nuclear watch new mexico

Background Paper: Plutonium Operations Space Requirements and Availability at LANL

Summary: This background paper is meant to accompany our two-page fact sheet *Costly Plutonium "Nuclear Facility" at Los Alamos Conflicts With New National Security Goals* (available at www.nukewatch.org/facts/nwd/CMRR_NF.pdf). We contend that floor space at Los Alamos National Laboratory's (LANL's) Plutonium Facility-4 (PF-4), the existing pit production facility in Tech Area-55, can be reorganized so that it can absorb the nuclear missions of the old Chemistry and Metallurgy Research (CMR) Building. This is enabled by transferring, whenever possible, PF-4's nonnuclear operations to the recently completed Radiological Laboratory, Utility and Office Building ("Rad Lab"), and already slated relocation of some missions to the Savannah River Site. **We recommend that Congress require a TA-55 capabilities study** that analyzes alternatives to the CMR Replacement Project (CMRR) "Nuclear Facility," and avoid building an unneeded multi-billion dollar facility that is not aligned with the newly declared national security goal of a world free of nuclear weapon.

The CMRR Nuclear Facility was originally conceived to directly support expanded plutonium pit production. The programmatic driver for expanded production was the National Nuclear Security Administration's (NNSA's) claimed need to build new-design replacement weapons. In FY 2008 and FY 2009 Congress rejected proposed "Reliable Replacement Warheads," and is not likely to fund new-design nuclear weapons in the future. Therefore, there is no need for the Nuclear Facility, as LANL is meeting stockpile needs under the currently sanctioned level of up to 20 pits per year without it.

However, NNSA and the Lab argue that the Nuclear Facility is also needed to relocate other CMR Building missions besides pit production support. The "Nuclear Facility" is by far the largest part of the CMR Replacement Project (CMRR). But instead of building the future Nuclear Facility the old CMR Building's mission can be relocated to two existing spaces:

1) The first phase of the CMRR, the recently completed Radiological Laboratory, Utility and Office Building, ("Rad Lab"), a "radiological" facility limited to 8.4 grams Pu 239 equivalent; and
2) LANL's existing pit production facility, Plutonium Facility-4 (PF-4) in Tech Area-55, that has long been a "nuclear" facility handling Security Category I/II quantities of special nuclear materials.

Some Quick Facts

- PF-4: 150,000 total square footage, with 59,600 square feet of "lab" space (i.e., processing space). Source: *Transuranic Waste Management at Los Alamos National Laboratory*, LA-UR-00-3363, July 2000.
- CMRR Rad Lab: 185,000 total square feet, with office space for 350 workers and 19,500 square feet of lab space.

- CMRR Nuclear Facility: 270,000 total square feet planned, with 22,500 square feet of lab space sized for a production capability level of 50 to 80 pits per year. Source: *Independent Business Case Analysis of Consolidation Options For The Defense Programs SNM and Weapons Production Missions*, December 2007.
- Old CMR Building: 550,000 total square feet, with approximately 180,000 square feet of lab space. Only half of CMR is now operating because of existing contamination and safety concerns.

Space Utilization Reports

An internal LANL document and a Government Accountability Office report give useful information on the use of PF-4 floor space by NNSA program. In the 1997 *Alternatives For Increasing The Nuclear Materials Processing Space At Los Alamos For Future Missions* (LA-UR-97-1000), the Lab was trying to assess and find space to expand production to 50 pits per year. It concluded in the table below that it needed only a total of 15,300 sq feet in the new CMR Building (now the CMRR) to do so. At the same time it shows that no additional floor space is needed for non-Defense Programs in the future CMRR.

We flip this to argue that if 15,300 sq feet were made available in PF-4 it would not only support current production levels of 20 and under pits per year, but could in fact even support expanded pit production as well (which, to be clear, we vehemently oppose). This means the Nuclear Facility does not have to be built.

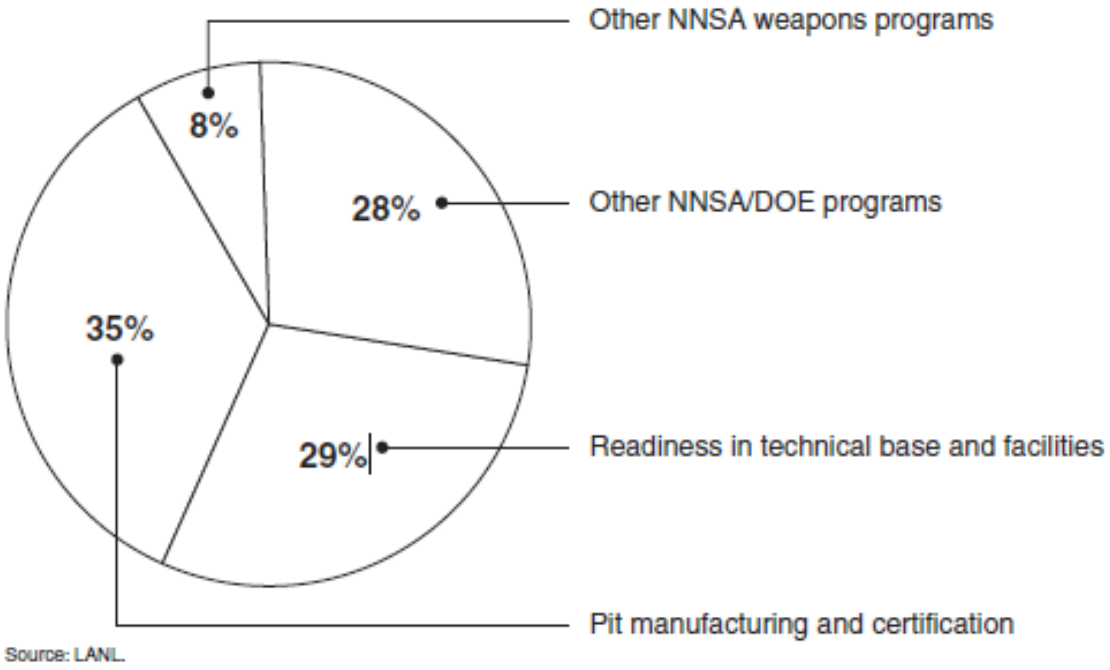
Table 1. Category 1 Laboratory Space Requirements.

	Present PF-4	Future PF-4	Future CMR	Change
DP-Programs				
Pit Fabrication - General	11,400	11,500	2,200	2,300
Pit Fabrication - Disassembly	0	0	1,000	1,000
Pit Fabrication - Assembly	0	3,100	0	3,100
Pit Fabrication - Radiography	0	700	0	700
Pit Surveillance	2,300	0	4,500	2,200
Pu-238 Heat Sources & Recovery	6,000	6,000	0	0
Stockpile Stewardship Programs	2,300	2,300	0	0
Special Recovery Line	700	0	1,200	500
Actinide Research & Development	3,400	3,400	1,000	1,000
Non-DP Programs				
Pu-238 Heat Sources & Recovery	3,000	3,000	0	0
Neutron Source Mat'ls Recovery	800	800	0	0
Fissile Materials Disposition - ARIES	1,000	1,500	0	500
Fissile Materials Disposition - MOX	3,000	3,000	0	0
EM Technology Support	800	0	0	–800
Non-Proliferation Technologies	0	0	0	0
Support Functions				
Aqueous and Pyro Recovery	13,400	13,400	0	0
Mat'ls Management and Rad. Control	4,400	4,400	2,000	2,000
Waste Management	2,400	2,400	1,200	1,200
Analytical Chemistry - Metallography	4,700	2,600	1,500	–600
Contingency Space	0	1,500	700	2,200
Totals	59,600	59,600	15,300	15,300

The table shows:
Present PF-4 = What existed in 1997
Future PF-4 = Space needed for 50 pits
Future CMR = Space needed for 50 pits, with no additional space needed for non-DP programs.

The second document, *NNSA Needs to Establish a Cost and Schedule Baseline for Manufacturing a Critical Nuclear Weapon Component* (GAO-08-593) includes this chart and program description:

Figure 2: Percentage of Space in PF-4 Occupied by Various Programs as of September 1, 2007



Source: LANL.

Nuclear Weapons

Program	Description
Other NNSA weapons programs	
Pit surveillance	This program takes pits from the stockpile and subjects them to destructive and nondestructive tests to ensure that no changes that might affect performance are occurring in the pits.
Plutonium research and development	This program supports all defense-related programs by maintaining the capability to address new and unusual issues that arise during the execution of the other plutonium-related programs.
Special recovery line	This program processes retired stockpile components to recover tritium-contaminated plutonium.
Other NNSA/DOE programs	

Pu-238 heat source fabrication	This program designs and fabricates general purpose heat source units and radioisotope heater units for the National Aeronautics and Space Administration.

Program Description

Source: GAO analysis of LANL data.

ARIES/pit disassembly	The Advanced Recovery and Integrated Extraction System (ARIES) disassembles legacy pits and removes and oxidizes the plutonium, which can be used as a feed metal for the mixed-oxide (MOX) fuel polishing activities described below. The purpose of the ARIES line is to develop and demonstrate the technologies to be used in the Pit Disassembly and Conversion Facility at the Savannah River Site.
MOX fuel polishing	This program purifies plutonium from the ARIES project to specifications that would allow direct use of the plutonium in the fabrication of MOX fuel (which could be used in a nuclear reactor).
Oxide fuels/ceramics research and development	This program analyzes and processes plutonium-bearing oxides and ceramics that could be used as fuel in a nuclear reactor.

Because other programs occupy the majority of the space in PF-4, NNSA is limited in its ability to expand its pit manufacturing operations into other areas in PF-4. In order for the pit manufacturing mission to acquire new space, NNSA Office of Defense Programs officials have to negotiate with the departmental sponsor of the other programs. For example, in June 2007, the NNSA Office of Defense Programs signed a memorandum of agreement with the DOE Office of Nuclear Energy to consolidate the activities conducted by the ceramic fuels program into a single room, thereby freeing up an additional room for use by NNSA. However, because NNSA has not issued a record of decision on its efforts to transform the nuclear weapons complex, the Office of Defense Programs has not reached a decision on whether to make the space available for pit manufacturing operations, for analytical chemistry analyses, or for the consolidation of special nuclear materials from other sites in the nuclear weapons complex. In addition, it will take several years for NNSA to consolidate the ceramic fuels program, decontaminate the room, and install the necessary new gloveboxes and equipment. [End of excerpt from GAO report.]

Ways that space requirements can be met without the Nuclear Facility

As shown above in the pie chart "Other NNSA/DOE Programs" occupy 28 percent of PF-4 floor space. Two of these programs are already slated for relocation to the Savannah River Site (SRS):

1. ARIES/pit disassembly –This was originally a pilot demonstration program for a new facility at SRS called the Pit Disassembly and Conversion Facility. The PDCF is scheduled to be operational in 2021, after which AIRES should no longer be necessary in PF-4.

2. MOX fuel polishing – Intended to demonstrate the processing of plutonium oxide suitable for mixed oxide (MOX) reactor fuel fabrication. Now it has been called on to produce feedstock for SRS until the MOX Fuel Fabrication Facility begins fuel production in 2016, after which this operation should no longer be necessary in PF-4.

"Readiness in Technical Base and Facilities" (RTBF) occupies 29% of PF-4's floor space, or 43,500 sq. ft. RTBF "operates and maintains NNSA's program facilities in a safe, secure, reliable, and compliant condition. In particular, this program is responsible for facility operations and maintenance and addressing environment, safety, and health issues." Surely much of this RTBF mission, that is perhaps largely administrative, could be relocated to the Rad Lab recently built with much new office space).

Conclusion

We contend that between "Other NNSA/DOE Programs" and "Readiness in Technical Base and Facilities" ample space can be freed up in PF-4. This is enabled by: 1) transferring some non-nuclear operations to the newly built Rad Lab; and 2) the already slated relocation of some nuclear operations to SRS.
In sum:
ARIES/pit disassembly1,000 sq. ft of lab space in PF-4
MOX fuel polishing 3,000 sq. ft of lab space in PF-4
RTBF up to 43,500 sq. ft in PF-4 available to be converted to lab space

This proposal could lead to up to almost 50,000 square feet becoming available in PF-4 for nuclear operations currently proposed for the Nuclear Facility. We believe that more than the Nuclear Facility's designed 22,500 square feet of lab processing space can be found in and made available in PF-4. There is no need to build the provocative, expensive and unneeded CMRR Nuclear Facility. Congress should require a TA-55 capabilities study to investigate this issue.