

NATIONAL NUCLEAR SECURITY ADMINISTRATION
OFFICE OF DEFENSE PROGRAMS



Stockpile Stewardship and Management 3+2 Strategy

Information Presentation to:
American Association for the Advancement of Science

Dr. Donald Cook
Deputy Administrator for Defense Programs
National Nuclear Security Administration

12 September 2014



Overview



- National Policy Framework for US Stockpile Management
 - National Security Strategy
 - Nuclear Posture Review
 - New Strategic Arms Reduction Treaty
- NNSA Mission Areas and Priorities
- Nuclear Security Enterprise
- Nuclear Stockpile and Delivery Systems
- Evolution of the Stockpile
- Stockpile Sustainment and Modernization
- Stockpile Stewardship and Management Plan
 - 3+2 Strategic Vision
 - W76-1 Life Extension Program
 - B61-12 Life Extension Program
- NSE Infrastructure and Modernization Progress and Plans
- Summary



National Strategic Policy for Nuclear Weapons has been Clearly Formulated



“The United States will take concrete steps towards a world without nuclear weapons... Make no mistake: As long as these weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary, and guarantee that defense to our allies...”

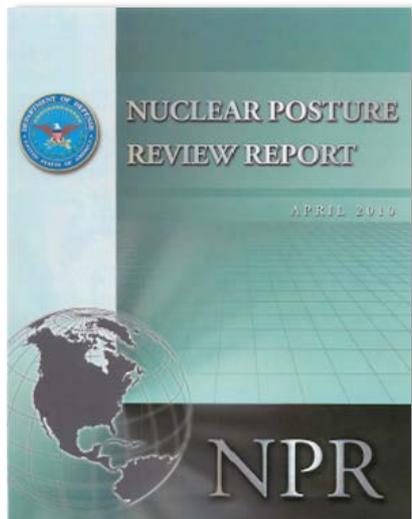
**President Obama, April 5, 2009
Prague, Czech Republic**

“Conduct research and development on a broad range of safety, security, reliability, and control methods and devices for nuclear warheads and weapon systems, including use control, and delay and denial capabilities. As a long-term goal, pursue technologies that render the unauthorized use of U.S. nuclear weapons impossible without their remanufacture.”

National Security Presidential Directive/NSPD-28



The Nation's Nuclear Security Agenda



Nuclear Posture Review, April 2010 *"In order to sustain a safe, secure, and effective U.S. nuclear stockpile as long as nuclear weapons exist, the United States must possess a modern physical infrastructure – comprised of the national security laboratories and a complex of supporting facilities – and a highly capable workforce..."*

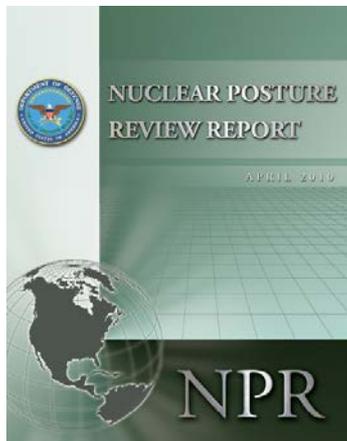
National Security Strategy, May 2010 *"As long as any nuclear weapons exist, the United States will sustain a safe, secure, and effective nuclear arsenal, both to deter potential adversaries and to assure U.S. allies and other security partners that they can count on America's security commitments."*

Office of Defense Programs Mission

To sustain a safe, secure, and effective nuclear deterrent through the application of science, technology, engineering, and manufacturing



National Strategic Policy for Nuclear Weapons has been clearly formulated



The NPR stated the following as priorities, among others:

"...providing annual stockpile assessments through weapons surveillance."

*"...funding fully the ongoing LEP for the **W76** submarine-based warhead and the LEP study and follow-on activities for the **B61** bomb..."*

*"...initiating a study of LEP options for the **W78** ICBM warhead, including the possibility of using the resulting warhead also on SLBMs to reduce the number of warhead types..."*

"...the science, technology and engineering base, vital for stockpile stewardship as well as providing insights for non-proliferation, must be strengthened..."

Department of Defense, "Nuclear Posture Review", April 2010



Key policy drivers and mission requirements focus the program



- Policy Framework
 - President's *National Security Strategy* (White House 2010)
 - *Nuclear Posture Review Report* (DoD 2010)
 - New Strategic Arms Reduction Treaty
- Defense Programs Mission
 - Ensure the Nation sustains a safe, secure, and effective nuclear deterrent
 - Ensure the United States maintains excellence in nuclear science and technology



Mission Areas



Defense Programs

To sustain a safe, secure and effective nuclear deterrent through the application of science, technology, engineering and manufacturing

Naval Reactors

To provide militarily effective nuclear propulsion plants and ensures their safe, reliable and long-lived operation.

Emergency Operations

To provide radiological and nuclear emergency response and to provide security to the nation from the threat of nuclear terrorism



Nuclear Nonproliferation

To detect, secure, and dispose of dangerous nuclear and radiological material, and related weapons of mass destruction technology and expertise

Defense Nuclear Security

To develop and implement security programs for NNSA including protection, control, and accountability of materials, and for the physical security of all facilities of the administration



NNSA Priorities



- **Overarching priorities**

- Sustain the nuclear weapons stockpile
 - Deputy's Management Action Group (DMAG) Option 1
- Conduct leading-edge scientific research
- Prevent nuclear proliferation and counter nuclear terrorism
- Support the naval nuclear reactor program
- Repair & modernize our aging infrastructure
 - UPF
 - Plutonium Strategy
- Develop our workforce
- Protect the safety and security of our sites, our employees, and the public





Nuclear Security Enterprise Sites



National Laboratories and Test Site



Sandia Nat'l Laboratories
NM and CA Sites

Systems engineering, neutron generators, and non-nuclear component design



Nevada National Security Site
Nevada

Experimental site and "subcritical" nuclear material tests



Los Alamos Nat'l Laboratory

Los Alamos, New Mexico
Nuclear design lab and Pu Sustainment
(B61, W76, W78, W88)



Lawrence Livermore Nat'l Laboratory

Livermore, California
Nuclear design lab
(W80, W87, B83)

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
Uranium operations



Savannah River Site

Aiken, South Carolina
Tritium operations



Shared Nuclear Deterrence Responsibilities with DoD



DoD

- Establish military requirements
- Design, develop, test, and produce delivery system
- Operate complete nuclear weapons system
- Secure and maintain nuclear weapons
- Train personnel and plan for employment

DOE

- Maintain safety, security and reliability of the stockpile
- Research and develop nuclear weapon science, technology and engineering
- Support stockpile levels
- Validate warhead safety and assess reliability
- Produce and manage nuclear materials

NUCLEAR WEAPONS COUNCIL



Today's Nuclear Stockpile and Delivery Systems



B61-11, W80-1, B83-1



B-52

W80-1



B61-7/11, B83-1



B-2A

W76-0/1, W88



D5

B61-3/4/10



F-15E



F-16

W78, W87



MM III

Both must be transformed to meet tomorrow's priorities



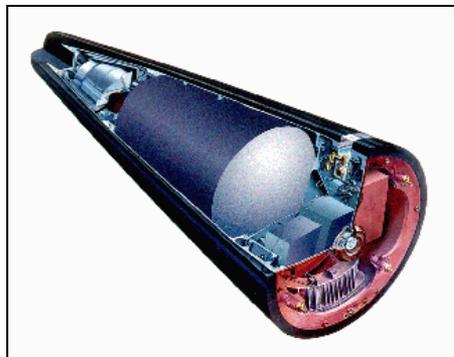
Bombs and Cruise Missiles



	B61-3/-4/-10	B61-7/-11	B83	W80-1
Description	Non-strategic bomb	Strategic bomb	Strategic bomb	Air launched cruise missile
Primary Use	Air to surface	Air to surface	Air to surface	Air to surface
Delivery System	F-15E, F-16, PA200, F-35	B-2	B-2, B-52	B-52
Service	Air Force	Air Force	Air Force	Air Force
Date Entered Service	10/79 (-3), 8/79 (-4) 8/90 (-10)	9/85 (-7), 11/97(-11)	9/83	2/82
Laboratory	LANL & Sandia	LANL & Sandia	LLNL & Sandia	LLNL & Sandia



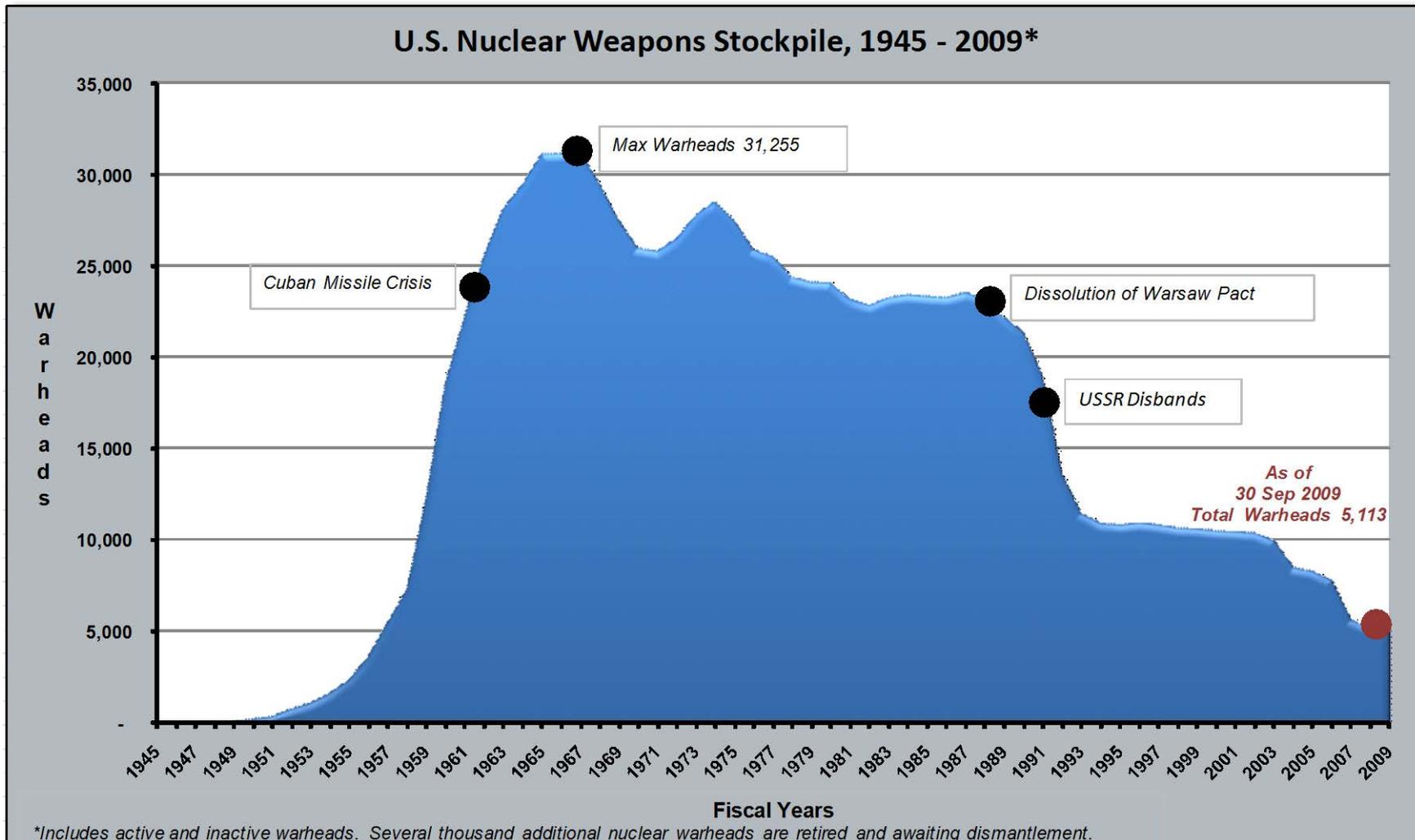
Ballistic Missiles



	W76	W78	W87	W88
Description	SLBM	ICBM	ICBM	SLBM
Primary Use	Underwater to surface	Surface to surface	Surface to surface	Underwater to surface
Delivery System	Trident II (D-5)	Minuteman III	Minuteman III	Trident II (D-5)
Service	Navy	Air Force	Air Force	Navy
Date Entered Service	11/78	9/79	7/86	6/89
Laboratory	LANL & Sandia	LANL & Sandia	LLNL & Sandia	LANL & Sandia



Evolution of the Stockpile



Not a linear relationship between weapons and budget. As the stockpile gets smaller, if anything goes wrong it impacts a greater fraction of the stockpile



Dismantlement Program



- Planned NNSA quantities completed

- Pantex Dismantlements

- FY08: 110% (648)*
- FY09: 117% (356)*
- FY10: 126%
- FY11: 120%
- FY12: 112%
- FY13: 88% (Seq.)
- FY14: 100% (Approx.)



- CSA Dismantlements

- FY08: 141%
- FY09: 110%
- FY10: 110%
- FY11: 100%
- FY12: 100%
- FY13: 105%
- FY14: 100% (Approx.)



*Fact Sheet: Increasing Transparency in the US Nuclear Weapons Stockpile

Complete by 2022 the dismantlement of all weapons systems retired prior to 2009.

- DOE Strategic Plan, May 2011



Stockpile sustainment encompasses a broad set of activities within Defense Programs



To be effective, NNSA's stockpile management strategy must achieve the following:

- **Sustain the stockpile, both active and hedge, through:**
 - Maintenance
 - Alterations
 - Modifications
 - Life Extension Programs (LEPs).
- **Respond effectively to geopolitical challenges, arms control opportunities, and technical surprises**
 - Sustain a highly specialized technical workforce
 - Develop and sustain capabilities, facilities and infrastructure essential to supporting dynamic stockpile requirements

A well-planned and well-executed strategy will enable NNSA and DoD to build a deployment and hedge strategy consistent with the goal to establish a smaller, yet effective, nuclear deterrent



Maintaining and modernizing the stockpile requires a long range vision



- Meet objectives of the President's deployment strategy
 - E.g., Presidential Policy Directives, Nuclear Posture Review
- Coordinate with the DoD
 - DoD Nuclear Weapon Council, including OSD Policy, AT&L (Nuclear Matters), Joint Staff, and STRATCOM, Air Force, Navy, and OSD CAPE
 - Align with DoD delivery system upgrades/capabilities
- Anticipate safety and security requirements and address aging and obsolescence components
- Is supported by the design and production capabilities within the Nuclear Security Complex
- ... and is adequately funded by Congress

NNSA develops a biannual "Stockpile Stewardship and Management Plan" laying out their plans for the next 25 years



DoD and NNSA have developed a 3+2 strategic vision

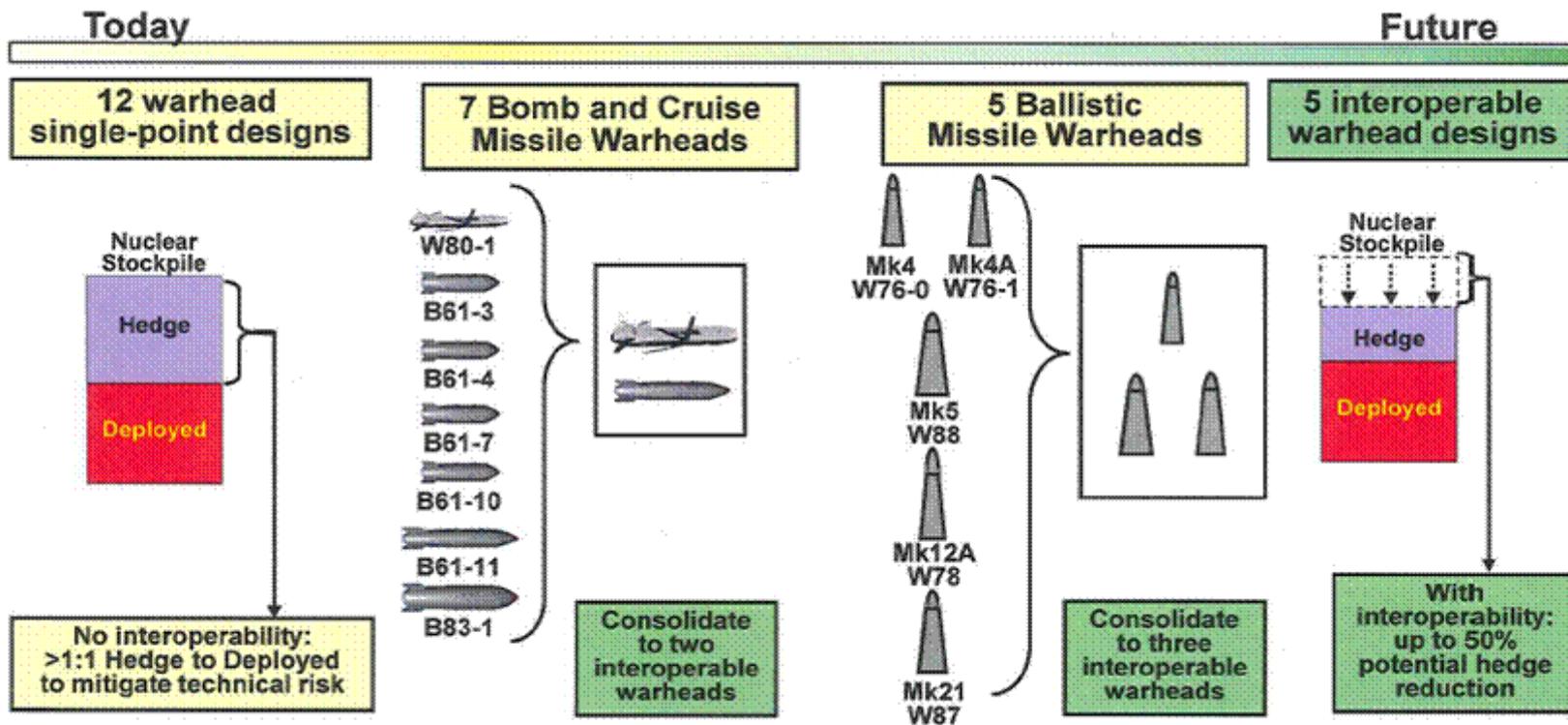


- The existing stockpile consists of 2 SLBMs (W76 & W88) , 2 ICBMs (W78 & W87) and 3 air delivered warheads or bombs (B61, B83 and W80-1).
- The “3+2” strategic vision calls for:
 - 3 interoperable ballistic missile warheads deployed on both the SLBM and ICBM legs of the Triad and,
 - 2 interoperable air-delivered warheads or bombs.
 - It will take 40-50 years to realize this strategic vision for all systems

The Nuclear Weapons Council has endorsed the “3+2” as a basis for stockpile modernization



The “3+2” Strategic Vision for Transition of the Stockpile



- Three ballistic missile-type warheads, each deployable on both Air Force and Navy delivery systems, employing three interoperable nuclear explosive packages with adaptable non-nuclear components.
- Two types of air-delivered nuclear weapons, both deployable in a cruise missile and a bomb weapon system, employing interoperable nuclear explosive packages with adaptable non-nuclear components.



W76 Life Extension Program



FY 2014 – FY 2019 Objectives

- Continue ongoing assessment and certification activities
- Conduct REST and Stockpile surveillance activities
- Accomplish safety studies necessary to maintain production and surveillance activities
- Monitor number of SFIs and aging effects
- First system to implement Phase 6.X process
- Implement improved project management and controls
- Improve weapon safety and reliability
- Eliminate quality and reliability watch list items
- Improve physics margin
- Eliminate safety soft spots
- Reduce future maintenance and future weapon exposure
- Continue W76 LEP production and deliver completed W76-1s to the Department of the Navy



D-5 Missile SLBM Flight Test

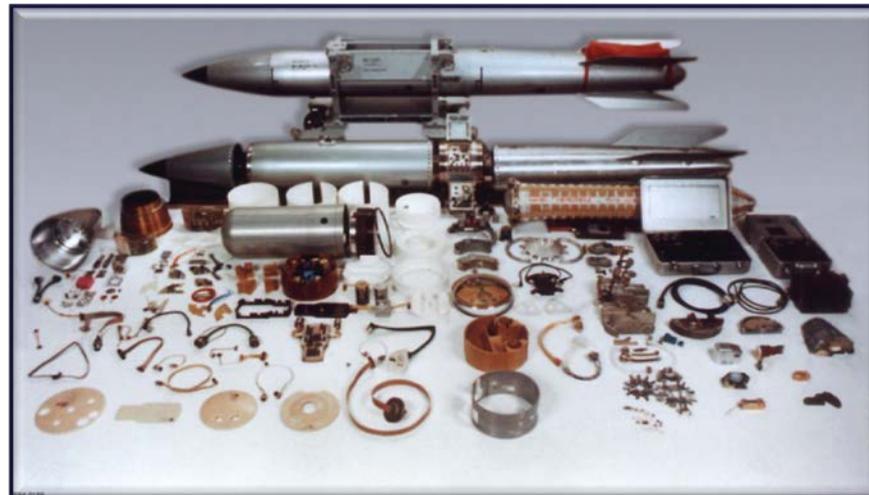


B61 Life Extension Program



FY 2014 – FY 2020 Objectives

- Qualify and certify the refurbished B61 for an additional lifetime with the FPU in FY 2020
- Ensure modern and legacy aircraft compatibility
- Integrate new Air Force delivery capability
- Consolidate (4) B61 modifications into a single bomb variant
- Improve weapon safety, use control and reliability
- Implement improved project management & controls
- Reduce special nuclear material
- Reduce maintenance and weapon exposure
- Improve physics margin
- Eliminate safety soft spots



B61 Full Scope LEP



Significant Progress has been Made in Modernizing the NSE infrastructure



- The new Kansas City Complex (KCRIMS) is complete
- Construction of the High Explosives Pressing Facility (HEPF) at Pantex will be completed by FY16
- Investments in plutonium infrastructure at LANL will be made in 3 phases: RLUOB, PF4, and additional special-purpose modules
- Investments in uranium infrastructure are being re-planned to permit exit from building 9212 by 2025
- At Pantex:
 - SS-21 (Seamless Safety) is fully in place
 - All weapon types can be maintained
- At Sandia:
 - MESA is fully operational
 - Neutron generator facility is in place
 - Z Refurbishment is complete, high-quality data are being obtained

Acronyms

MESA=Microsystems and Engineering Sciences Applications
NEPA=National Environmental Policy Act
NSE=Nuclear Security Enterprise
SEIS=Supplemental Environmental Impact Statement
SS21=Seamless Safety in the 21st Century



Significant Progress has been Made in Modernizing the NSE infrastructure



- At Savannah River:
 - Tritium extraction is underway
- At Los Alamos:
 - DARHT is fully complete and generating high-quality data
- At Livermore:
 - NIF is fully in place and generating high-quality data for ICF and weapon science
- At Nevada:
 - Criticality Experiments Facility (CEF) is complete and generating data
 - U1a subcritical experiments are generating high-quality data
 - JASPER gas gun experiments are continuing



Summary



- Implementation of the 2010 Nuclear Posture Review has been pursued aggressively. The results show in an increased focus on support for the New Start treaty implementation, nuclear non-proliferation, weapon life extension programs, infrastructure investments, and weapon dismantlements.
- The Stockpile Stewardship and Management Plan provides a national roadmap for the advanced science and technology development required to maintain the safety, security and reliability of the stockpile.