Report on Activities and Programs for Countering Proliferation and NBC Terrorism

Volume I
Executive Summary

May 2007

Counterproliferation
Program
Review
Committee

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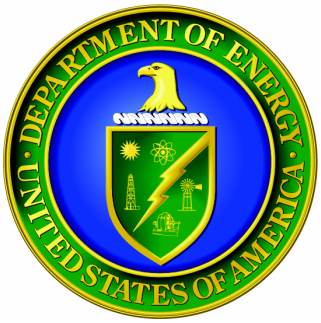

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INTRODUCTION

Our greatest and gravest concern … is WMD in the hands of terrorists. Preventing their acquisition and the dire consequences of their use is a key priority of this strategy.

National Strategy for Combating Terrorism
September 2006

This *Report on Activities and Programs for Countering Proliferation and NBC Terrorism* is submitted to the United States Congress as required by the *National Defense Authorization Act for Fiscal Year 1994 (as amended)*. The report provides the findings of the interagency Counterproliferation Program Review Committee (CPRC). The CPRC was chartered by Congress in 1994 to report on the activities and programs of the Department of Defense (DoD), Department of Energy (DOE), and the intelligence community (IC) that address improvements in the U.S. Government's efforts to combat weapons of mass destruction (WMD) and their means of delivery. In 1997, Congress broadened the CPRC's responsibilities to review those research and development (R&D) activities and programs related to countering terrorist nuclear, biological, and chemical threats.

This report is the principal executive branch report on research, development, and acquisition (RDA) programs to combat WMD. Other interagency committees or department-specific groups also publish related but separate reports on nonproliferation, arms control, and combating terrorism programs. The findings and recommendations of the CPRC's annual review for 2007 are presented in this, its 14th annual report to Congress.

The report comprises two volumes. Volume I is the unclassified executive summary. It provides an overview of the offices and principals that make up the CPRC and its Standing Committee; the linkage of national strategy and guidance to CPRC efforts; Areas for Capability Enhancement (ACEs); an assessment of progress in meeting combating WMD requirements; a presentation of the main efforts of DoD, DOE, and the IC in combating WMD; an overview of the fiscal year 2008 (FY08) funding for CPRC-monitored programs; recommendations; and the principal conclusion. A list of the abbreviations and acronyms that appear in the text is included at the end of the volume. The executive summary is available on line at *www.acq.osd.mil/cp*.

Volume II contains the classified main report and appendices. It provides an introduction on the purpose of this report, including a summary of the national strategy context to combat WMD; an overview of the threat from WMD; progress achieved vis-à-vis the CPRC recommendations presented in last year's report; assessment highlights of CPRC programs and activities; recommendations; and appendices. The appendices provide information on the genesis of the CPRC; the current participants in the process; data on DoD, DOE, and IC programs and activities for combating WMD, as well as Advanced Concept Technology Demonstrations (ACTDs) and Joint Capability Technology Demonstrations (JCTDs); WMD counterterrorism efforts; 2007 combating WMD capability shortfalls; and a list of abbreviations and acronyms that appear in the report.

CPRC ORGANIZATIONS AND STANDING COMMITTEE

The CPRC Standing Committee (SC) was established in 1997 by agreement of the member organizations, and meets several times each year to address major issues. It is composed of the Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs (ATSD(NCB)) (as chair); the Deputy Administrator for Defense Nuclear Nonproliferation, DOE (as vice chair); the Director for Science and Technology (DS&T), Central Intelligence Agency (CIA); the Deputy Director for Force Structure, Resources, and Assessment, Joint Chiefs of Staff (J–8); and the Assistant Secretary of Defense for Global Security Affairs (ASD(GSA)). Composition of the Standing Committee has changed over time to represent appropriate organizations.

An important goal of the SC, which has been recommended to Congress, has been to include other federal departments with significant combating WMD responsibilities as members of the coordination process. In 2006, as a result of discussion among representatives from the Department of Homeland Security (DHS), DoD, DOE, and the IC, improved coordination with DHS is underway regarding science and technology to combat WMD. Since DHS-funded research is addressing issues of interest to participant organizations, the Standing Committee is working with DHS to initiate appropriate legislation to add DHS as a community member. Communication with other relevant organizations for similar cooperation also has been initiated.

Another important development in the Nation's approach to combating WMD has been the work of the U.S. Strategic Command (USSTRATCOM) to integrate and synchronize combating WMD efforts in DoD. During the past year, USSTRATCOM has engaged in discussions with DoD's Office of the Secretary of Defense, DOE, and others to improve coordination. USSTRATCOM has analyzed the combating WMD mission areas, analyzed a set of scenarios that have combating WMD implications for the warfighter and for homeland defense, and gathered data on current combating WMD capabilities, as well as data on risks to mission accomplishment in the different scenarios being studied. This process resulted in a consolidated prioritization of capability shortfalls that will form the basis for initiating programs and making associated decisions and funding requests over the next year. Warfighter prioritization of CPRC assessment group shortfalls is provided in Volume II, Appendix E, of this report.

DEPARTMENT OF HOMELAND SECURITY

Although not a CPRC member, DHS is coordinating its efforts with DoD, DOE and the IC, as well as other federal departments, and has coordinated a memorandum of understanding with DoD regarding information sharing and participation in the CPRC process, to enhance interdepartmental cooperation for combating WMD.

The Domestic Nuclear Detection Office (DNDO) was created within DHS to coordinate the Nation's nuclear detection efforts. Together with the Departments of State, Energy, Defense, and Justice, DNDO will develop and deploy a comprehensive system to detect and report any attempt to import, assemble, or transport a nuclear device and fissile or radiological materials within the United States.

The DHS Science and Technology Directorate, in the Chemical Biological Division, conducts analyses for better threat characterization and prioritization of chemical and biological threats; develops detection systems to provide early warning of a possible attack; conducts

forensic analyses to support attribution; and helps develop technologies and systems to enable rapid decontamination and restoration from CB attacks. While the primary target beneficiary of these programs is the Nation's citizenry and infrastructure, component solutions from these programs may see beneficial application in DoD and other agencies' areas of concern. DHS works closely with multiple federal partners to enable broad coordination and to leverage national investments in WMD defense of civilians and infrastructure. DHS efforts in combating WMD mission areas address primarily the Passive Defense and Consequence Management Areas of Capability Enhancement.

DHS activities with direct relevance to CPRC organizations include the following:

- The Biodefense Knowledge Center (BKC) continues to expand its library of unclassified and classified materials on all aspects of the biothreat, and improve and expand semantic network tools for rapidly searching and discovering relationships in extensive databases.
- The National Biosurveillance Integration System was developed to promote situational awareness of a biological event as it occurs.
- The Chemical Security Analysis Center (CSAC) was established in 2006 to serve as the analytical chemical assessment resource for the domestic defense sector. In collaboration with DoD and the IC, the CSAC completed a source book compiling current information on nontraditional chemical agents.
- The demonstration phase of PROTECT, a networked chemical detection system for facilities, was completed. PROTECT has been identified as an allowable expenditure under the Transit Security Grant Program, thereby successfully transitioning the system to a capability available to major urban area transit systems.
- Threat assessments were completed under Project BioShield for anthrax, plague, tularemia, chemical nerve agents, radiological devices, nuclear devices, and cyanide. These assessments will be used to prioritize a wide range of national defense activities, including subsequent rounds of acquisition of medical countermeasures under BioShield.
- A robust risk assessment to prioritize biological threats was completed in 2006, and a similar assessment was initiated across chemical threats.
- The BioWatch Enhancement (Generation 2), an effort to place significantly more air collectors in the top threat cities (including transit and special event coverage), is now underway.
- Architecture for the Rapidly Deployable Chemical Defense System (RDCDS), which will provide chemical detection capability for protection at special events (e.g., National Security Special Events), was completed. RDCDS employs both air and networked ground sensors.

NATIONAL STRATEGY AND COMBATING WMD RESEARCH AND DEVELOPMENT

National strategy forms the context to develop implementing guidance and policies, as well as doctrine, organization, training, materiel, leadership and education, personnel and facilities (see Figure 1). At its highest level, the essential task of national security strategy with regard to the threat of weapons of mass destruction is to prevent our enemies from threatening us, our allies, and our friends with WMD.[1] The 2002 *National Strategy To Combat Weapons of Mass Destruction* defines three pillars of this essential task: strengthened nonproliferation (NP) to combat WMD proliferation, counterproliferation (CP) to combat WMD use, and consequence management (CM) to respond to WMD use. Additional strategic goals and objectives flow down through the U.S. Government's planning systems and set the parameters for identifying capability requirements that lead to material and nonmaterial solutions for combating WMD. The national tasks and pillars in turn serve as endpoints against which additional organizational objectives can be developed to measure the progress of material and nonmaterial solutions.

Participants in the CPRC process conduct their review of combating WMD activities and programs within the context of national strategy. The 2006 *National Military Strategy To Combat WMD* defines eight mission areas, and DOE's Defense Strategic Goal, described in the 2004 *National Nuclear Security Administration Strategic Plan*, defines goals for implementation of the combating WMD strategy. The strategy places emphasis on capabilities to stop or deter potential adversaries from proliferating or using WMD; capabilities to support the warfighter and the homeland in the event we must fight against WMD use; and capabilities to defend against and manage the consequences of an enemy WMD attack.

Figure 1. Strategic Guidance Framework

[1] 2006 *National Security Strategy of the United States of America*, p. 1.

AREAS FOR CAPABILITY ENHANCEMENT

To organize efforts effectively, the CPRC Standing Committee established Areas for Capability Enhancement categories. The ACEs address the three pillars of the *National Strategy To Combat Weapons of Mass Destruction* and are organized by the eight mission areas identified in the *National Military Strategy To Combat WMD.* The ACE structure addresses DOE's Defense Strategic Goal, described in the 2004 *National Nuclear Security Administration Strategic Plan,* and the ACEs also generally correspond to required capability areas applicable to other federal government agencies with combating WMD missions. The ACEs provide a framework for reviewing progress, assessing combating WMD requirements, and measuring RDA investment for combating WMD. It is important to maintain capabilities in all ACE areas in order to meet the U.S. Government's combating WMD objectives. The ACEs are listed in Table 1.

Table 1. Areas for Capability Enhancement

ACEs are broad and comprehensive areas for combating WMD. They reflect the National Military Strategy To Combat WMD *mission areas, address DOE's Defense Strategic Goal, and include capability needs developed by the IC as well as other federal government organizations*.

1. Interdiction. Operations to stop the transit of WMD, delivery systems, and associated technologies, materials, and expertise from transiting between states, and between state and nonstate actors of proliferation concern in any environment
2. Elimination. Operations* to systematically locate, characterize, secure, disable, or destroy a state or nonstate actor's WMD programs and related capabilities in hostile or uncertain environments
3. Threat Reduction Cooperation. Activities undertaken with the consent and cooperation of host nation authorities to enhance physical security, and to reduce, dismantle, redirect, or improve protection of a state's existing WMD program, stockpiles, and capabilities
4. Passive Defense. Measures to minimize or negate the vulnerability and effects of WMD employed against U.S. and partner/allied armed forces, as well as U.S. military interests, installations, and critical infrastructure
5. Security Cooperation and Partner Activities. Activities to improve partner and allied capacity to combat WMD across the eight mission areas through military-to-military contact, burden-sharing agreements, combined military activities, and support to international activities
6. Offensive Operations. Kinetic (both conventional and nuclear) or nonkinetic operations to defeat, neutralize, or deter a WMD threat or subsequent use of WMD
7. Active Defense. Military measures to prevent, deter, or defeat the delivery of WMD. Measures include offensive and defensive, conventional or unconventional actions to detect, divert, and destroy an adversary's WMD or delivery means while en route to their target
8. WMD Consequence Management. Actions taken to mitigate the effects of a WMD attack or event and restore essential operations and services at home and abroad

* This description omits the word "military" from "military operations" found in the description from the *National Military Strategy To Combat WMD* in order to accommodate activities other than military.

ASSESSMENT OF PROGRESS IN MEETING COMBATING WMD GOALS

The assessment of progress on combating WMD capabilities (Table 2, ACE Assessment Summary) drew upon recent past and ongoing efforts of DOE, the IC, USSTRATCOM, the Joint Capabilities Integration and Development System (JCIDS) process, and other processes to identify and prioritize current and anticipated technology capability shortfalls. The results of these prioritization processes provide a frame of reference to assess progress in some 200 programs submitted for this report. Progress highlighted below addresses fielded capabilities, transitional (but not yet fielded) improvements, and finally a summary assessment of ACEs.

CAPABILITIES FIELDED THROUGH COMBATING WMD RDA EFFORTS

Numerous ongoing efforts have reported fielding capabilities since last year's report or are scheduled to begin fielding capabilities in FY07. Of these, five are for chemical, biological, radiological, and nuclear (CBRN) detection, four are for protection, one is for decontamination, one is a munition to strike deeply buried WMD targets, one is a characterization and modeling effort to aid in WMD target planning, and one is the expected completion of training and certification of all 55 WMD Civil Support Teams. Capabilities were fielded in the following areas:

Passive Defense (CBRN detection). Notable areas of progress include biological detection systems. The *Joint Biological Standoff Detection System* is scheduled to begin operational fielding in 2007, delivering capabilities to (1) detect aerosol at up to 5 kilometers and (2) discriminate biological particles at 1 kilometer—both improvements in operationally useful standoff detection. In FY07, two other biological detection systems began fielding: the *Joint Biological Agent Identification and Diagnostic System,* a man-portable, Food and Drug Administration (FDA)-cleared system with capabilities to detect simultaneously up to 10 biological warfare (BW) agents and other pathogens of operational concern; and the *Joint Biological Point Detection System*, which delivers point detection capabilities on ships and ground vehicles. Two chemical detectors and alarms were in full-rate production, and the *Radiological Control* program to replace old radiation dosimeters will begin fielding in FY07.

Passive Defense (individual and collective protection). Four individual protection items of equipment are currently in full-rate production or will begin fielding in 2007, including the *Joint-Service General-Purpose Mask (JSGPM)*, which is scheduled to enter full production in FY07 and will be provided to all the military departments to replace the current mask. Four collective protection programs are producing items for fielding, including the *Chemical and Biological Protective Shelter (CBPS)*, a transportable shelter carried by a dedicated wheeled vehicle that provides suit-free protection for 72 hours. Two products with improved decontamination capability are being fielded: the *Joint-Service Transportable Decontamination System—Small Scale (JSTDS-SS)* and the *Joint-Service Personnel Decontamination System (JSPDS)/Reactive Skin Decontamination Lotion*.

Offensive Operations. An improved munition (GBU-28C/B BLU-122) to defeat hard and deeply buried targets (HDBTs) will be operational in 2007. Operational target assessment and characterization capabilities are being improved with the fielding of a large number of new engineering characterizations and three-dimensional models of facilities, to help warfighters and intelligence planners defeat specific targets. To defeat HDBTs sheltering WMD, DoD, DOE,

and the IC have worked cooperatively to improve capabilities to plan, find, fix, track, target, engage, and assess the effects of the attack, and have reported results to Congress as an essential component of the coordinated federal effort. Since 2000, these efforts have been guided by the USSTRATCOM/U.S. Special Operations Command (USSOCOM) initiated and approved Hard and Deeply Buried Target Defeat (HDBTD) Capstone Requirements Document, now subsumed in the HDBTD Mission Area Initial Capabilities Document approved by the Joint Staff.

Active Defense. Missile defense capabilities continue to be fielded. Five additional Ground-Based Interceptors (GBIs) were deployed to Alaska and California over the past year. A total of 15 GBIs are now deployed, and as many as 24 will be deployed by the end of 2007. Additionally, over the past year, the first AN/TPY-2 (formerly known as the Forward-Based X-band—Transportable (FBX-T) radar system) was deployed to Shariki Air Base in Japan, and a third Aegis engagement cruiser was outfitted with the Long-Range Surveillance and Track system. These systems provide improved intercept capabilities for ballistic missiles in the midcourse and terminal phases of flight.

WMD Consequence Management. Certification that all 55 National Guard WMD Civil Support Teams (WMD-CSTs) are equipped, trained, and ready will be completed in FY07. The CSTs provide local and state officials in every U.S. state and territory with expert assistance and ready access to WMD chemical and biological (CB) detection, mobile CB agent laboratory analysis, and interoperable communications equipment. Although these teams and their equipment represent current state-of-the-art advances in response knowledge and technologies, some technical gaps remain. Examples include data regarding various physical and physiological properties of biological agents. Even when such knowledge is more robust, such as with chemical agents and toxic industrial chemicals (TICs), the current DoD and interagency processes do not ensure consistent and defensible health-based standards or objectives (e.g., for detection levels, protection levels, decontamination levels).

TRANSITIONAL PROGRESS OF COMBATING WMD RDA EFFORTS

Reporting organizations indicate steady but incremental progress, such as improvements in scientific understanding of a physical or biological challenge, or achievement of an acquisition milestone decision. There are over 200 programs supporting combating WMD efforts mentioned in the report, with brief descriptions, accomplishments, and milestones provided. There is constant emphasis on progress through "transitioning"—advancing programs from one level of R&D to a higher level. For example, in December 2006, the Defense Threat Reduction Agency (DTRA) recommended that 15 medical-radiological products it manages undergo Milestone A transition from DTRA to the Joint Program Executive Office—Chemical and Biological Defense (JPEO-CBD), Joint Project Manager for Chemical and Biological Medical Systems (CBMS). These 15 medical countermeasures against radiological and nuclear threats were the best of a group evaluated for their technology readiness level (TRL). All 15 candidates have novel mechanisms of action that could potentially become approved drugs to treat post-irradiation acute radiation syndrome. The CBMS Joint Project Management Office, the advanced developer, will evaluate these and other candidate compounds and initiate advanced development activities in FY07 on one candidate leading to eventual FDA approval. Many of the other 200 programs in this report have also undergone a transition to a higher stage of development (see Volume II, Appendix C).

The Department of State-led Nonproliferation and Arms Control Technology Working Group (NPAC TWG) sponsored interagency discussion on identifying and coordinating with relevant sensor development efforts across the U.S. Government, with a focus on nuclear detection. The scope of the effort is to articulate technical goals and requirements needed to address current and emerging WMD threats; identify technologies of sufficient maturity to warrant accelerated transition to initial deployment; and identify high-risk/high-payoff technologies that merit additional, supplemental investment.

The principal agencies developing detectors for special nuclear materials (SNMs) and other radioactive substances of interest reside in DoD (DTRA), DOE (National Nuclear Security Administration (NNSA)), and DHS (DNDO). Their three portfolios cover operations overseas or in hostile environments, the core competency for nuclear detection and nonproliferation mission spaces, and homeland security. The three departments coordinate on technological approaches and application of technology to their respective mission areas. Key technology areas in which they are cooperating are (1) imaging detectors (to obtain directional information about the radiation source), (2) gamma spectrometers (e.g., to detect and identify both highly enriched uranium (HEU) and plutonium), (3) neutron detectors/spectrometers (e.g., to detect plutonium), (4) signal processing (for faster, more efficient analysis), (5) active interrogation (to create detectors that have increased standoff and search rate, and are capable of detecting shielded special nuclear material), (6) new materials (leading to improved gamma-ray spectroscopy), and (7) alternative signatures (involving secondary products rather than attempting the direct detection of gamma rays or neutrons).

SUMMARY OF ACE ASSESSMENTS

The combating WMD efforts of DoD, DOE, and the IC are being conducted in the context of a national strategy to combat WMD. Table 2 presents, for each of the eight combating WMD mission areas (ACEs), the goals, the ongoing R&D efforts (part of our current capability) to achieve the goals, remaining shortfalls, and recommendations for CPRC organizations to pursue to address the goals and shortfalls. This is the structure used for the CPRC report assessments of each mission area. See the main report (Volume II, Chapter 4) for additional details of these assessments.

Table 2. ACE Assessment Summary

Goals*	Ongoing Efforts	Shortfalls	Recommendations
Interdiction			
Develop plans, policy, and doctrine for interdiction Enhance command, control, communications, computers, intelligence, surveillance, and reconnaissance (C^4ISR), joint command and control, and capabilities to locate, tag, and track WMD and related materials and components and to link information on trade or transfer of WMD; develop an architecture for comprehensive national nuclear detection Provide operational constructs, force structure, combating WMD expertise, and interdiction capabilities, including nonlethal means, and special operations forces (SOF) capabilities Improve logistics to support interdiction	Ongoing capabilities-based assessments (CBAs) within JCIDS process to define interdiction requirements Multilateral cooperative interdiction initiatives Detection/sensors for high-priority threat materials Intelligence and information management tools Plans for new capabilities under development in Maritime Interception Initial Capabilities Document (ICD) Enhancement of interdiction architecture by DOE's Megaports radiological detection program	Lack of technologies and databases to disseminate and share intelligence information Lack of remote sensors to track WMD-related materials	Improve intelligence gathering (e.g., information management systems, decision support systems, sensor development, and intelligence support) regarding state and nonstate WMD proliferation and development activities
		Insufficient availability of detect, identify, and characterize technologies in hands of operational forces	Improve maritime interdiction capabilities to prevent illicit CBRN material from entering U.S. ports and harbors (in progress) Improve portability of CBRN sensor systems by leveraging both commercial and government-developed sensor technologies
		Lack of reachback to subject matter experts	Improve connectivity for operational elements in field or when boarding ships, to access subject matter expertise
Elimination			
Develop plans, policy, and doctrine for elimination Enhance C^4ISR, joint command and control, and capabilities to locate, detect, identify, characterize, tag, and track WMD production and storage Provide operational constructs, force structure, and WMD render-safe skills and capabilities, to include reachback Improve logistics to support elimination	Ongoing CBAs within JCIDS process to define elimination requirements Training/exercise development SOF detection and location capabilities Agent defeat/neutralization capabilities U.S. Army Nuclear and Combating WMD Agency Planning Assistance Teams Expansion of 20th Support Command capabilities for command and control for WMD elimination missions Expansion of render-safe technologies and teams	Limited production and availability of actionable intelligence on specific sites for elimination	Improve intelligence gathering (e.g., information management systems, decision support systems, sensor development, intelligence support) regarding state and nonstate WMD proliferation and development activities
		Lack of capabilities to defeat WMD with little to no collateral effects	Encourage basic research in novel high-energy material science Explore applicability of commercial technologies for CBRN remediation for possible use in elimination missions
		Lack of capabilities and procedures to secure and exploit WMD sites	Improve capability to conduct exploitation of WMD sites, including characterization of local WMD, onsite analysis, and data exfiltration Provide reliable, secure transportation and storage for further disposition of WMD-related materials

*ACE goals, initially developed by the CPRC ACE Assessment Groups in preparation for the 2006 CPRC report, have been updated for the 2007 report to include additional goals identified from ongoing capabilities-based assessments in 4 of the 8 combating WMD mission areas—the Interdiction, Elimination, Passive Defense, and Offensive Operations ACEs. CBAs were not available for the Threat Reduction Cooperation, Security Cooperation and Partner Activities, Active Defense, and WMD Consequence Management ACEs; goals for those mission areas remain the same as those identified in the 2006 CPRC report.

Table 2. ACE Assessment Summary (continued)

Goals	Ongoing Efforts	Shortfalls	Recommendations
Threat Reduction Cooperation			
Enhance capabilities to improve safeguards, physical security, and materials protection, control, and accounting of CBRN stockpiles Enhance capabilities to consolidate, reduce, or dismantle CBRN Expand threat reduction activities outside the former Soviet Union (FSU) by adapting existing or developing new cooperative frameworks and diplomatic initiatives Increase transparency through confidence-building arrangements and encourage higher standards of conduct in controlling CBRN materials	Multilateral safety and security initiatives Proliferation prevention training and equipment	Need for improved capabilities to detect WMD materials in transit at border crossings	Improve detection of nuclear materials. Improve development of more discriminating and sensitive sensors to monitor strategic transportation nodes
		Need for improved capabilities to validate and monitor dismantlement of WMD capabilities Need for improved indicators of undeclared WMD sites (e.g., epidemiological monitoring by region could reveal infectious diseases tied to BW activity)	Improve intelligence gathering (e.g., information management systems, decision support systems, sensor development, and intelligence support) regarding state and nonstate WMD proliferation and development activities
		Need for increased emphasis on sustainability of threat reduction capabilities	Continue to fund nonproliferation efforts Coordinate U.S. threat reduction cooperation efforts through a coordinating committee or group
Passive Defense			
Sense CBRN hazards Shape the operating environment Shield the force Sustain operations	Several reconnaissance, detection, and identification systems fielded in 2006-07 Battlespace management Individual/collective protection and medical countermeasures fielded in 2006-07 Decontamination and restoration capabilities fielded Ongoing CBAs within JCIDS process to define CBRN passive defense requirements Development of network-centric sensor reporting and coordination of medical information and reporting systems for early warning of biological attack	Excessive time required to detect, identify, and characterize biological agents at standoff distances	Emphasize new laboratory technologies that improve the time required to conduct multiplex assays Investigate new detection methods that identify common pathogenic mechanisms or properties of biological agents
		Insufficient radiological/nuclear standoff detection	Develop advanced sensors and techniques, including higher resolution detectors made from new materials and more efficient analysis algorithms Improve methods and technologies for detecting secondary products or surrogate signatures of SNM
		Lack of collective protection for sustainability of forces in WMD environment	Continue procurement of collective protection systems and R&D for integration of protective fabrics into existing shelters
		Insufficient integration of information system and sensor data necessary for early warning and battlespace analysis	Investigate the operation and performance of distributed sensor networks

Table 2. ACE Assessment Summary (continued)

Goals	Ongoing Efforts	Shortfalls	Recommendations
Passive Defense (continued)			
(continued)	(continued)	Lack of medically approved health-based detection, protection, and decontamination goals for chemical warfare and TIC hazards (policy and criteria for uniform risk model are lacking)	
		Need for improved wide-area, remote, and environmental monitoring capabilities	Improve intelligence gathering (e.g., information management systems, decision support systems, sensor development, intelligence support) regarding state and nonstate WMD proliferation and development activities
		Lack of efficient interagency data exchange	Continue efforts to integrate and coordinate U.S.-international partnering activities to reduce duplication
Security Cooperation and Partner Activities			
Develop, implement, and support focused cooperative activities, particularly research and development between the U.S. and our international partners, to improve their capabilities to combat WMD Provide technologies and systems to monitor and verify global regimes restricting the production, storage, and testing of WMD, WMD-related materials, and components	Multilateral arms control and nonproliferation treaties and agreements	Current monitoring regimes lack ability to distinguish proliferation activities in facilities using advanced reprocessing technologies	Improve detection of nuclear materials sufficiently to distinguish proliferation activity in nuclear facilities
Offensive Operations			
Plan operations Detect and identify targets Conduct decisive operations; employ offensive capabilities against in-transit, fixed, or WMD-related targets or infrastructure with little or no collateral effects Assess engagements	Ongoing CBAs within JCIDS process to define offensive operations requirements C^4ISR systems (e.g., detection, location, targeting) Strike capabilities (e.g., kinetic and nonkinetic) Ongoing HDBT efforts in DTRA, DARPA, USAF, and DIA/Underground Facility Analysis Center(UFAC)	Insufficient capability to address time-critical targets	Improve intelligence and near-term detection Conduct research and development for capabilities to address conventional prompt global strike
		Insufficient capability for physical defeat	Tailor investment in HDBTD capabilities to objective criteria defined in HDBTD Mission Area ICD Improve fidelity and reliability of predictive tools for design and development of optimized weapons and concepts through rock, soil, and other structures

Table 2. ACE Assessment Summary (continued)

Goals	Ongoing Efforts	Shortfalls	Recommendations
Active Defense			
Continue to develop and field a single, integrated, layered Ballistic Missile Defense System (BMDS) to protect the United States, our deployed forces, and our allies and friends against ballistic missiles at all ranges and in all phases of flight Develop and field an integrated cruise missile defense capability and an unmanned aerial vehicle (UAV) defense capability Enable U.S. forces to neutralize WMD threats worldwide—be they from national military programs, paramilitary organizations, or terrorists—by means of specially developed capabilities	Ongoing BMDS efforts Cruise missile defense program SOF programs Ongoing CBAs within JCIDS process to define integrated air and missile defense requirements	Challenges in countering ballistic missiles in boost phase and cruise missiles in all phases	Continue to fully fund ballistic missile defense program
WMD Consequence Management			
Provide material solutions to enable joint commanders and others to respond, mitigate, and restore services in a post-engagement scenario characterized by damage and collateral hazard from CBRN attack inside or outside continental United States (CONUS) Develop processes and systems to ensure effective communication and coordination with domestic authorities	Equipment initiatives Forensic capabilities (e.g., attribution) Advisory and augmentation assets (e.g., federal, state, local coordination) Ongoing CBAs within JCIDS process to define WMD CM requirements	Lack of standoff detection—interoperability and quantity of equipment	Improve capability for rapid biological and chemical detection, identification, and characterization, including at standoff distances
		Lack of medical prophylaxis capabilities	Improve medical protection and countermeasures programs, including through new research in medical/genomics field
		Limitation of current respiratory and ocular protective systems	Develop improved individual protection capabilities
		Deficiencies in several key medical response capabilities	Establish a readiness and training reporting system for installation protection
		Lack of scientifically and politically defensible health-based detection, protection, and decontamination objectives (Such criteria should be approved by appropriate medical and public health entities)	Develop and expand joint-service and multiservice CM doctrine

COMBATING WMD ACTIVITIES OF CPRC MEMBER ORGANIZATIONS

DoD, DOE, and the IC have separate responsibilities for combating WMD. DoD's activities span all three national strategy pillars and all eight combating WMD mission areas. DOE is concerned primarily with the nonproliferation pillar, in particular nuclear detection, proliferation prevention, and security of nuclear materials, which are the core of the Threat Reduction Cooperation and Security Cooperation and Partner Activities ACEs. The IC supports both DoD and DOE, among other organizations, with activities across the mission areas. Tables 3, 4, and 5 highlight selected combating WMD activities for DoD, DOE, and the IC, respectively, that have occurred since the issuance of the 2006 CPRC report. The highlights presented in the tables meet three important criteria: (1) fulfilling specific ACE goals and performance measures, (2) meeting the requirements of corresponding policy guidance or international agreements, and (3) reducing identified shortfalls or capability gaps within an ACE.

DOD SELECTED ACTIVITIES TO MEET COMBATING WMD GOALS

DoD activities and programs cover the full spectrum of combating WMD, providing warfighters with required capabilities to defeat, deter, defend, respond to, and recover from WMD and related threats or attacks. Key elements of DoD's approach include maintaining a strong deterrence capability; developing capabilities to identify, characterize, destroy, and interdict the production, transfer, storage, and weaponization of WMD; developing active defenses to interdict delivery means; developing passive defenses to provide detection, medical countermeasures, and individual and collective protection; training and equipping U.S. forces to operate effectively in a WMD-contaminated environment; and developing the ability to restore operations and manage the consequences of WMD use. In environments where international partners have agreed to cooperate to reduce the threat of WMD, DoD's contributions of expertise and technology for international cooperation are crucial to the success of these nonproliferation missions. The key elements of these international cooperative efforts are supporting U.S. diplomacy, arms control, and export controls; and encouraging U.S. allies and coalition partners to make the three pillars of combating WMD a part of their planning.

Quadrennial Defense Review. The 2006 *Quadrennial Defense Review (QDR) Report* outlined four main priority areas that frame the capabilities needed to address future challenges identified in the *National Defense Strategy*: (1) defeating terrorist networks, (2) defending the homeland in depth, (3) shaping the choices of countries at strategic crossroads, and (4) preventing hostile states and nonstate actors from acquiring or using WMD. DoD is pursuing a future force that will provide tailored deterrence of both state and nonstate threats (including WMD employment, terrorist attacks in the physical and informational domains, and opportunistic aggression) while assuring allies and dissuading potential competitors. DoD is also expanding special operations forces and investing in advanced conventional capabilities to help win the war against terrorism and to help dissuade any hostile military competitor from challenging the United States, its allies, and partners.

The QDR report recommended that DTRA be designated the primary combat support agency in support of USSTRATCOM as the lead combatant command for integrating and synchronizing combating WMD efforts. This has been done, and DTRA has been working

closely with the USSTRATCOM Center for Combating Weapons of Mass Destruction (SCC-WMD) since the center's establishment at DTRA headquarters in January 2006.

The QDR report identified important capabilities needed by DoD for combating WMD,[2] which are cross-referenced here to the Areas for Capability Enhancement used in the CPRC report. Some QDR issues cut across the mission areas, such as the need for improved understanding of intentions and motivations of adversaries:

Interdiction

- Systems to locate, tag, and track WMD and related materials (and transportation methods).
- Interdiction capabilities to stop all shipments of WMD, their delivery systems, and related materials.

Elimination

- Capabilities and specialized teams to render WMD safe and secure.
- Joint command and control (C^2) tailored for elimination.

Threat Reduction Cooperation

- Persistent surveillance over wide areas to locate WMD capabilities or hostile forces.
- Nonlethal weapons to secure WMD sites.

Passive Defense

- Sensors to detect fissile materials at standoff ranges.
- Capabilities to shield critical and vulnerable systems and technologies from the catastrophic effects of electromagnetic pulse (EMP).
- Capabilities to defend against the continuing evolution of threats, including man-portable nuclear devices, genetically engineered pathogens, and nontraditional chemical agents.

Offensive Operations

- Persistent surveillance over wide areas to locate WMD capabilities or hostile forces.
- Modification of Trident for a conventional prompt global strike capability.

Active Defense

- Deploying SOF forces to locate, characterize, and secure WMD.
- Capabilities to deploy, sustain, protect, support, and redeploy SOF in hostile environments.

Cross-Cutting Capabilities

- Human intelligence, language skills, and cultural awareness to better understand the intentions and motivations of potential adversaries and to speed recovery efforts.
- Persistent surveillance over wide areas to locate WMD capabilities or hostile forces.

[2] *Quadrennial Defense Review Report*, February 6, 2006, page 35 (an unclassified report).

DoD activities addressing combating WMD goals and QDR issues in 2006-07 are highlighted in Table 3.

Table 3. Highlights of DoD's Progress in Meeting Combating WMD Goals

Interdiction
Interdiction support to DoD policymakers was enhanced by the establishment within DoD intelligence organizations of a division responsible for integrating databases around the intelligence community for tracking individuals, organizations, and means of transport for items of proliferation concern for purposes of interdiction
Programs to improve the understanding of intentions and motivations of proliferant states and nonstate actors were initiated by DoD intelligence organizations, in concert with the IC (QDR issue)
Maritime security and WMD interdiction capabilities were improved through an Office of Naval Intelligence-led effort to integrate the development of cross-government, global maritime intelligence; provide strategic-to-tactical, time-sensitive maritime intelligence for policymakers around the clock; provide targeting support analysis; provide strategic indications and learning analysis; and conduct real-time information sharing
Improvements in applications for communications interception, nonlethal weapons, and improved detection for use in an interdiction role were made by the Navy (QDR issue)
Special operations forces capabilities were improved through DTRA programs for detection of WMD at standoff distances (QDR issue)
Elimination
Planning capabilities for elimination operations were enhanced when the U.S. Army Nuclear and Combating WMD Agency developed Combating WMD Planning Assistance Teams to integrate with planning at the echelons-above-corp level
Planning capabilities for joint elimination and site exploitation were expanded through the Army 20th Support Command (CBRNE) Transformation, particularly for explosive ordnance disposal units, conventional and technical escort and chemical units, and nuclear disablement teams (QDR issue)
C^2 capabilities for joint elimination and site exploitation missions were addressed through the creation of the Joint Elimination Coordination Element (JECE), assigned to USSTRATCOM (QDR issue)
Render-safe capabilities were enhanced through a Navy-led joint-service effort to enhance capabilities to improve communications, information technology support, and technical reachback (QDR issue)
Threat Reduction Cooperation
CBRN stockpile elimination was further enhanced through DoD's Cooperative Threat Reduction (CTR) program efforts to assist Russia with safe, secure, and environmentally sound destruction of the most proliferable portion of its chemical weapon nerve-agent stockpile, including nerve agent-filled, man-portable, artillery, and missile warheads
DoD's CTR program continues to engage countries of the FSU in diplomatic threat reduction focused activities in chemical, biological, and nuclear matters
DoD's CTR program is eliminating a stockpile of 16.45 metric tons of chemical weapon agents in Albania in accordance with the requirements of the Chemical Weapons Convention
DoD's CTR WMD Proliferation Prevention Initiative continues to enhance the capabilities of selected non-Russian FSU states (Ukraine Azerbaijan, Kazakhstan, and Uzbekistan) to detect and interdict illicit trafficking in WMD and related materials
DoD's CTR Biological Threat Reduction (BTR) program inter alia consolidates and secures dangerous pathogen collections into central reference laboratories; improves the safety and security of biological facilities involved in threat agent detection and response; and enhances partners' ability to detect, diagnose, and respond to bioterrorism attacks and potential pandemics

Table 3. Highlights of DoD's Progress in Meeting Combating WMD Goals (continued)

Passive Defense
Sense capabilities were further enhanced by the Joint Biological Agent Identification and Diagnostics System (JBAIDS); JBAIDS is an integrated FDA-cleared system capable of rapid, simultaneous identification and diagnostic confirmation of exposure to or infection from up to 10 biological warfare agents and other pathogens of operational concern
Shape capabilities were furthered by the Joint Operational Effects Federation (JOEF), which provides an operational requirements modeling and simulation system to enable warfighters and war planners to accurately predict chemical/biological environmental effects on personnel, equipment, and operations
Shield efforts will be furthered by adding the Joint-Service General-Purpose Mask (JSGPM) to the inventory in FY07. The JSGPM is a lightweight protective mask system (consisting of mask, carrier, and accessories) incorporating state-of-the-art technology to protect U.S. forces from anticipated threats. The mask components are optimized to minimize impact on the wearer's performance and to maximize its ability to interface with future Military Department equipment and protective clothing; The Joint Protective Aircrew Ensemble was in full-rate production at the start of 2007; the Integrated Footwear System was in full-rate production as of 2007 and provided chemical and biological protection without the need for a special boot. Technology for enhancing the individual Service member's performance in CBRN environments was advanced through DTRA-led research on specially designed lightweight modular clothing (QDR issue)
Sustain capabilities were further enhanced with the Collectively Protected Field Hospitals (CPFH) program, which provides the Services complete, collectively protected combat support field hospitals. Systems currently supported by CPFH are the Army's Chemically Protected Deployable Medical System and the Air Force's Collectively Protected Expeditionary Medical Support
Security Cooperation and Partner Activities
DTRA conducted several missions in conjunction with DOE to remove WMD materials from FSU countries and secure them at selected sites
Worldwide cooperation to interdict shipments, to disrupt proliferation networks, and to hold accountable the front companies that support them was furthered through DOS and DoD participation in the Proliferation Security Initiative (PSI) Program, now expanded to more than 80 countries
Offensive Operations
Capabilities to hold critical WMD facilities at risk were further enhanced with the development of the GBU-28 C/B (BLU-122), an upgraded laser/Global Positioning System (GPS)-guided bomb, which will provide increased penetration, improved lethality, and enhanced survivability against HDBTs
Capabilities to target mobile launch platforms and tracked vehicles were increased by the Mobile Target Lethality Analysis Tool, which performs conceptual weapon feasibility studies against ground mobile targets using facetized models and three-dimensional fragment ray-tracing codes
Capabilities to strike WMD targets with little to no collateral effects were furthered by DTRA in conducting lethality testing against tunnel targets, and developing live stimulant diagnostic technology for the evaluation of variant weapons against WMD targets
Capabilities for conventional prompt global strike to engage WMD targets were furthered by Navy R&D efforts for conventional ballistic missile warheads (QDR issue)
Active Defense
In 2006, the Ballistic Missile Defense System was placed on alert for the first time in response to real-world events. North Korea's missile launch activity in July precipitated the response, which included deployment of missile defense assets in the Sea of Japan and placed the Ground-Based Interceptors (GBIs) at Fort Greely, Alaska, in operational alert status. The BMDS was ready and prepared to respond, if necessary, against the North Korean ballistic missile threat to the United States or our allies
WMD Consequence Management
Preparation for a federal response to WMD incidents was enhanced through Deputy Secretary of Defense direction to DoD to comply with the National Response Plan and the National Incident Management System
WMD response capabilities throughout the U.S. states and territories are being achieved through the training and equipping of additional WMD-CSTs. Forty-eight of 55 teams are certified; the remaining 7 teams will be certified in 2007

DOE SELECTED ACTIVITIES TO MEET COMBATING WMD GOALS

NNSA is the DOE agency responsible for enhancing national security through the military application of nuclear energy. NNSA maintains and enhances the safety, security, reliability, and performance of the U.S. nuclear weapon stockpile without nuclear testing; works to reduce global danger from weapons of mass destruction; and responds to nuclear and radiological emergencies in the United States and abroad. Within the NNSA, the Office of Defense Nuclear Nonproliferation (DNN) detects, prevents, and reverses the proliferation of WMD, while mitigating the risks from nuclear operations. The National Nuclear Security Administration Act for Fiscal Year 2000 made DNN the organization within NNSA responsible for preventing the spread of materials, technology, and expertise relating to WMD; and for eliminating inventories of surplus fissile material. DNN accomplishes its mission by working closely with its international and regional partners as well as key federal agencies.

DOE activities that address the nonproliferation mission include the following:

- Developing new technologies to improve U.S. capabilities to detect and accurately monitor nuclear weapon production, proliferation, and prohibited nuclear explosions worldwide.
- Preventing and countering WMD proliferation by providing policy and technical support to implement and monitor transparent WMD reductions; strengthening indigenous international safeguards and export controls systems in other countries; transitioning WMD expertise and infrastructure to peaceful purposes; and improving international and multinational safeguards, export control, and interdiction regimes.
- Working in Russia, Libya, and other regions of concern to (1) secure and eliminate vulnerable nuclear weapons and weapons-usable material and (2) install detection equipment at border crossings and megaports to prevent and detect the illicit transfer of nuclear material.
- Enabling the Russian Federation to permanently cease production of weapons-grade plutonium by replacing plutonium-producing nuclear reactors with fossil-fueled powerplants to provide alternative sources of heat and electricity and provide for the shutdown of the reactors.
- Eliminating surplus Russian plutonium and surplus U.S. plutonium and highly enriched uranium.
- Identifying, securing, removing, or facilitating the disposition of high-risk, vulnerable nuclear and radiological materials around the world that pose a potential threat to the United States and the international community.

DOE supports the combating WMD missions of DoD and the IC through its nuclear proliferation prevention and counterterrorism activities as well as through access to the many sites engaged by its scientific cadre. DOE plays a critical role, through its core nuclear work, in addressing ACE priorities supporting (1) inspection and monitoring activities of arms control agreements and regimes, (2) protection of WMD and WMD-related materials and components, (3) detection and tracking of these materials and components, (4) removal of materials from compliant nation states, and (5) export control activities. In addition, DOE is working closely

with DoD and the IC to detect, characterize, and defeat WMD and WMD-related facilities under the auspices of counterproliferation programs.

DOE activities in the combating WMD mission areas are highlighted in Table 4.

Table 4. Highlights of DOE's Progress in Meeting Combating WMD Goals*

Interdiction
NNSA continues to train officials from licensing, scientific/technical, customs, and border guard organizations on WMD commodity recognition, nonproliferation principles, license review, and multilateral export controls
Through the Megaports Initiative, DOE provides radiation detection equipment and training to over 20 ports worldwide to screen for nuclear or other radioactive materials transiting to the United States
NNSA signed agreements with the governments of Georgia and Azerbaijan to install radiation detection and integrated communications equipment at multiple border crossings, airports, and seaports throughout the two nations. The work will be carried out by NNSA's Second Line of Defense program
The United States and the People's Republic of China signed an agreement, as part of NNSA's Megaports Initiative, to help thwart smuggling of nuclear and other radioactive material. Under this agreement, the countries will work together in the war on terrorism by installing special equipment at ports in China to detect hidden shipments of nuclear and other radioactive material
Elimination
Under the Global Threat Reduction Initiative, NNSA conducted the following operations: (1) Removal of 40 kilograms of highly enriched uranium (HEU) from Poland to Russia. The classified operation was a joint NNSA effort with Poland, the Russian Federation, and the International Atomic Energy Agency; (2) Removal of more than 5,500 curies of radioactive cobalt-60 and cesium-137 from Chechnya for return to Russia. The Russian Federation jointly supported the mission to remove the radioactive sources from a petrochemical production site in Chechnya; and (3) Removal of 3 kilograms of Russian-origin material appropriate for use in nuclear weapons from the Tajoura research reactor in Libya to Russia
Threat Reduction Cooperation
NNSA has completed security enhancements to protect against theft or terrorist attacks at 50 Russian navy nuclear sites
NNSA is upgrading Russian Strategic Rocket Forces site security at 25 nuclear sites throughout FY07
NNSA converted three international research reactors from use of HEU to low-enriched uranium (LEU) in FY06. These efforts include conversion of the VR-1 Sparrow research reactor at the Czech Technical University in October 2005 (which was the first time a Russian-supplied research reactor was converted from HEU to LEU), conversion of the High Flux Reactor (HFR) Petten research reactor in the Netherlands in October 2005, and conversion of the IRT (a Russian acronym for thermal research reactor) critical assembly in Libya
NNSA removed 24 fuel assemblies with more than 3 kilograms of U.S.-origin HEU from Argentina. This slightly irradiated nuclear fuel was safely and securely returned to the United States through a joint effort with Argentina's National Atomic Energy Commission
NNSA completed a 2-year cooperative effort to remove HEU from a Russian research facility and consolidate it at a more secure site in Russia. NNSA worked jointly with the Russian Federal Agency of Atomic Energy (Rosatom) to transfer the HEU from the Krylov Shipbuilding Research Institute in St. Petersburg to the Research Institute of Atomic Reactors in Dmitrovgrad
Security Cooperation and Partner Activities
NNSA installed radiation detection equipment to screen for nuclear and radiological material at the Port of Koper in Slovenia. The equipment is fully operational. This project was conducted under the Second Line of Defense program, which works around the world to prevent the illicit trafficking of nuclear weapons and "dirty bomb" material
NNSA and the Japan Atomic Energy Agency signed an agreement to broaden the existing partnership on nonproliferation and nuclear safeguards and security to develop new technologies and approaches that will help to meet future global energy needs by using a secure and proliferation-resistant nuclear fuel cycle
NNSA and the government of Belgium began phase 1 of installation of radiation detection equipment to identify smuggled or illicit shipments of nuclear and radiological materials at Antwerp—one of Europe's largest seaports
The United States and Russia signed a liability agreement on the disposition of plutonium, thus resolving a key issue that had been impeding progress on this program
The United States signed a declaration of principles with the governments of the Dominican Republic, Egypt, the Sultanate of Oman, Honduras, and Jamaica to thwart smuggling of nuclear and other radioactive material. The document covers implementation of NNSA's Megaports Initiative and the U.S. Customs and Border Protection's Container Security Initiative, to prevent smuggling of nuclear material to U.S. ports
The Second Line of Defense program installed radiation detection equipment at sites in Lithuania, Georgia, Kyrgyzstan, and Slovenia. Additional implementation is underway in Ukraine, Azerbaijan, Georgia, Slovenia, Armenia, and Kazakhstan

*DOE did not highlight activities in the Passive Defense, Offensive Operations, Active Defense, or WMD Consequence Management ACEs.

IC SELECTED ACTIVITIES TO MEET COMBATING WMD GOALS

The intelligence community provides strategic, tactical, and operational intelligence on WMD threats to all U.S. Government organizations, a critical enabling function that cuts across all eight ACEs. Recently the IC's counterterrorism and counterproliferation efforts have been significantly restructured to correspond to the new U.S. national security and homeland security guidance as well as the threat faced by our Nation. The National Counterterrorism Center continues to mature and gain acceptance in its efforts to better manage, direct, and coordinate IC activities and interagency support in the areas of combating terrorism, counterproliferation, and homeland security.

The National Counterproliferation Center (NCPC) was established as a result of recommendations of the *Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction*. The NCPC is chartered with coordinating strategic planning within the IC to enhance intelligence support to U.S. efforts to stem the proliferation of WMD and related delivery systems. It works with the IC to (1) identify critical intelligence gaps or shortfalls in collection, analysis, or exploitation, and develop solutions to ameliorate or close these gaps; (2) identify long-term proliferation threats and requirements; and (3) develop strategies to ensure that the IC is positioned to address these threats. NCPC coordinates with elements inside and outside the IC and the U.S. Government to identify new methods or technologies that can enhance the capabilities of the IC to detect and defeat future proliferation threats.

Recent IC activities in the combating WMD mission areas are highlighted in Table 5.

Table 5. Highlights of IC's Progress in Meeting Combating WMD Goals

Interdiction
The IC continues to: • Provide information for static and mobile interdiction on land and sea to improve capabilities to locate WMD activities • Support numerous PSI initiatives • Produce intelligence estimates on the trade and transfer of WMD technology The IC established a WMD database on trade and transfer of WMD
Elimination
The IC continues to: • Support ongoing operations to identify, locate, and track illicit material and personnel associated with WMD • Work with CPRC partner organizations in proving accurate information for ongoing inspection regimes
Threat Reduction Cooperation
IC efforts in assessing safety and security of WMD and delivery systems helped to improve safeguards; physical security; material protection, control, and accounting (MPC&A); and CBRN accountability in Russia, Poland, and Libya
Passive Defense
To further *sense*, *shape*, *shield*, and *sustain* capabilities, the IC characterized traditional and nontraditional chemical warfare (CW) and BW agents The IC developed testing facilities to help shape sensor development
Security Cooperation and Partner Activities
IC inputs to diplomatic and other nonproliferation efforts (through Weapons Intelligence, Nonproliferation, and Arms Control (WINPAC)) enhanced U.S. focused cooperative activities The IC continues to provide inputs to and cooperate with ongoing inspection and regimens

Table 5. Highlights of IC's Progress in Meeting Combating WMD Goals (continued)

Offensive Operations
IC estimates and analytical products, including terrorists' potential CBRN capabilities, helped to improve end-to-end C4ISR capabilities directed at WMD and related infrastructure
The IC continues to work with DTRA and USSTRATCOM on development of target packages for critical sites
Active Defense
The IC provided early warning of imminent missile and nuclear threats
The IC produced estimates and technical analysis of various missile systems
WMD Consequence Management
IC characterization of traditional and nontraditional CW and BW agents enhanced CM material solutions
IC provision of detailed consequence assessment analytical products significantly improved tool suites used by warfighters, planners, and homeland defense customers

FUNDING OF CPRC-MONITORED PROGRAMS

Combating WMD efforts build on the substantial investments made in the military forces and defense infrastructure necessary for the security of the United States. The combined DoD-DOE investment in combating WMD programs for FY08 is $16.1 billion compared with $16.3 billion in FY07. All FY08 budget figures in this report are from the President's Budget. Additional information on combating WMD investment is presented in Volume II, Chapter 4.

DoD's investment for FY08 is over $14.3 billion, compared with the FY07 level of $14.4 billion. DoD allocates the bulk of its combating WMD investment in the areas of missile defense; detecting, identifying, characterizing, locating, predicting, and warning of traditional and nontraditional CW and BW agents; and supporting threat reduction cooperation efforts to reduce, dismantle, redirect, and secure global WMD stockpiles and capabilities.

DOE continues its investment in nonproliferation activities with over $1.82 billion requested for FY08 compared with the FY07 level of $1.86 billion. As part of its core national nonproliferation program, DOE focuses on protection, tracking, and control of nuclear weapon-related materials and components and export control activities; and supporting the inspection and monitoring of arms control agreements and other nonproliferation initiatives.

The intelligence community investment in combating WMD efforts is not released for purposes of this report. However, the IC efforts cut across the range of intelligence collection disciplines, including scientific research to improve capabilities in all eight combating WMD mission areas.

CPRC RECOMMENDATIONS

The 2007 CPRC report recommendations are summarized below.

Recommendation: *Support the President's FY08 Budget request.*

Programs discussed in this report represent more than $16.1 billion in FY08-requested funding for DoD and DOE activities that directly support or are strongly related to combating WMD. IC program activities included in this report also represent significant efforts to improve U.S. Government capabilities to combat WMD, even though IC budgets are not reported by the CPRC. The level of funding requested by CPRC participant organizations demonstrates the high priority these organizations place on developing or acquiring improved capabilities for combating WMD.

Recommendation: *Increase emphasis on intelligence gathering (e.g., information management systems, decision support systems, sensor development, and intelligence support) regarding state and nonstate WMD proliferation and development activities*.

A common thread in the interdiction, elimination, and offensive operations mission areas, and a key shortfall emerging from USSTRATCOM as well, is the desire for "better" intelligence. More sophisticated or streamlined information management to fuse relevant data, improved decision support processes, and improved practices for deconflicting intelligence are required to address combating WMD challenges. Additional emphasis also must be placed on understanding methods of WMD acquisition, transport, delivery, and development processes.

Recommendation: *Enhance research and development efforts to address the ability to defeat or destroy WMD materials with little or no collateral effects*.

Minimizing collateral effects is desirable in an offensive weapon capability to minimize post-strike environmental effects (impacting local populations as well as ground-based military operations) and possible long-term liabilities. This is a problem that has been worked on for several years at a modest level of investment, but without resolution. Additional research and development emphasis is needed.

Minimizing collateral effects is also desirable in applications for elimination of found nuclear, biological, or chemical material, or to render inert such material in the event of interdiction activities at sea, at border crossings, and in transit. Ongoing and future research using methods based on commercial technologies for chemical, biological, and radiological remediation needs to be explored and used wherever applicable and modifiable to DoD needs. U.S. Government efforts to improve these capabilities would benefit from close cooperation with the Department of Homeland Security, which has a related responsibility for protecting critical infrastructure in the United States, including chemical production facilities, transportation networks, and associated infrastructure.

Recommendation: *Develop a range of capabilities to improve U.S. abilities to conduct conventional prompt global strike*.

There is agreement that a gap exists in U.S. capability to engage time-critical targets worldwide. Current options for prompt global coverage are limited to nuclear-armed ballistic missiles of intercontinental range, and, to some extent, cruise missiles. Cruise missiles provide some capability but do not meet the critical requirements of timeliness, range, and global coverage. Specifically, due to their longer flight times, cruise missiles are generally not viable against time-urgent or fleeting targets. Moreover, given their range limitations, cruise missiles are highly dependent on the location of the associated U.S. surface ships and aircraft used as launch platforms. Technology options for prompt global strike systems need to be developed to deal with the nexus of rogue states, nonstate actors, and terrorists armed with WMD. The Conventional Trident Modification is the only near-term, low-risk option for a prompt conventional global strike capability. Other options are under consideration, but they would likely not be available until 2015 at the earliest.

Recommendation: *Leverage new developments in the medical/genomic and laboratory sciences to improve medical protection capabilities against emerging biological threats*.

The emerging manmade and naturally occurring biological threats are outstripping our ability to identify them, let alone develop countermeasures. Over the past 3 years, however, new science and technology efforts have begun to address the shortcoming. The medical/genomic community, coordinated by the National Interagency Genomics Science Coordinating Committee (NIGSCC), is actively engaged in a comprehensive pathogen nucleic acid sequencing program. Laboratory-based technology from the medical/genomic community is being improved to decrease the cost of the global pathogen sequencing effort and to better develop the scope of the program. This sequencing capability is undergoing constant technological improvement and will benefit from increased support of the bio-informatics community.

Recommendation: *Place additional emphasis on rapid biological detection, identification, and characterization*.

The current architecture for biological agent detection is to identify threats individually and develop countermeasures one at a time. Unlike the past, when threats were limited and finite, an increasing biological threat spectrum has exceeded our ability to identify and develop countermeasures for them. Traditional laboratory techniques, augmented by new methodologies, including rapid polymerase chain reaction (PCR) DNA sequencing and other laboratory tools, are improving our ability to detect and identify biological threats, but we can only develop a limited number of countermeasures with available resources. Multiplex assays, as they become more widespread in use, will aid detection. In addition, efforts to detect biological agents based on common pathogenic mechanisms or properties may reduce reliance on specific assays. These detection methods and other emerging technologies will need special emphasis.

Recommendation: *Place additional emphasis on rapid detection of traditional as well as emerging chemical threat agents*.

The current architecture for chemical agent detection is to detect limited subsets of chemical agents. Most fielded detectors were designed to detect multiple agents, but, for each detector, the set of agents detected is considerably smaller than the current threat spectrum. As a result, multiple expensive detectors must be fielded and maintained. Current sensors also are less reliable in varying backgrounds.

An issue of growing concern is the detection of sublethal levels of chemical agents, as well as the associated costs and benefits of developing more selective and sensitive chemical sensors for an increasing threat spectrum. Fielded detectors are not programmed or updated to detect emerging threats such as nontraditional agents, toxic industrial chemicals, or toxic industrial materials. These fielded detectors are not sensitive enough to detect sublethal but harmful levels of chemical agents to provide (1) safe unprotected operations at a fixed or mobile site, (2) adequate collective protection in a contaminated environment, or (3) verification of personnel and equipment decontamination efficacy.

Recommendation: *Give high priority to identifying and developing the most promising technologies and concepts available within the U.S. laboratory system to improve the Nation's capabilities for detection of nuclear materials*.

Nuclear material is much more widely available than it was at the height of the cold war. Nonstate organizations may not be deterred, and some aspiring nuclear powers have unstable or unpredictable governments. Thus the possibility of a single attack with a smuggled nuclear weapon is no longer unthinkable. Better capabilities are needed as the radiological threat matures and refines itself.

DoD, DOE, and DHS are cooperating to address aspects of nuclear detection applicable to their respective missions. The special nuclear material detection mission addressed by DOE makes a crucial contribution to U.S. national security, and DoD is working to address the QDR goal to prevent hostile and nonstate actors from acquiring and using WMD. Even though progress has been made in organizing to improve nuclear detection capabilities, shortfalls remain. Significant technical challenges exist for all three of these organizations in detecting nuclear and radiological material at sufficient distances and in near-real time, discovering proliferation, warning personnel of the presence of radiological material, and addressing interdiction and other missions.

CONCLUSION

Improving integration and coordination for combating WMD remains an important goal for the U.S. Government. Information sharing among participating CPRC organizations and achieving an efficient allocation of available resources are crucial to enhancing and improving the diverse portfolio of combating WMD capabilities already available. Numerous federal entities engage in combating WMD research and development. The challenge is to coordinate all these activities in order to better "nationalize" this problem.

Although combating WMD is one of many competing priorities across the government, CPRC member organizations continue to make strides in development and fielding of mission-critical equipment, and improvements in capability continue to be made. These efforts reflect the commitment to stem the proliferation of WMD and WMD-related materials, and negate terrorist WMD threats. To effectively address this problem, it will take continued vigilance, resolve, and determination to deter, protect against, and respond to a future WMD attack.

ABBREVIATIONS AND ACRONYMS

ACE	Area for Capability Enhancement
ACTD	Advanced Concept Technology Demonstration
ASD(GSA)	Assistant Secretary of Defense for Global Security Affairs
ATSD(NCB)	Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs
BKC	Biodefense Knowledge Center
BMDS	Ballistic Missile Defense System
BTR	Biological Threat Reduction
BW	biological warfare
C^2	command and control
C^4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CB	chemical and biological
CBA	capabilities-based assessment
CBMS	Chemical and Biological Medical Systems
CBPS	Chemical and Biological Protective Shelter
CBRN	chemical, biological, radiological, and nuclear
CBRNE	chemical, biological, radiological, nuclear, and high-yield explosives
CM	consequence management
CONUS	continental United States
CP	counterproliferation
CPFH	Collectively Protected Field Hospitals
CPRC	Counterproliferation Program Review Committee
CSAC	Chemical Security Analysis Center
CTR	Cooperative Threat Reduction
CW	chemical warfare, chemical weapon
DHS	Department of Homeland Security
DNDO	Domestic Nuclear Detection Office
DNN	Defense Nuclear Nonproliferation (DOE/NNSA)
DoD	Department of Defense
DOE	Department of Energy
DS&T	Director for Science and Technology (CIA)
DTRA	Defense Threat Reduction Agency
EMP	electromagnetic pulse
FDA	Food and Drug Administration
FSU	former Soviet Union
FY	fiscal year
GBI	Ground-Based Interceptor
GPS	Global Positioning System
HDBT	hard and deeply buried target
HDBTD	hard and deeply buried target defeat
HEU	highly enriched uranium
IC	intelligence community

ICD	initial capabilities document
JBAIDS	Joint Biological Agent Identification and Diagnostic System
JCIDS	Joint Capabilities Integration and Development System
JCTD	Joint Capability Technology Demonstration
JECE	Joint Elimination Coordination Element
JOEF	Joint Operational Effects Federation
JPEO-CBD	Joint Program Executive Office—Chemical and Biological Defense
JSGPM	Joint-Service General-Purpose Mask
JSPDS	Joint-Service Personnel Decontamination System
JSTDS-SS	Joint-Service Transportable Decontamination System—Small Scale
LEU	low-enriched uranium
MPC&A	material protection, control, and accounting
NBC	nuclear, biological, and chemical
NCPC	National Counterproliferation Center
NIGSCC	National Interagency Genomics Science Coordinating Committee
NNSA	National Nuclear Security Administration (DOE)
NP	nonproliferation
NPAC TWG	Nonproliferation and Arms Control Technology Working Group
PCR	polymerase chain reaction
PSI	Proliferation Security Initiative
QDR	Quadrennial Defense Review
R&D	research and development
RDA	research, development, and acquisition
RDCDS	Rapidly Deployable Chemical Defense System
SC	Standing Committee
SCC-WMD	USSTRATCOM Center for Combating Weapons of Mass Destruction
SNM	special nuclear material
SOF	special operations forces
TIC	toxic industrial chemical
TRL	technology readiness level
UAV	Unmanned aerial vehicle
UFAC	Underground Facility Analysis Center
USSOCOM	United States Special Operations Command
USSTRATCOM	United States Strategic Command
WMD	weapons of mass destruction
WMD-CST	Weapons of Mass Destruction Civil Support Team