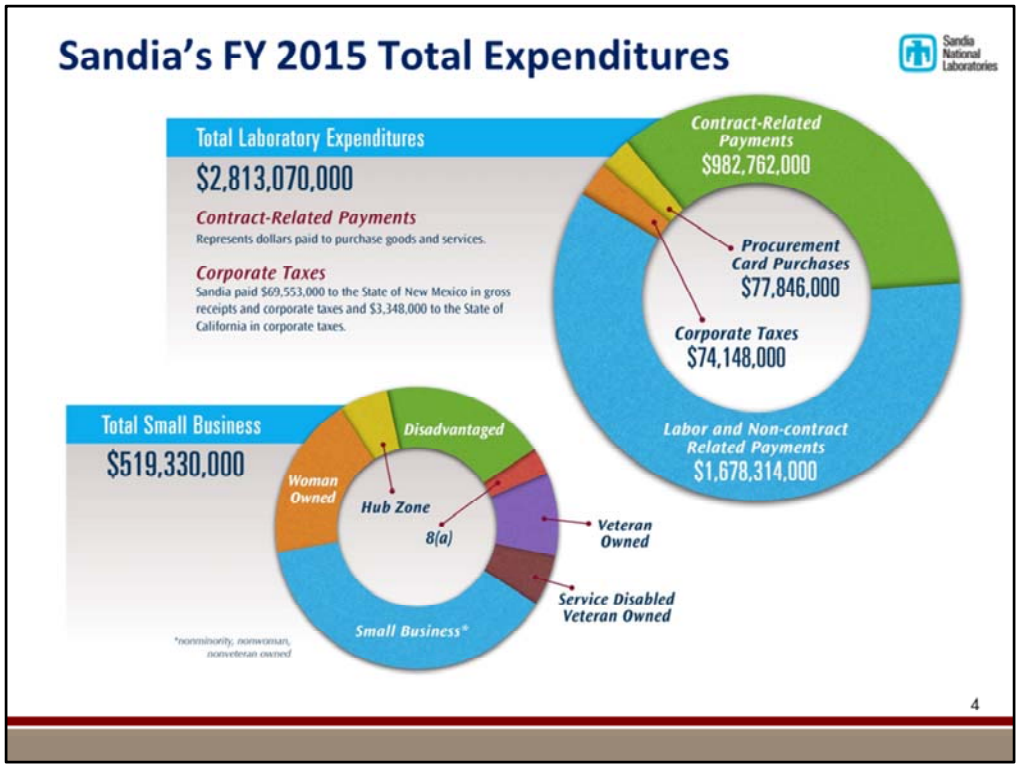
Lockheed Martin operates Sandia National Laboratories today and manages the Sandia Corporation.

As previously described, you can see the lineage of the laboratory on this slide. The Department of Energy and Sandia Corporation executed a formal agreement to extend the management contract of Sandia National Laboratories, through April 30, 2017. In addition, the Department determined to re-compete the contract, hence your presence here today.

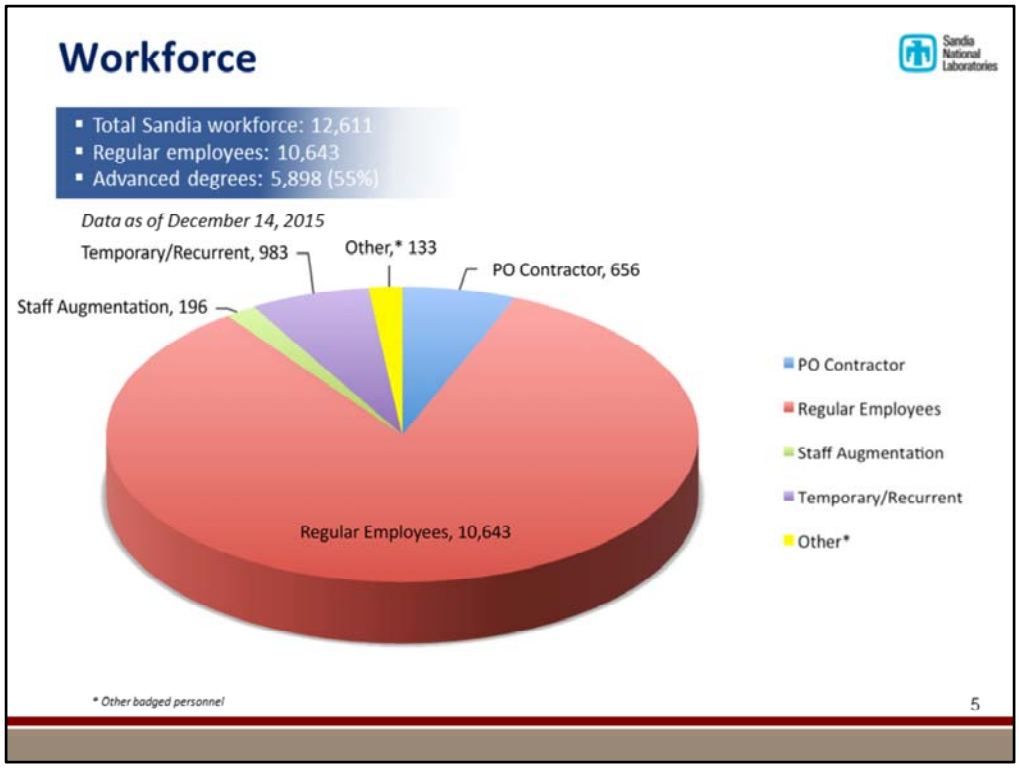
It is important to understand the government owned, contractor operated model used at Sandia. Industrial, academic, and nonprofit organizations have historically managed the U.S. Department of Energy national laboratories and other major government owned/contractor operated (GOCO) facilities. A GOCO partnership allows each partner to perform duties for which it is uniquely suited: the government establishes mission areas, and the private sector implements the missions, using best business practices. Sixteen of the 17 DOE labs are GOCO institutions.

Sandia is a Federally Funded Research and Development Centers.

FFRDCs are public-private partnerships which conduct research for the United States Government. Sandia is sponsored by the Department of Energy.



- The following data is from the Sandia National Laboratories 2015 Economic Impact brochure.
- Of the over $2.8 billion dollars in expenditures, the National Nuclear Security Administration Weapons Program accounts for over half at approximately $1.6 billion dollars.
- Approximately $1 billion dollars is related to non-Department of Energy Strategic Partnership Projects, formerly an area known as Work For Others. Subsequent slides will highlight key Sandia partners in this area of work.
- As you can see by the pie chart in the lower left corner, Sandia is actively involved in working with small businesses.



- The Sandia workforce is comprised of over 12,000 employees of which approximately 10,000 are full time, regular employees.
- The laboratory workforce is highly educated, with over 1800 employees holding doctorate degrees.
- Sandia employees have varied levels of experience. Ten percent of the work force has worked full or part time at Sandia National Laboratories for over 30 years. Conversely, approximately 50 percent of the employees have worked at Sandia for less than 10 years.

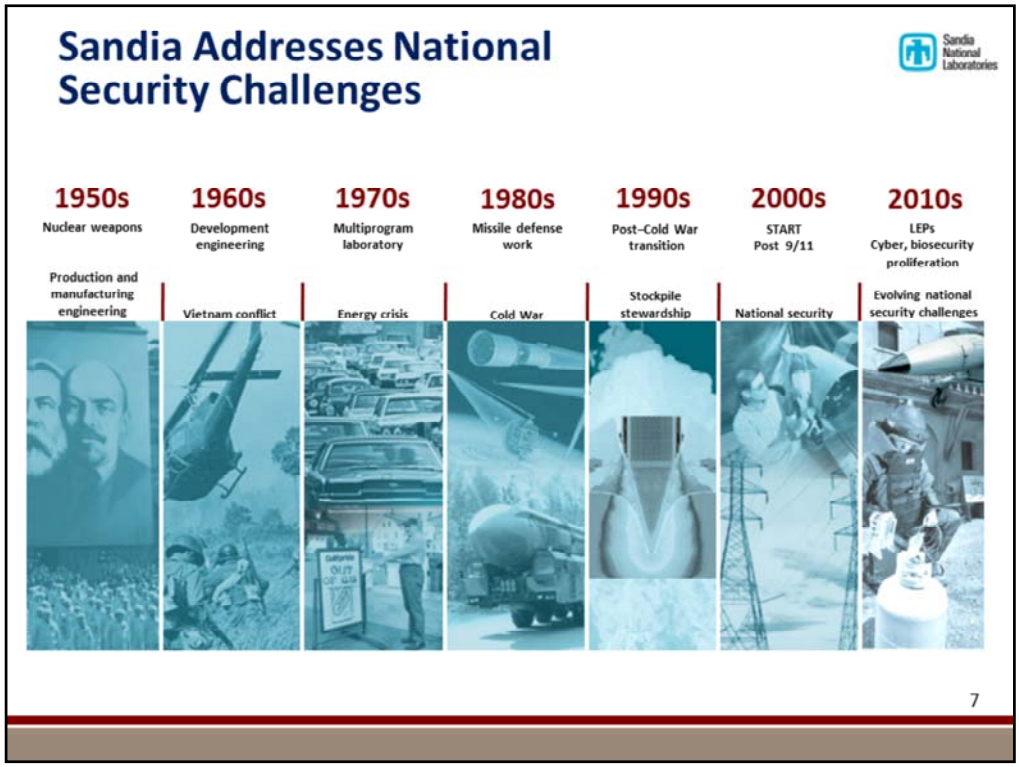
Sandia's principal sites are in Albuquerque, New Mexico (on Kirtland Air Force Base), and in Livermore, California, which consists of approximately 1000 of the 10,000 full time Sandia employees. In addition, Sandia National Laboratories has operations in the four locations across the bottom of the slide.

The Kauai Test Facility rocket launch range operated in Hawaii for the Department of Energy.

Sandia supports the Waste Isolation Pilot Plant by providing scientific and technical advice to the DOE. The WIPP Site is 26 miles east of Carlsbad, NM. For more than 19 years, Sandia has maintained offices and resident staff in Carlsbad consisting of 33 Sandians and 18-sub-contractor associates who occupy leased facilities situated directly across from DOE's Carlsbad Field Office.

At the Pantex Plant, Sandia operates the Weapons Evaluation Test Laboratory known as WETL. This is a $22 million state-of-the-art facility that houses more than $90 million worth of testing equipment to conduct systems-level, non-nuclear tests on nuclear weapons and components.

Sandia provides research and development test support for the Department of Energy's weapon programs at the Tonopah Test Range in Nevada. The range also offers a unique test environment for use by other government agencies and their contractors.



This slide depicts the evolution of mission areas at Sandia National Laboratories through the last 7 decades based on U.S. national security interests and world events.

Rooted in nuclear weapons and the Cold War, the scope of lab work grew in non-nuclear weapons work during the 1970s energy crisis and the post-cold war era of the 2000s.

Current work has expanded to include Life Extension Programs for nuclear weapons, cybersecurity, biosecurity and nuclear non-proliferation.

- The Laboratories Framework, describes the primary Sandia missions.
- The framework includes 7 integrated missions, including the NW core mission in a three-tiered strategy (as shown).
- All mission areas are supported by a robust foundation, enabling Sandia to function successfully as a broad-spectrum national security laboratory. The Laboratories Foundation consists of the vital resources (people, research, facilities and tools) that enable mission delivery.
- The NW mission represents the base of the framework. Sandia's NW mission is to maintain a safe, secure stockpile and an effective nuclear deterrent now and in the future.
- The three areas in the second row share a strong interplay, synergy, and product space with NW, and they are essential to sustaining Sandia's ability to fulfill its NW mission. Combined with the NW mission area, they represent the future core of Sandia's work as a national security laboratory.
- The three areas in the top row are critical to the national security mission and enhance Sandia's capabilities to solve broader national security challenges.

Sandia's nuclear weapons mission is to ensure the nation's stockpile is safe, secure and effective; that it meets military requirements and is logistically sustainable; and that it *always* works when needed and authorized, and *never* works when not authorized.

Sandia's nuclear weapons mission is the driver for more than 50 percent of the laboratories' overall $2.8 billion annual budget. The foundation of Sandia's work is science-based engineering, in which fundamental science, computer models and unique experimental facilities come together to enable researchers to understand, predict and verify weapon systems performance. 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. These types of challenges require systems engineering underpinned by deep science along with demonstrated product delivery.

Programmatically, it is helpful to think of Sandia's nuclear weapons mission in the context of three, balanced imperatives -- a triangle with three distinct, but connected, legs *(as pictured):*

- maintain the U.S. stockpile through surveillance and the exchange of weapon components that have limited life;
- sustain the stockpile into the future through life extension programs and alternations; and
- maintain and advance Sandia's required engineering and science capabilities, operations and infrastructure to ensure the vitality of Sandia's nuclear weapons mission .

Sandia is responsible for all non-nuclear components of the nuclear explosive package, i.e. "weaponizing" the U.S. nuclear deterrent. Currently, Sandia leads three nuclear weapons stockpile modernization programs that are in full scale engineering development: the B61 Life Extension Program (LEP), the W88 Alt 370, and the Mk21 Fuze Replacement.

On today's tour you will see many of the facilities used for Engineering, Design, Production and Testing of Nuclear Weapons components.

The Defense Systems & Assessments program provides enabling systems, science, technology, and expertise in support of national security objectives. The program supports the military, assessment, and nonproliferation communities by applying the Labs' engineering, science, and technology capabilities to develop innovative systems solutions for the toughest national security challenges. Defense Systems & Assessments works in the following areas:

Information operations: Ensuring security of critical military, government, and commercial networks using trusted systems to detect anomalies and intrusions.

Integrated military systems: supports the nation's needs for reentry, aerospace precision guidance, target acquisition and defeat technologies, directed energy, and military systems and technologies.

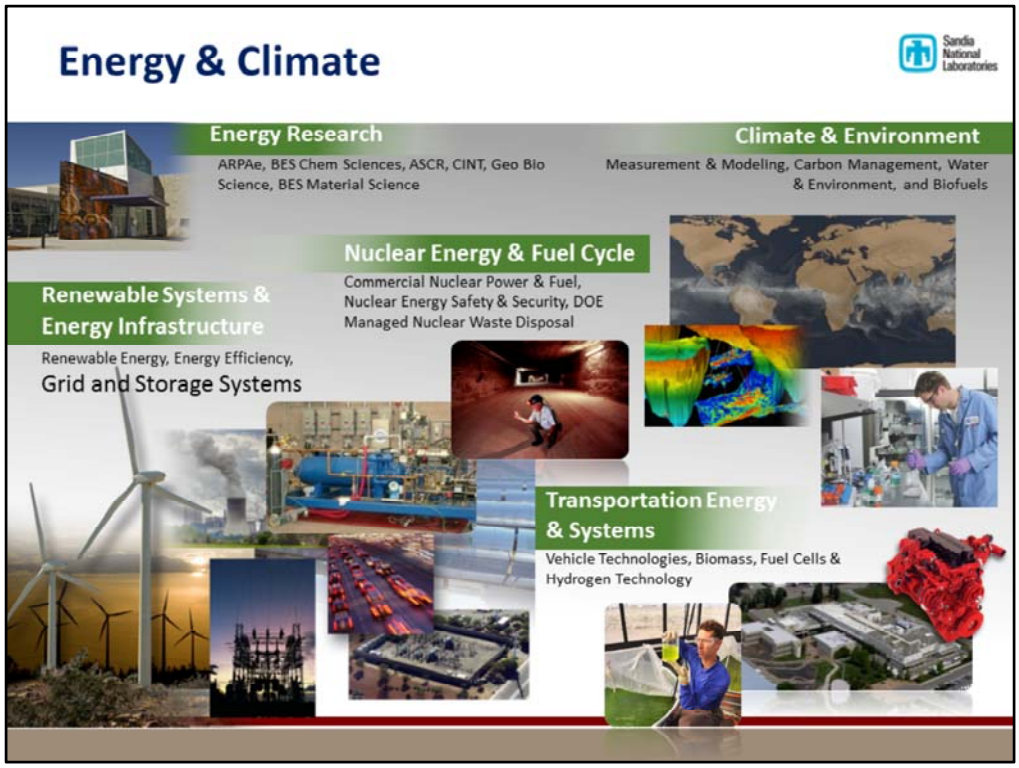
Proliferation assessment contributes to our customers' assessments of threats to our nation's security from weapons of mass destruction worldwide.

Remote sensing & verification Deterring proliferation and verifying compliance with international agreements using space-borne and ground-based sensing technology.

Space missions Cultivating space technologies that meet critical future national security needs.

Surveillance & reconnaissance Advancing U.S. capabilities in radar and other remote sensing technologies for the battlefield.

Science & technology products Providing differentiating research, innovation, and products, including microsystems and electronics technologies that provide the war fighter with new capabilities.



In the area of Energy & Climate, the Sandia mission focus is on a secure and sustainable energy future. The prosperity of the United States is tightly coupled with the security and sustainability of its energy infrastructure and supply. Shifting geopolitical dynamics create a broad spectrum of challenges that could threaten the U.S. energy future. Immediate and long-term threats affecting energy stability (e.g. depletion of fossil fuels, compounded by carbon emission concerns) add layers of complexity to ensuring a secure and sustainable energy future.

Through a diverse research, development, and demonstration portfolio, Sandia has developed an expansive experience base and a suite of capabilities that address energy sustainability. Sponsored program-level efforts have resulted in significant progress in (1) renewable and fossil energy, including concentrating solar and photovoltaics, wind, hydrokinetics, geothermal, biomass, and natural gas drilling; (2) electric grid integration and resiliency and the integration of stored renewable energy; (3) safety and security of nuclear power systems and nuclear waste management; (4) cleaner and more efficient vehicle technologies; and (5) energy efficiency in solid-state lighting and innovative semiconductors.

The goal of the work in International, Homeland and Nuclear Security, the goal is to Stay Ahead of Threat to the United States. This is supported by five main program areas:

Global Security. Sponsors: DOE/NNSA, Dept. of State, DOD/Defense Threat Reduction Agency (DTRA). Mission: Global technical engagement to prevent the misuse of nuclear, chemical, biological and radiological materials.

WMD Counterterrorism and Response. Sponsors: DOE/NNSA, DOD, FAA, FBI. Mission: Technology development, crisis response, consequence management, and training for our government agency partners.

Homeland Security Programs. Sponsors: DHS, Dept. of Health & Human Services, DOD. Mission: Research, analysis, and engineered solutions for keeping our homeland safe.

Homeland Defense & Force Protection. Sponsors: DOD (Air Force, Navy, Army, DTRA) and DOE. Mission: Technologies and systems for countering emerging threats and protecting US nuclear weapons and materials in all places at all times.

Cyber and Infrastructure Security. Sponsors: DHS. Mission: Advanced analyses and tools for securing the infrastructures that we rely on.

Remote Sensing and Verification. Sponsor: DOE/NNSA (NA-22). Mission:

Sandia has identified seven research foundations (or disciplines) critical to accomplishing the Labs' national security missions. Many of the disciplines have existed at the Labs since its creation, evolving over time to continually meet the nation's current and future needs.

Bioscience develops tools to lessen two national security risks: (1) biodefense and emerging infectious diseases, and (2) the United States' reliance on fossil fuels.
Computing & Information Science leads the challenge to build increasingly accurate predictive models and deliver reliable science and engineering results by advancing the state of the art in mathematics, computing, and cybersecurity
Engineering Sciences revolutionizes and refines Sandia's understanding of complex engineered systems. The work involves development and utilization of theory, experimental diagnostics, and computation and modeling to improve systems that support national security.
Geoscience focuses on developing a deep understanding of earth and atmospheric sciences to solve problems in areas such as energy security, defense, nuclear weapons, nonproliferation, disaster response, and climate security.
Materials Sciences focuses on analyzing materials and creating new classes of materials. Materials are critical to Sandia's missions and comprise semiconductors to stainless steels, carbon composites to ceramics, polymers, and new materials at the atomic- and nanoscale for specialized functions.
Nanodevices & Microsystems studies physical phenomena across the nano- and microscales. The foundation analyzes and develops microscale sensors, photonic devices, and microelectromechanical systems (MEMS) to create increasingly robust platforms that are virtually invulnerable to subversion.
Radiation Effects & High Energy Density Science seeks to advance science and engineering in the areas of radiation-effects science, high-energy density science, pulsed-power science, and associated enabling technologies.