Los Alamos Study Group

Nuclear Disarmament • Environmental Protection • Social Justice • Economic Sustainability

Chemistry and Metallurgy Research Replacement (CMRR) Project Primer:

Introduction, Overview, and Some Key Issues

Greg Mello, gmello@lasg.org, with help from Trish Williams-Mello, twm@lasg.org

September 7, 2009 (partially updated to December 21, 2009).

Further updates and several additional sections are pending.
Updates will be indicated by red text in future editions.

See prior analyses in Appendix A below (p. 29)

FY2010 congressional markups are in Appendix B (p. 62)

Final FY2010 congressional action will be added in the next edition

1. Introduction and overview of CMRR issues

The National Nuclear Security Administration (NNSA) and Congress are currently weighing *whether*, and if so *at what scale, with what capabilities, and in what order*, to build two proposed large new warhead production facilities, one at the Los Alamos National Laboratory (LANL) in New Mexico and the other at the Y-12 National Security Complex (Y-12) in Tennessee.

The Los Alamos facility is actually two buildings, together called the "Chemistry and Metallurgy Research Replacement (CMRR) Project," at LANL's Technical Area (TA) 55. The first of these, called the Radiological Laboratory, Utility, and Office Building (RLUOB), is nearly built, as far the physical structure goes. Fitting the building with special equipment is expected to cost more than the building itself and will not be completed until the end of fiscal year (FY) 2013.

The second CMRR building, the CMRR Nuclear Facility (NF), is estimated to cost very roughly ten times as much as the RLUOB.[1] It remains in preliminary design. As we shall see, no decision about whether to build it will be made by either the Administration or Congress prior to

[1] At this point in time, without firm estimates for either building, one can only say the second building is likely to cost anywhere from 5 to 15 times as much as the first, assuming all goes reasonably well, depending on which set of estimates one uses.

2011, when a budget-quality cost and schedule baseline for the building *may* finally become available.[2]

The purposes of the CMRR project are primarily to augment LANL's existing design and production capacity for plutonium warhead components ("pits") at the lab's Technical Area (TA) 55 complex, and, possibly and secondarily, to facilitate other LANL plutonium missions. As we shall see below, it is not clear that "non-pit" CMRR missions, to the extent there are any, can be meaningfully separated from pit certification and production.[3] Plutonium has very few uses.

As we shall see, the CMRR and more particularly the second CMRR building is not needed to preserve U.S. pit production capability, here defined as the ability to make a modest number of pits for the stockpile or otherwise. It has not been justified by NNSA or LANL on that basis. NNSA justifies the project rather on the basis of the additional production capacity it would provide.[4]

As discussed below and previously (see Appendix A), the CMRR, augmenting existing LANL facilities and other current and planned LANL investments, should be considered a "stealth" version of the Modern Pit Facility (MPF), with potential pit production rates overlapping those proposed in that earlier plan, including production rates of at least 125 pits/year in some

---

[2] Writing in early October 20009, it appears that the critical decisions (CD) process for the CMRR NF are to be decomposed into at least four separate CD tracks, the costs and schedules for each to be presented to Congress in turn, as the project completes milestones and is built, possibly: a) site work and utilities, including among other things, a concrete batch plant and geotechnical preparation, in this case solidification of a problematic tuff horizon by what will probably be more than one method, e.g. pressure grouting, excavation and replacement with concrete; b) concrete base mat; c) structural building components d) everything else about the building itself; e) special facility equipment (SFE) (October 7, 2009 interview with Steve Fong, NNSA Los Alamos Site Office (LASO) CMRR Project Manager). Thus the CMRR project as a whole may or may not have a budget-quality cost and schedule "performance baseline" until some years from now, assuming it is continued.

[3] For background on the CMRR project as whole see Greg Mello, "The U.S. Nuclear Weapons Complex: Pushing for a New Production Capability," March 20, 2008, http://www.thebulletin.org/web-edition/features/the-us-nuclear-weapons-complex-pushing-a-new-production-capability and other CMRR writings at www.lasg.org, some of which are captured below in Appendix A of this paper.

[4] One example:

> According to LANL personnel, an investment of about $500 million [*not CMRR*] would be needed to maintain a reliable pit production capability at the current level. The current Future Years Nuclear Security Plan funds required maintenance on the PF-4 facility such as roof and heating, ventilating, and air conditioning (HVAC) system repairs, as well as additional equipment purchase and installation. To account for the loss of the Chemistry and Metallurgical Research (CMR) facility in 2010, LANL proposes to reconfigure a wing of the PF-4 facility to accommodate the analytic chemistry capabilities required for pit production [i.e. *not CMRR NF*]. Analytic chemistry on smaller samples could be accomplished in the Chemistry and Metallurgical Research Replacement Radiological Laboratory/Utility/Office Building (CMRR-RLUOB), available in 2010, but this is not sufficient for pit production.

David Hunter, et. al., "Economic Analysis of National Nuclear Security Administration (NNSA) Modernization Alternatives," Institute for Defense Analyses (IDA) Report R-411, Nov. 2007, at http://stinet.dtic.mil/cgi-bin/GetTRDoc?AD=A479445&Location=U2&doc=GetTRDoc.pdf).

A second example: in May of 2007 NNSA told a Senate committee that "Without the CMRR, the long-term pit production capacity at LANL is limited to approximately 10 to 15 pits per year…" NNSA, "Chemistry and Metallurgy Research Building Replacement Project, May 2007" at http://www.doeal.gov/SWEIS/OtherDocuments/427%20NNSA%202007%20CMR%20senate%20report.pdf.

scenarios. The physical scale of CMRR is comparable to MPF – and if combined with other LANL plutonium and support facilities, *easily exceeds MPF*.[5]

According to the Secretary of Energy Advisory Board (SEAB), LANL's potential production rate could be as high as 200 pits/year[6] or, as we can surmise from other data, even higher under exigent conditions, assuming fully-supportive NNSA management and leaving aside the differences that would arise from short term high-rate campaigns as opposed to long ones. The highest production levels require both CMRR buildings.

Commonly-communicated production rate limitations are based on a current suite of administrative, managerial, and regulatory decisions that are flexible to varying degrees with respect to changes in national policy. Other limitations could be transcended with a rebalancing of funds and priorities within NNSA and DOE programs to the effect of liberating facilities, space, and staff. Still other rate limitations could be removed by future investments in LANL infrastructure, and in equipment within LANL's existing plutonium facility, which investments might be comparatively modest. Other limitations depend on pit design. Other limitations could be eased by applying physically-compact or rapid pit production techniques for more efficient production.

Please don't misunderstand. At present, pit production limitations are to varying degrees real and they cannot be rescinded or removed without incurring problems and sacrifices of one kind or another. There is no *easy, cheap, quick, or safe* way to produce more than a handful of pits per year.[7]

---

[5] The total MPF building footprint was estimated in 2003 to lie between 588,000 sq. ft. (125 pits/yr, single-shift operation) and 806,000 sq. ft. (450 pits/yr, single-shift operation). (See Summary, *Draft Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility*, DOE/EIS-236-S2, Study Group files.) Total CMRR building footprint is to be 400,000 sq. ft., to which must be added, to be comparable to MPF, a substantial portion of LANL's existing main plutonium facility, its waste treatment facilities (both liquid and solid), its proposed radiography facility, the TA-3 Sigma Complex, administrative and office buildings, security facilities, and other facilities current and proposed. In its January 2007 *LANL Ten-Year Site Plan: FY2008-FY2017* (at page 63), NNSA and LANL listed 1,098,000 gross sq. ft. of building space currently *already* devoted to pit manufacturing and certification, presumably including all or part of the 550,000 gross sq. ft. CMR building. Subtracting all of CMR to be generous, this leaves 548,000 sq. ft., to which 400,000 sq. ft. of CMRR space is to be added for a total of 948,000 sq. ft. New pit manufacturing-related construction aims to replace other aging facilities. While the comparison is crude, it appears LANL's present and additional proposed (via line item) pit manufacturing- and certification-related square footage roughly equals or even exceeds the largest MPF plans. According to the *Ten-Year Site Plan* (op. cit.) and other information, other new manufacturing-related facilities are also planned for LANL.

There appears to be no reason that the space-intensive "front end" of pit manufacturing – pit disassembly and conversion into purified metal or oxide – could not be performed at another site. Such a facility is planned for the Savannah River Site (SRS).

[6] Secretary of Energy Advisory Board, Nuclear Weapons Complex Infrastructure Task Force, "Recommendations for the Nuclear Weapons Complex of the Future," July 13, 2005, especially pp. H-1 and H-6, at http://www.doeal.gov/SWEIS/DOEDocuments/049%20SEAB%202005.pdf. As previously discussed by the author (in "The U.S. Nuclear Weapons Complex: Pushing for a New Production Capability," op. cit.), the quantitative productivity improvements envisioned by that committee were not just empty rhetoric.

[7] For a host of reasons mostly beyond the scope of this paper, and to be discussed in a companion paper being written under the auspices of the International Panel on Fissile Materials at Princeton's Program on Science and Global Security, the best number of pits produced *for the stockpile* each year is zero. There is no marginal value in actual stockpile production or in more than *de minimus* test pit production. There are considerable costs, not just

Pit production is the rate-limiting step in the production of primary-stage nuclear explosives ("primaries") – and, for the foreseeable future, and with or without new production facilities elsewhere for other primary, secondary, or case components, pit production is also the rate-limiting step for new-pit warheads overall. CMRR is pivotal to prompt and relatively rapid pit production – and hence to stockpile innovation.

Even a few new-design warheads could and probably would be significant to many important observers here and abroad. And a "modest" pit production facility like TA-55 with CMRR could produce much more than just "a few" new-design pits in the space of just a month or two. Even now the main TA-55 building (PF-4) and its many ancillary facilities could produce new-design pits, but not as rapidly, promptly, or steadily as would be possible with CMRR.

The MPF was sized for a larger arsenal than today's and tomorrow's. Today, the TA-55 complex with CMRR would embody much the same potential for stockpile modernization as MPF did in the context of a proportionately larger arsenal. Should the U.S. arsenal, or even the arsenals of other states, decline further, a CMRR-enabled TA-55 complex, and the warhead innovation it would enable, would loom even larger in policy and diplomacy than it does today.

In other words, "today's MPF" – the LANL plutonium complex including CMRR and ancillary projects there and elsewhere at LANL[8] – need not be as large as yesterday's to accomplish the same ends or create the same dangers. Not even considering potential "off-siting" of large portions of the pit production workload, as DOE has considered in the past, and not considering possible expansion (a key feature of the present design) it is, as we have seen quite as large as MPF was planned to be.

When viewed from the perspectives of nuclear states with arsenals in the low 100s, or from the perspective of non-nuclear weapon states – that is, from the perspective of any country besides the U.S. and Russia – the expanded LANL plutonium complex with CMRR as its flagship investment would enable a truly ***massive*** warhead production capacity. They must conclude that the value of warhead innovation to the U.S. is great because the cost of the CMRR is great. If CMRR is built – which means, in practical terms, if the CMRR NF is built – nuclear weapons will be accordingly valorized and legitimated.

It was the explicit intent of the previous Nuclear Posture Review (NPR) to create this perception.[9] From 2002 to 2005 the MPF was the most important proposed new production facility for precisely this purpose, the supposed "capability-based" reassurance of allies, dissuasion of potential competitors, and deterrence of adversaries. Investments in the LANL TA-55 complex, including supporting facilities in TA-50, TA-54, and elsewhere, have the same role today as investments in MPF then.

---

monetary, as well as risks that are difficult to bound. There are a number of benefits to a "zero stockpile production" policy. Investing in production, or in idle production infrastructure, in an attempt to anticipate hypothetical contingencies is neither cost-effective nor wise. Contingencies can and should be handled as such rather than as deterministic, immediate claims on scarce capital and other resources, as discussed in the main text below.

[8] See Table 1.1 in Mello, "Build Warhead Factories Now, Worry about Weapons Policy Later -- Will Congress Take Back the Reins?", Feb 12, 2008, at http://www.lasg.org/CMRR_2_12_08_ltrhd.pdf and Appendix A.

[9] Department of Defense (DoD), Findings of the Nuclear Posture Review, slide 9 ("New Triad"), January 9, 2002, at http://www.defenselink.mil/dodcmsshare/briefingslide/120/020109-D-6570C-001.pdf.

It hardly needs to be said that spending scarce funds to provide the capacity to "churn" the stockpile may not create the enhanced awe and fear that was sought by the neoconservative NPR authors. Might not such choices instead engender other, and far less deferential, judgments of this country? Alternatively, should enhanced awe and fear be created in those foreign eyes as planned, would that outcome really be in U.S. security interest? Usually those who fear acquire or enhance their own "deterrent."

If the Obama Administration wishes to write and implement a different nuclear posture than the Bush Administration, and wishes to have that difference perceived by foreign eyes, which will look at U.S. actions and capabilities and not just speeches, the Administration must implement a different infrastructure policy than the one pursued over the past few years.

As we will see, the capacity of the proposed LANL plutonium complex with CMRR is far excessive to that required for the indefinite sustainment of a U.S. stockpile of any size whatever, assuming no new-design pits. It is a capacity more accurately associated with the 2001 NPR and its explicit goal of global military hegemony than with sustainment of what happens to be a very large, diverse, and all-too-capable nuclear arsenal. It was precisely in the context of former hegemonic policy that the CMRR was initiated and developed.[10]

The CMRR's stated purposes are discussed in greater detail below. Apart from pit production, its purposes are very vague. As we shall see, neither LANL's plutonium missions nor the facilities needed to pursue them have been subject to comprehensive, let alone independent, review. Most congressional testimony and many publicly-available mission justifications are heavily laden with slogans and clichés that are passed from hand to hand and agency to agency. Most of these have no precise meaning. The justifications offered to the public by LANS (the LANL management contractor) and its public relations consultants have been demonstrably false, much further from the truth than NNSA's.[11]

---

[10] DoD, "Nuclear Posture Review" [Excerpts], submitted to Congress on 31 December 2001, links global military hegemony to nuclear weapons production and innovation capacity on p. 14: "The capacity of the infrastructure to upgrade existing weapon systems, surge production of weapons, or develop and field entirely new systems for the New Triad can discourage other countries from competing militarily with the United States." At http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm.

[11] For example:

> But it's not what most people think it is, Martz said emphatically [referring to the CMRR]. "This is not a pit manufacturing facility," he said, adding that nuclear bomb cores called pits are made in a building in TA55..."Plutonium is interesting stuff," he said. "Even if we built no pits, this facility is essential just for the plutonium research we do."… It's not actually part of the larger phenomenon called "complex transformation," although it will play into it, Martz said. (Sue Vorenberg, "New construction in Los Alamos heralds a new age for the lab," *Santa Fe New Mexican*, 3/10/2008.)

Compare these statements to NNSA, OMB, and congressional statements about the purposes of CMRR cited in this paper.

In a KTAO radio interview of 5/28/08 the cognizant LANL official admitted under questioning that Madison Avenue giant Burson-Marsteller, famous for "cleaning up" the public image of unsavory clients, had been advising LANS, as reliable sources had previously reported to us. Jeff Berger, Director, LANL Communications Office: "We hired, past tense, Burson-Marsteller, a public affairs firm, to help us with communications tied to…complex transformation." Recording in Study Group files.

From its name the CMRR *would appear* to provide a new home for missions currently housed in LANL's aging, less-than-safe Chemistry and Metallurgy Research (CMR) building.

Such a conclusion would be partially correct – but only partially. By the time the CMRR is completed in late Fiscal Year (FY) 2018 or in FY 2019 (assuming no further delays), there are expected to be no nuclear missions remaining in CMR. Until early this year, CMR had a FY2010 closure date, implying a nine-year gap between CMR closure and CMRR completion.

A new schedule for CMR closure is being developed. Meanwhile functions are gradually being removed from the building with large portions – all of wings 2, 3, and 4 – already permanently shuttered. Only wings 5, 7, and 9 are still in use.[12] Consolidation of all Wing 5 activities into wings 7 and 9 was recently planned.[13] We do not know the current status of Wing 5 consolidation and closure.

LANL has recently stated Wing 9 will not close "until replacement facilities can be developed."[14] CMRR-NF would presumably replace the CMR Wing 9 vault with a much larger one, but Wing 9's hot cell facility, its other main feature and *raison d'etre*, will not be duplicated in CMRR. What else, if anything, from Wing 9 is to be replaced at CMRR?

As far as lab space goes, this real physical elimination, both past and planned, seems to suggest CMRR would "replace" CMR Wing 7, primarily.

CMR wings 3 (closed), 5 (about to close?), and 7 each have approximately 8,000 sq. ft. of usable laboratory space.[15] Just the first CMRR building, as we shall see in a moment, has 26 laboratories totaling 19,500 sq. ft.; the second one would have at least 22,500 sq. ft. of laboratory space and at least 33,500 sq. ft. of total program space (see table below).

This situation begs for closer examination. It appears that the CMRR project would provide far more laboratory and vault space, *many times more space*, than has been recently used at CMR.

A congressional staff member asked me earlier this year why, assuming all remaining CMR missions were relocated long before CMRR completion as NNSA has promised, those relocated missions could not just stay in their new locations, perhaps with relatively modest investments to sustain them there. I did not and do not know the answer to that excellent question.

Whatever the link may be between CMR and CMRR missions (if there is any link remaining by the time CMR closes, or closes as a nuclear facility), the CMRR would also provide *new, qualitatively different capabilities and additional capacities* which are not currently at LANL.

---

[12] March 10, 2009 public presentation by Steven Fong, NNSA CMRR Project Manager and Rick Holmes, LANS CMRR Division Leader. Study Group notes and recording.

[13] LANL, *Ten-Year Site Plan FY2008-FY2017*, January 9, 2007, LA-CP-07-0039, p. 62. Study Group files, FOIA.

[14] "Until replacement facilities can be developed, Wing 9 of CMR will need to remain in operation to support NE [Nuclear Energy] as well as environmental, NNSA, and other activities." LANL, *Ten-Year Site Plan FY09-FY18*, September 2008, LA-UR-08-0654, p. 41.

[15] Drew Kornreich and Nelson DeMuth, "Alternatives for Increasing the Nuclear Materials Processing Space at Los Alamos for Future Missions," LA-UR-97-1000, April 25, 1997, p. 18 (see both text and figure). Study Group files.

The CMRR is much more, then, than any mere "replacement." As regards most CMRR *dollars*, it would be more accurate to say CMRR is a "replacement" for CMR's role *in NNSA's aspirations for LANL*.[16]

Taxonomically, CMRR's capabilities and capacities fall into three groups: a) those currently at CMR; b) those new capabilities and expansions of capacity NNSA *had hoped at one time* to house in a more intensively-used CMR; and c) other proposed new capabilities.

Although NNSA has never provided any study of mission need justifying CMRR[17], it appears that the first group of capabilities, the true *replacement* capabilities, is responsible for only a small portion of CMRR's cost. We do not know if CMRR as conceived was the most cost-effective way to replace those CMR capabilities, especially if re-evaluated under *today's* range of realistic capacity assumptions. It is possible that many or most of these functions could have been and still could be housed elsewhere at LANL for a modest investment, *provided the increased capacities implied by increased pit production – including a dramatic increase in analytical workload – were not required*. *The infrastructure implications of stockpile conservation with potential pit reuse and appropriate contingency planning has not (yet) been objectively evaluated, let alone independently reviewed.*

LANL's nuclear materials ambitions start but don't stop with pit production. More recently as 2007, some years after the CMRR project scale was selected, LANL was still apparently seeking a broader range of capabilities than were subsequently assigned to it by NNSA's Complex Transformation process. LANL specifically sought pilot-scale secondary manufacturing facilities involving "metals fabrication, radiological and salt component machining and

---

[16] There are many indications of this. Here is a recent one: "In fall 2006, the [Defense Nuclear Facilities Safety] Board [DNFSB] observed that DOE had diametrically opposed plans for CMR, which could pose safety concerns—plans were being made for reductions in engineering resources due to its approaching end of life, while at the same time, *other plans relied on the facility to support increased programmatic missions [i.e. a level of activity not currently present at CMR], particularly pit manufacturing, until a replacement facility became available in approximately 2016*." (emphasis and gloss added). DNFSB Budget Request to Congress, FY1020, p. 27, at http://www.dnfsb.gov/about/files/budget/budget_fy2010.pdf.

To see fully DOE's (and LANL's) earlier aspirations for CMR it is necessary to retrace the evolution of the CMR Upgrades Project, which was for a time in the early 1990s the largest capital project in the weapons complex. This is well beyond the scope of the present paper. NNSA's hopes for the CMR as a centerpiece of pit production collapsed when a Holocene fault with 8 ft. of vertical displacement was discovered to run beneath the building, visible not just in cores but in old aerial photographs. The original report on that fault is Krier, Caporuscio, Lavine, and Gardner, "Stratigraphy and Geologic Structure at the Chemical [sic] and Metallurgy Building, Technical Area 3, Los Alamos National Laboratory, New Mexico" October, 1998, LA-13522-MS. Study Group files.

A fairly clear description of how CMR fit into DOE and LANL aspirations is found in Kornreich and DeMuth, op. cit. In brief, LANL thought in 1997 that manufacturing 50 pits/year by 2005, as DOE had requested, while also undertaking all the other nuclear materials processing and related missions requested, would require 15,300 additional sq. ft. of Security Category I nuclear processing space, which LANL proposed to create in CMR Wing 5. There was no such space in CMR at the time.

It should also be noted that in addition to the CMRR, other planned LANL facilities will help increase effective pit production space and/or relieve the intensity of space conflicts at PF-4.

[17] LANL reports which appear to bear on this question are "Options for Plutonium-Related Missions and Associated Facilities Between 2007 and 2022," Oct. 10, 2006, LA-CP-06-0957 (Unclassified Controlled Nuclear Information, UCNI) and "Alternatives for Increasing Pit Production Capacity at the Los Alamos Plutonium Facility (U)," Apr. 10, 2006), LA-CP-06-0289 (Secret Restricted Data, SRD). Study Group FOIA in process (FOIA 09-00236P).

inspections capabilities, and advanced manufacturing technology development."[18] As earlier documents show, these other missions require considerable CMR involvement, and hence could still be a cryptic driver for the "flexibility" being designed into CMRR.[19]

I cannot quite banish from my mind a remark made to me in 2003 by Richard Mah, at the time Associate Director of Weapons Engineering and Manufacturing at LANL. I asked Mr. Mah if it was true that the CMRR was to include a 6 metric ton (MT) vault for plutonium. He said yes it would, but the vault was for uranium, not plutonium. Circumstances prevented us from continuing the conversation. Whatever that comment meant, it should remind us not to assume we know more than we do about classified decisions, or about decisions that might be made in the future. Sometimes those with appropriate clearances and need to know are among those at greatest risk for assuming that what they know includes all the relevant data. It nearly always does not. And, as they say, "plans change." The CMRR is being designed to accommodate change.

2. <u>The first of the two CMRR buildings is the Radiological Laboratory, Utility, and Office Building (RLUOB). The building, but not its equipment, is nearly complete.</u>

The $164 million (M), 130,000 sq. ft RLUOB is as of this writing nearly complete. It was expected to be ready for initial (partial) occupancy by September 30, 2009, a date that has been pushed back to January 31, 2010.[20] Special facility equipment (SFE) is not expected to be fully installed into all the RLUOB's 26 radiological laboratory modules, which total 19,500 sq. ft. in size, until the end of fiscal year (FY) 2013.[21] These modules are designed to be usable either separately or in combination.

The RLUOB is designed to be what Department of Energy (DOE) regulations describe as a Radiological Facility, not a Nuclear Facility. This means it must at all times maintain a total radionuclide inventory of 8.4 grams of Pu-239 or its hazard equivalent or less.[22]

This could change. According to a backup strategy prepared by NNSA for the contingency that the second CMRR building is delayed or not built, RLUOB could be upgraded to a Hazard Category (HazCat) II Nuclear Facility in some way, a proposition that surely would be expensive

---

[18] See especially the proposed "Weapons Manufacturing Support Facility" (p. 165, quoted) but also other proposed facilities in the LANL *Ten-Year Site Plan FY2008-FY2017*, op. cit., such as the "National Security Engineering Facility," "Tritium Upgrades/Consolidation," "Non-Nuclear Consolidation Project," "TA-55 Reinvestment Phase II," and others. The RRW first production unit (FPU) was to occur in 1Q FY2012 with full production in mid-2014. See chart, "Weapons Infrastructure Transformation at LANL," p. 68 op. cit.

[19] See "Nuclear Facilities Master Plan for Stockpile Stewardship and Management Support," July 1996, prepared for LANL by Lockwood Greene Technologies and Los Alamos Technical Associates; and "Alternatives for Increasing the Nuclear Materials Processing Space at Los Alamos for Future Missions," April 25, 1997, LA-UR-97-1000. Study Group files. Discussed further in main text below. These plans included secondary and case manufacture.

[20] Steve Fong, October 7, 2009 interview.

[21] CMRR Project Staff, March 10, 2009 public briefing slides, slide 13. Study Group files. "Baseline" cost, scope, and schedule for RLUOB special facility equipment (SFE) are expected to be completed "this summer" (author's 6/18/09 interview with Steve Fong, CMRR Project Manager, NNSA Los Alamos Site Office).

[22] See for example DOE, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," at http://www.hss.doe.gov/nuclearsafety/ns/techstds/standard/std1027/s1027cn1.pdf.

or extremely expensive.[23] The *nature* of the nuclear missions to be assumed at an "RLUOB nuclear facility," and the *quantity*, *frequency*, and *duration* of material at risk (MAR) needed to conduct them, would determine whether such expanded RLUOB operations would be prohibitively expensive, risky, or impractical for other reasons.

In addition to its labs the RLUOB will also provide office space for about 350 CMRR staff, a common utility core for both CMRR buildings, a training facility, an incident command center, some emergency response capabilities, and, in addition, "space for future support of [LANL's] defense program activities," whatever that means.[24]

RLUOB equipment is now expected to cost more than the building itself – $199.4 million (M) vs. $164 M. Additional design, procurement, and installation are expected to take about as long as building construction (about 4 years apiece, or 8 years in all). Partial occupancy is expected to begin in roughly 2011. The "long pole in the schedule tent" is glovebox procurement.[25]

3. <u>The proposed second CMRR building is the much more expensive Nuclear Facility (CMRR-NF). The supposed benefits, estimated costs, and risks of this facility need very careful scrutiny, as neither Congress nor the Executive have as yet committed to building it.</u>

The 270,000 sq. ft. Security Hazard I/Hazard Category (HazCat) II CMRR-NF is projected to cost "above $2 billion" (B).[26] If built, the CMRR-NF would add 22,500 net sq. ft. of plutonium processing and laboratory space to LANL's existing 59,600 net sq. ft of this space (in Building PF-4), a 38% increase.[27,28]

In 2008 the estimated unit cost of this space was $89,000 per sq. ft. After correction for the average inflation of all U.S. construction costs over these years, this unit cost is a factor of 25 greater than the construction cost of space in LANL's existing plutonium facility.[29]

---

[23] Defense Nuclear Facilities Safety Board (DNFSB) Weekly Site Report for 1/2/09, B. Broderick and R.T. Davis:

> Recently, LANL submitted their evaluation of an exit strategy for the CMR Building that does not include use of the CMR Replacement Nuclear Facility (CMRR NF)…LANL recommends additional evaluation of elevating the Radiological Laboratory, Utility, and Office building to a category 2 nuclear facility if the CMRR NF is significantly delayed. LANL also recommends pursuing additional actions to improve the Plutonium Facility vault utilization.

[24] From http://www.lanl.gov/orgs/cmrr/phases/rluob.shtml.

[25] NNSA, CMRR Public Meeting Presentation, September 23, 2009, pp. 18, 21; Fong October 7 interview.

[26] DOE FY2010 *Congressional Budget Request* (CBR), Vol. 1, pp. 215, at http://www.cfo.doe.gov/budget/10budget/Content/Volumes/Volume1.pdf. For CMRR-NF size see http://www.lanl.gov/orgs/cmrr/phases/nf.shtml.

[27] By comparison LLNL's existing modern Superblock plutonium facility (Building B332), currently slated for de-inventorying, has 25,000 sq. ft. of such processing space, enough for a full pit production line.

[28] This is net square footage, not including the CMRR-NF vault (per conversation with Steve Fong, NNSA CMRR Project Manager, August 11, 2009). The entire CMRR-NF is classified as HazCat II space, including utility and interstitial spaces.

[29] LANL's Building PF-4, containing 59,600 sq. ft. of Security Hazard I/HazCat II space, cost $75 M in 1978 (electronic communications with retired officials, July 2008, Study Group files). Using the *Engineering News Record* (ENR) "Building Cost Index," this cost inflates to $201 M in 2007 or an extrapolated $211 M in 2008, or $3,540 per sq. ft, 25 times less than projected CMRR space costs in constant construction dollars. The ENR "Construction Cost Index" gives a not-dissimilar result. Using the Consumer Price Index (CPI) gives a slightly

The CMRR-NF would also add 6 metric tons of active and long-term (passive) vault space to LANL, roughly tripling the lab's plutonium storage capacity.[30] The space occupied by this vault – very roughly 7,500 sq. ft.[31] – is not included in the laboratory space total above.

The CMRR-NF would also provide 3,500 sq. ft. of space for large vessel handling, likewise not included in the laboratory space total. This space, which is located near loading docks, doubles as a staging area for waste and could also be described as HazCat II "contingency space."[32]

Planned CMRR-NF Space Categories, Actual and Estimated		
Function	**Sq. ft.**	**Percent**
Labs	22,500	8
Vault	7,500*	3
Miscellaneous	5,000*	2
Large vessel handling	3,500	1
Utilities	71,500*	26

---

higher cost for PF-4 of $248 M in 2008 dollars. The ENR indices are designed to track construction inflation more accurately than CPI and I have chosen one of them here.

The SEAB NWCITF cited above suggests, in its Appendix H, that the then- estimated MPF costs ($19,400 per sq. ft in 2005 dollars) were approximately a factor of 10 higher than what could be achieved in private industry. CMRR-NF costs are almost 4 times higher than this now, or about 40 times private industry cost, according to the NWCITF.

When Senator Bingaman first announced his support in April 1999 for what later became CMRR, his spokeswoman said "This would not be a Taj Mahal but a scaled-down, streamlined facility that would meet the needs of the lab *at a lower cost* than they are met now." (Ian Hoffman, "Bingaman Seeks Funds for Design of Weapons Facility," *Albuquerque Journal North*, April 15, 1999, emphasis added, archived at http://www.lasg.org/Pit_Prod.htm.

Why have DOE's unit costs for plutonium laboratory space risen 25 times faster than the average inflation rate for the construction industry as a whole since 1978? In part it's much-needed safety oversight, but mostly it's not, as the SEAB NWCITF understood in their discussion of TA-55. In the author's opinion, the primary reason is the nearly ubiquitous lack of formal productivity in DOE contractors, a situation which has become culturally normalized by poor DOE and NNSA strategy and management. How many warhead certifications have the Dual-Axis Radiographic Hydrotest (DARHT) Facility, or the National Ignition Facility (NIF), the flagships of stewardship, made possible? Zero. Giant projects are commonly built with little or no, or with mistaken, justifications, and no one in government seems to have the gumption to point this out, not even the Government Accountability Office (GAO), whose terms of reference are usually too narrow to allow this. Thousands of employees are paid six-figure salaries in the service of vague, even vacuous, goals, and still more dubious "accomplishments." All this is tolerated because it keeps the enterprise funded, and presumably "maintains expertise." This is precisely what such diaphanous management is not doing. It is all in many ways a vast charade, a "welfare program for Ph.D.'s" as Rep. Hobson once said. Spending money in the weapons complex and especially the labs has become an end in itself, with institutional spending a tacitly-accepted surrogate for "confidence" in the nuclear deterrent, there being no other measure available. The effect on morale and technical integrity at the two weapons physics laboratories, the twin epicenters of overfunding, has been disastrous.

[30] For example see Steve Fong, NNSA, and Tim Nelson, LANL, "CMRR Project Update, September 19, 2006, LAUR-06-6590, p. 8, which is p. 52 at http://www.lanl.gov/orgs/cmrr/publicmeetings/documents/proceedings/LA-UR-07-0684_CMRR-Public-Meeting_Sept-2006_Final-Proceedings-Vol2.pdf.

[31] This and other estimated space allotments are estimated from an illustration in Slide 21, March 20, 2009 CMRR presentation by Steve Fong, NNSA, and Rick Holmes, LANL.

[32] Teleconference with Steve Fong, NNSA Project Manager, August 12, 2009.

Structure and building systems	160,000*	59
Total	**270,000**	**100**

* Author's estimate from NNSA pie chart of 3/20/09; others from NNSA

With only 8% of its space available for actual laboratories, CMRR-NF begins to resemble certain wild nuts – mostly shell, very little meat.

The CMRR-NF is now in its seventh year of conceptual and preliminary design. There is as yet no "validated" or "budget-quality" cost estimate or schedule for the project, and none is currently expected for several years. Such a "baseline," in project-management-speak, was, as of June 2009, expected sometime in FY2011, according to National Nuclear Security Administration (NNSA) project officials.[33] By October 2009, with another year's project funding in hand from Congress, this was no longer the case.

The seismic safety issues that have bedeviled CMRR-NF design (see below) have for the moment been resolved in the sense that a process has been created which will, if faithfully followed by NNSA in the years to come, result in a seismically-safe building.

It is not yet fully clear when, at the earliest, final design and construction of the initial project stage (geotechnical site work, utilities, concrete batch plant, and more) could begin. Quite possibly this could occur in FY2010, even before subsequent project stages are designed and approved.

The expected date of final CMRR completion is unclear but would appear to lie in the FY2019 timeframe.

If completed, CMRR-NF start-up could be delayed by delays in other projects whose completion and operation is required for CMRR operation, including planned facility upgrades (e.g. TA-55 Building PF-4, the main plutonium facility), security projects, and waste management projects.

As for using the upgraded TA-55 complex (including a completed, operating CMRR) for actual expanded pit production, there could be *other* bottlenecks at LANL that also might require major new construction projects. For example TA-3 Building 0066, the Sigma Complex, is in poor condition,[34] did not meet seismic requirements even in 1997,[35] and is the location where most pit components have been produced up to now. Of the two dozen or so parts in a pit, only the two hemi-shells are made of plutonium. Manufacture of these shells and attachment of the pit tube

---

[33] June 18, 2009 Fong interview.

[34] LANL, *Ten-Year Site Plan FY2008-FY2017*, January 9, 2007, LA-CP-07-0039, p. 88. Also:

> The Sigma facility supports a large, multi-disciplinary technology base in materials fabrication science. This facility is used mainly for materials synthesis and processing, characterization, fabrication, joining, and coating of metallic and ceramic items. Under Complex Transformation, capabilities provided by the Sigma facility will be required to support increased manufacturing. The Sigma facility is a candidate for replacement or significant revitalization due to its age and poor condition, and options for a replacement facility are currently being studied.

LANL, *Ten-Year Site Plan FY09-FY18*, September 2008, LA-UR-08-0654, p. 26.

[35] Todd Macon and Greg Mello, "Seismic Hazards at Los Alamos National Laboratory with Emphasis on the Plutonium Facilities at TA-55," January 23, 1997, http://www.lasg.org/archive/1997/seismic.htm.

are to the author's knowledge the only pit manufacturing steps that truly need to take place in any TA-55 building current or planned.[36]

The CMRR-NF is being managed as a concurrent "design/build" project, an ambitious approach for such a complex and unique facility.

So far the Administration has gone out of its way to express a lack of final commitment to the CMRR-NF. Its FY2010 budget request did not include a placeholder for construction funds.

> The funding profile…for FY2011 to FY2014 is…for the [CMRR-] NF final design only. No funding placeholder for construction of the Nuclear Facility is included…A future decision to proceed with construction of the Nuclear Facility and associated equipment has been deferred pending the outcome of the current ongoing Nuclear Posture Review and other strategic decision making.[37]

Prior to submitting the budget DOE Secretary Chu gave the reason for this. Speaking to reporters at Sandia National Laboratories (SNL) on April 10, 2009, Chu said in response to a question about the CMRR-NF, "I think the best thing to do is, let's wait for the Nuclear Posture Review."[38]

House Appropriators had been insisting on that approach for years.

[Since this paper was first written congressional appropriators nearly doubled the Administration's CMRR budget request in their final legislative action. This will be discussed in an update to this paper.]

4. <u>The other proposed major new NNSA production facility is the Uranium Processing Facility (UPF) at the Y-12 plant near Oak Ridge, Tennessee</u>

The purpose of the UPF is to replace existing processing and manufacturing facilities for highly-enriched uranium (HEU), facilitating production of thermonuclear "secondaries" and related missions.

NNSA currently estimates that the UPF, which is still in conceptual design, would cost "$1.4 to $3.5" B.[39] The Office of Management and Budget (OMB) and the Pentagon Cost Analysis Improvement Group (CAIG) believe UPF construction costs would be greater than $3 B.[40]

NNSA recently completed an internal review of its HEU infrastructure options and concluded UPF was the best option from both the safety and cost perspectives.[41] NNSA has also contracted

---

[36] More information on pit production is forthcoming in another paper.

[37] DOE FY2010 CBR Vol. 1 p. 215, http://www.cfo.doe.gov/budget/10budget/Content/Volumes/Volume1.pdf.

[38] Todd Jacobsen, "NNSA Construction Decisions Waiting for Nuclear Posture Review," *Nuclear Weapons and Materials Monitor*, April 20, 2009.

[39] DOE FY2010 CBR Vol. 1, pp. 215 and 203.
http://www.cfo.doe.gov/budget/10budget/Content/Volumes/Volume1.pdf

[40] In its November 2007 budget guidance "passback," OMB urged NNSA to use a UPF "in the upper part of the estimated range, at least $3.0 billion, which the Cost Analysis Improvement Group (CAIG) estimated to be a more realistic cost for the project." (Study Group files.) The CAIG estimated UPF costs at $3.4 B. (Institute for Defense Analyses, "Economic Analysis of National Nuclear Security Administration (NNSA) Modernization Alternatives," November 2007, pp. 31-32, http://stinet.dtic.mil/cgi-bin/GetTRDoc?AD=A479445&Location=U2&doc=GetTRDoc.pdf).

a review of UPF's mission, scale, and design, probably completed last month (July, 2009), with a view to decrease UPF's complexity and cost.[42]

NNSA believes the UPF will save money. Reporter Todd Jacobsen was there for the questions and answers following NNSA Administrator Tom D'Agostino's May 13, 2009 testimony before the House Armed Services Strategic Forces Subcommittee, and wrote:

> The CMRR-NF and UPF remain integral to [NNSA's complex transformation] plan, however, and D'Agostino said both facilities would help the agency save money in the long run, despite the significant upfront capital construction costs. "There's a lot of money to be drawn out of the program by consolidating," D'Agostino said. He said the UPF at Y-12 could ultimately save $200 million a

---

[41] Todd Jacobsen, "NNSA Review Reinforces Need for New Uranium Processing Facility," *Nuclear Weapons and Materials Monitor*, August 10, 2009.

[42] Todd Jacobsen, "NNSA Gets Placeholder Request in Year of "Wait-and-See' Policy," May 11, 2009, *Nuclear Weapons and Materials Monitor*. The review is being led by former weapons administrator Everet Beckner. At a March 17, 2009 House Appropriations Energy and Water Development Subcommittee hearing about the future of the nuclear weapons complex Beckner suggested the UPF could be about 25% smaller – and that the CMRR should be reevaluated as well. Quoting at length, with emphases in the original except for italics:

> **Due to unacceptably high projected construction and operating costs, NNSA should defer construction, down-size the planned operating spaces, reduce contingency space and re-assess security savings of UPF at Y12 Plant, based on the new NPR (Nuclear Posture Review).** The UPF (Uranium Processing Facility) project is a large, enriched uranium processing facility at the Y12 plant, intended to replace existing facilities (bldg 9212, among others) which are very old and were originally designed with standards that are unacceptable today in both safety and security features. *However, the design was started several years ago when the work load appeared to be considerably larger than now appears to be the case.*
>
> The solution: It appears the UPF design can be down-sized to accommodate the future workload and work scope, resulting in substantial cost savings. It appears that the present UPF design is at least 25% too big in its planned work spaces, contains too much contingency space, and is too complex, including a massive commitment to glove box operations beyond the present operational concepts at Y12. *Also, since UPF cannot be completed until the most significant manufacturing requirement for UPF will have been completed (namely, the W76-1 Live Extension program), re-scoping and delaying the UPF project will not significantly delay NNSA deliverables to the stockpile.* It does appear that the re-sized UPF should be constructed at Y12, rather than moved to Pantex or another nuclear operations site, since the recent construction costs of the new storage facility (HEUMF) were high, and that storage facility would also have to be replicated at whatever site is chosen for UPF.
>
> **4. To reduce its budget requirements, and in response to the smaller stockpile anticipated with the new NPR, NNSA should re-plan the production requirements for the plants and the lab support** (this should specifically include CMRR/NF and UPF). The operational requirements and the major facilities requirements presently being planned by NNSA and its contractors (both nuclear and non-nuclear facilities) have probably not been reduced in size and scope to fully reflect the NPR presently being developed by the Administration….[The] increased dismantlement workload can be accommodated at the Y12 plant by putting more secondaries into storage in the new HEUMF storage facility and dismantling them when time and space permits. (http://appropriations.house.gov/Witness_testimony/EW/Everet_Beckner_03_17_09.pdf.)

year. “It’s almost a facility that pays for itself over a 15-year or less time period,” he said.[43]

I know of no such cost-saving claim regarding the CMRR or the CMRR-NF in particular.

The UPF would replace existing unsafe facilities at Y-12, namely the 9212 Complex, which according to the Defense Nuclear Facilities Safety Board (DNFSB) “cannot meet existing nuclear safety requirements for Hazard Category 2 nuclear facilities.”[44]

In June the House Appropriations Energy and Water Development Subcommittee (HEWD) issued its markup, which would double the NNSA proposed budget request for UPF in FY2010 from $54 M to $109 M.

[Since this paper was written, NNSA’s UPF study was completed. Further information will be provided in an update.]

5. <u>These two large projects, with a combined cost currently expected to exceed $5 B (not including ancillary facilities), comprise the core of NNSA’s weapons “complex transformation” proposal.[45]</u>

---

[43] Todd Jacobsen, “NNNSA Faces Congressional Criticism for ‘Placeholder’ FY2010 Budget,” *Nuclear Weapons and Materials Monitor*, May 18, 2009.

[44] Testimony of A.J. Eggenberger, Chairman, DNFSB, to House Appropriations Energy and Water Development Subcommittee, March I7, 2009, at http://www.dnfsb.gov/pub_docs/testimonies/all/ts_20090317.pdf. Quoting at length, with emphasis added:

> NNSA continues to rely on aging facilities to carry out hazardous production missions in support of the nation's nuclear deterrent while planned replacement facilities suffer extended design and construction delays. Examples include the 9212 Complex at Y-12 (portions of which are more than 60 years old), to be replaced by the planned Uranium Processing Facility; and the Chemistry and Metallurgy Research building at LANL (55 years old), to be replaced by the Chemistry and Metallurgy Research Replacement Project. The 9212 Complex cannot meet existing nuclear safety requirements for Hazard Category 2 nuclear facilities, and the Chemistry and Metallurgy Research building's seismic fragility poses a continuing risk to the public and workers. Other facilities in similar situations include the Radioactive Liquid Waste Treatment Facility at LANL and the scattered facilities that constitute LANL's capability to repackage, characterize, and ship transuranic wastes offsite for disposal.
>
> NNSA is taking interim actions to improve the safety posture in the existing facilities. NNSA has reduced the inventory of uranium solutions in plastic bottles at the 9212 Complex, and plans to relocate some activities from the Chemistry and Metallurgy Research building to a more robust facility at LANL. NNSA also is executing a line-item project to upgrade certain facility systems in the 9212 Complex based on a facility risk review and is consolidating operations in the Chemistry and Metallurgy Research building into wings of the structure that do not lie directly above a seismic fault . However, these are stop-gap measures. These facilities are structurally unsound, are unsuitable for use any longer than absolutely necessary, and will have to be shut down, *perhaps before the replacement facilities are ready.*
>
> Unfortunately, planned replacement facilities have been delayed beyond original projections and face continued scrutiny regarding cost, scope, and programmatic need. NNSA must continue to drive safety improvements at the existing facilities while, in parallel, building replacement facilities quickly *or finding alternative, safer means of accomplishing mission related work.*

This last is an important recommendation NNSA has not yet heeded.

[45] See http://www.complextransformationspeis.com/.

Adding the above preliminary NNSA estimates, CMRR-NF and UPF are together likely to cost at least $5 B if built, not counting their expensive ancillary facilities and not considering the likelihood of significant cost inflation during their long construction periods.

The decisions to build either or both of them – and if so at what scale, with what capabilities, in what order and when, and at what final cost – will directly and indirectly affect weapons policies and NNSA management options for years to come. They would help *preserve* some capabilities in the weapons complex, they would *add* new capabilities, and if budget increases are not forthcoming, they would probably also *subtract* some current capabilities because of their huge cost. These effects are fairly predictable; there are other possible effects that are less predictable. Significant management risks are involved – again, to be discussed below.[46]

There are significant differences between UPF and CMRR-NF in regard to their respective roles in preserving (versus adding new) capabilities. Simply put, UPF mostly preserves; CMRR mostly adds.

CMRR-NF, in concert with other facilities at TA-55 and elsewhere at LANL, would significantly enable *relatively rapid*, *larger-scale* production of *new-design* pits, a capability not otherwise present at LANL without disruptive re-prioritization of programs and building space, special procurements, and variances from DOE safety regulations.[47] Even with these steps, the pit

---

[46] As the IDA study, op. cit., put it: "We note that the risk associated with the investment cost estimates is skewed to the right. That is, while there is some chance that actual costs could be substantially below this estimate, there is a much larger chance of costs substantially exceeding our estimate."

[47] In principle the CMRR-NF could facilitate all, and not just new-design, pit design and production, but there has been no requirement for reproducing pits of current design except for very approximately 3 dozen W88 pits, the slow production of which is currently slated to conclude in about three years, long before CMRR-NF could be built. I do not know whether this pit requirement originated within NNSA or externally.

Pit production now appears to be oriented more toward sustaining production capability than to any stockpile requirement. I know of no additional stockpile requirement (beyond these W88s) – and neither does Congress. Thus the House Appropriations Energy and Water Development Subcommittee (HEWD) recently said,

> The Committee also accepts, with some skepticism, NNSA's contention that preservation of plutonium capability requires the actual manufacture of plutonium pits, although the W88 pits now being produced are for a Cold War weapon poorly suited to the 21st Century threat. Under present plans, the production run of W88 pits will be completed in approximately three years, leaving no more pits to be produced to sustain the plutonium capability. Accordingly, the Committee recommends $123,201,000 for Plutonium Infrastructure Sustainment, $26,000,000 below the request in order to produce W88 pits at a minimum rate and extend plutonium capability, pending resolution of nuclear strategy issues. (House Report 111-203, July 13, 2009, http://thomas.loc.gov/cgi-bin/bdquery/z?d111:h.3183:)

In FY2008 NNSA manufactured 6 W88 pits, and qualified 7 for stockpile acceptance (see DOE Congressional Budget Request for FY2010, Volume 1, p. 68, http://www.cfo.doe.gov/budget/10budget/Content/Volumes/Volume1.pdf).

Deployed pits are expected to last at least 85 years from manufacture if not longer. "Most primary types have credible minimum lifetimes in excess of 100 years as regards aging of plutonium; those with assessed lifetimes of 100 years or less have clear mitigation paths that are proposed and/or being implemented." JASON, "Pit Lifetime," JSR-06-35, at http://lasg.org/JASONs_report_pit_aging.pdf.

The author's analysis based on production dates from a variety of open sources suggests that nearly all deployed pits were made in 1980 or after. The stockpile pit age profile could be improved somewhat if desired during selective planned dismantlements. Therefore the remaining pits, at a minimum, would have a greater life expectancy, starting now, than the proposed CMRR-NF with its expected 50-year life. Including all uncertainty, pit life exceeds – by

production capacity at LANL would be very different with, versus without, the CMRR. *New-design pit certification and production are the primary missions of both CMRR buildings.* Thus the House Appropriations Committee wrote in 2007:

> …[t]he CMRR facility has no coherent mission to justify it unless the decision is made to begin an aggressive new nuclear warhead design and pit production mission at Los Alamos National Laboratory.[48]

Given the absence of such a sweeping new mission the Committee proposed zero funding for the CMRR project for FY2008, as they also had done for FYs 2004 and 2006. (For FYs 2005 and 2007 the Committee proposed cuts of 58% and 89% from budget requests, respectively, recommending only pre-conceptual cost estimating and long-term planning.)

This year the Committee recommends funding the CMRR at the requested level for the very first time, although that request ($55 M) is itself just 57% of this year's funding ($97.2 M) and is just 32% of the $172 M estimated for CMRR for FY2010 in the last Bush Administration budget.[49]

[Please see Appendix B for the FY2010 committee markups, which have been superseded by congressional action. An update will be provided.]

The Bush Administration also understood the CMRR as a production facility (not: "a replacement for CMR," whatever that means) the capacity and justification for which was closely related to production requirements for the Reliable Replacement Warhead (RRW).[50] In its November 2007 budget "passback" guidance to NNSA, the Office of Management and Budget (OMB) wrote unambiguously regarding CMRR's purpose:

---

decades – the decade-long lead time required for construction of additional pit production facilities like CMRR-NF. Given also that future stockpiles are expected to include the same or fewer numbers of existing pits in each type as is present today, no requirement to reproduce existing pit designs based on reliability or numerical sufficiency is expected in any time frame relevant to present infrastructure decisions.

This logical conclusion could be strengthened *politically* by developing and adopting of a complex-wide infrastructure contingency plan.

The CMRR-NF also will provide for large-vessel cleanout capability, facilitating subcritical nuclear tests at LANL using weapons grade plutonium (WgPu) or the Pu-242 isotope (once called "Cider"). The latter is a scarce resource but allows for implosion of complete, full-scale plutonium primaries, a nearly exact experimental approximation to the definitive early stages of a complete nuclear primary explosive test (formerly: the "Appaloosa" program). Large (~2 m diameter) vessels are required; the capability to charge and clean out these large vessels is not available in existing TA-55 facilities. Such tests are obviously not required to certify the existing arsenal (which has been certified and recertified by a number of parties more than a dozen times without them), but could significantly assist certification of new-design primaries in a nuclear test ban regime. Large-vessel handling capability may be a significant mission driver for CMRR-NF. Limited background on this program is available at http://www.lasg.org/technical/subcritical-trident.htm.

[48] House Report 110-185, June 11, 2007, p. 105, http://thomas.loc.gov/cgi-bin/bdquery/z?d110:H.R.2641:

[49] DOE FY2009 CBR Vol. 1., p. 230. At http://www.cfo.doe.gov/budget/09budget/Content/Volumes/Volume1a.pdf.

[50] The RRW was canceled under that name by Congress, and then subsequently repudiated by the Obama Administration again under that name. Programs which could lead to a similar or identical end are before Congress again today. See Appendix B.

> ***NNSA Funding for Nuclear Weapons' Cores:*** The DOE/NNSA is requesting funding in FY 2009 for the Chemistry and Metallurgy Research Replacement Project. *This facility will be used to manufacture the central core of nuclear weapons, known as the "pit."* The DOE/NNSA has assumed a future production rate of 50 – 80 pits per year at Los Alamos National Laboratory, New Mexico, consistent with their preferred alternative for complex transformation. *Currently there is no formal agreement between DOE and DOD on production requirements, and thus no firm basis for setting a facility production capacity requirement. This requirement is the major cost driver for the facility.*
>
> Therefore, DOD and DOE should collaborate on an analysis that determines what level of production will be sufficient to meet requirements for pit replacement in the stockpile, whether for existing designs or for the future Reliable Replacement Warhead (RRW). This analysis should also clarify the number of RRW variants that will be produced. DOD and DOE should provide this analysis to OMB not later than July 2008.[51] (emphasis added)

By how much would CMRR increase production capacity?

In May of 2007 NNSA wrote to the Senate Appropriations Energy and Water Development Subcommittee that CMRR-NF would multiply LANL's pit production capacity by a factor of five, bringing it from "10 to 15" to "50-80 pits per year."

> Without the CMRR, the long-term pit production capacity at LANL is limited to approximately 10 to 15 pits per year, based on limited vault space and multiple mission requirements. The actual throughput that would be achieved likely would be lower owing to the inherent unreliability of the CMR. LANL provides the Nation's sole pit production capability until a new consolidated plutonium center is available. Although the limited LANL capability does sustain a certain level of production capability, the 10 pits per year rate would not support meaningful stockpile transformation, or provide a capability to respond to a significant technical issue in the current stockpile. If the NF were constructed, and if the existing plutonium facilities at LANL were dedicated to pit manufacturing, a pit production rate of approximately 50-80 pits per year might be sustainable for some duration.[52]

Over the years DOE, NNSA, LANL, and DOE's advisors have offered highly divergent and inconsistent interpretations of LANL's ***current*** pit production capacity, ranging from as low as "10-15" (as in the passage above) to as high as 200, as noted previously. It cannot be repeated enough that the production capacity of LANL depends as much or more on management commitment, space allocation, pit design, and other decisions as on any of the variously-stated "capacities" of the TA-55 complex with and without CMRR.[53]

---

[51] OMB, passback guidance to NNSA for its FY2009 budget request, Study Group files.

[52] NNSA, "Chemistry and Metallurgy Research Building Replacement Project, May 2007" at http://www.doeal.gov/SWEIS/OtherDocuments/427%20NNSA%202007%20CMR%20senate%20report.pdf.

[53] For further discussion see text above and in Mello, "Build Warhead Factories Now, Worry about Weapons Policy Later – Will Congress Take Back the Reins?", Feb 12, 2008, at http://www.lasg.org/CMRR_2_12_08_ltrhd.pdf.

Still more capacity could be added by:

Secondaries, by contrast, can be built or refurbished in quantity now and for some years to come in existing facilities, as Dr. Beckner noted in his March House testimony.[54] That production is under way. The W76-1 Life Extension Project (LEP), involving the largest production run of secondaries planned, is proceeding and may well be completed before (and without) UPF, as Beckner notes. NNSA is currently requesting construction and operational funds to extend the life of existing production facilities at Y-12 to assure "continued safe and efficient" operations involving HEU and nuclear secondaries.[55]

We have not been able to uncover any evidence that the 9212 Complex can be made "safe and efficient," which would contradict DNFSB and NNSA testimony, or if so how long it would remain in that condition after completion of the planned facility life extensions, currently loosely scheduled to be done in FY2014.

UPF would not come on line until the end of FY2018 (probably meaning the beginning of FY2019) at the earliest, so presumably the life extension project for the Building 9212 Complex (the Nuclear Facilities Risk Reduction, NFRR) is being developed and pursued with a view to preserve those buildings' capabilities until at least then.

6. <u>These projects cannot be built at the same time under current budgets without significant program and staff cuts.</u>

If built the CMRR-NF and UPF would have to be staffed, equipped, operated, guarded, and maintained to sustain their capability. According to NNSA the UPF will save $200 M in

---

- Increasing shifts;
- Expanding CMRR-NF (NNSA has said it could expand the nuclear-space footprint of the CMRR-NF by 9,000 sq. ft., a 40% increase; see "Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement" Summary, December 2007, p. S-36, at http://www.complextransformationspeis.com/Summary.pdf; the CMRR-NF is being designed to facilitate such modular expansion);
- Replicating the proposed CMRR buildings at LANL – building four buildings instead of two, an option NNSA and LANL have carefully examined and physically reserved (see for example NNSA, Fig. S.3.4.1-7, p. S-39, *Summary*, Final Complex Transformation Supplemental Programmatic Environmental Impact Statement, http://www.complextransformationspeis.com/Summary_Final.pdf); and/or
- Off-loading separable portions of the work – for example non-plutonium pit parts, pit recycling, and metal purification,-- to other NNSA sites, other LANL facilities (modified as necessary), or to off-site contractors as appropriate.

See also SEAB NWCITF discussion, op. cit.

[54] "Also, since UPF cannot be completed until the most significant manufacturing requirement for UPF will have been completed (namely, the W76-1 Live [sic] Extension program), re-scoping and delaying the UPF project will not significantly delay NNSA deliverables to the stockpile." Beckner, op. cit. Delaying the CMRR-NF also need not delay deliverables (pits, in the CMRR case) to the stockpile either, because after the current short-term W88 production run there are no pit deliverables currently foreseen, as noted above.

[55] NNSA's only new construction project for FY2010 is the Nuclear Facilities Risk Reduction (NFRR) Project, 10-D-50, the purpose of which is to "extend the life of Buildings 9212 and 9204-2E" at Y-12…The project will upgrade mission critical equipment that was selected through a risk-based analysis and thereby enable continued safe and efficient building operations." In FY2010 $12.5 M is requested; total project costs are expected to lie in the $85 to $109 M range with project completion loosely scheduled for FY2014. DOE Congressional Budget Request for FY2010, Volume 1, pp. 171, 179-184, http://www.cfo.doe.gov/budget/10budget/Content/Volumes/Volume1.pdf. FY2010 program funds are also being requested for this purpose.

operating costs per year. In the case of the CMRR-NF there will be significant new operating costs, which we might estimate to be in the general ballpark of $100 M per year.[56]

Thus a 10-year delay in CMRR-NF after preliminary design would save NNSA about $1 B, gross.[57] If, but only if, CMRR-NF were subsequently built, these savings would be slightly offset by new costs incurred by future partial redesign. Assuming the underlying fundamentals were indeed sound, this should mostly involve re-specification of equipment and fixtures and related details. Structures and passive design elements – the stuff of preliminary design – should not change much, if at all. Specialized nuclear design expertise could be maintained in the meantime through the TA-55 Reinvestment Project, which is at least to some degree a necessary project, and as well as through other safety-driven LANL nuclear facility line items, general plant projects, and program-funded maintenance projects. A "mothballed, contingent" CMRR-NF procurement strategy is favored by the fact that neither final design nor construction has begun.

There is another category of capital costs associated with construction of these projects, namely demolition and disposal (D&D) of existing facilities. NNSA has estimated these costs at roughly $400 M for CMR, an expense which would presumably commence before or immediately after CMRR-NF completion.[58] With at least three CMR wings decommissioned, there may be no

[56] "In FY14 [sic – now about 2019], the CMRR facility is planned to become operational. The CMRR maintenance budget is projected at approximately 2.5% of RPV [Replacement Plant Value] [that is, at least $2.2 B for both CMRR buildings, giving an estimated $55 M/year for maintenance] to sustain its condition. One of the challenges for the Laboratory and NNSA is to provide the funds necessary to meet this new maintenance funding demand." In FY07, total LANL maintenance spending was $88 M, of which $6 M was for the existing CMR building. If the existing CMR building ($6 M/year) is demolished and both planned CMRR buildings ($55 M/year) are completed, total LANL maintenance costs would increase by about $49 M (56%), by this account. See LANL, "Ten-Year Site Plan, FY2008-FY20017," LA-CP-07-0039, January 9, 2007, pp. 114-115. Study Group files, Freedom of Information Act request.

Total net new annual operating costs from CMRR and its supporting facilities would be much greater than just increases in net maintenance costs. These would include net new plutonium-related staff, supplies, additional security, and waste management expenses. The CMRR is being planned for a staff of 350. Upon information and belief, this is significantly more than work at CMR today.

It is difficult to imagine these increased net operating costs, in aggregate, being less than about $100 M.

As significant as these increases in operating costs are, it is during the earlier construction and demolition phases, when annual costs are expected to reach as high as $250 M, that the largest fiscal impact of CMRR-NF construction would occur, all other things being equal.

[57] This is just the beginning of the NNSA savings that would accrue from warhead sustainment policy that did not include design, certification, production, and deployment of new-design nuclear explosives and gratuitously new weaponization components – and to the Department of Defense (DoD) from abjuring new delivery systems and nuclear weapons platforms.

[58] NNSA FY2010 CBR Vol. 1, p. 223:"The initial pre-conceptual cost estimate range for D&D of the CMR Building is approximately $200,000,000 - $350,000,000 (un-escalated FY 2004 dollars) with an associated schedule estimate range of 4-5 years. (If this cost range is escalated to FY 2012, the cost estimate range increases to $350,000,000 - $500,000,000)." http://www.cfo.doe.gov/budget/10budget/Content/Volumes/Volume1.pdf.

There have been a variety of subtle indications in recent years, difficult to find and reference, that Los Alamos National Security (LANS), the LANL operating contractor, is not eager to knock down the CMR despite its lack of seismic safety. This is a subjective impression. Time will tell. If the CMR is wholly or partially kept, capital expenses for modification, life extension, and possibly partial decontamination of the CMR would replace CMR D&D costs, and to these would be added continued operating costs for all or part of the CMR.

need to wait for some of this demolition, which might proceed more smoothly if staged and begun sooner. This should be examined.

Demolition and cleanup costs for old Y-12 facilities are estimated to cost up to $8 B site-wide and take 15-20 years.[59]

The Congressional Commission on the Strategic Posture of the United States ("Perry Commission") emphasized the fiscal dangers arising from the anticipated construction and outfitting period for these facilities, currently anticipated to run until approximately FY2019 for both.[60]

> Although the NNSA decision to modernize in place is the right decision, the budget risk appears extremely high. The hope that consolidation would save money is unwarranted…*To juggle all of its competing commitments NNSA would have to reduce its base of scientific activity by 20-30 percent even in a flat budget and this would have a significant impact on the science and engineering base*
>
> ….If complex transformation must proceed without such an infusion [of cash], either complex transformation will be significantly delayed or the intellectual infrastructure will be seriously damaged. If the two major proposed construction projects [CMRR-NF and UPF] must be prioritized, give priority to the Los Alamos plutonium facility. In a flat or declining budget scenario, strong oversight must ensure that schedule and workforce issues are balanced in a way that does not substantially cripple current enterprise capabilities.[61] (Emphasis added.)

This summer the House Appropriations Committee spoke even more plainly, flatly stating that NNSA just cannot build the CMRR-NF and UPF simultaneously under current budgets.[62]

> The Administration has described the need for two major new facilities in the weapons complex...The tightly constrained budget does not permit construction of both [UPF and CMRR] simultaneously, and the [Administration's budget] request funds both programs at sustainment levels pending a decision on prioritization.

In addition to these "ordinary," but major, fiscal constraints the Department of Energy (DOE) is now also faced with unprecedented pension shortfalls for its contractor employees, which DOE must by law make up. The agency has paid $694 M to cover pension shortfalls in the current fiscal year (FY2009). Earlier this year DOE estimated its FY2010 shortfall, which depends on

---

[59] This is the Integrated Facilities Disposition Project (IFDP); see Todd Jacobsen, Industry, DOE Weigh Options For Massive Oak Ridge D&D Project," *Nuclear Weapons and Material Monitor*, February 4, 2008. I have not attempted to keep up with this project.

[60] For UPF, see p. 203 in DOE FY2010 CBR Vol. 1: "Preliminary schedule estimate for CD-4, Approve Start of Operations or Project Closeout, is 4QFY 2018." The most recent formal NNSA estimate for when the CMRR project might be completed was made in the FY2008 CBR, when NNSA estimated construction (CD 2/3) would begin in 4Q2007 and beneficial occupancy (CD 4: Approve Start of Operations), in 4Q FY 2014, 7 years later. Today, CD 2/3 is not expected prior to FY2011; keeping the same 7-year construction and outfitting period would lead to project completion in late FY2018. I am using early 2019 as the earliest reasonable completion date in this paper.

[61] William Perry et. al., *America's Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States*, May 2009, p. 63. http://media.usip.org/reports/strat_posture_report.pdf.

[62] House Report 111-203, July 13, 2009, http://thomas.loc.gov/cgi-bin/bdquery/z?d111:h.3183: p. 131.

its various contractor pension fund asset valuations, to be in the neighborhood of $1.7 B. This is about 6% of DOE's total budget, a large number.[63] The situation may be better now, but it is volatile.

Decisionmakers must therefore now weigh the importance, urgency, costs, and risks involved in building each of these projects – against each other, against the value of staff that might have to be laid off if they are built, and against other programmatic and infrastructure needs in the warhead complex and beyond, about which more below.

I would like to emphasize the word "risks" in the previous sentence. The future, as they say, is not what it used to be. If pension fund asset values fall, as they might, DOE's defined-benefit pension plans will eat into more of its budget, or into other agencies' budgets. Or, if increased deficits are chosen as a way to avoid tough choices in government, they will quite likely eat into *all* budgets public and private – that is, into the dollar itself. This year's federal deficit will run about 13% of GDP, over twice as great a fraction as has ever occurred since 1920, excepting the war years of 1942-1946.[64] It's unsustainable and it's risky, unless real productivity is increased at least comparably, which isn't occurring.

The choices NNSA's management has made so far do not sufficiently reflect the iceberg-filled waters in which the agency's ship is steaming. NNSA is optimistic when all available evidence, including evidence from its own past performance, suggests it should be increasingly conservative.

One anonymous House staffer remarked on that chamber's choice to double the requested amount of appropriations for UPF design in FY2010 while giving the Administration the design funds it requested for CMRR-NF:

> We know we're going to need a UPF, let's make sure we get it designed. CMRR, there is not complete consensus that we're going to need a nuclear facility of the same size, complexity and capability that they keep pushing for. We don't want to move forward on that very quickly, but there really is no debate that we're going to need a UPF of a certain size.[65]

7. <u>Building CMRR-NF would signal a national commitment to new-design warheads.</u>

A decision to build such expensive factories, to do so in a time of unprecedented fiscal overstretch, and to do so in the absence of clear mission need (particularly in the case of the CMRR-NF) would send a strong signal to international observers and other states that nuclear weapons are very important to the United States. More particularly such a commitment would signal the importance of *nuclear weapons innovation*, given the absence of observed aging,[66] the

[63] Todd Jacobsen, "Few Answers on Pensions from DOE Chief Financial Officer," *Nuclear Weapons and Materials Monitor*, June 29, 2009.

[64] Warren Buffett, "The Greenback Effect," *New York Times*, August 18, 2009, at http://www.nytimes.com/2009/08/19/opinion/19buffett.html.

[65] Todd Jacobsen, "House, Senate At Odds Over Funding For NNSA Weapons Program," *Nuclear Weapons & Materials Monitor*, July 13, 2009.

[66] "Until now, clear evidence of warhead deterioration has not been seen in the enduring stockpile, but the plans for remanufacture still assume that deterioration is inevitable on the timescale of the old, arbitrarily defined "design lives"…We recommend that the plans for remanufacture be made as flexible as possible, so that remanufacture cost savings and enhanced reliability can be achieved as the findings of stockpile surveillance become available."

known longevity of existing certified pits[67] and the thousands of spare pits already available with extensive surveillance pedigrees, not to mention the thousands of secondaries and *additional* spare pits that will be liberated from the declining stockpile over the coming decade. The number and kinds of redundancies and backups in the stockpile and with regard to pits in particular, independent of all other considerations, is very great.

It took until 1988 for a DOE Secretary (Herrington) to admit that the U.S. was "awash in plutonium." Now the U.S. is "awash" in very-long-lived pits of the precise kinds used (and in some cases, not *used*, but *usable*) in the U.S. nuclear stockpile.

As against these two large fixed-infrastructure commitments, CMRR-NF and UPF, NNSA should consider more responsive options involving contingency claims on existing infrastructure if (and as) needed, a possibility founded on the knowledge gained from stockpile surveillance and stewardship and on the lead times provided by ongoing surveillance. We return to this theme also below. *If the goal is to safely maintain a reliable nuclear stockpile of a few thousand warheads for the indefinite future, NNSA has simpler, smarter, and cheaper options than building CMRR-NF.*

Among other options, the option of maintaining existing plutonium facilities at the Lawrence Livermore National Laboratory (LLNL) "Superblock" in stand-by mode should be examined.[68]

Make no mistake: the increased willingness of the U.S. to engage in armed conflict since the late 1990s and especially in the early years of this century has made the credibility and "good faith"[69] of U.S. disarmament commitments doubly important for nonproliferation diplomacy – and therefore essential for U.S. security. That credibility lies in the eyes of other states, a fact that is very easy to forget in Washington, DC. Should NNSA invest billions of dollars in facilities justified primarily on the basis of stockpile innovation, the credibility of U.S.

JASON, "Remanufacture," JRS-99-300, p. 8. At http://www.fas.org/rlg/JSR-99-300.pdf. This is similar to the conceptual approach recommended here.

[67] To repeat: "Most primary types have credible minimum lifetimes in excess of 100 years as regards aging of plutonium; those with assessed lifetimes of 100 years or less have clear mitigation paths that are proposed and/or being implemented." JASON, op. cit., http://lasg.org/JASONs_report_pit_aging.pdf

[68] Any decision to build CMRR-NF is intertwined not just with decisions about the future of Superblock but also with decisions about the futures of K-Area at the Savannah River Site (SRS), Building PF-4 in LANL's TA-55, the CMR Building in LANL's TA-3 as well as other facilities at LANL and across the complex. It is noteworthy that DOE is proposing to build not just one but *three* new multi-billion-dollar plutonium facilities *at the same time* (CMRR-NF, the Pit Disassembly and Conversion Facility [PDCF] or its K-Area equivalent, and the Mixed Oxide Fuel Fabrication Facility [MFFF]) while also planning to decommission a fourth ("Superblock") that could provide backup pit production capability if desired. Not just one "Taj Mahal" for plutonium, in the telling phrase of Senator Bingaman's office, but three, and another for HEU.

NNSA may (or may not) soon announce the cancellation of PDCF in favor of integration of its missions with DOE Environmental Management missions at the SRS K-Area. Todd Jacobsen, "SRS Officials To Recommend K Area For PDCF Capability," *Nuclear Weapons and Materials Monitor*, June 22, 2009. See however the cautioning remarks from the DNFSB at http://www.dnfsb.gov/pub_docs/weekly_reports/srs/wr_20090626_sr.pdf.

[69] "Each of the Parties to the Treaty undertakes to pursue negotiations *in good faith* on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control." Treaty on the Non-Proliferation of Nuclear Weapons (NPT), Article VI, emphasis added, at http://www.state.gov/www/global/arms/treaties/npt1.html.

disarmament commitments will be (further) damaged, something the U.S. (and the world) can ill afford.

8. Cost and Schedule History

Since 1989 NNSA has pursued multiple strategies and projects to expand, upgrade, or replace plutonium-related nuclear facilities and functions at LANL.

In 1989, after the closure of the Rocky Flats Plant near Denver, LANL and DOE advanced a project resembling today's CMRR, called the "Special Nuclear Materials Research and Development Laboratory Replacement Project" (SNML). The 193,000 gross sq. ft. project was to complete preliminary design in January 1990, finish NEPA compliance and start construction in 1991, and complete construction by the end of 1994.[70] The project was abandoned in late 1990.

It was followed by the "CMRR Upgrades" project, the TA-55 "Capability Maintenance and Improvement Program," the "Nuclear Materials Storage Facility Renovation" project, and others. Some projects aimed at partial, others at comprehensive, answers to maintaining and expanding the nuclear facility options provided by PF-4, CMR, and related facilities.

The CMRR Project was first submitted to Congress for funding in February, 2002 as a subproject within the FY2003 Project Engineering and Design (PED), Project 03-D-103.[71] Formal "mission need" for the CMRR project as a whole (Critical Decision 0, "CD-0") was approved on July 16, 2002.

In that first congressional budget request, NNSA estimated physical construction would begin in the second quarter (2Q) of FY2005. Total project cost (TPC) for both buildings was projected to be $350-500 M (average: $425 M). Total design services were expected to cost $55 M, 13% of TPC.

As of February 2009 this 2003 PED account was still an apparently minor but continuing source of preliminary design funding.[72] No further appropriations for PED 03-D-103 were requested this year.

By February 2003 the estimated TPC had risen to $600 M. The project acquired its own line item that year (04-D-125), and in the process became two sub-projects, the "Light Lab/Office Building" (loosely similar to today's RLUOB), and a "Nuclear Laboratory(s)" (ambiguity present in original; loosely comparable to today's CMRR-NF). Both were to be design/build projects.

The CMRR's two sub-projects were *both* to be funded through *two* line items, PED 03-D-103 and 04-D-125.

At that time (February 2003), construction starts for RLUOB and then of CMRR-NF were predicted for 2Q FY2004 and 3Q FY2006, respectively. All CMRR construction (both

[70] LANL, "Special Nuclear Materials R&D Laboratory Replacement Project Fact Sheet," January 1990, LALP-89-48. Study Group files.

[71] DOE FY2003 CBR, Weapons Activities, Readiness in Technical Base and Facilities, e-page 42, at http://www.cfo.doe.gov/budget/03budget/content/weapons/rtbf.pdf.

[72] "CMRR SFE [Special Facility Equipment] and NF [Nuclear Facility] will complete preliminary design using PED funds included [in line item] 03-D-103. Design beyond preliminary will be completed using TEC [Total Estimated Cost] funds included in [line item] 04-D-125." DOE FY2010 CBR Vol. 1, p. 219.

buildings) was to be complete by 1Q FY2011 and all transition activities to the new buildings complete by 1Q FY2012.

No estimates of operating costs for the new buildings were provided, apparently *contra* the intent if not the letter of DOE life-cycle cost requirements.[73] There was no requirement at that time to provide for nuclear facility space retirement offsets and associated D&D expenditures.

In February 2003 NNSA's space requirements for the project were:

- 60,000 gross sq. ft of HazCat II space, including vault and "contingency" space
- 60,000 gross sq. ft of HazCat III/IV space, including "contingency" space
- 90,000 gross sq. ft for a "light lab/office building."

The following year (February 2004), NNSA pushed back its estimated construction start date by 1.25 years to 3Q FY2005 and its estimated date for construction completion by 1.5 years to 3Q 2012. CD 2/3 for CMRR-NF – production of a "validated" project cost and schedule ("performance baseline"), formal initiation of final design, CD-2, and approval to begin construction, CD-3 – was to also occur in 3Q FY2005.

By that date the CMRR project had resolved into three elements, the separate costs of which were not estimated:

- An RLUOB, with approximately 20,000 net sq. ft. of radiological laboratory space. (The RLUOB nearing completion today will have 19,500 sq. ft. of this space.)
- A Nuclear Laboratory (today: the Nuclear Facility) with approximately 22,000 net sq. ft. of HazCat II laboratory space and approximately 23,000 sq. ft. of HazCat III laboratory space.[74] (The 270,000 gross sq. ft. CMRR-NF is being designed today for 22,500 net sq. ft. of HazCat II laboratory space, plus a 6 metric ton vault – but no HazCat III space.)
- Special Facility Equipment (SFE) for both buildings. As pointed out in previous reviews, breaking out SFE as a separate but common (and delayed) sub-project prevents creation of accurate baselines for either the RLUOB or CMRR-NF.

From this point on the CMRR project has consisted of three sub-projects, two buildings and a poorly-defined third subproject through which funds can be cryptically applied to either building. All three are funded through both applicable line items.

By February 2005 the 23,000 sq. ft. of HazCat III space had disappeared from the CMRR-NF project data sheet, which listed only 22,500 sq. ft. of HazCat II laboratory space, not including a vault and "large vessel handling capability,"[75] which together amount to roughly 11,000 sq. ft. of program space as noted above.

Since 2004, therefore, projected CMRR nuclear lab space has been cut in half while estimated CMRR-NF costs have increased 4- or 5-fold, from $400 to $500 M to "more than" $2.0 B.

---

[73] DOE Order 430.1A, Life Cycle Asset Management, http://www.directives.doe.gov/pdfs/doe/doetext/neword/430/o4301a.html.

[74] HazCat III is a category for nuclear facility space containing radiological hazards greater than the equivalent of 8.4 grams of Pu-239 and less than the equivalent of 900 grams of Pu-239. Criticality is not a danger.

[75] DOE FY2006 CBR, Vol. 1, p. 270ff, at http://www.cfo.doe.gov/budget/06budget/Content/Volumes/Vol_1_NNSA.pdf.

Approval for RLUOB construction eventually occurred on 10/21/05 (1Q FY2006). RLUOB physical construction should be complete by September 30, 2009 (4Q FY2009), a slippage of 1.75 years since the beginning of the project. Full installation of RLUOB SFE is expected to take "two to three" years more, according to project staff. NNSA has not provided Congress with a formal estimate for full RLUOB completion and occupancy. The agency recently used "2013" as the date for RLUOB completion in a public presentation.[76]

Predicted CMRR-NF construction start dates have slipped from an initial 3Q FY2006 and the more optimistic 3Q FY2005 a year later to, at present, FY2011, a slippage of about 5 years so far. Since FY2010 funds cannot be used for construction, and since the Nuclear Posture Review (NPR) and associated plan for the weapons complex (upon which any possible go-ahead for CMRR-NF must be premised) are not expected until February 2010, and assuming the project baseline will not be completed until "the 2011 timeframe" as project staff have stated, it appears that construction could not begin until the beginning of FY2011 at the very earliest – and then only if Congress authorized and appropriated construction funds in advance of the normal schedule. This seems unlikely. A more realistic estimate for the earliest construction start would now appear to be 1Q FY2012.

Estimated CMRR-NF completion dates (not counting D&D) have apparently slipped from 1Q FY2011 to FY2019, about 8 years. NNSA no longer offers a completion date for the RLUOB, NF, or SFE portions of the project and will not do so until February 2011 at the earliest.

Total project costs excluding D&D have risen from $425 M in February 2002 to more than $2.2 B today, a factor of five. Nuclear laboratory space costs in the CMRR-NF (HazCat II, and earlier HazCat III as well) have risen from $8,900 per sq. ft. in February 2003 to $89,000 today, a factor of exactly ten. Comparison with the 2002 PED TPC cost estimate would be even less flattering.

Initial CMRR project estimates were wildly optimistic. There are many reasons for cost and schedule growth in this case, such as new and more stringent seismic standards, and requirements regarding safety-class and safety-significant building systems which NNSA did not at first accept. Yet NNSA has known, fairly precisely, about the increased seismic risk at the site for many years. Had senior NNSA management accepted DNFSB counsel regarding safety-significant systems and related fundamental assumptions sooner, I believe CMRR design could have preceded on a more realistic basis sooner.

So to speak of NNSA's early project estimates as merely "optimistic" is a euphemism, and wrong. NNSA's (and DOE's) pattern of initially low-balling project costs and later having large cost and schedule overruns is not a random outcome. The predictability and scale of NNSA overruns suggests they are the result of systematic, strategic understatement of project costs and risks by the agency and its contractors, abetted by a healthy dose of self-delusion related to DOE's weakness for technological fantasies mentioned above, as well as a greater-than-average need to sell its unpopular nuclear weapons projects to a dubious nation.

[76] Steve Fong, NNSA, and Rick Holmes, LANL, "CMRR Project Update," March 10, 2009 briefing slides, slide 13.

Deception is not unusual in large publicly-funded projects and is associated globally with project approval.[77] In my 17-year experience, strategic dissimulation by DOE, NNSA and its contractors is traditional.

It appears that through the end of the current fiscal year Congress will have appropriated a total of $394 M to the CMRR project, $329 M through project 04-D-125 and $65 M through PED 03-D-103-01. A different tally suggests the proper figure might be $439 M through FY2009.[78]

It is doubtful the CMRR project has been spending appropriations as fast as Congress has provided them. The CMRR project started using FY09 funds (total potentially available, $97.194 M) on May 1, 2009.[79] Unspent FY08 appropriations (total available, $74.14 M) covered the first 7 months of FY2009.

The FY09 Defense Authorization Act fences $50.2 M of FY09 appropriations until DNFSB and NNSA both certify that all seismic and safety design issues have been resolved for the CMRR NF.

We do not know the project "burn rate," or what unpaid obligations NNSA incurred prior to May 1, or at what date in 2008 NNSA began using FY08 funds, but: if a $74 M/year spending rate ($6.2 million per month) were applied to this year's $97 M starting on May 1, NNSA would carry $66 M (about two-thirds of the FY2009 appropriation) into FY2010 unspent.

Since NNSA has not yet obtained DNFSB design certification and is highly unlikely to do so prior to the end of this fiscal year, NNSA will carry *at least* $50.2 M unspent into FY2010 – and, as we have seen, possibly quite a bit more. If the Administration's request of $55 M is fully funded – on its face, a decrease in funding – the project would actually experience an increase in available funds for FY2010, assuming resolution of seismic issues and released of the impounded funds, from $97.2 M to at least $105.2 M and possibly up to $120 M or $125 M, if project funds have continued to be spent slowly.

Prior to further appropriations Congress should know the unspent CMRR balances in both line items and what obligations have been made against them.

Congress should now split this project into its two buildings, each separately accountable within its own line item, with building-specific SFE included in each, and Congress should specify the specific purposes of any FY2010 appropriation provided.

I do not think Congress should provide any FY2010 CMRR appropriation, however. The $50 M or more FY2009 carryover should be enough to bring preliminary CMRR-NF design to a stopping point and continue procurement of RLUOB SFE.

---

[77] Bent Flyvbjerg, "Design by Deception: The Politics of Megaproject Approval," *Harvard Design Magazine*, Spring/Summer 2005, at http://www.ethicsandtechnology.eu/images/uploads/HARVARDDESIGN63PRINT.pdf, and Bent Flyvbjerg, Massimo Garbuio, and Dan Lovallo, "Delusion and Deception in Large Infrastructure Projects: Two Models for Explaining and Preventing Executive Disaster," *California Management Review*, Winter 2009, at http://www.sbs.ox.ac.uk/NR/rdonlyres/56456AD3-D756-4540-A767-57E12F87EABD/6716/TypescriptDD_85PRINT.pdf.

[78] DOE FY2010 CBR Vol. 1. pp. 176 and 219, vs. the tally of TPC appropriations on p. 221.

[79] Telephone conversation with Steve Fong, NNSA Project Manager, May 4, 2009. All FY2009 funds were available for CMRR-NF design and RLUOB SFE procurement, completion of RLUOB construction being entirely covered by FY2008 appropriations according to project staff.

9. NNSA is currently juggling the fate of eight plutonium nuclear facilities. A complex-wide review of missions, capabilities, capacities, and budgets is needed.

NNSA currently operates five HazCat II nuclear facilities with significant plutonium missions. It is building or proposing to build three more:

Current NNSA Plutonium-Related HazCat II Nuclear Facilities			
Site	**Facility**	**Floor Area, net sq. ft.**	**NNSA/DOE Plan**
LLNL	Superblock (Building B332)	25,000	De-inventory, retain
LANL	CMR (in TA-3)	~ 75,000 (3 wings in use)	Demolish?
LANL	PF-4 (in TA-55)	59,600	Operate, upgrade
SRS	K Area Complex (KAC)	? Includes significant vault area	Upgrade for DOE Environmental Management (EM), possibly also PDCF, purposes[80]
SRS	H-Canyon	?	Operate
NNSA Plutonium-Related HazCat II Nuclear Facilities under Construction or Proposed			
Site	**Facility**	**Floor Area, net sq. ft.**	**Cost, Completion**
LANL	CMRR-NF	22,500 lab + ~ 7,500 vault + ~ 3,500 large vessel/contingency = ~ 33,500 program space	"More than" $2.0 B, FY2019, proposed
SRS	PDCF/K-Area Upgrades	?	PDCF: $2.4 - $3.2 B, FY2019, proposed; K-Area upgrades cost unknown at this time
SRS	MFFF	500,000 (process building, gross area)	$4.86 billion, FY2017, under construction

Plutonium facilities are expensive to build, operate, and dispose. We have seen how building UPF and CMRR-NF at the same time would badly strain NNSA's budget; to see the big picture we must add in MFFF and PDCF (or the latter's functional equivalent at the KAC), also to be built in the same timeframe.

Not counting the necessary supporting new infrastructure projects at LANL and SRS, which run at least $1 B, and not counting CMR D&D, NNSA has embarked on building roughly $10 B

[80] See note 42.

worth of new plutonium facilities over the next decade, plus the $3 B UPF, plus the rest of its capital project docket. This is too much. NNSA has a plutonium obsession.

Intertwined with these construction decisions are the fates of five (5) *existing* industrial plutonium facilities at LANL, SRS, and LLNL in the table above. Some of these facilities may be transitioned to other less demanding uses, others renewed or upgraded in place, others wholly or partially demolished.

NNSA is not just awash in plutonium and usable pits. *It is also awash in current and planned plutonium facilities*, the construction, operation, and management of which are among NNSA's greatest burdens.

For reasons that lie far beyond the scope of this paper, we believe all evidence shows that manufacturing MOX serves no rational purpose well. Likewise plutonium vitrification prior to disposal may be discovered to be a non-beneficial expense, if impartially reexamined anew. DOE should consider direct disposal of intentionally-ruined plutonium pits at the Waste Isolation Pilot Project (WIPP) in New Mexico. This too is a subject beyond the scope of this paper.

Thus we believe NNSA is already wasting billions of dollars servicing its plutonium obsession. NNSA has a number of plutonium facilities and will soon have more. These facilities are more than adequate to provide any contingency space NNSA might ever need to sustain the stockpile, and in the meantime, the specialized plutonium skills it must keep. The CMRR-NF is an extra piece of baggage NNSA would pay heavily to build and operate.

Appendix A: Selected prior analyses

I. "Build Warhead Factories Now, Worry about Weapons Policy Later: Will Congress Take Back the Reins?"[81]

Greg Mello, February 12, 2008

> Proceeding with the CMRR project as currently designed will strongly prejudice any nuclear complex transformation plan. The CMRR facility has no coherent mission to justify it unless the decision is made to begin an aggressive new nuclear warhead design and pit production mission at Los Alamos National Laboratory….The Committee is concerned the NNSA is proceeding with large expenditures for this project while there are significant unresolved issues, and recommends the fiscal year 2007 funding be held in reserve….[82]

1. Building factories means you want the product; infrastructure commitments make policy.

On January 15 the *Wall Street Journal* published an opinion piece written by George Shultz, William Perry, Henry Kissinger, and Sam Nunn and endorsed by 37 other national security experts. Entitled "Toward a Nuclear-Free World," it was the second such essay in the same outlet by these authors in as many years.[83] Both essays concern the claimed benefits, some immediate and others long-term, of specific nuclear policies the authors believe would be best advanced under an overall banner of nuclear disarmament.

Though these authors do not mention it, the U.S. and four other nuclear states (Russia, the U.K., France, and China) are already legally bound to "pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament…" by Article VI of the Nuclear Nonproliferation Treaty (NPT). The opinion of the International Court of Justice and subsequent U.S. diplomatic agreements has confirmed the binding character of these twin commitments to end the arms race and achieve nuclear disarmament.[84] Most observers would strongly agree that the collective unwillingness of the

---

[81] At http://www.lasg.org/CMRR_2_12_08_ltrhd.pdf.

[82] House Appropriations Committee, House Report 110-185 – Energy and Water Development Appropriations Bill, 2008, H.R.2641, search at http://thomas.loc.gov/.

[83] Available at http://online.wsj.com/article/SB116787515251566636.html. The prior essay, "A World Free of Nuclear Weapons," which was endorsed by 17 other experts, was published by the *Wall Street Journal* on January 4, 2007, at http://online.wsj.com/article/SB116787515251566636.html.

[84] The U.S. reiterated its commitment to nuclear abolition in the consensus statement of the 2000 NPT Review Conference, agreeing to a set of thirteen detailed "practical steps for the systematic and progressive efforts to implement Article VI." See http://www.basicint.org/nuclear/NPT/2000revcon/finaldoc-advance.htm#13%20Steps. Prior to this the International Court of Justice (World Court) unanimously ruled in 1996 that "There exists an obligation to pursue in good faith *and bring to a conclusion* negotiations leading to nuclear disarmament in all its aspects under strict and effective international control." Emphasis added. See decision paragraph "F" at http://www.lcnp.org/wcourt/opinion.htm.

five NPT nuclear weapons states to persuasively implement these Article VI obligations has harmed the NPT and the law-based nonproliferation regime it founds.[85]

If the disarmament aspiration expressed in these two essays means anything at all, it means refraining from long-term investments in the specialized infrastructure needed solely to make novel kinds of warheads, especially if that infrastructure is "responsive."

More broadly, nuclear weapons infrastructure investments that require large and long-term commitments of capital and skilled technical labor – scarce resources in any country – are good indicators of national nuclear intent. In other words, infrastructure investments make – and are – nuclear policy.

The U.S. government thinks so, and says as much. The President's January 2002 Nuclear Posture Review elevated what it called "responsive infrastructure" to an element of its overall strategic "triad."[86] These "responsive" infrastructure investments were to be integral to a "capabilities-based force" designed to assure allies and friends, dissuade competitors, deter aggressors, and "*decisively defeat any adversary* if deterrence fails"[87] (emphasis added).

Thus, according to the White House, "responsive infrastructure" for nuclear weapons means infrastructure that can support global military dominance. This is a different and more aggressive mission for NNSA than merely maintaining a nuclear arsenal.

---

[85] The author speaks from personal observations at several NPT preparatory and review conferences but also see, for example, the formal conclusions of Lewis Dunn et. al., Science Applications International Corporation, "Foreign Perspectives on U.S. Nuclear Policy and Posture," December 4, 2006, prepared for the Defense Threat Reduction Agency (DTRA), at http://www.dtra.mil/documents/asco/publications/ForeignPerspectivesUSNuclearPolicyCompleteReport.pdf.

Another recent testimony to this view is the speech delivered by Mohammed ElBaradei on February 11, 2008. Audio as delivered at http://www.securityconference.de/konferenzen/rede.php?menu_2008=&menu_konferenzen=&sprache=en&id=210&. Unofficial transcript at http://www.presstv.ir/detail.aspx?id=42679&sectionid=3510302.

[86] Department of Defense, "Findings of the Nuclear Posture Review," Slides 7 ("assure, dissuade, deter, defeat") and 9 ("responsive infrastructure") at http://www.defenselink.mil/news/BriefingSlide.aspx?BriefingSlideID=120. See also these excerpts from Nuclear Posture Review:

> "…U.S. strategic forces need to provide the President with a range of options to defeat any aggressor.
>
> "DEFEAT" – Composed of both non-nuclear systems and nuclear weapons, the strike element of the New Triad can provide greater flexibility in the design and conduct of military campaigns to defeat opponents decisively…Nuclear weapons could be employed against targets able to withstand non-nuclear attack, (for example, deep underground bunkers or bio-weapon facilities).
>
> "The need is clear for a revitalized nuclear weapons complex that will: ...be able, if directed, to design, develop, manufacture, and certify new warheads in response to new national requirements…
>
> "…One glaring shortfall is the inability to fabricate and certify weapon primaries, or so-called "pits"…. For the long term a new modern production facility will be needed to deal with the large-scale replacement of components and new production."

(At http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm).

[87] White House, National Security Strategy of the United States, September 2002, at http://www.whitehouse.gov/nsc/nss.html.

The capability to "defeat any adversary" is also unachievable, assuring an endless appropriation treadmill for contractors, with each program inadequacy or project failure serving as a potent justification for the next.

Linton Brooks, Administrator of the National Nuclear Security Administration (NNSA) in 2006, has emphasized the decisive nature of long-term manufacturing investments as a foundation of nuclear policies a "couple of decades" hence, which he envisions being more aggressive than those at present and accordingly supported by a different stockpile.

> We can change our declaratory [nuclear] policy in a day. We can make operational and targeting changes in weeks or months. In a year or so we can improve integration of nuclear and non-nuclear offense. By contrast, the infrastructure and the stockpile it can support cannot change as quickly. Full infrastructure changes may take a couple of decades.[88]

Brooks didn't explicitly mention, though he could have, that decisions in the short run about proceeding with the Reliable Replacement Warhead (RRW) are not on the critical path to actually deploying the RRW or any other new warhead. Warhead design and engineering development are short-term activities compared with designing and constructing the facilities needed to actually build RRWs in any quantity. The new buildings needed are orders of magnitude more complicated than the warheads.

As we shall see, the factory complex at Los Alamos National Laboratory (LANL) needed to produce the fissile plutonium cores "("pits") for RRW (or another new warhead) is not expected to be completed prior to at least 2017. These facilities are necessary, and they are the rate-determining step, for RRW manufacture. Thus delaying the decision to develop the RRW, a mature design, by 4 or 5 years – past the upcoming administration, in other words – would make little or no difference as to when RRWs would first enter the stockpile in any quantity. As long as design and construction of production facilities proceed, Congress could "halt" RRW for a few more years, as it did in late 2007, without significantly affecting its final delivery schedule, assuming it were eventually approved. And if sunk costs for RRW *factories* are allowed to grow much further, RRW will become hard to stop. The reins will have slipped from Congress' hands.

Sometimes NNSA gives the impression that production "capacity" could be somehow created without using it. This makes no sense. One cannot build, equip, and stand up highly-specialized factories costing billions of dollars, or hire and train hundreds of highly-specialized technicians over a period of many years without actually making the very things these costly arrangements were meant for – RRWs, or some other novel warheads not currently in the stockpile.

To the extent the U.S. constructs "responsive" nuclear weapons factories not actually needed to maintain U.S. nuclear weapons for several decades to come, the U.S. expresses not just a clear intent to keep nuclear weapons "forever" (as one Department of Energy briefing put it[89]) but also a commitment to continued innovation in the stockpile. As we have seen, such investments, if continued, will (continue to) undermine *both* NPT Article VI nuclear commitments.

---

[88] Linton Brooks, speech to the East Tennessee Economic Council, March 3, 2006, at http://www.nnsa.doe.gov/docs/speeches/2006/speech_Brooks_East-Tenn-Economic-Council-03Mar06.pdf.

[89] A. E. Whiteman, NNSA Albuquerque, "DOE Nuclear Weapons Complex Production Facilities and Technologies," March 2000 briefing slides, Study Group files.

2. The proposed Chemistry and Metallurgy Research Replacement (CMRR) Facility at Los Alamos: building a "Modern Pit Facility" (MPF) one piece at a time

The U.S. has now begun to invest heavily in the specialized manufacturing infrastructure needed for new nuclear weapons, pivotally at Los Alamos National Laboratory (LANL).[90] The flagship of this manufacturing complex is the "Chemistry and Metallurgy Research Replacement" (CMRR) project, currently at least a $2.2 billion project that is likely to cost even more than this, to be built at LANL's Technical Area (TA)-55.[91]

The CMRR consists of two buildings, the Nuclear Facility (NF), comprising in dollar terms roughly seven-eights of the project, and the Radiological Laboratory, Utility, and Office Building (RLUOB). Together the two buildings would comprise some 400,000 square feet of new interior space. The CMRR would be the largest single construction project in the history of LANL in inflation-corrected dollar terms. The NF's 6-metric ton vault would approximately triple LANL's plutonium storage capacity.[92]

The two CMRR buildings are to be linked by tunnels to each other and to LANL's existing 30-year-old plutonium facility ("PF-4"), which is slowly being modified using operational funds. NNSA has also begun renovating PF-4 in a series of open-ended long-term construction line items collectively called the "TA-55 Re-Investment Project" (TRP) (see Table 1, below).

---

[90] Important new manufacturing infrastructure is also under design at the Y-12 plant in Tennessee, namely the circa $3 billion Uranium Processing Facility (UPF). The author knows little about the UPF and specifically I do not know the extent to which it would add brand-new capabilities to the U.S. nuclear weapons complex, which these LANL projects would do.

[91] DOE, FY2009 Congressional Budget Request, NNSA (Vol. 1), pp. 298-307. http://www.cfo.doe.gov/budget/09budget/Content/Volumes/Volume1a.pdf.

The original budget estimate submitted to Congress in February of 2002 for the project (then Project 03-D-103-01) was "$350-500 million" (Total Estimated Cost and not including any Other Project Costs, which were not mentioned), that is, less than one-fourth of what it is today. See DOE, FY2003 Congressional Budget Request, NNSA Readiness in Technical Base and Facilities, p. 42. At http://www.cfo.doe.gov/budget/03budget/content/weapons/rtbf.pdf.

Then, "[t]he CMRR CD-1 was approved on June 17, 2005 with a preliminary cost range of $745,000,000 - $975,000,000, although costs could be greater." (DOE FY20009 CBR, Vol 1., op. cit, p. 298.)

Then, "[i]n late 2006, Los Alamos National Laboratory completed an independent review of the planned CMRR and the revised cost estimate for the [CMRR] Nuclear Facility approximately doubled." (NNSA Response to Senator Domenici, 4/18/07 Senate Energy and Water Development Appropriations Subcommittee Hearing, in Study Group files). Doubling the then- roughly $750 million CMRR Nuclear Facility cost and retaining the ~$200 million Radiological Facility budget without inflation results in a total project cost in the $1.7 billion ballpark. This response indicates the CMRR budget submitted to Congress in February of 2007 was already known by NNSA to be too low – by a factor of approximately 75% – when submitted.

Project costs are very likely climb further because the CMRR Nuclear Facility has not completed Preliminary Design (i.e. reached "Critical Decision 2" in DOE project management argot). As later noted in the text, basic variables such as building size, seismic design, and safety design have not been finalized. Costs of concrete, steel, and other materials are also inflating rapidly; see for example William Yardley, "Building Costs Deal Blow to Local Budgets," January 26, 2008 *New York Times*, http://www.nytimes.com/2008/01/26/us/26build.html?scp=15&sq=local+infrastructure&st=nyt. The CMRR is now projected to be completed in 2017 or 2019, 9 or 11 years away.

[92] LANL, CMRR briefing slides p. 8, no date.

At present pit production utilizes approximately 1/4 of PF-4's 59,600 square feet of nuclear floor space;[93] the CMRR NF would add at least 22,500 additional square feet of "Security Hazard 1/ Hazard Category 2" space, some with greater ceiling height and including capability for handling large vessels to be used for plutonium-containing subcritical explosions at LANL.[94]

As of January 18, 2008 the RLUOB was under construction and approximately 30% completed. It is not yet clear when or even if preliminary design for the CMRR NF will be completed, or when construction might at the earliest begin. Physically, the staging yard for RLUOB construction now occupies the 90,000-cubic-yard pit dug at the CMRR NF site, ostensibly to investigate seismic conditions there. For this reason alone the earliest possible date for the onset of construction is not until at least the spring of 2009.[95] Such a schedule seems very optimistic, however, as a number of significant design issues remain unresolved, including seismic and overall safety design – even the basic size of the building.[96] As of March of 2007, roughly four years into the project, conceptual vault design, including provisions for fail-safe cooling of plutonium stores, had not been finalized.[97]

As we will see in a moment, it is not easy to predict the ultimate capacity of a LANL pit production complex anchored by a renovated PF-4 and the two CMRR buildings – especially if additional production space or additional production annexes are subsequently added, as NNSA is currently suggesting might happen.[98]

From a managerial perspective there would be no need or motivation to build multiple plutonium facilities at the same time, were that desired. A staged strategy would be far more attractive, allowing "lessons learned," supplier relationships, design teams, and skilled installation crews to migrate from one facility to the other, minimizing overall risk, leveling workloads and appropriations, and staggering training requirements. At one time NNSA proposed that a Modern Pit Facility (MPF) could be constructed in exactly such a modular way.

Whether built with just the RLUOB, with the RLUOB plus the NF, with the RLUOB plus a "super-sized" NF, or with a CMRR doubled all around (i.e. with two RLUOBs and two NFs or their near-equivalents), the CMRR is not needed to maintain the present nuclear arsenal or any subset of it for several decades. When the expected 50-year life of the CMRR is drawing to a close in 2067, stockpile pits may (or may not) be just drawing toward the end of their "shelf life," as noted below.

In the meantime the Pantex nuclear weapons facility near Amarillo will have "produced" fully-certified, long-lived backup pits for stockpile systems to the tune of a couple of hundred per year, starting now. By that time it will have "produced" several thousand pits overall of the precise

---

[93] See note 33.

[94] LANL CMRR briefing slides, author's interpretation of the purpose of "large vessel handling" capability.

[95] Steve Fong, NNSA CMRR project staff, personal communication, 1/18/07.

[96] NNSA has said it may expand the footprint of the CMRR NF by 9,000 square feet, a 40% increase from the existing plan of 22,500 sq. ft of Category I/II space. NNSA, "Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement" (DCTSPEIS), Summary, December 2007, p. S-36. At http://www.complextransformationspeis.com/Summary.pdf.

[97] Oral response to author's questions, CMRR public meeting, Fuller Lodge, Los Alamos, March 2007.

[98] See NNSA, DCTSPEIS Summary, pp. S-34, 35. Similar plans have been internally available at LANL since at least 2001, e.g. LANL 2001 Comprehensive Site Plan, "TA-55 Pre-conceptual Plan," Study Group files.

kinds that could be used if needed to rebuild stockpile systems, having operated for many years without any additional capital investment or increase in operating cost whatsoever. Pantex can "produce" *better* pits[99] much *faster*, far *cheaper*, *without program risk* and, since they are produced by dismantlement, *with highly-positive nonproliferation benefits*.[100]

Under this scenario, the practical and politically-viable alternative for TA-55 would be to put pit production on "warm standby," making a very small number of pits each year and subjecting them to destructive testing. This is not greatly dissimilar from what NNSA was doing at LANL in the 1996-2006 timeframe. This approach would retain expertise and skilled workers and provide a "right-sized" skill-preservation program. The author believes that such a program could solve a host of management, safety, and morale problems as well. Perhaps most importantly, it would provide a much better basis – even a "good-faith" basis, in the words of Article VI of the NPT – for nonproliferation negotiations.

The CMRR *is* needed, however, to manufacture significant quantities of pits for novel nuclear explosives.[101] Given that even the hawkish Bush Administration believes that by the time the CMRR is completed each warhead type in the arsenal will be present to surfeit, manufacturing novel kinds of nuclear weapons is the only reason to build these facilities.[102]

Construction of the CMRR and the appurtenant facilities necessary to make the LANL production complex work is expected to take approximately a decade. While the production complex is to be centered in and around TA-55, important subsidiary elements are also planned for LANL's nuclear waste disposal and storage site, TA-54.

Several other construction projects are functionally required to make the production complex work. A list of these projects is provided in Table 1. A somewhat more detailed presentation of the same information provided in Table 1.1. In both tables the items underlined are those associated, in the author's view, with increases in manufacturing capacity. The others are arguably necessary to retain an operating plutonium facility at all – including basic pit production capability.

One project listed, the "more than" $240 million Nuclear Materials Safeguard and Security Upgrade Project (NMSSUP), is so closely associated with the CMRR in time, space, and logic as to suggest that the former project is simply an aspect of the latter that has been broken away from it to hold down apparent cost inflation somewhat.

---

[99] Letter from Danielle Brian to Secretary Bodman, January 18, 2008, at http://www.pogo.org/p/homeland/hl-080118-pits.html; Josef Hebert, "Quality of Nuclear Devices Questioned," Associated Press, January 20, 2008, at http://ap.google.com/article/ALeqM5gf16OkIt8_XfOR-kMzMGjmND8-9gD8U9MU900.

[100] Pit production, including this option, is the subject of another Study Group paper expected later this month.

[101] Neither the CMRR nor TA-55 as a whole is needed to make nuclear explosives made with uranium.

[102] See for example the interpretation of Bush Administration stockpile objectives by Robert Norris and Hans Kristensen, "The U.S. nuclear stockpile, today and tomorrow," *Bull. Atom. Sci.* Sept./Oct. 2007, at http://thebulletin.metapress.com/content/3605g0m20h18877w/fulltext.pdf. The temporary exception to this generalization is the W88 warhead, of which less than 30 additional units are to be produced between 2008 and 2010, inclusive, a campaign that will conclude long before the facilities in question come on line. The national security justification for these W88 warheads is in our view very weak; see Greg Mello, "Restarting Plutonium Pit Production: No Need, High Costs," at http://www.lasg.org/PU_talking_points1.htm.

Table 1: Pit Production and Related Construction Projects at LANL

Projects underlined are desired solely or primarily for production capacity expansion.

In millions of dollars. Sources: DOE congressional budget requests for FY2008 and FY2009; Consolidated Appropriations Act and Explanatory Statement, 2008[103]

Project	Total Project Cost	FY09 Request	FY08 Appropriation	Total Prior Appropriation	Estimated Completion Year
Chemistry and Metallurgy Research Replacement (CMRR) Project	More than $2,164 + gloveboxes, equipment	$100	$75	$217	2019
Nuclear Materials Safeguards and Security Upgrades Project (NMSSUP)	More than 240	46	50	0	[After CMRR]
Pit Radiography Facility	47	?	1	2	"TBD"
TA-55 Reinvestment Project	175 (omits "other project costs")	17	6?	0	Unclear
Radioactive Liquid Waste Treatment (RLWTF) upgrade	80	20	26	0	2011
TA-54 nuclear waste disposal expansion	60 (omits "other project costs")	7	2	3	2011
Total	**More than $2,800; will rise**	**$190**	**$162**	**$222**	**2019**
Decomm. & Demol. (D&D) of CMR [104]	400 (2008 dollars)	0	0	0	(after CMRR is completed)
Total w/ CMR D&D	**At least $3.2 billion**				

[103] At http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_house_committee_prints&docid=f:39564c.pdf.

[104] Chemistry and Metallurgy Research Building, existing. D&D required per FY2002 Energy and Water Development Appropriations Act report, H. Rept. 107-258.

Table 1.1: Pit Production and Related Construction Projects at LANL, February 2008 Projects underlined are desired solely or primarily for production capacity expansion. Dollars in millions (M). Sources: see Table 1.					
Project	**Total Project Cost**	**FY09 Request**	**FY08 Appropriation**	**Total Prior Appropriation**	**Estimated Completion Year**
Chemistry and Metallurgy Research Replacement (CMRR) Project (Projects 03-D-103 & 04-D-125)	More than $2,164 plus "Phase B" (gloveboxes, equipment); likely to increase	$100	$75	$217	2017, or 2019 with "Other Project Costs" (OPCs)
Nuclear Materials Safeguards and Security Upgrades Project (NMSSUP)* (Projects 05-D-170-01 & 08-D-701)	More than 240	46	50	0	"2012" (logically, after CMRR & Pit Radiography Facility are complete)
Pit Radiography Facility (Projects 06-D-140-01, unnamed later one	47	0 (not fully clear)	1	2	"2011" (as of 2007) and "TBD" (as of 2008)
TA-55 Reinvestment Project (Projects 06-D-140-02, 08-D-804, 10-D-XXX, & a later one)	175 (TEC) (author interpretation: 200 w/ OPCs)	8 (Phase I) 9 (Phase II)	6 (requested; final appropriation unclear)	0	"2011" (logically, after CMRR)
Radioactive Liquid Waste Treatment (RLWTF) upgrade (Project 06-D-140-03 & 07-D-220)	97 (2007) 80 (2008)	20	26	0	2011
TA-54 nuclear waste disposal expansion (Proj. 07-D-140-02)	65 (2007 w/o OPCs; ~100 w/ OPCs) 60 (2008)	7	2	3	"2011"
Total	**At least $2.8 billion and rising**	**$190 M**	**$162 M**	**$222 M**	**2019**
Decommissioning & Demolition (D&D) of CMR	400 (2008 dollars)	0	0	0	(after CMRR is completed)
Total w/ CMR D&D	**At least $3.2 billion**				

Notes to tables: Total Estimated Cost (TEC) + Other Project Costs (OPCs) = Total Project Cost (TPC). Does not include capitalized operating expenses, 1994 - 2008 or future years. Does not include possible doubling of the CMRR project or equivalent as part of the "Los Alamos Upgrade Option" (see footnote above) which would likely double CMRR costs. (Any design savings would likely be more than outweighed by expected high inflation of construction costs). Includes no operating costs for these facilities. Includes no short-term or ultimate D&D costs except for existing CMR building.

3. Policy decisions to date have not fully incorporated the results of NNSA's pit aging studies.

The purpose of all this is to make plutonium "pits," the fissile cores around which the first explosive stages in all currently-deployed U.S. nuclear weapons are built. The U.S. has circa 24,000 pits now – about 9,800 in stockpile weapons and another 14,000 in storage. [105]

Pits last a long time.

> …[M]ost plutonium pit types have credible lifetimes of at least 100 years. Other pit types have mitigation strategies either proposed or being implemented. Overall, the studies showed that the majority of plutonium pits for most nuclear weapons types have minimum lifetimes of at least 85 years….We can therefore conclude that pit lifetimes do not at present determine warhead lifetimes.[106]

Tens of billions of dollars have been invested in stockpile stewardship programs since 1995; the above consensus pit aging finding is one result. If this scientific result were actually applied to congressional decisions it would allow the indefinite deferral of many billions of dollars in constructing, operating, and eventually dismantling new pit production facilities. It is difficult to put a dollar cost on the program costs that were needed to come up with this finding; it is surely over one billion dollars. It would be a shame to waste that investment.[107]

4. How many pits could LANL make, with and without CMRR?

LANL has had the capability to make pits since 1945. With likely exceptions[108] however, LANL has not made pits for the stockpile from 1949 until last year, when 11 new pits were made, some or all of which were shipped to the Pantex nuclear weapons plant near Amarillo, Texas for assembly into W88 Trident warheads.

LANL's current (i.e. pre-CMRR) pit manufacturing capacity is uncertain and open to interpretation. In many ways it is a matter of management choice because there is more potential pit production space available, albeit space currently used for other programs.

In February of 1996 the Department of Energy (DOE) said LANL's then-current pit production capacity, prior to any investment, was "10 to 20 pits per year."[109] Later that same year DOE

---

[105] Stockpile total extrapolated from that of Robert Norris and Hans Kristensen, "U.S. Nuclear Forces, 2007," Bull. Atom. Sci. Jan/Feb. 2007, http://thebulletin.metapress.com/content/91n36687821608un/fulltext.pdf. Pantex "now stores more than 14,000" pits; see Jim McBride, "Nuclear reuse: Pantex facility to recertify plutonium weapon cores," *Amarillo Globe-News*, July 8,2007, www.amarillo.com/stories/070807/bus_7866118.shtml.

[106] Letter from Linton Brooks to Senator John Warner, summarizing and transmitting JASON review of LANL and LLNL pit aging studies, November 28, 2006, at http://lasg.org/JASONs_report_pit_aging.pdf.

[107] Comparably large savings are possible in the stockpile stewardship program if it were no longer deemed necessary to attempt to develop the capacity to certify the novel pits that would, if the CMRR was not built, not be made. Acquiring the capability to a) certify and b) manufacture novel nuclear explosives are the two largest mission drivers in the stockpile stewardship budget.

[108] There are indications LANL's TA-21 site may have briefly resumed quantity pit production in the immediate aftermath of the disastrous 1969 Rocky Flats fire (Ken Silver, East Tennessee State University, personal communication).

[109] DOE, Draft Stockpile Stewardship and Management (SSM) Programmatic Environmental Impact Statement (PEIS), original reference temporarily lost.

stated that a pit-making capacity of "up to 50 per year" is "inherent with the facilities and equipment required to manufacture one component [pit] for any stockpile system."[110]

In 2005 the Secretary of Energy's Advisory Board (SEAB) Nuclear Weapons Complex Infrastructure Task Force said LANL's existing pit production capacity could be (and should) increased by a ratio of "1:20."[111] This 20-fold increase was not just a rhetorical flourish; it rather was predicated on production of an RRW or RRW-like pit designed especially for mass production involving simpler design, broader tolerances, robotic production technologies in some steps, and fewer toxic materials.[112] Their report makes it very clear these production experts believe PF-4 could produce pits at a much higher rate than the current 10 or so pits/year, with or without RRW.

Existing LANL pit production capacity is to a slight degree predicated on continuing use of the nine-wing Chemistry and Metallurgy Research (CMR) building in LANL's TA-3. Much of the CMR is nearing the end of its useful life, despite extensive upgrades in the 1990s and early years of this century. Pit production could continue at LANL without the CMR (or, in another option,

---

[110] DOE, Final SSM PEIS, Volume 1, p. 3-4, Table 3.1.1.2-1, note "a," September 1996.

[111] DOE Secretary of Energy Advisory Board Weapons Complex Infrastructure Task Force, "Recommendations for the Nuclear Weapons Complex of The Future," July 13, 2005, p. H-6. At http://www.seab.energy.gov/publications/NWCITFRept-7-11-05.pdf. It is worth quoting at length:

> …the manufacturing operation at TA-55 is extremely inefficient when compared with any conventional manufacturing operation. There is little evidence of modern manufacturing techniques being employed….Modern manufacturing techniques…if applied rigorously could yield unprecedented reductions in TA-55 pit manufacturing costs and cycle time.
>
> The enormous investment made in the TA-55 facility has not yielded anywhere near the productivity levels this facility should be capable of attaining. The process is operated with little sense of urgency. It appears that each manufacturing step is "an event" attracting numerous witnesses and visitors. The process of actually building a pit seems to be a secondary mission of the facility, not the primary focus.
>
> At every phase of operation, there appears to be numerous opportunities to "lean-out" the operation….the vast majority of the time the plutonium material, raw or in the process of becoming a pit, is waiting to be inspected, to be tested, waiting for test results, etc. This is an incredible waste of time…Fundamentally, the pit facility produces one product, yet it appears that every pit produced is a "hand crafted individual object". This method of production yields process inefficiencies in every operation. Additionally, process automation at several steps of this process would be quite valuable. Currently available CNC machining centers, modified for the unique safety hazards, would yield a wealth of productivity gains.
>
> From a modern industry standpoint, world class productivity, quality, and safety can all be attained at the TA-55 facility by thorough and rigorous analysis and hard work on the production floor. The cursory analysis of the TA-55 facility yields a ratio of value-added to non-value added work of perhaps 1:20 or much worse. This indicates a tremendous opportunity for improvement. The available productive capacity of this plant is being wasted by inefficient utilization of plant equipment and personnel.
>
> In conclusion, the TA-55 facility is an expensive national asset, which has the opportunity to be a dramatically more effective and efficient facility if operated as a modern production facility, utilizing available automation and world class operations management techniques.

[112] Congressional source, anonymous.

without the full use of the CMR), as Mr. D'Agostino, NNSA Administrator, wrote in response to congressional questions in 2007.[113]

The author believes there are no pit production activities occurring in the CMR that could not readily occur in PF-4 or the CMRR RLUOB, *provided* – and this is the catch – there were no successfully-competing missions, including certification of new pits. [114] With new-weapon certification, however, there would be no reason to produce new pits in the first place.[115]

What LANL's pit production capacity would be if CMRR *were* built is even less clear, as the many uncertainties involved – including uncertainties in the size of the CMRR and the number of facilities ultimately available at TA-55 – are compounded. In addition, as the senior cognizant DOE official explained to the author in 2002, the production rate achievable in a given number of square feet of plutonium space is a sensitive function of the production technology used – as well as the complexity of the pits, as seen in the SEAB report above. Thus any capacity cited today is not necessarily the same as the capacity that might be available ten years now, provided plutonium pit production technology development continues.[116]

Production capacity is also a function of the *flexibility* required, e.g. whether it is required to produce two or more kinds of pits simultaneously or to be preparing to do so.

---

[113] Chairman Visclosky: "NNSA currently relies on the existing, 50-year-old...(CMR) facility at LANL to perform analytical chemistry and material characterization activities for the Pit Manufacturing Campaign. The CMRR would replace this facility. However, the "basis for interim operations" for the CMR facility expires in 2010…If NNSA decides to produce 30-50 RRW pits at the TA-55 facility at LANL starting in the 2012-2014 timeframe [i.e. long before the CMRR is completed], how will the CMR facility accommodate those activities?"

Mr. D'Agostino: "…The options include moving all nuclear Chemistry and Metallurgy Research Facility (CMR) operations into the Plutonium Facility at LANL with attendant displacement of other efforts in the Plutonium Facility; extending the Basis for Interim Operations with the existing operations; and shrinking the operating footprint of CMR and continuing to decrease the inventory of materials in CMR to decrease its risks to support extending the Basis for Interim Operations of CMR beyond 2010." House Energy and Water Development Appropriations Subcommittee, Hearing of March 29, 2007, supplemental questions for the record, p. 584 in Part 8, "Energy and Water Development Appropriations for 2008," printed version.

The use of the CMR solely as a radiological laboratory, rather than a nuclear facility, has to the author's knowledge not been investigated. Neither has there been to my knowledge any comprehensive study of current and planned mission requirements for LANL's nuclear facilities or for LANL's radiological facilities.

[114] In 1997 LANL wrote:

"Pit Rebuild (1996-2004): …Los Alamos will produce a few War Reserve (WR) pits per year during this period. Present [1997] floorspace allocations for the pit rebuild program, which includes general pit fabrication, disassembly, assembly, and radiography are 11,400 sq. ft.

"Pit Fabrication (2005 and Beyond): Los Alamos will produce approximately fifty War Reserve (WR) pits per year during this period, while establishing the capacity to produce eighty pits per year with multiple shifts. Future floorspace allocations for pit fabrication programs are 18,500 sq. ft., of which 3,200 sq. ft. will be located at the CMR Building [a floor allocation which, if added to current PF-4 usage, would more or less remain within one of four wings in PF-4]. The space at the CMR building will be used primarily to test new technologies outside of the production lines [note plural] and to prepare components for testing." Drew Kornreich and Nelson DeMuth, LANL, "Alternatives for Increasing the Nuclear Materials Processing Space at Los Alamos for Future Missions," LA-UR-97-1000, April 25, 1997, p. 10. Note that under current plans, radiography would be moved to a separate facility at TA-55, liberating PF-4 floor space.

[115] The author has a paper in draft which includes further discussion of this issue.

[116] For more discussion along these lines see DOE FY2009 CBR, p. 110, under "Pit Manufacturing Capability."

The *lowest* capacity in all these scenarios is governed by what might be called the "fiasco factor." Accidents and malicious acts, previously-undiscovered infrastructure or management inadequacies, enforcement actions, preventive stand-downs – all these are real possibilities and some produce a production capacity of zero, possibly for a long, or even indefinite, period.

The highest production capacity at LANL achievable under the most aggressive – and lucky – scenario could be significantly greater than 200 pits/year.

5. <u>The House of Representatives has zeroed funding for the CMRR three times and cut its funding twice; the Senate has funded it each year. The project continues, though progress on the Nuclear Facility has been slowed to an unknown degree.</u>

The CMRR project burst into view in 2003 as a "project engineering and development" (PED) construction line item. It became a stand-alone construction project for budget and appropriations purposes the following year. Since then the Senate, led by Mr. Domenici in this case, has reliably concurred in NNSA's proposed CMRR funding. The CMRR has been consistently and strongly questioned by the House, however, with increasingly harsh words.

In its markup of NNSA's FY2004 budget request, the House Appropriations Committee had this to say about the proposed CMRR project, then new as a stand-alone project:

> The Committee recommends no funding for [the CMRR project] in fiscal year 2004. Due to the complexity of this project, the Committee directs the completion of the project management decision process for the CMR-R in fiscal year 2004…The Committee notes the Department has not completed the project engineering steps concerning the CMR-R, including reaching critical decision one (CD-1) to commence the acquisition strategy or any baseline cost validation. The current cost estimate is based on pre-conceptual planning…the Committee must question the actual commitment of the Department to its own process by allowing this project to go forward in the fiscal year 2004 budget request.

House appropriators were critical again regarding FY2005 appropriations, but they opened the door just a little:

> The Committee recommends $10,000,000 for the CMRR project, a decrease of $14,000,000 from the budget request….The NNSA concludes in its budget justification that additional analysis is required to validate cost estimates that are coming in at the high end of the pre-conceptual baseline range. Due to the complexity of the project and the uncertainty of the current estimates, the Committee directs the NNSA to complete its pre-conceptual baseline cost estimating and include in the fiscal year 2006 budget request the revised schedule and cost estimates.

By the following year (2005, in deliberations for FY2006 appropriations) the CMRR began to be overtaken by NNSA's competing ambitious priorities. House appropriators:

> The Committee recommends no funding for the CMRR project, a decrease of $55 million from the budget request. Construction at the CMRR facility should be delayed until the Department determines the long-tem plan for developing the responsive infrastructure required to maintain the nation's existing nuclear stockpile and support replacement production anticipated for the RRW initiative…the production capabilities proposed in the CMRR will be best located

> at whatever future production complex configuration the Department determines necessary to support the long-term stockpile program.

By the time discussion of FY2007 appropriations came around, the House was clearly losing patience.

> The Committee provides $12,400,000 for the CMRR project, a decrease of $100,000,000 million [89%] from the budget request. Construction at the CMRR facility should be terminated and the Department should revise its long-term plan for developing the responsive infrastructure required to maintain the nation's existing nuclear stockpile and support replacement production for the reliable replacement warheads (RRW). Production capabilities proposed in the CMRR should be located at the future production site that supports the RRW and long-term stockpile requirements.

But still the project continued. Congress never completed an appropriations bill for Energy and Water Development for FY2007. The CMRR was continued that year by extending the FY2006 funding level.

In its markup of the proposed FY2008 appropriation, the House said this:

> Proceeding with the CMRR project as currently designed will strongly prejudice any nuclear complex transformation plan. The CMRR facility has no coherent mission to justify it unless the decision is made to begin an aggressive new nuclear warhead design and pit production mission at Los Alamos National Laboratory. The NNSA is directed to develop a long-term plan to maintain the nation's nuclear stockpile requirements that does not assume an a priori case for the current program. Production capabilities proposed in the CMRR should be located at the future production sites identified in a detailed complex transformation plan that supports the long-term stockpile requirements. The Committee is concerned the NNSA is proceeding with large expenditures for this project while there are significant unresolved issues, and recommends the fiscal year 2007 funding be held in reserve. Although the NNSA claims the Nuclear Facility Phase 3 of the project is under review, the Committee notes the Laboratory excavated 90,000 cubic yards of soil at the construction site where the CMRR Phase 3 Nuclear Facility is proposed to be built. The Committee also notes the Department's CMRR acquisition strategy combines Critical Decision 2 (approval of performance baseline) and Critical Decision 3 (approval to start construction) under DOE Order 413.3A on project management. The Committee does not support construction projects that fail to strictly adhere to DOE Order 413.3 requirements by abbreviating the process.

Again Senate appropriators fully funded the project, though the full Senate failed to act. When the dust finally settled on the omnibus appropriations bill passed in mid-December 2007, the CMRR was funded at $75 million for FY2008, about 86% of the president's request. Neither the bill nor the report as passed contain specific guidance as to which parts of the CMRR project are to receive the abridged funding; NNSA project management is privileging RLUOB construction.[117]

[117] Steve Fong, NNSA, personal communication, 1/18/07.

6. What if any "dire" consequences would occur if the CMRR Nuclear Facility were not built?

The short answer, as well as the complete answer, is none, even if the objective were to maintain considerable innovative freedom in a future stockpile – which if exercised would be highly counterproductive.

Halting the CMRR would not threaten in any way the reliability of the 9,800-weapon U.S. nuclear stockpile, either now or ever.[118] Halting the CMRR would not threaten, even remotely, any existing U.S. nuclear capability, and so halting the CMRR would not be in any way an actual disarmament step.

It *could*, however, reflect an *aspiration* toward disarmament, depending on other policies adopted. In that case it would express the spirit of the Shultz, Perry, Kissinger and Nunn editorials with which this article began.

Halting the CMRR would not entirely remove the possibility of stockpile innovation by "small builds" of special nuclear weapons, whether pursued openly or clandestinely, whether involving plutonium or not.[119]

Halting the CMRR would not diminish prospects for uranium-based weapons, for example gun-assembled, highly shock-resistant weapons of the type demonstrated in the 1962 "Aardvark" nuclear test.[120]

Halting the CMRR would not harm prospects for pit re-use, which provide an avenue for manufacture not only for thousands of warheads of some if not all existing types but of certain novel kinds as well. There is, for example, a certifiable pit re-use option for replacing Trident warheads, should that be desired, which was developed at LLNL in the late 1990s.[121] Other pit reuse options have also been developed and in some cases tested.[122]

---

[118] The author does not see any value in retaining such a stockpile. We must never lose sight of the fact that "reliability" in this case means "reliable" for the purpose of mass killing and the intimidation which flows from that potentiality. The very heinousness of such an act and the posture which promises it undercut its supposed "deterrence" value, leading to an unending quest for nuclear relevance. These considerations are far beyond the narrow scope of this paper but they cannot be totally forgotten either. They usually return in a crude, quantitative version, as in "How many nuclear weapons are necessary?" It is highly germane here to notice that all parties agree that the right answer to this question is: much fewer. The process of dismantlement produces pits, as observed in the text, increases pit redundancy, and decreases the *apparent* need for the CMRR and for pit production. The *actual* need for pit production, as noted above and in reference to the existing stockpile, is already zero.

[119] See for example, Anon., "Stockpile Stewardship Conference Planning Meeting Minutes," January 10, 2003, at http://www.lasg.org/technical/stewardship-conference.htm, and LANL, "The US Nuclear Stockpile: Looking Ahead: Drivers of, and Limits to, Change in a Test-Constrained Nuclear Stockpile," March 1999 congressional briefing (SRD, redacted), slides 56-60, at http://www.lasg.org/NuclearStockpileMar99.pdf (17.3MB).

[120] David Ruppe, "U.S. Nuclear Weapons Programs Could Require Testing, Official Says," Global Security Newswire, http://thenti.com/d_newswire/issues/2003/9/3/3p.html.

[121] Greg Mello, "That Old Designing Fever," The Bulletin of Atomic Scientists, January/February 2000, http://www.lasg.org/DesigningFever.pdf?art_ofn=jf00mello.

[122] See for example James Tyler, Lawrence Livermore National Laboratory, "Innovative Warhead Design: Pit Reuse," presentation to the Galvin Panel, ND. Los Alamos Study Group files.

Halting the CMRR would not prevent upgrading non-nuclear warhead components to achieve new military capabilities, as is unfortunately beginning, or is poised to begin, in the W76-1 Life Extension Project.

Halting the CMRR would not prevent existing nuclear explosives from being adapted to new delivery vehicles and systems within some constraints of size, weight, and balance.

Halting the CMRR would not threaten the scientific viability of the nuclear weapons program in any way.

Halting the CMRR *would*, however, prevent the relatively rapid production of significant quantities of new plutonium-based nuclear explosives. It would halt an RRW-type program, and it would halt the evolution of the stockpile *in this particular dimension only*.

7. <u>For all these reasons, the CMRR is a project without a supportable mission.</u>

This narrow paper has not attempted to describe in detail the many advantages of pursuing a strategy of "warm standby" for pit production. Neither has it placed the CMRR project within the larger context of weapons complex transformation, or attempted to quantify the significant economies in other NNSA programs that could be realized if the option of designing, certifying, and producing new-design nuclear primaries were abandoned, or the still more significant economies available if new-design nuclear explosives were abjured altogether. Also unexamined are the significant opportunity costs of these expenses within the ambit of the congressional Energy and Water Development budget. These discussions must wait for another day.

If the U.S. is not prepared to take this kind of "baby step" toward fulfilling its NPT treaty obligations, it is difficult for this author to see how the U.S. could ever play a constructive role in the international cooperation required to prevent nuclear proliferation.

II. The U.S. nuclear weapons complex: Pushing for a new production capability[123]

Greg Mello, *Bulletin of the Atomic Scientists*, March 20, 2008

On January 15, the *Wall Street Journal* published an op-ed by former secretaries of state George Shultz and Henry Kissinger, former Defense Secretary William Perry, and former Georgia Democratic Sen. Sam Nunn, which 37 other national security experts also endorsed. Entitled "Toward A Nuclear-Free World," it was the second such essay in the *Journal* by these authors in as many years. (See also "A World Free of Nuclear Weapons.") Both essays concerned the benefits--some immediate, others long-term--of specific nuclear policies the authors believe would be best advanced under the nuclear disarmament banner.

These authors do not mention that the United States and four other nuclear states (Russia, Britain, France, and China) are already legally bound to "pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament . . ." by Article VI of the Nuclear Non-Proliferation Treaty (NPT). The opinion of the World Court and subsequent U.S. diplomatic agreements has confirmed the binding character of these twin commitments to end the arms race and achieve nuclear disarmament.[124] Most observers agree that the collective unwillingness of the five NPT nuclear weapons states to persuasively implement these Article VI obligations has harmed the NPT and the law-based nonproliferation regime it underpins.[125]

If the disarmament aspiration expressed in these two essays means anything, it means refraining from long-term investments in the specialized, "responsive" infrastructure needed to make novel warheads. Nuclear weapons infrastructure investments that require large, long-term commitments of capital and skilled technical labor--scarce resources in any country--are good indicators of national nuclear intent. In other words, infrastructure investments make, and are, nuclear policy.

The U.S. government says as much. In 2006, Linton Brooks, the then administrator of the National Nuclear Security Administration (NNSA), emphasized the importance of long-term manufacturing investments as a foundation of more aggressive nuclear policies a "couple of decades" hence. "We can change our declaratory [nuclear] policy in a day," he said during a speech to the East Tennessee Economic Council. "We can make operational and targeting changes in weeks or months. In a year or so we can improve integration of nuclear and non-nuclear offense. By contrast, the infrastructure and the stockpile it can support cannot change as quickly. Full infrastructure changes may take a couple of decades."

---

[123] At http://www.thebulletin.org/web-edition/features/the-us-nuclear-weapons-complex-pushing-a-new-production-capability.

[124] The United States reiterated its commitment to nuclear abolition in the consensus statement of the 2000 Nuclear Non-Proliferation Treaty (NPT) Review Conference, agreeing to a set of 13 detailed, "practical steps for the systematic and progressive efforts to implement Article VI." Prior to this, the World Court unanimously ruled in 1996 that "there exists an obligation to pursue in good faith *and bring to a conclusion* [Emphasis added.] negotiations leading to nuclear disarmament in all its aspects under strict and effective international control."

[125] The author speaks from personal observations at several NPT preparatory and review conferences but also see the formal conclusions of Lewis Dunn et al, Science Applications International Corporation, "Foreign Perspectives on U.S. Nuclear Policy and Posture", December 4, 2006, prepared for the Defense Threat Reduction Agency (DTRA). Another recent testimony to this view is a speech delivered by IAEA Secretary-General Mohamed ElBaradei on February 11, 2008.

Brooks is right. The factory complex at Los Alamos National Laboratory (LANL) needed to produce the fissile plutonium cores, or "pits," for RRW or another new warhead isn't expected to be completed until at least 2017. But as long as design and construction of these production facilities proceeds, Congress could "halt" RRW for a few more years, as it did in late 2007, without significantly affecting its final delivery schedule, assuming it were eventually approved.

Warhead design and engineering development are short-term activities compared with designing, constructing, equipping, and standing up operations in the facilities needed to actually build RRWs. The new buildings needed are orders of magnitude more complicated than the warheads and there is considerable managerial risk involved in acquiring them.[126] For example, the nuclear explosive portion in a warhead or bomb contains at most a few hundred components, nearly all of which are inert until use. By contrast, a typical automobile has more than 10,000 parts. A plutonium production complex contains millions of parts, and such a complex is anything but inert. To successfully operate it would require training and coordinating at least 1,000 people and would also require some success in meeting safety, security, and environment standards. Construction of the most recent large-scale U.S. pit production-related facility, Building 371 at Rocky Flats in Colorado began in 1973 and was completed in 1981 at a cost of $225 million ($524 million in today's dollars). It operated for only one month before the Energy Department realized that the technology on which it was based would not work. The repair cost $400 million and took eight years. Energy called it a "fiasco."

NNSA describes the proposed new factories at LANL as merely providing "capacity," as if "capacity" could be created and then mothballed. One cannot build, equip, and stand up highly specialized factories that cost billions of dollars and hire and train hundreds of highly specialized technicians over many years without actually making the objects these costly and complex arrangements were meant to produce.

The proposed Chemistry and Metallurgy Research Replacement (CMRR) Facility at Los Alamos

The United States has now begun to heavily invest in the specialized manufacturing infrastructure needed for new nuclear weapons, pivotally at LANL. The flagship of this complex is the CMRR project to be built at LANL's Technical Area (TA)-55. NNSA describes the current cost for CMRR as at least $2.2 billion. But if completed, it would probably cost more.[127]

---

[126] Keith Schneider, "U.S. Spent Billions on Atom Projects That Have Failed," *New York Times*, December 11, 1988, p. A1.

[127] Energy Department Congressional Budget Request for FY2009, Vol. 1, National Nuclear Security Administration (NNSA), p. 298. The cost of more than $2.2 billion for the Chemistry and Metallurgy Research Replacement Facility (CMRR) is derived from NNSA's estimate of "above" $2 billion for the CMRR Nuclear Facility (NF), its estimate of $164 million for the Radiological, Utility, and Office Building (RLUOB), and an allowance in the low tens of millions for specialized RLUOB equipment and furnishings--carried now in a separate CMRR project account, "Phase B"--bringing the total to "above" $2.2 billion. Construction costs for even ordinary construction are inflating rapidly and can be expected to continue to increase for the next decade. The CMRR NF is a complex project that involves large quantities of concrete and steel. For these reasons, the CMRR can be expected to increase in cost significantly over the nine years NNSA allots for further design and construction. These CMRR costs don't include the required new $240 million Technical Area (TA)-55 security perimeter, which must in part be built *twice* to accommodate construction, the new Pit Radiography Facility ($47 million), the TA-55 Reinvestment Project (at least $200 million), the Radioactive Liquid Waste Treatment Facility Upgrade ($80 million), or the TA-54 nuclear waste disposal expansion project (at least $60 million). Nor do they include demolition and disposal of

The CMRR consists of two buildings--the Nuclear Facility (NF), comprising roughly nine-tenths of the project in dollar terms, and the Radiological Laboratory, Utility, and Office Building (RLUOB). Together, the two buildings would comprise some 400,000 square feet of new interior space, and the NF's 6-metric ton vault would approximately triple LANL's plutonium storage capacity.[128] If completed, the CMRR would be the largest construction project in the history of LANL in inflation-corrected dollars.

The two CMRR buildings would be linked by tunnels and connect to LANL's existing 30-year-old plutonium facility (PF-4), which has been modified for production using operational funds over the last decade or more. NNSA has now begun a more extensive renovation of PF-4 in an open-ended, long-term construction line item called the "TA-55 Reinvestment Project."

At present, pit production utilizes approximately one-quarter of PF-4's 59,600 square feet of nuclear floor space; the CMRR NF would add at least 22,500 additional square feet of this type, some with greater ceiling height, providing greater operational flexibility. Ceiling height has been a limiting factor regarding manufacturing equipment and production processes in PF-4.

RLUOB construction is approximately 40 percent complete, while after four years, the Nuclear Facility is still in preliminary design and it's unclear when, or if, it will be completed or when construction might begin if approved. Physically, the 90,000-cubic-yard pit dug at the NF site, ostensibly to investigate seismic conditions, is now the staging yard for RLUOB construction. Therefore, the earliest possible construction start date for the NF is spring 2009--the earliest RLUOB could be completed.[129]

Such a schedule seems optimistic, as a number of significant NF design issues remain unresolved, including seismic design, overall safety design, and building size. (See the summary of the "Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement".) As of March 2007, conceptual vault design, including provisions for fail-safe cooling of plutonium stores, hadn't been finalized.[130]

It's difficult to predict the ultimate capacity of a LANL pit production complex anchored by a renovated PF-4 and the two CMRR buildings--especially if additional production space or an additional two production buildings were subsequently added, as NNSA suggests might happen.[131]

Whether built with just the RLUOB, the RLUOB and the NF as planned, the RLUOB plus a "supersized" NF, or with the whole project doubled in size by subsequent construction, the CMRR is unnecessary to maintain the present nuclear arsenal or any subset of it for several

---

the existing Chemistry and Metallurgy Research (CMR) facility ($400 million). All of these projects (save for CMR demolition and disposal) are functionally required for CMRR operation.

[128] Los Alamos National Laboratory (LANL), CMRR briefing slides, p. 8, no date.

[129] Personal communication with Steve Fong, NNSA CMRR project staff, January 18, 2007.

[130] Oral response to author's questions, CMRR public meeting, Fuller Lodge, Los Alamos, New Mexico, March 2007.

[131] See NNSA, "Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement," pp. S34, 35. Similar plans have been internally available at LANL since at least 2001, e.g., LANL 2001 Comprehensive Site Plan, "TA-55 Preconceptual Plan," Los Alamos Study Group files.

decades. The CMRR *is* needed, however, to manufacture significant quantities of pits for novel nuclear explosives.[132]

How many pits could LANL make--with and without CMRR?

LANL has possessed the capability to make pits since 1945. But until last year--when it produced 11 new pits, some or all of which were assembled into W88 Trident warheads at the Pantex nuclear weapons plant near Amarillo, Texas--LANL hasn't made pits for the stockpile since 1949, with one or two possible exceptions.[133]

LANL's current pit manufacturing capacity is uncertain and open to interpretation. On the one hand, NNSA could choose to displace or terminate certain programs currently housed in PF-4; on the other hand, some of those programs are likely needed for new-design nuclear explosive package certification, without which pit production has no reason to proceed.

At a minimum, successful certification of new-design nuclear explosives requires the use of extensive design, testing, and simulation capabilities. These might not be sufficient; nuclear testing might also be required. So any decision to resume pit production has long coattails, tasking most of PF-4 and much of the nuclear weapons complex as a whole.

In February 1996, Energy said LANL's pit production capacity, prior to any investment, was "10 to 20 pits per year."[134] Later that year, Energy stated that LANL pit production of "up to 50 [pits] per year" is "inherent with the facilities and equipment required to manufacture one component [pit] for any stockpile system."[135] In 2005, the Secretary of Energy's Advisory Board (SEAB) Nuclear Weapons Complex Infrastructure Task Force said LANL's existing pit production capacity could (and should) be increased by a ratio of "1:20." This twentyfold increase wasn't a rhetorical flourish; rather, it was predicated on producing an RRW or RRW-like pit designed for mass production involving simpler design, broader tolerances, robotic production technologies in some steps, and fewer toxic materials, which would allow greater ease, flexibility, and speed of production.[136]

This year, NNSA stated, "A reasonable judgment of the inherent capacity of a production line for nuclear components exceeds 50 per year. A modern factory-style layout could result in a *minimum* [emphasis added] inherent capacity in the range of 125 components per year."[137]

Existing LANL pit production capacity is somewhat predicated on the nine-wing Chemistry and Metallurgy Research (CMR) building in TA-3. Despite extensive recent upgrades, much of the

---

[132] Neither the CMRR nor Technical Area (TA)-55 as a whole is needed to produce nuclear explosives made with uranium.

[133] According to a personal communication with Ken Silver at East Tennessee State University, there are indications LANL's TA-21 site may have briefly resumed quantity pit production in the immediate aftermath of the disastrous 1969 fire at Rocky Flats.

[134] Energy Department, Draft Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM PEIS), Los Alamos Study Group.

[135] Energy Department, Final SSM PEIS, Volume 1, pp. 3-4, Table 3.1.1.2-1, note "A," September 1996. Note: "A" is note "1" there.

[136] Anonymous congressional source.

[137] NNSA, "Complex Transformation Supplemental Programmatic Environmental Impact Statement (CTSPEIS)," pp. 2-22, December 2007.

CMR *may* be nearing the end of its usefulness for this purpose. According to NNSA Administrator Tom D'Agostino, pit production could continue at LANL without either the CMRR or CMR, or possibly with part of the CMR, as NNSA wrote in response to congressional questions in 2007.[138]

How many pits per year LANL could produce if CMRR *were* built is even less clear, as the uncertainties--including uncertainties in CMRR's size and the number of facilities ultimately available at TA-55--are compounded. In addition, as a senior Energy official explained to me in 2002, the achievable production rate in a given number of square feet of plutonium space is a sensitive function of the technology used. It is also a function of the complexity and tolerances required in the type of pits produced. Any capacity cited today isn't necessarily what might be available 10 years from now if technology development were to continue--and RRW were approved.

Production capacity is also a function of *flexibility*, e.g. whether two or more kinds of pits are to be produced simultaneously or in rapid succession.

The *lowest* capacity is governed by what might be called the "fiasco factor." Accidents and malicious acts, previously unknown or undisclosed infrastructure or management inadequacies, enforcement actions, and preventive stand-downs have all occurred at LANL and are real possibilities. A production capacity of zero could easily result from any of them, possibly for a long time.

The highest capacity achievable could be significantly greater than the advertised maximum of 200 pits per year.

CMRR's congressional funding

CMRR appeared in 2003 as a "project engineering and development" line item, becoming a standalone construction project the following year. Since then the Senate, thanks to New Mexico Republican Sen. Pete Domenici, has reliably backed CMRR funding. The House of Representatives, however, has zeroed out the CMRR in three of the past five years and proposed cuts of more than one-half in the other years. The Senate has largely won these battles.

In its most recent markup (for the fiscal year 2008 appropriation), the House Appropriations Committee zeroed out the project and wrote: "Proceeding with the CMRR project as currently designed will strongly prejudice any nuclear complex transformation plan. The CMRR facility has no coherent mission to justify it unless the decision is made to begin an aggressive new nuclear warhead design and pit production mission at Los Alamos National Laboratory." The House as a whole agreed with this assessment by a wide margin, rebuffing an amendment introduced by New Mexico Democratic Rep. Tom Udall to restore funding for the CMRR, pit production operations, and nuclear weapons overall.

But Senate appropriators had fully funded the project. When the omnibus appropriations bill finally passed in mid-December, the CMRR was funded at $75 million for fiscal year 2008, about 86 percent of NNSA's request. Neither the bill nor the report contain specific guidance as

[138] House Energy and Water Development Appropriations Subcommittee, March 29, 2007, supplemental questions for the record, p. 584 in printed version of "Energy and Water Development Appropriations for 2008." The use of CMR as solely a radiological laboratory rather than a nuclear facility, to my knowledge, hasn't been investigated. Neither to my knowledge has there been any comprehensive study of current and planned mission requirements for LANL's nuclear facilities or radiological facilities.

to which parts of the CMRR project are to receive the abridged funding; project management is privileging RLUOB construction.[139]

What dire consequences would occur if the CMRR Nuclear Facility wasn't built?

None. Halting the CMRR would not even remotely threaten any existing U.S. nuclear capability--not now and not for many decades to come. But such a step *could* reflect an aspiration toward disarmament, depending on other policies adopted. In that case, it would express the spirit of the Shultz, Perry, Kissinger and Nunn editorials.

If the United States isn't prepared to take even this kind of baby step toward fulfilling its NPT obligations, it's difficult to see how Washington could ever play a constructive role in the international cooperation necessary to prevent nuclear proliferation.

This article has been adapted from a larger piece entitled "Build Warhead Factories Now, Worry About Weapons Policy Later: Will Congress Take Back the Reins?", available at the Los Alamos Study Group website.

[139] Personal communication with Steve Fong.

III. Letter to selected congressional and executive staff[140]

Greg Mello, June 11, 2008

Re: http://www.dnfsb.gov/pub_docs/lanl/cor_20080516_la.pdf

Dear colleagues –

The National Nuclear Security Administration (NNSA) has not clarified the missions of the Chemistry and Metallurgy Research (CMR) at Los Alamos National Laboratory (LANL) to the satisfaction of the Defense Nuclear Facility Safety Board (DNFSB).

In a May 16, 2008 letter to NNSA Administrator D'Agostino ("Operation and Safety of the Chemistry and Metallurgy Research Facility at LANL"), DNFSB Chairman Eggenberger expresses the Board's concern that a new Documented Safety Analysis (DSA) for continued operation of the CMR facility past 2010 is now expected to be delayed until February 2009.

Such a delay would "leave little time [before planned CMR closure in 2010] for NNSA to complete any necessary upgrades to safety systems or identify alternative strategies for meeting national security priorities." The DNFSB hopes NNSA will provide "an objective assessment of programmatic alternatives in lieu of rationalizing continued operations at CMR with minimal change."

The Board emphasizes "the need for a detailed definition of the scope of work proposed to continue in CMR," and repeats that "[i]t is essential that NNSA thoroughly understand the programmatic need for future activities in CMR."

"For example," Eggenberger continues, "*NNSA has not identified a programmatic need to manufacture war reserve pits beyond the current campaign scheduled for completion in about 2010*." (Emphasis added.)

For the past two years if not longer this organization has repeatedly stressed that there appears to be no objective analysis of missions and associated nuclear facility requirements at LANL. This lack of objective mission and facilities planning, in the specific case of the CMR facility and its related safety issues, is the main subject of Dr. Eggenberger's letter.

We have also stressed that no convincing case -- apparently no case at all -- has been made for manufacturing more war reserve pits. A Department of Defense (DoD) or Nuclear Weapons Council (NWC) order or memorandum requesting such manufacture would not in itself constitute a convincing case, but to our knowledge there is no such order. Here the Safety Board states NNSA has not offered any pit production mission need past the current short W88 campaign. While it is not the Board's role to analyze the *validity* of such a programmatic need, the total *absence* of one begs the question of whether NNSA is poised to assume unnecessary hazards at the CMR facility and other facilities associated with pit production.

Going farther than the Safety Board, I believe NNSA is already incurring unnecessary, and very significant, hazards at LANL for the sake of pit production.

I am concerned that the stated lack of objective analysis is a major factor allowing the $2.6 billion Chemistry and Metallurgy Research Replacement (CMRR) project to drift forward. I

[140] At http://www.lasg.org/CMRR_Cong_Exec_ltr.htm.

believe it is necessary for Congress to request such a mission and facility analysis, preferably by an independent third party, and at a minimum to pause further CMRR project commitments, especially Final Design of the proposed Nuclear Facility (NF), until that analysis can be provided.

I believe it likely that NNSA's internally-generated programmatic pit production aspirations are clouding its view of necessary CMR missions, their associated required scales, and how to maintain them. If the entire suite of current *and aspirational* CMR missions were taken as an inviolable "package deal," it might appear that a large new nuclear facility were "necessary" to "replace" the CMR. If, however, there is no need for war reserve pit production -- and there is no evidence of that -- would it be possible to meet the remaining mission needs in PF-4, LANL's several other nuclear facilities, the CMRR Radiological Laboratory, and possibly a portion of the CMR facility itself, for example a stabilized Wing 9? No one seems to know yet.

In the absence of a study of nuclear missions and facilities at LANL, and in particular in the absence of any stated programmatic need whatsoever for pit production, it is impossible to say if the CMRR and its related projects are justified. Together, these projects will cost approximately $3 billion. If continued they will absorb a disproportionate amount of management attention for another decade (or as is likely, longer). It is truly shocking that Congress has so far funded this very large suite of projects without any analysis of alternatives, allowing the unchallenged pit production mission, which itself lacks any clear (let alone logical) statement, to obscure an underlying lack of clarity about the nature of the other CMR missions, and whether, and how, to support them past 2010.

Sincerely,

Greg Mello
Executive Director

IV. Brief Partial Update on the Chemistry and Metallurgy Research Replacement (CMRR) Project at Los Alamos National Laboratory (LANL)[141]

January 28, 2009

Greg Mello, Los Alamos Study Group

Summary

1. **LANL has recently written an "exit strategy" from the existing Chemistry and Metallurgy Research (CMR) building that does not include the CMRR Nuclear Facility (CMRR-NF).**
2. **The Defense Facilities Safety Board (DNFSB), required by law to certify the safety of CMRR-NF design prior to full release of FY09 funds, has for the time being refused to do. NNSA has stated that it "may not be economically feasible to…qualify…the active confinement ventilation system" to seismic design requirements.**
3. **NNSA's plan to construct a total of 4 large new plutonium facilities (3 nuclear facilities and 1 radiological facility), plus 5 related projects at LANL alone, needs more careful vetting.**

Conclusion: it is at best premature to fund the CMRR project at this time. We believe the entire project is not needed, for reasons summarized in the publications cited above.

1. In its 1/2/09 Weekly Site Report (pdf), DNFSB reported that LANL had "recently" submitted an "exit strategy" from the existing CMR building that did *not* include use of the CMRR-NF, the second (and by far the more dollar- and schedule-intensive) of the two buildings in the CMRR project.

To our knowledge this is the first public reference in at least five years to a LANL strategy for its plutonium facilities that does not include the CMRR-NF.

Detailed design of the CMRR-NF has not begun and the project remains controversial. The House of Representatives has voted to withhold some or all CMRR appropriations (for both CMRR buildings) since project inception in FY04. The House has attempted to withhold these funds (and attach conditions; see below) for multiple reasons, including the absence of a new nuclear policy, an associated nuclear posture, and consequent infrastructure plan.

NNSA estimated in February 2008 that the CMRR-NF would cost at least $2 billion (B). A validated cost estimate for CMRR-NF will not be available until at least February 2010.

DNFSB says LANL recommended additional evaluation of upgrading the CMRR Radiological Laboratory, Utility and Office Building (RLUOB) to the status of a Category II nuclear facility. This would be a major unplanned design change; the RLUOB is now about 2/3 completed. All necessary funds have been appropriated for this building *as originally designed*. Specification of RLUOB special facility equipment (SFE) is not yet completed.

NNSA and LANL have stated repeatedly since the February 2003 Congressional Budget Request (i.e. the FY04 CBR) that the RLUOB would be a Category III radiological facility – an analytical facility limited to less than 9 grams of plutonium-239-equivalent, plus an office and utility

[141] At http://www.lasg.org/CMRR_brief_update.htm.

building – and not a nuclear facility containing kilograms or even tons of plutonium, which the CMRR-NF would be. This strategy was codified in the CMRR Record of Decision (pdf) (ROD) of February 12, 2004.

According to DNFSB, LANL's non-CMRR-NF, "CMR exit strategy" includes other elements as well, including improvements related to the existing TA-55 Building PF-4 plutonium vault.

LANL asserts that delays in the CMRR-NF would cause safety, security, and programmatic risks. The assumptions that lead LANL to these conclusions are not available to us and we cannot independently evaluate them. In general we believe LANL and NNSA are planning on maintaining more plutonium missions, at a larger scale and production rate, than can be justified by NNSA's and the Department of Energy's (DOE's) national security and energy mandates, the requirements of worker and public safety, and prudent fiscal management.

2. Seismic issues have long been of concern at LANL. Extensive seismic assessment over the past 20 years has increased the known probability of large accelerations in both the vertical and horizontal directions across the LANL site. As a result of this new knowledge LANL is now operating under a site-wide Justification for Continued Operations (JCO), as multiple LANL facilities do not meet nuclear safety requirements and are being reevaluated, with potential changes to operations, structures, and equipment.

Seismicity is a central reason an exit strategy from the CMR Building is needed. It is also a major concern in the design and operation of nuclear facilities at TA-55, including the proposed CMRR-NF. To date NNSA and LANL have not succeeded providing a preliminary design for the CMRR-NF capable of meeting seismic requirements, despite years of work.

The FY09 Defense Authorization Act requires DNFSB to certify CMRR design prior to releasing any funds over $50.2 million in FY09.

> **Section 3112. Limitation on funding for Project 04-D-125, Chemistry and Metallurgy Research Replacement facility project, Los Alamos National Laboratory, Los Alamos, New Mexico.**
>
> Of the amounts appropriated pursuant to an authorization of appropriations in this Act or otherwise made available for fiscal year 2009 for Project 04-D-125 Chemistry and Metallurgy Research Replacement (in this section referred to as ''CMRR'') facility project, Los Alamos National Laboratory, Los Alamos, New Mexico, not more than $50,200,000 may be made available until—(1) the Administrator for Nuclear Security and the Defense Nuclear Facilities Safety Board have each submitted a certification to the congressional defense committees stating that the concerns raised by the Defense Nuclear Facilities Safety Board regarding the design of CMRR safety class systems (including ventilation systems) and seismic issues have been resolved; and (2) a period of 15 days has elapsed after both certifications under paragraph (1) have been submitted.

On January 16, 2009, DNFSB sent two letters to NNSA regarding seismic design deficiencies in the CMRR-NF project. One letter and attached findings (pdf) concerned seismic design issues overall; the other and its attached findings.

Attachment

Safety Board Raises Seismic Issue on Los Alamos Project

George Lobsenz, *Energy Daily*, January 26, 2008. (Reprinted with permission.)

In a potential problem for a key nuclear weapons project, staff at a federal safety oversight board have formally notified the National Nuclear Security Administration that they may not be able to certify the design for a new plutonium-handling facility at Los Alamos National Laboratory because the agency has said it may cost too much to ensure the facility's emissions confinement system can withstand a strong earthquake.

In a January 16 letter to the NNSA, the semi-autonomous Energy Department agency that manages the department's nuclear weapons complex, staff at the Defense Nuclear Facilities Safety Board (DNFSB) said the position taken by NNSA is "not acceptable" given the risks posed by the Chemistry and Metallurgy Research Replacement (CMRR) project at the seismically active Los Alamos site.

Staff at the DNFSB said they wanted NNSA to "reconfirm its commitment" to making the emissions confinement system capable of withstanding so-called performance category, or PC-3, earthquake events.

NNSA's position is somewhat unusual because commercial nuclear power plants and other nuclear facilities are typically designed to earthquake safety standards that are substantially equivalent to the PC-3 standard used by DOE.

The DNFSB staff's concerns are important because Congress in the defense authorization bill for fiscal year 2009 specifically gave the DNFSB certification authority for the design of the CMRR project, which NNSA says is vital to maintaining weapons design and production capabilities at Los Alamos.

Under the defense authorization bill, Congress withheld $50.2 million in fiscal 2009 funding for the CMRR project subject to the DNFSB and NNSA providing formal certification to the House and Senate armed services committees that design of the CMRR facility was adequately protective of public safety.

As part of the certification process, the DNFSB staff earlier this month began sending "findings" to NNSA laying out their initial concerns about aspects of the CMRR design.

The staff has sent two findings, one about overall seismic safety of the CMRR and the other focusing on the so-called confinement ventilation system, which is critical to capturing and preventing the release of any harmful emissions from the facility.

While seismic safety has long been a key DNFSB concern on the CMRR project, the January 16 finding on the confinement ventilation system contains stronger language from DNFSB staff about the need for NNSA to change its position.

"The [NNSA's] CMRR Nuclear Safety Design Strategy…states that it may not be economically feasible to seismically design and qualify some components of the active confinement ventilation system or its support system to PC-3 seismic design requirements," the staff said in the finding.

"It is not acceptable to downgrade PC-3 seismic design requirements for the active confinement ventilation system."

As for a solution, the DNFSB staff said: "NNSA should reconfirm its commitment to seismically design the active confinement ventilation system to PC-3 seismic design requirements."

And in an accompanying letter to Gerald Talbot, assistant deputy NNSA administrator for nuclear safety and operations, DNFSB staff said that by sending a finding to NNSA, the staff was highlighting a safety issue that "has not been adequately resolved and that could preclude board certification."

NNSA officials said they expected to address the DNFSB concerns in an internal review of the CMRR project that was now under way.

"We are aware of their concerns," NNSA said in a statement to *The Energy Daily* Friday. "We are in the midst of a major internal review of our design plan and feel confident that the board's questions will be answered when they see the results of this review. We look forward to continuing to work constructively with them to ensure that the CMRR is safe."

NNSA has said that moving forward with the CMRR project is vital because the existing Chemistry and Metallurgy Research (CMR) building at Los Alamos is more than 50 years old and does not meet modern earthquake, fire safety and other environmental and public health protection requirements.

NNSA has been attempting to respond to safety concerns in the interim by removing some plutonium and other hazardous materials from the CMR building. However, the agency says it cannot shut down the CMR building because it provides critical capabilities for handling plutonium and other nuclear materials used in nuclear weapons.

As a result, NNSA has been trying to expedite construction of the CMRR facility, but has run into difficult design and cost problems, with the project's price tag roughly doubling to an estimated $2 billion.

The DNFSB has had longstanding concerns with the design of the CMRR, especially NNSA's initial plan to use "passive confinement" strategies to prevent radioactive releases in some accident scenarios; passive confinement means radioactive releases will be confined by the buildings walls and ceiling, as opposed to being sucked up by an "active" ventilation system and trapped in filters.

Earthquake issues are of particular concern for the CMRR facility because Los Alamos is located in a seismically active area of New Mexico. In addition, the lab recently completed a new seismic review that showed earthquake risks to lab facilities are roughly 50 percent higher than previously believed.

V. April 3, 2009 letter to selected executive branch and congressional officials[142]

[Bracketed text and strikethrough have been used to update this letter to August 11, 2009.]

Greg Mello, Los Alamos Study Group

The Obama Administration should not request funding for the Chemistry and Metallurgy Research Replacement (CMRR) project, Los Alamos National Laboratory.

The Chemistry and Metallurgy Research Replacement (CMRR) is a stealth "Modern Pit Facility." It is the single most pivotal and important project in the previous administration's ambitious nuclear weapons complex transformation project and the one which carries the most policy implications.

The CMRR has been strenuously opposed by House appropriators for the past five years. Only one visible attempt was made during this period to restore CMRR, RRW, and related nuclear weapons funding to the Energy and Water Appropriations bill in the House -- by the congressman in whose district it would be spent. This amendment failed by a wide margin. It did not attract a majority of Republicans and received very few Democratic votes.

It is very likely that Congress will fund the CMRR, however, if the Obama Administration requests funding for it.

The CMRR Nuclear Facility, the second stage of the CMRR, is the most expensive portion of the CMRR by far, about 90% of the total new construction expense. Its primary purpose is to greatly augment the potential plutonium pit production rate at LANL's Technical Area (TA-55).

The Nuclear Facility could begin construction as early as ~~this October~~ [FY2011], ~~but only if the Obama Administration includes the CMRR in its forthcoming budget request to Congress.~~ [The Obama Administration request for FY2010 was $55 M, 57% of the FY2009 level of $97.2 M.]

The Obama Administration should not request funding for the CMRR Nuclear Facility. Since Congress has already appropriated all the funds needed to construct the first CMRR building, the "Radiological Laboratory, Utility, and Office Building (RLUOB)," the Administration should not request any funding for the CMRR at all this year.

Some special facility equipment (SFE) will eventually be needed for the RLUOB, but it is not yet clear which of the requested equipment is specific to the RLUOB and which would be used to equip the Nuclear Facility. NNSA has not prepared any budget for SFE – or, for that matter, any validated cost estimates for the project as a whole.

This is the natural and best moment to downscale this project from two buildings to one. The RLUOB is fully funded and nearly complete. The Nuclear Facility is likely to conclude preliminary design ~~this summer~~ [in the summer of 2010]. It is not yet in either final design or construction – but it would be ~~next fiscal year~~ [in FY2011], if funded.

The CMRR nuclear facility could be canceled or at least delayed on the basis of any subset of the following reasons:

1. The primary purpose of the CMRR is to facilitate larger-scale production of new-design pits, a fact well-understood in most or all the relevant congressional committees. Yet there is

[142] Study Group files.

neither any request, nor any need, for pit manufacturing *at all*, whether of new-design or old-design pits. There is as yet neither any nuclear posture, nor any stockpile plan upon which such a request or need could be founded. The "need" for the CMRR Nuclear Facility should be discussed *only* after the new Nuclear Posture Review, a new stockpile plan, and a new infrastructure plan are prepared. Design, let alone construction, is premature.

2. Upon information and belief, NNSA does not understand the explosive out-year budget implications of its current infrastructure plans, which would, if pursued in the present budget climate, force the agency to downscale other planned projects and/or lay off program staff. NNSA has presented no credible cost estimate for these ambitious plans, let alone a cost comparison of alternative infrastructure strategies based on the yet-to-be-completed Nuclear Posture Review and resulting expected more modest, stockpile plan.
3. LANL's existing plutonium infrastructure, especially with the addition of the first new CMRR building, a radiological laboratory, is adequate to preserve U.S. pit-production capabilities and to manufacture small numbers of pits, whether for quality assurance purposes or for the stockpile. (I do not think the latter is wise.) The life of these existing LANL capabilities is being extended some decades into the future by the TA-55 Reinvestment Project and other NNSA projects already funded and underway.
4. The production capacity of TA-55 could be increased substantially in a hypothetical emergency by displacing other plutonium programs, such as the production of Pu-238 heat sources for the space program, to other sites, or by simply postponing them. Lawrence Livermore National Laboratory (LLNL) also has a plutonium facility that can produce pits, if need be, in this hypothetical emergency. The Department of Energy (DOE) also is constructing at least one if not two facilities for plutonium disposition at the Savannah River Site (SRS) that could also be adapted fairly quickly to pit production if there were ever a perceived strong national need.
5. The proposed CMRR vault is not needed to store plutonium. Ample storage capacity exists already at LANL, though it has been poorly managed. Much larger potential capacity exists elsewhere in the DOE and NNSA complex at SRS, the Nevada Test Site (NTS), and quite likely elsewhere.
6. There have been no independent reviews of NNSA plutonium missions and facilities, either at LANL or for the DOE complex as a whole, other than reviews which openly or tacitly assume Bush Administration stockpile levels and a policy of large-scale new-warhead (i.e. RRW) production. The decision to not proceed with the Reliable Replacement Warhead (RRW) has dramatic impacts on the production complex workloads which have not been incorporated into planning.
7. There is no validated cost estimate for the CMRR; the most recent budget request only said that the Nuclear Facility would cost "more than" $2 billion (B).
8. NNSA is pursuing a "design-build" strategy for the Nuclear Facility, which is questioned by some in Congress. DOE has not successfully designed and built a plutonium facility since the PF-4 portion of TA-55, which was built in 1978. The prime contractor chosen had, until this project, no apparent nuclear industry experience.
9. To my knowledge there has been no pit reuse study focused on maintaining the existing stockpile rather than substituting pit reuse for new pits in an RRW. Smaller stockpiles and

weapon system retirements significantly increase pit reuse options. Pit reuse, where applicable, is a far faster, cheaper, cleaner, less controversial, and safer way to provide pits than new pit manufacture, and it does not require nuclear facility space.

10. NNSA has prepared or is preparing a backup plan for TA-55 without the CMRR Nuclear Facility, in the event the latter is not funded. This plan involves changes to PF-4 and RLUOB. The plan is not complete and its mission assumptions are unknown probably even to its authors, and as of last month there was no associated cost estimate or any commitment to one.
11. Dr. Richard Garwin and Mr. Phil Coyle recently testified (here and here, pdfs) before the House Energy and Water Development Appropriations Subcommittee regarding the need to re-think NNSA's weapons complex infrastructure plans. A video of the hearing is available in its entirety here (requires RealPlayer). In different ways, both questioned the need for the CMRR Nuclear Facility.

The CMRR project consists of two buildings, the Radiological Laboratory, Utility, and Office Building (RLUOB) and the Nuclear Facility (NF), both within LANL's Technical Area TA-55 and both to be connected to LANL's existing plutonium facility (PF-4) by short tunnels.

Construction of the RLUOB is proceeding and is expected to be complete by 9/30/09, at which time partial initial occupancy is to occur -- probably just in offices at first. Special Facility Equipment (SFE) is to be added to the RLUOB over the following 2-3 years.

The NF is currently in preliminary design and ~~may (or may not)~~ [will] remain so for the duration of FY09 [and FY2010]. There have been difficult seismic and safety engineering problems, the former exacerbated by NNSA's insistence on an open floor plan. NNSA proposes a concurrent design-build construction strategy for the NF, which could result in breaking ground in [FY2011] ~~the first quarter of FY10, i.e. in October, six months from now~~. The NF is expected to take approximately 9 years to design-build and equip.

NNSA's most recent (February 2008) cost estimate (not validated) for the CMRR is "more than" $2.6 billion, including roughly $0.2 B for RLUOB and $0.4 B to demolish the existing Chemistry and Metallurgy Research (CMR) building at some future time. The NF comprises 75-80% of the total CMRR cost -- or about 90% if CMR demolition and disposal are not included. A validated CMRR cost estimate is not expected until February, 2010, or after.

House appropriators have consistently proposed cutting CMRR appropriations either to zero (three times) or near zero (twice). In 2008, they attempted to halt expenditure of FY07 funds. Senate appropriators have prevailed and funded the project so far, though not always fully. The House appropriators consistently and strongly believe the project is premature without a new nuclear posture, a stockpile plan, and a credible overall weapons complex infrastructure plan. In 2008, House appropriators wrote that "[t]he CMRR facility has no coherent mission to justify it unless the decision is made to begin an aggressive new nuclear warhead design and pit production mission at Los Alamos National Laboratory."

The FY09 omnibus appropriations act funded the project at $97.2 million -- nearly all of the $100.2 M request. The FY09 Defense Authorization Act withheld $50.2 M in FY09 CMRR funding until the Defense Nuclear Safety Board (DNFSB) and NNSA certify that all seismic and safety design issues have been resolved.

Further information can be found at http://www.lasg.org/CMRR_2_12_08_ltrhd.pdf and in subsequent documents also posted at http://www.lasg.org. I am available to answer any questions you have.

VI. Don't Build a Plutonium "Bridge to Nowhere," *Albuquerque Journal*, May 17, 2009

The *Journal* carried a critical editorial Monday about the National Nuclear Security Administration's (NNSA's) slowdown of a planned new plutonium facility at Los Alamos National Laboratory (LANL).

Even prior to NNSA's action the project's overall goals (and design) had become uncertain. NNSA didn't stop the project, though that's a good idea.

The building in question is called the "CMRR Nuclear Facility." It's one of two buildings in the misnamed "Chemistry and Metallurgy Research Replacement" project – misnamed because the CMRR would provide *additional* warhead capabilities, not just "replace" those to be retired.

Construction of the first CMRR building is nearly complete. The Nuclear Facility is to be the second. If built it would comprise about half the square footage and 90% of the total CMRR construction cost.

The Nuclear Facility would cost "at least" $2 billion. Despite seven years of work on the project, NNSA has not been able to complete preliminary design or provide a stable cost estimate.

Using standard cost inflators, the Nuclear Facility would cost five times as much as any prior government construction project in New Mexico, excepting the interstate highways.

Because the project's primary purpose is to design and build parts for a new warhead repeatedly rejected by Congress, Newsmax.com labeled this project the nation's "Boondoggle #1" earlier this spring.

The lab space it would provide will cost $89,000 per square foot – or $618 per square inch if you prefer. LANL's existing plutonium facility, with 2.6 times the space, cost $75 million in 1978, about $201 million in today's dollars. The Nuclear Facility would add 38% more plutonium space at 26 times the 1978 unit cost, assuming no further increases.

Department of Energy (DOE) dollars have better uses. With $2 billion DOE could pay for about 2,000 megawatts of new wind generation capacity. This would displace millions of tons of carbon pollution and save millions of gallons of fresh water every year henceforth. It would create about 30,000 new jobs in manufacture, construction, and operation.

The same dollars used to subsidize state, local government, tribal, and private investment in renewable energy, energy efficiency, and building weatherization would go even further.

Infrastructure choices like this tell us a lot about who we are as a people and where we are going.

They also tell us about our leadership. It will be interesting to see how our congressional delegation, all Democrats, come down on this. "Green jobs," or plutonium palace? There is only so much money that can be wrung out of households. Choices have to be made.

Our Democrats should be under no illusions about the CMRR. The hawks on the recent Perry Commission certainly know exactly what it's for: building new-design warheads, rapidly. That's why it's their highest-priority warhead infrastructure project. It's the bellwether of the whole and they know it. It's not at all required to maintain even a very large arsenal of existing warheads for the indefinite future, as sad an outcome as that would be.

Los Alamos already *has* a modern plutonium facility, a quarter of which is occupied by a pit production line, largely idle. This large facility has been continuously maintained; NNSA is requesting hundreds of millions to upgrade it.

There is also a plutonium facility at Lawrence Livermore, bigger than the planned CMRR and soon to be mothballed as a high-security lab. All talk of making more pits is madness, of course.

The *Journal* mistakenly called Obama's nuclear weapons plan a "budget-cutting proposal." It's not. Obama would grow NNSA's budget by 9% next year, a big increase. Most of that growth is in nuclear nonproliferation, which would rise by 36%. Nuclear weapon spending is flat.

For five years the House of Representatives has been saying this building and its rationale were not ready for prime time. NNSA now agrees.

We should rejoice at this baby step. The CMRR Nuclear Facility would harm, not help, national security.

Appendix B: FY2010 Congressional Markup Language

1. The CMRR in FY2010 Committee Markups

House Authorization: $55 M

(The Committee made no comments beyond the dollars authorized.)[143]

Senate Authorization: $35 M

> The committee recommends a decrease of $20.0 million in the Chemistry and Metallurgy Facility Replacement project (CMRR), Project 04–D–125, at the Los Alamos National Laboratory as a result of uncertainty in the design of the CMRR. The committee notes that the certification required to be made by the Defense Nuclear Facility Safety Board (DNFSB) and the National Nuclear Security Administration has not been made. The committee continues to believe that replacing the existing facility is essential but the CMRR has significant unresolved issues including the appropriate size of the facility. Some of these decisions will not be made until the Nuclear Posture Review is completed at the end of the year. The CMRR is one of two projects that the DNFSB has identified as having significant unresolved safety issues. These issues are associated with the project's safety-related systems. Until such time as the safety basis documents are completed, the outstanding issues cannot be resolved. CMRR will be a category I facility supporting pit operations in building PF–4 and has a preliminary cost estimate of $2.6 billion. As stated last year the committee continues to support reconstitution of the pit manufacturing capability in PF–4 but urges that all safety issues with CMRR be resolved as soon as possible. If there is any change in the planned mission at CMRR, the committee directs the Secretary of Energy to notify the congressional defense committees.[144]

House Appropriations: $55 M

> The Administration has described the need for two major new facilities in the weapons complex: the Uranium Processing Facility (UPF) at Y–12 Complex, and the plutonium capabilities of the Chemistry and Metallurgy Research Replacement (CMRR) facility at Los Alamos National Laboratory. The tightly constrained budget does not permit construction of both simultaneously, and the request funds both programs at sustainment levels pending a decision on prioritization. The Committee commends NNSA for its now completed ultra-secure design of the Highly Enriched Uranium Materials Facility, and notes that UPF is planned to incorporate the same security standards. For this reason as well as its uranium downblending nonproliferation benefits, the Committee's recommendation includes $101,470,000 for UPF, $49,992,000 above the request, to achieve Critical Decision 2, and to fund the procurement of long-lead items if necessary. The Committee's recommendation includes $55,000,000, the same as

[143] House Report 111-166. At http://thomas.loc.gov/cgi-bin/cpquery/R?cp111:FLD010:@1(hr166).

[144] Senate Report 111-35. At http://thomas.loc.gov/cgi-bin/cpquery/R?cp111:FLD010:@1(sr035).

the request, for CMRR; these funds are recommended only for the Radiological Laboratory/Utility/Office Building and the ongoing design of CMRR–NF.[145]

Senate Appropriations: $98 M

The Committee has restored funding to support the design effort and to minimize job losses associated with the Chemistry and Metallurgy Research Replacement facility at Los Alamos and the Uranium Process Facility at Y–12. The facilities replace aging facilities which pose a serious threat to worker health and safety and have been recommended to be closed by the Defense Nuclear Facilities Safety Board. The Committee urges the NNSA to continue the design efforts to develop appropriately sized facilities to support the mission needs.…The Committee recommends $98,000,000 to keep the Radiological laboratory completion and equipment installation on schedule and to sustain design efforts of the nuclear facility.[146]

[145] House Report 111-203. At http://thomas.loc.gov/cgi-bin/cpquery/R?cp111:FLD010:@1(hr203).

[146] Senate Report 111-45. At http://thomas.loc.gov/cgi-bin/cpquery/R?cp111:FLD010:@1(sr045).