Ending enchantment: LANL's plans for plutonium pit production and weapons expansion

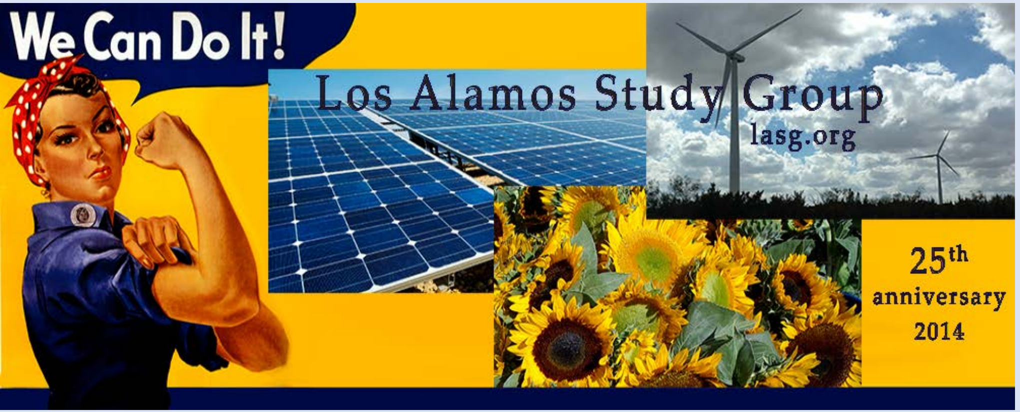
Greg Mello, Los Alamos Study Group, 23 Aug 2019

"I am become death, destroyer of worlds."

Bagavat Gita, recalled by Robert Oppenheimer at the Trinity Test, July 16, 1945

"Thus it is that those to whom destiny lends might, perish for having relied too much upon it....Only he who knows the empire of might and knows how not to respect it is capable of love and justice."

Simone Weil, "The Iliad, Poem of Might"



To subscribe to the Study Group's main listserve send a blank email to lasg-subscribe@lists.riseup.net

Los Alamos Study Group
2901 Summit Place NE
Albuquerque, NM 87106
www.lasg.org, 505-265-1200

Write if you would like to be part of our activist network. We have retired our Facebook page. Twitter: @TrishABQ; Blog: Remember Your Humanity

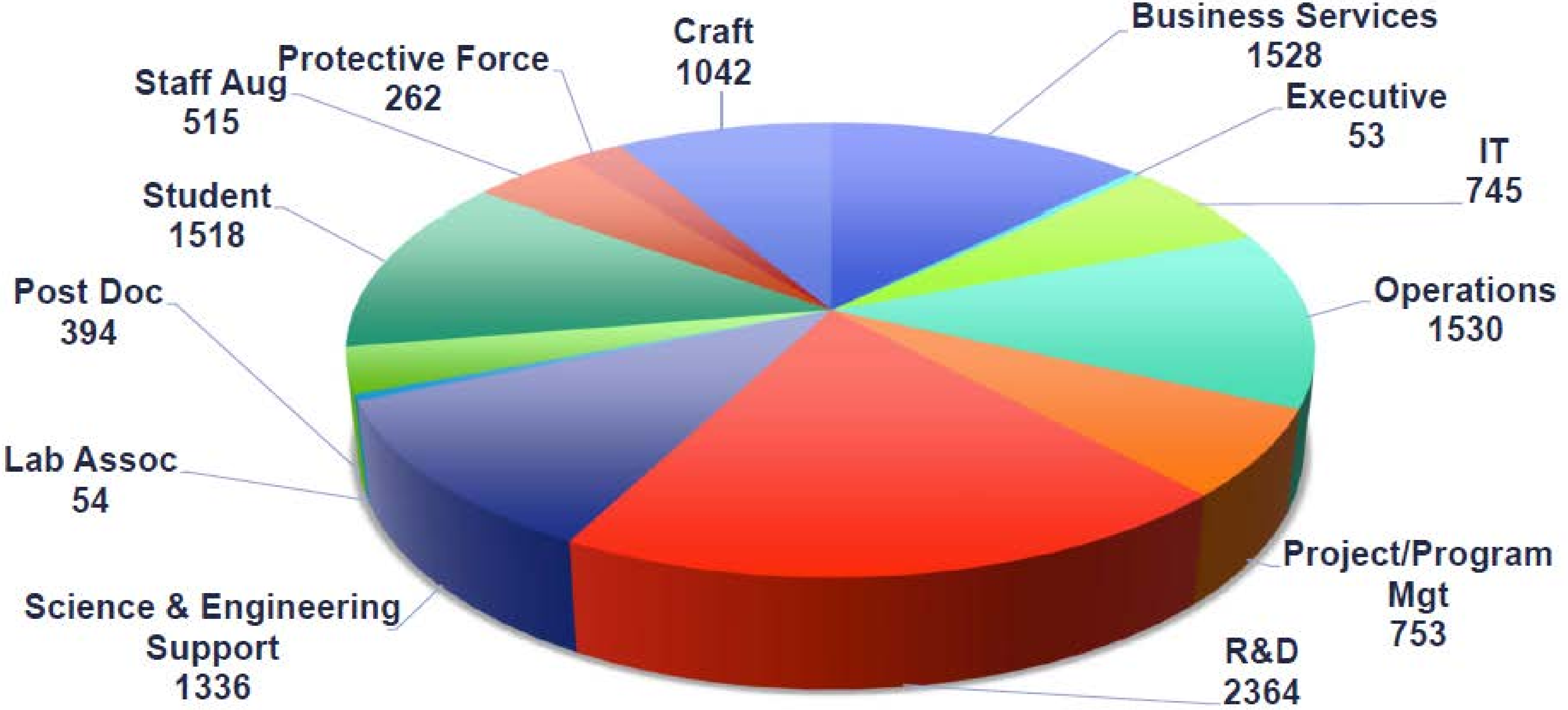

Welcome to New Mexico
America's Nuclear Weapons Colony
www.lasg.org


NEW MEXICO
www.lasg.org
#1 in nuclear weapons
#1 in poverty
COINCIDENCE?

Stockpile Stewardship: How do we sustain the nuclear deterren
501835
B61 12
SERIAL 020970
B83
US Air Force
Strategic Bomb
B61
US Air Force
Tactical/Strategic
Bomb

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	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%

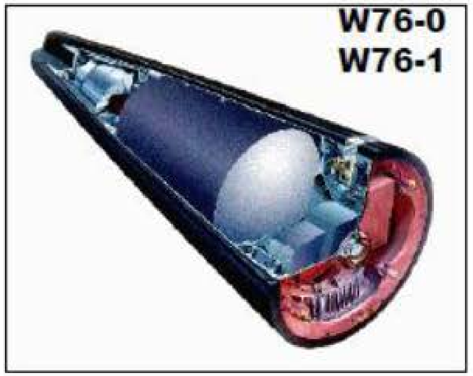
12,094 People: Our strengths are the diversity and quality of our employees



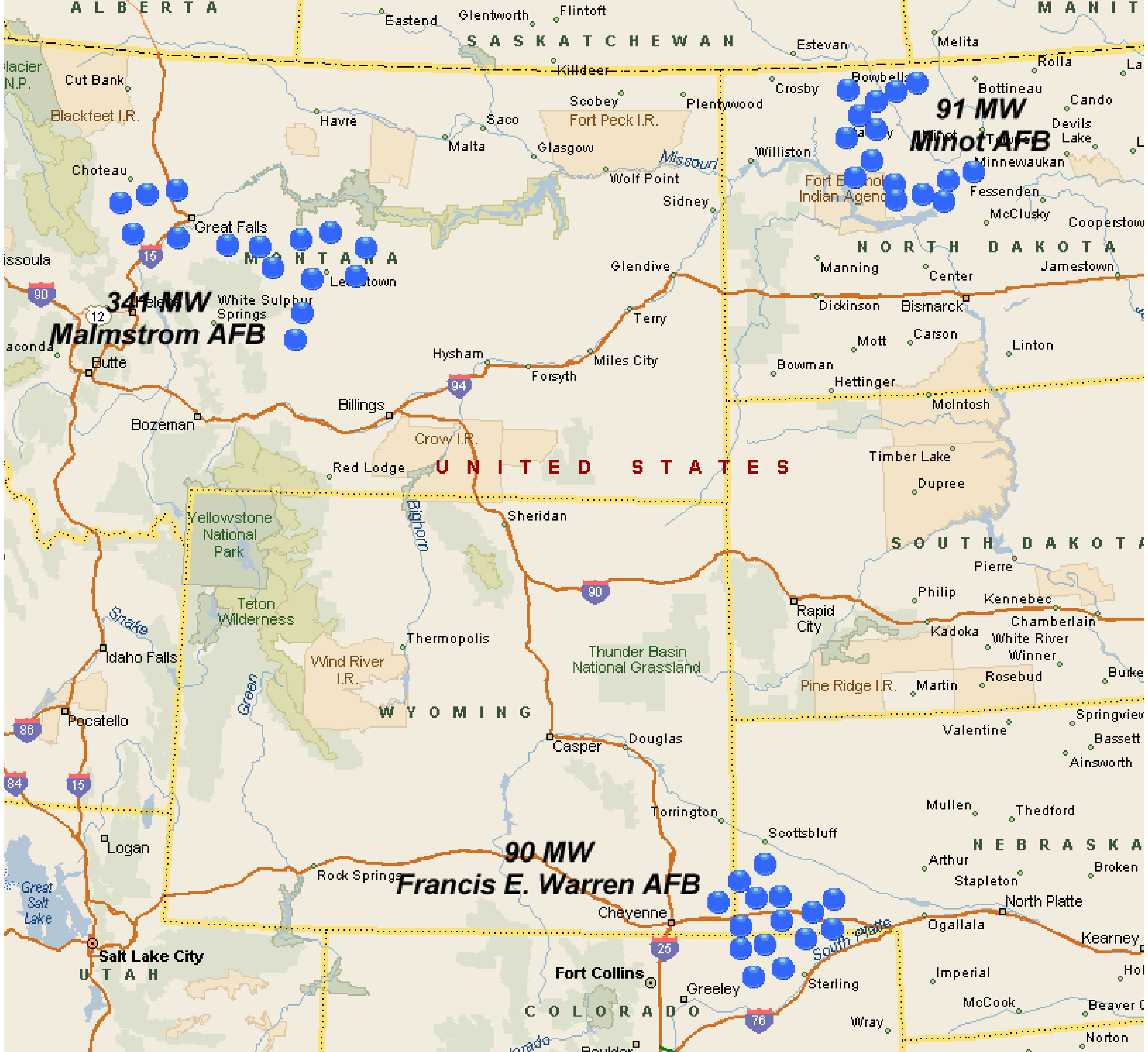
Today, the US has 11 nuclear weapon types, and Los Alamos has responsibility for 8 of the weapons

LANL Weapons

B61-3,-4,-7



LLNL Weapons



For the coming decade at least, a talk about new pits is also a talk about intercontinental ballistic missiles (ICBMs), both the existing Minuteman III's and the planned Ground-Based Strategic Deterrent (GBSD), a roughly $80-140 billion program.

MM IIIs are deployed in 3 bases spread over 5 states. There are 150 silos at each base, divided into 3 wings of with 50 missiles apiece.

50 silos are in "warm standby," without missiles in them. Thus 400 missiles are deployed.

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.

Mark 21/W87 on single RV MM III bus, the present deployment configuration.

This RV is too wide and heavy for MIRVing MM III.

MM III in operation.

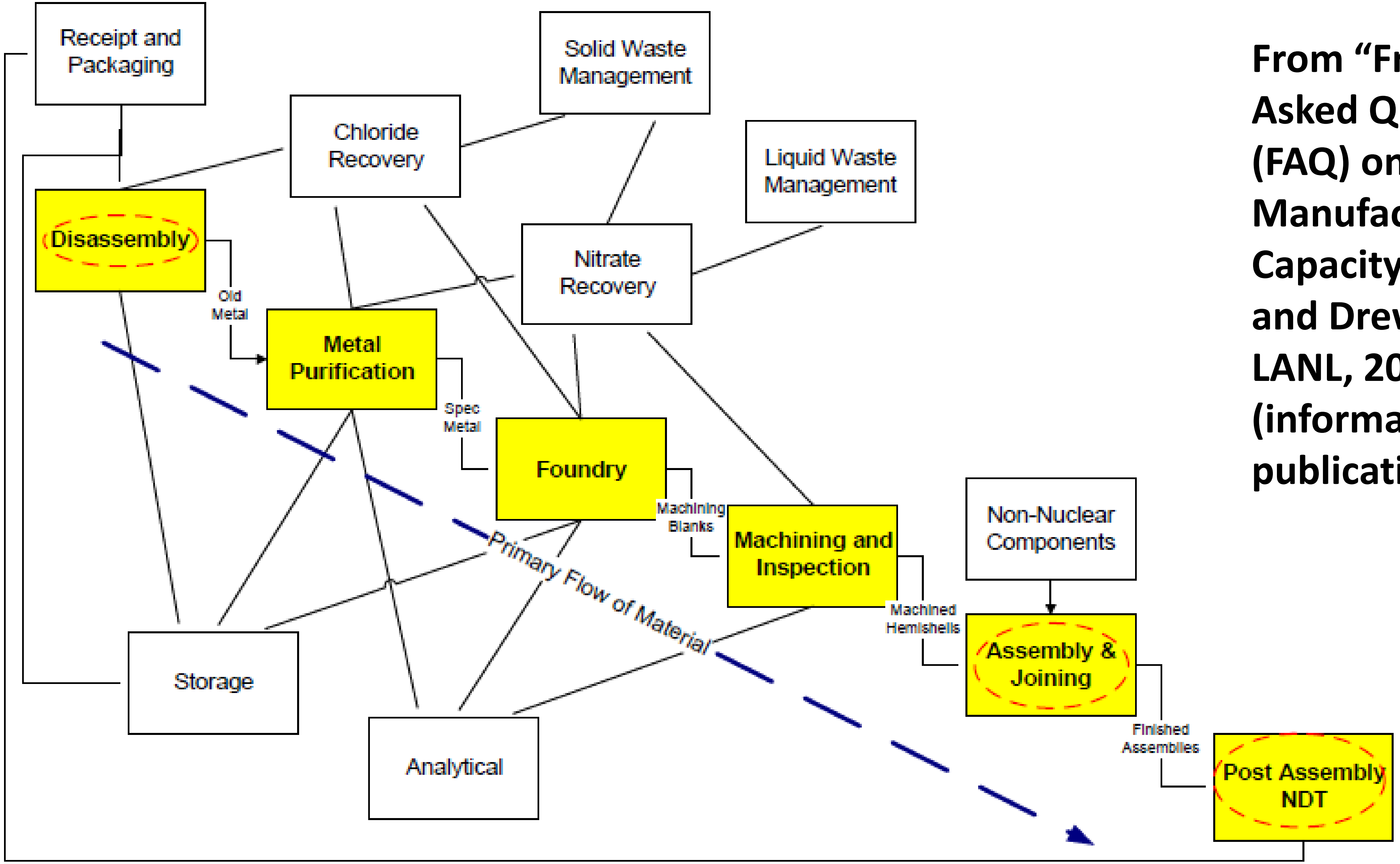
Result.

Skinnier, lighter, less accurate RV for the W78.

Pantex Zone 4 surplus pit and warhead magazines

~17,000 – 20,000 pits are here and in Zone 12

TA-55 the Nation's center of plutonium science and processing



From "Frequently Asked Questions (FAQ) on Pit Manufacturing Capacity, Brett Kniss and Drew Kornreich, LANL, 2009 (informal publication)

Figure 1: The generic pit manufacturing flowsheet starting with raw materials (aged

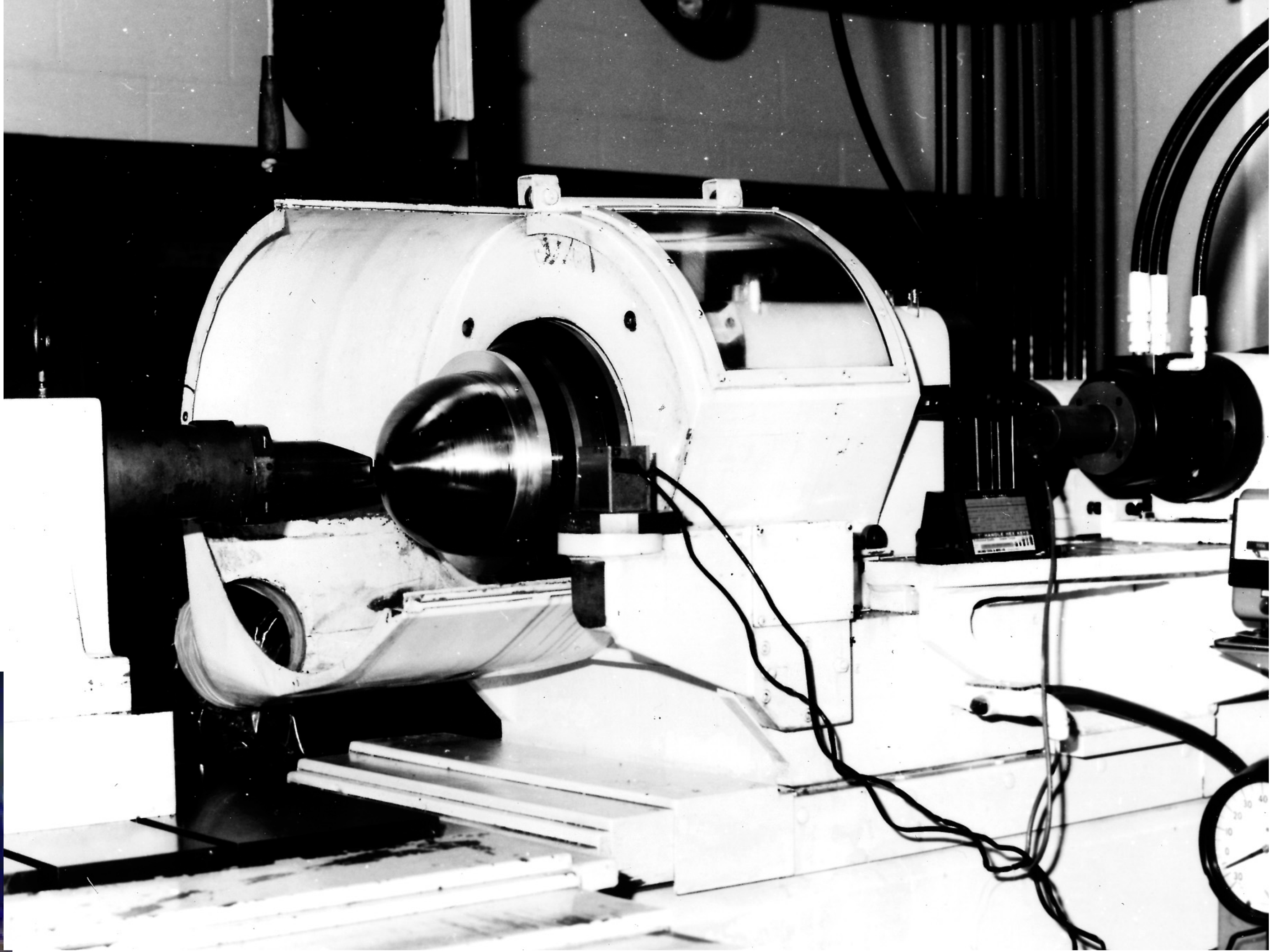
Coater

Plutonium Glove Box

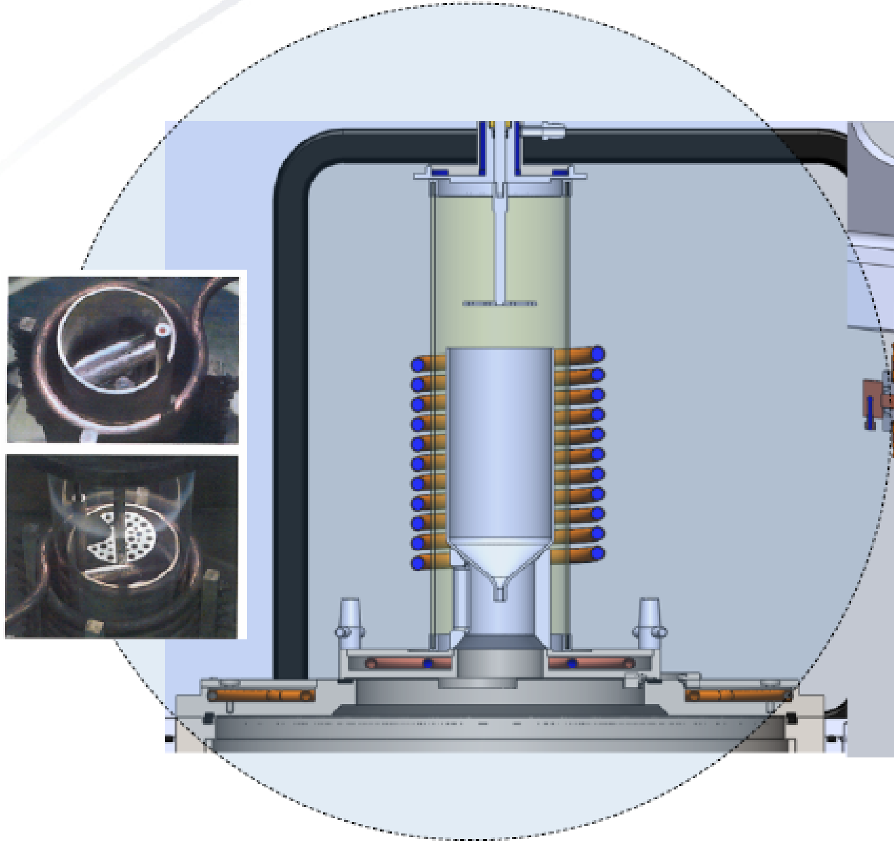
Random scenes from the LANL pit production world

Prior to this effort, high-mass operations in PF-4 had been shut down since June 2013.

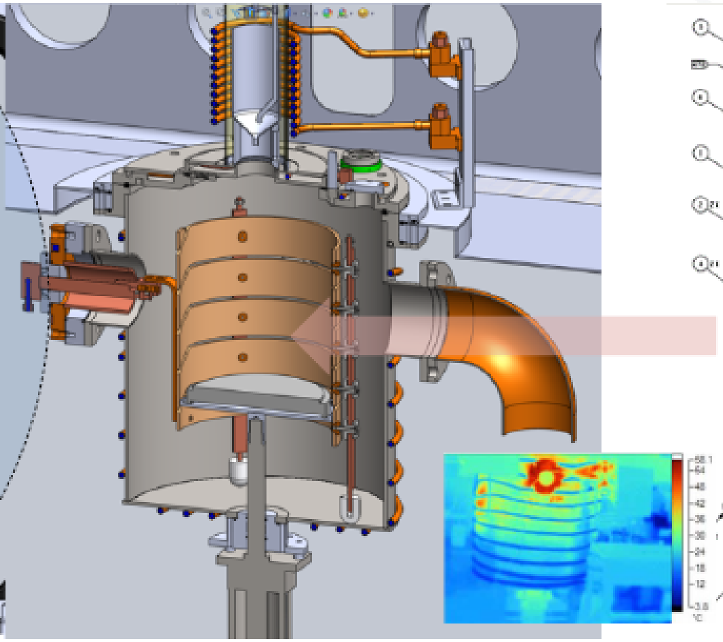
One or two days after this triumphant picture was taken, another egregious criticality violation occurred and the program was shut down again.



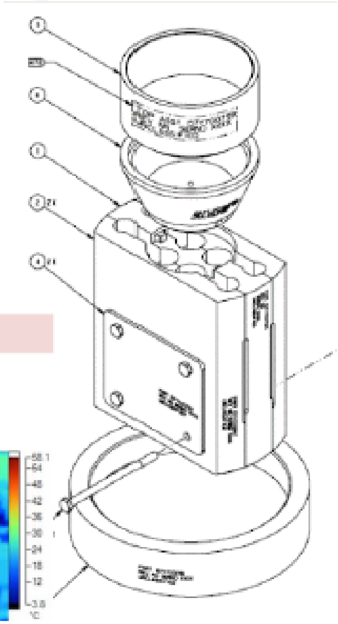
Pit Manufacturing (casting)



Upper Furnace

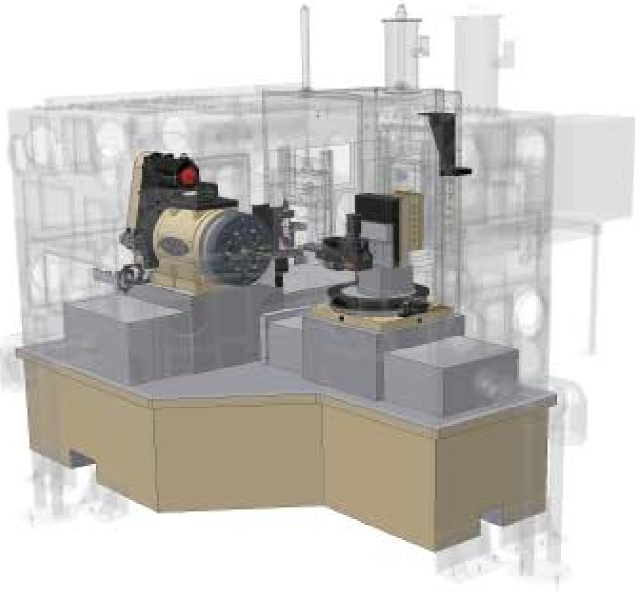


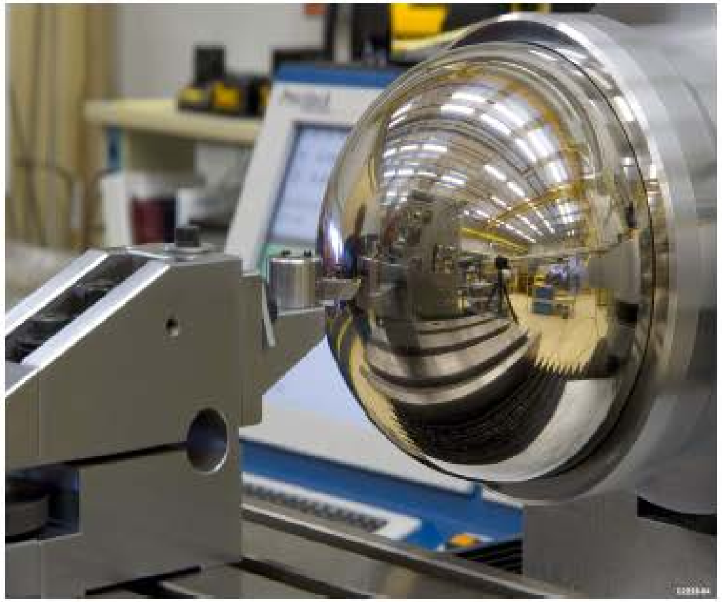
Lower Furnace

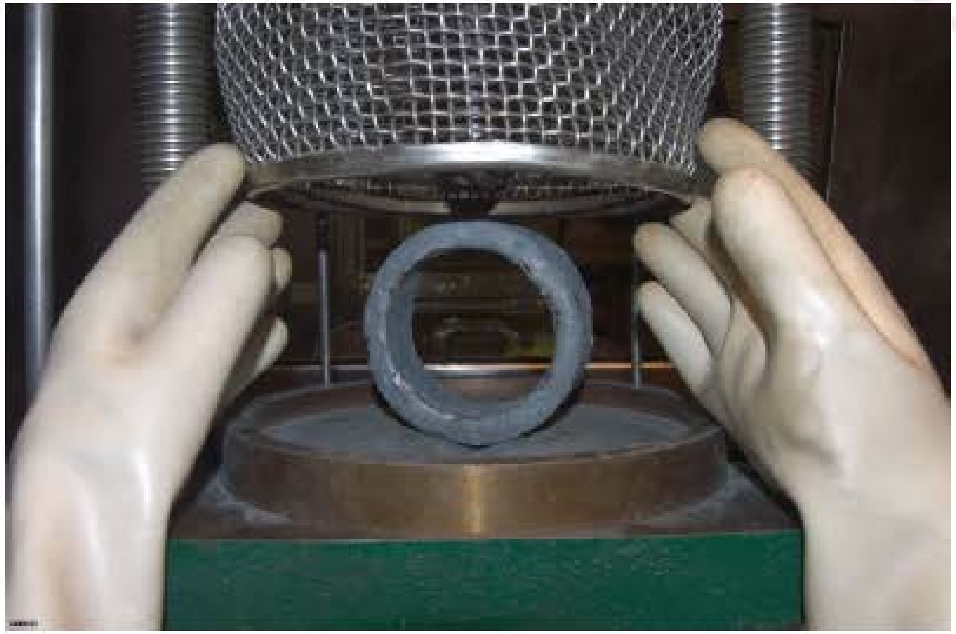


Casting Mold

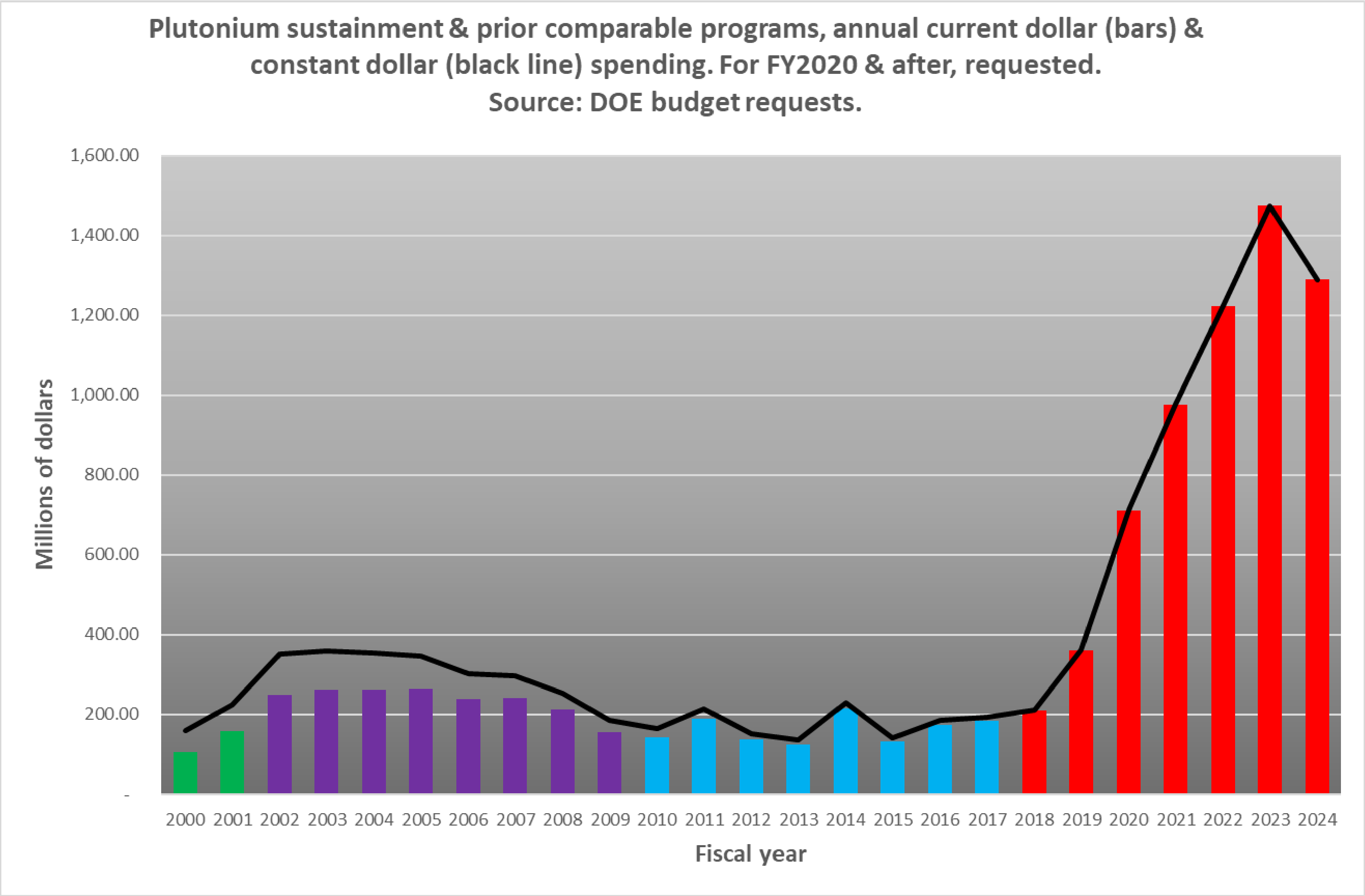
Pit Manufacturing (machining)

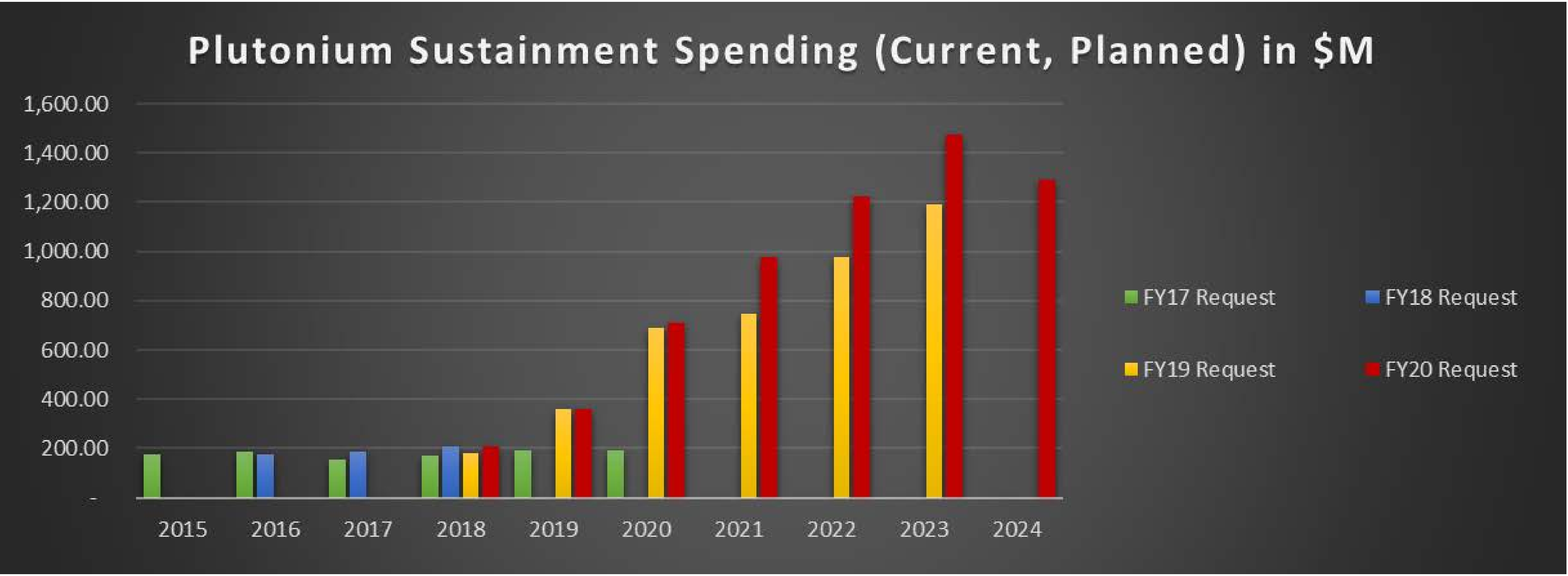






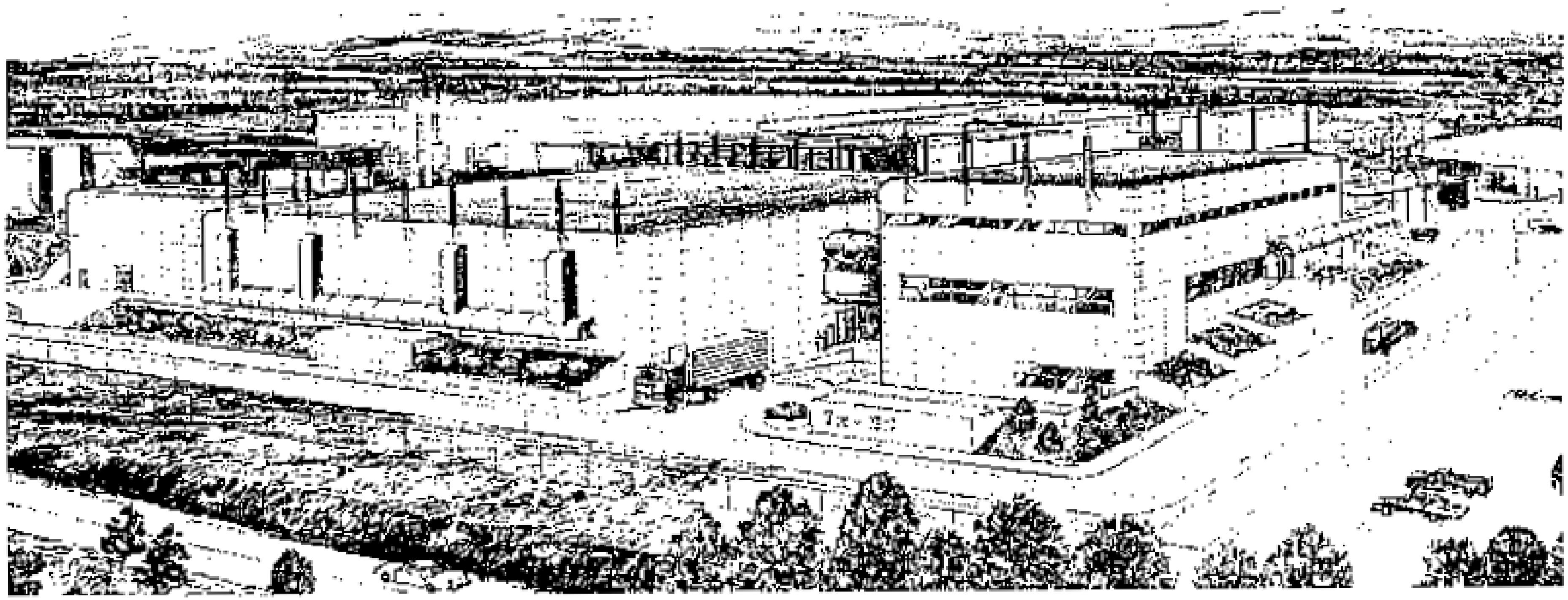

PRF1502


Plutonium sustainment & prior comparable programs, annual current dollar (bars) & constant dollar (black line) spending. For FY2020 & after, requested.
Source: DOE budget requests.
Millions of dollars
1,600.00
1,400.00
1,200.00
1,000.00
800.00
600.00
400.00
200.00
-
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
Fiscal year

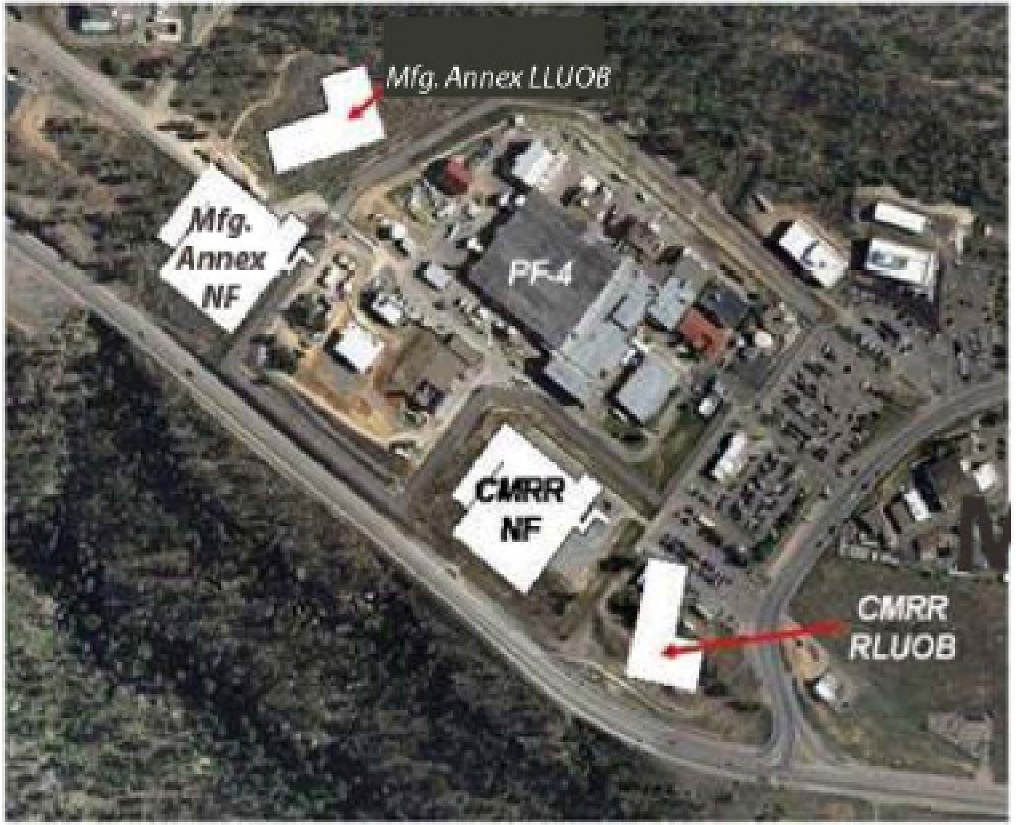


Plutonium Sustainment Spending (Current, Planned) in $M
1,600.00
1,400.00
1,200.00
1,000.00
800.00
600.00
400.00
200.00
-
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
FY17 Request
FY18 Request
FY19 Request
FY20 Request

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



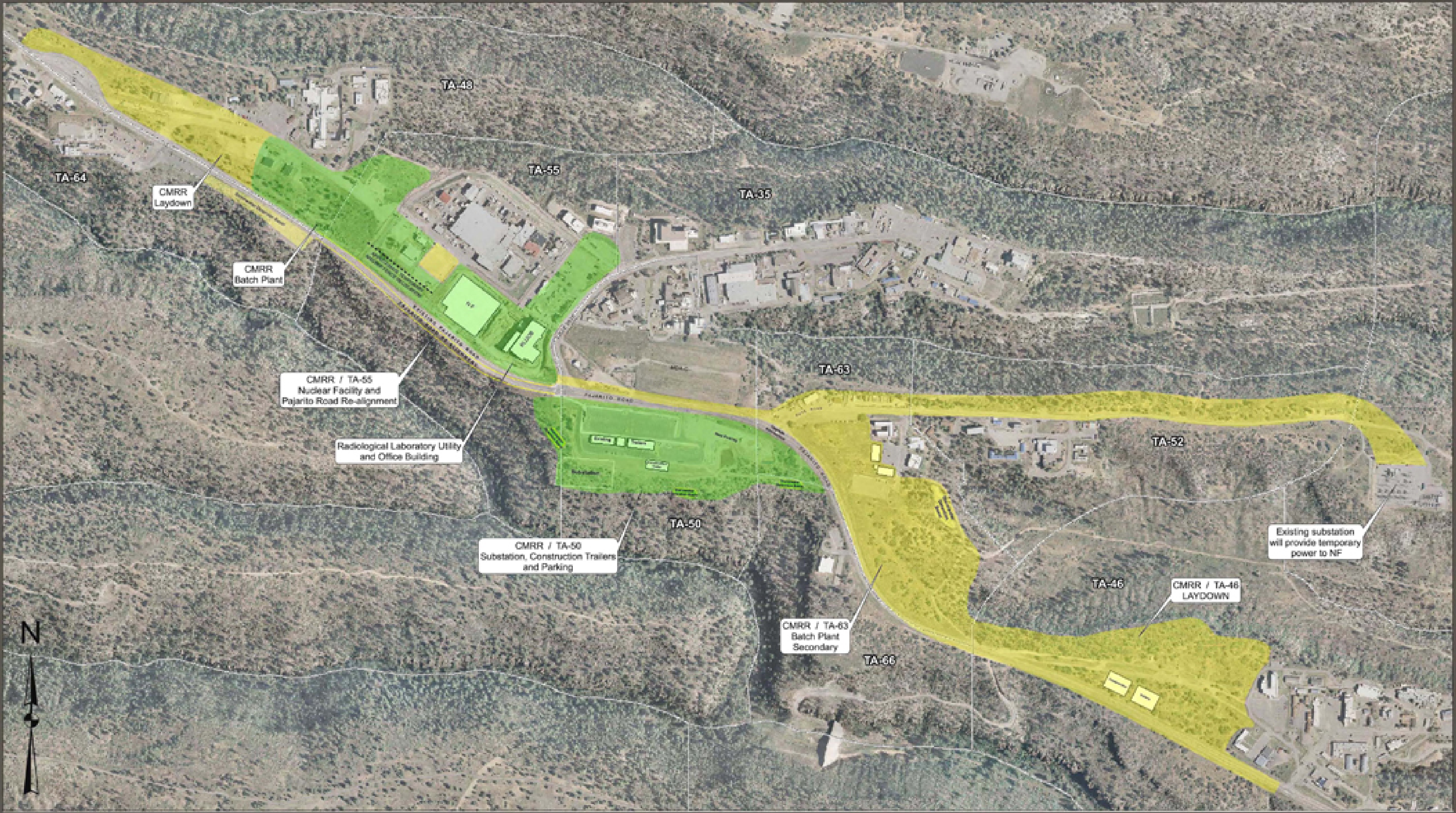
Architectural rendering of the Special Nuclear Materials Research and Development Laboratory Replacement Project.



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

S.3.4.1.2.2 Los Alamos Upgrade Alternative to Provide Up To 80 Pits per Year ("50/80



CMRR Nuclear Facility Project Overview

October 2010

Aerial Photography - September 2008

Los Alamos NATIONAL LABORATORY EST. 1943

NNSA National Nuclear Security Administration

LA-UR 10-07047

Legend

- Proposed 2010/2011 SEIS Project Activities
- Previously Evaluated in 2003 EIS and 2005 SA
- Technical Area Boundary

PROJECTION: State Plane Coordinate System, New Mexico, Central Zone, U. S. Feet, DATUM NAD 83

SPATIAL DATA REFERENCES:
-Aerial Photography, SPPI-P, September 2008
-Roads, Facilities, ES-EE
-Hillshade, 4-ft, LIDAR, GISLab
-Potential Release Sites, ADEP-WES, EP2009-0653

0 100 200 400 600 800 1,000 1,200 Feet

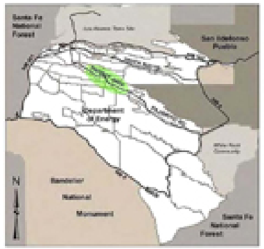
1 inch = 200 feet

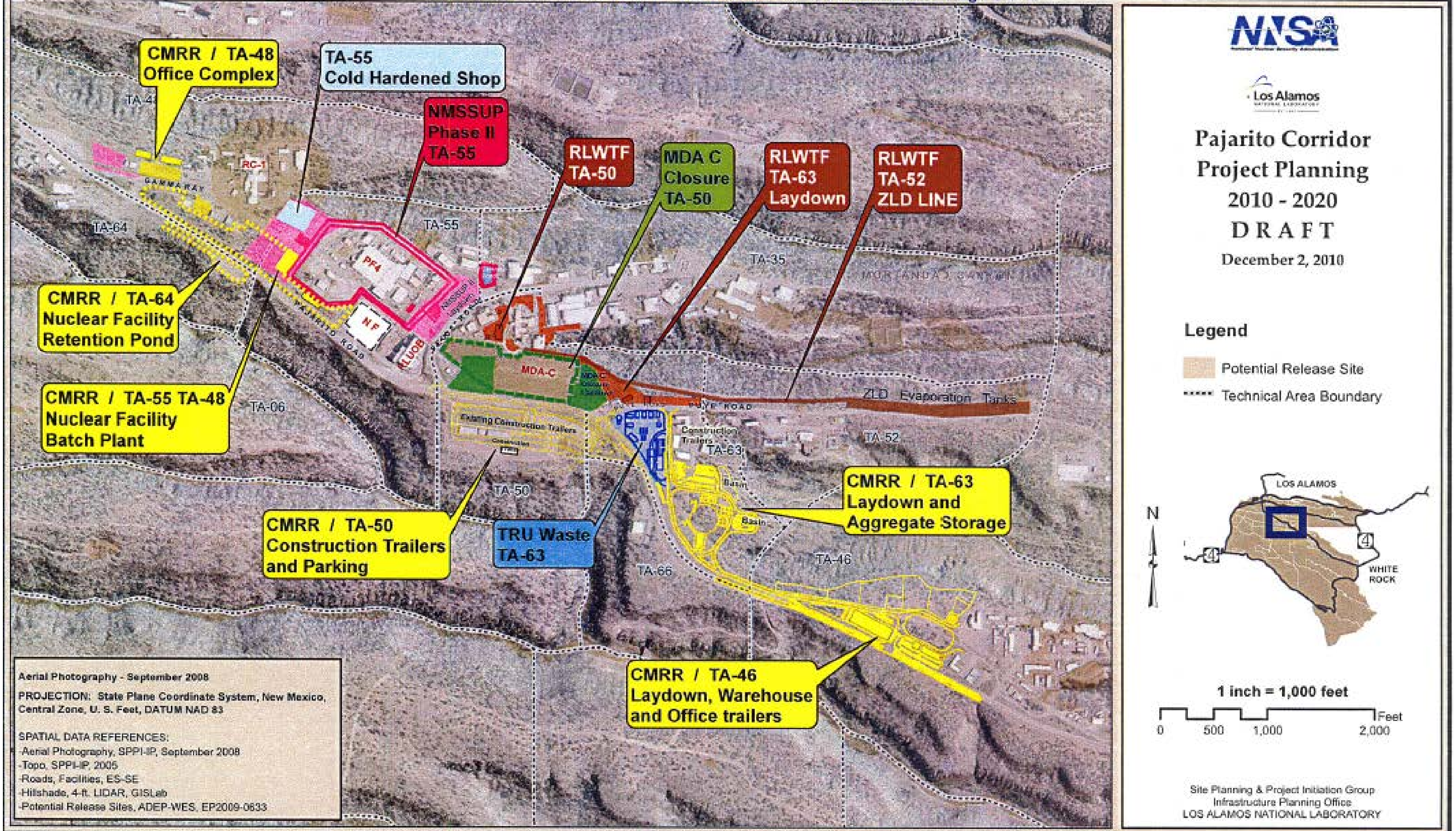
UNCLASSIFIED

Site Planning & Project Initiation Group
Infrastructure Planning Office
LOS ALAMOS NATIONAL LABORATORY

DISCLAIMER OF LIABILITY
Neither the United States Government nor LANS, LLC nor any of their employees, makes any warranty, express or implied, including the warranties of merchantability and fitness for a particular purpose, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

FOR PLANNING AND GENERAL PURPOSES ONLY:
Using this map for anything other than its intended purpose may yield inaccurate or misleading results.





NNSA
Los Alamos
Pajarito Corridor Project Planning 2010 - 2020
DRAFT
December 2, 2010
Legend
Potential Release Site
Technical Area Boundary
LOS ALAMOS
WHITE ROCK
N
1 inch = 1,000 feet
0 500 1,000 2,000 Feet
Site Planning & Project Initiation Group
Infrastructure Planning Office
LOS ALAMOS NATIONAL LABORATORY
CMRR / TA-48 Office Complex
TA-55 Cold Hardened Shop
NMSSUP Phase II TA-55
RLWTF TA-50
MDA C Closure TA-50
RLWTF TA-63 Laydown
RLWTF TA-52 ZLD LINE
CMRR / TA-64 Nuclear Facility Retention Pond
CMRR / TA-55 TA-48 Nuclear Facility Batch Plant
CMRR / TA-50 Construction Trailers and Parking
TRU Waste TA-63
CMRR / TA-63 Laydown and Aggregate Storage
CMRR / TA-46 Laydown, Warehouse and Office trailers
TA-64
TA-55
TA-35
TA-06
TA-50
TA-63
TA-52
TA-66
TA-46
RC-1
PF4
NF
RLUOB
MDA-C
ZLD Evaporation Tanks
Existing Construction Trailers
Construction Trailers
Basin
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

Main issues NNSA faces w/ pit production

- Lack of solid mission need
- Bad conceptual design (esp. the “modules”)
- High and uncertain cost
- Recurrent poor facility management
- Long project duration (construction ends FY27)
- Recurrent poor project management
- Numerous fiscal “time bombs” in DOE and USA
- Competition for funds in government (DoD, others!)
- Instability of contract, work compatibility issues


MFFF, Jan 2018
MOX
Google
Imagery ©2018 Google, Map data ©2018 Google United States Terms Send feedback 100 ft

Is there a window of practical, safe pit production at LANL's PF-4? It is unlikely. (Los Alamos Study Group, 18 May 2019)

Year	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Needed TA-55 and TA-50 infrastructure tests, analysis, and upgrades, not all-inclusive																						
Column testing, seismic analysis; could be fatal to PF-4 operation as HC II Nuclear Facility; analysis may also limit MAR	(DNFSB WSR 12/28/18)			Necessity, feasibility, scope, and duration of possible PF-4 alterations are unknown at present				If needed, design and construction of a greenfield PF-4 replacement could begin in ~2022, with 30 ppy ops in ~2035. There is no room for a PF-4 replacement at TA-55. A separate 30 ppy production facility could not be built at TA-55 without massive disruption & risk. See other slides. PF-4 replacement, which is unlikely to be possible for a number of reasons, would be vastly expensive (>$10 B).														
PC-3 fire suppression system upgrade	(DNFSB WSR 1/4/19)																					
Internal firewall upgrade to 2 hours	(DNFSB WSR 1/4/19)																					
PC-3 active ventilation, fire alarm upgrade	(DNFSB WSR 1/4/19)																					
Fire water loop integrity	(DNFSB WSR 1/4/19)																					
CMRR subproject REI2	(DOE CBR)																					
CMRR subproject PEI1	(DOE CBR)																					
CMRR subproj. PEI2 (to Pu Pit Prod. Project, PPP)	(DOE CBR) Scope, cost, & duration of Pu Pit Proj. (PPP) unknown; purpose is to take LANL from 10 to 30 ppy so duration shown accordingly																					
CMRR subproj. RC3 (to PPP)																						
TA-55 Reinvest. Project III	Duration: >2024 (CBR) by ~2 yrs (estimate)																					
TRU liquid waste (TA-50)	Duration unclear but >2024 (CBR)																					
War reserve (WR) pit production expected (pits per year, ppy)																						
1	(funded by Pu Sustainment Ops)				X																	
10						X																
20	(funded by Pu Pit Production Project, scope TBD)						X															
30 (average)								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
≥30 (NNSA: 41 average)	Infeasible (AoA p. 2)				We believe multi-shift production would lead to fairly prompt and repeated pauses and shut-downs due to single-point failures and overwhelmed chokepoints. Inadequate and inappropriate facilities, management, training, and institutional culture would be exposed. Existing PF-4 missions would be threatened, as would worker and public safety. Recovery could be difficult and might not be successful.																		
≥50 (NNSA: 84 average)	Infeasible (AoA p. 2)																					
≥80 (NNSA: 103 average)	Infeasible (AoA p. 2)																					
Cumulative WR pits (theoretical, 30 ppy average)					1	11	31	61	91	121	151	181	211	241	271	301	331	361	391	421	451	481
Model (heuristic only): probability of effective PF-4 end of life (EEOL) by given year assuming normal distribution, 10 year standard deviation																						
2039 est. EEOL (NNSA, FY2014 CBR p. WA-211)	.02	.03	.04	.04	.05	.07	.08	.10	.12	.14	.16	.18	.21	.24	.27	.31	.34	.38	.42	.46	.50	.54
2034 est. EEOL (assumed earlier EOL with 30 ppy)	.07	.08	.04	.04	.05	.07	.08	.21	.24	.27	.31.	.34	.38	.42	.46	.50	.54	.58	.62	.66	.69	.73

These pit production purposes fall into two clear groups

Essential plutonium missions undergird and complement the first group

- These basic missions have unambiguous value within overall program objectives, low to moderate cost, low to moderate management risk, and engender little controversy:

   a. Pit surveillance

   b. Pit aging studies

   c. Targeted plutonium science

   d. Retain production skills via pilot or demonstration production; transmit skills

   e. Retain production technologies and develop them as needed

   f. Inspect, reuse, and if needed repair (rebuild) pits

- These industrial missions have contested value, very high cost and risk, a track record of failure, and are controversial in themselves and in their implementation:

   g. produce stockpile quantities of existing types of pits

   h. produce stockpile quantities of new types of pits

Why do some of us say that industrial pit production is virtually impossible at LANL?

- Isolation
- Dissected topography, e.g. at TA-55
- R&D culture
- Institutional arrogance
- Unconsolidated sediments
- Seismicity
- Aging facilities (PF-4); decrepit, unsafe facilities (Main Shops); unknown status (Sigma)
- RLUOB
- Negative social attributes of New Mexico
- Lack of qualified workforce, low educational attainment of population
- Local opposition

It will be very difficult or impossible for LANL to establish industrial pit production at _any_ scale for a multitude of reasons, all of which are independent of senior management actions. These factors are negatively synergistic in ways that have proven, and will prove, difficult to predict or prevent.

• The industrial, cultural, and educational isolation of the site, which increases costs and creates program risks;

• LANL's dissected topography, which dramatically increases costs and places limits on construction;

• LANL's R&D culture, which is necessary to protect in order to attract young scientists and engineers, especially given LANL's isolated location;

• LANL's institutional arrogance, a product of isolation, enormously large relative income and generous benefits, low taxes and local high government subsidies and therefore excellent local schools, etc., and high formal educational attainment among LANL managers and technical staff in comparison to the surrounding region;

• The unconsolidated sediments that underlie TA-55 and other LANL sites, which together with the site's considerable seismicity (next bullet) increase costs and limit construction options;

• LANL's high seismicity, a problem that is amplified by known active on-site faults and hence possible ground rupture, the shallow location and high acceleration of earthquakes from them, seismic amplification from unconsolidated sediments, and the structural incompetence of _all_ the rock at LANL;

Why LANL can’t do industrial pits, continued

• LANL's legacy nuclear facilities, which were built for R&D and of limited size; most of these will soon (relative to this mission) be at, or are already past, their reliable, safe, and useful lives; these include PF-4, the Main Shops, and Sigma, all of which are to have greater or lesser roles in pit production; tearing these facilities down will also be disruptive to a greater or lesser extent.

• The planned repurposing of a new radiological laboratory (RLUOB) as a HC3 nuclear facility; the success of this "bait-and-switch" operation is central to industrial pit production at LANL;

• The concatenation of difficulties and strain on support systems posed by multiple industrial plutonium missions at PF-4 (pit production, ARIES, Pu-238);

• The environment of corruption, complaisance, and low work standards that is pervasive in New Mexico, especially northern New Mexico, as a long-term result of poverty and lack of opportunity; very high incidence of drug use and associated crime of all kinds; this reinforces LANL arrogance and racism on the job as well as contributes synergistically to mistakes at work;

• The lack of a qualified regional workforce for LANL as a whole as well as for pit production and the low educational attainment of the surrounding population; a relative lack of post-secondary educational and vocational institutions; and

• The relative incompatibility of industrial plutonium operations and Santa Fe cultural pretensions; and

• Local opposition.