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Author(s): Wallace, Terry

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# **Welcome to Los Alamos National Laboratory: A premier national security science laboratory**

By  
Terry Wallace

June 27, 2012

## **ABSTRACT**

Dr Wallace presents visitors with an overview of LANL's national security science mission: stockpile stewardship, protecting against the nuclear threat, and energy security & emerging threats, which are underpinned by excellence in science/technology/engineering capabilities. He shows visitors a general Lab overview of budget, staff, and facilities before providing a more in-depth look at recent Global Security accomplishments and current programs.



# Welcome to Los Alamos National Laboratory

## A premier national security science laboratory

Terry Wallace  
Principal Associate Director  
for Global Security

June 27, 2012

# Los Alamos National Laboratory:

## National Security Science Mission



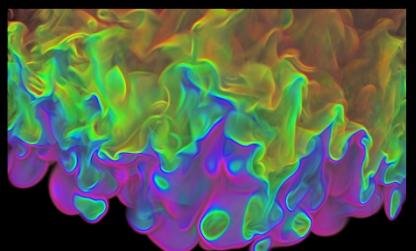
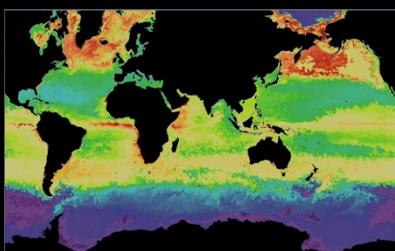
**Stockpile Stewardship**

**Protecting against the Nuclear Threat**



**Energy Security & Emerging Threats**

**Science, Technology & Engineering Capabilities**



**Los Alamos**  
NATIONAL LABORATORY

EST. 1943

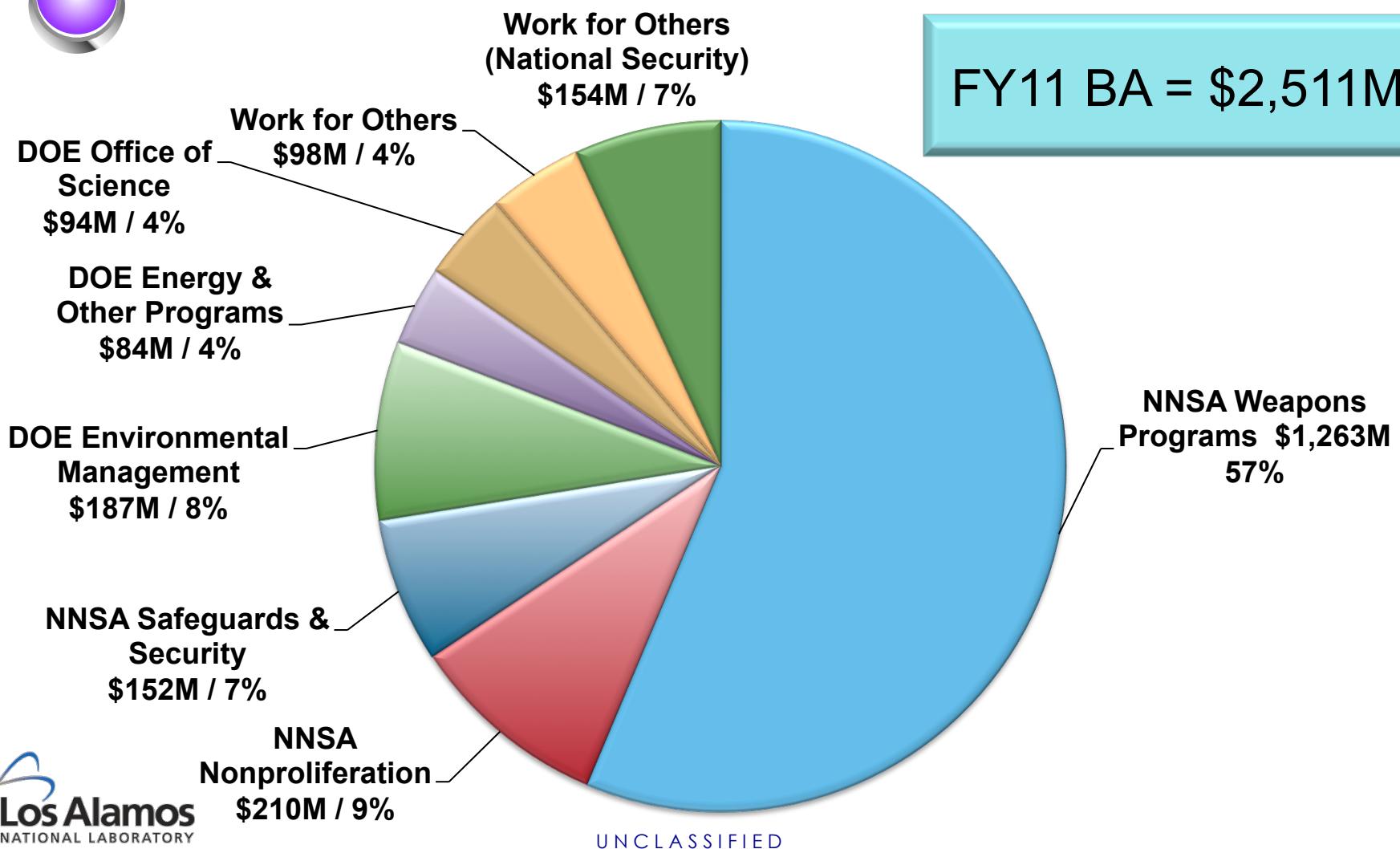
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**NNSA**

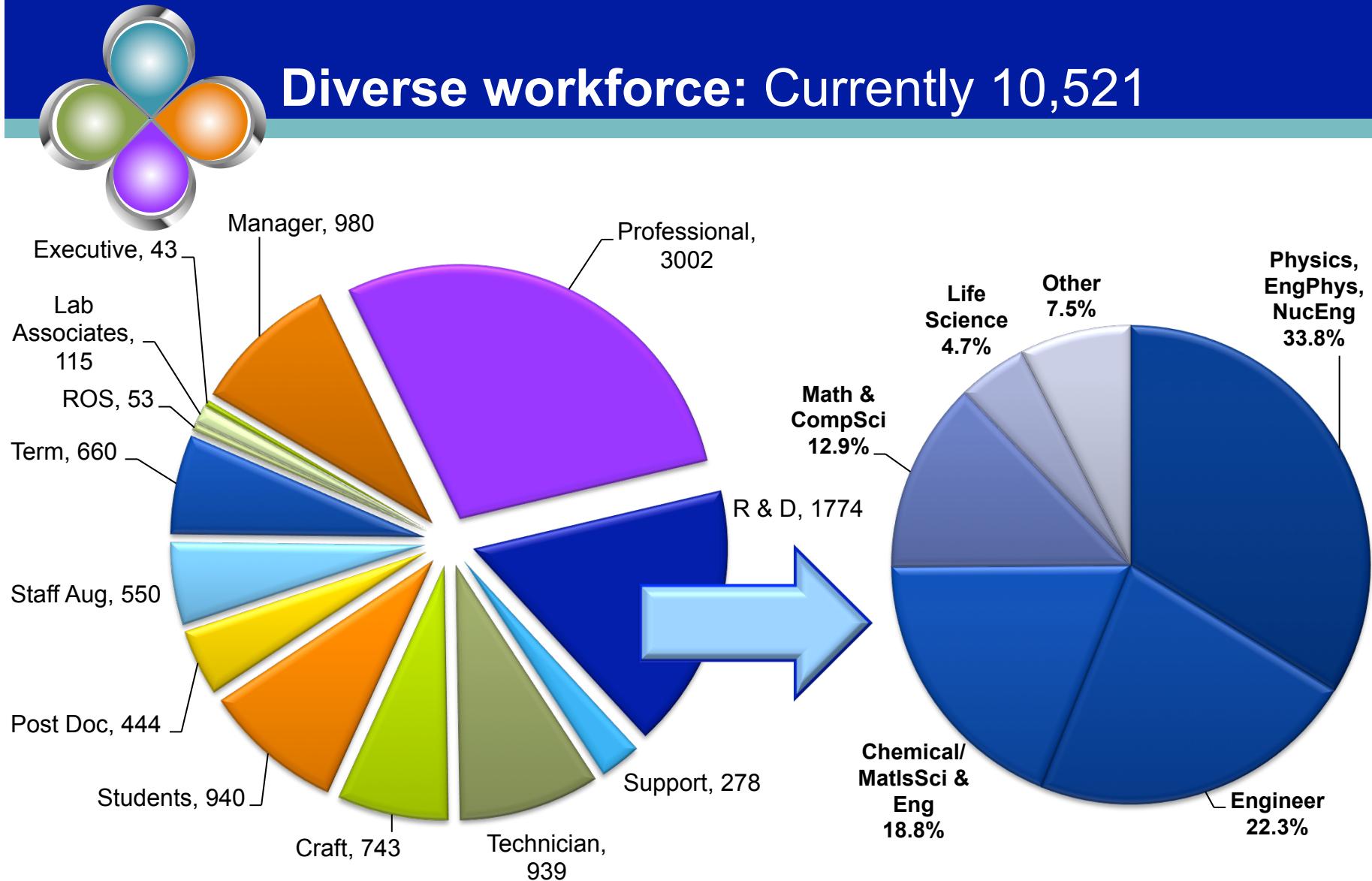


# FY12 LANL budget: \$2,242M (est)



FY11 BA = \$2,511M

# Diverse workforce: Currently 10,521





# LANL is unique facilities



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)

## Stockpile Stewardship

# Stockpile Stewardship: Sustaining the safety, security, and effectiveness of the Nation's deterrent



- Los Alamos is the design agency for warheads that constitute more than 60% of nation's deterrent and the majority of the on-alert deterrent
- Stockpile managed through surveillance and life extension
- Confidence without nuclear testing is based on a more fundamental science and engineering understanding



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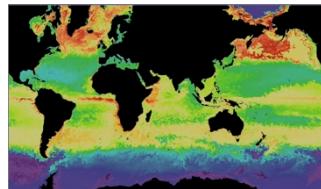
# Science, Technology & Engineering

capabilities support national security missions

## Science & Engineering Capabilities



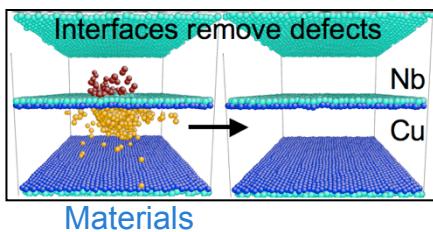
Accelerators & Electrodynamics



Information Science & Technology



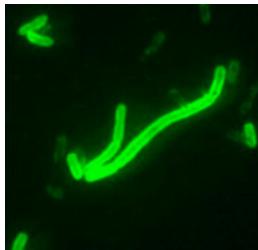
Weapons Science & Engineering



Materials



Science of Signatures



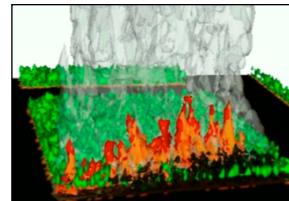
Biosciences



Computer & Computational Sciences



Nuclear Physics, Astrophysics & Cosmology



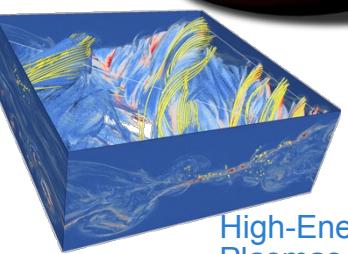
Earth & Space Sciences



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Chemical Science



High-Energy Density Plasmas & Fluids  
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Nuclear Engineering and Technology





# Global Security: Protect against proliferant and unconventional nuclear threats — regardless of origin

**Nuclear Event Sequence:**  
LANL has capabilities and programs in all of these areas



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# Our GS mission and sponsors are found in two major areas



## Nuclear Nonproliferation & Security

**Customers:** NNSA (NA-21/22/24/25/26), DHS, DOE/NE, NASA, IWFO (space programs), DOS

**Focus Areas:** Nonproliferation Deployment, Nonproliferation and Space R&D, Nonproliferation and Treaty Verification, Homeland Security

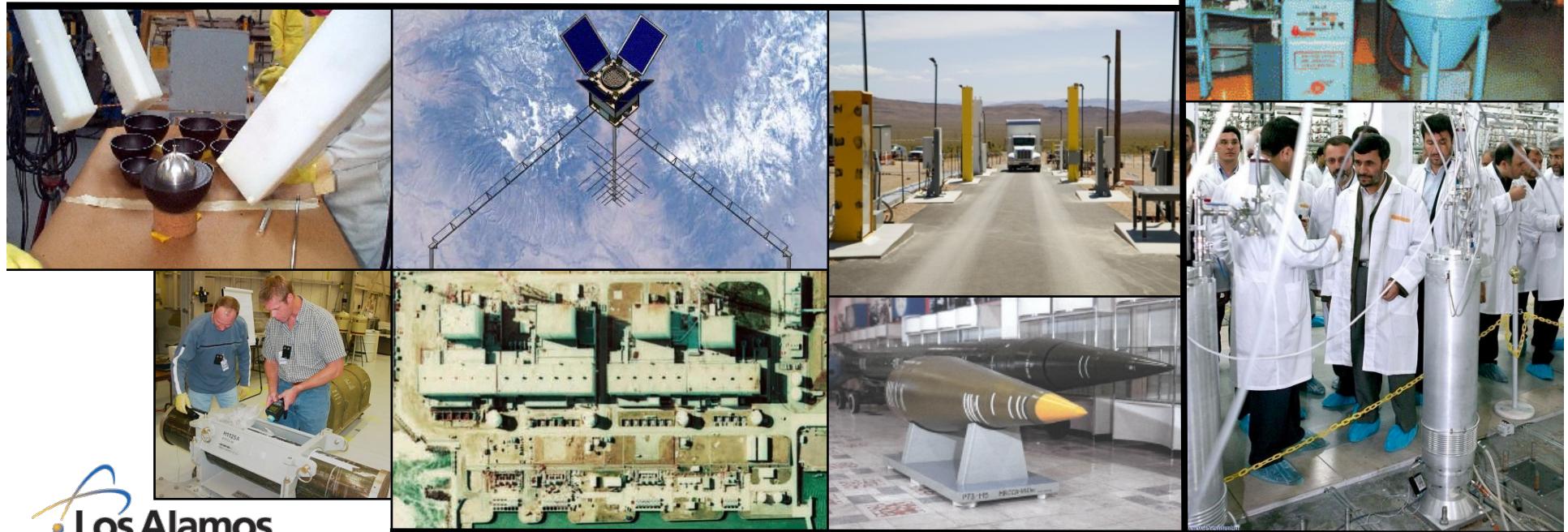
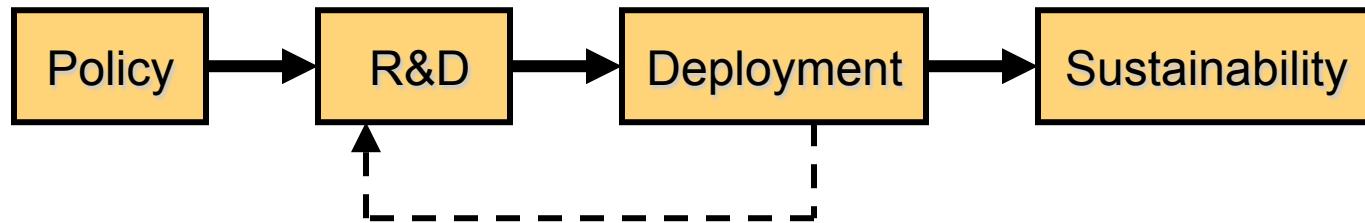
## Intelligence, Defense & Counterterrorism

**Customers:** IWFO (excluding space programs), DOE-IN, DoD, NNSA (NA-40, NA-10, NA-80)

**Focus Areas:** Defense R&D, Special Operations Forces-DoD, Nuclear Counterterrorism, Intelligence

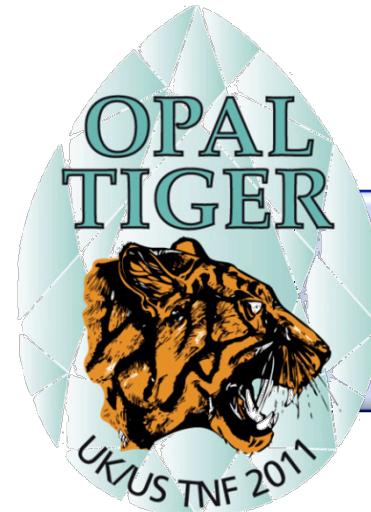
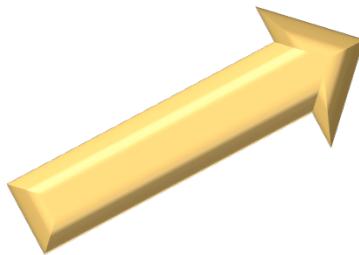
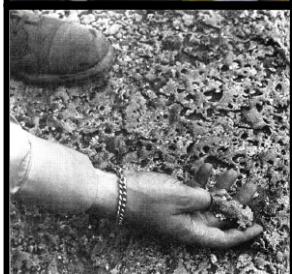
# Nuclear Nonproliferation

**Nonproliferation Deployment, Nonproliferation R&D,  
Nonproliferation and Treaty Verification, Homeland Security**



LANL is called for our nuclear forensic capabilities in national and international exercises and events

## LANL post-detonation forensic capabilities



“Opal Tiger”  
UK/US exercise  
October 3–28, 2011

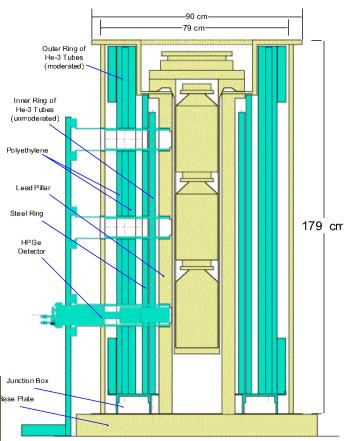
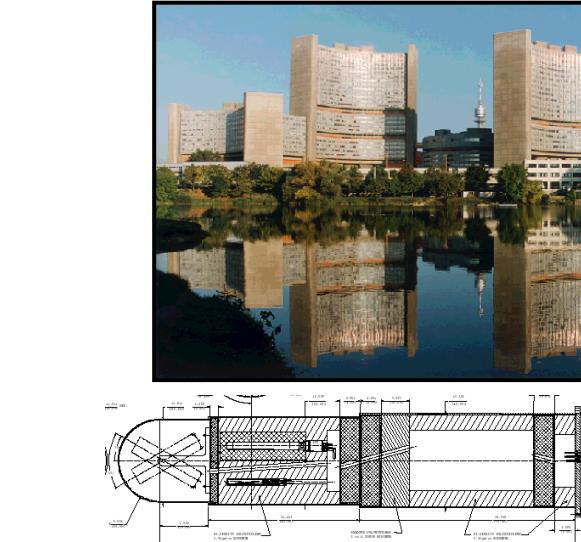


“Operation Tomodachi”  
(friendship in Japanese) with  
field support, accident  
assessment, and sample  
analysis

# LANL supports the International Atomic Energy Agency

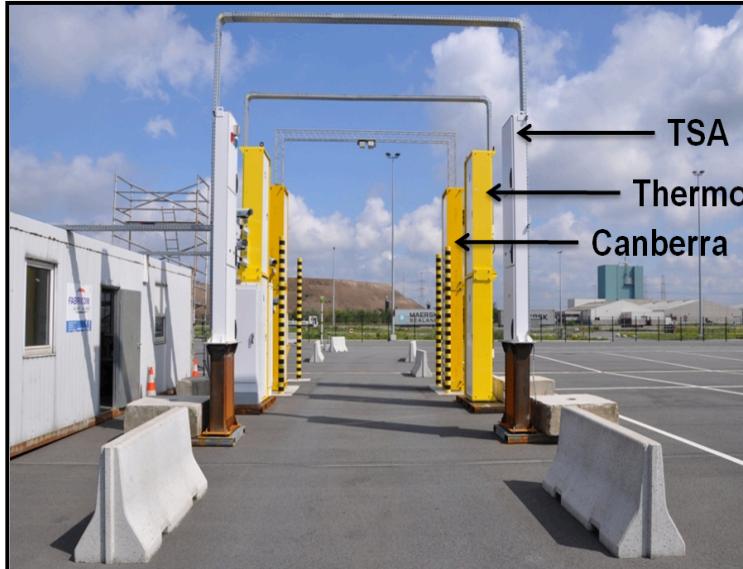
## 45 years of LANL direct support to the IAEA

- 50 ongoing technology development projects
- Development of nearly every nuclear materials assay technology in use today by the IAEA
- Training every IAEA inspector at LANL
- 17 LANL Staff currently on rotational assignment in Vienna



Camera Radiation Detector and Pu canister assay system installed in Japanese reprocessing facility

# Second Line of Defense (SLD) successes



Antwerp, Belgium, Field Test



Straddle nuclear detector

Completed installation of radiation-detection systems at all 383 Customs sites in Russia

Completed installation at 39 international seaports

Installed equipment at 160 locations at Former Soviet Union and Eurasian sites

To date, the SLD program has deployed more than 2300 portal monitors around the world

Second Line of Defense at remote border site



Interdicted radiological material at SLD-equipped site



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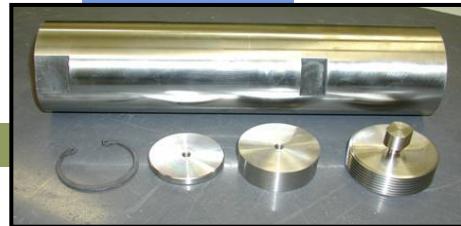
# Off-Site Recovery Program (OSRP)



**Every year, thousands of disused and unwanted radioactive sources are identified.**

**LANL is well suited to support source recoveries:**

- Specific understanding of the potential threats
- Well-trained material handlers
- Unique Pu storage and disposal capability



OSRP primarily recovers  
Cs-137, Co-60, Sr-90,  
Am-241, Pu-238, Pu-239

**Domestic Recoveries:** 26,800 sources recovered totaling 825,000 Curies

**International Recoveries:** 2,430 sources from 18 countries totaling 4,113 Curies

# Emerging Threats:

## Fixed Site Detection System



Portal monitor radiation  
detector test-bed



New test-bed established at LANL to evaluate software and hardware designed to detect radiological and nuclear materials.

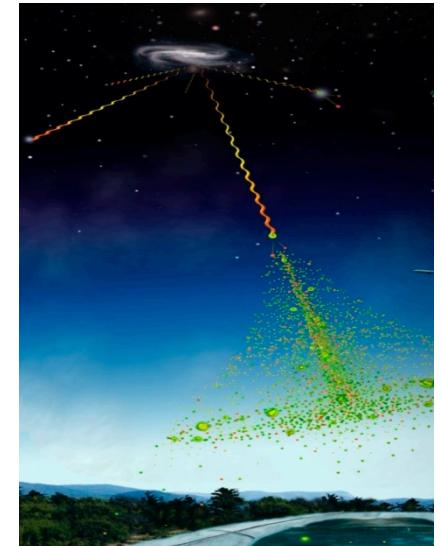
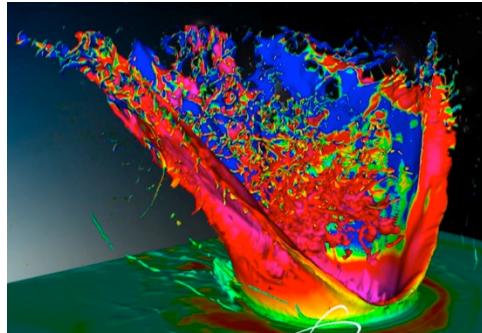
### Objective

Determine optimal software and hardware configurations to allow major U.S. cities to screen vehicles while limiting impacts on traffic.

### Specifications

- 3 traffic lanes with passenger vehicles up to 30-mph
- 3 detector panels per lane
- 20 spectra per detector per second (spectral list mode)
- Successful demonstration to customer at beginning of the year

# Global Security success relies on leveraged HPC and Experimental capabilities

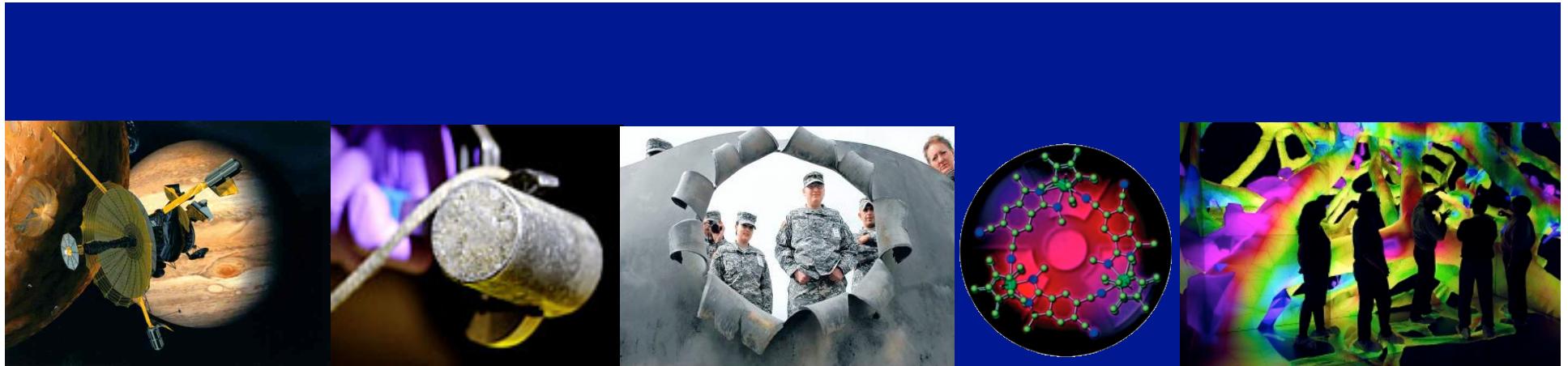


## Global Security requires experimental validation

Integrated system tests validate modeling & simulations

## Global Security HPC strategy requires two types of capabilities

- **Data-intensive computing** exploits large, diverse data sets, for example Nonproliferation and Space missions
- **Computationally intensive computing** (e.g., 2- and 3-D assessments of foreign nuclear weapons and improvised nuclear devices) builds on the Nuclear Weapons Program foundation



# Supplements

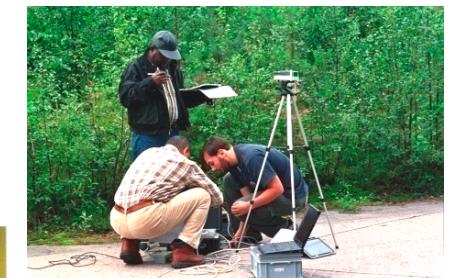
# Treaty Verification:

## Moving down a road to Zero nuclear weapons



Russian warhead attribute verification with an information barrier

Gamma & neutron-based measurements on pits



Seismic After Shocks



Hand-held gamma detector

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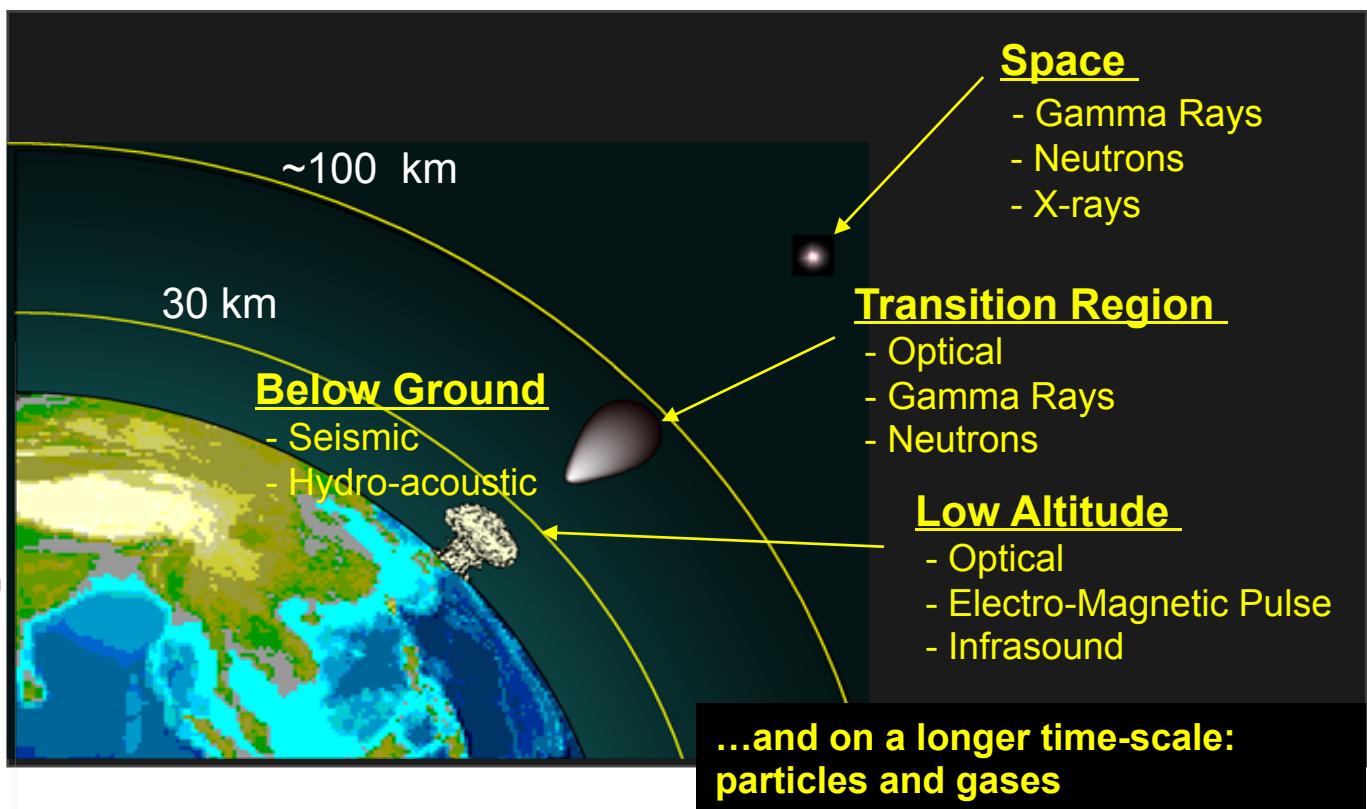
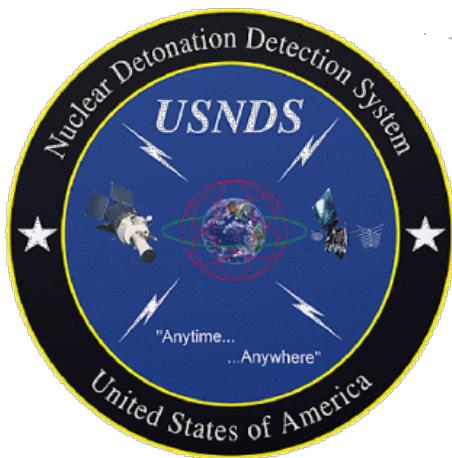


Environmental Sampling

# Nuclear Detonation Detection: Part of an integrated program involving air, space & ground assets

## Together, they answer the questions:

- ◆ Did it happen?
- ◆ Was it nuclear?
- ◆ Where was it?
- ◆ How big?
- ◆ Who did it?



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 for the stockpile**

## Infrastructure investments

- Create state-of-the-art facilities to sustain laboratory capabilities
- Hire and train next generation

