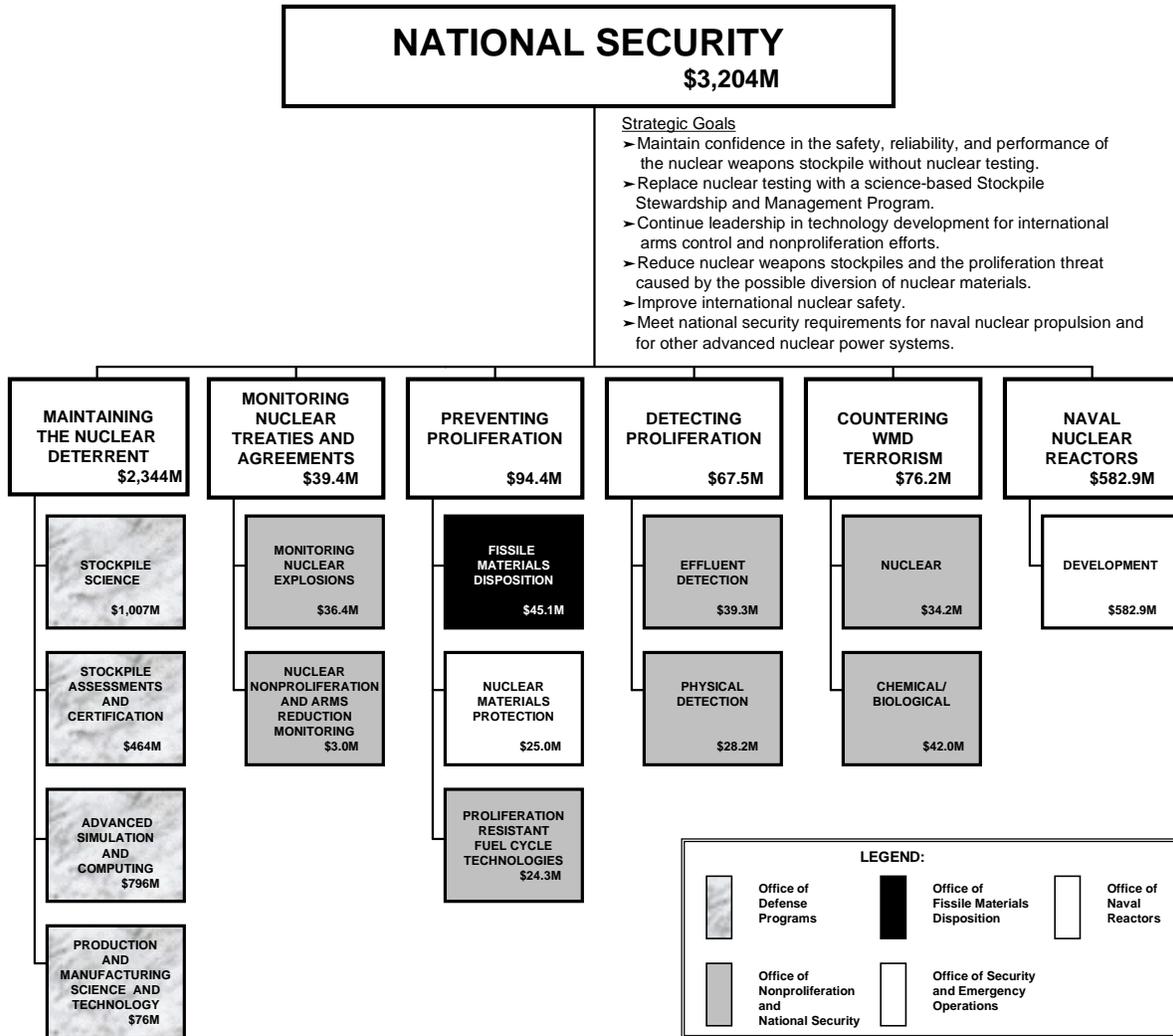


Chapter 2 Portfolio Analysis



Chapter 2

Portfolio Analysis

Table of Contents

	Page
The Context for the National Security Research and Development Portfolio	15
The National Security R&D Portfolio	16
Next Steps	19

The Context for the National Security Research and Development Portfolio

The Department of Energy's national security research and development responsibilities have traditionally focused on matters regarding nuclear weapons, special nuclear materials, nuclear security and safety, arms control, and nonproliferation. DOE is an integral part of the U. S. national security community. DOE maintains an essential role in the provision of unique technical expertise in support of the Departments of Defense and State, and other agencies by focusing on reducing the global danger from nuclear weapons or other weapons of mass destruction.

Over the past several years, the United States national security policies have undergone profound change to reflect the new and evolving geopolitical and military realities of the post Cold War world. Reflecting these changes, DOE has enhanced the Nation's nonproliferation and international nuclear safety policies. At the same time, DOE has worked towards maintaining the viability of deterrence with a smaller, cost effective, secure nuclear weapons complex without underground testing.

Program Performance Measures

DOE is committed to a science-based program in order to maintain confidence in the nuclear weapons stockpile without testing, as required by Presidential directive. In addition, DOE is committed to safely disposing the nuclear fissile materials made surplus by the downsizing of the nuclear arsenal in conformance with arms control and nonproliferation treaty requirements, countering the proliferation of weapons of mass destruction, and furthering international safeguards. The Department foresees a future national security environment with continued uncertainty and risks of international terrorism from weapons of mass destruction.

The Strategic Objectives, Strategies, and Performance Measures in development for the current update of the Department of Energy Strategic Plan are the basis for this portfolio presentation. The first three nuclear stewardship strategic objectives will be accomplished as a result of carrying out the supporting activities detailed in this R&D portfolio description. The remaining goals are reflected in the additional national security objectives:

- **Objective 1**— Maintain and refurbish nuclear weapons to sustain indefinitely the confidence in their safety, security, and reliability, without conducting nuclear testing.
- **Objective 2**— Achieve a robust and vital scientific, engineering, and manufacturing capability to enable present and future assessment and certification of the enduring stockpile, and develop the ability to design and manufacture nuclear components without conducting nuclear testing.
- **Objective 3**—Ensure the vitality of DOE's science, engineering and production enterprise required for nuclear stewardship.

- **Objective 4**—Reduce nuclear weapons stockpiles and the proliferation threat caused by the possible diversion of nuclear materials.
- **Objective 5**—Continue to provide leadership in policy support and technology development for international arms control and nonproliferation efforts.
- **Objective 6**—Meet national security requirements for naval propulsion and for other advanced nuclear power systems.
- **Objective 7**—Improve international nuclear safety.

The R&D activities described in the following chapters demonstrate both significant activity changes since the end of the Cold War and how DOE is investing its resources to solve current critical national security issues.

The National Security R&D Portfolio

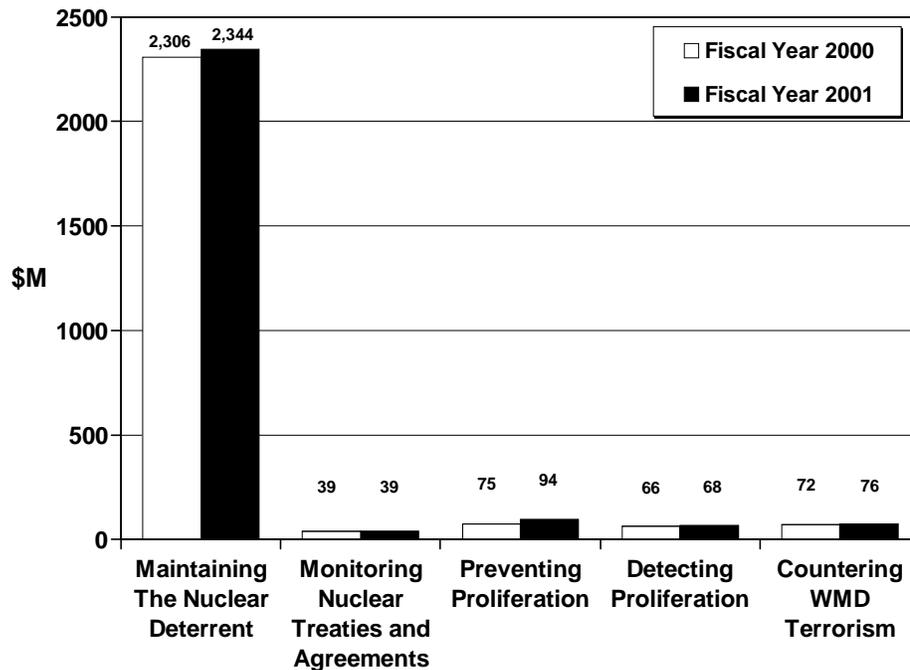
National security is the constitutional mandate of the Federal Government, and has no commercial/industrial analogue. Resource allocations and funding are entirely driven by the need to maintain the country's national security in a rapidly changing post-Cold War world facing a less defined, more diffuse threat. While details of many of DOE's national security activities are not widely publicized, the Department is acutely aware of the need to uphold the public's trust by fulfilling its important national security mission.

The DOE National Security R&D Portfolio has been structured to address the following five major activity areas:

- Maintaining the Nuclear Deterrent.
- Monitoring Nuclear Treaties and Agreements.
- Preventing Proliferation.
- Detecting Proliferation.
- Countering Weapons of Mass Destruction Terrorism.

The distribution of the Portfolio's resources to address these issues is shown in the figure on the following page.

National Security Portfolio Resources



The National Security R&D Portfolio’s resources have been balanced in accordance with DOE’s strategic plan along with numerous factors related to national needs. Maintaining the nation’s nuclear deterrent in the absence of underground nuclear testing is a resource-intensive challenge. The Department’s goal of implementing a science-based stockpile stewardship approach requires a large investment in new technology and research to develop and validate science-based methods to ensure the safety and reliability of the nuclear deterrent.

The nuclear weapons R&D activities generally are considered to be “applied research.” Some of the research is quite basic in nature and is pursued in this Portfolio because of its value to specific applied problems encountered in maintaining the stockpile. Defense Programs (DP) has undertaken a major shift in program management strategy during the last year, resulting in the adoption of a business model for R&D management. This has resulted in significant changes to the organizational structure of the Stockpile Stewardship Program (SSP) relative to previous years. As a result, the SSP is organized into three focus areas: 1) Directed Stockpile Work (DSW), designed to ensure that stockpiled weapons meet military requirements, 2) Campaigns, designed to provide the science and engineering capabilities needed to meet ongoing and evolving DSW requirements, and 3) Infrastructure that is required for stockpile work and computational and experimental facilities at the DP laboratories and the Nevada Test Site. Within these three areas, R&D primarily is focused in DSW and Campaigns, which are multiyear research intensive initiatives that are designed to resolve DP’s highest priority stockpile related scientific issues.

During FY 2000 and 2001, the SSP will significantly enhance experimental and computational facilities needed for assessing and certifying the stockpile’s safety, security, and reliability in the

sabsence of nuclear testing. These enhancements target improved scientific understanding and new scientific and computational facilities in six areas in FY 2001:

1. Assessment and certification of nuclear weapon primaries.
2. Assessment and certification of nuclear weapon secondaries.
3. Advanced radiography facilities.
4. Inertial confinement fusion.
5. Defense applications and modeling.
6. Enhanced surveillance of the enduring stockpile.

Although at a lower level of funding, the Department of Energy's other national security research and development programs are making considerable progress in meeting their important objectives. The Department of Energy continues its long history of developing technology to monitor nuclear treaties and agreements. In response to profound world-wide political changes, during the last decade, the Department has increased its activities in the areas of developing technology to detect and prevent proliferation. DOE's investments in preventing proliferation are 'opportunity driven' and we expect that changes in DOE's level of investment will be closely correlated with these new opportunities.

Preventing proliferation is an area of critical importance to U.S. national security and a high-interest research area for the Department of Energy. The U.S. and Russia have similar interests in and responsibilities for reducing the risk of nuclear proliferation from civilian nuclear power, and both are pursuing technology development programs to accomplish that goal. Continuing interactions with Russian officials on this topic will lead to the identification of many areas where the U.S. and Russian philosophies and technologies contributing to the development of proliferation-resistant nuclear systems will overlap. The Department of Energy intends to accelerate development of proliferation-resistant nuclear systems by implementing a new research initiative (the Proliferation Resistant Reactors and Fuels Research Program) during FY 2001.

While research and development in countering weapons of mass destruction terrorism is not new to the Department of Energy, changing world events have clearly demonstrated that terrorism is rapidly becoming a primary threat to national security. The Department recognizes that its existing expertise in nuclear weapons is a valuable asset to meet the challenges of terrorism and is leveraging the DOE Laboratories' large investment in chemical and biological sciences to support the national effort.

DOE places a high priority on its R&D so that essential long-term goals are not sacrificed to address current problems. Solving challenging problems often involves long-term, long lead time research. Within the R&D planning process, decisions are continually being made in the planning-programming-budgeting process in order to keep the priorities in rank order. At the same time, however, it must be recognized that R&D, which is one of the most important DOE functions, cannot remain healthy and vibrant within a rapidly varying funding environment.

Next Steps

The portion of this R&D Portfolio titled “Maintaining the Nuclear Deterrent” summarizes unclassified R&D activities conducted by DP. A comprehensive and classified description of the DP’s Stockpile Stewardship Program can be found in the “FY 2001 Stockpile Stewardship Plan” also known as the “Greenbook.” This plan is prepared annually, and is submitted by the Secretary of Energy to Congress by March 15 of each year, as mandated by the FY 1988 National Defense Authorization Act (P.L. 105-85).

Formulation of the National Security R&D Portfolio makes use of extensive scientific and programmatic reviews to help delineate the path forward. These reviews, a primary source of feedback, are used to establish baselines, to gauge and track progress, and to tune and balance R&D programs. Many of these reviews are science-focused, including JASON, the National Academy of Sciences, *ad hoc* program review groups, and laboratory-specific reviews. It is anticipated that the SSP and its constitutive elements will continue to be the subject of multiple external reviews each year. During FY 2000, for example, it is anticipated that several of the Campaigns will be reviewed by JASON.

A comprehensive review of DOE’s SSP, as directed by Secretary of Energy Richardson, was recently conducted by Under Secretary Moniz. The review concludes that the SSP is “on track,” but is stretched thin in many areas. A fifteen-point action plan was developed in response to the Review’s recommendations, and steps to implement the action plan will be completed during FY 2000. A report that summarizes the results of the review is available at http://www.dp.doe.gov/dp_web/doc/CONRAD.PDF.

The quality of the work conducted within the National Security R&D Portfolio is directly related to, and dependent upon, the quality, capability, and motivation of the researchers themselves. Maintaining the science, engineering, and production facilities from a human resources perspective is one of the most important challenges DP faces, and one that will continue to grow as the private-sector demand for top talent increases. To understand comprehensively the issues surrounding this challenge, Congress directed in Public Law 104-201 the establishment of the Commission on Maintaining U.S. Nuclear Weapons Expertise. This Commission, chaired by Admiral H. G. Chiles, Jr., reported its findings and recommendations (Summarized in Appendix C) to Congress on March 1, 1999. One of the most important recommendations calls for the development of work force plans for each DP facility that address the human resource needs of the laboratories and production plants over the next decade. These plans will ensure that the weapon complex has in place qualified scientists, engineers and technical experts who can ensure the safety and reliability of the enduring stockpile.

The chapters on “Monitoring Nuclear Treaties and Agreements,” “Preventing Proliferation,” and “Countering Weapons of Mass Destruction Terrorism” provide comprehensive descriptions of DOE’s contributions to national security R&D (due to classification issues, Chapter 6 of the National Security R&D Portfolio, “Detecting Proliferation,” is a separate supplement). This presentation and description of the Portfolio and its relevance to national interests is an important first step in portfolio development and analysis. This document demonstrates that the Portfolio

meets multiple objectives, with the robustness required for an uncertain future. Continued and expanded planning and analysis is needed to ensure appropriate prioritization and efficient utilization of taxpayer funds applied to these efforts. Future steps should include expansion of current technology and program roadmapping.

The Department of Energy has established the Nonproliferation and National Security Advisory Committee in accordance with Section 9 of the Federal Advisory Committee Act, Pub. L., No. 92-463, and Executive Order 12838. The Advisory Committee will provide an external review of research and development activity within the Office of Nonproliferation and National Security (NN). A review and analysis of research and development activity of the Office of Nonproliferation Research and Engineering (NN-20) programs was completed in FY 2000.

Future changes to portions of the Portfolio will occur as new opportunities, technological developments, and requirements arise from evolving national and international events. Strategic planning, portfolio analysis, and technology roadmapping will provide the framework to keep pace with demanding national security needs.