LA-UR-23-30097

Approved for public release; distribution is unlimited.

Title:	Weapons Engineering Directorate (ALDW) Overview
Author(s):	Casperson, Cassandra Lee
Intended for:	The "Weapons Engineering Directorate (ALDW) Overview" is a presentation for recruiting purposes to be delivered at various colleges, universities, conferences, and professional organizations. The presentation provides prospective applicants with information about LANL, ALDW, the benefits of working
Issued:	2023-09-06

Los Alamos NATIONAL LABORATORY

Weapons Engineering Directorate (ALDW) Overview

Presented By:
Cassandra Casperson, SPD
Program Manager
casperson@lanl.gov

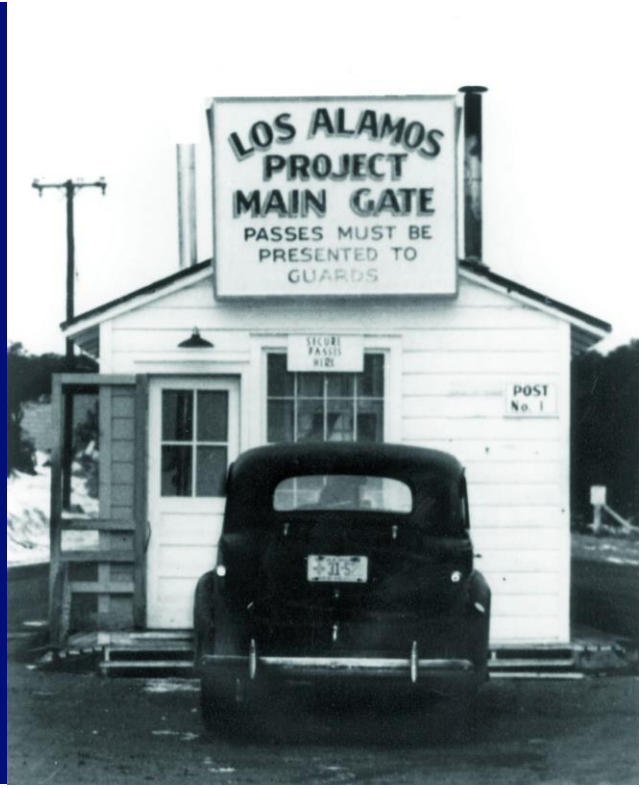
September 11th, 2023

This document deemed unclassified by:
Joseph Sanchez, Deputy Division Leader

P.O. Box 1663
Los Alamos, NM 87545

75+ years serving the nation

- Los Alamos National Laboratory (LANL) was founded in 1943 to design and build a weapon that would help end World War II
- Today, LANL focuses on maintaining a strategic nuclear deterrent to protect the nation's security
- Our workers, facilities, and instruments:
  - Design, produce, and certify current and future nuclear weapons
  - Detect nuclear weapons and improvised devices
  - Promote cooperation and diplomacy
  - Limit nuclear arms and the spread of nuclear materials, technology, and expertise



LANL is part of a large enterprise under the DOE and NNSA

- Department of Energy (DOE): Addresses energy, environmental, and nuclear challenges through science and technology solutions.
- National Nuclear Security Administration (NNSA): Enhances national security through the military application of nuclear science.
- Department of Defense (DOD): Provides military forces to deter war and ensure national security. The DOD and NNSA share responsibility for nuclear weapons.

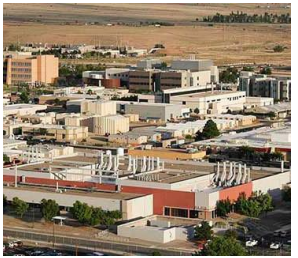
LANL is a key part of the U.S. Nuclear Security Enterprise

National laboratories and test sites

Los Alamos National Laboratory*

Lawrence Livermore National Laboratory

Nevada National Security Site



Sandia National Laboratories*

Production complexes

Kansas City National Security Campus

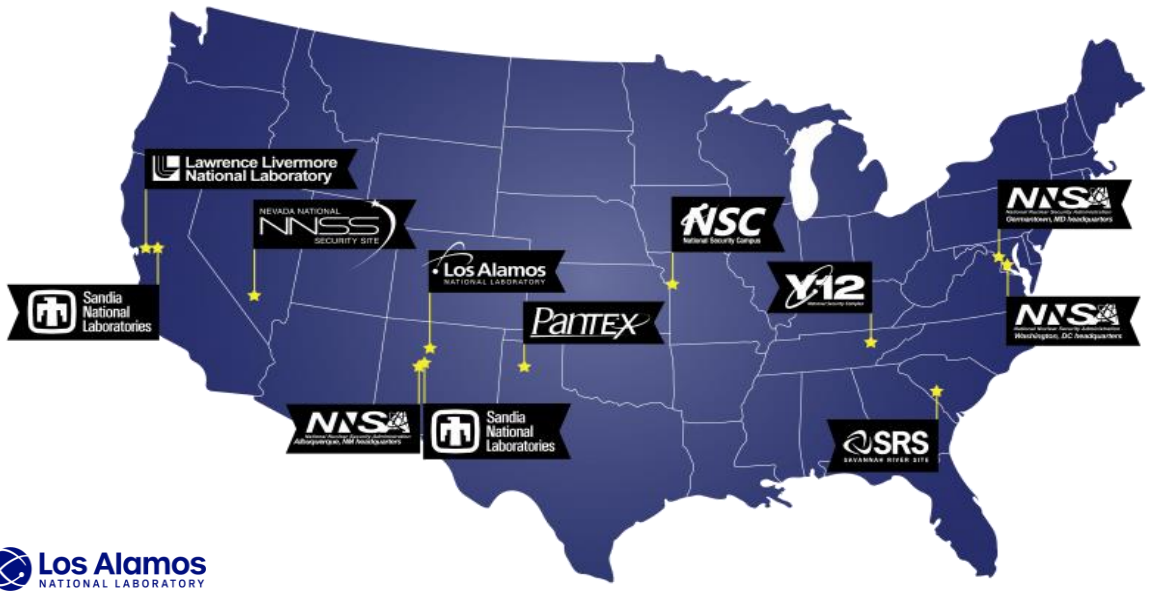
Pantex Plant

Savannah River Site

Y-12 National Security Complex

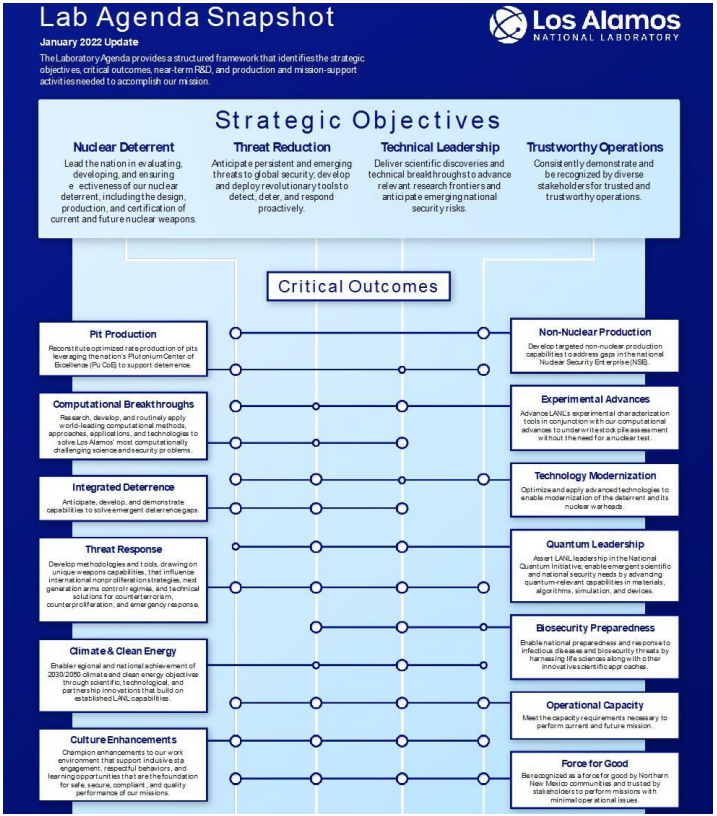
*Also, production facilities

Map of the U.S. Nuclear Security Enterprise Facilities

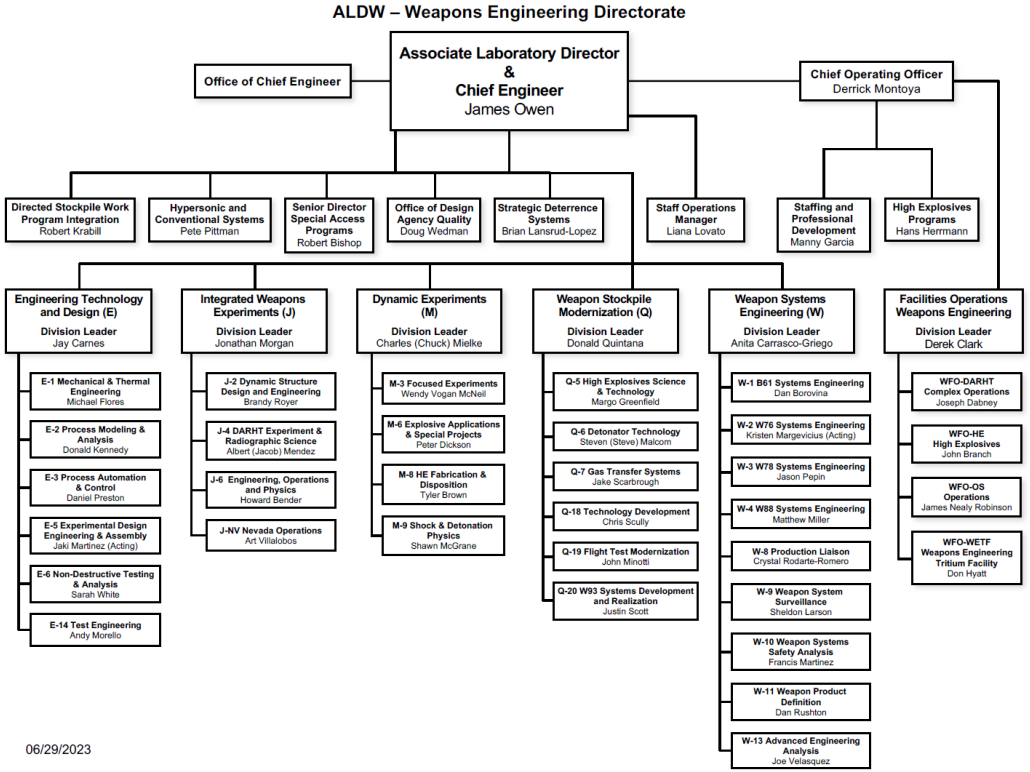


Los Alamos NATIONAL LABORATORY

Lab Agenda


Lab Agenda Snapshot
January 2022 Update
The Laboratory Agenda provides a structured framework that identifies the strategic objectives, critical outcomes, near-term R&D, and production and mission-support activities needed to accomplish our mission.
Los Alamos NATIONAL LABORATORY
Strategic Objectives
Nuclear Deterrent
Lead the nation in evaluating, developing, and ensuring effectiveness of our nuclear deterrent, including the design, production, and certification of current and future nuclear weapons.
Threat Reduction
Anticipate persistent and emerging threats to global security; develop and deploy revolutionary tools to detect, deter, and respond proactively.
Technical Leadership
Deliver scientific discoveries and technical breakthroughs to advance relevant research frontiers and anticipate emerging national security risks.
Trustworthy Operations
Consistently demonstrate and be recognized by diverse stakeholders for trusted and trustworthy operations.
Critical Outcomes
Pit Production
Reconstitute optimized rate production of pits leveraging the nation's Plutonium Center of Excellence (Pu CoE) to support deterrence.
Computational Breakthroughs
Research, develop, and routinely apply world-leading computational methods, approaches, applications, and technologies to solve Los Alamos' most computationally challenging science and security problems.
Integrated Deterrence
Anticipate, develop, and demonstrate capabilities to solve emergent deterrence gaps.
Threat Response
Develop methodologies and tools, drawing on unique weapons capabilities, that influence international nonproliferation strategies, next-generation arms control regimes, and technical solutions for counterterrorism, counterproliferation, and emergency response.
Climate & Clean Energy
Enable regional and national achievement of 2030/2050 climate and clean energy objectives through scientific, technological, and partnership innovations that build on established LANL capabilities.
Culture Enhancements
Champion enhancements to our work environment that support inclusive staff engagement, respectful behaviors, and learning opportunities that are the foundation for safe, secure, compliant, and quality performance of our missions.
Non-Nuclear Production
Develop targeted non-nuclear production capabilities to address gaps in the national Nuclear Security Enterprise (NSE).
Experimental Advances
Advance LANL's experimental characterization tools in conjunction with our computational advances to underwrite stockpile assessment without the need for a nuclear test.
Technology Modernization
Optimize and apply advanced technologies to enable modernization of the deterrent and its nuclear warheads.
Quantum Leadership
Assert LANL leadership in the National Quantum Initiative; enable emergent scientific and national security needs by advancing quantum-relevant capabilities in materials, algorithms, simulation, and devices.
Biosecurity Preparedness
Enable national preparedness and response to infectious diseases and biosecurity threats by harnessing life sciences along with other innovative scientific approaches.
Operational Capacity
Meet the capacity requirements necessary to perform current and future mission.
Force for Good
Be recognized as a force for good by Northern New Mexico communities and trusted by stakeholders to perform missions with minimal operational issues.

ALDW Organization Chart



ALDW Key Focus Areas

- Serves as the design agency for weapons
  - Ensure design, development, qualification, and surveillance processes comply with the NNSA Policy Letter NAP-24A, "*Weapon Quality Policy"*
- House explosives research and weapons engineering, assembly, and test infrastructure in 17-square miles dedicated to national security mission
- Six divisions comprised of ~1,200 regular employees dedicated to the integrated planning and execution
  - Sustain the majority of deployed U.S. nuclear weapons (LEP, Alt)
  - Lead major warhead-modernization efforts and refresh programs (W93)
- Responsible for Directed Stockpile Work Program Integration, Explosive Safety Program, Nevada Operations Office, and Office of Design Agency Quality
- Apply outstanding capabilities to other customer needs and help smooth out the natural fluctuations in large stockpile activities, e.g., LEPs
- Ensure program excellence

Engineering Technology and Design Division (E-DO)

E Division is involved in every phase of the engineering process: requirements definition, design, analysis, fabrication, assembly, and testing and evaluation.

E-Division Capabilities

- Advanced engineering analysis
- Assembly engineering
- Cryogenics
- Glovebox design and integration
- Industrial engineering
- Instrumentation and control development
- Mechanical design, fabrication, and testing
- Nondestructive testing and evaluation
- Nuclear process design
- Process automation and robotics
- Process modeling
- Radiography
- Risk analysis
- Systems engineering
- Thermal design and analysis
- Weapon assembly
- Weapon environmental testing

Integrated Weapons Experiments Division (J-DO)

J Division addresses national security challenges by executing mission-driven, large-scale integrated experiments, emphasizing subcritical experiments, hydrodynamic tests, focused experiments, and tests of engineered systems at multiple firing sites and use of the Dual-Axis Radiographic Hydrodynamic Test (DAHRT) facility.

J-Division Capabilities

- Accelerator and beam physics
- Accelerator operations
- Data analysis
- Develop and field x-ray and related diagnostics
- Dynamic structure R&D
- Experiment and diagnostic probe design and construction
- Experiment integration (designing, modeling, and conducting integrated experiments)
- High Explosive (HE) fabrication and disposal (pressing, sawing, machining, inspection, HE waste treatment)
- High Explosive operations
- Mechanical engineering and maintenance
- Technical and operational expertise in planning and executing complex and hazardous system/subsystem tests
- Vessel operations (fielding, cleanout, repair, and procurement)

Explosive Science and Shock Physics Division (M-DO)

M Division is responsible for ongoing and expanding explosive science and shock physics efforts including the Dynamic Equation of State (DEOS), a new shock physics research facility.

M-Division Capabilities

- Analytical chemistry
- Dynamic properties of materials
- Explosives detection
- Gas and powder gun
- High explosive (HE) crystal growth
- High explosive pulsed power
- High explosive science
- Investigations of reacting energetic materials
- Materials synthesis and formulation
- Processing, characterizing, and examining new and traditional HE
- Reactive flow modeling
- Shockwave compression of organics and shock-induced chemistry
- Shockwave initiation and detonation physics
- Small-scale safety, sensitivity, and performance testing of energetic materials

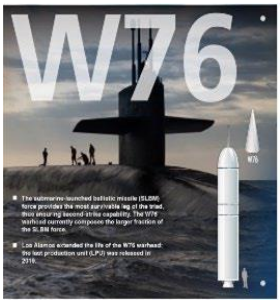
Weapons Stockpile Modernization Division (Q-DO)

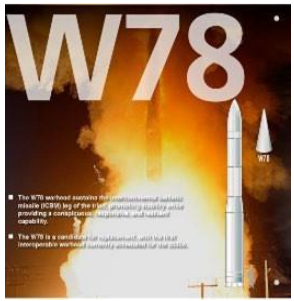
Q Division brings its system engineering and program management expertise and state- of-the-art simulation and experimental capabilities to roles ranging from basic and applied research and development; component technology conceptualization and maturation; through to sub-system and system testing of flight and integrated performance.

Q-Division Capabilities

- Advanced surety and safety systems
- Data processing, environmental analysis, and requirements development
- Development of Safety and Surety Architectures and Assessment Methodologies
- Firing system, detonator, and actuator design
- Gas transfer system (GTS) and GTS related design
- Ground, flight, and hydrodynamic qualification testing
- New weapon system design (W93)
- NNSA business practice
- Nuclear Explosive Package design, system engineering, and system integration

Weapon Systems Engineering Division (W-DO)





W Division provides the system engineering and program management necessary to sustain the safety, reliability, and security of the Laboratory's assets in the active U. S. nuclear stockpile – the B61, W76, W78 and W88. The Division generates key certification data for annual assessments supporting the Laboratory director's letter to the president of the United States on the health of those warheads.

W-Division Capabilities

- Engineering (quality, requirements, software, surveillance, systems, test)
- Ground, flight, and hydrodynamic qualification testing
- Military liaison
- Model-based design drafting
- Nuclear Explosive Package design, system engineering, and system integration
- Nuclear explosive safety
- Production liaison
- Use Control
- Weapons Response

Weapons Facilities Operations Division (WFO-DO)

WFO Division is charged with facilitating mission execution at the Weapons Engineering Tritium Facility (a Hazard Category II nuclear facility), DARHT, High Explosive Sciences, Firing Sites, and Detonator Facilities.

WFO Capabilities

- Access control
- Engineering
- Environment, safety, and health (environmental management, industrial hygiene and safety, radiation protection, waste management)
- High Explosive operations and safety
- Maintenance and work control
- Operations support
- Safety basis
- Training

Employee Benefits: The Science of Living Well

Health and wellness

- Medical: 2 options through Blue Cross Blue Shield of New Mexico (HDHP, PPO)
- Dental: preventative care and orthodontics through Delta Dental of New Mexico
- Vision: complete vision care through Davis Vision
- Wellness Program: incentivized wellness program and onsite fitness and medical facilities

Financial security and protection

- Retirement Plans: 401(k), Roth 401(k), company match up to 6%, service-based contribution starting at 3.5%
- Life Insurance: various options including basic, supplemental, dependent, and AD&D
- Disability: short-term and long-term plans through MetLife
- Legal: access to licensed attorneys and identity theft coverage through ARAG
- Tax-Advantage Plans: set aside pre-tax monies through payroll deductions for health, dependent care, and adoption assistance.

Employee Benefits Continued…

Professional development

- **ALDW Mentoring Program**: build networks and expand career opportunities through one-on-one mentorship
- Education Assistance Program: reimbursement for the cost of tuition, fees, and books
- Texas A&M and University of California in- state tuition: eligible dependents of full- time employees can apply for resident status for tuition purposes
- **Weapons University**: professional training

Work-life balance

- Alternative work schedules: 9/80 schedule with a Friday off every other week
- Holidays and PTO: 10 paid holidays per calendar year, 200-256 hours annual accrual rate based on years of service for personal/family sick days and vacation
- Paid Maternity Leave: 100% pay for up to 6 consecutive weeks after birth
- Paid Parental Leave: 100% pay for up to 3 consecutive weeks within 12 months after

  birth/adoption

Northern New Mexico and Los Alamos

Fall in Los Alamos

Valles Caldera National Preserve

Bandelier National Monument

Historic Downtown Santa Fe

Discover Los Alamos

Outdoor Adventures

Mountains and National Parks

Neighboring Communities

Join Our Team!

ALDW early and mid-career open positions

- Post Bachelors Internship
- Post Masters Internship
- Engineering Technologist 1-2
- Control Engineer 1-2
- R&D Engineer 1-2

LANL internship programs

- Student Programs Office
- Undergraduate Internship Program
- Graduate Internship Program

Scan the QR code to view all the opportunities in ALDW or visit this link.

Visit lanl.jobs to view all the opportunities at LANL.

Recommended Reading

- *Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility Virtual Tour.* July 2022. LA-UR-22-26448.
- *Engineering Technology and Design (E).* August 2019. LA-UR-19-28219.
- *J Division Integrated Weapons Experiments.* September 2016. LA-UR-16-23348.
- *Weapon Systems Engineering and Stockpile Modernization.* December 2016. LA-UR-16-29485.

Contacts

Manny Garcia

Program Director
Staffing & Professional Development
Weapons Engineering
mgarcia@lanl.gov

Cassandra Casperson

Program Manager
Staffing & Professional Development
Weapons Engineering
casperson@lanl.gov