

Appendix: Report of the Defense Science Board Task Force on Nuclear Deterrence Skills¹

Executive Summary

The Defense Science Board Task Force on Nuclear Deterrence Skills was chartered to assess all aspects of nuclear deterrent skills—military, federal, and contractor—and to recommend methods and strategies to maintain a right-sized, properly trained, and experienced workforce to ensure the viability of the U.S. nuclear deterrent through 2020.

As long as anyone in the world has or can acquire nuclear weapons, America must have nuclear deterrence expertise competent to avoid strategic surprise and respond to present and future challenges. There are many kinds of threats that demand national leadership, but no threat can put the nation's existence at risk as quickly and as chillingly as nuclear weapons. To say this is not to dismiss the seriousness of other threats. It simply acknowledges that since the dawn of the nuclear age, security from nuclear attack has been in a class of its own, and major national decisions on nuclear deterrence issues have been reserved for the President of the United States.

Nuclear deterrence expertise is uniquely demanding. It cannot be acquired overnight or on the fly. It resides in a highly classified environment mandated by law, it crosses a number of disciplines and skills, and it involves implicit as well as explicit knowledge. Nuclear weapons expertise is necessary to design and build nuclear weapons, to plan and operate nuclear forces, and to design defense against nuclear attack. It is also necessary to analyze and understand foreign nuclear weapons programs, devise nuclear policies and strategies, deal with allies who depend on the American nuclear umbrella, prevent and counter nuclear proliferation, defeat nuclear terrorism, and—in the event that a nuclear detonation takes place by accident or cold, hostile intent—cope with the catastrophic consequences.

America's nuclear deterrence and nuclear weapons expertise resides in what this study calls the “nuclear security enterprise.” This enterprise

1. Report of the Defense Science Board Task Force on Nuclear Deterrence Skills. Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics: Washington, D.C. September 2008.

includes nuclear activities in the Department of Defense (DOD), Department of Energy, Intelligence Community (IC), and the Department of Homeland Security.

During the Cold War, the bulk of the nuclear security enterprise consisted of the U.S. nuclear weapons program and force posture devoted to deterring the Soviet Union. The skills acquired for those activities provided a robust base from which the United States not only could conduct nuclear deterrence, but also could devote expertise with nuclear proliferation and nuclear terrorism issues. However, nuclear deterrence was the principal focus.

Today, deterrence of major power nuclear threats and the prospects of global war have receded in national priority while nuclear proliferation terrorism and defense have become urgent concerns. Today's nuclear security enterprise devotes the energy and attention to proliferation and terrorism issues that once were reserved for nuclear offensive forces. It is in that context that this task force reviewed nuclear deterrence expertise.

Principal Observations

The task force is concerned that adequate nuclear deterrence competency will not be sustained to meet future challenges. A national strategy for the nuclear security enterprise has not been emphasized and, as a consequence, there is disillusionment within the workforce that could lead to decline in the remaining critical skills. Existing and emerging weapons of mass destruction (WMD) threats and adversary intentions are not well understood. Intelligence assessments lack the needed focus and expertise.

The perception exists that there is no national commitment to a robust nuclear deterrent. This is reflected in the downgrading of activities within Office of the Secretary of Defense (OSD) policy and the Joint Staff, U.S. Strategic Command (STRATCOM), the U.S. Air Force, and congressional action on the Reliable Replacement Warhead (RRW).

Management and the workforce in the defense industry and in nuclear weapon contractors believe that "sustainment" programs (e.g. life extension programs) will not retain the skills necessary to completely solve major problems with existing systems or to initiate new programs should the need arise. Pessimism exists about follow-on nuclear deterrence systems becoming a reality, thereby leading to loss of opportunity to train the next generation of nuclear weapon system experts. Priorities have shifted strongly, and to a degree appropriately, but the pendulum has swung too far. Now the nation is faced with about \$100 billion of decisions (RRW, Complex Transformation, land-based strategic deterrent, sea-based strategic deterrent), with an eroded capability to think about these issues and with attention focused on other priorities.

Findings

In the absence of a strong national commitment to sustaining the nuclear security enterprise and visible leadership starting at the senior levels, it is difficult to keep the rigor and focus needed at all levels to meet the demanding proficiency standards that are indispensable for nuclear deterrence activities. It also is difficult, absent such a strong national commitment, to retain the best of the younger workforce. Words are not enough. There must be evidence of commitment that manifests itself in both strong leadership and real, meaningful work.

Today's nuclear weapons expertise generally is of high quality, although we are unable to assess the capability to design, develop, and produce new weapons or weapon systems through the entire cycle, as the nation has not done so for over 15 years. The challenge for the future is to preserve nuclear weapons expertise across the entire spectrum of requirements, ranging from today's priorities to a possible return, best intentions and efforts notwithstanding, of international relations dominated by major power nuclear confrontation.

The task force is concerned about the future of America's nuclear deterrence expertise. A significant part of the current workforce in the national laboratories and production facilities is at or nearing retirement age. New people must be hired and trained. This need is complicated by resource issues in today's environment. More fundamentally, however, the task force does not find adequate planning for dealing with the problem. The situation is further affected by the general decline in the numbers of U.S. citizens acquiring graduate degrees in science and engineering. Citizenship remains a prominent requirement in the highly classified world of nuclear weapons work. With our current course, the end state will not provide for a safe and reliable stockpile or for a responsive infrastructure.

The technical expertise required for dealing with the nuclear dimensions of proliferation, terrorism, and defense is closely related to nuclear weapons skills. Indeed, a significant part of the intellectual capital derives from expertise and knowledge acquired by working with nuclear weapons and related technologies. The nuclear experts drawn from the weapons program are needed in counterproliferation and counterterrorism.

The problems the task force identified are not insurmountable. The United States retains the capacity to step up to the most difficult challenges, given commitment and leadership. Sustaining nuclear weapons expertise is such a challenge.

Recommendations

Based on these and other related findings discussed in this report, the task force has arrived at twenty-three major recommendations, categorized

as dealing principally with leadership, organization, strategic planning, and capabilities and competencies.

Leadership

- 1. The Secretary of Defense, working with the Secretaries of State, Energy, and Homeland Security, and the Director of National Intelligence, must lead the development of a clear U.S. vision and strategy for nuclear deterrence capabilities and competencies.**

A new vision is required of what comprises needed nuclear deterrence capabilities and competencies, and how to sustain them. The strategy should address 21st century nuclear deterrence capabilities needed to respond to an uncertain future while supporting the broadly held goal of reduced reliance on nuclear weapons. Advocacy within government requires a comprehensive framework—a widely shared and understood set of concepts for dealing with the national security issues raised by nuclear weapons across the board—American nuclear weapons and their role in deterrence, nuclear weapons and materials in the hands of states, nuclear terrorism, nuclear proliferation, and global/regional nuclear threat reduction.

- 2. Senior civilian and military leaders should reinforce the necessity for and value to the nation of the nuclear deterrence mission.**

The administration and senior military leadership, through actions and words, should make a concerted and continuing effort to convey to the nuclear weapons community that their mission is vital to the security of the nation and will remain vital well beyond the planning horizons normally associated with programmatic decisions.

- 3. Commander, U.S. Strategic Command, should strengthen the headquarters supervision and involvement in the nuclear weapons program.**

The STRATCOM Commander (Gen. Chilton) has initiated corrective action this regard.

- 4. Air Force and U.S. Strategic Command leadership should restore the rigor and focus necessary to reestablish and sustain the demanding proficiency necessary for nuclear operations.**

Commanders must plan, integrate, fund, train, and staff subordinate commands to ensure effective skills for mission success at all levels. Unresolved waivers of security and other requirements should have corrective action planned and funded. Nuclear bomber alert should be exercised and adequate training incorporated as necessary. Personnel Reliability Program (PRP) requirements should be reviewed to ensure realistic requirements.

- 5. The Administrator of the National Nuclear Security Administration (NNSA) must reduce the high indirect cost of the nuclear weapon complex. These high costs impede refurbishment of legacy weapons, or authorization of new weapons if proposed, and preclude the work experience needed to maintain competence.**

The NNSA laboratories and production facilities must be incentivized to reduce indirect costs to make more affordable efforts to sustain and enhance the skills needed to respond to today's threats and future challenges. Many of the causes of these high indirect costs fall outside the control of the Administrator, but he can, working with the Secretary of Energy and Congress, move to address this increasingly burdensome issue.

Organization

- 6. The Secretary of Defense should assure that nuclear-weapon-related responsibilities in OSD are at the proper level and are adequately staffed.**

Create an Assistant Secretary of Defense for Strategic Weapons as previously recommended by the Defense Science Board Permanent task Force on Nuclear Weapons Surety. Elevate nuclear weapon responsibilities within the Office of the Under Secretary of Defense for Policy to the level of Deputy Under Secretary to ensure high-level attention is focused on development of a national nuclear weapon strategy, and to assure that issues affecting the deterrence posture of the United States are provided appropriate evaluation. Reestablish OSD study and analytic capabilities for nuclear deterrence to support senior decision-makers.

Strategic Planning

- 7. The Secretary of Defense should establish nuclear requirements for capabilities, including nuclear competencies, force structure, and programs for the timeframe 2009 to 2030, using the next Nuclear Posture Review (NPR), and provide requirements for NNSA planning.**

Evaluate the U.S. nuclear weapons capabilities needed as hedges against the uncertain future. Also, as part of the NPR, evaluate the technical feasibility and cost aspects of adding nuclear capability to platforms developed for conventional weapon delivery.

- 8. The Secretaries of Defense and Energy, with the Director of National intelligence, should urgently identify and act to fill the gaps in the skill base needed to improve assessments of foreign nuclear programs.**

Focus requirements on nuclear expertise to monitor, assess, and analyze the global threats posed by nuclear weapon developments, proliferation of nuclear technology, and potential employment of nuclear weapons or “dirty bombs” that could threaten the United States, U.S. forces abroad, or allies and friends. Leadership should challenge current assessments utilizing a peer review process (red teams) to ensure that more of the known and unknown issues are identified and corrective action assigned to competent specialists for resolution.

- 9. The Assistant Secretary of Defense for Strategic Weapons (when appointed) and Administrator, NNSA, must maintain critical weapon design, development, production, integration, and surveillance skills by exploring follow-on nuclear weapon system designs, including prototyping (even without commitment to production).**

Development of new systems (of any kind) requires certain skills that are different from those needed to sustain existing systems. A program of exploration of follow-on nuclear weapon system design should be re-established at some level that is decided by balancing the real risks. With regard to future life extension programs, dual revalidation of nuclear weapon refurbishments should be required not only to ensure the weapons remain safe, secure, and reliable, but also to improve the workforce expertise.

The full range of real and engaging work is the only validated mechanism for sustainment of unique skills. Some provision must be made for skills not used today but possibly needed quickly in the future. Sustainment and dismantlement programs cannot be relied upon to exercise and maintain the total competencies required. DOD and NNSA must work with the Congress to ensure an annual workload that is reasonably stable yet can accommodate design, development, and production rate changes and avoid interruptions that compromise long-term mission design and production competence. The production rate must provide the basis for surge should it be necessary.

- 10. The Administrator, NNSA, should make the development of capabilities and competencies an explicit part of NNSA planning consistent with the next NPR.**

The Administrator should establish and implement a strategy and plans on a priority basis for the next generation of nuclear stewards, identify and implement strategies and tools for recruiting and retaining essential weapons employees, and adopt a comprehensive strategy for knowledge transfer and training that emphasizes the essential contribution of hands-on work.

- 11. Cognizant organizations throughout the nuclear enterprise—within government and the supporting contractor base—should maintain**

selected nuclear skills by managing their application in related non-nuclear applications where appropriate.

Careful coordination of requirements to describe the minimum set of capabilities needed and thoughtful cost allocation are required to fully leverage activities that are technically similar to nuclear work.

- 12. Cognizant organizations that comprise the nuclear security enterprise (to include NNSA/DOD/IC/DNDO [Domestic Nuclear Detection Office]) should develop a human capital management system(s) to identify current and future needed capabilities and manage so personnel can move from one part of the nuclear security enterprise to another as needed.**

Capabilities and Competencies

- 13. The Secretary of Defense should require the periodic participation of senior civilian and military leadership in exercises that involve the use of adversary and/or U.S. nuclear forces.**

Training these senior leaders in nuclear weapon-related scenarios is important for competent decision-making.

- 14. The Secretary of Defense should establish Department of Defense requirements for understanding foreign cultural and behavioral factors related to nuclear issues.**

Potential adversaries generally do not have the same views of their nuclear weapons future as the United States. Deterring future adversaries will require greater understanding of the goals, culture, values, social characteristics, government limitations, leadership decision-making, and motivations of nations and non-state actors. Such an understanding is an essential component of intelligence needed for competent conduct of U.S. foreign policy. Better training and education are needed for personnel at all levels to include senior personnel and those charged with developing U.S. assurance, dissuasion, and deterrence positions, pronouncements, and use of “red lines.”² The overall connection between communications and deterrence requires improvement and greater use of red-team activities to improve executive decision-making. The Secretary of Defense should urge the President to take similar steps government-wide.

- 15. The Secretary of Defense should direct a review of war college core courses of instructions for nuclear strategy and operations to strengthen the preparation of senior military officers for future responsibilities.**

2. A “red line” in this report is a boundary that, if crossed, will trigger punitive action against the offender.

If nuclear weapons are used against, or employed by, the United States, senior personnel need to understand the ramifications and basic requirements.

16. **Commander, U.S. Strategic Command, should review errors made in recent years by the operating forces and examine implementation of requirements for command and control of nuclear weapons to determine if more effective procedures can be devised.**
17. **Commander, U.S. Strategic Command, should review with the Director of National Intelligence and strengthen reconnaissance planning for the nuclear dimension of the global strike mission.**
18. **Commander, U.S. Strategic Command, should strengthen competence to identify consequences of targeting actions (battle damage assessments).**
19. **The Secretary of the Air Force and Secretary of the Navy should fund advanced development programs to technically evaluate potential replacement systems to maintain and renew necessary skills in anticipation of the end-of-life of U.S. nuclear-capable delivery systems.**

In particular, the task force strongly believes an advanced development program for ICBM application is needed to evaluate concepts that might be applied to any follow-on to Minuteman III. Secretary of the Air Force should review the nuclear weapons systems and weapons effects capabilities and expertise to determine if re-establishment of the Air Force Weapons Laboratory or other options are needed.

20. **The Assistant Secretary of Defense for Strategic Weapons (when appointed) and Director, Defense Threat Reduction Agency (DTRA) should rebuild the capabilities to define and update the range of nuclear threat environments that U.S. forces may face in deployed operations and in the homeland.**
21. **The Chairman of the Joint Chiefs of Staff and service chiefs should require that the competencies of military forces operating in nuclear environments be rebuilt.**

The Chairman and service chiefs should direct that joint education, training, and exercises include aspects of such operations. The Secretary of Defense should assign DTRA responsibility for technical support to exercising, gaming, education, and system/network response assessments related to nuclear survivability.

22. **Service chiefs; Director, DTRA; and Administrator, NNSA, should grow a new technical design and development skills base for the nuclear weapons effects enterprise.**

Identify skills base essential to sustain the current systems and to design, develop, and operate replacement systems. Rebuilding this capability should entail modeling and simulation capability analogous to that for weapon design. A minimum “national” nuclear weapons effects simulator enterprise should be defined to maintain the unique expertise necessary to operate ranges and test facilities. An exchange program should be implemented between DOD, Department of Energy (DOE), and NNSA laboratories to ensure remaining talent stays in the field. This community should be charged with teaching operations, system design, code development, simulator advancement, and hardening innovations. A long-term plan for growing and maintaining talent should be developed that is connected with a sustained research and development program in all agencies to ensure a career path for professionals.

23. Congressional oversight of the nuclear weapons program should be reinvigorated.

Historically, the Congress took a major role in overseeing and supporting the nuclear weapons program. Focused and structured oversight is important today to strengthen the program, as well as the public’s perception that the program is indeed a matter of supreme national interest. Focused and structured oversight should also provide the basis for the Congress to establish a multi-year fiscal commitment to the program. This would provide essential fiscal stability and assurances to those personnel working on the scientific and technical challenges of the long-term support of their missions. Finally, the Congress needs to provide positive, explicit reinforcement of the public service character of the mission to maintain a safe and reliable nuclear deterrent.

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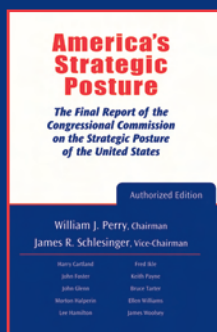
**Indicates that the author is currently an employee of the U.S. government but was not at the time of writing.*

In the Eyes of the Experts

Twenty years after the end of the Cold War, nuclear weapons are once again at the forefront of international affairs as events from far-flung regions of the world ramp up the debate on the objectives and direction of America's strategic posture. In May 2009, the Congressional Commission on the Strategic Posture of the United States, led by Chairman William Perry and Vice-Chairman James Schlesinger, presented its final report to the President and Congress. As a companion volume to the final report, "In the Eyes of the Experts: Analysis and Comments on America's Strategic Posture" is a collection of papers and ideas that commission experts submitted to the commissioners over their many months of deliberation. This team of experts has extensive knowledge of national security, defense policy, nuclear engineering, nuclear arms control and nonproliferation, and intelligence. Their papers provided comprehensive and thoughtful analysis to the commissioners on pressing matters of national and international concern.

To better inform the public discussion of America's strategic posture, this timely compilation offers an in-depth view into the material presented to the Commission as it formed its conclusions. A guide for the expert and layman alike, "In the Eyes of the Experts" explores the gamut of strategic issues, including deterrence, strategic infrastructure, arms control and nonproliferation, that will shape the discussions and decisions of America's leadership.

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