

***Assessing the Current (former, future ...)  
Approaches to Weapon Life Extension  
Programs amidst Fiscal Constraints,  
New Priorities***

***Presentation to***

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U.S. DEPARTMENT OF  
**ENERGY**





# 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...”*

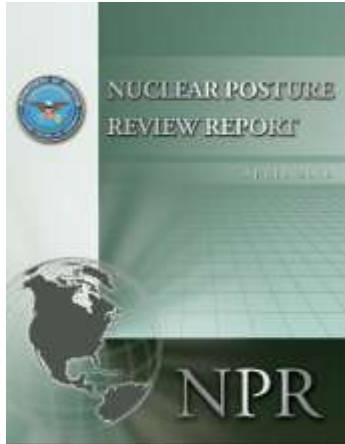
**President Obama, April 5, 2009  
Prague, Czech Republic**

*“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**



# 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**



# National Strategic Policy for Nuclear Weapons has been clearly formulated ... and executed



## NPR Implementation: Results so far

The NPR stated the following as priorities, among others:

“...providing annual stockpile assessments through weapons surveillance.” *Surveillance funding increased significantly*

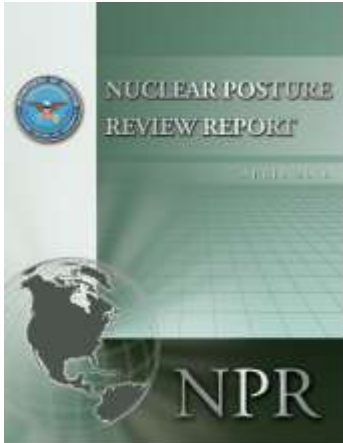
“...funding fully the ongoing LEP for the **W76** submarine-based warhead and the LEP study and follow-on activities for the **B61** bomb...”

*W76-1 build rate achieved; all required weapons delivered in FY12*

*B61-12 LEP now in Phase 6.3*

“...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...” *W78/88-1 now in Phase 6.2*

“...the science, technology and engineering base, vital for stockpile stewardship as well as providing insights for non-proliferation, must be strengthened...” *ST&E base has been sustained, some elements strengthened; e.g., Pu subcrit expts, component technology maturation*





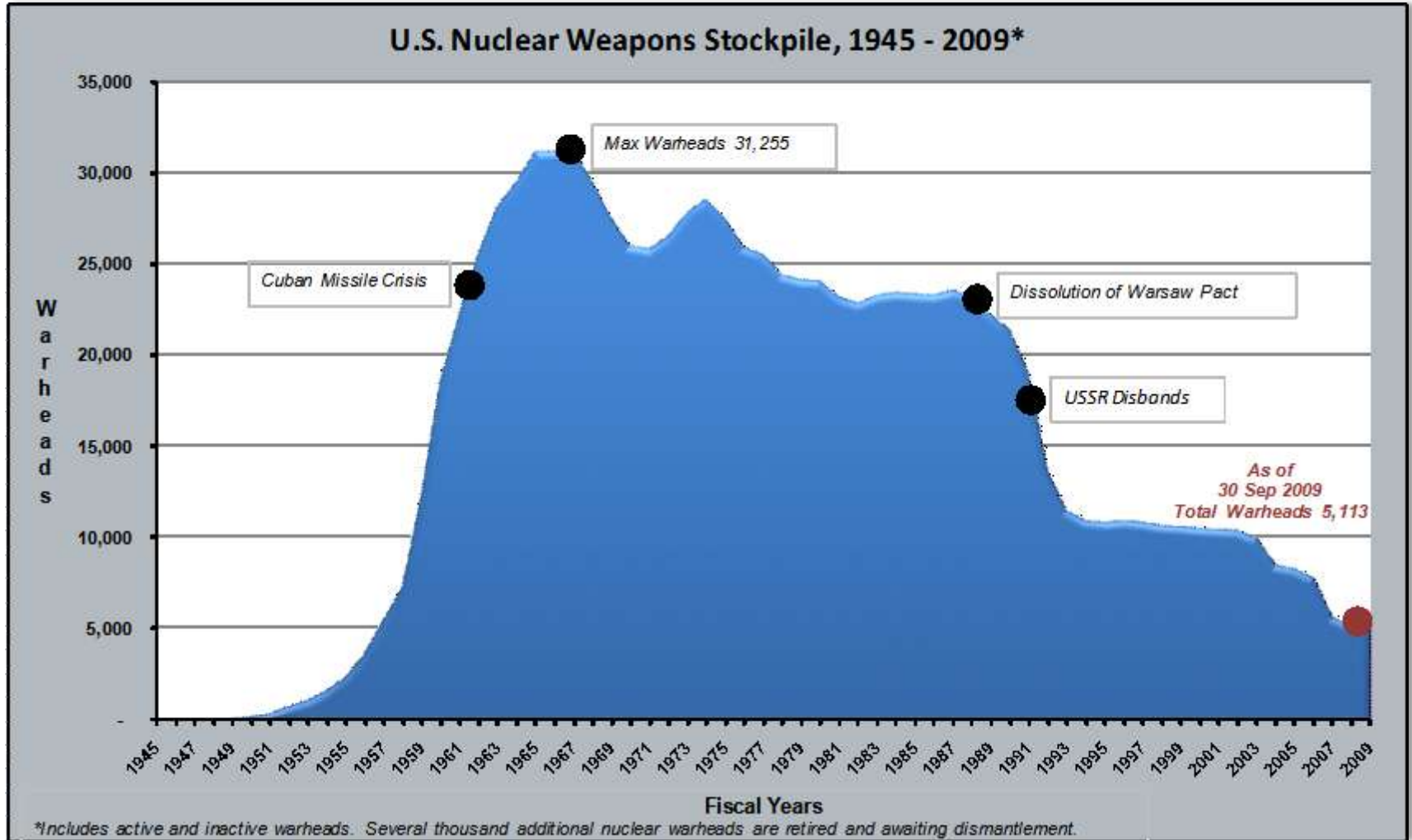
## Four Assertions



1. We have the oldest stockpile we have ever had (avg. life > 26 yrs) and the smallest stockpile since the Eisenhower administration.
2. Currently, we expend substantial effort in understanding the effects of warhead aging (because we must), but we desire to re-set the clock (remanufacture and modernize warheads).
3. In the first two decades post NTE (nuclear test era) we built the “power tools” of Stockpile Stewardship. In the next two decades, we must apply those power tools to modernization of the US nuclear deterrent writ large (people, stockpile, infrastructure, business practices).
4. “Regularizing” the activities in Stockpile Stewardship and Management, in such a way as to use the capabilities we must have, is an effective manner of continuous capability maintenance and renewal.



# Evolution of the Stockpile





# 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



# Safety, Security and Reliability are the Key Elements of Stockpile Sustainability

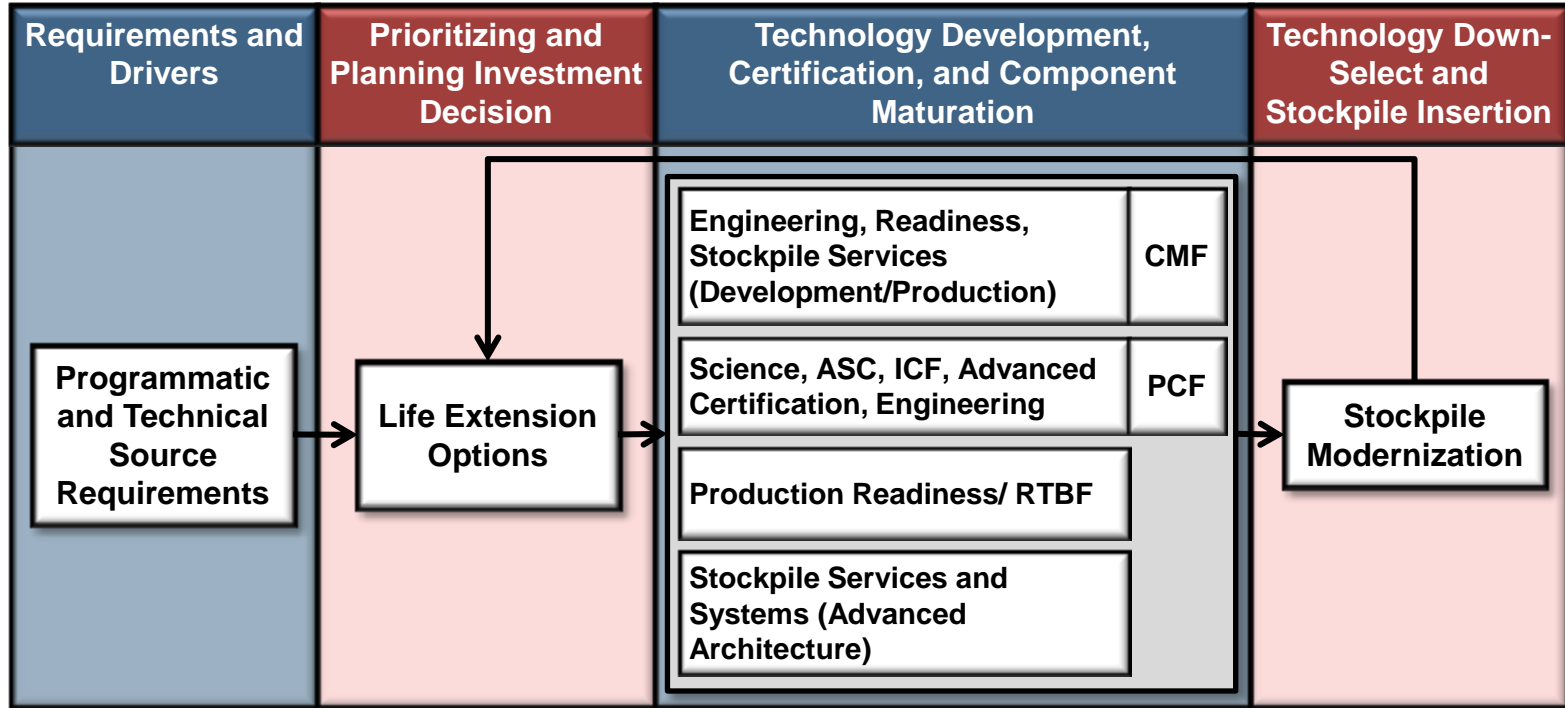


- **Continual surveillance and performance assessments** of the stockpile underpin **reliability and safety**
  - Modern system baselines rely on advanced computational models and an assimilation of data from the UGT and post-UGT eras
  - In-depth evaluation of nuclear and non-nuclear components and materials; functional component, laboratory, and flight tests
- **Certification and annual assessment** of the state of the stockpile through comprehensive theoretical modeling validated by comparison with test data and current experiments
- Detailed formulation of **Life Extension Plans (LEP)** for each system includes **safety and security** considerations
  - Use of insensitive high explosives is a goal for all systems
  - Plan meets military requirements and policy commitments
  - Validation of LEP activities through modeling and experiments





# LEP Planning Framework



Requires continual advancement of the state of the art for each element of the framework



# Flow of Science and Technology Deliverables to the LEP process



Phase 6.x



**SSMP-PCF, CMF**

- Refurbishment options analyzed (PCF)
- Determination of component lifetimes (CMF)

**Acronyms**

DA=Design Agency  
FPM=Federal Program Manager  
PA=Production Agency

**CMF**

- Component technology and manufacturing development
- Integration between DAs, PAs, and FPMs

**PCF**

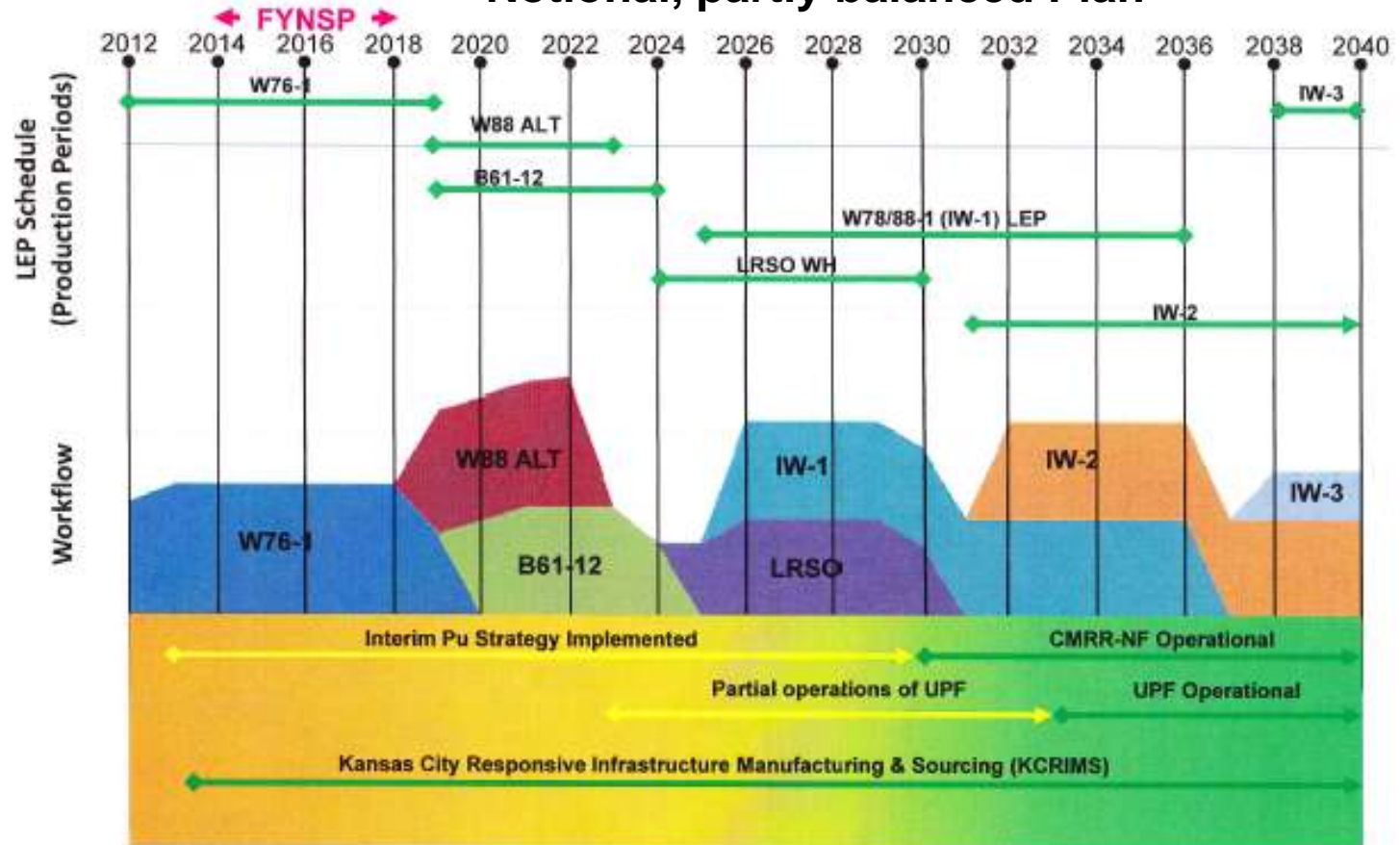
- Certification and qualification activities
- Models and simulations of all aspects of weapon performance
- Supplies computational tools and data to the CMF



# A balanced plan for stockpile life extension across the deterrent platforms would levelize the workload



## Notional, partly balanced Plan



A more evenly leveled plan could reduce large peaks and valleys by adjusting work schedules to fit within a “capability complex” framework



## Next Steps



- Focus on Life Extension Programs to treat LEPs as major acquisition programs – which they are (FY13-14).
- Incorporate Systems Engineering and Integration principles in further implementation of the 2010 Nuclear Posture Review, delivering on present commitments, and analyzing and making decisions regarding new commitments (FY13-14).
- Conduct detailed analysis of the workforce requirements across the nuclear security enterprise to support integration of life extension programs and infrastructure modernization efforts (FY13-14).
- Strengthen the linkage between modernization, transparency, and verification technologies in support of the New Start Treaty and any potential follow-on treaties (ongoing).



# Conclusions



- Implementation of the 2010 Nuclear Posture Review is being pursued aggressively. The results show in an increased focus on support for the New Start treaty, nuclear non-proliferation, weapon life extension programs, infrastructure investments, and weapon dismantlements.
- The Stockpile Stewardship and Management Plan provides a roadmap for the advanced science, technology, engineering, and manufacturing development required to maintain the safety, security and reliability of the stockpile, and to extend it into the future. The FY14 SSMP is being drafted, with intent to release following incorporation on PBR14.
- The long-term cost of the US nuclear deterrent warheads will likely be minimized with commitment to, and execution of, a “regularized” level of activity across the nuclear security enterprise. Strong connections between modernization and transparency of operations will prove to be invaluable.