Report of the
Defense Science Board Task Force
on

Nuclear Capabilities

Report Summary

December 2006

Office of the Under Secretary of Defense
For Acquisition, Technology, and Logistics
Washington, D.C. 20301-3140

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
DEC 2006	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Report of the Defense Science Board Task Force on Nuclear Capabilities Report Summary	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics Washington, DC 20301-3140**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**58**	

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MEMORANDUM FOR UNDER SECRETARY OF DEFENSE (ACQUISITION, TECHNOLOGY, AND LOGISTICS

SUBJECT: Report of the Defense Science Board Task Force on Nuclear Capabilities

I am pleased to forward the final report of the Defense Science Board Task Force on Nuclear Capabilities. This task force was asked by the Secretary of Defense to consider the issues associated with the current nuclear stockpile, nuclear production complex, management of the nuclear enterprise, and examine plans to transform the nuclear enterprise to provide a capability to respond to 21st Century security needs.

The task force concludes there is a need for a national consensus on the nature and role of nuclear weapons, as well as a new approach to sustaining a reliable, safe, secure, and credible nuclear stockpile. Additionally, the task force calls for new approaches to the organization and management of the nuclear weapons enterprise, both in DoD and DOE.

The task force has set forth many recommendations in the areas of sustaining the nuclear weapons stockpile, transforming the nuclear production complex, and organizing and managing changes needed for the nuclear weapons enterprise. The task force urges senior leaders to understand the urgent need to act and implement the recommendations at the earliest opportunity.

I endorse the task force's recommendation and encourage you to review the report.

William Schneider, Jr.
Chairman

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MEMORANDUM FOR THE CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Final Report of the Defense Science Board (DSB) Task Force on Nuclear Capabilities

The DSB Task Force on Nuclear Capabilities has completed its work and a final report (the classified version) is attached. This Task Force was established to specifically: a) assess the current plan for sustaining the nuclear weapons stockpile; b) assess progress towards the goal of an integrated new triad of strike capabilities (nuclear, advanced conventional, and non-kinetic) within the new triad of strike, defense, and infrastructure; c) examine the DoD role in defining needs in the nuclear weapons stockpile and recommend changes in institutional arrangements to ensure an appropriate DoD role; d) examine a wide range of alternative institutional arrangements that could provide for more efficient management of the nuclear enterprise; e) examine plans to transform the nuclear weapons production complex to provide a capability to respond promptly to changes in the threat environment with new designs or designs evolved with previously tested nuclear components; and, f) examine approaches to evolving the stockpile with weapons that are simpler to manufacture and that can be sustained with a smaller, less complex, less expensive design, development, certification and production enterprise.

The full classified report of the Task Force discusses each of the issues identified above and makes recommendations to achieve the needed future capabilities. The major problems associated with the current nuclear enterprise can be summarized in three key issues: 1) The need for a national consensus on the nature of the need for and the role of nuclear weapons; 2) The nuclear weapons complex and the approach to sustaining a reliable, safe, secure and credible set of nuclear weapons; and 3) The organization and management of the nuclear weapons enterprise, both in DoD and DOE.

The Task Force concluded that there is agreement that the overriding priority for the US nuclear weapons enterprise is to provide and sustain a reliable, safe, secure and credible set of nuclear weapons needed to maintain the nuclear deterrent. However, there is no national consensus on the nature of that need. Currently approved programs are focused on extending the life of existing weapons indefinitely with a production complex that is not configured, managed, or funded to meet minimum immediate stockpile sustainment needs. However, the Reliable Replacement Warhead (RRW) program, if it progresses to production, provides for a path to a sustainable nuclear stockpile. Finally, the current nuclear organization, management, and programs do not provide for a nuclear weapons enterprise capable of meeting the nation's minimum needs.

The Task Force believes that the recommendations and considerations contained in this report will get the US on the right track toward achieving a reliable, safe, secure and credible nuclear weapons stockpile and overall nuclear enterprise for the 21st Century. The Task Force urges the senior leaders of this nation to understand the urgent need to act on the report's findings and recommendations.

Dr. John Foster
Task Force Co-Chair

Gen (ret) Larry Welch
Task Force Co-Chair

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Section 1: Introduction

The Task

The Undersecretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)) requested that the Defense Science Board form a Task Force to assess current and future nuclear capabilities.

Specifically, the Task Force terms of reference (TOR) are:

- Assess the current plan for sustaining the nuclear weapons stockpile and make recommendations to provide for relevant future capabilities.
- Assess progress towards the goal of an integrated new triad of strike capabilities (nuclear, advanced conventional, and non-kinetic) within the new triad of strike, defense, and infrastructure.
- Examine the DoD role in defining needs in the nuclear weapons stockpile and recommend changes in institutional arrangements to ensure an appropriate DoD role.
- Examine a wide range of alternative institutional arrangements that could provide for more efficient management of the nuclear enterprise.
- Examine plans to transform the nuclear weapons production complex to provide a capability to respond promptly to changes in the threat environment with new designs or designs using previously tested nuclear components.
- Examine approaches to replacing weapons in the stockpile, over time, with weapons that are simpler to manufacture and that can be sustained with a smaller, less complex, less expensive design, development, certification and production enterprise.

Three Key Issues and the Bottom Lines

The need for a national consensus on the nature of the need for and the role of nuclear weapons.

- There is agreement that the overriding priority for the U.S. nuclear weapons enterprise is to provide and sustain a reliable, safe, secure, and credible set of nuclear weapons needed to maintain the nuclear deterrent. There is no national consensus on the nature of that need.

The nuclear weapons complex and the approach to sustaining a reliable, safe, secure, and credible set of nuclear weapons.

- Currently approved programs are focused on extending the life of existing weapons indefinitely with a production complex that is not configured, managed, or funded to meet minimum immediate stockpile sustainment needs. The Reliable Replacement Warhead (RRW) program, if it progresses to production, provides for a path to a sustainable stockpile.

The organization and management of the nuclear weapons enterprise – DOE and DoD.

- The current organization, management, and programs do not provide for a nuclear weapons enterprise capable of meeting the nation's future needs.

The Need for a National Consensus on Nuclear Capabilities

For the fifty years of the Cold War, there was a viable national consensus on the need for nuclear weapons and the role these weapons played in the security of the United States and its allies. Fifteen years after the end of the Cold War, this consensus no longer exists. Most Americans agree that as long as actual or potential adversaries possess or actively seek nuclear weapons (or other weapons of mass destruction), the United States must maintain a deterrent to counter possible threats and support the nation's role as a global power and security partner. Beyond that, there are sharp differences on the role and complexion of how the U.S. nuclear deterrent should shape the security environment. On the one hand, there is an entrenched set of views held by an influential segment of the U.S. population that transforming the stockpile is the wrong way to shape the security environment and counter nuclear proliferation pressures. On the other hand, there are alternative views that this Task Force believes need to be much more widely understood in order to transform the nuclear enterprise to one effective in meeting the security threats we face today.

The result of this lack of consensus is an entrenchment of longstanding and strongly held views, with little genuine debate aimed at forging a new consensus. A new consensus would enable sensible and supportable choices on future nuclear capabilities and doctrine needed to move forward in providing the right nuclear weapons and nuclear enterprise for the 21st century. To begin to remedy this situation, senior leaders need to do more than reaffirm the need for a modern, safe, and reliable nuclear deterrent. They need to engage more directly to articulate the persuasive case for nuclear transformation that provides an integrated vision of the role of nuclear weapons – their currency in international politics, their contribution to the New Triad, and the prospects for further stockpile reductions.

Some Entrenched Views on Nuclear Capabilities

There is a set of entrenched views that make it more challenging to deal with nuclear strategy and nuclear weapons issues. Contrary to expectation, as the Cold War wound down, nuclear issues have become more, not less, complex as the nation moved from the dangerous, but slowly evolving, set of challenges characterizing the Cold War to the more complex, rapidly changing, and still dangerous, challenges in this century. Further, the stewards of the nation's nuclear deterrent are not active in articulating alternatives to the entrenched set of views -- partly because they tend to dismiss these views out of hand. The discussion in this section of the report is not intended to dismiss the entrenched views. It is not about which views are right and which are wrong. It is about coming to a more complete understanding of complex issues that ultimately frame progress on future nuclear capabilities. The following addresses a subset of five widely expressed views. It is not an exhaustive presentation, but presents some of the most salient issues in contemporary public discussion of nuclear weapons. The Task Force believes it important to bring these views to the forefront as the context in which to assess current and future nuclear capabilities.

View 1: *Lower numbers of U.S. nuclear weapons are preferable regardless of the starting point, with zero as the ultimate goal.* Typically, this goal of zero nuclear weapons is regarded not as an instrumental objective, but as a desirable end in itself. Occasionally, a security-oriented rationale for this goal is suggested: a nuclear-free world would be a safer world for the United States because we would dominate a conventional-only world. This view that the United States should

move fully away from nuclear capabilities is an element in the domestic political opposition to any U.S. nuclear initiative.

Alternative View: The desirability of a nuclear-free world is irrelevant. It is not possible to erase from history technology that has been widely understood for decades. The worst outcome would be for the United States to have a nuclear deterrent that is inadequate to address the variety of weapons of mass destruction (WMD) threats confronting the United States and its allies.

The objective for U.S. nuclear capabilities should be to ensure that the U.S. capability is a powerful force for peace. It clearly served that role in Europe where two armed camps, with divergent political doctrines faced each other across a common political border for half a century navigating successfully through a wide range of crises that could have led to major armed conflict.

Filling that role in the post-Cold War era requires credible, sustainable capabilities that include reliable, safe, and secure nuclear weapons. A fundamental requirement for credibility is the belief by the potential adversary that we would execute our deterrent threat. Any other attitude invites dangerous challenge to our resolve and virtually assures that deterrence will fail.

View 2: U.S. *nuclear development and sustainment activity causes other states to seek their own nuclear weapons. U.S. initiatives lead others to see greater value in acquiring nuclear weapons, thereby spurring proliferation.* The corollary often appended to this view is that if the United States rejects any new nuclear initiatives, other states, including Rogue leaderships, will not seek to acquire nuclear weapons. This view that the United States' rejection of nuclear initiatives will decisively reduce the value that others see in nuclear weapons also is an element in domestic and international political opposition to any nuclear initiative.

Alternative View: Nations, including Rogues, pursue weapons of mass destruction because they have concluded that acquiring WMD is in their national interest – often because they feel threatened by neighbors, want to intimidate their neighbors, or because they want to ensure freedom of military action in pursuit of their own regional ambitions. These countries reach their own conclusions about the value of WMD to their national interest, not because they mimic the United States. It would be enormously self-centered to believe that the U.S. influence as a role model is more powerful than a foreign leadership's own conclusions about its national interests and the value of WMD.

In those cases where rogue leadership considers U.S. nuclear weapons capabilities in their attitudes and aspirations, a continuing robust U.S. capability can help dissuade them from acquiring nuclear capabilities. The credibility of U.S. capabilities and intentions has led a number of nations with the capability to acquire nuclear weapons to decide not to do so. In addition, allied confidence in U.S. nuclear capabilities has been at the heart of the extended "nuclear umbrella." An enduring, reliable U.S. capability enhances assurance to allies reducing their motivation to acquire or expand their nuclear weapons capabilities. A credible U.S. nuclear deterrent capability contributes significantly to global non-proliferation.

View 3: *Non-proliferation is a more important value than nuclear deterrence in a post-Cold War era.* The Soviet Union is gone, neither Russia nor China pose a serious threat. The real threat to the United States instead now comes from proliferation. Therefore, nuclear deterrence in the post-Cold War era is a lower priority goal than non-proliferation. This view, in combination with View 2 described above, is the basis for dismissing arguments that a U.S.

nuclear initiative could be important to sustain or enhance the United States' capability for deterrence: if non-proliferation is a higher priority than deterrence, and a nuclear initiative would undercut the United States' non-proliferation efforts, then even if a nuclear initiative might contribute to deterrence, it should not go forward. The tradeoff should favor the priority goal of non-proliferation. This view, again, is an element in the domestic political opposition to any U.S. nuclear initiative.

Alternative View: The holders of this view assume they can predict the intentions of sovereign nations into the distant future with confidence. So long as there remains, in the hands of other than a completely reliable and trustworthy friend, WMD capable of inflicting intolerable levels of destruction on the United States or its allies, the assured ability to deter such an act remains the first priority in meeting the fundamental first responsibility of a democratic government – to keep its people alive and free.

We should applaud the improved relationship between the United States and Russia and continue to work towards making the two nations reliable and trustworthy friends. Similarly, we should seek to promote cordial relations with China. In neither case, however, is that the current situation. We have, since the end of the Cold War, repeatedly dealt with strong differences in U.S. and Russian national interests, e.g., Eastern Europe, Yugoslavia, Kosovo, Afghanistan, Georgia, Ukraine, and Iraq. In each case the national interest led us down a path seen by the Russian leadership as inimical to their interests. The potential flashpoint with China over Taiwan remains an immediate concern and the basis for some bellicose statements by Chinese military leaders towards the United States. It is naïve to believe that nuclear deterrence is no longer essential to the long-term security of the U.S.

View 4: *Nuclear weapons should deter only nuclear threats.* This view is based on the notion that U.S. threatened retaliation must be comparable to the provocation it seeks to prevent. Consequently, nuclear deterrence should only be intended to deter nuclear threats. When combined with the view described above, that neither Russia nor China pose threats necessitating nuclear deterrence, the conclusion is drawn that the U.S. need and role for nuclear deterrence is narrow and that U.S. nuclear capabilities should be treated accordingly. This view also is an element in the domestic political opposition to any U.S. nuclear initiative.

Alternative View: Deterring nuclear threats is, by itself, an adequate reason to sustain a credible nuclear deterrent. But, there is a convincing case that, in the modern world of chemical and biological weapons (CBW) proliferation, U.S. nuclear deterrent capabilities have a broader purpose.

Reserving nuclear deterrence to address only nuclear threats would be a dramatic change from established practice, and would pose potentially significant risks to the United States and its allies. Throughout the Cold War, NATO's doctrine of Flexible Response was based on presenting the Soviet Union with the possibility of NATO nuclear escalation if the Warsaw Pact attacked NATO with overwhelming conventional military force. That deterrence policy succeeded for decades. There is no reason for the United States to now reserve nuclear deterrence to address only nuclear threats when the growth in the number and severity of chemical and biological threats continues to expand. The United States has decided to forego CBW, even for deterrence purposes. It would be hubris in the extreme to base U.S. and allied security on the proposition that U.S. non-nuclear weapons are and will be adequate to deter all CBW threats.

View 5: *Any new nuclear initiatives are unnecessary for deterrence, and would undermine the higher priority non-proliferation goal.* Nuclear deterrence will work reliably without any new nuclear capabilities. Those types of nuclear weapons that provided adequate deterrent effect during the Cold War will be adequate for future deterrence needs, at greatly reduced numbers. This final view also is an element in domestic political opposition to any U.S. nuclear initiative.

Alternative View: The view that it is possible to sustain, in the 21st century, an element of national security completely unchanged from its Cold War origins is applied uniquely to nuclear capabilities. In no other aspect of national security do we assume an unchanging constant in a rapidly changing world. The existing set of nuclear weapons was designed for a finite life against a defined national security need. Most of these weapons are already well beyond their defined life and the world environment that drives national security needs is changing daily. Although part of the current nuclear stockpile is becoming less relevant to contemporary threats, it is true that much of the current set of nuclear weapon capabilities remains appropriate for the task of deterring a major nuclear conflict with a peer or near-peer adversary. It is not obvious, however, that the existing set of nuclear capabilities is suitable for deterring the WMD threats increasingly posed to the United States and allies by Rogue states. Further, deterrence is not the only national goal supported by U.S. strategic forces. The 2001 Nuclear Posture Review formally identified additional important national goals that had, in fact, long been understood: assurance, dissuasion, and defense. What types of nuclear weapons will be needed to support deterrence and these additional goals now and in the future is a question that deserves intense attention; not a premature answer that what was adequate in the past will be adequate for the future.

In addition, it will not be possible to sustain the current weapons without replacing some current nuclear warheads with new nuclear warheads. It will not be possible to sustain a credible nuclear deterrent in the 21st century with only Cold War capabilities. No one would imagine the possibility of doing so with any other element of our national security capability.

The Need for Continuing Assessment

The differences in views expressed above underscore the need for continuous attention to the range and implications of emerging, plausible nuclear, chemical, and biological capabilities that can threaten the security of the United States and its allies with potentially catastrophic consequences and the implications for U.S. capabilities and policies. In past eras, we have benefited from an intense and sustained intelligence effort, a wide and deep intellectual commitment, and sustained national leadership attention to the role of nuclear capabilities, ours and those of potential adversaries. This level of commitment and attention was aided and abetted by focus on a well-understood set of capabilities in the hands of a well-understood threat.

It would be reasonable to expect that a more complex security environment with a more widely varied potential for catastrophic consequences from adversaries – national and transnational – would result in more, not less, focus on nuclear capability and policies. Instead, the present reality is far less focus on that capability.

The Need for Urgency

The current deficiencies in the nuclear weapons complex are already resulting in triage among demands to sustain a healthy nuclear enterprise. Current capacities are forcing choices between essential areas of work. At present:

- We are behind on weapons surveillance, which is essential to continuing confidence in the reliability, safety, and security of weapons;
- We are behind on dismantling unneeded weapons which adds to the security and safety concerns and burdens;
- We are currently trying to catch up on capability for essential elements of warhead life extension work;
- We have little or no capacity to respond to unexpected problems in the physics elements of weapons in the stockpile;
- The DoD requirements for numbers and status of warheads beyond the deployed stockpile continue to strongly drive the weapons production complex workload and need to be rationalized and clearly stated;
- We have an inadequately defined and funded capability for replacement, over time, of aging weapons in the stockpile; and
- The current nuclear weapons production complex demands extensive added resources for security and maintenance.

These issues are discussed in more detail elsewhere in the report, but the bottom line is that the nation is currently behind in essential work to sustain the weapons in the current nuclear stockpile. Hence, there is reason for urgency in providing credible guidance for weapons needs that are appropriate to the 21st century and an efficient, effective, right-sized set of laboratory and production complex capabilities to meet those needs. We are already late in addressing needs and the current pace of progress in defining, approving, and implementing the needed capabilities is not encouraging.

Section 2: Summary of Recommendations

Assessing Progress in Developing Integrated Strike Capabilities in the New Triad:

- ***The national security leadership should:***
  - ***Declare, unequivocally and frequently, that a reliable, safe, secure, and credible nuclear deterrent is essential to national security and a continuing high priority;***
  - ***Form a standing assessment team (Red Team) to continuously assess the range of emerging and plausible nuclear capabilities that can threaten the United States and its allies and friends with potentially catastrophic consequences; and***
  - ***Form a Deterrence Team tasked with gaining greater understanding of a variety of contemporary and future potential foes so as to establish optimal U.S. approaches to deterring WMD threats.***
- ***The Secretary of Defense should review the plans to improve the missile defense capability to deal with expected threats. This will require investment in new developments, especially to address the challenge of dealing with countermeasures. Fielding the current systems in larger numbers will not lead to a robust system.***
- ***The Secretary of Defense and the Commander, U.S. Strategic Command (USSTRATCOM), should strongly advocate accelerated development of the full set of New Triad capabilities – missile defense, infrastructure, and the Strike Triad, including a credible Nuclear leg of the Strike Triad.***
- ***The Commander, U.S. Strategic Command should:***
  - ***Develop a comprehensive plan for effective non-kinetic attack options and provide a time-phased roadmap for growing non-kinetic capabilities.***
  - ***Ensure that recommendations for changes beyond those agreed to in the Moscow Treaty:***
    - ***Take into account the full spectrum of U.S. national goals, i.e., assure, dissuade, deter, and defeat, and our contemporary inability to predict the future strategic environment with confidence;***
    - ***Carry benefits worth the potential cost in capability; and***
    - ***Remain reversible until clear evidence that the world situation, to include developments in Russia and China, provide confidence in future directions.***
- ***The Commander, U.S. Strategic Command and the Assistant Secretary of Defense (Networks & Information Integration)(ASD/NII) should define and pursue a robust, survivable New Triad command and control structure that makes the best available information available to senior decision makers, communicates those decisions, and supports responsive execution. Such a system must exploit modern information networking while meeting the full set of current Integrated Threat Warning and Attack Assessment (ITW/AA) requirements.***

The Structure, Organization, and Management of the Nuclear Weapons Enterprise:

- ***The national security leadership should demand that the weapons complex be capable of producing a predetermined number of RRW-class warheads per year by 2012 for timely evolution to sustain a reliable, safe, secure, and credible stockpile.***
- ***The National Security Council should recommend to the President a National Nuclear Weapons Agency (NNWA) with the administrator reporting to the President through a Board of Directors made up of the Secretaries of Defense, Energy, and Homeland Security and the Director of National Intelligence who are accountable to the President for oversight and support of the nuclear weapons enterprise.***
    - ***The core of the new agency's responsibility should be the three national nuclear weapons laboratories and the weapons production complex.***
    - ***The agency's responsibilities should also include those activities that require unique knowledge of nuclear weapons.***
- ***The Secretary of Defense should:***
    - ***Direct that the Nuclear Weapons Council (NWC), with full participation by the Commander, USSTRATCOM, perform a full risk management assessment weighing the demand on resources to sustain the current quantities and diversity in the nuclear weapons stockpile against the resources required to provide needed future capabilities.***
    - ***Direct action to change the Assistant to the Secretary of Defense (NCB) to an Assistant Secretary of Defense for Strategic Weapons (ASD (SW)), reporting to the Deputy Secretary of Defense with continuing responsibility for nuclear, chemical, and biological programs. The ASD (SW) would have a Deputy Assistant Secretary of Defense for Nuclear Weapons (DASD (NW)).***
    - ***Propose and facilitate the Congressional process to:***
        - ***Appoint the Deputy Secretary of Defense as the chairman of the Nuclear Weapons Council; and***
        - ***Make the Commander, U.S. Strategic Command a member of the Nuclear Weapons Council.***[1]
- ***The Secretary of Defense and the Administrator, NNSA should pursue plans to reduce the number of DoD and DOE sites and locations within sites containing bomb-size quantities of Category I nuclear materials.***
- ***The Administrator, NNSA should:***
    - ***Contract for nuclear weapons production involving nuclear materials with a single contract with incentives for creating the most efficient production enterprise with right sizing and consolidation;***

[1] As of early May 2006, the House Armed Services Committee markup of its version of the FY07 Defense Authorization Bill includes adding CDRUSSTRATCOM as a member of the Nuclear Weapons Council.

- ***Ensure that line management (federal and contractor), has the authority and accountability to deliver the mission product;***
- ***Ensure that staff and advisory board functions are supporting, not directing, line management; and***
- ***Thoroughly embed safety and security functions in line management with the concerns of staff and outside agencies passing through the crucible of systems analysis, risk management, and line mission management judgment.***

- ***The Chairman of the NWC should produce an annual calendar for the NWC that provides for comprehensive and integrated review of nuclear weapons programs and policies to include the full nuclear warhead and delivery vehicle programs.***

Sustaining the Nuclear Weapons Stockpile:

- ***The Nuclear Weapons Council should:***
  - ***Clearly articulate a new policy for sustaining the nuclear weapons stockpile that depends on evolving the stockpile, over time, to one of weapons with greater margins in performance, safety, and security;***
  - ***Establish a policy that no more than 20% of the deployed stockpile be invested in a warhead for which there is not a genetically different alternative warhead suitable for timely deployment in the event of a single mode failure of a warhead type; and***
  - ***Direct that:***
    - ***The RRW program be pursued as a broad new approach to sustaining the stockpile, re-energizing design capability, and transforming the weapons complex; and***
    - ***RRW-1 as the pilot for the RRW program, be pursued as a full weapons program and trade-offs with the scope of the W76 life extension effort be analyzed and implemented at the appropriate point in the W76 program.***

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Section 3: Assessing Progress in Developing Integrated Strike Capabilities in the New Triad

The Role of Nuclear Weapons in the 21st Century

Any discussion of options for improving the U.S. nuclear deterrent must be grounded in an understanding of the role of nuclear weapons in the 21st century. Nuclear capabilities remain an essential element of U.S. national security strategy and defense posture. The knowledge needed to create the power and destructive potential of nuclear weapons is widespread and is a continuing fact of life. Global abolition of these capabilities is a naïve hope. Consequently, the effective implementation of U.S. national security strategy in the 21st century requires nuclear capabilities adequate to the task of continuing deterrence in a dynamic world where the emergence of new and diverse threats makes the deterrence task more complex and less certain.

It is widely understood that nuclear weapons carry both strategic and political utility. Our potential adversaries could reasonably believe that the acquisition of nuclear weapons and other weapons of mass destruction provide the means to threaten, intimidate, or deter the United States from pursing our national interests that may be in conflict with their perceived interests. These weapons can accord status and power to states that cannot challenge the United States with conventional capabilities. They can be seen as a means of "leveling" the military and political playing field. Nuclear weapons can also serve as instruments of mass terror and destruction both by nations and non-state actors.

The continued reduction of U.S. nuclear forces is intended to reduce the nuclear danger and promote trust and understanding between the United States and our former, Cold War nuclear adversaries. Paradoxically, reductions in the quantity of weapons with no change in their qualities, may, by itself, degrade our capability to deter war, assure our allies, dissuade challenges, and defend against attack. Today's nuclear weapons were tailored for the Cold War adversary and Cold War policies. Without tailoring to the present and possible future circumstances, these weapons may not be credible for other than massive retaliation in the eyes of 21st century potential WMD adversaries. Credible deterrence requires that the adversary believe that U.S. capabilities will be used if the adversary takes the course of action that we seek to deter. Without such a belief, deterrent effect is neither predictable nor reliable. Some have expressed the view that tailoring the nuclear weapons stockpile, over time, to make its deterrent power more credible lowers the nuclear threshold increasing the probability that nuclear weapons will be used. The opposite is far more likely. That is, the more credible their use in the face of extreme provocation, the more powerful their deterrent effect, and the less likely their employment will be needed.

For these reasons, it is essential to an effective deterrent that the U.S. nuclear weapons complex be capable of producing and maintaining a set of nuclear weapons that are credible in our eyes and in the eyes of adversaries so that those adversaries are deterred from attack, and dissuaded from acquiring nuclear weapons and other threatening military options.

The Strategic Environment

The 2001 Nuclear Posture Review (NPR) and the nuclear reductions it recommended were predicated on the assumptions of an increasingly benign post-Cold War relationship with Russia

and the ability to respond flexibly and promptly to any future negative political or technical changes in the global strategic environment. The nuclear reductions postulated in that NPR were indicative of both an existing relationship with Russia very different from the Cold War relationship and the desire to forge a new strategic relationship no longer based on the theory of mutual assured destruction that was the hallmark of the Cold War rivalry.

Although United States relations with Russia are considered relatively benign at the moment, Russia retains the capability to destroy the United States in 30 minutes or less. Russia's strategic nuclear arsenal has declined in the wake of the collapse of the Soviet Union, lost key production facilities now located on "foreign" soil, and faces budgetary and economic constraints. Nevertheless, the concomitant decline in Russia's conventional military forces has resulted in greater emphasis by the Russian government on the importance of nuclear weapons for maintaining superpower status, deterrence, and potentially warfighting.

In addition, Russia's transition to democracy has been difficult as evidenced in a variety of social spheres. Russian foreign policy continues to often be at odds with fundamental U.S. principles and actions, notably regarding Iraq and Iran. Russia is also increasingly challenging the U.S. presence in Central Asia. Domestically, the Russian government has exhibited signs of increasing conservatism in its policies and practices. In an April 2005 address to the Duma, President Vladimir Putin declared the collapse of the Soviet Union to be "the greatest geopolitical catastrophe of the century."

These and other indications suggest that Russia's future as a democratic state remains uncertain. The first DoD Strategic Capabilities Assessment following the 2001 NPR, conducted largely in 2003, concluded that nothing had changed so significantly since 2001 to affect the scope or pace of the drawdown of U.S. nuclear forces postulated in the NPR. Given recent Russian activities, especially in the nuclear arena, that conclusion may be open to reasonable challenge.

China's military modernization program is also a cause of concern. Though its current nuclear forces remain modest, political tensions with the United States over Taiwan make it prudent to take China's nuclear capabilities seriously. Despite official denials, some Chinese military officials have suggested that an American defense of Taiwan in the event of conflict with the mainland would result in the use of nuclear weapons against the United States.

In addition, the development of nuclear and CBW capabilities by countries such as North Korea and Iran is a reality now. North Korea has declared itself to possess nuclear weapons, and Iran has an active nuclear weapons program. Each also has ongoing missile development programs. The question of how to establish effective deterrence and dissuasion policies vis-à-vis these states looms large, as does the prospect of assuring our allies in their vicinity.

Despite the desire for improved relations with Russia, the direction, scope, and pace of the evolution of U.S. capabilities must be based on a realistic recognition that the United States and Russia are not yet the reliable, trusted friends needed for the United States to depart from a commitment to a robust nuclear deterrent. Intentions can change overnight; capabilities cannot. Moreover, the military courses of China, North Korea, and Iran require continued attention to effective dissuasion and deterrence. There is a need for a continuing focus and process to ensure that nuclear weapons capabilities plans and policies reflect the changing world environment and the impact that environment has on the effectiveness of the nuclear deterrent.

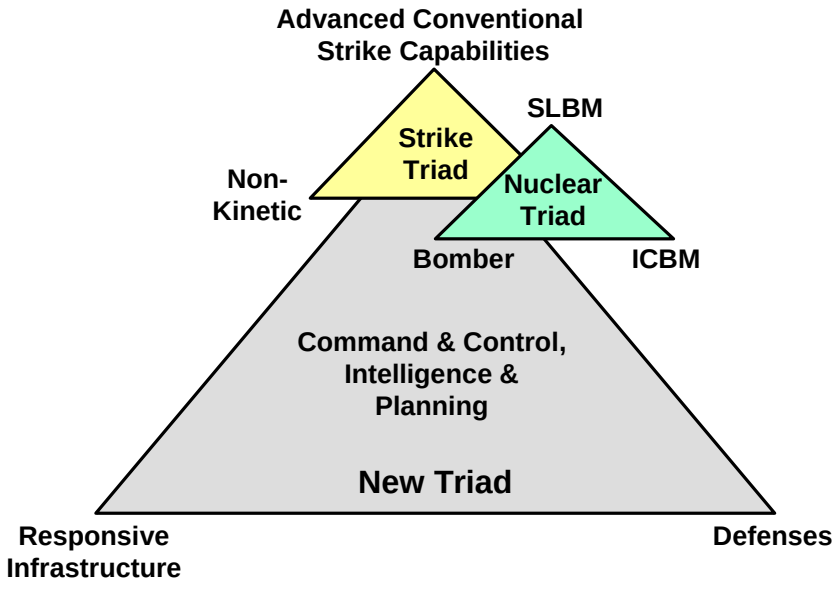
Recommendation: The national security leadership should:

- ***Declare, unequivocally and frequently, that a reliable, safe, secure, and credible nuclear deterrent is essential to national security and a continuing high priority;***
- ***Form a standing assessment team (Red Team) to continuously assess the range of emerging and plausible nuclear capabilities that can threaten the United States and its allies and friends with potentially catastrophic consequences; and***
- ***Form a Deterrence Team tasked with gaining greater understanding of a variety of contemporary and future potential foes so as to establish optimal U.S. approaches to deterring WMD threats.***

The Nuclear Posture Review and the New Triad

The 2001 Nuclear Posture Review outlined a goal of modernizing and transforming U.S. strike capabilities to make them more relevant to the changed strategic environment of the 21st century, particularly the increased uncertainties surrounding the reliable functioning of deterrence against emerging threats. This included reducing the size of deployed legacy nuclear forces (the nuclear "Triad") while developing improved nuclear, conventional, and non-kinetic capabilities to deal with contemporary threats and support the broad national goals of assurance, dissuasion, deterrence and defense. This triad of capabilities comprises the strike leg of the NPR's "New Triad" of strategic capabilities. As illustrated in Figure 1, the New Triad embraces a triad of triads.

Fig 1: The Triad of Triads (U)



Along with these strike capabilities, the New Triad calls for developing strategic defenses – both active and passive – and a robust infrastructure to allow for timely development, fielding, or reconstitution of capabilities should the strategic environment warrant. To enable the integration

of these reinforcing capabilities, the New Triad would be strengthened by improved intelligence and a robust command and control system.

These capabilities are intended to provide greater flexibility, adaptability, and robustness for addressing contemporary threats and future potential negative political and technical developments. As such, the purpose of the New Triad is to strengthen global deterrence across the full spectrum of immediate and potential threats by ensuring that the President and/or Secretary of Defense has a full range of strategic options and alternatives; can effectively communicate its decisions; and can have timely knowledge of the outcome of those decisions once executed. The New Triad is also intended to provide the warfighter with the range of capabilities needed to successfully execute assigned missions.

Four years after promulgation of the Nuclear Posture Review, progress in achieving the goals of the New Triad remains elusive. The only robust capability in the New Triad is the Old Triad – the legacy nuclear forces of land-based ICBMs, sea-based SLBMs, and strategic bombers. These forces continue to be retired and removed from service as part of the reductions postulated in the NPR with little compensating progress in other aspects of the NPR goals.

To ensure responsiveness to the evolution of current and future threats, the NPR called for periodic assessments of the strategic environment and of progress in developing the capabilities represented by the New Triad. These assessments were expected to take place every two years. The first periodic assessment was completed in 2004. Referred to as the "Strategic Capabilities Assessment," it reviewed changes in the strategic landscape since 2001 and assessed progress in developing the capabilities called for as part of the New Triad. While actions have been taken to implement various aspects of the NPR, the Strategic Capabilities Assessment identified significant areas of deficiency where insufficient progress has been made to develop the capabilities called for in the New Triad.

The Strategic Defense Leg

The approach to active strategic defenses is the ballistic missile defense program. That program, after several decades, is deploying a mid-course intercept system and expanded terminal phase systems. Development has also started on boost phase capabilities.

The most critical, continuing challenge for the mid-course system is to discriminate the warhead from decoys. There is broad agreement in the missile defense community that there are viable options for more robust discrimination. However, while pieces that can contribute to these options are being pursued, there is not a coherent, funded program to develop and test these options.

Recommendation: The Secretary of Defense should review the plans to improve the missile defense capability to deal with expected threats. This will require investment in new developments, especially to address the challenge of dealing with countermeasures. Fielding the current systems in larger numbers will not lead to a robust system.

The Infrastructure Leg

The United States does not currently have the infrastructure required to sustain a reliable, safe, secure, and credible stockpile of nuclear weapons. Plans to provide such an infrastructure are still in development and are not funded. The production complex is discussed in *Section 4: The Structure, Organization, and Management of the Nuclear Weapons Enterprise.*

The Strike Leg

The "strike" leg of the New Triad consists of nuclear and advanced conventional forces, both kinetic and non-kinetic. The importance of the strike leg of the New Triad is reinforced by the difficulties discussed elsewhere in the report in realizing progress in fielding the capabilities represented by the other two legs.

Enhancements to U.S. nuclear capabilities, envisioned as part of a restructured set of strike capabilities more appropriate to contemporary threats, have encountered a number of obstacles including: the unique requirements of maintaining aging systems; the overall decline of the nuclear weapons production complex; the decline in scientific and engineering talent; the lack of high-level official attention to nuclear weapons issues; a general lack of understanding regarding the importance and role of nuclear weapons in U.S. deterrence strategy in the 21st century; the absence of an effective public affairs strategy; and congressional opposition.

In recent years, these difficulties have been illustrated by the debate over the Robust Nuclear Earth Penetrator (RNEP). The RNEP effort has been opposed on the basis that it is a "new" nuclear weapon whose development would make it more "useable" and, therefore, more likely to be employed. The RNEP plan has a modest objective. The proposal was a study effort to address what would be required to hold at risk hard and deeply buried targets, including those which might house weapons of mass destruction.

The nature of the debate over RNEP tends to ignore a fundamental truth with respect to deterrence that is worth repeating: *weapons that are not seen as useable and effective by potential adversaries cannot be an effective, reliable deterrent.*

RNEP is one of a number of nuclear initiatives that has fallen victim to allegations that the United States is pursuing a nuclear "warfighting" strategy. Other nuclear initiatives that have engendered opposition among legislators, arms control advocates, and some in the nonproliferation community include the Modern Pit Facility – intended to produce the plutonium "pits" necessary for nuclear weapons; the Advanced Concepts Initiative – designed to investigate concepts for new warhead designs that could lead to more credible deterrence in the 21st century; and the Enhanced Test Readiness program – designed to reduce the amount of time necessary to conduct an underground nuclear test from three years to eighteen months.

Given the political opposition and reduced funding for these initiatives, there has been little progress to date in evolving needed U.S. nuclear capabilities to address effectively the more diverse range of potential threats likely to emerge in the 21st century.

The deployment of a suite of advanced conventional precision strike capabilities with greater accuracy, penetration, and reduced time-to-target is a major element of the New Triad. It is also a major priority for USSTRATCOM, which has been assigned the Global Strike mission. According to the Unified Command Plan, USSTRATCOM's responsibilities include "providing integrated global strike planning and C2 support" to execute global precision strike objectives in support of national policy.

The United States possesses an impressive set of conventional attack capabilities including the capability to attack almost any target, anywhere in the world, anytime, in any weather, and with high precision. However, conventional weapons' capabilities are globally less responsive than is the case with strategic nuclear weapons.

As part of fulfilling its global strike mandate, USSTRATCOM is investigating the utility of arming ballistic missiles with conventional payloads. This option would provide a rapid strike capability with worldwide reach. USSTRATCOM has been given the mission of synchronizing DoD efforts to combat WMD worldwide. Conventionally-armed, ballistic missiles – which have the ability to strike quickly at long distances – would provide an important new capability that could augment efforts to destroy WMD before they can be used against the United States, its allies, or interests. They also could contribute to U.S. policy goals of deterrence, dissuasion, and assurance.

Options for developing a conventional, long-range, ballistic missile capability include both land-based and sea-based alternatives. Follow-on improvements in capability will present more difficult challenges than any near-term alternatives being investigated. USSTRATCOM is already taking steps to develop a wider range of conventional deterrent weapons. Key initiatives include[2]:

- Deploy an initial precision-guided conventional Trident SLBM capability as soon as practical. The speed and range advantage of a conventional Trident missile increases decision time and provides an alternative to nuclear weapon use against fleeting, high value targets. The conventional Trident missile could be particularly useful in deterring or defeating those who seek to coerce or threaten the U.S. with WMD.
- Develop a new land-based, penetrating long-range strike capability to be fielded by 2018.
- Study alternative options for delivering prompt, precise conventional warheads using advanced technologies such as hypersonic vehicles from land, air, or the sea.

Various avenues for non-kinetic strike programs are also promising but are in the formative stage at this point.

Recommendation: The Commander, U.S. Strategic Command (USSTRATCOM) should develop a comprehensive plan for effective non-kinetic attack options and provide a time-phased roadmap for growing non-kinetic capabilities.

In summary, the capabilities represented by the New Triad have the potential to significantly enhance global deterrence by providing a robust and credible set of capabilities and alternatives for responding to a variety of extant and emerging threats. However, the implementation of New Triad programs has been slow and, in some cases, encumbered by a lack of understanding of how these programs contribute to global deterrence, dissuasion, and assuring allies.

Without greater emphasis on explaining the rationale behind the New Triad concept, coupled with senior-level support for the funding required to make the necessary programs a reality, implementation of New Triad capabilities will be jeopardized.

Recommendation: The Secretary of Defense and the Commander, U.S. Strategic Command should strongly advocate accelerated development of the full set of New Triad capabilities – missile defense, infrastructure, and the Strike Triad, including a credible Nuclear leg of the Strike Triad.

[2] Statement by General James S. Cartwright, Commander USSTRATCOM, before the Strategic Forces Subcommittee of the Senate Armed Service Committee on Global Strike Plans and Programs, 29 March 2006.

Nuclear Reductions

The NPR recommended reductions in the number of operationally deployed strategic nuclear warheads to a level between 1,700 and 2,200 by the end of 2012. The Moscow Treaty codified these reductions in 2002.

Reductions in legacy nuclear weapons and systems are occurring apace, despite the concerns over Russia's future strategic course noted previously. Peacekeeper ICBMs have been retired and the MIRVed Minuteman III ICBM force is being reconfigured with single warheads. Four Trident SSBNs are being removed from strategic service and being modified as SSGNs capable of carrying cruise missiles and special operations forces. The U.S. heavy bomber force no longer stands on day-to-day alert and is increasingly tasked for conventional missions.

Further reductions in the deployed ICBM and SLBM force are expected to occur to comply with the mandated Moscow Treaty limits. The reduction in strategic nuclear weapons is the only element in the transition to the New Triad that appears to be proceeding according to the anticipated schedule. Moreover, the President has approved a plan that will reduce by roughly one-half the number of nuclear weapons available in the stockpile for reconstitution in the event of a negative change in the strategic environment. These capabilities, once eliminated, are unlikely to be restored.

Recommendation: The Commander, U.S. Strategic Command should ensure that recommendations for changes beyond those agreed to in the Moscow Treaty:

- ***Take into account the full spectrum of U.S. national goals, i.e., assure, dissuade, deter, and defeat, and our contemporary inability to predict the future strategic environment with confidence;***
- ***Carry benefits worth the potential cost in capability; and***
- ***Remain reversible until clear evidence that the world situation, to include developments in Russia and China, provide confidence in future directions.***

Nuclear Command and Control

There is also concern in U.S. nuclear command and control capabilities. As nuclear forces are reduced, the ability to exercise effective command and control over residual forces to ensure the continued functioning of deterrence has never been more important. Numerous studies, assessments, and exercise results have highlighted the nuclear command and control system as a capability that must be sustained into the future, as dictated by national policy[3], as we continue to study Nuclear C3 migration into the evolving net-centric environment.

Although the nuclear command and control system was designed to ensure a robust and enduring capability for nuclear retaliation, the command and control structure envisioned by the New Triad has a far broader role. The effective integration of the strike forces comprising the New Triad can only be achieved with reliable, robust, and survivable command and control. This includes ensuring that the nuclear command and control system is robust and adaptable to the new security environment.

[3] *Nuclear C3 ("Thin-line") and Migration to a New Triad Architecture*, OASD (NII)/C2 Policy DISA/GIG Transport Engineering, briefing presented to the DSB Task Force on 17 June 2005. Briefing was a result of Nuclear Weapons Council tasking in March 2005 to inform the NWC on the current nuclear C3 architecture and construct.

In addition to their primary purpose and function, the assets generally associated with nuclear command and control also comprise an essential component of a broader national system that supports decision-making and operations in non-nuclear crises and conflicts. There is a demonstrated need for a responsive, reliable, survivable, and robust command and control system that can provide the President with the information, access to advisors, and the means necessary to respond deliberately and appropriately to any crisis, without constraining the President's decisions due to weaknesses in command and control or in the continuity of Presidential authority. At present, the current nuclear command and control system represents the only capability in the near- to mid-term that has the potential to meet the robust command and control requirements dictated by current national policy. Investment will be required to ensure adequate capability.

Recommendation: The Commander, U.S. Strategic Command and the Assistant Secretary of Defense (Networks & Information Integration)(ASD/NII) should define and pursue a robust, survivable New Triad command and control structure that makes the best available information available to senior decision makers, communicates those decisions, and supports responsive execution. Such a system must exploit modern information networking while meeting the full set of current Integrated Threat Warning and Attack Assessment (ITW/AA) requirements.

Section 4: The Structure, Organization, and Management of the Nuclear Weapons Enterprise

The 21st Century Need

Both the nuclear weapons stockpile and the enterprise that sustains the needed stockpile are in need of fundamental transformation. The needed transformation will be difficult for several reasons. It will have to be carried out, or at least be set on the right track, at a time when nuclear weapon capabilities do not receive the same degree of military and political support as they did during the Cold War. Transformation of the nuclear complex will require added resources at a time when there will be increasing budget pressures and competing priorities. At the same time, when transformation is so urgently needed, there are significant management and leadership issues. The National Nuclear Security Administration (NNSA) part of the nuclear enterprise has not achieved the degree of focused autonomy needed to effectively and efficiently manage and lead the nuclear weapons enterprise. Further, the nuclear weapons program suffers from lack of consensus and support in the national security decision-making apparatus.

Meeting the concert of these challenges will require extraordinarily effective leadership and management, facilitated by more effective and efficient organizational arrangements. The weapons programs and enterprise will have to be transformed in fundamental ways. At the present time there are three fundamental challenges with the leadership and management of the nation's nuclear capabilities.

- While the national security leadership has clearly declared a need to sustain a credible nuclear deterrent, this has not been accompanied by a clear and coherent national approach to doing this for the long term.
- The DoD leadership, to include nuclear force providers, is not playing the needed role of demanding customer for the nuclear capabilities which are to be provided by the DOE.
- The DOE leadership that should be responding to demanding customers has been unable to provide a comprehensive, coherent, funded plan or capability to sustain a reliable, safe, secure, and credible stockpile of nuclear weapons for the long term.

History of the Weapons Enterprise and Current Issues

After World War Two and the Manhattan Project, the Atomic Energy Commission (AEC) was established to explore and develop military and civil applications of nuclear energy and science. At first, such an independent organization was deemed necessary in part "to keep nuclear weapons out of the hands of the military," but soon sounder reasons held sway: to assure strong commitment to both the civil and the military programs, and to provide an independent view on nuclear matters to the President, to whom the chairman of the Commission reported.

Growing out of the Manhattan Project and the early days of the AEC was the institutional arrangement that came to be known as the Government-Owned, Contractor-Operated, Federally-Funded Research and Development Center (GOCO FFRDC), the epitomes of which were the national laboratories. The essence of this model is science and engineering competencies concentrated in contractor-operated facilities, and sustained and adapted over long periods of time to address large, enduring scientific/technical problems of national significance. The

national laboratory model was fostered by a productive partnership between the AEC and the Congress' Joint Committee on Atomic Energy (JCAE).

These generally successful arrangements for the weapons program – AEC sponsorship of GOCO laboratories and production facilities – continued until the energy crises of the 1970s led to disestablishment of the AEC and formation, in the mid-1970s, of the Department of Energy and the Nuclear Regulatory Commission. The JCAE was also disbanded at this time. In the nuclear arms control climate at the time, the nuclear weapons program, rather than being incorporated into the DoD, was attached to the new DOE, with little regard for natural congruence of missions and programmatic approaches.

When the first Reagan administration proposed the disestablishment of DOE in 1981, the initial approach was to locate the nuclear weapons program in DoD. Because of the Services' concerns over budget impacts, however, the draft legislation instead located the weapons program in an essentially autonomous agency, somewhat similar in structure to the AEC. However, in the end, of course, DOE was not disestablished, the draft legislation was not enacted and the weapons program remained part of DOE.

Underlying Causes

During the 1980s and 1990s, the lack of congruence between the DOE's missions, policies, and methods relative to the weapons program, led to increasing encumbrance by DOE management based on approaches that were not tailored to the needs of a nuclear weapons enterprise. Also during this period the appreciation for, and effectiveness of, the GOCO FFRDC model began to decline as DOE exercised increasingly detailed authority over the organizations that were formed to provide a level of stable technical and management expertise not available in the government. This is the basic reason for establishing FFRDCs. Today, the national laboratory FFRDC model is poorly understood, in DOE, the Congress, and elsewhere in government.

A key disconnect has been in knowledge and experience. From the early days of the AEC, the weapons program, because of its uniqueness, grew its own expertise in-house -- in science, engineering, programmatics, and surety – and mainly outside of government, in the national nuclear laboratories and the production plants that largely comprise the enterprise. The AEC, the JCAE, and these organizations grew up concurrently, following in Leslie Groves' footsteps, and were confident in their ability to execute effective government oversight without detailed control or frequent intervention. When the DOE was formed, for a variety of reasons the necessary expertise was never effectively transferred to the DOE as a whole. Further, in the process of absorbing the nuclear weapons mission into DOE, a fundamental principle essential to the proper management of the nuclear enterprise was lost. That principle is that the source of expertise for the federal line management for mission execution, to include risk management in safety and security, must be the contractor line management. Instead, increasingly DOE replaced reliance on this essential contractor expertise with rules and processes developed and enforced in staff, not line organizations, thereby inappropriately separating accountability from authority. No compilation of rules can be a substitute for the expert judgment of those accountable for delivering the mission product, safely and securely. The developing bureaucratic encumbrances to the efficient and effective operation of the nuclear weapons enterprise were examined in detail by the Secretary of Energy Advisory Board in the February 1995 report on *Alternative Futures for the Department of Energy National Laboratories* (the Galvin Report). Among an extensive list of specific management oversight excesses, the report noted that:

> "The net effect is that thousands of people are engaged on the government payroll to oversee and prescribe tens of thousands of how-to functions. The laboratories must staff up or reallocate the resources of its people to be responsive to such myriads of directives; more and more of the science intended resources are having to be redirected to the phenomenon of accountability versus producing science and technology benefits."[4]

In March 1999, the Commission on Maintaining United States Nuclear Weapons Experience (Chiles Commission) characterized the impact of increasingly detailed oversight from DOE headquarters and the site offices with the following:

> "The current stewards of the stockpile experience frustration caused by the high level of DOE micromanagement in the workplace. Worker feelings range from anger to resigned despair. Uncertainties are created by the overlapping and unclear government roles in supervision of operations. At the extreme, some felt that supervisory bureaucracies had become the prime customer of their facility – that is, pleasing the overseers has become equally or more important than accomplishing their stewardship mission."[5]

In October 1999, recognizing the dissonance inherent in the situation and the encumbrances for the weapons program, President Clinton signed into law a bill establishing the NNSA to be a semi-autonomous agency within the DOE responsible for enhancing national security through the military application of nuclear energy. The law specifically transferred responsibility for managing the nuclear weapons complex from DOE to NNSA.

A year after the NNSA Act, a special oversight panel of the House Armed Services Committee found that "NNSA was little more than a paper organization, bereft of the leadership, structure, and degree of semi-autonomy intended by the Congress."[6] The panel expressed hope that the impending appointment of a new Administrator would lead to fulfilling the intent of Congress. The evolution of management approaches since that time has not increased the autonomy of the NNSA, which must still operate within the DOE bureaucratic structure. In contradiction to the NNSA Act, the DOE Implementation Plan specifically preserved oversight responsibilities of the existing DOE staff agencies. The Implementation Plan declared "The Implementation Plan does not change the scope of responsibility of the Departmental offices that perform independent oversight and have the Department-wide responsibilities for overall policy in staff areas, such as environmental compliance, worker safety and health, and project management."[7] Hence the Implementation Plan denied the NNSA the intended autonomy. *Further it established that DOE practice was de facto assignment of what are clearly line management responsibilities to staff agencies.* Specifically, the plan characterizes environmental compliance, worker safety and health, and project management as staff, rather than line management functions. With this construct, it is difficult to impossible for the NNSA management or the contractors operating the nuclear weapons complex to integrate these essential functions into the daily management and operations of the enterprise. This approach continues to produce results that do not meet mission needs, but that are regularly blamed on contractor line management rather than on the confusion

[4] *Alternative Futures for the Department of Energy National Laboratories*, Secretary of Energy Advisory Board, February, 1995, Apendix A.
[5] *Report of the Commission on Maintaining United States Nuclear Weapons Expertise*, Pursuant to the National Defense Authorization Acts of 1997 and 1998, March 1, 1999, p. 36.
[6] *An assessment by the Special Oversight Panel on Department of Energy Reorganization*, Committee on Armed Services, U.S. House of Representatives, October 13, 2000, Executive Summary.
[7] *The Department of Energy Implementation Plan, National Nuclear Security Administration,* January 1, 2000, pg 9.

of authority and accountability engendered by excessive oversight, micromanagement, and a risk avoidance policy.

This assessment of the effect of the language of the Implementation Plan is not a recent issue. The GAO noted in 2000 that:

> "DOE's Implementation Plan simply transfers many of the DOE's historic shortcomings to NNSA. In particular:
>
> - NNSA's organizational structure does not establish clear lines of authority or streamline the field structure.
> - NNSA is taking a "business as usual" approach to planning, programming, budgeting and securing skilled technical staff instead of affecting needed change as part of the Implementation Plan.
> - While NNSA was to be distinct from DOE, they have duplicative and overlapping functions.
> - Significant questions remain about the relationship between NNSA and DOE's organizations that oversee NNSA and DOE's line management to ensure effective security and environment safety, and health programs."[8]

Some five years later, the issues - identified in studies, commissions, and panels – that led to the establishment of the NNSA persist. The latest evidence is found in the 13 July 2005 *Report of the Nuclear Weapons Complex Infrastructure Task Force* which declares that:

> "The complex must learn to balance quality, safety, security and cost in order to meet the needs of the nation in a cost-effective, appropriate manner. . . . Many administrative orders and procedures designed for the DOE civilian research and science laboratories are not well suited to the product-oriented Complex. The NNSA mission requires clear deliverables and requirements for the nuclear weapons life cycle, achieved by design, testing, manufacturing, and production with materials that by their very nature embody risk."[9]

Some members of the nuclear community believe that demands for new and life extension production will correct the current imbalances. The Task Force believes that, given all that has gone before, the needed transformation in the nuclear weapons enterprise will require some fundamental change in the current situation, and it is time for a remedy that would both enable the transformation and be part of it.

The DoD Role

There is also an urgent need for changes in scope of the DoD involvement in the broader nuclear enterprise and capabilities risk management equation. Specifically, DoD is requiring continuing stockpile levels that include the operationally deployed warheads and a significant non-deployed stockpile as a hedge against technical problems or geopolitical changes. This approach appears to be low risk on the surface but can, instead, be the source of high risk to the future enterprise and capabilities. The resource demands of sustaining the stockpile, both in numbers and in types of

[8] Testimony of Associate Director of GAO, *Views on DOE's Plan to Establish the National Nuclear Security Administration*, Special Oversight Panel on Department of Energy Reorganization, March 2, 2000, pp. 1, 2.

[9] *Recommendations for the Nuclear Weapons Complex of the Future*, Report of the Nuclear Weapons Complex Infrastructure Task Force of the Secretary of Energy Advisory Board, 13 July, 2005, par. 5 & 5.2.

warheads, puts high pressure on available resources and may put the future enterprise at high risk. The DoD needs to participate fully in the trade-offs, accepting prudent risks in the current environment, to help ensure a viable set of capabilities in the longer term where the environment is far more uncertain.

Recommendation: The Secretary of Defense should direct that the Nuclear Weapons Council, with full participation by the Commander, USSTRATCOM, perform a full risk management assessment weighing the demand on resources to sustain the current quantities and diversity in the nuclear weapons stockpile against the resources required to provide needed future capabilities.

Transforming the Nuclear Weapons Production Complex

There have been no new nuclear weapon types produced since the early 1990s and only minimal modification of some of the weapon types since that time. Various DOE internal and external studies suggest there is little reason to be confident in the responsiveness of the production infrastructure today and the current schedule backlogs in weapon surveillance and dismantlement contribute to this lack of confidence.

There are studies past and present replete with ideas and concepts, but the DOE has yet to put forward a plan for a responsive production infrastructure prescribed in the 2001 Nuclear Posture Review. There are two current, high profile, studies that bear directly on this issue -- the ongoing DoD/DOE Reliable Replacement Warhead (RRW) study and the recently released report of the DOE Nuclear Weapons Complex Infrastructure Task Force (NWCITF). The RRW study will not be completed until November 2006. The DOE NWCITF study was recently released. It is important to note that the NWCITF included the RRW concept as a keystone for transformation to a responsive production infrastructure.

The key NWCITF recommendation on organization and structure of the production complex is to create a single consolidated site for work with special nuclear materials (SNM). A single site, while theoretically attractive, is not likely to be viewed as an affordable near-term approach.

The reality is that the 2020 production complex will be some version of the current set of facilities though downsized and upgraded. There are affordable plans and opportunities to reduce the number and size of locations where SNM is involved in work or storage. This can both improve efficiency and reduce the cost of security. Some examples are included in this report.

The RRW concept can provide the catalyst to transform the complex to a responsive infrastructure and to provide the production capability needed to sustain the nuclear deterrent as required. The RRW pilot program is a competition to design a more reliable, safer, more secure replacement for follow-on increments of the W76 life extension program. The RRW requirement is discussed in the next section of this report *(Section 5: Sustaining the Nuclear Weapons Stockpile)*, but the corresponding near-term production challenge is to be able to produce a predetermined number of RRW-class warheads per year by 2012 (determined by USSTRATCOM to meet operational requirements and ensure the endurance of the W76 as a viable deterrent). This is not the end point for the complex, but rather the driving near-term need. For the longer-term, pit production capability must be expanded to meet the broader future need. Planning for that warrants a high priority now.

Recommendation: The national security leadership should demand that the weapons complex be capable of producing a predetermined number of RRW-class warheads per year by 2012 for timely evolution to sustain a reliable, safe, secure, and credible stockpile.

There seems to be no question about the need for transformation of the production complex. The issue is transformation to what, with what, and for what purpose. Three key elements of needed transformation are:

- Changing the way weapons are designed and produced;
- Changing the production site and facility infrastructure; and
- Changing the way the nuclear weapons enterprise is managed.

Changing the Way Weapons are Designed and Produced

Replicating major segments of the current stockpile of high performance (yield-to-weight) weapons to extend their lives for the long term is proving to be difficult and expensive. These weapons are difficult to build and difficult to certify. An ongoing program to address this issue is the RRW concept discussed in the next section of this report. The RRW approach has great potential merit for a number of reasons, to include improved manufacturability, and in a properly managed complex, will contribute to reduced cost of production. However, it will not significantly reduce cost with the current approach to production management. Less and less of the total resource is actually consumed by direct labor on the nuclear warhead. As a reasonable first approximation, 80% of the total cost would go to operate the production infrastructure in warm standby and 20% of the total cost would go into producing the warheads.

Even with a completely successful RRW program, current weapon types will remain a significant fraction of the stockpile for the next 20 years. The RRW can be one of a set of enabling actions for transformation, but there are other enabling actions that would be timelier in reducing costs and improving responsiveness.

Changing the Production Site and Facility Infrastructure

The report of the DOE NWCITF recommends immediate action on the RRW concept and essentially a point solution for the production infrastructure, the Consolidated Nuclear Production Center (CNPC). Currently, new pit and secondary production facilities are the most critical needs. To first approximation, these facilities require the same safety, security and production infrastructure. Based on the current DOE approach, it is unrealistic to assume that new nuclear production facilities would appear less than 10-15 years from today.

Today, the distributed production infrastructure is sub-optimized, resulting in high cost and slow response. Since each element of this sub-optimized structure is under separate contract, there is little contractor incentive to contribute to a more effective and efficient production complex. With either the CNPC concept or a distributed production infrastructure, a single contract arrangement could be the vehicle for incentives to reduce cost and improve responsiveness in the near term.

Consolidation of administrative and technical overhead for production operations involving materials alone should yield significant savings. Technical overhead refers to the significant level of analytical work that is required today to run a safe, secure, and environmentally

compliant production facility – for example, extensive hazard analyses to support facility safety basis documentation.

The single contract should include the Pantex and Oak Ridge Y-12 plants, the tritium facilities at the Savannah River Site, the Nevada Test Site, and the pit manufacturing facility. The resulting savings could be applied to supporting critical production capabilities for existing weapons and RRW while the stockpile and production infrastructure are being transformed. Current contracts are on an approximate 5-year cycle, so this action could be implemented far sooner than building new facilities.[10]

Recommendation: The Administrator, NNSA should contract for nuclear weapons production involving nuclear materials with a single contract with incentives to creating the most efficient production enterprise with right-sizing and consolidation.

This "single contract" recommendation should be considered an important near-term strategic step to enable a longer-term transformation to a more responsive and cost-effective production infrastructure.

In the current structure, nuclear materials are located at multiple sites and at multiple locations on sites. Efforts to consolidate nuclear materials at fewer locations in smaller footprint restricted areas would change the demand for the protective force size to meet the increased design basis threat. There are consolidation opportunities within both DOE and DoD sites. For example, at one DoD site the restricted area for nuclear weapons storage is five times larger than needed to store the current and anticipated inventory of weapons at that location. A modest restructuring could significantly enhance security at this site. At a DOE site, the restricted area containing SNM could be reduced to $1/10^{th}$ the current size providing for more efficient operations and a concurrent reduction in security costs.

Recommendation: The Secretary of Defense and the NNSA Administrator should pursue plans to reduce the number of sites and locations within sites containing bomb-size quantities of Category I nuclear materials.

Changing the Way the Nuclear Weapons Enterprise is Managed

This portion of the report focuses on the more tactical day-to-day operation of the nuclear weapons production infrastructure and particularly the risk management model exhibited by the DOE.

The DOE risk management model responds to concerns about safety, even those that are highly hypothetical, with a work stop until a new detailed safety basis is established. For example, the W76 surveillance program lost about 30 weeks in 2004, mainly through safety and security-related shutdowns. Internal staff agencies and the Defense Nuclear Facilities Safety Board exercise influence that amounts to de facto directive authority over safety matters with no accountability for the impact of their activities on productivity. Hence, the precipitous drop in productivity has gone unchallenged – perhaps unnoticed. There is an urgent need to ensure that people with competence in the details of the mission analyze safety and security issues so that the concerns are properly addressed with an acceptable level of risk in balance with the mission

[10] At the time this report was written there was an ongoing public discussion of DOE/EM re-bidding the Savannah River Site contract to include the weapons tritium facilities. These facilities should be under the contracting control of the new NNWA.

of the enterprise. Risk management is an inherently line management function that must be fully integrated into the daily execution of the mission.

A key example of the result of the current disconnected approach is found at Pantex. Pantex is selected for the example because, unlike other operations in the NNSA complex, there has been no break in the continuing demand for dismantlements and surveillance. As compared with the workload in the 1980s, today Pantex, with about the same hands-on work force as in the 1980s, has only a capacity of about 10% of the throughput for fiscal year 2005. The workload is **expected** to increase significantly by FY2011.[11]

The sharpest decline in productivity was between 1995 and 1999 and is primarily due to restrictive processes in response to safety and security concerns. Given this state of productivity, there is a significant and growing backlog meeting even the current workload. The difference is not attributable to increased complexity of the operations. It is attributable to the way the operation is managed. For example, in a scenario involving a potential safety issue, the response was to limit operations while a safety basis was devised to reduce the probability of the identified accident scenario to no more than one in a million. Since responding to hypothetical safety challenges can require proving a negative, resolving any such issue can take months or years. The effect on productivity of this single issue is enormous.

Further, much of the most expensive manpower is tied up searching for solutions to respond to people with no managerial or production accountability. It has reached the point that, at Pantex, there are three process engineers for each hands-on worker even though they are dealing with weapons that have been in the inventory for an average exceeding 20 years using processes that have a perfect, decades-long record of achieving the goal of no scattering of plutonium from any accident scenario.

In spite of the high cost, one might decide that the nation is willing to pay that price in productivity for a zero-risk approach. The demonstrated reality is that the nation is not willing to pay the price; hence the large backlog in work at some NNSA facilities. Further, stopping work, in most of these incidences, is not zero risk. It can, instead, increase risk. It is likely that a significant contributor to this overwhelming primacy of safety concerns over productivity is because it has been well over a decade since the complex was required to actually produce weapons. Even so, the current attitude of "no work equals zero risk" has created a large backlog of past due surveillance and a large dismantlement backlog. Some of the awaiting dismantlements, long in queue, were removed from the active stockpile because of identified operational safety concerns. Yet, after several years they still wait in queue.

One of the purposes of regular surveillance is to provide an early warning signal that hazards in the weapon are occurring due to aging or other reasons, such as improper handling or storage. Delaying surveillance because of theoretical safety issues can produce greater and more real safety issues.

Recommendation: The Administrator, NNSA should:

- ***Ensure that line management (federal and contractor), has the authority and accountability to deliver the mission product;***

[11] NNSA briefing to DSB Task Force on Nuclear Capabilities on 21 July, 2005, entitled *Status of Production Complex and Readiness*, slide 8, Pantex Throughput (Current NNSA FY & FYNSP Years P&PD 2005-0 – Pantex (weapon equivalent operations).

- ***Ensure that staff and advisory board functions are supporting, not directing, line management; and***
- ***Thoroughly embed safety and security functions in line management with the concerns of staff and outside agencies passing through the crucible of systems analysis, risk management, and line mission management judgment.***

Criteria/Principles for Management and Organizational Arrangements

Certain criteria, principles, and goals must guide the needed changes:

- The nation must have a nuclear weapons enterprise that is fully capable of sustaining a reliable, safe, secure, and credible nuclear deterrent, limiting and dealing with proliferation, and avoiding technical surprise.
- The crucial imperatives are a focus on nuclear weapons and organizational independence from disparate equities and interests.
- The enterprise must report at the top to experienced people who care about the mission, and who understand that the long-term foundation of deterrence is the nation's intellectual capital regarding nuclear weapons beyond the extant stockpile and infrastructure.
- The enterprise must operate in accordance with well-proven management and leadership practices and norms that give line management *unquestioned* authority and accountability for all aspects of enterprise operations and products.
- The nuclear weapons enterprise consists of the stockpile of warheads, the inventory of platforms, and the associated development, production and operational infrastructures. It also consists of science and weapon R&D, weapon and platform production and sustainment, integration of weapons with platforms and with DoD operations with nuclear weapons, and national policy. Organizational arrangements must be evaluated as to competence across this wide range of activities, commitment to the program, as well as congruence between these activities and the parent organizations' other activities.
- Arrangements must properly strike three kinds of balances:
    - Between integration with DoD and maintaining an independent view on nuclear weapons matters,
    - Between assuring a strong focus on nuclear weapons and contribution to other security needs of the nation.
        - Especially for the national nuclear laboratories, working on other security-related matters both strengthens the nation and provides a broader base for weapons work. It would benefit both weapons and other national security needs if the nuclear laboratories were once again treated as true national laboratories, taking on large, long-term, high-risk/high-payoff problems of importance to national security.
    - Between management approaches conducive to R&D and management approaches conducive to production.
- The interface between DoD and the warhead/weapons program must be effective.

- There must be commitment to management practices conducive to mission accomplishment including:
    - Consolidating contracts into a small number covering the broad mission areas, and
    - Broad delegation of responsibility to the contractors, so that decisions can be made at the point where expertise and authority coincide, including especially returning responsibility for safety and security of operations to the line management organization.

Options for Management and Organization

The Task Force considered three options to improve the efficiency and effectiveness of managing the nuclear weapons enterprise.

- Reform within the Current NNSA/DOE Structure
- Moving NNSA to DoD
- A Government Corporate Approach

Reform within the Current NNSA/DOE Structure: NNSA was established to provide clear lines of authority to accomplish the mission of sustaining a reliable, safe, secure, and credible stockpile. A Secretary of Energy could direct and enforce internal reforms that would meet that purpose, providing the needed semi-autonomous NNSA accountable only to the Secretary. However, this would take a fundamental change in the culture currently driving nuclear weapons complex operations. Further, this culture has spread to the NNSA itself. As a minimum, there would need to be effective and credible steps to correct the most fundamental detractors from the nuclear weapons mission within DOE. They include:

- A return to a risk assessment approach that balances risk against mission demands with safety concerns passing through the crucible of analysis before taking precipitous action. This does not imply less emphasis on safety. Instead, it implies more effective emphasis with safety awareness and attention embedded in operations at every level.
- An end to the excessive oversight and micromanagement that has been repeatedly identified by line management and by a long series of commissions and studies over the past decade with literally thousands of detailed how-to processes imposed on daily operations at all levels. As noted earlier in this report, the excessive oversight and micromanagement that characterizes the current situation long predated establishing the NNSA.
- Moving all the functions to NNSA needed to plan, program and execute nuclear complex infrastructure and weapons activities.

Given the culture of excessive oversight, micromanagement, and risk aversion without regard to productivity that has developed since the end of the Cold War, this Task Force has low confidence in the prospect for an effective lasting change in management of the nuclear weapons enterprise within DOE. It is more likely that there will be continuing pressures to more fully absorb NNSA functions within the regular DOE structure.

The politics and programmatics of the broader energy needs, the economy, and the environment make intense demands on the top leadership in DOE. Management demands for nuclear weapons

are very different than for nuclear reactors or other energy programs. Energy R&D is conducted in a market context; weapon R&D in a deterrence context. Hence it has proven somewhere between difficult and impossible for that leadership to attend to the breadth of demands while dealing with the unique demands of running the nuclear weapons enterprise.

Because of the nature of nuclear weapons, the program has always been and will continue to be controversial. Furthermore, inherent in the weapons program is managing significant levels of risk in program operations and in weapon design and surety. The risks are of a level and type significantly different from those related to DOE's other energy activities. Considering weapons controversy and risk-management differences together, the tendency to micromanage the nuclear weapons complex and the resulting delayed and conflicted decisions are not surprising.

DOE does not engage in production other than nuclear weapons.

In contrast to the relationship between NNSA and DOE headquarters and field offices, the Naval Nuclear Propulsion (Naval Reactors) program operates effectively with the level of independence envisioned by the Congress for NNSA. However, the Naval Nuclear Propulsion program had existed as a tightly integrated, largely independent, focused program for more than 25 years before the establishment of DOE. Hence, the success of the Naval Nuclear Propulsion program within DOE does not provide confidence that the approach to the broader nuclear weapons program can be modified within the DOE to provide for efficient and effective management.

On balance, the DOE alone is not a good fit for the nuclear weapons program for the crucial time ahead. This is not judgment critical of the DOE enterprise or its leadership. The driving motivation for the formation of DOE in 1977 and its predecessor Petroleum Board in 1972 and Energy Research and Development Administration in 1974 was dealing with the energy crisis. Given the continuing urgency of that need and the divergent demands of managing the nuclear weapons program, divestiture of the nuclear weapons enterprise from DOE would be in keeping with proven good business practice to spin off functions that do not fit coherently into the larger enterprise. Almost 30 years of experience should provide enough of a basis to conclude that such a divestiture could benefit both the increasingly important energy program and the nuclear weapons enterprise.

Move NNSA to DoD: In terms of competencies, commitment, and congruence of goals and management approaches, the DoD could be a better match for oversight and support of NNSA. National defense is a common goal. The DoD -- its agencies and contractors – engage competently in R&D, quantity production, weapons integration with delivery systems, and many other aspects of nuclear weapons operations that underwrite deterrence.

But behind these top-level affinities there are considerations that raise serious doubts about a natural fit for nuclear weapon R&D and production in DoD alone. Much of the discussion about the difficulty in accommodating the demands of the nuclear weapons enterprise embedded in DOE also apply to DoD. Even during the Cold War, nuclear weapons were something of a round peg in a square hole in DoD. They were (and are) instruments of national policy more than weapons of military operations -- although for deterrence there must be sound operational planning for their use and a credible expectation that they would be used if deterrence failed. Without such a credible expectation, there is no deterrence.

The DoD has done a competent job in developing, producing, and operating nuclear weapons delivery systems, in integrating weapons into delivery systems, and in the many other aspects of nuclear weapons operations that underwrite deterrence. These DoD aspects of the overall nuclear weapons enterprise are extensions of DoD's general competencies in system development and military operations.

But warhead R&D and production are different from other DoD activities, partly because of the nature and importance of the basic science involved. Because of the unique phenomena and the extreme physical regimes involved in nuclear explosions, fundamental physics is more intimately tied up in warhead design and production than in design and production of almost anything else, and confidence in weapons' reliable performance must be based on a uniquely deep understanding of the science involved. It was never possible to test nuclear weapons enough to gain statistical confidence in them, and in a time without nuclear testing, fundamental understanding is even more important. Furthermore, because the science must be reflected in the produced weapon, and because of the extremely rigorous imperatives for nuclear weapons safety and use control, there are demands placed on the quality and understanding of the engineering involved that are equal to those for the science, and there must be seamless integration of the science, the engineering, and the manufacturing of weapons.

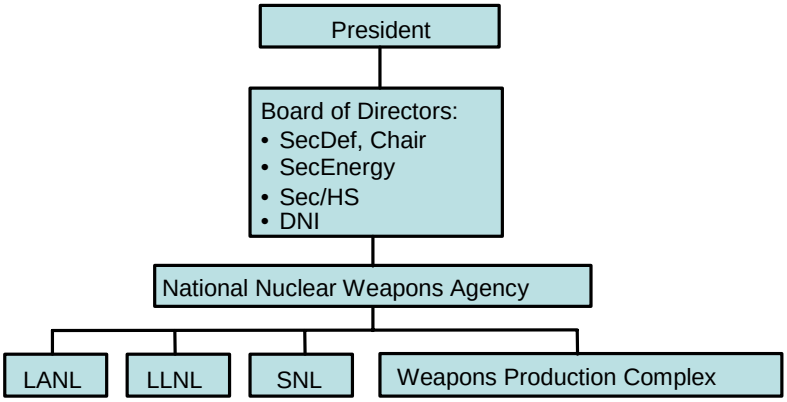
Since the end of the Cold War, DoD senior-level attention to nuclear weapons management has been minimal at best. The Assistant to the Secretary of Defense for Atomic Energy's focus was expanded to include chemical and biological that have little in common with nuclear matters except the generic term of WMD. The Air Force has eliminated a major command focused on nuclear capabilities and has changed the headquarters organization dealing with nuclear matters several times in recent years and has no headquarters office or organization with nuclear in the title. Within the Navy the Strategic Systems Programs (SSP) organization has remained intact and effective. But that is largely a matter of a longstanding, tightly integrated and focused organization that has existed with little change in organization and status since 1957.

Furthermore, just as in the early days of the nuclear weapons program, it remains important to preserve an independent view, for the President and the Congress, on nuclear weapon matters. And finally, the nuclear weapons laboratories are needed by other departments' national security related work, especially homeland security and the intelligence community, and are strengthened by doing that work, as long as a reasonable balance is maintained.

Hence, on balance, DoD alone is not a good fit for NNSA.

A Government Corporate Approach: A compromise that provides the best hope of providing the needed supplier and customer attention and giving the nuclear weapons complex the appropriate unfettered focus is a fully independent agency. The independent agency – the National Nuclear Weapons Agency (NNWA) – would be headed by a Senate-confirmed, Executive-Level 2 Administrator, reporting to the President, with a Board of Directors to ensure active and balanced attention. The Board would be made up of the cabinet officers who have the most direct stake in the enterprise -- the Secretaries of Defense, Homeland Security, and Energy, and the Director of National Intelligence. The Secretary of Defense would chair the Board. The organization is illustrated in Figure 2 below.

Fig 2: A Government Corporation



The Task Force recognizes that this is a unique organization with no identified existing model in the Government. However, the nuclear weapons enterprise is a unique enterprise creating unique management demands. Hence a unique solution may be the best solution.

Recommendation: The National Security Council should recommend to the President a National Nuclear Weapons Agency (NNWA) with the administrator reporting to the President through a Board of Directors made up of the Secretaries of Defense, Energy, and Homeland Security and the Director of National Intelligence who are accountable to the President for oversight and support of the nuclear weapons enterprise.

- ***The core of the new agency's responsibility should be the three national nuclear weapons laboratories and the weapons production complex.***
- ***The agency's responsibilities should also include those activities that require unique knowledge of nuclear weapons.***

With this option, the Administrator of the National Nuclear Weapons Agency (hereafter referred to as NNWA) would be charged with advising the President on issues related to nuclear weapons and on other national security technologies within his purview.

The Board of Directors would assure the fundamental viability of the enterprise, that its objectives are clearly defined and achieved, and that the balances mentioned above are properly struck.

The NNWA would be staffed by drawing from the nation's full range of competence in labs, universities, industry, government, and elsewhere. Personnel policies must be put in place to allow this.

New management and regulatory practices would be used, drawing on current and past best practices, and reflecting the nation's priorities and urgencies. Of crucial importance would be to let the contractors involved, who make up the core of the enterprise, do their jobs with only the minimum essential government oversight and intervention. In addition to their intrinsic merit, these and other measures would help to revitalize the concept of the national laboratory, at least within the NNWA sphere.

There is no perfect arrangement for the nuclear weapons program. This proposal seeks to strike a workable balance among the competing considerations for the nuclear weapons program – certainly a better balance than in today's arrangements.

Making the Proposal Work

In the method of appointment of the Administrator, serious consideration should be given to institutionalizing measures that will provide for continuity, appropriate experience and, to the extent possible, avoiding politicization. A relatively long-term appointment similar to that of the Naval Nuclear Propulsion program that is not tied to the presidential election cycle would contribute to this goal.

The proposed cabinet-level Board of Directors for the Agency will be crucial. Key to making the Board of Directors work well is what makes boards of directors of corporations work well – that is accountability. The Board would be written into the legislation that establishes the NNWA, and the nature of the enterprise itself adds to the expectation that the Board will pay serious attention. Among the Board's functions would be to:

- Report annually to the President on the health of the U.S. nuclear weapons enterprise.
- Address issues related to use of NNWA assets by other agencies/departments so as to assure both a) long-term support for the nation's nuclear weapons technology and industrial base and b) ease of access to unique NNWA capabilities by agencies/departments with relevant needs.

The NNWA's core would be the entirety of the current NNSA nuclear weapons program. In addition, activities related to proliferation, arms control, threat reduction, homeland security, and intelligence should be examined for inclusion. Carrying the nuclear aspects of some or many of these activities into the NNWA would add scope and coherence to the nation's nuclear deterrence posture, but it would also divert management attention from the U.S. nuclear weapons program. Perhaps they should all be incorporated in the NNWA, perhaps none, perhaps some. Activities included in the new Agency should be those that require unique knowledge of nuclear weapons. The decision should be made on the basis of a detailed review of what would provide best for deterrence and the security of the United States. At the same time, the nuclear weapons laboratories, as distinct from the NNWA, can and should play a broader role in national security technology, subject always to striking the right balances among nuclear weapons focus, contributing to the nation's security by working in other areas, and strengthening the labs' nuclear weapon technology base by doing such other work.

Although this proposal provides for significant organizational changes, the most fundamental aspects of the proposed arrangement are unchanged: it would be still a federal agency with nuclear weapons as it highest priority and contracting outside of the federal government for operation of federally-owned facilities.

Forming the New Agency and the Transition

It will be important to avoid the pitfalls that deflected the will of Congress as NNSA was formed. It will also be important to separate sharply the nuclear weapons enterprise from the myriad set of regulatory, safety, inspection, and other bodies associated with the nuclear power industry. The objective is to clearly assign full responsibility and accountability for all aspects of the safe, secure operation of the enterprise to line management within the new agency with appropriate oversight by the Board of Directors, i.e., all mission operations and all oversight are invested in that chain of authority with appropriate oversight by the Congress.

A change will be needed to the legislation to create an independent agency reporting to the President through a board of directors with the composition of the Board specified in law. However, most of the other provisions of the NNSA Act remain valid.

The assumption is that the appointment of the three Cabinet members and the Director of National Intelligence as the members of the Board of Directors will ensure the needed champions to correct the longstanding deficiencies identified in the operation of the nation's nuclear weapons enterprise. However, the Congress will also need to provide strong support so that this time, the intent of Congress is implemented to create a safe, secure, and effective nuclear weapons enterprise that efficiently meets the nation's security needs.

Changes in DoD and at the Interface

Changes in DoD are also essential, and these will be difficult, but changes are an essential part of a needed comprehensive package.

As already stated, nuclear weapons have always been and continue to be more instruments of national policy than weapons of military operations. Hence, even during the Cold War, nuclear weapons required special organizations and approaches in DoD. These were generally dedicated, nuclear-unique, organizations and programs at the DoD staff level, in the military departments and in the combatant commands. Since the end of the Cold War, with the escalation of other national security challenges, nuclear matters have slipped even further toward the edge of DoD's mainstream attention. With perhaps one exception – the Navy Strategic Systems Programs -- the nuclear-dedicated organizations were disestablished, vitiated, or tasked with additional missions that, in various degrees, submerge the nuclear weapons activities. Nuclear weapons need to be addressed within the context of the NPR and the overall strategic posture, to include non-nuclear capabilities. Still, nuclear weapons remain unique in their policy implications, their effects, and the demands of safety and security. Hence, a competent and committed structure for nuclear weapons within the DoD needs to be re-established.

The basic structure of the national nuclear weapons enterprise can be thought of as having three parts:

- Suppliers of equipment – the NNWA for the warheads, DoD contractors and DoD's acquisition apparatus for delivery systems and nuclear/strategic C4ISR,
- Force providers, and

- Users/operators.

Changes are needed in all three and especially in their inter-relationships. The recommendation for the NNWA addresses, in part, the supply of warheads/weapons. In DoD there are three key needs – creating an Assistant Secretary of Defense for Strategic Weapons (ASD (SW)), strengthening the Nuclear Weapons Council, and strengthening the role of the U.S. Strategic Command.

The relationship between an "Assistant to the Secretary" of Defense and other DoD authorities has, over time, become cloudy and inconsistent. For this and other reasons, the Task Force believes that the Office of the Assistant to the Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs (ATSD (NCB)) should be changed to a new office/position -- the Assistant Secretary of Defense for Strategic Weapons (ASD (SW)), reporting to the Deputy Secretary of Defense, with authorities that are clear and well understood.

The ASD (SW) would be the architect of the strategic offensive weapons (nuclear and kinetic non-nuclear) systems-of-systems, and the proponent in OSD for nuclear weapons programs. The ASD (SW) would support the Secretary of Defense's responsibilities on the Board of Directors of the NNWA, previously proposed. The NWC is discussed later in this report. The responsibility for oversight of strategic systems acquisition would remain in the office of the USD (AT&L) as currently organized. The ASD (SW) would work closely with the USD (Policy) on nuclear weapons issues. This structure appropriately elevates attention on strategic weapons for the critical time ahead.

Within the ASD (SW), a Deputy Assistant Secretary of Defense for Nuclear Weapons (DASD (NW)) would be established and have responsibility for the nuclear aspects of strategic weapons. The DASD (NW) would have the nuclear weapons responsibilities of the current ATSD (NCB) and the nuclear weapons aspects of global strike-related programs. The ASD (SW) would work closely with the USD (AT&L) to better ensure oversight of the status and responsiveness of DoD's contractor/industrial base for nuclear weapons.

USSTRATCOM should play a more influential role in the strategic systems acquisition process and must be the bridge from acquisition to operations. This is needed in part because nuclear and (other) global strike weapons, by their nature, have been and will likely continue to be "things apart" from the bulk of the Services' responsibilities and interests. Such specialized capabilities require strong combatant command advocacy in acquisition deliberations and the resource allocation process. As such, the Commander, USSTRATCOM is now an official member of the Nuclear Weapons Council.

The functions of the Defense Threat Reduction Agency (DTRA) in support of the U.S. strategic posture remain crucial. In this new construct, DTRA would report to the ASD (SW). DTRA would continue to provide strong support directly to combatant commanders.

Recommendations: The Secretary of Defense should:

- ***Direct action to change the Office of the Assistant to the Secretary of Defense (NCB) and establish an office/position of the Assistant Secretary of Defense for Strategic Weapons (ASD (SW)), reporting to the Deputy Secretary of Defense. The ASD (SW) would have a Deputy Assistant Secretary of Defense for Nuclear Weapons (DASD (NW)). The ASD (SW) should function as Executive Director of the NWC (currently performed by the ATSD (NCB)), and***

- ***Propose and facilitate the Congressional process to make the Commander, U.S. Strategic Command a member of the Nuclear Weapons Council.***[12]

The NWC should be redirected to provide comprehensive and integrated reviews and oversight of nuclear weapons policies and programs. The current practice is piecemeal review of specific issues, e.g., Project Officer Group briefings on individual weapons status, review of ad hoc nuclear-related studies and issues, NNSA surveillance updates. Such issues are better handled by the ASD (SW) and the Administrator of the NNWA. The needed approach would periodically review complete programs, e.g., plans and programs for the family of ballistic missile warheads, nuclear bombs, ballistic missiles, strategic aircraft, and nuclear cruise missiles, and how these comprise the integrated nuclear deterrent to meet U.S. security needs for the future.

Given the need for the Nuclear Weapons Council (NWC) to play a more expansive role in broad reviews of the nuclear weapons program and in assessing the nuclear weapons enterprise needs with an authoritative customer and supplier interface, the Deputy Secretary of Defense should become the NWC chair with USD (AT&L), USD (Policy), the Vice CJCS, the Commander, USSTRATCOM and the Administrator NNWA (NNSA) as members. Other changes may be needed in the inter-relationships, and policy and acquisition aspects of the nuclear/strategic posture, but assigning the Deputy Secretary of Defense as chair can catalyze the needed changes.

Recommendations:

- ***The Secretary of Defense should propose and facilitate the Congressional process to appoint the Deputy Secretary of Defense as the chairman of the Nuclear Weapons Council.***
- ***The Chairman of the NWC should produce an annual calendar for the NWC that provides for comprehensive and integrated review of nuclear weapons programs and policies to include the full nuclear warhead and delivery vehicle programs.***

[12] As of early May 2006, the House Armed Services Committee markup of its version of the FY07 Defense Authorization Bill includes adding CDRUSSTRATCOM as a member of the Nuclear Weapons Council.

Defense Science Board
DSB
Department of Defense

Section 5: Sustaining the Nuclear Weapons Stockpile

Much of the information in this section was extracted from studies on the future of the nuclear weapons stockpile by the ATSD (NCB) and the USSTRATCOM Strategic Advisory Group. This section addresses important deficiencies in the current path to sustaining a reliable, safe and secure stockpile of nuclear weapons.

The current guidance from the President for nuclear weapons was communicated in the Nuclear Weapons Stockpile Memorandum (NWSM) and Nuclear Weapons Stockpile Plan of January 2006. It provides the long-term objectives for the transformation of strategic capabilities of 1,700-2,200 operationally deployed strategic nuclear warheads in 2012. The President stated in the NWSM that it is of vital importance to U.S. interests to maintain a safe, secure, reliable, and effective nuclear weapons stockpile. In doing so, we must ensure that U.S. nuclear forces have the right types and quantities of nuclear warheads critical to achieving defense policy goals. Maintaining the infrastructure that supports nuclear warheads, reserves of tritium, and special nuclear material is essential to sustaining reliable operations.

The Administration has defined responsive capability as a combination of responsive infrastructure and weapon re-deployment options. For the near-term – until the nuclear infrastructure is sufficiently restored and responsive to unexpected needs – the responsive capability will depend primarily on excess capacity in the force structure and on preserving an inventory of non-deployed warheads.

The current approach to refurbishing the stockpile of aging weapons is not sustainable and will not provide for the characteristics described by the President and the Secretary of Defense. Specifically, the current approach to maintaining a reliable, safe, and secure stockpile of nuclear weapons is to refurbish weapons for another 30 years. This approach would continue the Cold War legacy of designs optimized to accommodate maximum yield on delivery platforms. Meeting these Cold War-design goals with acceptable confidence in the reliability, safety, and security of the weapons require:

- A planned design life of 20-25 years,
- Underground nuclear testing available as needed to verify proper operation of the original design and any significant subsequent changes, and
- A production complex capable of quickly producing replacements when needed.

None of these conditions exist today. The current plan is to sustain many of the weapons for more than double their design life via life extension programs (LEPs). The production complex is not responsive to the demands mentioned above and some aspects of the original designs are difficult to replicate due to changes in materials, manufacturing processes, environmental constraints, and safety requirements.

Attempting to continue to sustain these weapons with the current set of characteristics will require reconstituting an extensive and expensive weapons production complex requiring more resources than are likely to be available. The cumulative changes in aging weapons and the lack of a responsive production complex, force the U.S. to retain non-deployed weapons in the stockpile as a hedge against technical failure or changes in the security environment. The current approach attempts to extend weapons of the 1980s into the 2040s and requires programs to

refurbish and sustain current weapons decades beyond design life. This approach attempts to project the past into the future rather than bring the desired future into the present.

Recommendation: The NWC should clearly articulate a new policy for sustaining the nuclear weapons stockpile that depends on evolving the stockpile, over time, to weapons with greater margins of performance, safety, and security.

Until a responsive infrastructure capable of sustaining the stockpile in the face of unexpected failures in aging weapons exists, the approach is to maintain a hedge of non-deployed warheads that can be used as substitutes. There are warhead or weapon substitutions available for most of the stockpile. While other capabilities can compensate for most shortfalls in the force from a single warhead type failure, a common mode failure would negatively impact the deterrent force, and recovery with the current state of the production complex would take well over a decade.

Recommendation: The NWC should establish a policy that no more than 20% of the deployed stockpile be invested in a warhead for which there is not a genetically different alternative warhead suitable for timely deployment in the event of a single mode failure of a warhead type.

The needed path is to transition away from the current stockpile life extension program as envisaged today. This program would produce large numbers of single-configuration, aging, complex, hard-to-manufacture warheads. A new approach is required that would produce genetically different sets of weapons that are robust, require less complex manufacturing processes, are safer and more secure, and provide for less adverse consequences from a common mode failure.

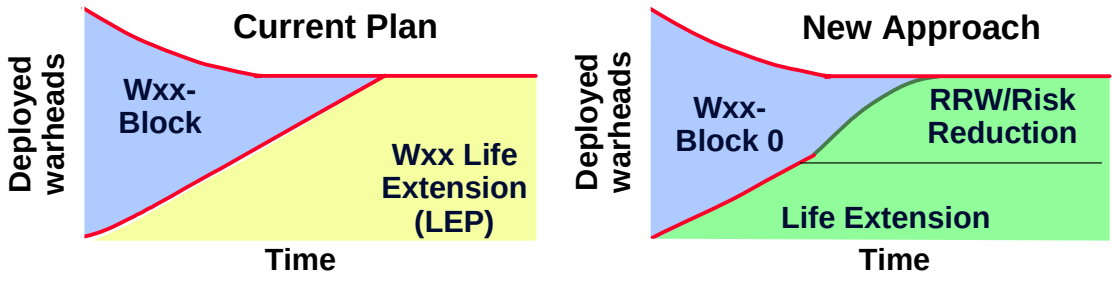
More than a decade of investment has produced understanding and tools that provide increased confidence in new weapons designs with higher performance margins and greater intrinsic safety and security. With the reduced warheads per platform in future deployed force and responsive force plans, the weight and volume constraints can be relaxed to facilitate design and increase confidence while permitting simplified manufacturing processes. The proposed path to transformation to this more robust and sustainable approach is the Reliable Replacement Warhead program that has the following characteristics:

- Trade size and weight for increased performance margins and ease of manufacture and certification,
- Transition to efficient, responsive infrastructure – design for production,
- Enhance safety, security and control in weapons and in the complex,
- A new approach key to sustaining confidence in our capabilities, and
- For warheads that make up a large percentage of the deployed stockpile or a warhead with no deployable alternative, use a new approach that relies on: 1) Life Extension Program warheads, 2) Reliable Replacement Warheads (RRW), and 3) reliability back-up options using current genetically different components.

This proposed approach is the key to addressing vulnerabilities for those warheads that make up a large fraction of the deployed or responsive capability, and for which there is no substitute warhead. The approach is to break the programs for these weapons of concern into blocks of a size such that the failure of any one block would not put the nuclear deterrent in jeopardy for an

extended period. The block approach also provides for an orderly evolution from refurbishing complex Cold War weapons to weapons that will constitute a sustainable stockpile and infrastructure. Figure 3 illustrates this approach.

Fig. 3: Sustaining the Nuclear Enterprise: Reliable, Safe, Secure Weapons & a Responsive Production Complex



Since the SLBM leg of the nuclear triad provides both the most stressing risk from common mode failure and the first opportunity to move to the recommended approach to a sustainable stockpile of weapons, the Task Force recommends that it receive first priority attention.

The solution needs to:

- Depart quickly from a path that is clearly not a sustainable approach (i.e., solely warhead life extensions), to a path that can provide a sustainable approach (i.e., the RRW program).
- Reduce the consequence of a common mode failure in a single warhead type to an acceptable level. The assumption for any level stockpile should be that there is an infrastructure capability to replace those warheads over time. If the total numbers of deployed warheads are reduced, the upper limit on a single type should also be reduced.
- Provide more robust designs with larger performance margins, increased surety (safety, security, and use control), and that are simpler to manufacture. These are essential prerequisites for an affordable, adaptable infrastructure that can design, certify, refurbish or produce the weapons that make up a sustainable, minimum-sized stockpile.
- Take advantage quickly of the pool of weapons designers and producers experienced with major acquisition programs before they age out of the workforce. These experienced people need to be heavily involved with the younger workforce to perpetuate the needed expertise over the long term.
- Provide near-term alternatives in the event the RRW is delayed for technical or other reasons.
- Produce some slack in schedules and resources to continue scaled-back refurbishment programs while designing replacement weapons, and establishing the needed infrastructure to sustain the stockpile.
- Improve surety, especially security and use control.

A proposed approach to sustaining the SLBM force is:

- A laboratory design competition for a ballistic missile Reliable Replacement Warhead (RRW-1).
    - Designs must enable the transformation to a responsive infrastructure.
    - Interchangeability with the ICBM platform should be a goal.
- A laboratory design study for a minimum-cost, risk-reduction design effort and solution.
    - A hedge against delays in production and deployment of RRW-1.
- Reduce planned W76-1 refurbishments/LEPs.

The proposed approach retains the currently planned operationally deployed W88 warheads.

To support interim pit production needs prior to 2022, the plutonium facility at Tech Area 55 at Los Alamos is to be upgraded by 2012 to a production rate of 30-50 war reserve pits per year continuing until the proposed consolidated plutonium center comes on-line.[13] Experience with the W88 would indicate that production of 30-50 pits per year is an optimistic expectation. However, with the criteria of more robust, simpler designs for the RRW, the production rate planned at LANL could suffice. If that goal proves unattainable, options would be available to sustain the planned operationally deployed force with some increased risk until the warhead production rate catches up to the need.

The timeline for an RRW first production unit is challenging. Therefore, a two-laboratory design competition is needed for a risk-reduction warhead replacement using existing nuclear components.

Given these two actions, the SLBM deployed force and responsive capability should be sufficiently sustained in the future-- given the baseline force structure. The exact number of W76-1s will be determined with USSTRATCOM requirements and Service logistical needs. To generate the needed slack in schedule and resources, production could be spread over a suitable period of time to enable infrastructure transformation and efficiency.

The follow-on to the SLBM solution are approaches to sustain the cruise missile force and, at a later date, after the potential benefits and costs of RRW concepts are better understood, an approach to sustaining the ICBM force.

The NWC has approved a multi-laboratory competition to design RRW-1 for, initially, a follow-on increment of the currently planned W76 life extension program. Further, a joint Project Officers Group has been formed to oversee the program. Initially, this competition focused primarily on the physics package. Currently the focus has expanded to embrace the complete warhead system. The focus on a deployable warhead needs to be carefully sustained. This is essential for the RRW program to serve either of its key purposes that are:

- To reduce the consequences of a single mode failure in the SLBM force, and

[13] Statement of Thomas P. D'Agostino, Deputy Administrator for Defense Programs, NNSA, before the Strategic Forces Subcommittee of the House Armed Services Committee, April 5, 2006.

- To serve as the catalyst to getting off the current unsustainable path of extending the life of 1980s-era weapons and, instead, forging a viable approach to sustaining a reliable, safe, secure, and credible stockpile.

Recommendations: The NWC should direct that:

- ***The RRW program be pursued as a broad new approach to sustaining the stockpile, re-energizing design capability, and transforming the weapons complex.***
- ***RRW-1, as the pilot for the RRW program, be pursued as a full weapons program and trade-offs with the W76 life extension effort be analyzed and implemented at the appropriate point in the W76 program.***

Appendix A: Terms of Reference

ACQUISITION AND TECHNOLOGY

THE UNDER SECRETARY OF DEFENSE

3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

APR 1 2005

MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference—Defense Science Board Task Force on Nuclear Capabilities

The qualitative features of the nuclear leg of the new triad continue to be largely an extension of the cold war capabilities. The quantities of deployed warheads and related delivery vehicles are reducing in increments from the 10,000+ at the height of the cold war to the 1700-2200 in the Moscow Agreement.

The cold war weapons designs include a variety of toxic and high risk materials and complex mechanisms that make the weapons difficult to manufacture or refurbish. The infrastructure required to sustain these designs for the long term does not currently exist and restoral is unaffordable.

Current plans do not lead to qualitative changes in the sustainability of a reliable, safe and secure weapons stockpile. Instead, the plan is to extend the life of cold war weapons that were introduced during or before the 1980s. The current life extension plans would have this same inventory of weapons to beyond 2040.

The NPR articulated a new multi-level triad – a triad of nuclear weapons in a triad of strike capabilities in a new triad of strike, defense, and infrastructure. With the exception of deploying a rudimentary missile defense program, there are few programs to convert the NPR vision to reality.

The Nuclear Capabilities Task Force is to:

1) Assess the current plan for sustaining the nuclear weapons stockpile and make recommendations for ensuring the future reliability, safety, security, and relevance of the nuclear weapons stockpile for the 21st century.

2) Examine the DoD role in defining needs in the nuclear weapons stockpile and recommend changes in institutional arrangements to ensure an appropriate DoD role.

3) Assess progress towards the goal of an integrated new triad of strike capabilities (nuclear, advanced conventional, and non-kinetic) within the new triad of strike, defense and infrastructure.

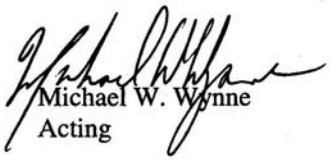
4) Examine a wide range of alternative institutional arrangements that could provide for more efficient management of the nuclear enterprise.

5) Examine approaches to evolving the stockpile with weapons that are simpler to manufacture and that can be sustained with a smaller, less complex, less expensive design, development, certification and production enterprise.

6) Examine plans to transform the nuclear weapons production complex to provide a capability to respond promptly to changes in the threat environment with new designs or designs evolved with previously tested nuclear components.

The study will be sponsored by me as the Acting Under Secretary of Defense (Acquisition, Technology and Logistics), and by the Assistant to the Secretary of Defense (Nuclear, Chemical and Biological Defense Programs). Gen Larry Welch, USAF (retired), and Dr. John Foster will serve as the Task Force Chairmen. Col Dan Wilmoth, OATSD(NCB), will serve as the Executive Secretary, and Lt Col Dave Robertson will serve as the Defense Science Board Secretariat representative.

The Task Force will operate in accordance with the provisions of P.L. 92-463, the "Federal Advisory Committee Act," and DOD Directive 5105.4, the "DoD Federal Advisory Committee Management Program," It is not anticipated that this Task Force will need to go into any "particular matters" within the meaning of Section 208 of Title 18, U.S. Code, nor will it cause any member to be placed in the position of acting as a procurement official.



Michael W. Wynne
Acting

Appendix B: Task Force Participation

Task Force Members	Affiliation
Dr. John Foster, Co-Chairman	Northrop Grumman
Gen (ret) Larry Welch, Co-Chairman	Institute for Defense Analyses
Dr. Joe Braddock	The Potomac Foundation
Dr. Bryan Gabbard	Defense Group Inc.
Mr. Steve Guidice	Independent Consultant
Dr. Ted Hardebeck	Science Applications International Corporation
Dr. Clark Murdock	Center for Strategic and International Studies
Dr. Keith Payne	National Institute for Public Policy
Dr. William Schneider	International Planning Services, Inc.
Mr. David Trachtenberg	CACI - National Security Research, Inc.
Dr. Rich Wagner	Los Alamos National Laboratory

Appendix B: Task Force Participation (continued)

Task Force Government Advisors

Mr. Lew Arnold – USSTRATCOM

Maj Gen Roger Burg, USAF – Air Force/XOS

Dr. Mark Byers – Defense Threat Reduction Agency

VADM (ret) G. Pete Nanos -- Defense Threat Reduction Agency

Mr. John Schaefer – Navy/Strategic Systems Programs

Mr. Martin Shoenbauer – National Nuclear Security Administration

Task Force National Laboratory Advisors

Dr. Mike Anastasio -- Lawrence Livermore National Laboratory

Dr. Roger Hagengruber -- Sandia National Laboratories

Dr. C. Paul Robinson -- Sandia National Laboratories

Dr. Fred Tarantino -- Los Alamos National Laboratory

Dr. Joan Woodard -- Sandia National Laboratories

Executive Secretary

Col Dan Wilmoth, USAF – OATSD (NCB)/Nuclear Matters

DSB Secretariat Representative

Lt Col Dave Robertson, USAF – OUSD (AT&L)/DSB

Task Force Support

Ms. Michelle Ashley – Science Applications International Corporation

Ms. Brenda Poole – Science Applications International Corporation

Appendix C: Briefings Received

April 15, 2005

Mr. Mike Elliot	Deputy, Plans & Policy, J-5	USSTRATCOM Vision for the Nuclear Deterrant
Mr. Steve Henry	Deputy ATSD(NCB) Nuclear Matters	Approach to Sustaining a Reliable, Safe and Secure Stockpile
RDML Rick Hunt	United States Navy	Joint Staff Vision for the Nuclear Deterrant
CDR Cathal O'Connor	United States Navy, Joint Staff J-8	J-8 Global Strike Capabilities Based Assessment (GS CBA)
Mr. Tom Scheber	OSD – Forces Policy	Strategic Capabilities Assessment (SCA)

May 26-27, 2005

Mr. Tom Cook/Mr. Elmer Stover	Department of Energy	Chinese Nuclear Weapons Developments
Dr. Jerry Freedman	NNSA	NNSA Plutonium Manufacturing – Requirements and Planning
Mr. Kevin Kyle	DIA	Worldwide Fissile Material
Mr. Don Linger	DTRA	Special Perspectives on Testing
Ms. Lynch/Mr. Larry Thornbull	CIA	Russia Nuclear Weapons Developments
Mr. Eric Miller	National Institute for Public Policy	Russia and Its Near Abroad: From One Empire to Another?
Mr. Scott Petrakis/Mr. Jeff Lucas	NGA	Chinese Test Activities
Ms. Robin Richard	NGA	Russian Test Activities
Mr. Mark Schneider	National Institute for Public Policy	Weapons Policy of the Russian Federation
Mr. Andrei Shoumikhin	National Institute for Public Policy	In Search of "New Ideology" in Russia
Mr. Robert Wapole	NIO/WMD and Proliferation	Trends in Nuclear Proliferant Capabilities

June 17, 2005

Mr. Paul Filios	DISA	Current State of Nuclear Command and Control
Dr. Joseph Martz	Project Director for RRW, LANL	Introduction to the Reliable Replacement Warhead Concept
Mr. Walter Morrow	DSB	DSB Task Force on Future Strategic Strike Skills
Mr. Steve Zavadil	Systems Planning & Analysis	New Triad Risk Management Approach

July 21-22, 2005

Mr. George Allen	NNSA	NNSA Responsive Infrastructure
Mr. Bryan Fearey	Senior LANL Advisor on National Security Strategy	Enterprise Modeling – Lab-Developed Tools
Mr. Doug Henson	Sandia	Sandia National Laboratories Transformation Perspectives
Mr. David Krivich	Lockheed Martin	New Triad Capabilities – Industry Perspective
Mr. Rick Lavelock	Senior Project Specialist for Responsive Infrastructure	Kansas City Plant Transformation Perspectives
Mr. John McClelland	Los Alamos National Laboratory	Los Alamos National Laboratory Transformation Perspectives
Mr. Hank O'Brien	RRW Program Leader	Lawrence Livermore National Laboratory Transformation Perspectives
Mr. Martin Schoenbauer	Director, NA-12	NNSA Transformation Persepctives

August 31, 2005

Mr. David Overskei	NNSA	NNSA SEAB Complex Study

Appendix D: Acronym List

AEC	Atomic Energy Commission
AFB	Air Force Base
ASD/NII	Assistant Secretary of Defense for Networks & Information Integration
ASD(SW)	Assistant Secretary of Defense for Strategic Weapons
ATSD(NCB)	Assistant to the Secretary of Defense for Nuclear & Chemical & Biological Defense Programs
B53	Nuclear Gravity Bomb
C2	Command and Control
C4ISR	Command, Control, Communications & Computers, Intelligence, Surveillance and Reconnaissance
CBW	Chemical and Biological Weapons
CJCS	Chairman Joint Chiefs of Staff
CNPC	Consolidated Nuclear Production Center
D5	specific missile for Trident II Submarine-Launched Ballistic Missile
DASD(NW)	Deputy Assistant Secretary of Defense for Nuclear Weapons
DoD	Department of Defense
DOE	Department of Energy
DTRA	Defense Threat Reduction Agency
FFRDC	Federally-Funded Research and Development Center
FPU	First Production Unit
FY	US Government Fiscal Year
GAO	General Accounting Office
GOCO	Government-Owned, Contractor-Operated
ICBM	Intercontinental-Ballistic Missile
ITW/AA	Integrated Threat Warning and Attack Assessment
JCAE	Joint Committee on Atomic Energy
LEP	Life Extension Program
MIRVed	Multiple Independentlt0targeted Reentry Vehicles
NNSA	National Nuclear Security Administration
NNWA	National Nuclear Weapons Agency
NPR	Nuclear Posture Review
NWC	Nuclear Weapons Council

NWCITF	Nuclear Weapons Complex Infrastructure Task Force
NWSM	Nuclear Weapons Stockpile Memorandum
R&D	Research and Development
RNEP	Robust Nuclear Earth Penetrator
RRW	Reliable Replacement Warhead
RRW-1	pilot program for Reliable Replacement Warhead
SLBM	Submarine-Launched Ballistic Missile
SLEP	Stockpile Life Extension Program
SNM	Strategic Nuclear Materials
SSBNs	Nuclear-powered Ballistic Missile Submarine
SSGNs	Nuclear-powered Guided Missile (Cruise Missile) Submarine
SSP	US Navy's Strategic Systems Programs
TOR	Terms of Reference (for DSB Task Force)
USD	Undersecretary of Defense
USD(AT&L)	Undersecretary of Defense for Acquisition, Technology, and Logistics
USSTRATCOM	United States Strategic Command
W76	Submarine-Launched Ballistic Missile nuclear warhead
W80	Cruise Missile nuclear warhead
W88	Submarine-Launched Ballistic Missile nuclear warhead
WMD	Weapons of Mass Destruction