

October 22, 1996

The Honorable Hazel O'Leary
Secretary of Energy
1000 Independence Ave. SW
Washington, DC 20585

Re: The report on DOE's capability to remanufacture plutonium pits that is required by the FY1997 Defense Authorization Act conference report

Dear Secretary O'Leary:

In the conference committee report to the FY 1997 Defense Authorization Act, at Subtitle D, §3151, the Department of Energy (DOE) is required to submit to the congressional defense committees "a report on plans for achieving the capability to produce and remanufacture plutonium pits" not later than 60 days after enactment. Our best information is that President Clinton signed this bill into law on September 23, making this report due on or about November 22.

The purpose of this letter is to suggest some questions we believe should be answered in the unclassified portion of this report. These questions are listed below with very short commentaries. More details are provided in the attached discussion.

1. What *scale* of pit remanufacturing capacity is needed, *when* is it needed, and precisely *why* is this scale needed at that time?

a. Is there any reliability-based reason to begin replacing the pits in existing weapons, whether deployed or reserve, in the next decade or two?

Dr. Paul Cunningham, Director of the Nuclear Materials Technology Program at Los Alamos National Laboratory (LANL) official has told us that LANL has found no aging phenomena which would significantly decrease pit performance in the first few decades of pit life, assuming there are no design errors or manufacturing defects. If this is the case, then maintaining the reliability of existing weapons is no reason for urgent investment in pit-producing capacity.

b. Is there any safety-based reason to begin replacing the pits in existing weapons, whether deployed or reserve, in the next decade or two?

Our analysis (attached) shows that changing pits to "increase safety" is highly likely to *decrease* safety, not to mention reliability.

c. Is there any reason to increase the stockpile of pits of existing types?

Manufacturing capacity to increase the size of the U.S. arsenal can be acquired in a timely fashion when it is needed, if ever. At present there is no rational national security justification for such action.

d. Is there any reason to modify pits or make ones of new types?

The JASONs have repeatedly warned DOE against modifying the nuclear components of weapons, especially pits, for reasons of conserving reliability. The President has publicly upheld the Bush Administration policy not to build new types of weapons. Yet a modified weapon with significant new military capabilities (the B61-11) is about to be deployed.

We believe a clear and unambiguous policy is needed that will preclude design changes to "physics packages" and to weapons' military characteristics--with the sole exception of changes made to non-nuclear components for the purpose of maintaining or improving safety and security.

e. What are the reliability risks, economic costs, and the environmental, safety, and health liabilities of modifying the U.S. arsenal, and in particular pits?

These costs are significant in every category, but are as yet largely unquantified. The choice to deploy an evolving arsenal, versus a stable one, has vastly different future costs, institutional relationships, and capital investments.

2. What is the current baseline capacity to produce pits?

LANL has or will soon have both the capability and some capacity to make pits, prior to any line-item investment.

3. How would currently-planned construction at LANL augment that capacity?

Planned construction at LANL related to nuclear materials manufacturing exceeds \$500M. What pit-making capacity is implied by the combined full use, after upgrades, of TA-55/PF-4, the CMR Building, the Sigma Complex, the Main Shops, the Nuclear Materials Storage Facility, and all other related nuclear-materials-capable facilities at LANL? We believe that with modular processes, based on net-shape or near-net-shape casting, the three-shift manufacturing capacity of LANL after these upgrades is much greater than has been represented by the Department, and that most of this planned construction is not necessary to maintain the safety and reliability of the arsenal.

4. What are the potential risks to U.S. arms control and nonproliferation objectives of acquiring additional pit remanufacturing capacity?

We believe these risks are significant and merit careful, independent study prior to proceeding. The risks of modifying the arsenal are especially great; such modifications cannot remain secret if they are to deter.

Thank you for your attention to this important issue and the favor of your reply.

Sincerely,

Greg Mello, Executive Director

Two Attachments

cc: Paul Cunningham, LANL; Tom Todd, DOE/LAAO; Vic Reis, DOE/DP-1

Attachment to Letter to Secretary O'Leary from the Los Alamos Study Group
October 22, 1996
Discussion of Pit Remanufacturing Report Required by Congress

1. Establishing unneeded pit manufacturing capacity is costly and could damage U.S. arms control and nonproliferation efforts.

If all related capital projects are counted, the aggregate facilities investment now planned for improving pit manufacturing capacity and related infrastructure at LANL will be found to lie somewhere between \$500M and \$1B. This does not count the annual program costs, the waste management costs, and the environmental, safety, and health liabilities, all of which are considerable. Many of these costs have not been included in the Department's analysis of its stockpile management alternatives or its environmental analyses.

In addition there will be significant national security costs to pit-making investments, which will impact U.S. arms control and nonproliferation efforts to an unknown degree. These large, long-term investments will, for example, conflict with U.S. commitments under Article VI of the Nuclear Nonproliferation Treaty (NPT), our compliance with which is already a subject of contention among non-nuclear weapon states.

Controversy on this subject is expected in 1997, as an international conference on NPT compliance will occur in New York this spring, not long after the report that is the subject of this letter will have been completed and the related Record of Decision (ROD) for the stockpile stewardship and management (SS&M) programmatic environmental impact statement (PEIS) will have been filed. The Department will at that time may also be struggling with controversy over its proposed program of subcritical tests, as well as over production and deployment of the first new nuclear military capability to be added since signing the comprehensive test ban, the B61-11, not to mention over other projects.

Large investments in new pit production capacity could likewise impact arms reductions among the nuclear weapon states, including our bilateral reductions with Russia, in unpredictable and unpleasant ways. Concurrent impediments to U.S.-Russian arms reductions include the proposed NATO expansion to the Russian border, U.S. ballistic missile defense plans, and the cost to Russia of implementing START II. To these strains must be added asymmetries in stockpile stewardship funds and equipment, the proposed U.S. subcritical tests, the planned use of Pu-242 for high-fidelity hydrotesting, and many others, some of which will damage nuclear diplomacy with other nuclear states as well.

Assuming these strains are not fatal, current trends suggest that further arms control treaties may well decrease both the number and kinds of pits (both active and reserve) in the stockpile. Thus premature or excessive investment in pit-making capacity is likely to create unneeded facilities that have avoidable costs, some predictable and some unpredictable, in all the above categories. As you well know, DOE has consistently lagged behind world events in planning for stockpile management activities, requiring two complete re-writes of its reconfiguration (now SS&M) PEIS.

For all these reasons, excessive pit manufacturing capacity should be avoided by a careful analysis of the required timing and scale for pit production, as suggested in our questions

above. That analysis should be presented in this report.

2. We can find no urgent need to remanufacture pits now.

There are three possible reasons to make pits, the combined salience of which will determine the urgency and scale of the Department's pit-making investment in the next few years. The first is to replace those types of pits that have or may become unreliable in the next decade or two; the second is to increase, now or in the near future, the stockpile of certain pits; and the third is to create the capability to make pits of modified or new design. Let's look at these one at a time.

a. We know of no urgent reliability reason to replace existing pits.

As noted above, the relevant senior LANL manager has told us that LANL has found no aging phenomena which could cause pits to become unreliable over the next few decades, provided they were designed and manufactured correctly. To our knowledge, there is at present no unclassified discussion of these findings. Your report to Congress should include such a discussion. At the present time, our best information is that there is no current requirement to make pits in order to maintain a reliable arsenal of existing types and quantities of nuclear weapons, and no such requirement is expected soon.

b. There is no reason to increase the stockpile of pits of existing types.

What valid national security purpose could be served by increasing the stockpile of pits particular existing types, given that the United States is already planning to retain more than twice the number of warheads and bombs that we can actually deploy under START II, plus thousands of pits from dismantled weapons?

To mention one possible specific case, what national security need--what improvement to deterrence--would justify making W88 warheads for deployment while necessarily retiring an equal number of W76 warheads? The national security cost of such an action would be likely to exceed any putative benefit.

The mere replacement of pits (e.g W88s) dismantled for surveillance purposes does not require investment in new facilities. Our best information is that existing facilities at LANL are or soon will be more than adequate for this purpose, without line-item construction.

c. Modifying pits or making ones of new types for any reason will, according to DOE's advisors, incur reliability costs that will degrade confidence in the stockpile.

It is the third justification for urgently making pits which could be the most confusing to the Department, namely, the "need" to make pits in order to replace existing pits with others of modified or new design.

The Department's advisors have strictly warned against such actions. While generally supporting the Department's proposed science-based stockpile stewardship program, the

JASONS wrote in their November 1994 report¹ to DOE:

...the primary--if not the sole--nuclear weapons manufacturing capacity that must be provided for in an era of no nuclear testing is the remanufacture of copies of existing (tested) stockpile weapons...the ultimate goal should be to retain the capability of remanufacturing SNM [special nuclear material] components that are as identical as possible to those of the original manufacturing process and not to "improve" those components. This is especially important for pits...(p. 81, emphasis added)

The JASONS conclude their chapter on special nuclear material by saying that

[W]e see the SNM manufacturing component of the stewardship program as a narrowly defined, sharply focused engineering and manufacturing curatorship program. (p. 85)

¹Science Based Stockpile Stewardship, Sidney Drell, et. al., JASON, The MITRE Corporation, McLean, Virginia.

It is this as-identical-as-possible approach which became the unambiguous recommendation of the 1995 JASON report², whose authors included senior primary designers from both Livermore and Los Alamos. The first conclusion of that report said:

The United States can, today, have high confidence in the safety, reliability, and performance margins of the nuclear weapons that are designated to remain in the enduring stockpile. This confidence is based on understanding gained from 50 years of experience and analysis of more than 1000 nuclear tests, including the results of approximately 150 nuclear tests of modern weapon types in the past 20 years.

In arriving at their subsequent conclusions, the JASONs relied on three key assumptions:

1. The U.S. intends to maintain a credible nuclear deterrent.
2. The U.S. remains committed to the support of world-wide nonproliferation efforts.
3. The U.S. will not encounter new military or political circumstances in the future that cause it to abandon the current policy--first announced by President Bush in 1992--of not developing any new nuclear weapon designs.

Their Conclusion 3 is relevant:

The individual weapon types in the enduring stockpile have a range of performance margins, all of which we judge to be adequate at this time. In each case we have identified opportunities for further enhancing their performance margins by means that are straightforward and can be incorporated with deliberate speed during scheduled maintenance or remanufacturing activities. However greatest care in the form of self-discipline will be required to avoid system modifications, even if aimed at "improvements," which may compromise reliability. (emphasis added)

Donald McCoy, Director of Nuclear Weapons Physics and Evaluation at LANL, lent weight to these concerns in a recent interview.

The question we're trying to answer is, if you get 30 or 40 years out in time, and I keep replacing components...at some point I may have lowered confidence after I've changed the component five times. (Inside the Pentagon, August 15, 1996)

McCoy believes that changing at least some components is inevitable and necessary. This conclusion has been disputed by many authorities, especially in the strong form in which

²Nuclear Testing (unclassified Summary and Conclusions), Sidney Drell et. al., JASON, The MITRE Corporation, McLean, Virginia.

lab spokespersons present it. In any case, none of the reasons tendered for changing components (e.g materials becoming unavailable, new safety and environmental regulations) apply to pits. There is no imperative to change pits. In fact the reverse is true: there is an imperative to not change pits.

At the present time there are studies underway directed at redesigning certain nuclear weapon primaries to make them "safer." As we have shown in the attached paper, there will be no net safety improvement from this substitution, should it be carried out, and instead there will likely be a decrement to overall safety.³ "Safety" justifications for primary redesign and remanufacturing appear to have no rational basis.

3. Overall, the activities in the stockpile stewardship and management program related to the U.S. nuclear weapons should be conducted to assure the continuing safety and reliability of existing weapon designs, and for no other purpose.

If this policy were to be adopted, it would greatly clarify the requirements for pit manufacture, among other benefits.

Under this policy, we would retain and deploy only those stockpile weapons which have been fully tested in their actual military stockpile configuration, acknowledging that attempted "improvements" to the physics packages for the sake of increased robustness or safety, or for any other purpose, may degrade confidence. Inadequately tested designs have been the principle cause of historic problems in the stockpile and should be scrupulously avoided. This would preclude repackaging nuclear explosives into new warhead or bomb configurations, the development of new untested designs, as well as the modification of existing physics packages for any purpose whatsoever.

In sum, we believe that there should be no design changes to the nuclear components--the "physics packages"--of weapons in the U.S. stockpile. Neither should there be changes to the military characteristics of weapons, except as regards those safety and security characteristics which can be implemented without modification of the physics packages.

4. The Department has not clarified the current pit manufacturing capacity or the degree to which this capacity could be increased using existing facilities.

The Department distinguishes "capability" and "capacity" in pit remanufacture. In fact, "capability" always implies a minimum level of "capacity."

³. "Nuclear Weapons Safety: No Design Changes Are Warranted," July, 1995, Greg Mello for Tri-Valley CAREs, Livermore, CA.

LANL has always had and still has the capability to make prototype pits--pits that have apparently been indistinguishable or nearly so from war reserve pits in nuclear tests.⁴ It is our understanding that LANL will soon have, prior to any line-item construction, the facilities and equipment to allow at least some production of pits with "war reserve" quality assurance as well.

The decision to make those pits at LANL has not, to our knowledge, been formally made by the Department. What, then, is the current or soon-to-be-in-place capacity to make pits at LANL?

It may well be possible, provided that pits in the stockpile were not modified or increased in number, that this existing capacity would be adequate to satisfy stockpile requirements. If this is not the case, the Department should clarify exactly which requirements would not be satisfied, i.e. whether it is the deployed, the hedge, the reserve, or all three arsenals which cannot be maintained with existing capacity.

Augmenting current capacity would occur in two steps. The first step, by far the more costly and time-consuming, would involve upgrading facilities, with the second step being the actual installation of modular production gloveboxes and related equipment. This increase in capacity is apparently misunderstood by the relevant congressional committees to be "achieving the capability to produce and manufacture plutonium pits." Clearly these improvements would create additional capacity for pit production, but do not achieve capability, which already exists.

What is the full capacity of existing facilities at the LANL site, after planned upgrades, for pit production? Could the stockpile be maintained without some or all of the planned upgrades, e.g. without upgrade to the CMR Building? If not, exactly which part of the stockpile (deployed, hedge, or reserve) could not be so maintained?

5. The Department has never studied the arms control and nonproliferation risks of its SS&M program, and should do so prior to implementing the controversial features of that program, of which this is one.

⁴. See Ray Kidder, 1987, "Maintaining the U.S. Stockpile of Nuclear Weapons During a Low-Threshold or Comprehensive Test Ban," UCRL-53820, p. 6:

Clearly, this impressive record [of nuclear tests of primaries; see Kidder's appendices] would not have been possible if U.S. nuclear weapons were not comfortably tolerant of the small variations in materials and manufacturing that accompany any practical production process. This is particularly well illustrated by the excellent performance of the new primary designs the very first time they were tested. It is also illustrated by the results of the SCTs [stockpile confidence tests].

The units tested in these SCTs differed from those previously tested in that they were production-line units [made at Rocky Flats] as opposed to final development preproduction units [presumably made at each of the labs]. The difference between them evidently had little or no effect, with only one exception, on their performance.

This request has been repeated to the DOE in a number of forums by many organizations and individuals. Recent events in Geneva and New York have upheld the thesis that other states can and will politically use the robust U.S. SS&M program to advance their own nuclear interests, or as a reason to avoid, postpone, or bid up the diplomatic cost of these nations' full support of U.S. nonproliferation objectives.

These nonproliferation objectives have much more to do with U.S. national security than any putative increase in nuclear military capabilities gained by having such an unnecessarily robust SS&M program. It appears to us that most of these robust capabilities are necessary not to allow recertification and remanufacture of existing U.S. weapons and their components--a relatively easy task--but to provide the ability to certify and manufacture modified or new weapons under a comprehensive test ban. This is a policy that offers decreased reliability, increased costs of every type, as well as increased arms control and nonproliferation risks. We urge you to study these costs carefully, and choose instead a more conservative program--the one recommended on two occasions by the JASON panels.