Los Alamos Study Group

Nuclear Disarmament • Environmental Protection • Social Justice • Economic Sustainability

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CMRR Project Primer: Executive Summary

The National Nuclear Security Administration (NNSA) and Congress are currently weighing whether, at what pace and scale and with what capabilities, to build two proposed large warhead component production facilities, one at Los Alamos National Laboratory (LANL) and the other at the Y-12 National Security Complex in Tennessee. The capital cost of these facilities is expected to exceed $7 billion (B) exclusive of supporting facilities.

The LANL facility is called the Chemistry and Metallurgy Research Replacement Nuclear Facility (CMRR-NF). The CMRR-NF is expected to cost at least $3.4 B, according to the latest estimates, including a contingency of $728 million (M). This would bring the cost to roughly ten times that of the first CMRR building, the Radiological Laboratory, Utility, and Office Building (RLUOB).

The Y-12 facility is called the Uranium Processing Facility (UPF) and is expected to cost in the neighborhood of $3 B, not counting additional budget increases.

A decision to begin the first phase of CMRR-NF construction may be made in 2011, at least a year prior to the first date when a budget-quality cost and schedule baseline may finally become available. The critical decision process for CMRR-NF is currently being parceled into several subprojects which are to be designed, approved, funded, and tracked separately and on distinct timelines. The CMRR-NF is now in its seventh year of conceptual and preliminary design.

According to NNSA the primary purpose of the CMRR project is to augment LANL's existing design and production capacity for plutonium warhead components, called "pits." The cognizant congressional committees and independent congressional agencies have consistently understood the purpose of CMRR in exactly the same way.

According to the Department of Energy (DOE) Secretary of Energy Advisory Board (SEAB), reliable senior anonymous informants, and NNSA's own background analysis, the potential steady-state pit production capacity of LANL with the CMRR-NF equals or even exceeds the 125 pit/year capacity once proposed for the Modern Pit Facility (MPF). The physical size of LANL's new and upgraded plutonium pit facilities, including CMRR-NF, would exceed those planned for MPF. The MPF was in many ways a conceptual forerunner of the CMRR, but was associated with programs like the Reliable Replacement Warhead (RRW) that did not gain congressional backing at the time.

Commonly-communicated pit production rate limits are not based on physical limitations but rather on a current suite of administrative, managerial, and regulatory decisions that are flexible to varying degrees with respect to changes in national policy.

Pit production involves a number of steps, material processes, and components. There is no need for all these to take place in the same geographic site, or the same building. Only three of approximately twenty-five pit components require manufacture or assembly in a plutonium facility. Thus the full latent capacity of any pit production facility engages capacities elsewhere, the involvement of which is a matter of policy and perceived need.

Pit production is the rate-limiting step for new-pit primaries and the resulting new-pit warheads, whether those pits are new copies of existing certified types, or altogether new types. CMRR-NF is pivotal to prompt, rapid pit production and hence to stockpile innovation. It is being designed for flexibility.

As examined in greater detail in a companion paper, ("U.S. Plutonium 'Pit' Production: Additional Facilities, Production Restart are Unnecessary, Costly and Provocative," there is no compelling reason to produce additional copies of current pit types, and none is expected. CMRR-NF is not needed to maintain the safety, security, or reliability of the present stockpile.

Augmented pit production activities have foreign policy implications. When viewed from the perspectives of the smaller nuclear weapon states, or from the perspectives of non-nuclear weapon states, the expanded LANL plutonium complex with CMRR as its flagship would appear to enable a massive production capacity for novel warheads.

Over the past seven years congressional discussion of CMRR-NF has waxed and waned. The House has generally been less comfortable with the project and attempted to halt or delay it for five years, pending the completion of a new Nuclear Posture Review, stockpile plan, and overall infrastructure plan. The first of these was released on April 6, 2010, and the other two are expected to be released this month (May, 2010).

While Congress is generally supportive of infrastructure modernization, there is growing awareness and unease concerning NNSA's ambition to attempt several simultaneous (and in some cases interdependent) multi- billion-dollar initiatives, including CMRR.

From its name the CMRR would appear to provide a new home for missions currently housed in LANL's Chemistry and Metallurgy Research (CMR) building. Such a conclusion is only partially correct. It is more accurate to say CMRR is a "replacement" for CMR's role in NNSA's aspirations for LANL. It is possible that at least one wing of CMR may be retained.

CMRR's capabilities 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.

NNSA has never provided an objective, let alone an external, study of mission need justifying the CMRR project and especially its expensive CMRR-NF component. Such a study is especially critical today, following the tremendous cost increases the project has experienced, largely due to changing performance requirements and a very challenging geographic setting.

The 130,000 sq. ft. RLUOB, which is to have 26 separable radiological laboratory modules totaling 19,500 sq. ft. and which is to include offices for 350 staff plus meeting spaces, training facilities, an emergency response center and a utility core for both CMRR buildings, is expected to be completed and ready for use at the end of fiscal year (FY) 2013. Its overall cost is expected to be in vicinity of $363 M. Glovebox procurement has been the rate-limiting factor in project completion during the latter stages.

NNSA has prepared at least two backup strategies for the event CMRR-NF was not built or was delayed. In 2007 LANL proposed to reconfigure a wing of its existing plutonium facility to accommodate those analytical chemistry capabilities needed for pit production which could not be conducted in the CMRR RLUOB. In early 2009, LANL proposed upgrading the CMRR RLUOB to a Hazard Category II nuclear facility in the event CMRR-NF was significantly delayed (a plan which may or may not be feasible), as well as improving management of its existing plutonium vaults. For added measure, the current NNSA budget request notes that D&D (Decommissioning and Decontamination) the CMR building will not begin before FY2020, so there will still be a place to work if the CMRR-NF is canceled or delayed. NNSA has considered adding structural reinforcements, including buttresses, to CMR, which experienced hundreds of millions of dollars in renovations in the 1990s.

The 270,000 sq. ft. Security Hazard I/Hazard Category (HazCat) II CMRR-NF would, if built, 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. Lab space is to be 8% of the total floor space in the building. The six metric-ton vault (roughly tripling LANL's present capacity), miscellaneous space, and space for large vessel handling bring the total programmatic space in CMRR-NF up to about 14% of the total.

Current estimated unit cost of this space is about $126,000 per sq. ft., up from the $89,000 per sq. ft. estimated in 2008. This unit cost is, in constant dollars, a factor of 36 greater than Building PF-4 LANL's existing plutonium facility. The 59,600 sq.-ft. PF-4 was completed in 1978 for a total cost of just $75 M, and is apparently considered structurally sound even by today's far more demanding seismic requirements.

The seismic safety issues that have bedeviled CMRR-NF design, and the delays in resolving them with the approval of the Defense Nuclear Facilities Safety Board (DNFSB), have reflected unfavorably on the planning process that led to such surprises. The risks of major seismic events at the building location were "unofficially" known for some years prior to being adequately weighed and incorporated into planning. Now, an addition requirement of 225,000 cubic yards of "lean concrete" to be installed beneath the building, beginning at a depth of 125 ft below the surface, has bloated the budget and complicated construction logistics to deal with a problem that has never been more than provisionally resolved. The potential consequences of a severe earthquake

occurring at the site of the nation's primary plutonium processing facility remains one of the main reasons to cancel the plan altogether.

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 FY2011, even before subsequent project stages are designed and approved. Given past history and future uncertainties, NNSA's current projection of finishing construction in the FY 2022 timeframe can only be considered tentative.

Larger-scale plutonium pit production may also require replacement of other LANL facilities, measures not yet requested by NNSA. Building 0066 in TA-3, the Sigma Complex, is in poor condition and did not meet seismic requirements even in 1997. It is the location where most pit components have been produced up to now.

The CMRR-NF is being managed as a concurrent "design/build" project, an ambitious approach for such a complex and unique facility. The U.S. has not successfully completed construction and subsequent operation of a new, large plutonium facility since 1978. There is considerable management risk in the present approach and a fresh look at the project is badly needed.