

LANL pit production: fifth failure in progress

What's going on, why it's important, and how we all can help

Greg Mello and Trish Williams-Mello, Los Alamos Study Group, September 30, 2021

"If there must be trouble, let it be in my day, that my child may have peace." (Thomas Paine, "The Crisis")

"Save as many as you can." (from the 2004 movie, "The Day After Tomorrow")*

**Clipped at https://www.lasg.org/videos/DayAfterTomorrow_clip_SaveAsManyAsYouCan.mp4*

*"The French people, in June and July 1940, were not a people waylaid by a band of ruffians, whose country was suddenly snatched from them. They are a people who opened their hands and allowed their country to fall to the ground. Later on...they spent themselves in ever more and more desperate efforts to pick it up again; but someone had placed his foot on it." (Simone Weil, *The Need for Roots*)*



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To subscribe to the Study Group's New Mexico listserve, send a blank email to lasg_activist_leaders-subscribe@lists.riseup.net

Blog: <https://lasg.org/wordpress/>

Tonight's agenda

- 1. (10 minutes) Key takeaways**
- 2. (40 min.) Background & update on recent nuclear weapons developments, nationally and at LANL, with Q&A, discussion**
- 3. (20 min.) Savannah River Site pit production, background and update: presentation, Q&A, discussion**
- 4. (15 min.) Overcoming artificial divisions between issues, discussion**
- 5. (35 min.) Next steps, including: demonstration and call for transparency, dialogue, and accountability, November 5, noon at the State Capitol -- general outline, objectives, volunteer opportunities**
- 6. (Informal discussion as we prepare to vacate hall)**

W88 Warhead for Trident D-5 Ballistic Missile

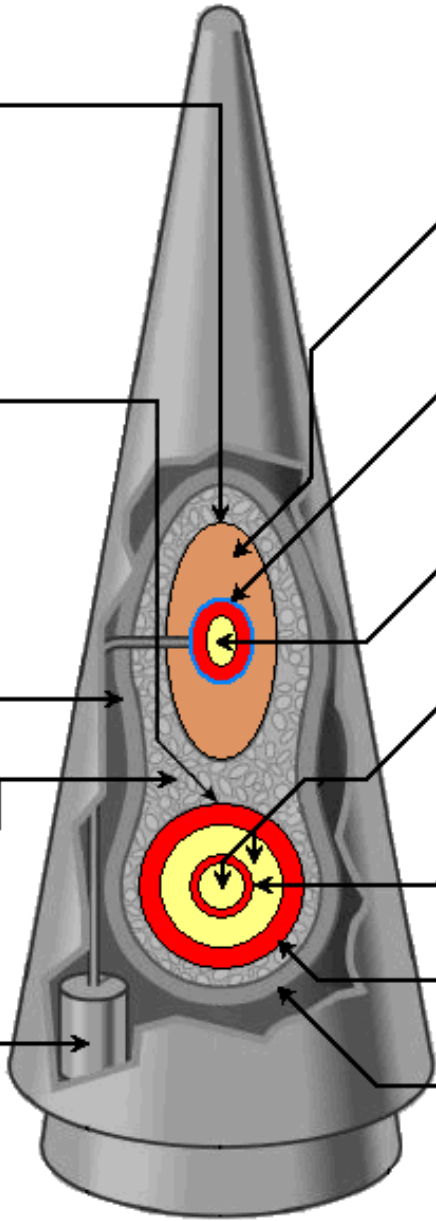
1. The "Primary"
Two-point, hollow-pit, fusion-boosted high explosive implosion

2. The "Secondary"
Spherical, all-fissile, fusion-boosted radiation implosion

3. Radiation Case
Peanut-shaped, channels x-rays from primary to secondary

4. Channel Filler
Plastic foam plasma generator

5. Booster Gas Cannister
Periodic replacement as tritium gas decays



High Explosive Lens
Two lenses drive primary implosion

Plutonium-239 Pit
Beryllium-reflected hollow pit

Tritium & Deuterium
Booster gas, fusion makes neutrons

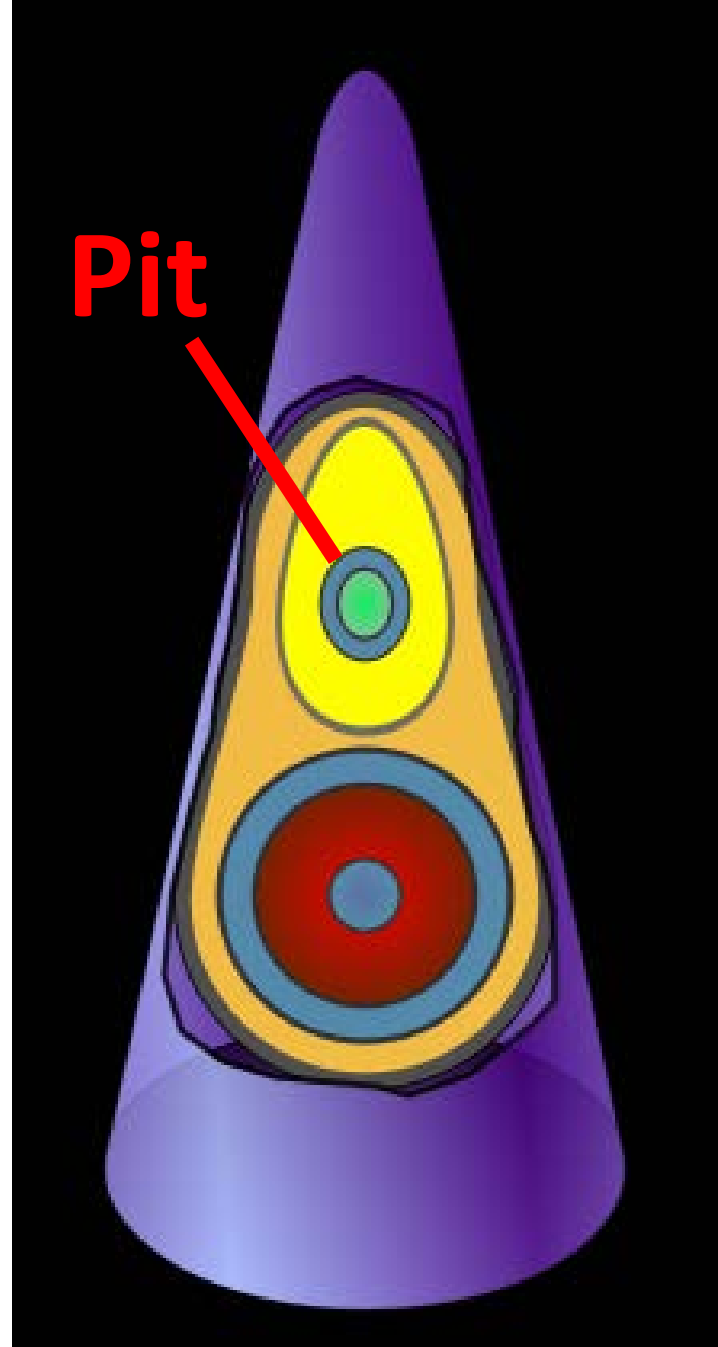
Lithium-6 Deuteride
Lithium becomes tritium, fusion makes neutrons

Uranium-235 "Sparkplug"
Starts tritium generation and fusion in the secondary

Uranium-235 "Pusher"
Heat shield, tamper, and fission fuel (fission by all neutrons)

Uranium-238 Case
Fission by fusion neutrons only

Sources for illustrations: Wikipedia



New silo-based missiles are to be the destination for new plutonium pits.

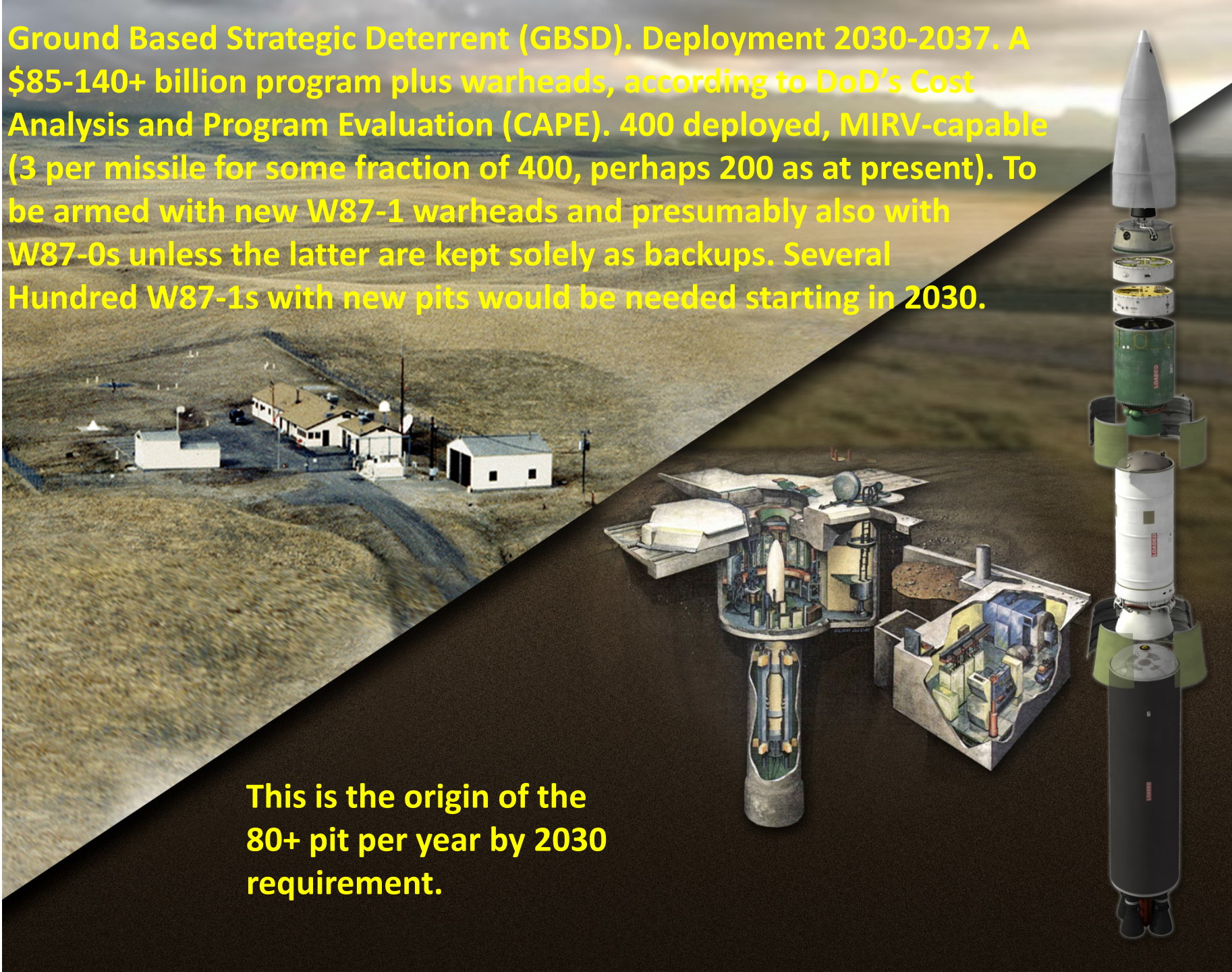


W87, shown here in (retired) MX missile configuration, circular error probable (CEP) is classified but < 400 ft. Yield is 330/475 kilotons (kt). It is pits for this warhead or a variant which LANL is tasked to make.

The US possesses ~ 540 W87s, in addition to ~780 W78s in Mark 12A RVs (CEP ~720 ft) for the same 450 Minuteman III missiles.

At present, at least 200 MM IIIs could be returned to multiple independent RV (MIRV) status, with 3 W78 warheads each.

Ground Based Strategic Deterrent (GBSD). Deployment 2030-2037. A \$85-140+ billion program plus warheads, according to DoD's Cost Analysis and Program Evaluation (CAPE). 400 deployed, MIRV-capable (3 per missile for some fraction of 400, perhaps 200 as at present). To be armed with new W87-1 warheads and presumably also with W87-0s unless the latter are kept solely as backups. Several Hundred W87-1s with new pits would be needed starting in 2030.



This is the origin of the 80+ pit per year by 2030 requirement.



Key Takeaways (I)

- 1. LANL's new production mission is a key enabling program for a new Cold War against now-combined Russia and China.**
- 2. LANL's new mission is absurd, based on poor engineering and management, and is vulnerable to "off-ramps." With help, LANL has failed at this mission four times before and is in the process of failing now, so far invisibly.**
- 3. It will be impossible to meet climate, environmental, or social goals under conditions of empire and a nuclear arms race, for political, fiscal, and social reasons.**
- 4. Santa Fe and Northern New Mexico are uniquely placed to make an enormous, material contribution to peace and social development.**



Key Takeaways (II)

- 5. LANL pit production in the 2020s and early 2030s artificially increases nuclear weapons (NW) spending & hiring across the NNSA complex.**
- 6. Postponing pit production until 2032-2035 makes sense from every perspective except a) empire, b) runaway nuclearism, and c) contractor budgets.**
- 7. There are senior staff in Congress and the military who want to stop LANL pit production in lieu of just R&D and training.**
- 8. If the war-state is not stopped now, and a broad political awakening not achieved in the 2020s, prospects for a habitable earth are dim.**
- 9. NW proponents deny the U.S. faces immediate, converging existential crises. We are certain otherwise. Pit production in the mid- to late-2030s is a pipe dream. Assertion of humane values matters most here, and now.**

Key Takeaways (III)

10. The U.S. is hardly a democracy any more. We cannot win if we naively imagine we can reform the present structures through electoral and lobbying techniques. The “MICIMATT” complex rules over the “Madisonian” institutions (Congress, the Executive, Courts). Naivety is dangerous.

We face the same governance failure in finance and large corporate cartels. We won't halt climate collapse through electoral & lobbying techniques either.

The bottom line is that we are in an emergency situation, in which we are called to revisit our personal priorities. We need to have family meetings, consider quitting our jobs if they are not deeply beneficial, and more. We need to get rid of the idea that we can “solve” our society's problems in comfort or without full-time commitments by a lot more people. Serious money is also needed.

Key Takeaways (IV)

11. To make this concrete, one (1) LANL pit will cost \geq \$50 million. LANL will spend \geq \$1 billion on pit production this year – and every year hence.

Components for a ~6kW solar system cost ~\$10,000. Installation & permitting approximately double this cost. A 4kW system is adequate for most homes (e.g. ours), & will support an electric bicycle also. If we can cut through unreasonable permitting requirements & provide consulting for DIYers, \$10,000 to \$12,000 for a 4kW system should be adequate. Obviously this does not solve intermittency or grid issues.

With an average federal subsidy of 50%, ~8,000-9,000 residential solar systems could be purchased & installed for the cost of 1 pit. For what LANL spends on pits in a year, \geq 167,000 residential solar systems could be bought.

Education, rural health care, & social services: go ahead, price them in pits.





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34 NA Pit Disassembly and Processing, LANL

PARS ID / DOE Project Number: 1201 TBD
CE or PME / Project Owner: Turk, D. Halse, J.
PM Analyst: Barker, P.
FPD / Certification: Not Assigned
Current CD / Date Approved: CD0 07/09/2021
CD-0 Cost Range, Low-High: \$1,000.0M \$3,400.0M
CD-1 Cost Range, Low-High:
CD-4 Date Range, Low-High: 09/30/2031 09/30/2035
Last Peer Review Date:
Next CD / Next CD Planned Date: CD1 09/30/2023

On July 9th, 2021, the Project Management Executive (PME) approved Critical Decision (CD)-0, Approve Mission Need, with a rough order-of-magnitude (ROM) cost range of \$1B to \$3.4B and a completion schedule range of FY 2031 to FY 2035.

35 NE Versatile Test Reactor (VTR) INL

PARS ID / DOE Project Number: 1158 21-E-200
CE or PME / Project Owner: Turk, D.

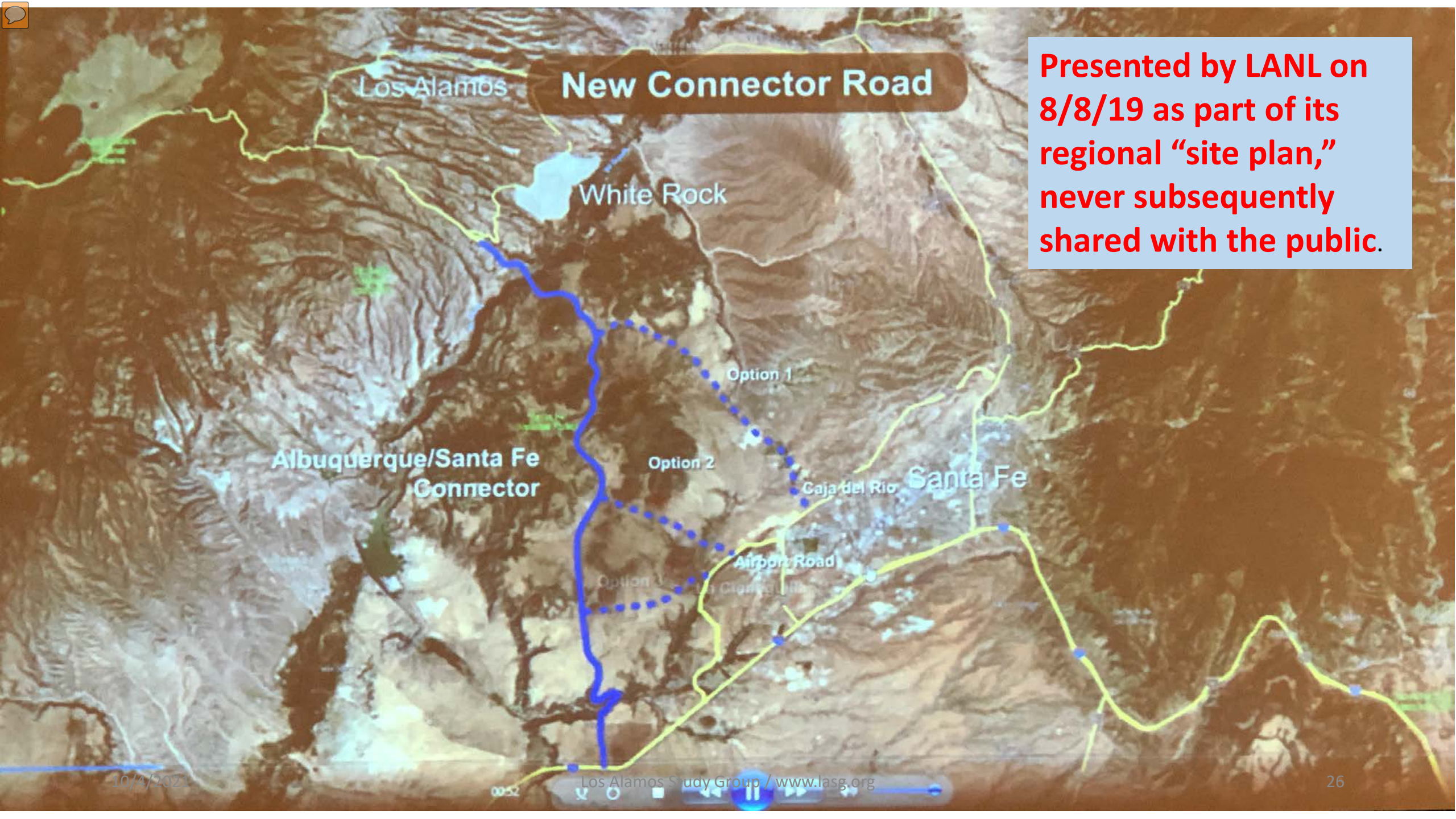
The integrated project team (IPT) anticipates completion of the final Environmental Impact Statement (EIS) by October 2021. Negotiations with the selected Design/Build contractor continue with award of the design portion





New Connector Road

Presented by LANL on 8/8/19 as part of its regional "site plan," never subsequently shared with the public.



Albuquerque/Santa Fe Connector

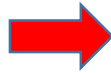
Option 1

Option 2

Option 3

Seven months earlier...

New Mexico Department of Transportation
Major Investment Projects of Regional Significance
(dollars in millions)



District 5		
I-25	\$ 250	Adding 3rd lane on I-25 between Bernalillo and Santa Fe.
NM 170	\$ 20	Adding shoulders and performing pavement preservation on 18 miles from Farmington to the Colorado state line.
Los Alamos Bypass	\$ 67	Construction of 15-16 miles of additional roadway and an additional crossing over the Rio Grande.
U.S. 64	\$ 225	Improve 2-lane sections and widen shoulders on various segments from the Arizona state line to the District 4 boundary.
U.S. 491	\$ 18	Pavement preservation and shoulder widening on 15 miles of roadway from Shiprock to the Colorado state line.

Source: NMDOT and LFC Files

*Project costs are based on formula calculations and are intended to provide an initial estimate only. Costs are not intended for programming or financing.

STATE OF NEW MEXICO
Report of the Legislative Finance Committee
to the Fifty-Fourth Legislature
January 2019
For Fiscal Year 2020
FIRST SESSION
Volume 3
https://nmlegis.gov/Entity/LFC/Documents/Session_Publications/Budget_Recommendations/2020RecommendVolIII.pdf

Ted Wyka, Manager, NNSA Los Alamos Field Office

September 21, 2021 presentation to Los Alamos County



LAP4 Mission Focus Areas

▶ Mission Focus Areas

- ▶ Producing pits - 30ppy in 2026
- ▶ Reestablishing qualified manufacturing processes to reliably produce War Reserve pits
- ▶ Modernizing production infrastructure
- ▶ Installing equipment to expand pit production capacity
- ▶ Investing in production and supporting infrastructure

▶ Los Alamos is focused on:

- ▶ •Hiring, clearing and training ~2,000 additional personnel
- ▶ •Providing support infrastructure (office space, parking, etc.) for new staff
- ▶ •Installing and qualifying new production equipment to achieve 10 ppy
- ▶ •Planning and executing capital acquisitions to reach and sustain 30 ppy capability
- ▶ •Aligning support capabilities to enable pit production -e.g., waste management

What will NNSA's pit production program cost?

August 24, 2021 gm

- We find that NNSA's pit production start-up costs for its two-site plan will lie in range of \$32-39 billion (B) through FY2033, with more than half of these expenses occurring at LANL under all assumptions.
- Omitting sunk costs, we estimate that FY22-33 pit production costs will lie in the range of \$27-\$34 B.
- We estimate costs for LANL pits made over the years 2023-2033 to be in the range of \$57-84 M per pit.
- SRS production capacity is expected to be much greater than LANL; our estimates assume 30-41 pits per year (ppy) at LANL vs. 50-103 ppy at SRS.
- We also estimate that SRS will have lower operating costs due to single-shift production, vs. two-shift production at LANL. For these reasons alone, not considering others, SRS per-pit costs will be much less than LANL's.
- The obvious way to cut back these tremendous program expenses without jeopardizing the goals of the pit production program overall is to eliminate early-time, quantity production at the inferior site.

See <http://lasg.org/MPF2/What-will-pit-production-cost.pdf> & <http://lasg.org/MPF2/Ltrhd,%20logo%20etc/spreadsheet>



New Mexico's largest public infrastructure investments

In relation to LANL capital projects (LCPs) planned, FY2020 – FY2030 (\$13 billion)

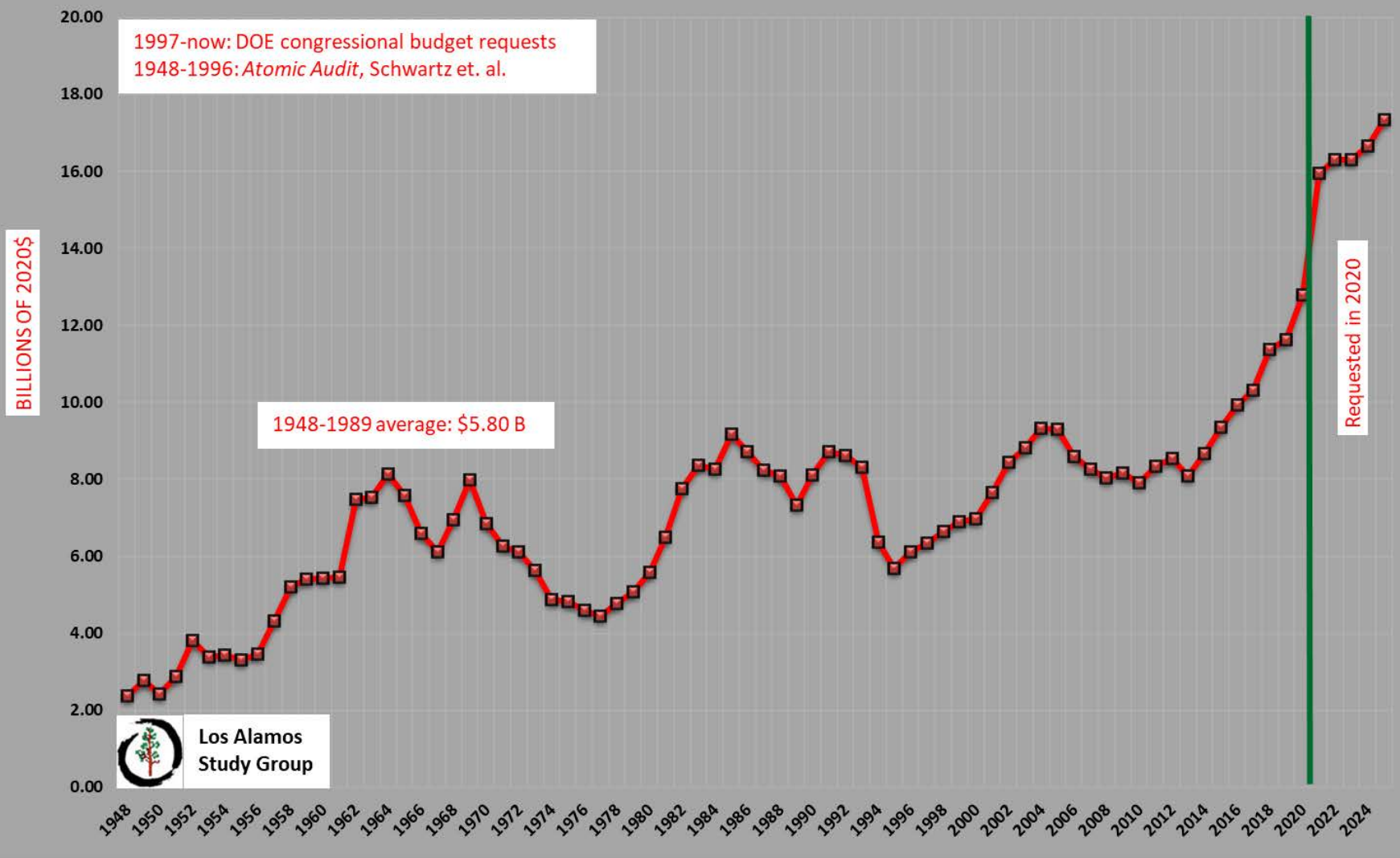
(Costs are best available; dates mostly at completion)

Project	Year	Cost Then (\$M)	Cost in 2019 (\$M)	Percent LCPs
Elephant Butte Dam, NM	1916	5.2	262	2%
(Golden Gate Bridge, CA)	1937	35	1,003	8%
San Juan Chama Diversion	1964	>35	>321	>2%
Cochiti Dam, NM	1975	94.4	406	3%
LANL TA-55 PF-4	1978	75	251	2%
I-40 + I-25 + I-10 highways, NM (treated here as one project)	1956-1995	~7.4 M/mile, 2006 dollars	Ballpark 9,207	71%
Big I Interchange, Albuquerque	2001	290	455	4%
San Juan Chama drinking water project, Albuquerque u	2008	280	334	3%
Railrunner Heavy Rail Extension to Santa Fe (incl. track lease)	2008	~400	~477	4%
LANL DARHT (very approximate)	~2008	~ 400	~477	~4%
SNL MESA Complex	2008	516.5	616	5%

Make no mistake, do not be distracted by details: this is to be a huge expansion that will dominates all investment in NM.

It will dominate our politics, attitudes, and institutions, and limit our future possibilities in myriad ways.

AEC/ERDA/DOE/NNSA Annual Spending for Nuclear Weapons Research, Development, Testing, and Production: NNSA Weapons Activities with administrative costs included; constant 2020\$; ≥FY21 requested, in then-year \$. Updated 2/28/20.



Previous slide: DoD components of nuclear weapons modernization; general discussion of vast overall nuclear weapon expense.

This slide: Unprecedented expansion of NNSA warhead budget. Backstory: Trump was blackmailed by bomb advocates as possible impeachment loomed.

Los Alamos National Laboratory (LANL) spending, current and proposed, \$ billions				
LANL M&O contractor: Triad, LLC	FY 2020 enacted	% total	FY 2021 request	% total
Weapons programs	1.93	59%	2.91	71%
Nonproliferation programs	0.29	9%	0.31	8%
Safeguards & security	0.15	5%	0.03	1%
Environmental Mgmt	0.03	1%	0.03	1%
DOE office of science	0.09	3%	0.06	1%
Energy & other programs	0.09	3%	0.02	0%
Work for others (WFO) (assumed unchanged)	0.35	11%	0.35	9%
Total Triad	2.93	89%	3.71	91%
LANL cleanup (N3B)	0.19	6%	0.19	5%
Los Alamos Site Office (LASO) (federal)	0.17	5%	0.18	4%
Total LANL	3.29	100%	4.08	100%

What does LANL do?

As of 8/20/20, LANL says it has 13,137 employees:

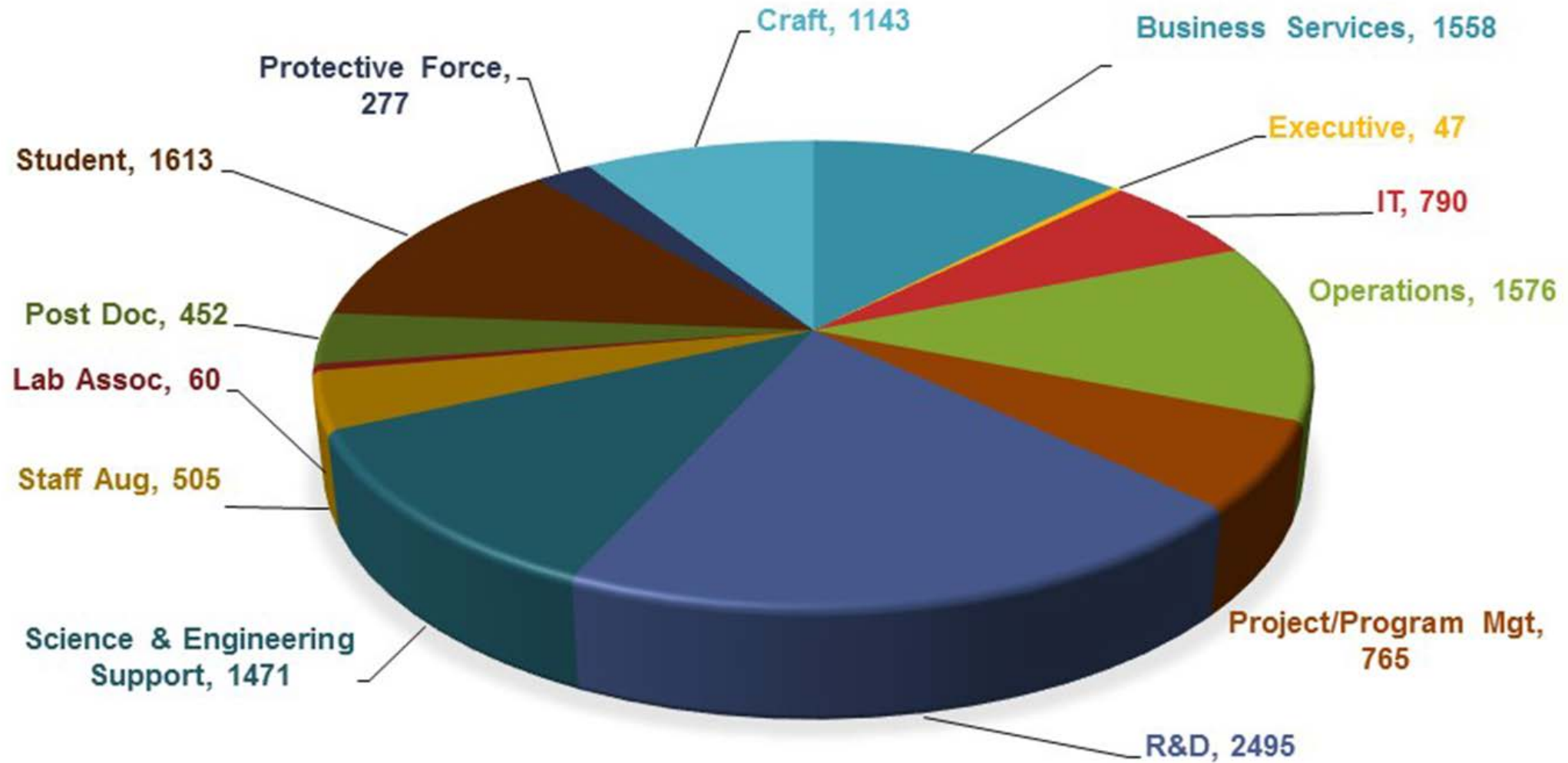
- Triad: 9,397 (67% university degreed, 21% PhD)
- Guard force (Centerra-LA): 281
- Subcontractors: 478 (part- or full-time?)
- Students: 1,323 (presumably few are full-time)
- Unionized craft workers: 1,160
- Postdocs: 498

This does not include N3B, its subcontractors, or LASO

Sources:

- <https://www.lanl.gov/about/facts-figures/index.php> (retrieved 8/20/20)
- <https://www.lasg.org/budget/FY2021/doe-fy2021-laboratory-table.pdf>

Los Alamos Workforce: 12,752

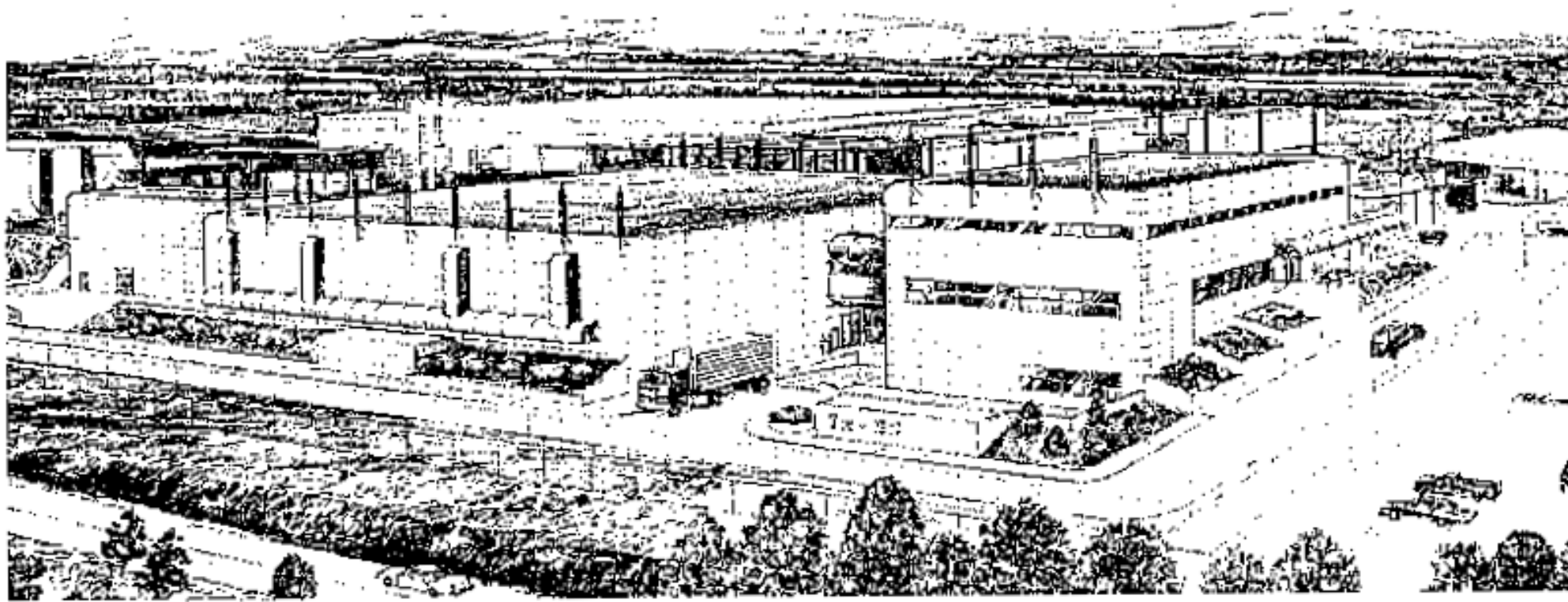


<https://www.lanl.gov/about/facts-figures/talent.php>



*Special Nuclear Materials Research and Development Laboratory
Replacement Project at Los Alamos National Laboratory*

**A glance
back at
LANL's
first
proposal
for a post-
Rocky
Flats pit
facility**



Architectural rendering of the Special Nuclear Materials Research and Development Laboratory Replacement Project.

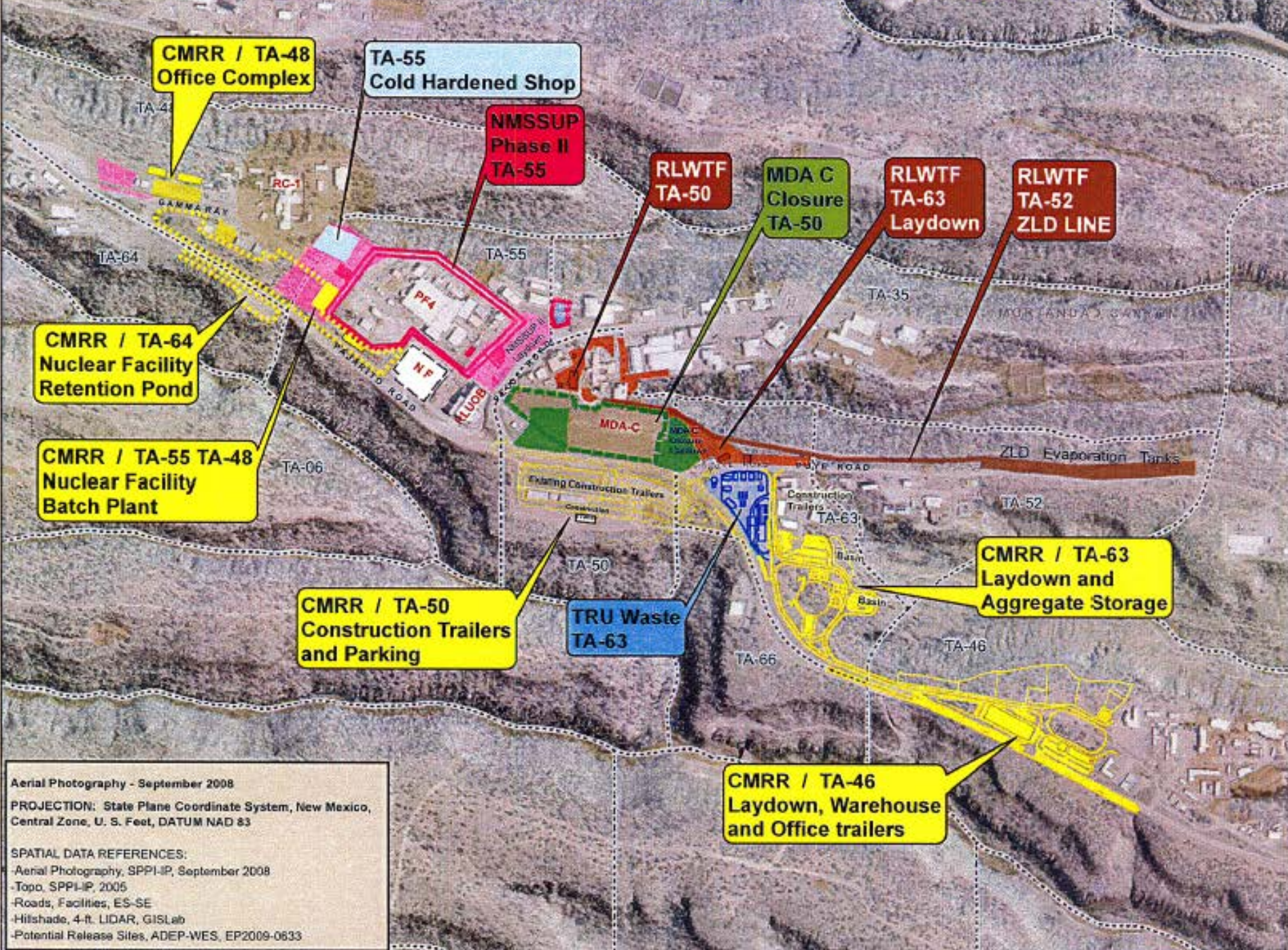
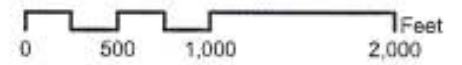
**Pajarito Corridor
Project Planning
2010 - 2020
DRAFT
December 2, 2010**

Legend

- Potential Release Site
- Technical Area Boundary



1 inch = 1,000 feet



Aerial Photography - September 2008
PROJECTION: State Plane Coordinate System, New Mexico, Central Zone, U. S. Feet, DATUM NAD 83
SPATIAL DATA REFERENCES:
-Aerial Photography, SPPI-IP, September 2008
-Topo, SPPI-IP, 2005
-Roads, Facilities, ES-SE
-Hillshade, 4-ft. LIDAR, GISLab
-Potential Release Sites, ADEP-WES, EP2009-0633



RLUOB: The most expensive construction project in the history of New Mexico (\$1.4 B, est. total cost)



RLUOB = Radiological Laboratory/Utility/Office Building
CMRR NF = Chemistry and Metallurgy Research Replacement Nuclear Facility
LLUOB = Light Laboratory/Utility/Office Building

Figure S.3.4.1-7—TA-55 Site Plan Showing the Proposed
CMRR and Manufacturing Annex Facilities

Fanciful proposal for a pit factory at LANL, 2008. Half of this was a real project, most of which (CMRR-NF) was canceled due to LASG litigation and prior geologic acts of God.

Plutonium Pit Manufacturing at the Savannah River Site

Dave Olson

SRNS Executive Vice President – NNSA Capital Projects

Nuclear Deterrence Summit – Pre-Conference Workshop

August 3, 2021

Plutonium Pit Processing at the Savannah River Site

- Repurpose the unfinished Mixed Oxide Fuel Fabrication Facility as the Savannah River Plutonium Processing Facility
- Achieve NNSA two-site solution to deliver 80 pits per year
 - 50 from Savannah River Site
 - 30 from Los Alamos National Laboratory

- Received CD-1 approval June 28 for Design/Build Project
- Conceptual design completed
- Life Cycle Cost Estimate completed
- EIS completed and ROD issued





The Program Requirement is to go from this concept ...



... to this reality, fully equipped and fully staffed for pit production



Workforce Recruitment and Training

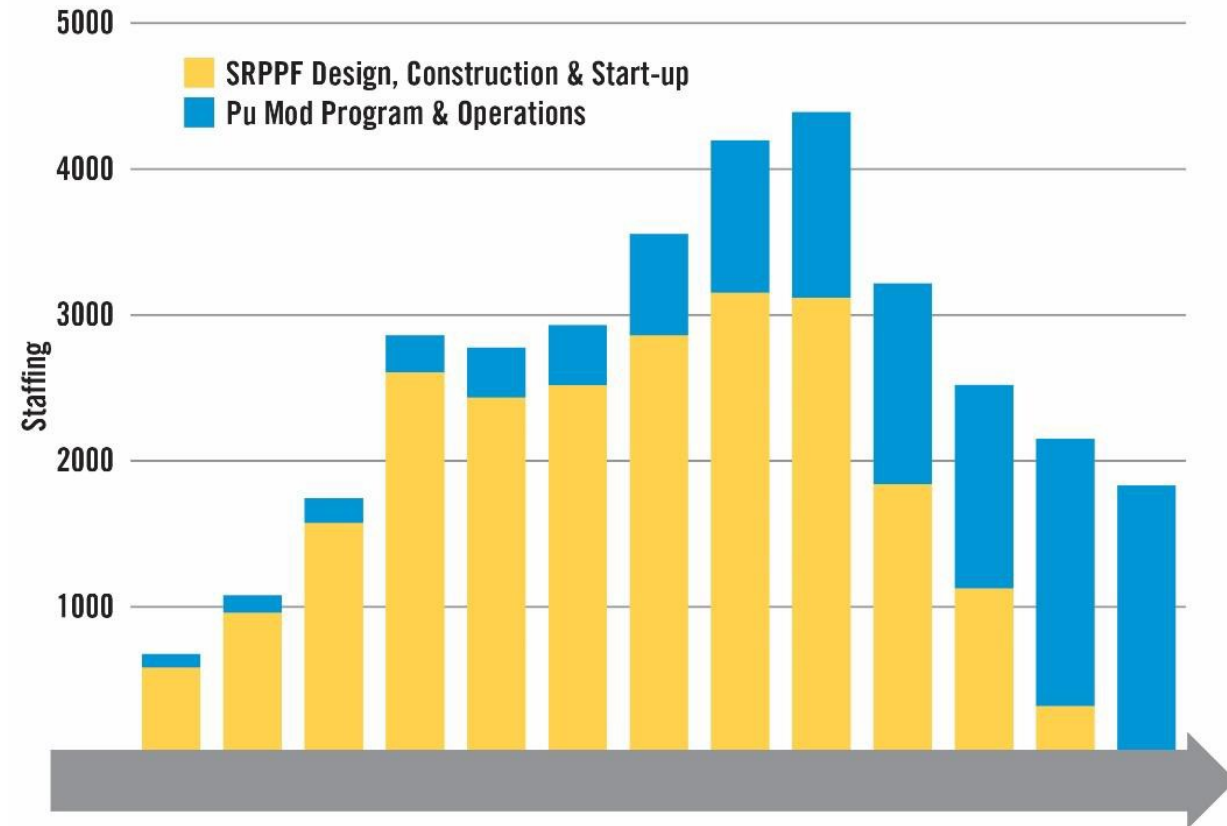
Objective: Recruit, hire, train and qualify ~1,800 future O&M and security staff over next 10 years

Status:

- Currently at 45 program staff (plus >600 project staff)
- Software model being utilized to balance staffing supply vs demand
- Working with colleges/tech schools to prime pipeline with candidates
- Active knowledge transfer program from LANL to SRS
- Benchmarking other NSE sites

Near-Term Program Needs:

- Staffing – (see later slides)
- Other – Virtual Reality/Augmented Reality training platform for operators



Identifying the SRS Plutonium Pit Processing Workers of the Future

- Looking locally first and then within 15 state region
- Traditional SRNS supply chain for many of the skill sets
- Several skill sets unique for SRNS
 - Metrology, high precision machining, cyber security, etc.
 - Machinists with nuclear skills
- Outreach into the academic community to begin within next 6 months
- Working with InVizion on innovative program to model supply resources and demand for selected critical positions



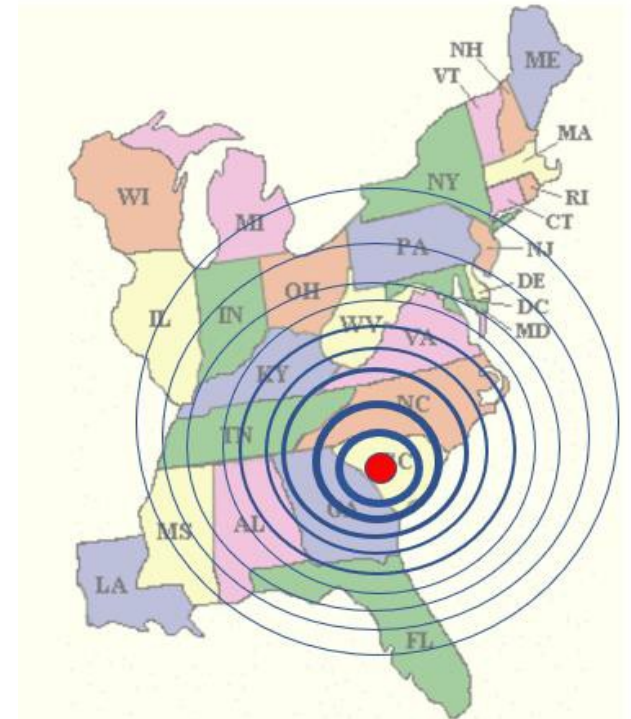
Supply/Demand Pipeline Parameters

Critical Positions

1. QA/QC Technicians – EX and Non-Exempt
2. Machinists
3. Welders
4. Nuclear / Pu Operators
5. Production Control
6. Product Acceptance Technicians
7. Engineer/Scientists
8. RADCON Inspectors and Technicians
9. Information Technology / Systems & Cyber Security

15 States for Critical Resource Pools

- **Group I**
 - South Carolina
 - Georgia
 - Florida
 - Virginia
 - North Carolina
- **Group II**
 - Alabama
 - Mississippi
 - Louisiana
 - Arkansas
 - Missouri
- **Group III**
 - Kentucky
 - Ohio
 - Indiana
 - Tennessee
 - West Virginia



SRS Plutonium Pit Processing – Knowledge Management Strategy


- **Knowledge Transfer**: Expand the skillset of the workforce. Develop a deeper knowledge and understanding of roles and functions
 - Current: two-year rotational assignments at LANL alongside PF-4 workers.
 - *Pu metal processing, fabrication, and assembly*
 - Future: one-to-three-month job-shadowing rotations at one or more locations across the NSE.
 - *Operations, Maintenance, Engineering, Radiological Control, QA, Weapons Certification*
- **Knowledge Preservation**: Document and capture existing organizational knowledge on Process Systems and Support Evolutions
 - Documented interviews, development of facility systems training (Study Guides), refinement of operations philosophy / procedure development
- **Knowledge Share**: Provide the knowledge gained from Transfer/Preservation throughout the workforce




First group of Knowledge Transfer Program participants at LANL

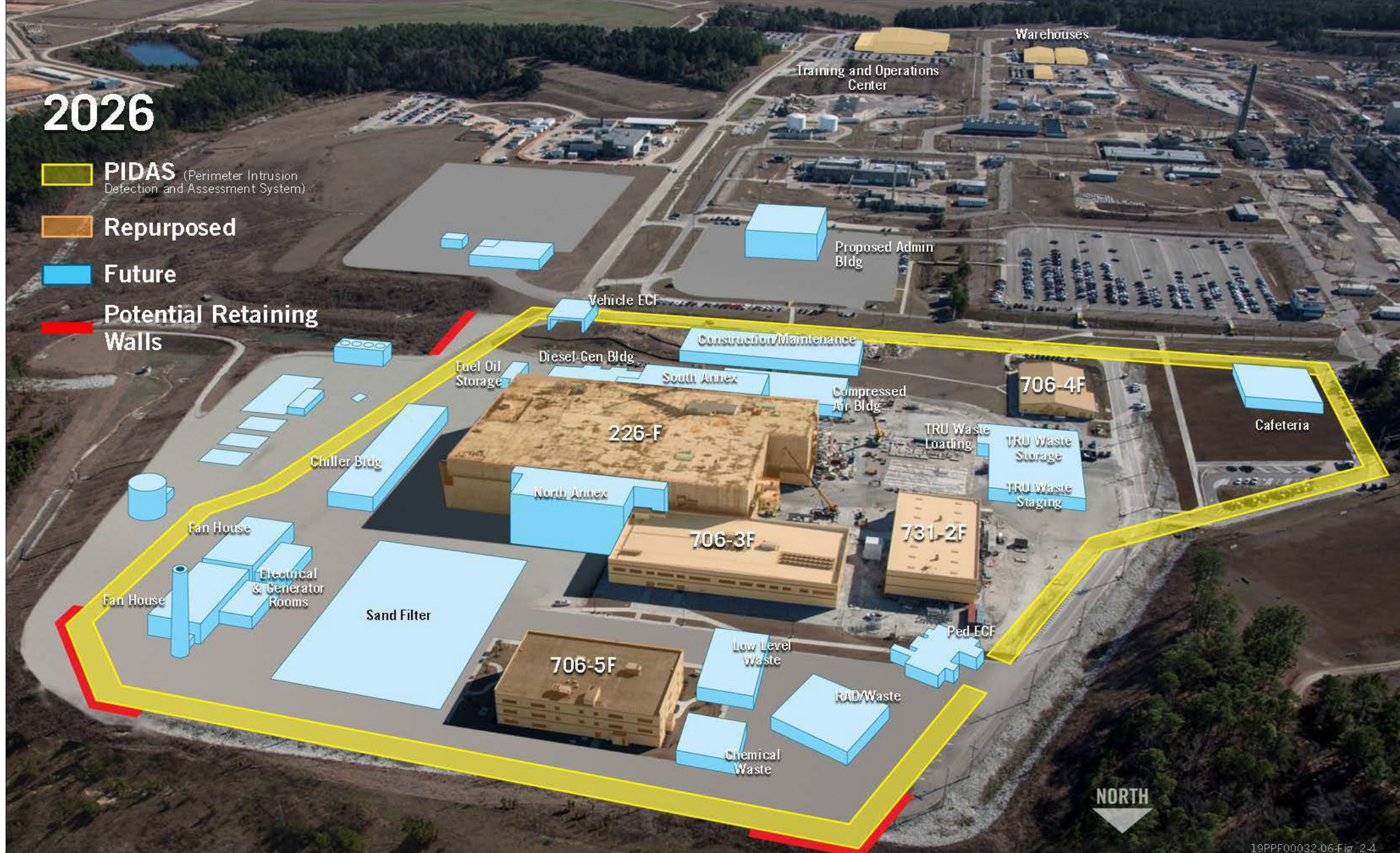
2026

 **PIDAS** (Perimeter Intrusion Detection and Assessment System)

 **Repurposed**

 **Future**

 **Potential Retaining Walls**



Facts and conclusions (the most important slide in this presentation)

- ❑ **LANL alone cannot handle the pit production mission.**
 - LANL production is not stable, or adequate for any warhead's pits, or enduring. New LANL facilities would come late, at high cost, and with high risk.
 - LANL would need much larger capacity (NNSA: 140 ppy vs. 30 ppy) to compensate for this instability, and very large new investments to provide it. (LASG: LANL does not have a good location for that new facility, at any price.)

- ❑ Barring economic collapse, **the U.S. will continue investing each and every year in pit production capacity** deemed adequate and enduring by the Nuclear Weapons Council. Providing for zero or only a few new pits in the 2030s and 2040s is not just going to happen for the foreseeable future. After 2030 (or some similar date), all bets may be off.

- ❑ Planning and construction of a new pit facility will take at least 14 years. We are almost 3 years into SRS design. No other facility anywhere near the capability and safety of SRS could be brought on line in 11-14 years (NNSA: "by 2032-2035").

- ❑ Thus no site other besides LANL and SRS can produce pits in a timely fashion, except LLNL. Political considerations will prevent LLNL pit production.

- ❑ **These four facts mean** that full investment in SRS pit production will continue, no matter what any of us say or do.

- ❑ **The only policy decision available in pit production is whether investments in LANL pit production, to the tune of \$1 billion/year, will continue, or rather how long they will continue.**

- ❑ In addition, the marginal cost of LANL pit production (two shifts) will always be several multiples of what it is for a much larger (single-shift) facility.



Next steps (I)

- **Nov. 5, noon: Demonstration at Capitol, calling for transparency and accountability. We need outreach help above all, to individuals and co-sponsoring groups.**
- **Elected officials, specifically the Governor and the congressional delegation, will be invited. What do officials think the impacts of this mission will be? We want them engaged on this issue – and by implication, on others – not hiding.**
- **We will call on them to be physically present on Nov. 5. Meanwhile, if they want to host or attend on-line meetings at which they supply us with accurate, up-to-date information in open public meetings and tell us where they stand and why, that's OK too.**
- **We will need to step up protest and resistance after Nov. 5. There are many avenues and possibilities if there is interest.**



Next steps (II)

- We also need to talk with those same officials about overall federal priorities in a time of national social, economic, and environmental crises. Why are "we" starting a new Cold War? Why are we spending nearly \$1 trillion/year on "defense," dwarfing every other component of discretionary spending? We are we doing so little on virtually every major issue? Where is the leadership?**
- Nothing important is going to happen on any of the major issues we face without a broader political awakening on the part of a critical mass of citizens, sufficient to impel more transparency and accountability from elected officials.**
- Secret meetings will result in corrupt, faithless, unjust outcomes. That's how policy is being made, currently. We have an extreme lack of democracy.**



Next steps (III)

- **Speaker Egolf's climate and energy summit (October 25-26) is important, we think. Definitely in a bad way, possibly in a good way. Register on-line.**
- **It is very important to become educated about climate and energy issues. Nothing substantial will be done unless a serious tumult, in one form or another, is created. NGO malpractice is everywhere.**
- **Our first job is to overcome our own fears and liberate our own creative energies. The state, the country, and the world are facing real crises, and we need to get real about them, which means getting beneath and beyond the propaganda spewing from political parties and their actors, and of course from defense contractors like LANL. Many possibilities, personal and political, will open when we do that.**