ISSUES ONLINE IN SCIENCE AND TECHNOLOGY

A Publication of
National Academy of Sciences
National Academy of Engineering
Institute of Medicine
University of Texas at Dallas

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The Stockpile Stewardship Charade

The U.S. program to maintain the reliability of the nuclear arsenal is masking an effort to design new nuclear weapons.

By signing the Nuclear Non-Proliferation Treaty (NPT) in 1968, the United States promised to pursue good-faith negotiations "leading to cessation of the nuclear arms race at an early date and to nuclear disarmament." Instead of abiding by this promise, the United States has undertaken a "stockpile stewardship" program that is primarily aimed at subverting both parts of this commitment. More than half of the Department of Energy's (DOE's) proposed $4.53 billion FY 2000 stockpile stewardship budget would be spent on nuclear weapons design-related research, on basic nuclear weapons physics research that goes far beyond the needs of maintaining the existing stockpile, and on nuclear weapons production programs. Mixed into the current stockpile stewardship budget are not just programs to monitor and maintain our nuclear stockpile but also jobs programs for the nuclear weapons labs and production facilities. The budget also reflects programmatic responses to ideology and paranoia stemming from fears that Russia will secretly break out of any nuclear arms agreement or that the United States will be less of a superpower without nuclear arms. It is time to separate the programs required for genuine stewardship from those directed toward other ends.

By reducing nuclear forces to START II levels and removing unnecessary parts of the stockpile stewardship program, the United States could save about $2.6 billion per year while substantially reducing Department of Defense (DOD) strategic weapons costs. No significant change in defense policy would be needed, just the cutting of a number of controversial programs whose justification is weak and whose funding depends on their inclusion in the amorphous program that has become stockpile stewardship. The cuts we suggest would be an important first step in restoring some rigor to the

stewardship program while simultaneously removing parts of it that could trigger another nuclear arms race with its attendant costs and dangers.

Political payoff

In 1992, the United States began a nuclear testing moratorium that foes and supporters alike thought might be a precursor to a Comprehensive Test Ban Treaty (CTBT). With no way to test their designs, the three nuclear weapons laboratories-Los Alamos National Laboratory and Sandia National Laboratories in New Mexico and Lawrence Livermore National Laboratory in California-faced a sudden lack of demand for their services. Elsewhere in the DOE weapons production complex, the absence of new work, together with reductions in the numbers of deployed weapons, led to an initial phase of consolidation and downsizing. The Nevada Test Site also had no immediate mission and was threatened with eventual closure.

These facilities had two options to avoid significant downsizing or shutdown: embrace conversion to civilian missions, with uncertain prospects for success, or develop and sell a new rationale for their old mission. DOE, the facilities, and their congressional champions chose the latter course, devising the stockpile stewardship program.

Little about the program was conceived on the basis of strictly technical requirements. With its scale and scope both directed toward continued nuclear weapons development and design, its creation essentially constituted a political payoff aimed at ending decades of successful resistance to a CTBT by the nuclear labs. The stewardship program provided the labs with guaranteed growth in funding and long-term employment stability. New and entirely artificial technological "challenges" that had no technical connection with maintaining nuclear weapons were created to rationalize this new policy. Maintaining the vitality of this large enterprise became a goal in itself.

Meanwhile, DOE's public rationale for the program stressed the need to monitor the existing nuclear weapons stockpile and precisely predict age-related weapons problems. It was assumed that problems would require weapons redesign and certification of the new designs without nuclear testing.

Genuine stewardship should instead be defined as curatorship of the existing stockpile coupled with limited remanufacturing to solve any problems that might be discovered. Although few would argue with such a practical program, the preferences in DOE's budgets are instead for activities that provide, according to DOE, for "preproduction

design and engineering activities including initial design and development of all new weapon designs...the design and development of weapon modifications...studies and research to apply basic science to weapon problems producing new technologies...[and] re-instituting the war reserve pit production capability that has not existed since production activities ceased at the Rocky Flats Plant."

Much of this work is directed at designing new or modified weapons in the absence of any safety or reliability problems in the existing arsenal or toward developing the capability to do so in the near future. With a reasonable curatorship and remanufacturing approach, there would be no need for huge new weapons science programs, just as there is no need to modify weapons and design new ones. Thus, substantial savings are possible in this part of the budget without affecting the legitimate aspects of stockpile stewardship.

By 1995, the test ban had become one of the formal promises made by the nuclear weapon states in their successful bid to indefinitely renew the NPT. Thus, any failure to achieve a CTBT would for the first time directly threaten the survival of the world's nonproliferation regime. Without the substantial payoffs represented by the stockpile stewardship program, the labs would likely be able to undercut the treaty as they had done in the past. Their acquiescence was bought behind closed doors with a 10-year promise of $4.5 billion annually for the nuclear labs and plants.

The CTBT was signed in 1996; its ratification is still pending and uncertain. But the agreement with the labs reversed an eight-year decline in lab budgets. Since then, as budgets have increased, the stewardship program has drained the arms control content from the treaty by providing the impetus and funding for what arguably will soon be far greater design capabilities than existed before the treaty was signed.

The $4.5 billion price tag was a substantial increase over average Cold War funding levels for comparable activities. This increase was possible because policymakers heard no knowledgeable peer review of the program, elected representatives from states with nuclear facilities held leadership roles on key committees in both houses of Congress, and nongovernmental arms controllers largely tolerated the bargain in order to win support for the CTBT.

Originally, the stewardship program was centered almost completely at the labs. But three remaining production plants-the Savannah River Site in South Carolina, the Kansas City Plant in Missouri, and the Y-12 Plant in Tennessee-quickly joined in to help broaden the program. For them, as for the labs, the stockpile stewardship program provides workforce

stability and new capital investment. DOE had realized that without congressional support from states with production plants, it might not be possible to fund the entire program in the out-years or to deflect criticism from the nuclear weapons enterprise as a whole. Said one knowledgeable insider: "DOE realized that by themselves the labs could not pull the train."

Our detailed review shows that even if a very large nuclear arsenal were to be retained, over half the stockpile stewardship budget could be saved or redirected. This view is not new; U.S. Rep. George Brown (D-Calif.), then chair of the House Science Committee, made a similar proposal to DOE in 1992. Since then, many nongovernmental organizations and a few individuals within the weapons establishment itself have expressed similar views. This school of thought is now quietly accepted in many more quarters than one might imagine. As a Democratic Senate staffer told one of us, "Yes, the budget for NTS (Nevada Test Site) and the National Ignition Facility should be zero, but this senator is not going to get in the way of the CTBT."

How DOE justifies the program

The primary technical justification for the excess costs in DOE's program is the agency's attempt to create the capability to design and certify new weapons without nuclear testing. Yet the idea that nuclear deterrence requires new weapons is on its face implausible. There is also growing recognition that by continuing the nuclear arms race virtually alone, the United States will suffer significant political, economic, and military costs.

Why? Because the program as currently conceived and implemented provides many opportunities for the proliferation of detailed nuclear weapons knowledge. Its direction, scale, and scope substantially undercut U.S. compliance with the NPT's disarmament obligations. And its programs to refine the military capabilities of nuclear weapons systems violate the intent, if not in some cases the letter, of the CTBT itself. Already, India has cited the U.S. program as one justification for its own nuclear testing, and certain aspects of the program have been condemned in international forums, such as the European Parliament. Thus, dollar savings may be the smallest part of the benefits of right-sizing the stockpile stewardship budget.

The stewardship program constituted a political payoff to the weapons labs in return for their acquiescence to the CTBT.

Further, the untestable nuclear innovations expected to enter the stockpile as a result of the program are almost certain to undercut rather than maintain confidence in the U.S. stockpile. Such a result would serve to perpetuate the funding and influence of the labs and the production complex and would further the desires of those who support conducting underground nuclear tests to confirm weapons designs. To put it bluntly, the program is designed to undercut objective measures of reliability in favor of a subjective level of confidence that is the exclusive property of the weapons labs themselves, giving them an unprecedented grip on the levers of U.S. nuclear weapons policy.

DOE's FY 2000 budget request for "Weapons Activities," a $4.53-billion budget category that includes stockpile stewardship, program direction, and related expenses, would be $1.3 billion more than the FY 1995 appropriation of $3.2 billion, the post-Cold War low for nuclear weapons activities. By comparison, the Cold War-era annual average for roughly comparable activities was about $4 billion in 1999 dollars, and that figure also included waste management expenses that are not included in the stewardship budget today.

In theory, the stewardship budget is divided into many discrete funding lines. But in practice, at least at the laboratories, a variety of mechanisms are used to blur budget distinctions, a process aided by the vague funding line descriptions that DOE increasingly offers to congressional reviewers-for example, hundreds of millions of dollars at Los Alamos to "maintain infrastructure and plant." In addition, special-access "black" programs lie hidden in DOE's budget in vague or unrelated descriptions and commitments.

Some aspects of the stockpile stewardship mission are clearly necessary. For example, maintaining the existing stockpile and retaining a sufficient level of remanufacturing capability are preserved in the Enhanced Surveillance and parts of the Core Stockpile Management areas of the program's budget. However, the labs in particular have expanded most of the rest of the program into a funding source for a renewed design and production complex that will soon be able to make entirely new kinds of nuclear weapons as well as rapidly reconstitute a large arsenal. Much of this part of the stewardship program is simply a new name for the old "flywheel" programs at the labs: major weapons research activities so generously funded that they could support other research programs. These programs kept employment and activity levels high throughout the Cold War. Ten years after the end of the Cold War, unaccountable nuclear flywheel programs are both unnecessary and undesirable.

Today's stewardship program consumes vast resources without the debates and budget transparency that should accompany spending of this magnitude. This same political climate has also drained funding from the cleanup of DOE's decommissioned nuclear sites. Lack of debate is also forcing DOD to spend a significant amount of money on weapons it cannot use and that must soon be retired.

Realities of stewardship

Five realities of nuclear weapons stewardship should dictate the program's budget. First, after reviewing extensive historical and analytical data, the JASONS, DOE's top experts, concluded that all primaries (the fission stage of nuclear weapons, usually composed of a plutonium pit, neutron reflectors, and high explosives) in U.S. warheads are not only highly reliable now but will remain so for the foreseeable future through continuance of the existing surveillance programs and, if necessary, the reuse of spare plutonium pits. Current stockpile stewardship projects that would modify existing primaries will, if allowed to proceed, undercut this high level of confidence. Ultimate pit life is uncertain, but extensive studies conducted in the United States and elsewhere indicate that it is at least a half century. Current surveillance techniques will, according to DOE, uncover problems at least five years before a failure occurs.

Second, almost no reliability problems have been detected in the secondaries (the sealed components of a nuclear weapon that contains stable materials such as lithium hydride and uranium) needed for a thermonuclear explosion. No change is anticipated in this situation.

Third, all nuclear weapons components except the primaries and secondaries can be fully tested without detonation. Any problems that have occurred have always been fixed and can still be fixed using existing knowledge and DOE's capacity for remanufacturing, independent of the test ban.

Fourth, no nuclear safety risks have arisen or can arise because of the aging of pits and secondaries, because the materials involved are extremely stable.

Fifth, although testing was used to maintain the reliability of U.S. weapons before 1992, the labs, according to recently declassified information, considered reliability testing of stockpiled weapons unnecessary. Why, then, would a substitute system have to be devised today, unless its purpose was to design new nuclear weapons?

In addition to these facts, we believe that with or without START II, economic realities in the United States and Russia

will drive the total deployed stockpile sizes to about 4,500 weapons or less in both countries. This would allow the tritium (used in all modern primaries) in the decommissioned excess warheads to be reused. If the undeployable "hedge" arsenal (an additional stock of warheads retained in case Russia violates its arms reduction agreements) is also eliminated, the tritium in these warheads could also be reused. Thus, new production of tritium could be deferred for about 12 years.

Further excesses

Two cases deserve a more detailed discussion because of their scale, lack of relevance to the stockpile, and technical uncertainties: the National Ignition Facility (NIF) and the Accelerated Strategic Computing Initiative (ASCI). Both illustrate the programmatic and budgetary excesses that are typical of the stockpile stewardship program.

The NIF, a huge laser inertial confinement fusion (ICF) installation being built at Lawrence Livermore, will focus large amounts of energy onto small amounts of deuterium and tritium with the aim of achieving a small fusion explosion. The NIF will cost $1.2 billion to build and $128 million annually to operate. DOE claims that the NIF is needed to retain the skilled staff necessary to ensure that U.S. nuclear weapons will be safe and reliable. It is also promoting the NIF as a valuable tool for fusion energy research.

Yet there is no clear connection between inertial confinement fusion research and maintenance of the warheads in the stockpile. The argument that extensive ultra-high-power ICF experiments are needed to exercise the skills of weapons scientists is far less relevant to maintaining existing weapons than to retaining the capability to develop new ones. As Richard Garwin wrote in the November/December 1997 issue of Arms Control Today, only a portion of the NIF "is coupled directly to the stockpile stewardship task, and much of that portion has more to do with maintaining expertise and developing capabilities that would be useful in case the CTBT regime collapsed than with maintaining the enduring stockpile of the nine existing weapon designs safely and reliably for the indefinite future."

ICF facilities can be used in combination with other fusion research facilities to increase knowledge relevant to new types of nuclear weapons, including weapons that could lead to dangerous new arms races. For example, "pure" fusion weapon research, aimed at achieving a nuclear explosion without the use of plutonium or uranium, is now being actively pursued.

A vigorous ICF program also poses proliferation risks. ICF capability almost inevitably implies technical competence in many if not most aspects of nuclear weapons design. Knowledge about sophisticated ICF programs could be diffused through scientific publications and contacts and assistance from the U.S. labs themselves, thus expanding the number of nations with the technological base for a sophisticated nuclear weapons program.

NIF may not even work. As it turns out, the definition of "ignition" has quietly been changed, and the value of the facility without ignition is now stressed. Even as construction proceeds, serious scientific and engineering hurdles remain.

The NIF illustrates the programmatic and budgetary excesses that are typical of the stewardship program.

The NIF, with a life-cycle cost of $5 billion, would become the nation's largest big science project, a decision that should at least require a careful balancing of its scientific value against its costs, the probability of its technical success on its own terms, and the global proliferation issues it presents. Further, we are moving ahead in the absence of a national debate about either the proliferation dangers or the ICF's relative scientific value as compared to all the other research areas for which public money could be spent.

There are no easy explanations for this national lapse in attention, although one possibility is the continued unquestioning deference paid to nuclear weapons research. Allowing the nuclear labs to make nuclear policy has always been dangerous for democracy. It is inexcusable a decade after the end of the Cold War.

DOE created ASCI five years ago to give U.S. weapon makers the capability to design and virtually test new, refined, and modified nuclear warheads. DOE has requested more than $500 million for weapons computing costs in FY 2000, and costs are expected to grow to $754 million per year by FY 2003. To what end? All of today's nuclear weapons were designed by computers that would cost perhaps $10,000 today. Existing weapon designs do not need to be changed. The labs' claim that faster, more sophisticated computers are needed to maintain existing weapons is without foundation. No amount of computing power directed at determining the precise effect of an aging or cracked component will provide more confidence than simply replacing that component.

In 1992, a time of active nuclear weapons design and testing involving all three laboratories, the total number of weapons-related calculations was about five giga-operation years, equivalent to about five CRAY-YMP supercomputers running for a year. By FY 1999, the number of weapons-related calculations had increased by a factor of 1,400. In Explosive Alliances, an exposé of the ASCI program, Chris Paine and Matt McKinzie of the Natural Resources Defense Council argued that "DOE's strategy...us[es] ...test-qualified personnel in...a crash program to develop and validate new three dimensional simulation capabilities...[that] DOE hopes a new generation of U.S. designers-but no one else-will employ, ostensibly to optimize requirements for remanufacture...but more plausibly to implement future changes in nuclear explosive packages of stockpile weapons."

DOE's public justification for ASCI is based on the carefully crafted untruth that, as one senior weapons manager put it, "without ASCI, bombs will not work." DOE has adequate certification data on its current arsenal of weapons. More testing, real or virtual, would be necessary only if designs were changed or new weapons were developed. Even if ASCI were important, DOE's program already includes a triply redundant architecture, with individual state-of-the-art supercomputers for all three labs. And it aims at integrating production plants with the labs through computer-designed, just-in-time manufacturing techniques to produce newly designed nuclear weapon components and to allow on-demand production of "special" weapons.

None of these activities is required to maintain nuclear weapons that are already designed, tested, and certified. Existing computing resources can easily support the maintenance and continued certification of the nuclear arsenal. A new computing technology development and acquisition effort in combination with other new nuclear weapons experimental facilities creates a research complex that is far better suited to design and modify nuclear weapons than to maintain them.

Huge potential savings

U.S. national security is better served by preventing breakthroughs in nuclear weapons science than by fostering them. New weapons know-how will proliferate if developed. But if no new weapons are needed, current designs can be conserved by a relatively small scientific staff. Programs or technologies relevant only to new weapons design or to unneeded modifications, including those with new military capabilities, can then be cut. For the most part, only those programs and facilities needed for current modes of

surveillance, assessment, simulation, and certification of existing warhead types should be maintained.

By relying mainly on surveillance and remanufacturing of existing warhead designs and using original production processes wherever possible, a savings of about $2.6 billion could be realized in the current budget. We call this our Option A. Our calculations, which can only be outlined here, include a considerable margin of error by providing funding for a broader range of nuclear weapons experimental facilities than we believe are necessary for maintaining the existing arsenal. For example, because a large reduction in the stockpile size would likely lead to the closing of Lawrence Livermore National Laboratory, the remaining labs could be faced with additional infrastructure and capital costs. As a result, we have retained $40 million in general capital expenditures, despite the fact that the DOE budget request provides no explanation or detail for this expenditure. In addition, we conservatively assume that our Option B stockpile retains six of the nine weapon types in the Option A stockpile, despite a nearly 10-fold decrease in assumed stockpile size. And we have retained a limited number of hydrotests (experiments for studying mockups of nuclear weapon primaries during implosion) in order to maintain skill levels at Los Alamos National Laboratory, even though hydrotests are not necessary for certifying weapons already in the stockpile.

> The labs' claims that faster, more sophisticated computers are needed to maintain existing weapons is without foundation.

In addition to DOE costs associated with unnecessary parts of the stockpile stewardship program, the U.S. failure to abide by the NPT or even to reduce the strategic nuclear arsenal below START I levels has been very expensive for the Pentagon. Under our Option A, significant amounts of the $16 billion strategic nuclear weapons budget could be avoided if the United States simply reduced its arsenal to the number of warheads allowed under Start II. Further substantial savings to DOD's budget could be realized under our Options B and C, in which larger reductions in warhead levels would allow much greater budget reductions.

Option A: In addition to the $2.6 billion per year that could be saved by removing unnecessary parts of the stewardship program, reducing U.S. nuclear forces to START II levels could save taxpayers at least $800 million annually by 2003. The United States would still retain all 200 strategic bombers

currently in service; 500 land-based missiles [intercontinental ballistic missiles (ICBMs)]; and 10 Trident submarines, while retiring four Trident submarines ($700 million per year) and 50 ICBMs ($100 million per year.)

Option B: If the United States assumed long-term maintenance of an arsenal of 350 to 1,000 weapons, it could further cut DOE programs to take into account both a smaller absolute number of warheads and fewer warhead types, changes that reduce requirements for surveillance, evaluation, and remanufacturing capacity. Total stewardship program savings would be $2.8 billion per year. This level of warheads would allow the United States to retire all of its ICBMs while retaining 100 bombers and six Trident submarines. At a level of about 500 warheads, DOD would save about $4.9 billion per year. Further, if the United States were to cut the number of warheads to 350 and eliminate strategic bombers, DOD would save about $7.1 billion per year, although DOE's savings would remain at $2.8 billion per year.

Option C: If all nuclear weapons could be eliminated by 2015, aging issues would be unlikely to present significant problems, and ample supplies of most weapons components and materials, including tritium, would be available to sustain a rapidly diminishing arsenal. DOE would save about $3 billion per year. DOD would retain surveillance missions and programs related to treaty verification. Its total savings would be about $12 billion per year. The budgetary impacts of these four options are summarized in Table 1.

Table 1:
Total Savings From Cuts to DOE stockpile stewardship and DOD Programs

Alternative	DOE Savings	DOD Savings	Total Savings
Option A	$2.6 billion	$800 million	$3.4 billion
Option B	$2.8 billion	$4.9 billion	$7.7 billion
Option B-	$2.8 billion	$7.1 billion	$9.9 billion
Option C	$3.0 billion	$12.0 billion	$15.0 billion

The savings possible from any of the scenarios suggested here are substantial. With the exception of eliminating all warheads, none of these options need involve any significant change in the security posture or policies of the United States. Although we believe that significant changes in

nuclear posture, leading to the mutual and complete nuclear disarmament that our NPT treaty obligations require, would indeed be in our security interests, we have not discussed such changes here. Dropping to START II levels simply captures the economies that already exist. In fact, dropping to a 500-warhead level still retains a full nuclear deterrent, albeit at a lower level of mutual threat between the United States and its only nuclear rival, Russia, whose strategic arsenal is already rapidly declining to about these levels.

The debate our nation needs is one in which the marginal costs of excessive nuclear programs, as shown here, are compared with the considerable opportunity costs these funds represent, both in security programs and elsewhere. Nuclear weapon programs have received only cursory examination since the Cold War. We believe that by any reasonable measure, the benefits of these programs are now far exceeded by their costs, if indeed they have any benefits at all.

Recommended reading

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