National Academies Committee on International Security and Arms Control
Public Symposium

"Post-Cold War U.S. Nuclear Strategy:
A Search for Technical and Policy Common Ground"
August 11, 2004

Stockpile Stewardship and U.S. Nuclear Weapons Policy

Victor H. Reis

Stockpile stewardship is among the world's largest, multidisciplinary science and technology programs. It was started ten years ago, as part of a nuclear policy initiative – the Comprehensive Test Ban Treaty - and its success is a critical element in nuclear weapons policy now and in the future. Much as I would like to, I will not regale you with the remarkable scientific and technical successes of the Stockpile Stewardship Program – and they really are remarkable – but instead examine the interplay between stockpile stewardship and nuclear weapons policy. This interplay is particularly critical as we search for technical and policy common ground in the post-Cold War environment.

My thesis is that stockpile stewardship – science-based stockpile stewardship - is not only an integral part of many elements of nuclear weapons policy, but is in and of itself a critical element in U.S. nuclear strategy.

Let me start with a little personal history of how stockpile stewardship began.

Shortly after President Clinton assumed office in 1993, he directed that the interagency examine underground nuclear testing and the Comprehensive Test Ban Treaty (CTBT). You recall that the first President Bush approved some fifteen so-called "Hatfield compliant" tests prior to a moratorium on U.S. nuclear testing. These tests were constrained to investigating safety and reliability of weapons that were already in the stockpile. The position of the National Security Council and the Defense Department was that the number of tests be reduced to nine, whereas the Arms Control and Disarmament Agency and the President's Science Advisor were recommending an immediate cessation of testing. The Energy Secretary, Hazel O'Leary did not wish to take a formal position until she knew more about the subject, so she held a two-day workshop in June to help her understand the issues. Because I had been nominated for the position of Assistant Secretary of Energy for Defense Programs, and was at the time the Director of Defense Research and Engineering, I was invited to attend. After the workshop, Hazel asked me to send her a note expressing my views.

This is an excerpt from that note:

> In the far term the role of nuclear weapons in national security has yet, to my knowledge, to be defined, but it is prudent to assume that some stockpile of safe, secure nuclear weapons will be part of any future military arsenal. Again, it is even harder to imagine that a small number of "Hatfield compliant" tests, per se could be critical in shaping the future structure of that arsenal. For this longer picture, what is of concern is the health and vitality of the weapons laboratories. After all shaping the future is what we have them for.
>
> The most important measure of the state of any laboratory is the quality and quantity of technical talent of its staff. Attracting and retaining top lab talent requires challenging technical problems, stability of funding and flexibility of operations. It is clear that the original mission of the labs - designing new nuclear weapons - will be influenced by the lack of nuclear testing, but given the scale of the problem it is hard to argue that the testing program as envisioned could seriously impact the overall talent pool at the labs. Indeed one could make the opposing argument: the prospect of helping to define the nuclear future, and designing contingencies for that future - without nuclear tests - is a technical challenge worthy of our best minds.

Given the subject of today's symposia, I guess it is safe to say that we are still trying to reach consensus regarding the role of nuclear weapons in national security, but "helping to define the nuclear future, without nuclear tests" soon became the rationale of a new program - stockpile stewardship - when on July 4th of that year, President Clinton announced that the United States would declare a moratorium on nuclear testing and would actively seek a Comprehensive Test Ban Treaty. He directed the Departments of Energy and Defense to look at ways to maintain the nuclear deterrent without testing.

One approach suggested was to engage in a vigorous surveillance program and then to remanufacture the weapons in the stockpile to their original specifications. Given the state of the production complex – it was mostly closed or inoperative - the change in environmental regulations, and the uncertainty in future nuclear missions, trying to remanufacture current weapons to their original design specifications was deemed not feasible without a return to nuclear testing.

Instead, over the next two years, we organized a series of workshops and conferences with a wide variety of experts that helped define the stewardship program and its major elements. The key element of this program was that it should be "science based." "Science based" is not a slogan. It meant that the program would emphasize a deep understanding of all aspects of the nuclear weapon explosive process, including the effect of aging of materials, and supporting design and manufacturing. It would require a significant increase in laboratory capabilities: in materials science, hydrodynamics, simulation and high-density physics and as such would represent a significant challenge - and opportunity - to the scientists and engineers at the laboratories. By emphasizing nuclear weapon science, it could effectively assess and maintain the current stockpile, and also maintain a capability to return to testing, or indeed to design and build new weapons if such were required by future national leadership.

The science-based approach was codified in the summer of 1995, when after the French had resumed nuclear testing President Clinton announced that the United States would sign a "zero-yield" CTBT.

He made this statement on August 11, nine years ago to this very day:

> "As part of our national security strategy, the United States must and will retain strategic nuclear forces sufficient to deter any future hostile foreign leadership with access to strategic nuclear forces from acting against our vital interests and to convince it that seeking a nuclear advantage would be futile. In this regard, I consider the maintenance of a safe and reliable nuclear stockpile to be a supreme national interest of the United States."

And he stated further:

> "I am assured by the Secretary of Energy and the Directors of our nuclear weapons labs that we can meet the challenge of maintaining our nuclear deterrent under a Comprehensive Test Ban Treaty through a science-based Stockpile Stewardship Program without nuclear testing."

He also established specific safeguards that were included in his formal transmittal of the treaty on September 22, 1997 to the Senate for its advice and consent to ratification. These included the conduct of a science-based Stockpile Stewardship Program, maintenance of the nuclear laboratories and an annual certification process.

The U.S. Senate, of course, rejected the CTBT, but the policies outlined in the safeguards were reaffirmed by the Bush Administration and remain operative to this day.

Much of the early vision of stockpile stewardship has come into being. We know a lot more about how nuclear weapons work, what happens when nuclear weapons materials age, and have developed and continue to develop some truly remarkable experimental facilities. The computational capability within the stewardship community is without question best in the world – by a lot. And we haven't returned to underground nuclear testing.

So how does stockpile stewardship interact with nuclear weapons policy? Nuclear weapons policy is frequently divided into three elements: deterrence, dissuasion and assurance.

Deterrence can be defined as the policy of preventing enemy attack by maintaining sufficient military force to retaliate. Successful dissuasion means that potential adversaries would see it as useless to even think about developing nuclear weapons or other weapons of mass destruction to harm our vital interests. Assurance means that our

friends and allies can be confident in our commitment to support their vital interests, and so do not find it necessary to create or enlarge their own nuclear arsenal.

Stockpile stewardship supports nuclear deterrence by maintaining the reliability, safety and performance of the current stockpile to DoD requirements. This is done with surveillance, assessment and when necessary, replacement or refurbishment of weapon components. The assessment of the stockpile culminates in the annual certification process, which focuses on the current "as-is" stockpile. Because there is not sufficient expertise outside the labs to provide a truly independent, authoritative assessment, this system places a major requirement on the Stockpile Stewardship Program to ensure that the certifiers themselves are as trustworthy and competent as possible.

The certification process directly involves the nation's senior leadership in nuclear weapons matters, and insofar as the potency of stockpile represents deterrence, both in the mind and actions of the President, and in the minds and actions of any potential adversary, there is a direct and continuing link between stockpile stewardship and nuclear deterrence.

Further, the nuclear weapons program must be capable of producing any necessary replacement components for the in-being stockpile, even if the manufacturing processes for those replacements are no longer available. Thus, for example the NNSA is looking hard at the need for a modern plutonium pit facility. The schedule and capacity for such a facility depends upon a detailed understanding of the effect of plutonium aging on the nuclear explosive. Accordingly, the weapons labs are engaged in a comprehensive experimental and theoretical program to inform the modern pit facility decision. A robust production capability would indicate that the U.S. is investing in future nuclear capability as part of our nuclear weapons strategy. Indeed, the current Administration's Nuclear Posture Review explicitly recognizes infrastructure as an element of the new, post-Cold War nuclear triad.

But supporting a post-Cold War nuclear weapons policy is more than maintaining Cold War weapons and the Cold War nuclear weapons complex. It also has to do with the capability to develop different future stockpiles and different future supporting infrastructures. The current stockpile and its infrastructure was created for the Cold War, based on a specific adversary, specific sets of targets and delivery systems all driven by a specific doctrine. That specificity no longer exists, and dissuasion – and assurance - means shaping the future, creating a world that is less likely to burst into nuclear conflagration, and with a more stable and secure international structure. This might very well involve new capabilities, tailored to specifically dissuade. Science-based stockpile stewardship provides our leadership with the information and expertise to make effective policy decisions.

Stockpile stewardship also contributes to assurance. Our traditional nuclear allies - U.K. and France - participate in the stewardship program, and in a more limited way, so does the Russian Federation. Indeed, stockpile stewardship might be integrated with the other elements of our post-Cold War nuclear programs – Cooperative Threat Reduction,

Materials Protection Control and Accounting, the Global Threat Reduction Initiative, etc. to help reduce the potential for any sort of Russian return to adversary status, and to help encourage their participation in international security policies and operations.

In short, a robust science-based Stockpile Stewardship Program provides the U.S. with not only the means for maintaining an effective nuclear deterrent, but also the opportunity for our national leadership to aggressively pursue dissuasion and assurance; to reduce the global number of nuclear weapons with confidence, to enter into international agreements with confidence and to provide the global strategic leadership that is incumbent on the world's leading superpower.

Some 50 years ago Thomas Schelling used the term 'long shadow' to describe how the existence of nuclear weapons shaped views of the future. Science-based stockpile stewardship provides exceptional opportunities to use that long shadow to effectively shape a safer and more secure world.