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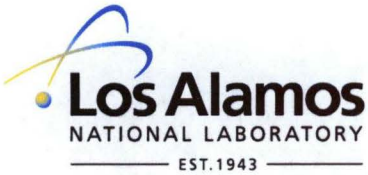
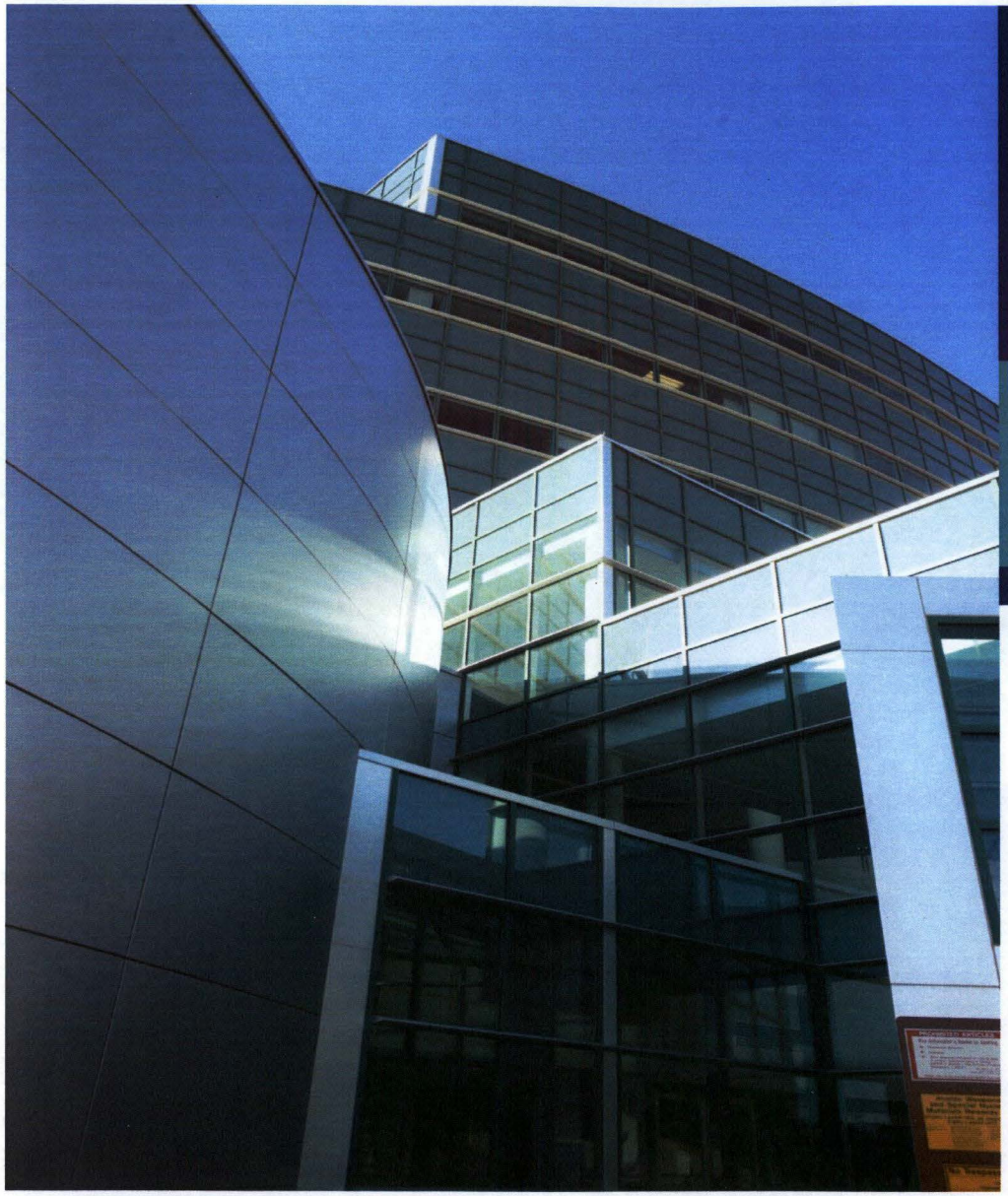
Title:	Los Alamos National Laboratory Overview
Author(s):	Jonathan Ventura
Intended for:	Air Force Nuclear Weapons School Albuquerque, NM



Form 836 (7/06)



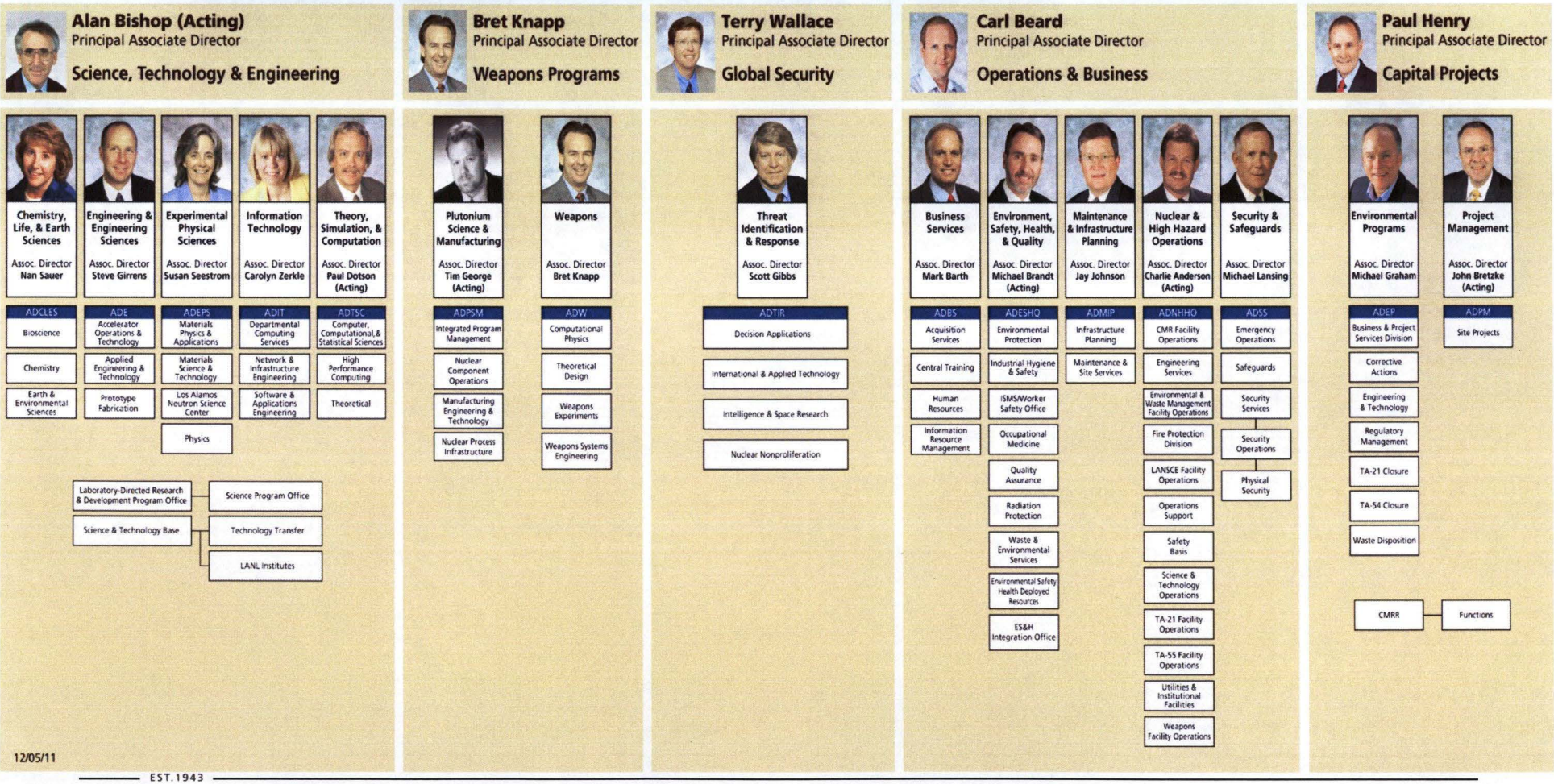
Los Alamos National Laboratory Overview

Jonathan Ventura
Office of the Principal Associate Director
Weapons Programs

March 2012

Los Alamos at the center of the Nation's deterrent posture for more than 69 years

- 1943 established as part of the Manhattan project
- 1945 Trinity device tested in New Mexico
- 1945 Little Boy and Fat Man detonated over Hiroshima and Nagasaki, Japan
- 1952 MIKE test–1st full scale thermonuclear device tested yield of 10.4 MT
- 1989 LANSCE proton radiography facility dedicated
- 1989 U.S. halts the design and manufacture of nuclear weapons
- 1992 U.S. conducts last underground nuclear weapons test
- 1994 Stockpile Stewardship Program established to ensure the safety, security and reliability of the stockpile w/o UGT
- 1999 DARHT experimental machine phase 1 operational
- 2007 1st LANL manufactured pit delivered
- 2008 Road Runner world's 1st supercomputer to achieve 1 petaFlop operations
- 2009 Full DARHT capability online
- 2010 Cielo supercomputer delivered
- 2011 NWC approves B61-12;last W88 WR pit delivered



EST. 1943

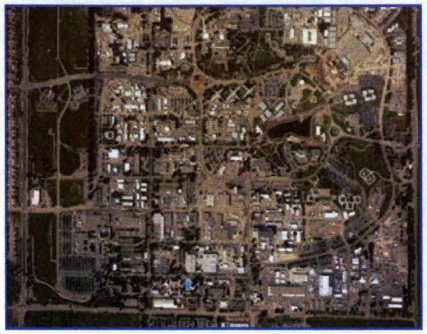
Operated by Los Alamos National Security, LLC for NNSA

NNSA

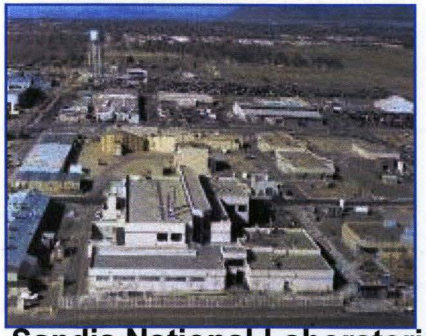
LANL is part of the nuclear security enterprise that is delivering on its national security commitments

National Laboratories and Test Site

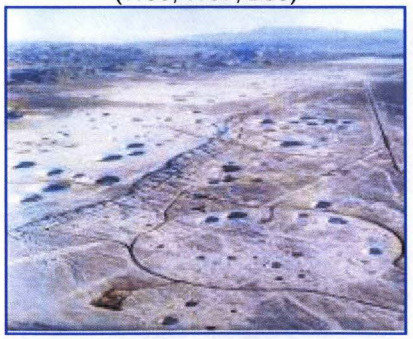
Los Alamos National Laboratory
Los Alamos, New Mexico
Nuclear design lab
(B61, W76, W78, W88)



Lawrence Livermore National Laboratory
Livermore, California
Nuclear design lab
(W80, W87, B83)



Sandia National Laboratories
Systems engineering, neutron generators, and non-nuclear component

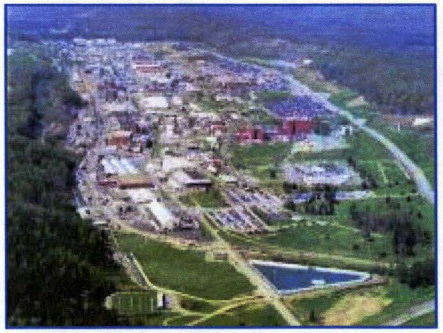


Nevada National Security Site
Nevada
Experimental site and
"subcritical" nuclear material tests

Production Complex

Pantex Plant
Amarillo, Texas
Weapons assembly/disassembly

Kansas City Plant
***Kansas** City, Missouri*
Nonnuclear manufacturing/
Procurement



Y-12 National Security Complex
Oak Ridge, Tennessee

Savannah River Site
Aiken, South Carolina
Tritium operations

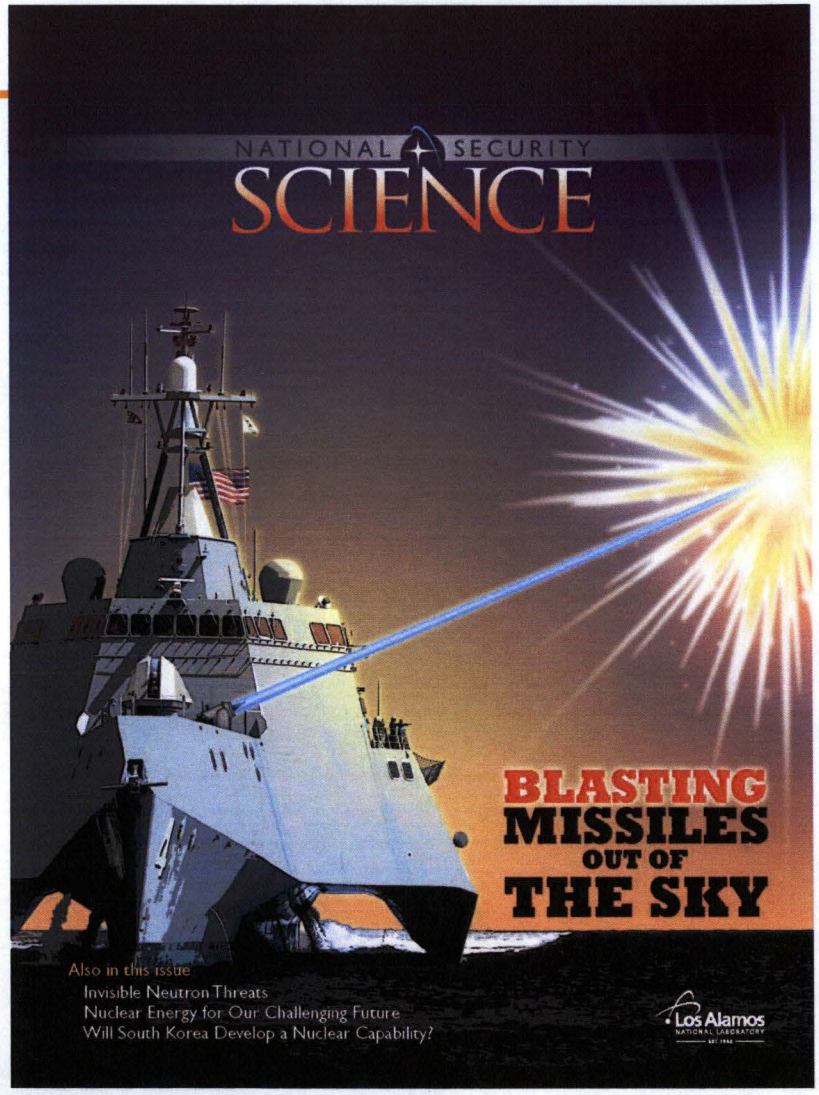
Los Alamos NATIONAL LABORATORY EST. 1943

LANL's Mission and Vision

Mission develop and apply leading edge science, technology, and engineering solutions that:

- Ensure a safe, secure, and effective nuclear deterrent
- Reduce global threats
- Solve energy security and other emerging national security challenges

Vision the premier National Security Science Laboratory

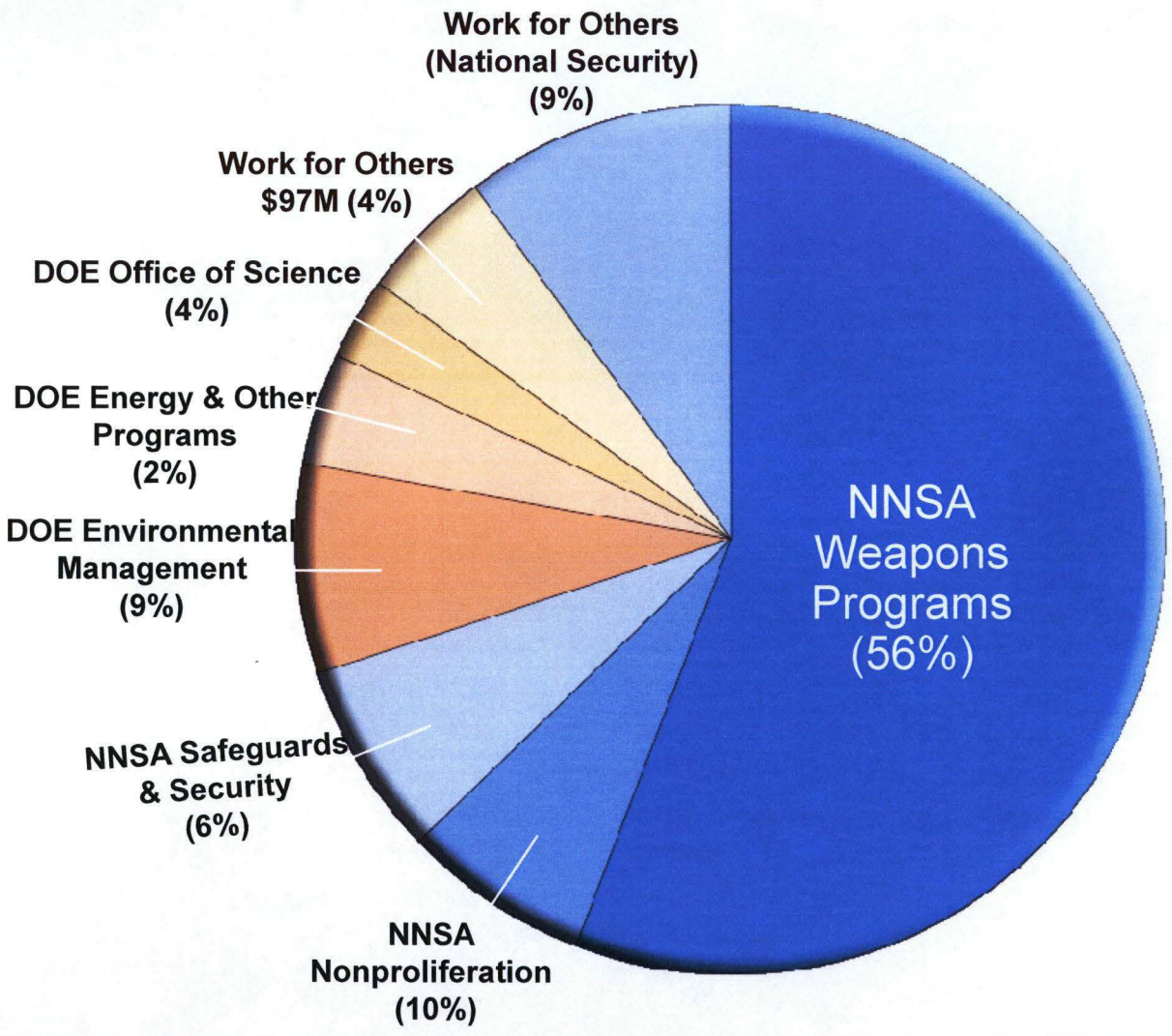


Los Alamos NATIONAL LABORATORY EST.1943

People → Capability → Mission Impact

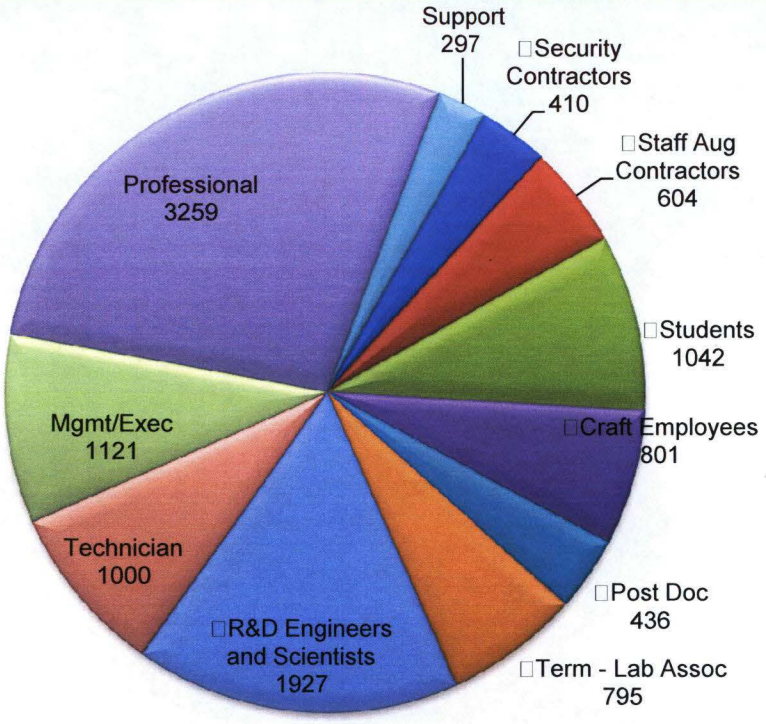
Laboratory budget is declining and managing that is critical to the long term health and vitality

***The Laboratory's FY12 annual funding is approximately $2.2 billion.**



People are the MOST important resource of the laboratory

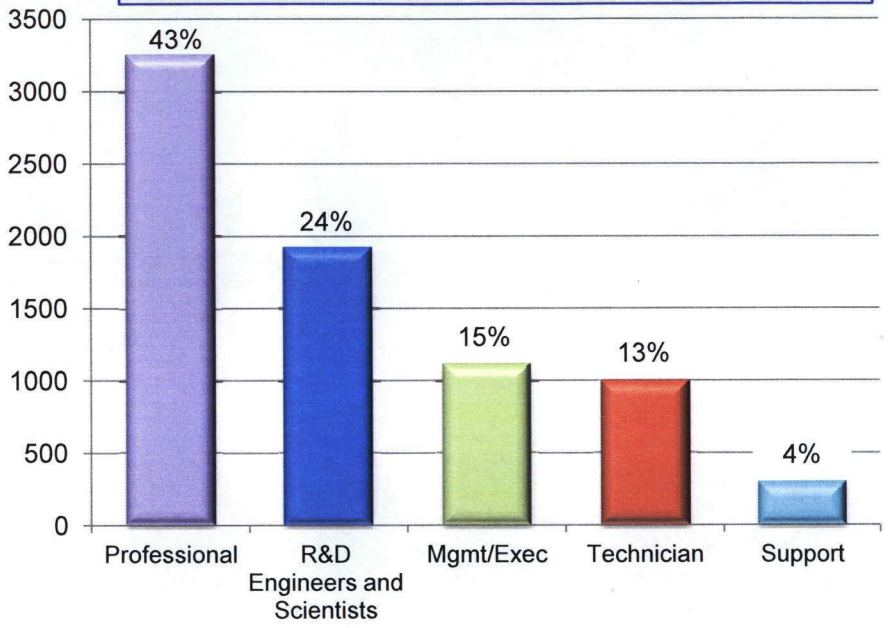
LANL Staffing 11,692 employees a decrease of 490



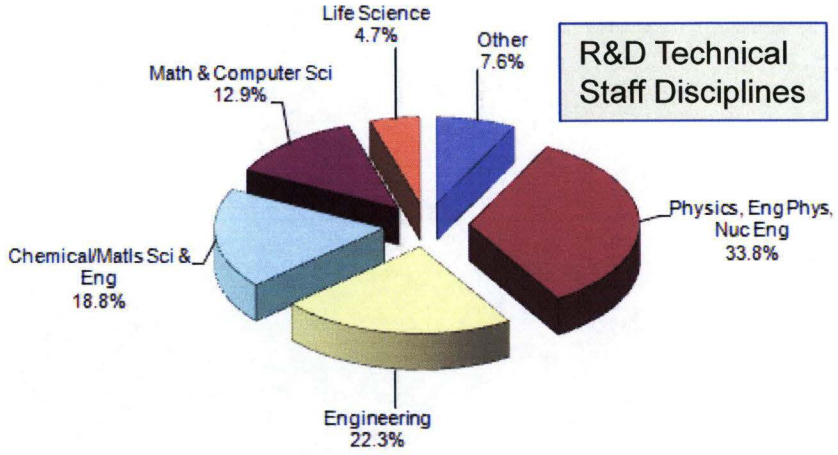
Career (Regular) Employees

- R&D Engineers and Scientists
- Technician
- Management/Executives
- Professional
- Support

LANL Career Employee Distribution 7,604



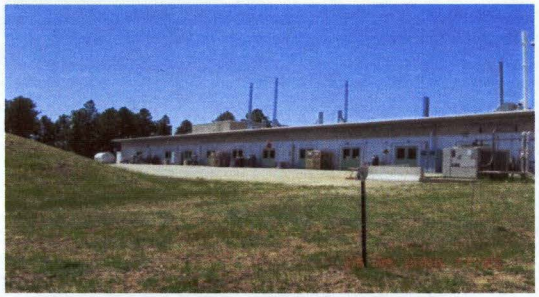
R&D Technical Staff Disciplines



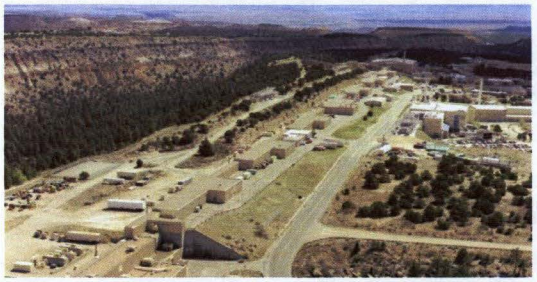
Los Alamos NATIONAL LABORATORY EST. 1943

LANL's science and engineering infrastructure a critical component of U.S. deterrent

Metropolis Center for Modeling & Simulation

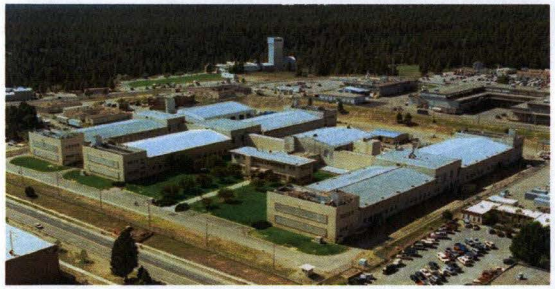


High Explosive laboratories

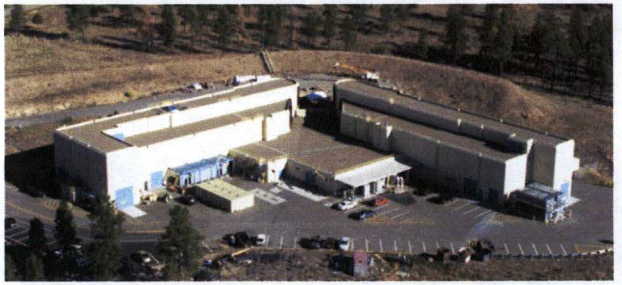


Los Alamos Neutron Science Center

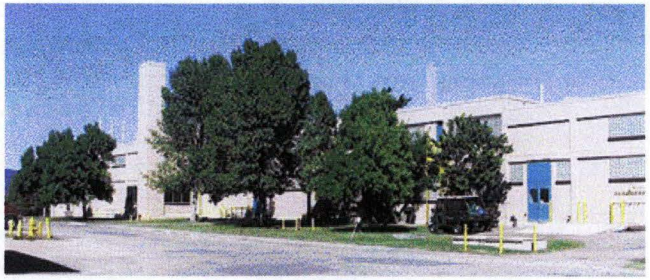
Plutonium Processing Facility



Chemistry and Metallurgy Building



Dual Axis Radiographic Hydrotest Facility

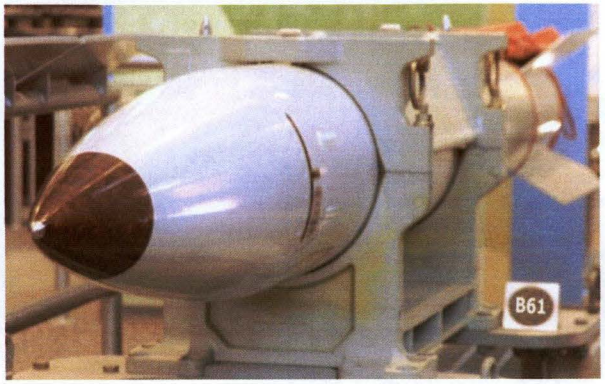


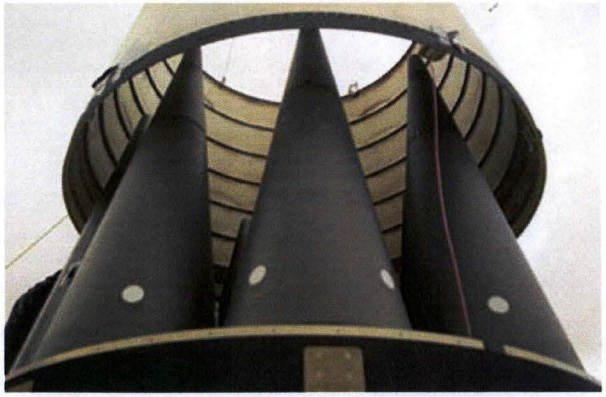
SIGMA Building

Chemistry & Metallurgy Research Replacement (RLUOB)

LANL is the design laboratory for the majority of the Nation's on alert deterrent

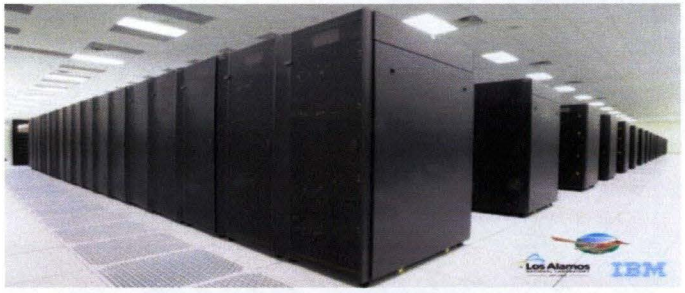
- **LANL is the design laboratory for:**
  - B61Bomb
  - W78 ICBM
  - W76 SLBM
  - W88 SLBM

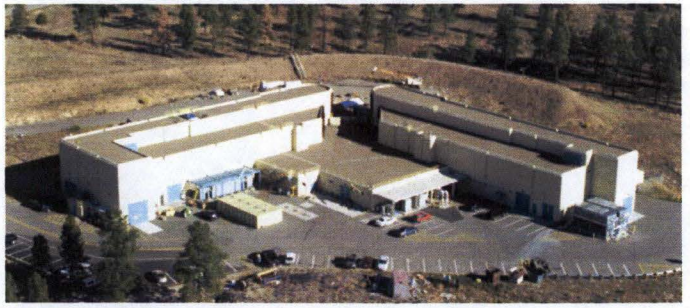




LANL maintains a carefully balanced three part weapons program to sustain the Nation's deterrent

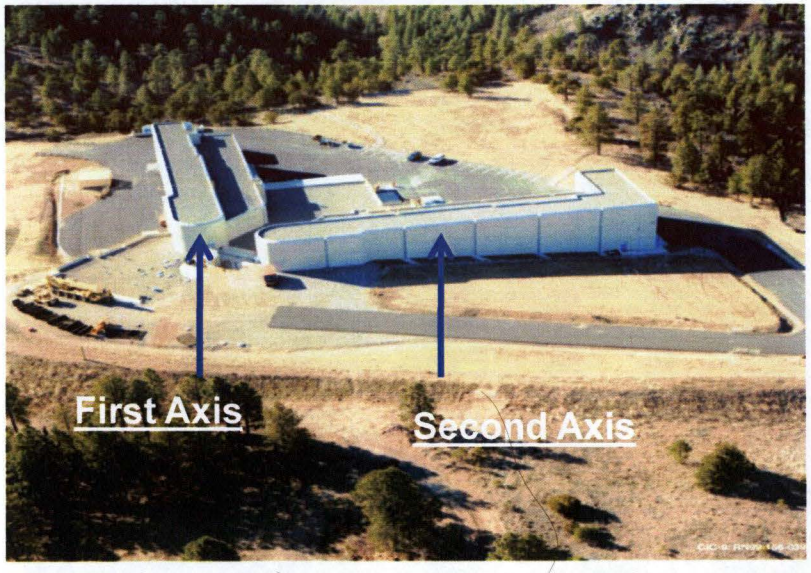
- **Stockpile management**
  - LEPs, Alts, Mods
  - Surveillance
  - Annual Assessment
- **Using science, technology and engineering investments**
- **Infrastructure investments**
  - Create state-of-the-art facilities to sustain laboratory capabilities
  - Hire and train next generation



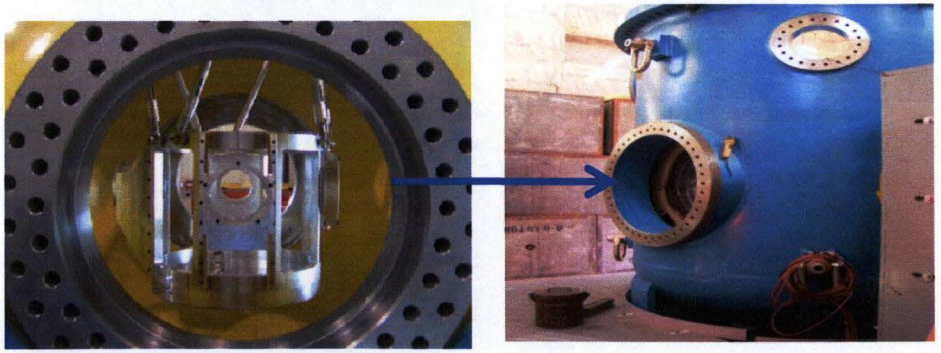


DARHT world class imaging in support of the deterrent

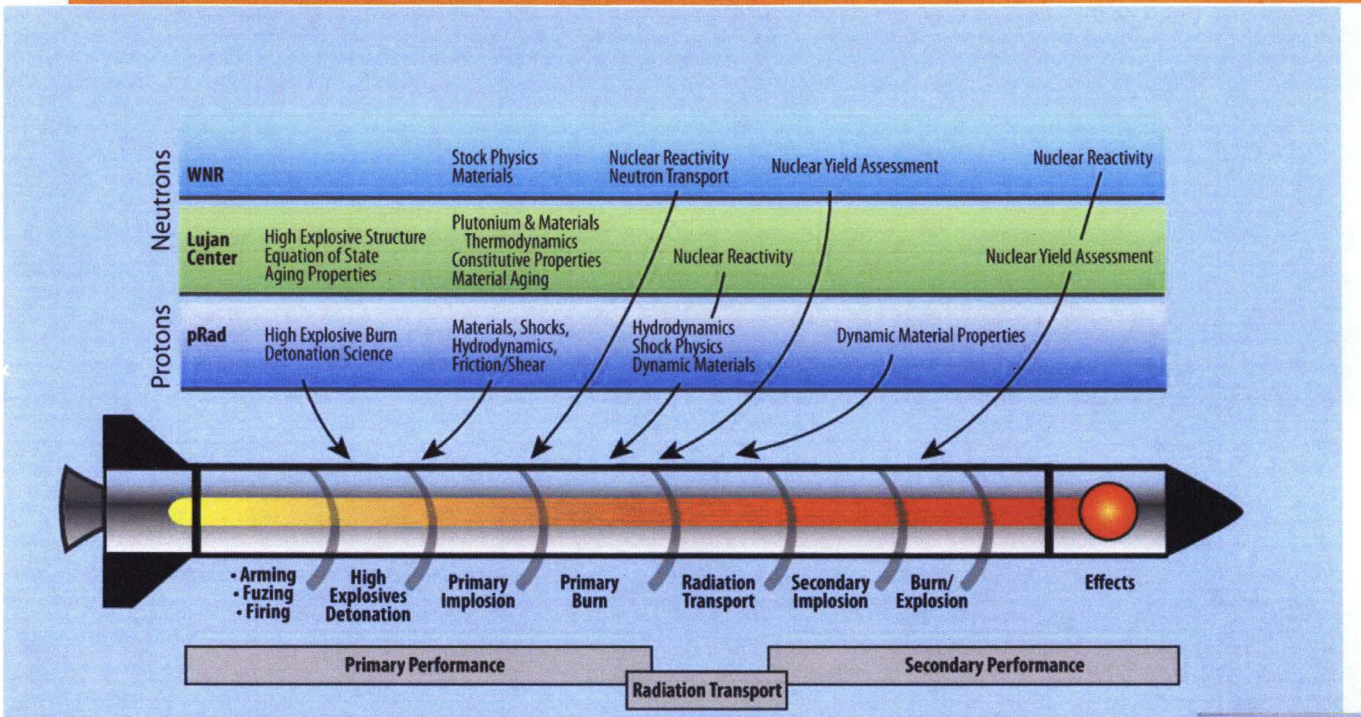
- World class X-ray radiography for non-nuclear hydrodynamic tests
- Axis 1 single image
- Axis 2 four images
- World's first dual axis experiment December 2009
- Experiments fully contained to reduce environmental impacts and increase shot rate



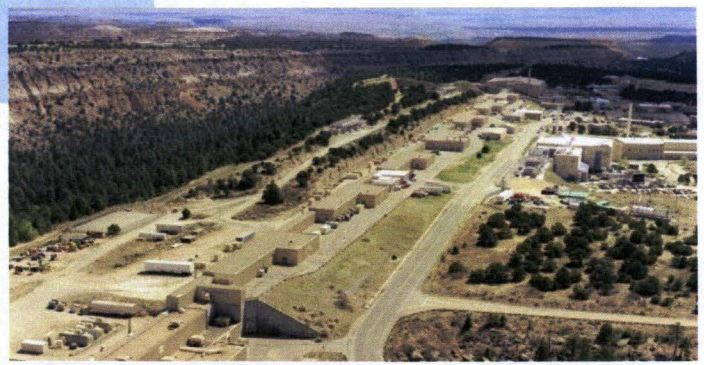
DARHT Containment System



LANSCE contributes to understanding weapons performance

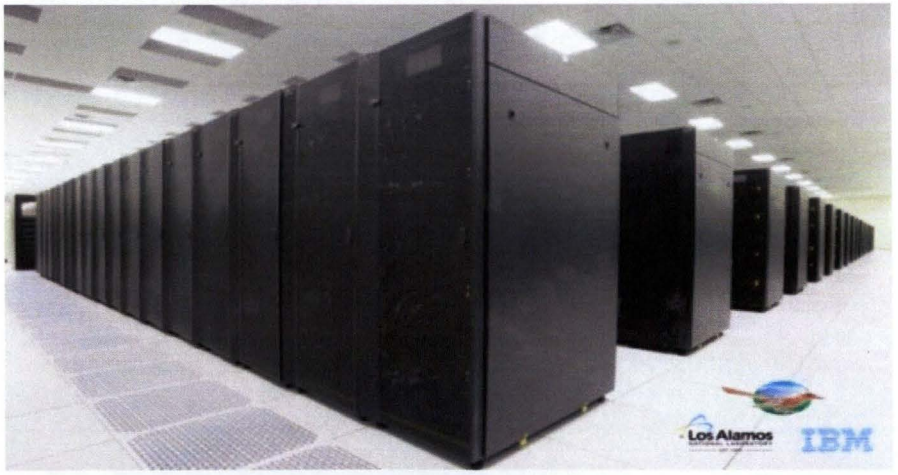


The Stockpile Stewardship Program is a science-based predictive capability. From button-to-boom, LANSCE uniquely addresses the SSP requirements.



Supercomputing critical to sustaining the deterrent and other national security missions

- Stockpile challenges are increasingly complex as systems age
- DARHT, LANSCE provide large data sets to resolve stockpile challenges
- Data sets require ever more capable machines to rapidly process data
- Road Runner @1.105 petaflops and Cielo @ 1.35 petaflops are key resources for LANL



Stockpile issues are requiring improvements in simulation fidelity

These stockpile issues

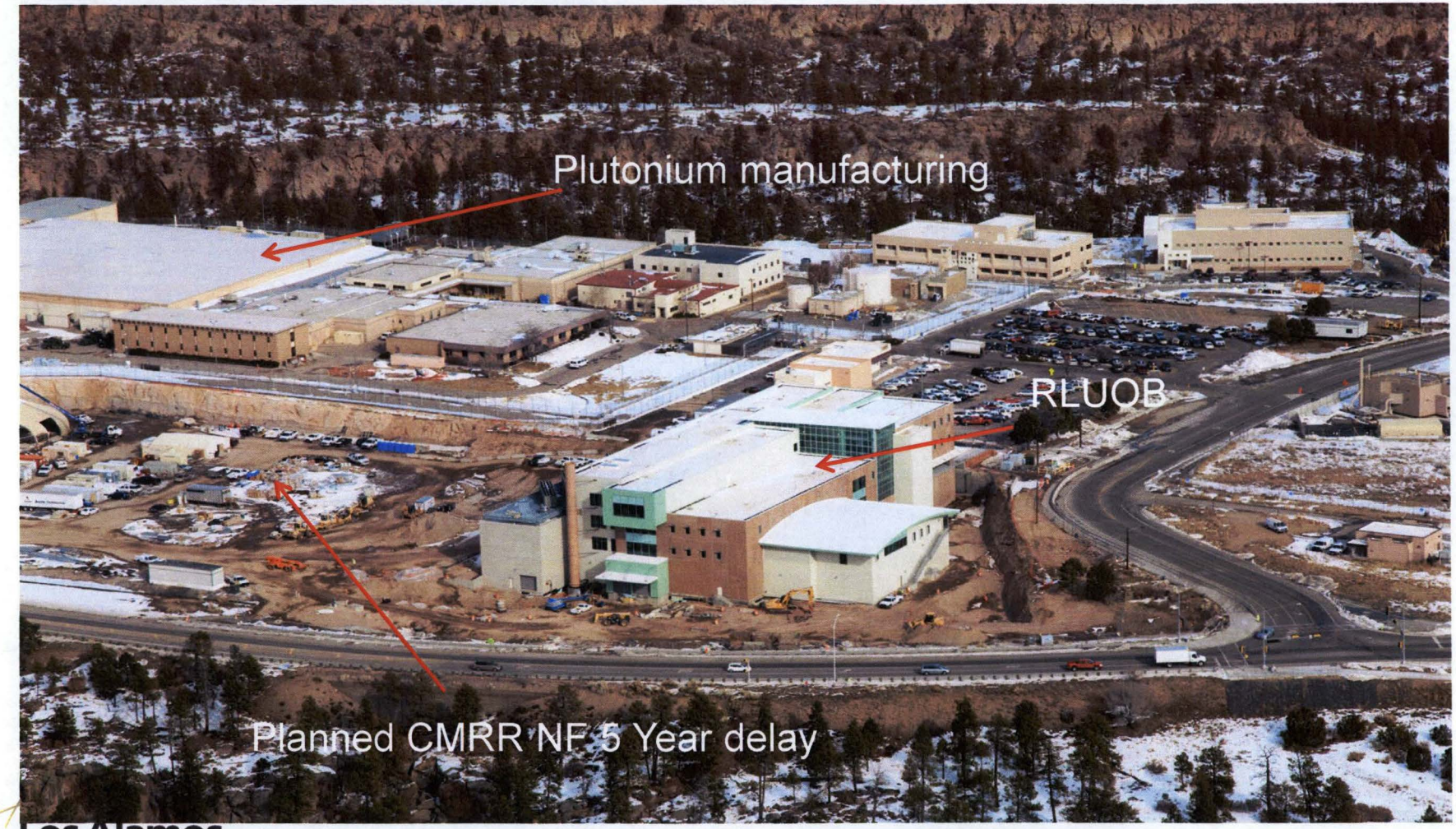
- Need to mature new technology for SLEPs
- Need to improve understanding to resolve SFIs
- Need to resolve nuclear test anomalies
- Need to improve weapon surety

Drive these simulation fidelity improvements

- Physics fidelity
  - Replace calibrations with physics models to improve confidence of extrapolation away from the nuclear test base
- Numerical fidelity
  - SFIs sensitive to fine scale features, requiring much finer resolution
- Geometric fidelity
  - Neglected features need to be included; many are inherently 3D

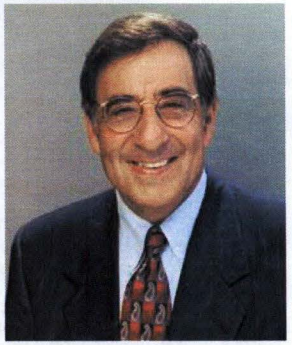
Trinity will dramatically increase the fidelity of weapon simulations

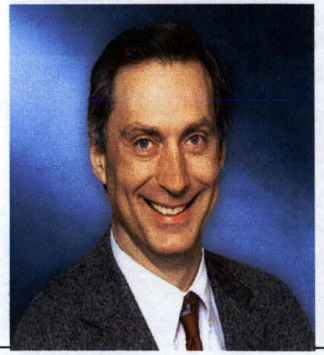
TA-55 the Nation's center of plutonium science and manufacturing



Annual Assessment applying the intellectual, experimental, computational, and engineering strengths of the lab

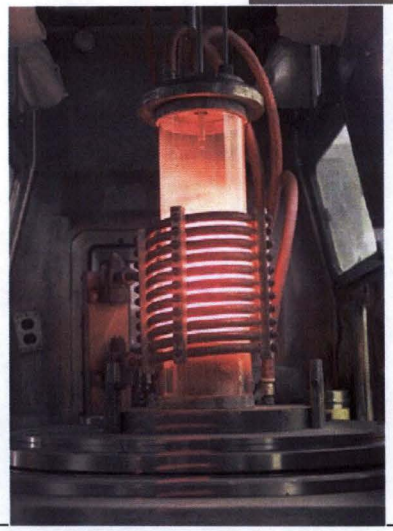
- Detailed reports are prepared on each warhead
- Lab Director briefed in detail
- INWAP is strengthening the process
- Lab Director issues letter to Secretaries of Defense & Energy and Chair of the NWC
- Lab Director briefs the Secretary of Energy
- STRATCOM issues separate report and briefs the Secretary of Defense
- Secretaries of Defense & Energy brief the President
- President advises Congress



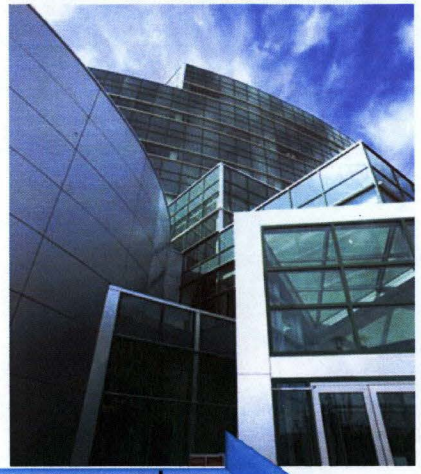


Continued success of the Stockpile Stewardship requires management attention and focus

- **Challenges confronting the program**
  - Sustaining bipartisan support
  - Managing budgetary resources
  - Downsizing staff
  - Executing program
  - Balancing risk (safety and security)
  - Recruiting and retaining workforce for future
  - Investing in scientific and engineering tools
  - Addressing infrastructure requirements



For 65+ years, LANL has served the mission of national security beyond the weapons program



German & Japanese Nuclear Program Assessments

Vela Satellites: Treaty Monitoring

Nuclear Nonproliferation Treaty

Safeguards Invented

EO 12333: Lab. Intel. Activities

Sensors on GPS

Small Satellites

Russian Materials Protection

1945 1950 1960 1970 1980 1990 2000 2010

Field Intelligence Element

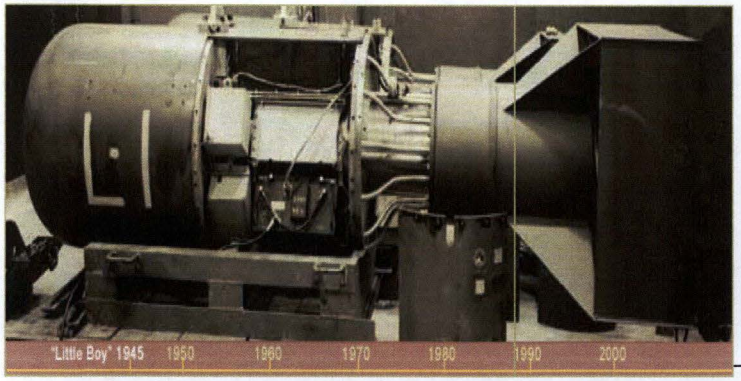
Nuclear Emergency Support Team

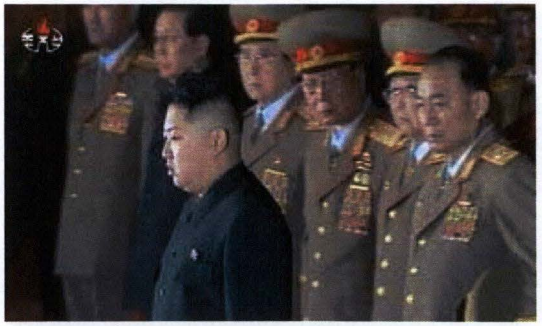
IAEA Training

Proliferation Detection Program

Libya Rollback

Iraq Survey Group

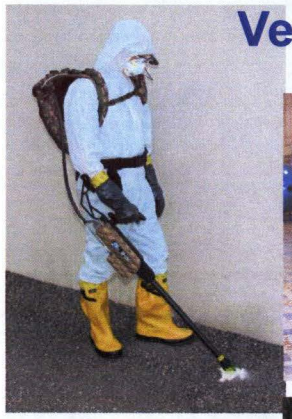


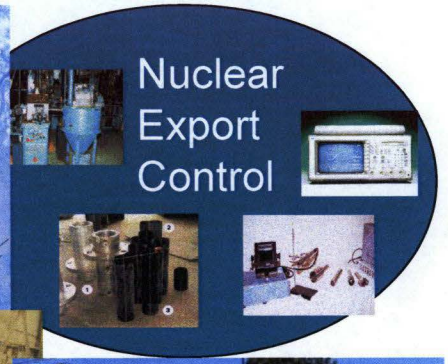


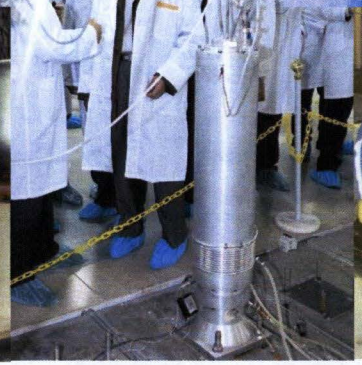
NNSA

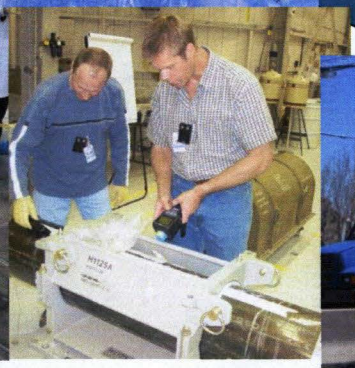
Science challenges for Nuclear Nonproliferation Programs

Nonproliferation, Arms Control Policy, Monitoring and Verification, International Safeguards and Export Control









Policy → R&D → Deployment → Sustainability

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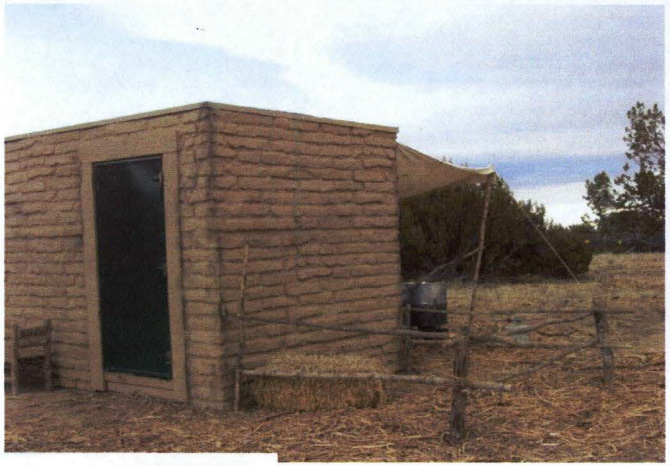
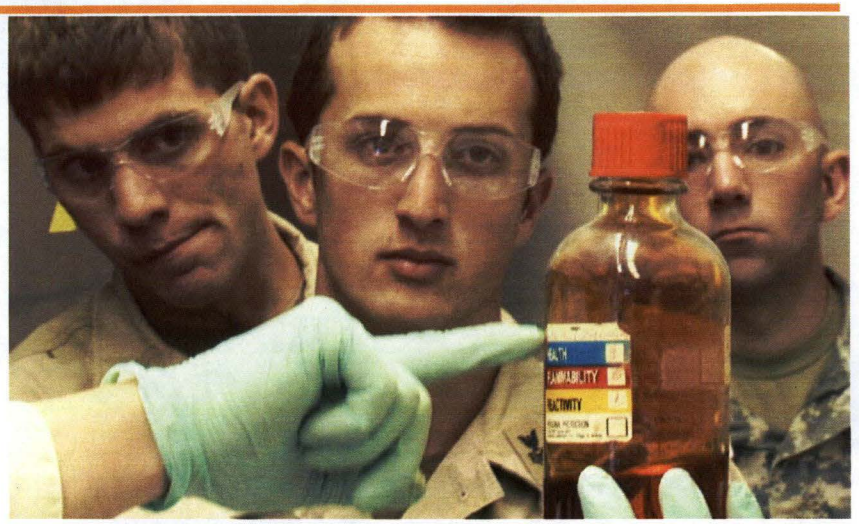
Science challenges for Global Security making a difference for the troops

- **LANL's HE expertise in the areas of:**
  - **Homemade explosives - explosives chemists**
  - **Improvised explosive devices - using HMEs in IED's or EFP's**
  - **Small scale testing - safety and sensitivity**
  - **Detection - properly identifying HMEs**
  - **HME database - information tool for our troops**

Realistic training scenarios reinforce class room knowledge to troops





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NATIONAL LABORATORY
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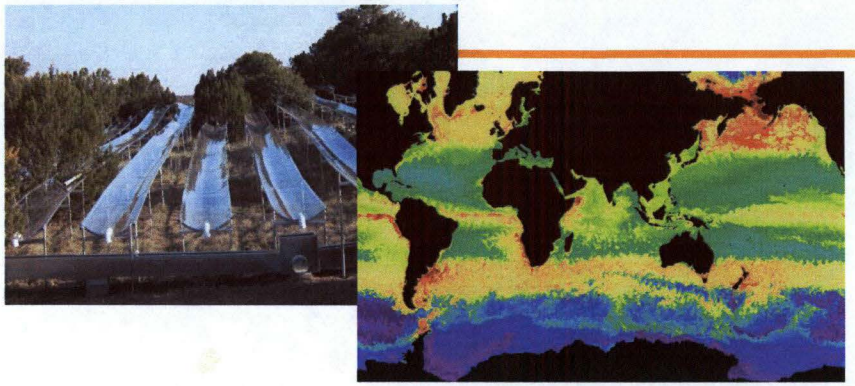
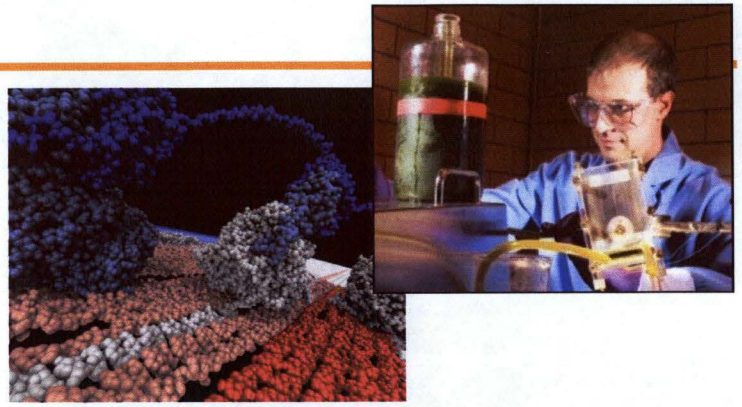
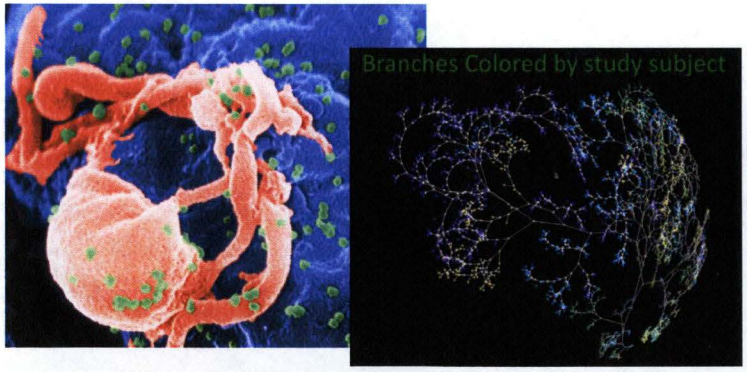
Questions for Science and Energy



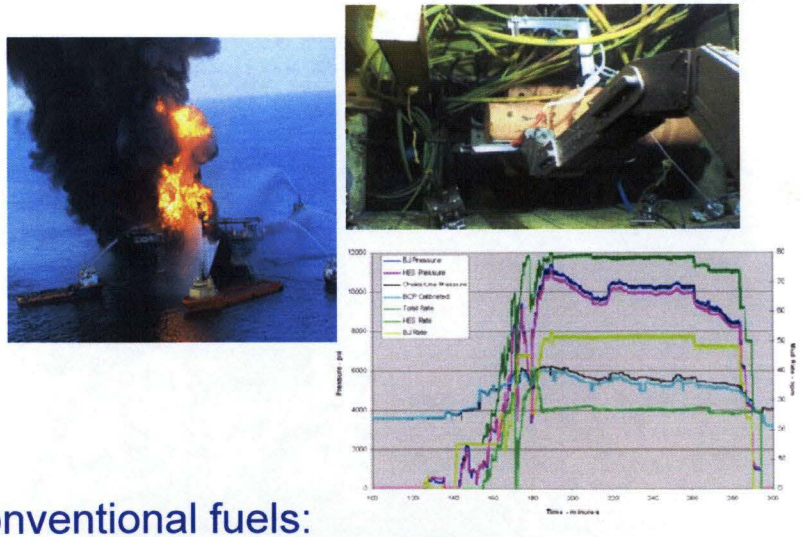
Climate / Energy Impacts:
Measurement, simulation, and prediction



Unconventional Fuels:
Extraction of energy



Theoretical Biology: HIV evolution and design of "mosaic vaccines"



Conventional fuels:
Responding to disasters with technology