Plutonium Pit Production Analysis of Alternatives (AoA) Results & Next Steps

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NATIONAL NUCLEAR SECURITY ADMINISTRATION OFFICE OF DEFENSE PROGRAMS

Pit Production Strategy and Progress

- To sustain plutonium infrastructure and establish capabilities to resume production of war reserve pits, NNSA is:
  - Investing over $1B from FY19 – FY23 to sustain current operations and achieve 30 pits per year (ppy) production capability by 2026
  - Investing over $2B in construction projects to replace CMR capabilities and reconfigure space to support production
  - Analyzing options, consistent with DOE O 413.3B, for long-term infrastructure needs to support the 80 ppy requirements and other mission needs

- Progress:
  - Safely resumed operations in PF-4 after a 3-year operational pause
  - Began construction activities for the first two CMRR subprojects:
    - RLUOB Equipment Installation Phase 2 (REI2)
    - PF-4 Equipment Installation Phase 1 (PEI1)
    - Both are on schedule and under budget
  - Fabricated two development pits in FY17; will build four development pits in FY18
  - Completed the Plutonium Pit Production Analysis of Alternatives in FY17

Pit Production AoA Scope and Assumptions

- The AoA assessed alternatives to meet the sustained production capacity of no fewer than 80 ppy by 2030

- AoA Assumptions, Facts and Constraints
  - LANL is the Plutonium Center of Excellence for the enduring R&D mission
  - Capabilities installed under CMRR and Plutonium Sustainment remain in PF-4 and RLUOB
  - Operations in PF-4 to meet the 30 ppy goal in 2026 will continue and PF-4 will be capable of an estimated 30 ppy after the upgrades
  - The threshold requirement is 80 ppy at high confidence, due to pit aging estimates and planned production schedules to meet military requirements
  - Future pits will be produced using current processes and technology

Evaluation Criteria and Other Considerations

Evaluation Criteria:

- Cost, schedule, risk
- Ability to support objective requirements for NNSA and DOE missions
- Capacity for pit reuse operations simultaneous with pit remanufacturing
- Ability to accommodate surge capacity
- Synergy of plutonium science, metal preparation, and production
- Ability to accommodate future changes in mission requirements
- Useful lifetime

Other Considerations:

- Qualified workforce & Expertise / Availability of workforce
- Design Agency (DA) and Production Agency (PA) Colocation / Resiliency
- Environmental
- Transportation
- Mission Impact

AoA Results: Two Preferred Alternatives

1. Refurbishing and repurposing facilities at the Savannah River Site
   - Cost range: $1.4-5.4 B
   - Schedule range: FY24-31
   - Risk: Reconfiguring a partially completed facility for a new mission in a new location

2. Additional footprint to accommodate pit production requirements at Los Alamos National Laboratory
   - Cost range: $1.9-7.5 B
   - Schedule range: FY27-33
   - Risk: Less favorable cost and schedule for achieving a sustained 80 ppy facility

Next Steps

- Conduct detailed engineering analysis (EA) for both alternatives to inform the selection of a single alternative and support conceptual design
- The EA is analyzing pre-conceptual design options at the two sites and will provide an engineering feasibility report
- The results of the EA will inform conceptual design for the Deputy Secretary's approval of Critical Decision (CD)-1 (Approve Alternative Selection and Cost Range) in accordance with DOE Order 413.3B
  - Project baselines are not established until CD-2 approval (Approve Performance Baseline), which requires 90% design completion

BACKUP

41 Options Evaluated Resulting in Detailed Analysis of 5 Alternatives

Production Approach	Capabilities in PF-4	Capabilities Outside PF-4	41 Alternatives Evaluated 5 Options (*shaded green*) Received Detailed Cost, Schedule and Risk Analysis			
0 - Status Quo	Pu Science and Cert + Metal Prep and 30 ppy		LANL0			
1 - Split Production	Pu Science and Cert + Metal Prep and 30 ppy	Production 50 ppy at LANL	LANL1-A (New)			
		Production 50 ppy at SRS	SRS1-A (MFFF)	SRS1-B (K-Area)	SRS1-C (WSB)	SRS1-D (New)
		Production 50 ppy at INL	INL1-A (FPF)	INL1-B (New)		
		Production 50 ppy at Pantex/NNSS	PX1 (New)	NNSS1 (New)		
	Pu Science and Cert + Metal Prep and other missions out	Production various ppy at new construction at LANL	LANL1-B (Aries and Pu238 stay)	LANL1-C (Aries stays, Pu238 goes)	LANL1-D (Aries goes, Pu238 stays)	LANL1-E (Aries and Pu238 go)
2 - Move Production and Metal Prep	Pu Science and Cert	Metal Prep and 80 ppy at LANL	LANL2 (New)			
		Metal Prep and 80 ppy at SRS	SRS2-A (MFFF)	SRS2-B (K-Area)	SRS2-C (WSB)	SRS2-D (New)
		Metal Prep and 80 ppy at INL	INL2-A (FPF)	INL2-B (New)		
		Metal Prep and 80 ppy at Pantex/NNSS	PX2 (New)	NNSS2 (New)		
3 - Move Production	Pu Science and Cert + Metal Prep	80 ppy at LANL	LANL3 (New)			
		80 ppy at SRS	SRS3-A (MFFF)	SRS3-B (K-Area)	SRS3-C (WSB)	SRS3-D (New)
		80 ppy at INL	INL3-A (FPF)	INL3-B (New)		
		80 ppy at Pantex/NNSS	PX3 (New)	NNSS3 (New)		
4 - Move Metal Prep	Pu Science and Cert + 80 ppy	Metal Prep at LANL	LANL4 (New)			
		Metal Prep at SRS	SRS4-A (MFFF)	SRS4-B (K-Area)	SRS4-C (WSB)	SRS4-D (New)
		Metal Prep at INL	INL4-A (FPF)	INL4-B (New)		
		Metal Prep at Pantex/NNSS	PX4 (New)	NNSS4 (New)		

- 36 of 41 options were eliminated from further consideration after the team developed floor space estimates and initial cost, schedule, and risk assessments
  - Insufficient space
  - High cost for support facilities
  - Late to need
  - Facility condition
  - Mission disruption

Summary of Results

Approach	Refurbishment		New Facility Construction		
Alternative	**SRS MFFF**	**INL FPF**	**INL**	**SRS**	**LANL**
CD-4 Cost Range (FY18$B)	1.4 - 5.4	1.5 – 5.0	1.9 - 6.9	1.8 - 6.7	1.9 - 7.5
CD-4 Schedule Range	FY24 – 31		FY27 – 33		
80 ppy Schedule Range	FY29 – 36		FY33 – 38		
Risks	Potentially contentious state government				
	No experience with pit production				
	Delays in facility availability cause schedule delays				
	Potential structural issues with refurbishment				
	Change in safety basis from NRC to DOE				
		Organizational Interface - Not an NNSA Site (DOE-NE site)			
Opportunities	Ample space for future flexibility				Experienced pit production techs
	Current NNSA production agency			Current NNSA production agency	
	NNSA Site Office			NNSA Site Office	