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# Report on Activities and Programs for Countering Proliferation and NBC Terrorism

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## Volume I Executive Summary

May 2011

### Counterproliferation Program Review Committee

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# INTRODUCTION

*“...although we averted a nuclear nightmare during the Cold War, we now face proliferation of a scope and complexity that demands new strategies and new approaches.”*

President Barack Obama  
United Nations Security Council Summit on Nuclear  
Non-Proliferation and Nuclear Disarmament  
September 2009

This *Report on Activities and Programs for Countering Proliferation and Nuclear, Biological, and Chemical (NBC) Terrorism* provides the latest 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), the 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 terrorists’ nuclear, biological, and chemical threats. With the passage of the *National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2008*, Congress further broadened the scope of the CPRC by expanding its membership to include the Department of Homeland Security (DHS) and the Department of State (DOS), and by changing the IC’s CPRC representative from the Director of Central Intelligence to the Director of National Intelligence (DNI). The formal members according to the CPRC Charter are:

- The Secretary of Defense (Chair)
- The Secretary of Energy (Vice Chair)
- The Chairman of the Joint Chiefs of Staff
- The Director of National Intelligence
- The Secretary of Homeland Security
- The Secretary of State

Congress also extended the committee’s termination year to 2013 and changed the reporting requirement from being an annual report to a biennial report.

This report is the principal Executive Branch summary of activities and programs that provide technologies and capabilities to combat WMD. The term WMD used in this report refers to chemical, biological, radiological, and nuclear (CBRN) weapons that can kill large numbers of people and/or cause great damage to man-made structures, natural structures, or the biosphere in general. 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 biennial review are presented in this, its 16th report to Congress.

The report is comprised of two volumes. Volume I is the unclassified, publicly releasable, 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 (ACE); capabilities fielded since the publication of the 2009 CPRC Report; notable efforts of DoD, DOE, DHS, DOS, and the IC towards combating WMD (CWMD); an overview of the FY 2011 and 2012 funding for CPRC-reported programs, as reported in the President's Budget Request; Fiscal Years (FY) 2009 and 2010 appropriations for CPRC-reported programs; FY09-10 expenditures for CPRC-reported programs; recommendations; and principal conclusions. The Executive Summary is available online at [www.acq.osd.mil/cp](http://www.acq.osd.mil/cp).

Volume II contains the classified main report and its appendices. It provides an introduction on the purpose of this report, including a summary of the national strategy context to counter WMD; an overview of the threat from WMD; progress achieved relative to the CPRC recommendations presented in the July 2009 CPRC report; an assessment of CWMD programs and activities; limitations and impediments to the DoD's biological weapons counterproliferation efforts; recommendations; and appendices. The appendices provide information on the current law regarding the CPRC; the current participants in the process; data on DoD, DOE, DHS, DOS, and the IC programs and activities for CWMD, as well as Joint Capability Technology Demonstrations (JCTDs); the recommendations of the Chairman of the Joint Chiefs of Staff regarding programs' utility and requirements; and a discussion of programs in support of countering WMD terrorism.

## **CPRC ORGANIZATION OVERVIEW**

The CPRC Standing Committee (SC) was established in 1997 by agreement of the member organizations and meets each year, as required, to address major issues. The SC was created as an intermediate-level forum to oversee the activities of the CPRC and to guide development of the report. Its principal functions are to (1) facilitate information exchanges and efforts to coordinate research, development, and acquisition matters; (2) provide broad guidance regarding research, development, and acquisition activities that could reasonably support improvements in CWMD capabilities; and (3) issue recommendations for developing new or enhancing existing capabilities and technologies to support National CWMD objectives. To update the purposes of the SC and respond to changes in the CWMD community, including the addition of DHS and DOS as new CPRC members, a memorandum of understanding (MOU) was completed in June 2009. The SC's formal membership is currently composed of:

- The Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs (ASD(NCB)) (Chair)
- The Assistant Deputy Administrator for Nonproliferation and Verification Research & Development, National Nuclear Security Administration, DOE (Vice Chair)
- The Deputy Director for Force Structure, Resources, and Assessment/Director, Joint Requirements Office for Chemical, Biological, Radiological, and Nuclear Defense, Office of the Joint Chiefs of Staff (J-8)
- The Deputy Director, Resource Management & Investment, National Counterproliferation Center (NCPC), Office of the Director of National Intelligence
- The Under Secretary of Homeland Security for Science and Technology, DHS
- The Director of the Office of Technology and Assessments, Bureau of Verification, Compliance, and Implementation, DOS

- The Assistant Secretary of Defense for Global Strategic Affairs (ASD(GSA))
- The Director of the Defense Threat Reduction Agency (DTRA)

DTRA was added as an SC member organization in September 2008. Composition of the SC has changed over time to represent the most appropriate organizations within the CPRC member organizations.

An important goal of the SC is to include other Federal departments with significant CWMD responsibilities as participants in the CPRC process. For example, prior to their addition as formal CPRC members by the FY08 NDAA, DOS and DHS participated informally in SC and action-officer meetings, as well as review processes for the CPRC report. As part of the SC's ongoing effort to include other Federal agencies, the Department of Justice's (DOJ) Federal Bureau of Investigation (FBI) WMD Directorate began informal participation in CPRC processes in September 2008.

## NATIONAL STRATEGY AND COMBATING WMD

National strategy forms the context to develop implementing guidance and policies, as well as doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) (see Figure 1). At the highest levels of the Federal government, the message is clear: "...there is no greater threat to the American people than weapons of mass destruction, particularly the danger posed by the pursuit of nuclear weapons by violent extremists and their proliferation to additional states<sup>1</sup>." The 2002 *National Strategy to Combat Weapons of Mass Destruction* defines the 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. The 2010 *Nuclear Posture Review Report* places the prevention of nuclear terrorism and proliferation at the top of the U.S. policy agenda, and describes how the United States will reduce the roles and numbers of nuclear weapons<sup>2</sup>. The 2009 *National Strategy for Countering Biological Threats* provides a framework for future U.S. Government planning efforts that support the overall *National Biodefense Strategy (Homeland Security Presidential Directive (HSPD)-10/National Security Presidential Directive-33)*, and complements existing White House strategies related to biological-threat preparedness and response.<sup>3</sup> These national-level documents provide strategic guidance for U.S. Government departments and agencies to develop goals and objectives, identify capability requirements, and ultimately provide the material and nonmaterial solutions for CWMD.



**Figure 1. Strategic Guidance Framework**

High-level goals and objectives for the CPRC member organizations are published in strategic-guidance documents tailored to the needs of their own internal communities:

<sup>1</sup> *National Security Strategy of the United States of America (May 2010)*, p. 4.

<sup>2</sup> *Nuclear Posture Review Report (April 6, 2010)*, p. i

<sup>3</sup> *National Strategy for Countering Biological Threats (2009)*, p 3

- DoD: The Chairman of the Joint Chiefs of Staff's 2006 *National Military Strategy to Combat Weapons of Mass Destruction* defines eight broad CWMD mission areas for the Military Departments and other DoD organizations.
- DOE: The 2010 *DOE Strategic Plan* (draft) sets the goal of enhancing nuclear security through defense, nonproliferation, and environmental efforts. DOE will provide the scientific and technical knowledge to enable national security agencies to understand and counter dangers arising from foreign nuclear weapons programs, the spread of nuclear capabilities to additional countries, and the potential exploitation of nuclear materials by terrorists.
- DNI: *The National Intelligence Strategy (NIS) for 2009* presents the way ahead for the IC to operate as a fully integrated and agile enterprise. It describes mission objectives for the IC including objectives to: "Combat Violent Extremism" and "Counter WMD Proliferation." The NIS sets the IC's strategic priorities and guides current and future decisions on budgets, acquisitions, and operations for these and other missions.
- DHS: The 2008 *Strategic Plan* focuses on preventing WMD from entering the Nation's borders and strengthening our capabilities to respond and recover from a WMD attack.
- DOS: The *Strategic Plan for Fiscal Years 2007-12* discusses CWMD objectives in terms of building international coalitions to interdict and disrupt proliferation of WMD, while also strengthening verification and compliance enforcement.

## **AREAS FOR CAPABILITY ENHANCEMENT**

To organize efforts effectively, the CPRC SC established Areas for Capability Enhancement (ACE) categories. ACEs are broad and comprehensive areas for combating WMD. They reflect the *National Military Strategy To Combat Weapons of Mass Destruction*'s mission areas and one strategic enabler (Intelligence), address DoD, DOE, DOS, IC, and DHS's strategic goals and objectives, and include capability needs developed by the IC and other Federal departments and agencies. They address the three pillars of the *National Strategy To Combat Weapons of Mass Destruction*, and, beginning with the May 2005 CPRC report, have been the same as the eight mission areas identified in the *National Military Strategy To Combat Weapons of Mass Destruction*. For the 2009 CPRC Report, the CPRC community added an Intelligence ACE and modified some of the descriptions of ACEs in order to accommodate activities other than those of the Armed Forces and more accurately reflect CWMD activities across the expanded CPRC membership. The ACE structure generally corresponds to required capability areas applicable to Federal government departments and agencies with CWMD missions. The ACEs provide a framework for reviewing progress, assessing CWMD requirements, and measuring investment in technologies and capabilities for CWMD. It is important to maintain capabilities in all ACE areas in order to meet the U.S. Government's CWMD objectives. The ACEs are listed in Table 1.

**Table 1. Areas for Capability Enhancement\***

<p><b>Interdiction.</b> Operations designed to stop the transit of WMD, delivery systems, associated and dual-use technologies, materials, and expertise between states of concern and non-state actors, whether undertaken by the Armed Forces or by other agencies of government.</p>
<p><b>Elimination.</b> Operations to systematically locate, characterize, secure, disable, and/or destroy a state or non-state actor's WMD programs and related capabilities in hostile or uncertain environments.</p>
<p><b>Threat Reduction Cooperation.</b> Activities undertaken with the consent and cooperation of host nation authorities to enhance physical security, emplace detection equipment, and to reduce, dismantle, redirect, or improve protection of a state's existing WMD program, stockpiles, and capabilities.</p>
<p><b>Passive Defense.</b> 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.</p>
<p><b>Security Cooperation and Partner Activities.</b> 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.</p>
<p><b>Offensive Operations.</b> Kinetic (both conventional and nuclear) and/or non-kinetic options to deter, neutralize, or defeat a WMD threat or subsequent use of WMD.</p>
<p><b>Active Defense.</b> Measures, to include but not limited to, missile defense (ballistic and cruise), special operations, and security operations to defend against conventionally and unconventionally delivered WMD.</p>
<p><b>WMD Consequence Management.</b> Actions taken to reduce the effects of a WMD attack or event, including toxic industrial materials (TIM), and assist in the restoration of essential operations and services at home and abroad.</p>
<p><b>Intelligence.</b> Timely collection, analysis, and dissemination of actionable intelligence to combat the development and spread of weapons of mass destruction and detect, identify, and characterize the location, nature, and ownership of WMD. This includes collection and analysis of intentions, motivations, and disincentives policymakers can use to dissuade, deter, and otherwise counter WMD.</p>

\*The CPRC ACEs are based on the descriptions of CWMD military mission areas found in the 2006 *National Military Strategy To Combat Weapons of Mass Destruction*.

## **ASSESSMENT OF PROGRESS IN MEETING COMBATING WMD GOALS**

The assessment of progress of CWMD capabilities accounts for the broad range of activities reported by the CPRC member organizations and includes the unique perspectives of a widening community-of-interest (COI) for CWMD. Each of the member organizations provided prioritized shortfalls, current and projected capabilities, and programmatic details of more than 200 CWMD programs and projects. The analysis of this information is supported by recent official U.S. Government reports and analytical products of congressionally appointed commissions, the R&D community, and CWMD issue-specific working groups. Overall, significant progress is being made, as illustrated by capabilities recently fielded, newly developed, or transitioned to end users, summarized in the section following Table 2. Table 2 presents a summary assessment of goals, ongoing efforts, shortfalls, and recommendations to address the shortfalls identified for each ACE. The table has been updated to reflect changes since the 2009 CPRC Report to Congress.

**Table 2. ACE Assessment Summary**

Goals	Ongoing Efforts	Recommendations
<b>Interdiction</b>		
<ul style="list-style-type: none"> <li>• Develop plans, policy, and doctrine for interdiction.</li> <li>• Enhance joint command and control (C<sup>2</sup>), communications systems, intelligence, surveillance, and reconnaissance (ISR), and capabilities to locate, tag, and track WMD and related materials and components and to link information on trade or transfer of WMD.</li> <li>• Provide operational constructs, force structure, CWMD expertise, and interdiction capabilities, including non-lethal means, and special operations forces (SOF) capabilities.</li> <li>• Improve logistics to support interdiction.</li> <li>• Build and implement a Global Nuclear Detection Architecture (GNDA).</li> <li>• Build allied and partner military capabilities to conduct WMD interdiction in support of their own national authorities and international laws.</li> <li>• Focus intelligence collection on possible transfer methods and activities to identify and track the potential transfer of WMD-related material, technology, or expertise.</li> <li>• Surveil and intercept the transit of suspected WMD materials and components by land, sea, or in the air.</li> <li>• Identify and characterize the suspected WMD materials or components.</li> <li>• Prevent the unauthorized acquisition or use of CBRN materials and capabilities, specifically anticipate emerging threats, control access to and movement of CBRN materials, and protect against hostile use of CBRN materials.</li> <li>• Continue support and progress in the Nuclear Forensics Expertise Development Program.</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment of the Combating Weapons of Mass Destruction Joint Integrating Concept as a framework to support future CWMD CBAs.</li> <li>• Multilateral cooperative interdiction initiatives (e.g., Proliferation Security Initiative, Global Initiative to Combat Nuclear Terrorism, etc.).</li> <li>• Development of detectors/sensors for high-priority threat materials.</li> <li>• Development and use of intelligence and information management tools.</li> <li>• Enhancement of interdiction architecture by DOE's Megaports radiological detection program.</li> <li>• Continuing installation of radiological/nuclear detection equipment by DOE/DHS at strategic international borders, airports, and feeder ports.</li> <li>• DoD CWMD Coordination Group efforts to improve planning and doctrine to facilitate WMD interdiction operations.</li> <li>• DHS S&amp;T continues lab development efforts to analyze suspicious materials at borders/customs sites.</li> <li>• DHS/DNDO continued to implement the Securing the Cities (STC) initiative in the New York City (NYC) region, which enables state and local jurisdictions to coordinate and execute PRND screening operations for various events.</li> <li>• DHS/DNDO supported DHS/CBP in completing Congressionally-mandated covert testing at the top 22 seaports.</li> </ul>	<ul style="list-style-type: none"> <li>• DHS and DoD within the DoD Joint Capabilities Integration Development System (JCIDS) process, or other jointly-agreed process, develop solutions for WMD interdiction gaps/shortfalls.</li> <li>• Improve intelligence gathering and analysis (e.g., information management systems, decision support systems, sensor development, and intelligence support) regarding state and non-state WMD proliferation and development activities.</li> <li>• Pursue real-time detection and identification of biological threat agents, enabling timely and focused response.</li> <li>• Apply socio-behavioral models and assessments of adversaries to develop indicators of an individual or group's interest, motivation, and intent to develop, acquire, and use WMD.</li> <li>• Provide threat-based warnings to border and immigration officials in the United States and abroad to enhance screening of known or suspected WMD-related persons.</li> <li>• Improve maritime interdiction capabilities to prevent illicit chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) material from entering U.S. ports and harbors.</li> <li>• Develop or adapt, and operationally prove capabilities for in-transit detection of nuclear/radiological materials aboard ships and aircraft.</li> <li>• Improve connectivity for operational elements in order to enable remote access to subject matter expertise.</li> <li>• Provide threat-based technical assessments and reachback assistance to border officials to enhance screening operations of weapons-useable materials, components, devices, and other materials of concern.</li> <li>• Improve efficiency of nuclear forensics material characterization operations from collections to evaluations in support of WMD-related collection activities.</li> <li>• Support continued progress on the R&amp;D priorities as stated in the NTNFC-lead OSTP Nuclear Defense R&amp;D Roadmap Nuclear Forensics Working Group Chapter.</li> <li>• Conduct more robust and expansive NTNF exercises.</li> </ul>

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>Interdiction (continued)</b>		
	<ul style="list-style-type: none"> <li>• DHS/DNDO's On-Dock Rail Program develops a system, or multiple systems, to close the capability gap and improves scanning of intermodal cargo containers transiting a sea port of entry from ship to rail without exiting the terminal through RPMs to detect and identify illicit RN material.</li> <li>• DHS/DNDO in close collaboration with DHS/S&amp;T is evaluating the feasibility of using computed tomography (CT) X-ray infrastructure systems currently deployed throughout aviation pathways primarily for explosives detection to detect RN materials in baggage and small cargo.</li> <li>• DHS/DNDO's Radiation Portal Monitor Program (RPMP) deploys radiation detection systems at the nation's land, sea, and air ports of entry. Deployment of these systems is part of the DHS multi-layered defense strategy. RPMs are passive, safe, and effective means to scan traffic and cargo entering the U.S. for RN materials, while maintaining the efficient flow of commerce.</li> <li>• DHS/DNDO's Human Portable RN Detection Systems provide a wide variety of law enforcement and first responders with effective systems for RN detection that will be used in all DNDO mission areas: the Handheld program, the Human Portable Wide Area Search (HPWAS) program, and the Human Portable Tripwire (HPT) program.</li> <li>• DHS/DNDNO's PRND Capabilities Development Initiative (CDI) provides an initial RN detection capability to the 64 Tier I and II Urban Area Security Initiative regions to accelerate the development and implementation of PRND programs that fill immediate gaps in the domestic layer of the GNDA and facilitate commitment in designing and maintaining PRND programs for the long term.</li> </ul>	

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>Interdiction (continued)</b>		
	<ul style="list-style-type: none"> <li>• DHS/DNDO's Joint Acquisition Strategy (JAS) with U.S. Coast Guard identifies radiation detection requirements and develops/provides equipment. It also provides for recapitalization of currently deployed systems, and for the acquisition of advanced detection systems</li> <li>• DHS/DNDO's long range radiation detection (LRRD), limited use experiment in coordination with DoD and DOE. The program explores rad/nuc detection solutions that are passive, can detect at ranges of 100 meters or more, has greater sensitivity than currently fielded systems, can rapidly and accurately localize and identify sources, and does not suffer performance loss if source and/or system are in motion.</li> <li>• Bolstering interagency coordination in nuclear forensics through Collections Working Group.</li> </ul>	
<b>Elimination</b>		
<ul style="list-style-type: none"> <li>• Develop plans, policy, and doctrine for elimination.</li> <li>• Enhance joint C<sup>2</sup>, communications systems, ISR, and capabilities to locate, detect, identify, characterize, tag, and track WMD production and storage.</li> <li>• Provide operational constructs, force structure, and WMD render-safe skills and capabilities, to include reachback.</li> <li>• Improve logistics to support elimination.</li> <li>• Secure suspected WMD sites, material, equipment, or personnel.</li> <li>• Destroy, dismantle, remove, transfer, or dispose of an adversary's WMD material, weapons equipment, and infrastructure.</li> <li>• Conduct intelligence exploitation of program experts, documents, and other media as well as secure weapons, material, agents, delivery means, and related processes and facilities.</li> <li>• Monitor, redirect and convert elements of an adversary's WMD program to ensure that eliminated programs are not reconstituted.</li> </ul>	<ul style="list-style-type: none"> <li>• Training/exercise development.</li> <li>• SOF detection and location capabilities.</li> <li>• Development/enhancement of agent defeat/neutralization capabilities.</li> <li>• Development and employment of U.S. Army Nuclear and Combating WMD Agency Planning Assistance Teams.</li> <li>• Creation of the Standing Joint Force Headquarters-Elimination.</li> <li>• Expansion of 20th Support Command (CBRNE) capabilities for command and control for WMD elimination missions. Unit reached Full Operational Capability (FOC) in October 2009.</li> <li>• Expansion of render-safe technologies and teams</li> </ul>	<ul style="list-style-type: none"> <li>• Within the DoD JCIDS process, develop solutions for WMD elimination gaps/shortfalls.</li> <li>• Improve intelligence gathering, analysis, and fusion (e.g., information management systems, decision support systems, sensor development, intelligence support) regarding state and non-state WMD proliferation and development activities.</li> <li>• Encourage and fund research in agent-environment interaction and novel high-energy material science.</li> <li>• Explore applicability of commercial technologies for CBRNE remediation for possible use in elimination missions.</li> <li>• Improve capability to conduct exploitation of WMD sites, including characterization of local WMD, onsite analysis, and data exfiltration.</li> <li>• Provide reliable, secure transportation and storage for further disposition of WMD-related materials.</li> </ul>

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>Elimination (continued)</b>		
	<ul style="list-style-type: none"> <li>• Focused research and development by DOE of basic and applied technologies aimed at identifying, locating, and analyzing the proliferant nuclear weapons programs.</li> <li>• In accordance with the 2010 QDR and at the direction of the SECDEF, USSTRATCOM is currently establishing and will maintain a Standing Joint Force Headquarters-Elimination (SJFHQ-E) of WMD with standing exploitation and intelligence cells in order to plan, train for, and execute global WMD elimination operations.</li> </ul>	
<b>Threat Reduction Cooperation</b>		
<ul style="list-style-type: none"> <li>• Enhance capabilities to improve safeguards, physical security, and materials protection, control, and accounting of CBRN stockpiles.</li> <li>• Enhance capabilities to consolidate, reduce, or dismantle CBRN stockpiles and capabilities.</li> <li>• Expand threat reduction activities outside the former Soviet Union by adapting existing or developing new cooperative frameworks and diplomatic initiatives.</li> <li>• Increase transparency through confidence-building arrangements and encourage higher standards of conduct in controlling CBRN materials.</li> <li>• In coordination with all relevant federal agencies, enable international partners to detect and capture WMD crossing their borders.</li> <li>• Develop plans, policy, and doctrine for expanded Threat Reduction Cooperation roles.</li> </ul>	<ul style="list-style-type: none"> <li>• Multilateral safety and security initiatives.</li> <li>• Proliferation prevention training and equipment.</li> <li>• Support the security of high priority nuclear/radiological materials worldwide from theft and sabotage.</li> <li>• Assist in shutting down plutonium producing Russian nuclear reactors.</li> <li>• Detect, secure, and eliminate vulnerable nuclear weapons and weapons-usable material in Russia, the FSU and other countries.</li> <li>• Downblend surplus highly enriched uranium and dispose of surplus weapons-grade plutonium.</li> <li>• Develop and sustain nuclear forensics international coordination through joint exercises, training, and formal cooperation related to nuclear material, technologies, procedures, and policies. Formal international exchanges in nuclear forensics include ongoing efforts with GICNT, the Nuclear Forensics International Technical Working Group (ITWG), Forensics Engagement Working Group (FEWG), NATO, IAEA, and Interpol.</li> </ul>	<ul style="list-style-type: none"> <li>• DHS, DOE, DHS and DoD within the DoD JCIDS process, or other jointly-agreed process, develop solutions for WMD Threat Reduction Cooperation gaps/shortfalls.</li> <li>• Improve detection of nuclear materials.</li> <li>• Improve development of more discriminating and sensitive sensors to monitor strategic transportation nodes.</li> <li>• Increase biological threat reduction activities to consolidate and secure pathogens and to build detection and response systems to provide early warning of a disease outbreak or bio-attack.</li> <li>• Improve intelligence gathering and analysis (e.g., information management systems, decision support systems, sensor development, and intelligence support) regarding state and non-state WMD proliferation and development activities.</li> <li>• Continue to fund nonproliferation efforts.</li> <li>• Coordinate U.S. threat reduction cooperation efforts through a coordinating committee or group.</li> <li>• Develop OCONUS Nuclear Forensics Response Playbook to include cooperation and policy coordination with international community.</li> </ul>

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>Passive Defense</b>		
<ul style="list-style-type: none"> <li>• <i>Sense</i>. Provide real-time and continuous capability to detect, identify, and quantify all potential or validated CBRN threats in all operational environments and on personnel, equipment or facilities.</li> <li>• <i>Shape</i>. Characterize CBRN hazards throughout the operational environment through the collection and fusion of information from all CBRN defense assets and integration of that data with other relevant information and C<sup>2</sup>, communications, and ISR systems.</li> <li>• <i>Shield</i>. Protect personnel and equipment from degradation caused by CBRN hazards by preventing or reducing exposures, mitigating negative physiological effects, and protecting critical equipment.</li> <li>• <i>Sustain</i>. Enable the quick restoration, recovery, and maintenance of combat power or essential functions that are free from the effects of CBRN hazards and return to pre-incident operational capability as soon as possible.</li> <li>• <i>Deter</i>. Provide significant CBRN defensive capabilities to deny potential adversaries from achieving their desired effects of creating a catastrophic event with WMD.</li> </ul>	<ul style="list-style-type: none"> <li>• Coordination of nuclear/radiological detection technology R&amp;D efforts between DHS, DoD, DOE, DOS, DHHS, the FBI, and other agencies.</li> <li>• Development of network-centric sensor reporting and coordination of medical information and reporting systems for early warning of biological attack.</li> <li>• The OASD(NCB) Biosurveillance Matrix Team serves as the single point of contact for coordination of information on biosurveillance capabilities across components. These components include, Chemical and Biological Defense (OASD(NCB/CB)), Threat Reduction and Arms Control (OASD(NCB/TRAC)), The Defense Threat Reduction Agency (DTRA), the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD), and the Joint Science and Technology Office for Chemical and Biological Defense (JSTO-CBD).</li> <li>• DTRA/DHS memorandum of agreement (MOA) with DHS/DNDO to provide rigorous, repeatable test and evaluation support for nuclear, radiological, and fissile material detection, standoff detection technologies, and prototype systems.</li> <li>• The OASD(NCB/CB) reviewed and provided input for the 2010 National Vaccine Plan, which was primarily written by DHHS, to provide a strategic approach for "Protecting the Nation's Health through Immunization" against a range of infectious diseases. DoD and DHHS have worked together through the Integrated National Portfolio Advisory Committee to</li> </ul>	<ul style="list-style-type: none"> <li>• DHS, DoD, and the Department of Health and Human Services (DHHS) within the DoD JCIDS process, or other jointly-agreed process, develop solutions for WMD passive defense gaps/shortfalls.</li> <li>• Finalize draft DoD/DHHS MOU to increase collaboration on medical countermeasure development between OASD(NCB/CB) and DHHS' Biomedical Advanced Research and Development Authority (BARDA).</li> <li>• In addition to OASD(NCB/CB) engagement, DoD continue to collaborate with DHHS through engagement in reinventing MCM manufacturing. DoD is focusing on advanced development and manufacturing technologies in its Medical Countermeasures Initiative (MCMi), while DHHS is focusing on advanced development and manufacturing services to protect the nation and facilitate surge capacity as needed in an emergency.</li> <li>• The OASD(NCB) Biosurveillance Matrix Team recommend courses of action to inform senior leadership on ways to rapidly and efficiently identify emerging threats and hazards.</li> <li>• Emphasize development of new laboratory technologies that reduce the time required to conduct multiplex assays.</li> <li>• Develop approaches to promote early notification and warning of release of NTAs</li> <li>• Investigate new detection methods that identify common pathogenic mechanisms or properties of biological agents.</li> <li>• Develop advanced sensors and techniques, including higher resolution detectors and more efficient analysis algorithms.</li> <li>• Improve methods and technologies for detecting secondary products or surrogate signatures of special nuclear materials.</li> <li>• Continue efforts to transition mobile laboratory capabilities for analyzing samples to identify non-traditional chemical agents.</li> <li>• Continue to investigate the operational viability and performance of distributed sensor networks.</li> </ul>

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>Passive Defense (continued)</b>		
	<p>ensure there is no duplication of efforts in the development of medical countermeasures (MCMs) for chemical, biological, radiological, and nuclear threats (CBRN) and emerging infectious disease. This coordination also leverages related efforts to secure the best return on investment for all agencies. This also allows better coordination of efforts, such as the development of H1N1 antivirals for therapeutic use by DoD to ensure there is no duplication of efforts in the development of medical countermeasures (MCMs) for chemical, biological, radiological, and nuclear threats (CBRN) and emerging infectious disease. This coordination also leverages related efforts to secure the best return on investment for all agencies. This also allows better coordination of efforts, such as the development of H1N1 antivirals for therapeutic use by DoD to supplement the H1N1 vaccine program of DHHS.</p> <ul style="list-style-type: none"> <li>• Legacy Aircraft CBRN Contamination Survivability Initial Capabilities Document (ICD).</li> <li>• Fielding of CBRN installation protection and response capabilities.</li> <li>• Continued integration of national bio-monitoring efforts at DHS and other federal agencies, including the Centers for Disease Control and Prevention, Environmental Protection Agency, and Federal Bureau of Investigation</li> <li>• Ongoing development is occurring at DARPA to advance CBRN sensing abilities and countermeasures.</li> <li>• Ongoing DoD Chemical and Biological Defense Program (CBDP), which develops and fields capabilities to address the Sense, Shape, Shield, and Sustain operational elements.</li> <li>• Continuing efforts to establish full operational capability of the Air Force Counter-Biological Warfare Concept of Operations (CONOP).</li> </ul>	<ul style="list-style-type: none"> <li>• Continue procurement of collective protection systems and R&amp;D for integration of protective fabrics into existing shelters.</li> <li>• Develop detector materials and systems to locate and identify nuclear/radiological materials at stand-off distances.</li> <li>• Improve portability of CBRNE sensor systems by leveraging both commercial and government-developed sensor technologies.</li> <li>• Continue development of investigative new drugs (IND) using broad spectrum approaches against viruses and bacterial pathogens.</li> <li>• Continue procurement of collective protection systems and R&amp;D for integration of protective fabrics into existing shelters.</li> <li>• Develop detector materials and systems to locate and identify nuclear/radiological materials at stand-off distances.</li> <li>• Improve portability of CBRNE sensor systems by leveraging both commercial and government-developed sensor technologies.</li> <li>• Continue development of investigative new drugs (IND) using broad spectrum approaches against viruses and bacterial pathogens.</li> <li>• Continue efforts to integrate and coordinate U.S.-international partnering activities to reduce duplication.</li> <li>• Provide WMD threat awareness outreach and technical reachback to state and local authorities through intelligence fusion centers and other information sharing initiatives.</li> <li>• Provide indicators to state and local law enforcement officials to recognize and report suspicious activities that may involve WMD materials, devices, components, and infrastructure.</li> <li>• Conduct joint threat analysis with state and local analysts to characterize events.</li> <li>• Improve capability for rapid radiological, nuclear, biological and chemical detection, identification, and characterization, including at standoff distances.</li> </ul>

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>Passive Defense (continued)</b>		
	<ul style="list-style-type: none"> <li>• Building space-based sensors and providing ground-based models to operational programs for the global monitoring of nuclear detonations through DOE research and development efforts.</li> <li>• Conducting transformational radiological / nuclear detection program to fill gaps in the GNDA and to build long term highly-trained workforce.</li> <li>• Ongoing interagency integration and coordination through DND0's NTNFC through Nuclear Forensics Executive Council, Steering Committee, Exercise Working Group, Strategic Communication Working Group, Research &amp; Development Working Group, and NDRD Working Group.</li> <li>• Implement the National Nuclear Forensics Expertise Development Program (NNFEDP), in close coordination with the academic community, national laboratories, and federal government partners, to restore and sustain an enduring nuclear forensics expertise pipeline and workforce.  Engagement between DND0 NTNFC, National Academy of Science (NAS), DOE, and National Science Foundation (NSF) to assess long-term supply and demand for nuclear chemistry and radiochemistry expertise in the U.S. (over the next 20 years) and provide recommendations for appropriately growing nuclear forensics expertise development efforts into the future.</li> </ul>	
<b>Security Cooperation and Partner Activities</b>		
<ul style="list-style-type: none"> <li>• Develop, implement, and support focused cooperative activities, particularly research and development between the United States and its international partners, to improve their capabilities to combat WMD.</li> <li>• Provide technologies and systems to monitor and verify global regimes restricting the production, storage, and testing of WMD, WMD-related materials, and components.</li> <li>• Secure, control, monitor, and track WMD materials and related components through increased commitments from foreign governments.</li> <li>• Develop plans, policy, and doctrine for Security Cooperation and Partner Activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Multilateral arms control and nonproliferation treaties and agreements.</li> <li>• Expansion of DHS Container Security Initiative (CSI) to additional strategic locations around the world to examine high-risk maritime cargo.</li> <li>• Ongoing assessments of critical verification technology programs.</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• DOS and DoD within the DoD JCIDS process, or other jointly-agreed process, develop solutions for Security Cooperation and Partner Activities gaps/shortfalls.</li> <li>• Improve detection of nuclear materials sufficiently to distinguish proliferation activity in nuclear facilities.</li> </ul>

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>Security Cooperation and Partner Activities (continued)</b>		
	<ul style="list-style-type: none"> <li>• DOE support for the implementation of President-directed or Congressionally-mandated nonproliferation and international security requirements derived from high-level nonproliferation initiatives, agreements and treaties.</li> <li>• Policy/technical analyses on urgent national security issues, proliferation trends in regions of concern, and options to strengthen international mechanisms of proliferation prevention which are conducted by the DOE.</li> </ul>	
<b>Offensive Operations</b>		
<ul style="list-style-type: none"> <li>• Detect and identify targets.</li> <li>• Conduct decisive operations; employ offensive capabilities against in-transit, fixed, or WMD-related targets or infrastructure with little or no collateral effects.</li> <li>• Assess engagements.</li> <li>• Deter potential adversaries through significant WMD defeat capabilities as a viable response to WMD use or threats against the United States, its friends, or allies.</li> </ul>	<ul style="list-style-type: none"> <li>• Continued improvements to command &amp; control, communications, and ISR systems (e.g., detection, location, targeting).</li> <li>• Continued development of strike capabilities to include WMD as target (e.g., kinetic and non-kinetic).</li> <li>• Ongoing hard and deeply buried target (HDBT) efforts in DTRA, DARPA, USAF, USSOCOM, and DIA/ Underground Facility Analysis Center.</li> <li>• Ongoing agent defeat/neutralization capabilities to address the employment of offensive capabilities with little or no collateral damage.</li> <li>• The Stockpile Stewardship Program continues to provide a stockpile that is safe, secure, and reliable, thereby preserving its strategic deterrent role.</li> </ul>	<ul style="list-style-type: none"> <li>• Within the DoD JCIDS process, develop solutions for WMD offensive operations gaps/shortfalls.</li> <li>• Improve intelligence and near-term detection.</li> <li>• Conduct research and development for capabilities to improve conventional prompt global strike.</li> <li>• Tailor investment in hard and deeply buried target defeat (HDBTD) capabilities to objective criteria defined in HDBTD Mission Area ICD.</li> <li>• Improve fidelity and reliability of predictive tools for design and development of optimized weapons and concepts through rock, soil, and other structures.</li> </ul>
<b>Active Defense</b>		
<ul style="list-style-type: none"> <li>• Continue to develop and field a single, integrated, layered Ballistic Missile Defense System (BMDS) to protect the United States, its deployed forces, and its allies and friends against ballistic missiles at all ranges and in all phases of flight.</li> <li>• Maintain and sustain an initial capability to defend the United States, its deployed forces, and its allies and friends against limited ballistic missile attack.</li> <li>• Develop and field an integrated cruise missile defense capability and an unmanned aerial vehicle (UAV) defense capability.</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing BMDS efforts</li> <li>• Ongoing Cruise missile defense program.</li> <li>• Ongoing applicable SOF programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Within the DoD JCIDS process, develop solutions for WMD active defense gaps/shortfalls.</li> <li>• Continue to fund and develop comprehensive ballistic and cruise missile defense capabilities using a test-validated and sustainable building block approach.</li> </ul>

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>Active Defense (continued)</b>		
<ul style="list-style-type: none"> <li>• 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.</li> <li>• Develop options to dissuade current rogue state and near-peer threats.</li> </ul>		
<b>WMD Consequence Management</b>		
<ul style="list-style-type: none"> <li>• Provide integrated material solutions to enable Joint Force Commanders (JFC) and others to respond, mitigate, and restore services in a post-engagement scenario characterized by damage and collateral hazard from CBRN incident inside or outside the continental United States.</li> <li>• Develop processes and systems to ensure effective communication and coordination with domestic authorities.</li> <li>• Provide specialized expertise, operational personnel, or capabilities to the U.S. homeland or friendly nations, as required, to respond to or recover from attacks or disasters associated with WMD.</li> </ul>	<ul style="list-style-type: none"> <li>• DoD/DHHS interagency agreement to implement a single, integrated national stockpile for Anthrax and Smallpox vaccines, meeting the requirements for the Strategic National Stockpile. The agreement will result in a cost avoidance of more than ten million dollars, annually.</li> <li>• DoD/DHS collaborative efforts to co-locate bio-detection technologies for BioWatch at DoD installations.</li> <li>• DoD revived the Consequence Management Working Group</li> <li>• DOE continued support for nuclear counterterrorism response capabilities and personnel.</li> <li>• Foreign Consequence Management (FCM) Working Group led by OSD(P), and the Interagency FCM WG led by DoS.</li> <li>• DoD is restructuring its Domestic CBRN response force to enhance responsiveness and life-saving capabilities.</li> <li>• The Domestic Emergency Support Team is an interagency team of subject matter experts that deploys in support of the FBI during CBRNE threat situations, with capability to operate in a contaminated environment.</li> <li>• The Improvised Nuclear Device (IND) Response and Recovery Program developed and is implementing the DHS Strategy for Improving the National Response and Recovery from an IND Attack. It works to align interagency roles and missions for response and recovery to an IND.</li> <li>• The Prepositioned Equipment Program is a national asset established after 9/11 to provide immediate support to first responders in the event of a WMD incident, bringing equipment in the form of standardized caches of emergency equipment, protective gear, and medical supplies.</li> </ul>	<ul style="list-style-type: none"> <li>• DHS, DoD, and DHHS within the DoD JCIDS process, or other jointly-agreed process, develop solutions for WMD consequence management gaps/shortfalls.</li> <li>• Continue research in the medical/genomics field.</li> <li>• Develop improved individual protection capabilities.</li> <li>• Establish a readiness and training reporting system for installation protection.</li> <li>• Develop and expand joint-service, multi-service, and interagency CM doctrine.</li> <li>• Continue to improve DoD's CBRN response force support to primary federal agencies.</li> <li>• Develop integrated and evaluated plans and procedures for Technical Nuclear Forensics collections operations with National WMD Response operations.</li> </ul>

**Table 2. ACE Assessment Summary (continued)**

Goals	Ongoing Efforts	Recommendations
<b>WMD Consequence Management (continued)</b>		
	<ul style="list-style-type: none"> <li>• Continue to develop, implement, and evaluate plans and procedures for National Technical Nuclear Forensics material and debris collections operations plan in coordination with consequence management response and recovery procedures.</li> <li>• Continued development of WMD CM equipment initiatives.</li> <li>• Continued development of advisory and augmentation assets (e.g., Federal, state, local coordination).</li> </ul>	
<b>Intelligence</b>		
<ul style="list-style-type: none"> <li>• Acquire high-value intelligence to support U.S. policies and actions to dissuade, prevent, rollback, deter, and mitigate and manage the consequences of WMD.</li> <li>• Provide planning, integration and improvements to U.S. Government nuclear forensics capabilities.</li> <li>• Develop capability for robust assessments of CW or BW alleged use and attribution.</li> <li>• Provide improved intelligence to support Administration policy goals to secure dangerous nuclear materials worldwide.</li> </ul>	<ul style="list-style-type: none"> <li>• Work with IC and government partners, including international allies, to improve intelligence capabilities across the full spectrum of policy objectives..</li> <li>• Ongoing collaborative working relationships between DNDO, DOE, DTRA, and the FBI within the National Technical Nuclear Forensics Center.</li> <li>• Ongoing development of the Biodefense Knowledge Management System (BKMS) at the DHS Biodefense Knowledge Center.</li> <li>• Continue development of attribution capabilities.</li> <li>• Respond to an ever-widening set of WMD threats and challenges such as those described in <i>The Report of the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, 2008</i>.</li> <li>• Continue positioning IC collection and analysis to provide US policy-makers counterproliferation decision advantage to halt or reverse WMD programs.</li> <li>• Continue the development of forensic data evaluation methods.</li> </ul>	<ul style="list-style-type: none"> <li>• DHS, and DoD within the DoD JCIDS process, or other jointly-agreed process, develop solutions for WMD intelligence gaps/shortfalls.</li> <li>• Coordinate and publish a revised <i>National Intelligence Plan for Countering WMD Proliferation</i></li> <li>• Develop next-generation pattern analysis tools to support the identification of nuclear forensic signatures.</li> <li>• Initiate international discussions to develop memoranda of understanding for pathogenic strains.</li> <li>• Lead and coordinate efforts to develop a pipeline of nuclear forensics experts.</li> </ul>

# COMBATING WMD PERSPECTIVES AND SELECTED ACTIVITIES OF CPRC MEMBER ORGANIZATIONS

The WMD threat, combined with the existence of potentially unsecured WMD materials, technology, or knowledge in regions of concern, is among the most serious security challenges facing the United States. The CWMD activities of CPRC member organizations are integrated, however each member organization has separate responsibilities for CWMD.

## Department of Defense

DoD's activities span all three pillars of the *National Strategy to Combat Weapons of Mass Destruction*. DoD is pursuing an integrated CWMD approach with a combination of offensive-operations capabilities, missile defenses, and cooperative threat-reduction activities.

The 2010 *Quadrennial Defense Review (QDR) Report* advances two clear objectives:

- (1) "Further rebalancing Armed Forces capabilities to prevail in today's wars, while building capabilities needed to deal with future threats."
- (2) "To further reform DoD institutions and processes to better support warfighters' urgent needs; buy weapons that are usable, affordable, and truly needed; and ensure that taxpayer dollars are spent wisely and responsibly."

"Among the QDR recommendations aimed at helping to rebalance America's Armed Forces to better enable success in the following missions critical to protecting and advancing the nation's interests, are recommended enhancements directed at improving the DoD's role in defending against and responding to WMD in the following key mission areas:

- Defend the United States and Support Civil Authorities at Home:
  - Improve the responsiveness and flexibility of consequence management response forces;
  - Enhance capabilities for domain awareness;
  - Accelerate the development of standoff radiological/nuclear detection capabilities; and
  - Enhance domestic capabilities to counter improvised explosive devices (IEDs).
- Succeed in counterinsurgency, stability, and counterterrorism operations:
  - Expand manned and unmanned aircraft systems (UASs) for intelligence, surveillance, and reconnaissance (ISR);
  - Increase key enabling assets for special operations forces (SOF);
  - Increase counterinsurgency, stability operations, and counterterrorism competency and capacity in general purpose forces;
  - Strengthen key supporting capabilities for strategic communication.
- Prevent proliferation and counter weapons of mass destruction:
  - Establish a Joint Task Force Elimination Headquarters to plan, train, and execute WMD elimination operations;
  - Research countermeasures and defense to nontraditional agents;

- Enhance nuclear forensics;
- Secure vulnerable nuclear materials;
- Expand the biological threat reduction program; and
- Develop new verification technologies.”

Within the QDR’s priority objective, “to prevent and deter conflict”, the requirement is to strengthen the U.S.’s approach to deterrence. The recommended action is ”to reinforce U.S. commitments to our allies and partners by consulting closely with them on new, tailored, regional deterrence architectures that combine our forward presence, relevant conventional capabilities (including missile defense), and continued commitment to extend our nuclear deterrent.” These missile defense regional architectures and new capabilities are detailed in the *Ballistic Missile Defense Review* of February 2010.

Following are excerpts from the areas of focus the QDR provides direction for reforming how the Department operates, as such they are applicable to how the DoD should enhance its CWMD capabilities through improving program execution:

- “Continue to strengthen the execution phase of weapons development;”
- “Match requirements with mature technologies;”
- “Maintain a disciplined Systems Engineering approach integrated with comprehensive testing;”
  - “Demonstration of critical technologies and new concepts should be integral to all new development programs;”
  - “Accurate technical baselines and realistic testing should be carried out throughout the development life cycle;”
- “Avoid sacrificing cost and schedule for promises of improved performance.”

Lastly, the QDR provides direction for how the DoD should proactively address Future Challenges Risk, through:

- “Reforming general acquisition processes, optimizing information technology acquisition processes, and maintaining the defense industrial base;”
- “Streamlining the acquisition process to reduce overall acquisition time;”
- “Managing uncertainty about future environments and S&T trends.”

DTRA is the DoD’s official Combat Support Agency for countering WMD. The U.S. Strategic Command Center for Combating Weapons of Mass Destruction (SCC-WMD) synchronizes CWMD efforts from across the military’s geographical commands and leverages the people, programs, and interagency relationships of DTRA at a strategic level. Together DTRA/SCC-WMD developed the following priorities:

- Implement the Nunn-Lugar Global Cooperation Program.
- Implement President Obama’s arms-control vision.
- Develop analytical tools and technology to detect and acquire, or actively confront, the full spectrum of WMD threats.
- Develop a robust reach-back capability to facilitate the U.S. Government’s counter-proliferation efforts.

- Provide operational and technical support to ensure the safety, security, and sustainability of the U.S. nuclear weapons stockpile.
- Support Combatant Commands in their efforts to respond to WMD threats.

As another example of the DoD’s efforts to improve its counter WMD capabilities, in September 2010, the Marine Corps published the “*Marine Air Ground Task Force (MAGTF) Combating Weapons of Mass Destruction Operating Concept*”<sup>4</sup>. The USMC CWMD Operating Concept defines and clarifies support by USMC forces to the CWMD mission areas and is further intended as a baseline reference document for development of CWMD capabilities analysis. Its additional purpose is three-fold:

1. To highlight the likely impact of USMC CWMD capabilities on Joint and Service concepts, theater plans, and force structures.
2. To stimulate early discussion of organize, train, and equip activities and support processes needed for CWMD missions conducted or supported by USMC forces.
3. To identify requirements for enhanced capabilities that guide future force development.

### **Department of Energy**

One of DOE’s primary goals is to enhance nuclear security through defense, nonproliferation, and environmental efforts. The National Nuclear Security Administration (NNSA) is the DOE agency responsible for addressing the following four principal objectives:

- *Maintain the U.S. nuclear deterrent while working toward a world free of nuclear weapons.* The Department will maintain a safe, secure, and effective U.S. nuclear stockpile.
- *Stem nuclear proliferation and lead an international effort to secure all vulnerable materials worldwide within four years.* In the context of reducing global nuclear dangers, the DOE will enhance nonproliferation efforts and the security of nuclear materials, and support the President’s arms-control and nonproliferation agendas.
- *Reduce the threat of nuclear terrorism and increase international engagement on nuclear security matters.* The Department will leverage its expertise in the analysis of foreign nuclear weapons programs and novel technologies to assess the potential of emerging nuclear threats and countering the threat of nuclear terrorism.
- *Enhance the proliferation resistance of nuclear power deployment and fuel cycle engagement.* Through research and development, the DOE will strengthen international safeguards and export controls to support safe and secure deployment of nuclear power.

DOE supports CWMD missions through its nuclear proliferation prevention and counter-terrorism 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 inspection and monitoring activities of arms control agreements and regimes; protection of WMD and WMD-related materials and components; detection and tracking of these materials and components; removal of materials from compliant nation states; export control activities; and responding to nuclear and radiological emergencies in the United States and abroad. DOE is working closely with DoD, DHS, DOS, and the IC to detect, characterize, and defeat WMD and WMD-related facilities.

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<sup>4</sup> <http://www.quantico.usmc.mil/activities/?Section=CDI>

## Department of Homeland Security

*The Quadrennial Homeland Security Review Report: A Strategic Framework for a Secure Homeland (February 2010)* establishes three key concepts which form the foundation for our national homeland security strategy: Security, Resilience, and Customs and Exchange. These concepts drive five broad areas of activity defined as homeland security core missions. Of the five core missions, three provide goals and objectives relevant to countering WMD and terrorism:

### *Preventing Terrorism and Enhancing Security*

#### Goal 1.1: Prevent Terrorist Attacks:

##### Objectives:

- Understand the threat
- Deter and disrupt operations
- Protect against terrorist capabilities
- Stop the spread of violent extremism
- Engage communities

#### Goal 1.2: Prevent the Unauthorized Acquisition or Use of Chemical, Biological, Radiological, and Nuclear Materials and Capabilities

##### Objectives:

- Anticipate emerging threats
- Control access to CBRN
- Control movement of CBRN
- Protect against hostile use of CBRN

### *Securing and Managing Our Borders (Note: Goal 2.2 is not related to CWMD)*

#### Goal 2.1: Effectively Control U.S. Air, Land, and Sea Borders

##### Objectives:

- Prevent illegal entry
- Prevent illegal export and exit

#### Goal 2.3: Disrupt and Dismantle Transnational Criminal Organizations

##### Objectives:

- Identify, disrupt, and dismantle transnational criminal and terrorist organizations
- Disrupt illicit pathways

### *Ensuring Resilience to Disasters*

#### Goal 5.1: Mitigate Hazards

##### Objectives:

- Reduce the vulnerability of individuals and families: Improve individual and family capacity to reduce vulnerabilities and withstand disasters.
- Mitigate risks to communities: Improve community capacity to withstand disasters by mitigating known and anticipated hazards.

#### Goal 5.2: Enhance Preparedness

##### Objectives

- Improve individual, family, and community preparedness
- Strengthen capabilities

#### Goal 5.3: Ensure Effective Emergency Response:

##### Objectives:

- Provide timely and accurate information to the public
- Conduct effective disaster response operations

- Provide timely and appropriate disaster assistance

Goal 5.4: Rapidly Recover

Objectives:

- Enhance recovery capabilities
- Ensure continuity of essential services and functions

DHS will develop, with the approval of the Secretary of Homeland Security, and in coordination with the Attorney General and the Secretaries of State, Defense, and Energy, an enhanced Global Nuclear Detection Architecture (GNDA) with the following implementation: (1) the Domestic Nuclear Detection Office (DNDO) will be responsible for the implementation of the domestic portion of the GNDA; (2) the Secretary of Defense will retain responsibility for implementation of requirements within and outside the United States; and (3) the Secretaries of State, Defense, and Energy will maintain their respective responsibilities for policy guidance and implementation of the portion of the global architecture outside the United States, which will be implemented consistent with applicable law and relevant international arrangements. The GNDA is the worldwide network of sensors, telecommunications, and personnel, with the supporting information exchanges, programs, and protocols that serve to deter, detect, identify, and report on nuclear and radiological devices and materials out of regulatory control (“out of regulatory control” are devices and materials that are being imported, possessed, stored, transported, developed, or used without authorization, either inadvertently or deliberately). The GNDA:

- Is global in that it includes both U.S. systems and those of other countries, as well as the sharing of information among those systems;
- Targets illicit nuclear devices, radiological devices, and material to help protect against both nuclear and radiological terrorism;
- Detects by way of passive and active detection equipment, as well as by non-technical means, such as ongoing law enforcement information or observations, public and other government agencies’ observations, or reporting of suspicious behavior; and
- Represents the architecture or structure which reflects the fully coordinated approach to detect and promptly report nuclear and radiological threats.

On December 20, 2010, Secretary Napolitano signed the GNDA Strategic Plan and submitted it to the U.S. Congress. DNDO will also complement the GNDA Strategic Plan with a revised GNDA annual-review report. The annual report, required by Congress, will provide a means to evaluate, document, and track progress to assist in refining the GNDA. It will also provide a means to link the U.S. Government’s organizational roles and responsibilities to the GNDA goals, and identify the funding necessary to achieve those objectives. Like the Strategic Plan, the GNDA annual report will be jointly produced and approved by all relevant U.S. Government stakeholders.

The National Technical Nuclear Forensics Center (NTNFC), an Interagency activity embedded within DHS DNDO, will (a) address pre-detonation materials concept of operations and capability development, which involve research, development, assessments, and exercises as required by NSPD-17/HSPD-4, (b) address NTNFC integration and stewardship across the U.S. Government as required by NSPD-17/HSPD-4, and (c) provide leadership to the National Nuclear Forensics Expertise Development Program codified by the Nuclear Forensics and Attribution Act (P.L. 111-140).

DHS works to increase the nation’s preparedness against chemical and biological threats through improved threat awareness, advanced surveillance and detection, and responsive coun-

termeasures. The Biological Defense thrust area conducts risk-based biological threat countermeasure development programs which seek to characterize the threat, develop and transition new and improved technologies, strategies and procedures for the interdiction, detection, response and recovery from the use of biological threat agents resulting from intentional attacks or from accidental releases that present hazards to the health of the nation's human population. Hazards to the population through inhalation, dermal exposure and ingestion are within this mission<sup>5</sup>.

The Chemical Defense thrust area conducts risk-based chemical countermeasures development programs which seek to characterize the threat, as well as develop and transition new and improved prototype technologies, strategies and procedures for the interdiction, detection, response and recovery from use of toxic chemical threat agents in intentional attacks or from major accidental releases that present acute hazards to the health of the nation's human population. Hazards to the population through inhalation, dermal exposure and ingestion are addressed within this mission<sup>6</sup>.

Goals of the DHS program are: 1) Develop pre-release interdiction capabilities for biological and chemical threats; 2) Develop reliable capabilities for detection and characterization of chemical and biological releases to facilitate timely warning and notification for decision-makers; 3) Enable efficient and effective response and recovery from biological chemical attacks; 4) Ensure comprehensive understanding of biological and chemical agents and threats; and 5) Enhance the capabilities to identify biological and chemical attack sources.

### **Department of State**

WMD in the possession of terrorists or hostile States constitutes a serious and immediate threat. DOS will devote significant resources to counterproliferation and counterterrorism, nonproliferation, verification and compliance enforcement, and consequence management. These resources support DOS efforts to:

- Prevent the acquisition of WMD by terrorists and hostile States.
- Contribute to the international effort to secure, remove, and eliminate WMD, their delivery systems, related materials, and expertise through diplomacy, foreign assistance, counterproliferation, and counterterrorism efforts.
- Build coalitions to interdict proliferation trade, disrupt financing, and punish violators.
- Strengthen our common capacity to deter, prevent, and manage the consequences of WMD terrorist attacks by working through international partnerships and organizations such as the Global Initiative to Combat Nuclear Terrorism, the Group of Eight (G8) Global Partnership, the Organization for the Prohibition of Chemical Weapons (OPCW), and the International Atomic Energy Agency (IAEA).
- Strengthen other countries' export and border-security controls to detect and interdict the illicit movement of WMD.
- Roll back hostile nuclear-weapons programs, including working with the IAEA to deny States the ability to pursue nuclear weapons under the cover of peaceful nuclear-energy programs.

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<sup>5</sup> HSPD-7, 9, 10, 18 and 21, PPD-2

<sup>6</sup> HSPD-7, 22

- Support existing arms control and nonproliferation agreements and verification protocols and work with international partners to strengthen their implementation and ensure their compliance.
- Support cooperative efforts to develop missile defenses.

Responsible governments must be able to deal with threats within their own borders and address international problems in partnership with the United States and others. In support of this objective, DOS will:

- Develop and maintain effective security relationships with other countries and international organizations.
- Build strong partnerships through robust political-military activities such as defense trade and export-control regimes; arms control, nonproliferation, and disarmament agreements and verification protocols; international treaties, alliances, and burden-sharing agreements; security-assistance programs; international exercises; and active confidence-building measures.

National security starts overseas and our mission is to create conditions abroad that serve and protect U.S. citizens and interests. Our consular and infrastructure-protection programs play a critical role in protecting U.S. borders, transportation systems, and critical infrastructure. As part of our overseas mission, DOS will:

- Ensure that our consular policies and systems strengthen our borders to protect our homeland.
- Protect our economic vitality through enhanced security of the U.S. transportation sector.
- Work with foreign counterparts, international organizations, and the private sector through programs such as the Container Security Initiative to improve security standards in the maritime- and aviation-transportation sectors.
- Continue to play an important role in Critical Infrastructure Protection, working with and through our partners. We are intensifying our efforts to protect the physical and cyber infrastructure we share with other nations and upon which our economies and mutual security depend.

The following are key U.S. Government partners with which DOS will coordinate to achieve our counterproliferation and counterterrorism goals:

- DHS coordinates intelligence and law-enforcement activities, and programs that help protect the United States from terrorist and other threats. It also leads on border and transportation security and biodefense.
- DoD coordinates closely on counterterrorism and counter-narcotics programs, and provides the military-to-military contacts, assistance, and training that strengthen military and alliance relationships. It also plays an important role in the management of arms transfers and the Excess Defense Articles program, and supports the evacuation of non-combatants from crisis or disaster sites. DoD sponsors significant cooperative threat reduction programs and supports the Proliferation Security Initiative. DoD leads in providing security support, when needed, for stabilization and reconstruction activities, and participates in government-wide stabilization and reconstruction planning while conducting operations with other agencies.

- DOE sponsors many nuclear nonproliferation programs, including the Global Nuclear Energy Partnership, which the Department helps to implement.
- DOJ leads on international legal assistance and implements some criminal justice and rule of law programs in conjunction with DOS and the U.S. Agency for International Development (USAID).
- The Department of the Treasury (Treasury) leads money-laundering and asset-seizure issues, and monitors export controls. DOS co-chairs with Treasury, a committee on proliferation financing. DOS chairs, and USAID participates in, the Terrorist Finance Working Group of the Counterterrorism Security Group’s Technical Assistance Sub-Group.
- The Department of Commerce leads on some export-control regimes, and coordinates on others.

### **The Intelligence Community**

The IC concentrates its CWMD activities on acquiring high-value intelligence to support U.S. policies and actions that discourage, prevent, rollback, deter, and mitigate the consequences of WMD. The CBRN Counterterrorism Group (CCTG)—formed by merger of the CIA Counterterrorism Center’s and National Counterterrorism Center’s CBRN analysis groups—pools scarce analytical experts from CIA, NCTC, DIA, FBI, and other US Government organizations to support a wide range of customers. Additional CPRC members’ CWMD perspectives are presented in Volume II, Section 4.

Tables 3 through 6 highlight selected CWMD activities for DoD, DOE, DHS, and DOS, respectively, that have occurred since the issuance of the 2009 CPRC Report to Congress. The highlights presented in the tables meet three important criteria: (1) fulfilling specific ACE goals; (2) meeting the requirements of corresponding policy guidance or international agreements; and (3) addressing identified shortfalls or capability gaps associated with an ACE.

### **DOD SELECTED ACTIVITIES TO MEET COMBATING WMD GOALS**

**U.S. Strategic Command’s (USSTRATCOM) Role in CWMD.** An important aspect in the Nation’s approach to CWMD has been the work of USSTRATCOM to synchronize planning and advocate for CWMD capabilities in DoD. USSTRATCOM has engaged in discussions within DoD’s Office of the Secretary of Defense, DOE, and other Federal agencies to improve coordination. USSTRATCOM completed Concept Plan (CONPLAN) 8099-08, *DoD Global Combating Weapons of Mass Destruction Campaign Plan*, in March 2009. The CONPLAN incorporates national-level guidance for CWMD with the *Guidance for Employment of the Forces (GEF)* and *Joint Strategic Capabilities Plan 2008 (JSCP 08)*. CONPLAN 8099-08 synchronizes DoD CWMD plans by providing a common framework and methodology for CWMD planning which puts into effect a global strategy to combat WMD. USSTRATCOM completed a Joint Integrating Concept, approved in December 2007, for CWMD that describes how a Joint Force Commander will conduct future CWMD operations. In addition, the Joint Requirements Oversight Council (JROC) approved the CWMD Joint Capability Document (JCD) in October 2008, which documented a prioritized list of DoD CWMD-capability gaps.

DoD activities in the CWMD mission areas are highlighted in Table 3.

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

<b>Interdiction</b>
<ul style="list-style-type: none"><li>• DoD has provided support to the USG interdiction community through:<ul style="list-style-type: none"><li>-intelligence collection and analysis, to include dedicated support from the Defense Intelligence Agency, the Office of Naval Intelligence, and the newly established Civil Air Intelligence Analysis Center (CAIAC);</li><li>-operational execution of the Maritime Counterproliferation Interdiction (MCPI) Execute Order (EXORD);</li><li>-leading the Proliferation Security Initiative's (PSI) Operational Experts Group (OEG);</li><li>-supporting development of interdiction courses of action for specific cases; and</li><li>-supporting the Department of State in the negotiation of agreements with two additional flag states, Antigua and Barbuda and St. Vincent and the Grenadines, to provide expedited boarding authority when a vessel belonging to a party is believed to be carrying items of proliferation concern. There are now 11 such agreements in place.</li></ul></li></ul>
<b>Elimination</b>
<ul style="list-style-type: none"><li>• Based on lessons learned from the current Joint Task Force for WMD Elimination, the Secretary of Defense directed USSTRATCOM to establish a Standing Joint Force HQ for WMD Elimination during FY11. This organization will provide responsive expertise and enhanced intelligence capabilities to Geographical Combatant Commands.</li></ul>
<b>Threat Reduction Cooperation</b>
<ul style="list-style-type: none"><li>• The U.S. Additional Protocol (AP) with the International Atomic Energy Agency (IAEA) is designed to strengthen IAEA nuclear safeguards in the United States. Current DoD AP implementation efforts are focused on interagency coordination and discussions with IAEA counterparts to establish the necessary procedures and requirements to implement the AP in the United States, while also protecting U.S. national security.</li><li>• DTRA's Biological Threat Reduction Program's (BTRP) accomplishments included: completion of the Central Reference Lab in Tbilisi, Georgia; establishment of the Electronic Disease Detection and Surveillance System as the national reportable disease system for the Ministry of Health in Azerbaijan, Ministry of Health in Georgia and for the Ministry of Agriculture in Kazakhstan; initiating projects outside the FSU in Pakistan and Afghanistan, and will have efforts in Africa, Iraq and India by the end of 2011. Since 2009, the BTRP program has provided training to over 4,000 scientists.</li></ul>
<b>Passive Defense</b>
<ul style="list-style-type: none"><li>• The ASD(NCB) initiated efforts to field viable Non-Traditional Agent (NTA) chemical warfare defense solutions to the Joint Force. The Joint Requirements Office for CBRN Defense Programs, in collaboration with the Joint Program Executive Office for Chemical and Biological Defense Programs (JPEO-CBD) and the Joint Science and Technology Office for Chemical and Biological Defense Programs (JSTO-CBD), initiated a NTA defense technology demonstration and fielding program to rapidly equip warfighters with improved NTA defense equipment. Following successful initial fielding to a designated unit, efforts will continue to improve NTA defense capabilities across the Joint Force.</li><li>• The Office of the Assistant Secretary of Defense for Health Affairs (OASD(HA)) continued developing and updating policies and guidelines necessary to ensure that the Service members receive the best available medical countermeasures, protecting our military forces from existing and emerging CBRN threats, and enhancing their operational capability to combat WMD.</li><li>• OASD(HA) updated anthrax vaccination policy and guidelines that make the immunization process more efficient by changing the doses from 6 to 5 immunizations, and the route from subcutaneous to intramuscular administration. OASD(HA) also issued new policy and immunization protocol to replace the previous smallpox vaccine with ACAM2000. Both updates on the smallpox vaccine and the anthrax vaccine promote DoD's CWMD passive defense capability.</li><li>• OASD(HA) developed two analysis of alternatives (AOA) study reports in support of the acquisition process and milestone decision for developing medical countermeasures against biological WMD. These reports assessed alternative technology solutions for medical capability needs of CBRN therapeutic pharmaceuticals and made recommendations for the most promising candidates for advanced development aimed at preventing and protecting Service members from exposure and infection by intracellular bacteria pathogens and hemorrhagic fever viruses.</li><li>• OASD(HA) funded biosurveillance activities for rapid and real time detection of emerging infectious diseases of military significance such as Dengue Fever. OASD(HA) also funded and developed policies to smoothly transition to a new FDA-approved vaccine against the biological threat, Japanese Encephalitis.</li><li>• OASD(HA) updated DoDI 6440.cc, The Department of Defense Laboratory Network, which establishes policy, provides instructions, and introduces a forum which allows DoD laboratories, programs, and activities with analytic and/or related response capabilities to coordinate execution, develop consensus, and make recommendations governing the detection, identification/characterization/ diagnosis, and reporting of CBRN agents, infectious diseases, and other all-hazards agents of military and/or national significance in support of the DoD's global mission.</li><li>• On January 12, 2009, OASD(HA) collaborating with the Department of Veterans Affairs' (VA) biosurveillance program launched a Joint Incentive Fund initiative to create a joint VA/DoD ESSENCE (Early Notification of Community-based Epidemics) application in 2009, which will link DoD and VA ESSENCE programs. This will allow DoD and VA public health personnel to collaborate on analyses of surveillance data, improve information sharing, and increase situational awareness for important health events. ESSENCE is a web-based syndromic surveillance application that screens the entire military health system worldwide for rapid or unusual increases in the occurrence of certain syndromes. ESSENCE automatically alerts users to these unusual increases and uses geographic information system mapping to display occurrences geographically.</li></ul>

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

<b>Passive Defense (continued)</b>
<ul style="list-style-type: none"><li>• OASD(HA) developed and released policies and guidance encompassing all aspects of medical response to the 2009 H1N1 pandemic influenza. It also developed and released policies and guidance encompassing all aspects of medical response to an influenza pandemic.</li><li>• The Joint Service Lightweight Standoff Chemical Agent Detector will be employed on the Stryker Nuclear, Biological, Chemical Reconnaissance Vehicle. Increment 1 began low-rate initial production fielding in March 2007.</li><li>• The Collective Protection Systems Backfit program, a system for filtering air to the most critical interior spaces, remains one of the most effective ways of protecting ship personnel. The last of 15 ships will complete installation of this capability in FY12.</li><li>• The focus of the FY10/11 Transformational Medical Technologies Initiative profile will shift towards advanced development efforts as selected candidates enter the Food and Drug Administration's clinical trials process.</li><li>• The Joint Service Transportable Decontamination System-Small Scale (JSTDS-SS) began fielding in FY10. The JSTDS-SS will be used to conduct operational decontamination missions and support thorough decontamination operations. It may also be used to support clearance decontamination missions, limited facility decontamination, and/or terrain decontamination.</li><li>• The Joint Effects Model (JEM) is an accredited model for predicting hazards assessment of NBC hazards including industrial materials. JEM Increment I (C2 Variant) achieved a full rate production decision in 2010. JEMs have been fielded to the Army and Air Force.</li><li>• Fielding of the Joint Warning and Reporting Network (JWARN) Increment I begins in 2011.. A Full Deployment Decision occurred on September 29, 2010.</li><li>• The Uniform Integrated Protection Ensemble (UIPE) Increment 1 - Lightweight Chemical Biological Protective Garment (LCBPG) program completed a Materiel Development Decision (MDD) with the JPEO-CBD in July 2010. UIPE Inc 1 - LCBPG highlights CBDP determination to reduce thermal burden to the warfighter which allows them to continue to fight in multiple environments.</li><li>• Since FY09, JPEO-CBD's Joint Project Manager for Individual Protection (JPM-IP) has fielded 315, 774 Joint Service General Purpose Masks (JSGPM). This mask replaces MCU-2P, M-40, and M45-series legacy systems. Considerable efficiencies are gained by having a single product or system replace multiple legacy products and systems.</li><li>• Since FY09, JPEO-CBD's Joint Program Manager (JPM-IP) has fielded over 10,000 M53 Masks. This mask provides the warfighter the flexibility to use in filter mode or respirator mode. This SOF variant of the JSGPM is currently being studied by the CBDP for its utility for General Purpose Force missions.</li><li>• Since FY09, JPM-IP has delivered the following protective clothing components: Alternative Footwear System 856,687 pairs; Integrated Footwear System 66,218 pairs; JSLIST Block 2 Glove Upgrade non-Flame Resistant 765,473 pairs; and Joint Protective Aircrew Ensemble 34,597 garments.</li><li>• Since FY09, the Joint Service Aircrew Mask-Rotary Wing (JSAM-RW), Mask Protection Unit-6/P (MPU-6/P) Apache attack helicopter variant received Full Rate Production decision. The Apache variant of the JSAM-RW program replaces the M-43 and M-48 legacy masks. Considerable efficiencies are gained by having a single product or system replace multiple legacy products and systems.</li><li>• Since the 2009 report, additional capabilities have been developed and fielded for CBRN Dismounted Reconnaissance Systems (CBRN DRS). CBRN sensor integration on Service-procured platforms and within Service organizations provides the Commanders with the capability to conduct mounted or dismounted reconnaissance and surveillance with mobile and portable sensors. In response to a Joint Urgent Operational Needs Statement (JUONS), CBRN DRS fielded 14 sets of mission-specific kits to the U.S. Army for conducting dismounted (on-foot) CBRN reconnaissance. This new capability includes the characterization of hazardous material events or accidents and weapons of mass destruction detection or denial operations. The JUONS-inspired product achieved MS C in 2010.</li><li>• The Joint Biological Point Detection System (JBPDS) being fielded to the Army, Navy, Army Reserve and National Guard units is capable of biological point detection, identification, warning, and sample isolation within 30 minutes. The JBPDS provides a means of limiting the effects of biological warfare agent attacks and provides assistance to medical personnel in determining the appropriate treatment if exposure occurs. The JBPDS consists of two configurations for the Army and Navy with the following nomenclatures: XM97 shelter vehicle and the XM98 ship. The JBPDS is a component of the Stryker Nuclear, Biological, and Chemical Reconnaissance Vehicle and M31E2 Biological Integrated Detection System companies. The JBPDS obtained Full Rate Production and Full Materiel Release in October 2009. The JBPDS will conduct a technology refresh in 2011-2012 to reduce operations and sustainment (O&amp;S) costs to the Services.</li><li>• The Collectively Protected Field Hospitals (CPFH) Program includes the Army's Chemically Protected Deployable Medical System (CP DEPMEDS), the Air Force's Collectively Protected Expeditionary Medical Support, and the Navy's Chemically Hardened Expeditionary Medical Facility. The CPFH converts field hospitals into fully operational, environmentally controlled, and collectively protected medical treatment facilities designed to sustain medical operations in a CB-contaminated environment. Since 2009, the CPFH Program completed the conversion of one CP DEPMEDS to the Medical Re-engineering Initiative configuration. The CPFH Program also completed one new equipment-training event for the CP DEPMEDS.</li><li>• The Shipboard Collective Protection System Backfit (CPS BKFT) Program continues to provide collective protection to the command and control, rest/relief, and hospital areas on large deck amphibious ships, and includes the capability to treat casualties arriving from the shore. Since 2009, system installations were completed onboard two amphibious Navy ships through the CPS BKFT program.</li><li>• During FY10, the Navy installed 20 Joint Biological Agent Identification and Diagnostic System (JBAIDS) Block I on large-decked ships. In FY11, four more will be installed in addition to deploying systems to 15 shore-based Navy Forward Deployed Preventive Medicine Units (FDPMU).</li><li>• The Joint Service Lightweight Standoff Chemical Agent Detector will be employed on the Stryker Nuclear, Biological, Chemical Reconnaissance Vehicle. Increment 1 began low-rate initial production fielding in March 2007.</li><li>• Published Army Training and Doctrine Command (TRADOC) Pamphlet 525-7-19, The United States Army Concept Capability Plan for Combating Weapons of Mass Destruction for Future Modular Force 2015-2024, 25 March 2009.</li></ul>

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

<b>Passive Defense (continued)</b>
<ul style="list-style-type: none"><li>• In FY11, JPEO-CBD will begin procurement of the Non-Traditional Agent Detection Program (NTAD) which will enhance the warfighter's ability to attain situational awareness and respond to unknown and emerging hazards.</li><li>• In FY11, JPEO-CBD will begin procurement of the Human Remains Decontamination System (HRDS), which will provide the capability for safe intra-theater handling and storage of Contaminated Human Remains resulting from chemical contamination.</li><li>• As part of the FY 2010/2011 research solicitation process, the JSTO-CBD solicited proposals from more than 50 DoD and Service Labs. In addition, the JSTO-CBD solicited research efforts from numerous interagency organizations and laboratories, including the DOE National Laboratories, the EPA, the U.S. Food and Drug Administration (FDA), the National Aeronautics and Space Administration, and the National Institutes of Health (NIH).</li><li>• JPEO-CBD's JPM-CBMS has several partnerships with the Department of Health and Human Services (DHHS) to maximize collaboration in the area of medical countermeasure development and to shorten fielding timelines. CBMS has entered into an agreement with the Biomedical Advanced Research and Development Authority (BARDA) to facilitate the interagency advanced development of medical radiation countermeasures as well as to collaborate on the development of the Advanced Anticonvulsant System (midazolam in an autoinjector).</li><li>• In FY10, the JPM Biological Defense (BD) awarded the full rate production contract for the Joint Biological Point Detection System (JBPDS) and initiated Phase 2 of the Whole System Live Agent Test with the JBPDS (utilizing new containment chamber). They also designed a JBPDS "system refresh approach" for aging system components. In FY10, nine JBPDS were fielded to the United States Navy.</li><li>• The Joint Biological Tactical Detection System (JBTDS) Increment I and, the Joint Biological Standoff Detection System (JBSDS) Increment II successfully passed their Materiel Development Decisions (MDDs). The two products will fill capability gaps identified by the Joint Services and will provide the U.S. Armed Forces with a capability to counter future asymmetric threats and sustain a superior edge in biological defense.</li><li>• The Next Generation Diagnostic System (NGDS) program completed a Materiel Development Decision (MDD) with the JPEO-CBD in October 2010. NGDS will enhance diagnostic capability that compliments the Joint Biological Agent Identification and Diagnostic System. NGDS will be fielded by the end of FY14.</li><li>• The JPEO-CBD's Joint Project Manager for Nuclear, Biological, and Chemical Detection (JPM-NBC CA) developed and fielded to the U.S. Army sets of mission specific kits for conducting dismounted (on-foot) CBRN reconnaissance. Specifically, this new capability includes the characterization of hazardous material events or accidents and weapons of mass destruction detection or denial operations. The Joint NBC Reconnaissance System (JNBCRS) Increment II achieved Milestone C in the second quarter of FY10. Since FY09, 22 JNBCRSs Increment II have been fielded to the Army.</li><li>• The Joint Chemical Agent Detector (JCAD) is being fielded to all Services. The U.S. Army Reserve, Navy and Special Operations units were the first to receive the most advanced hand held chemical agent detector in the DoD inventory. Since FY09, the JPM-NBC CA has delivered approximately 32,611 JCADs to the Services.</li><li>• The JPM-NBC CA is executing an engineering upgrade to the M256A1 Chemical Detection kit to standardize the method for detection of low volatility agents and to enhance field usability. The M256 is not an alarm. It is a tool used after personnel have received other warnings about the possible presence of chemical warfare agents. The new M256A2 kit standardizes the detection methods for solid and liquid phase agent samples and is backward compatible with the M256A1 kit. The A2 kit is Modular Lightweight Load-carrying Equipment compatible per feedback from Service users and incorporates replenishment of components to reduce user costs. Procurement of A2 kits began in FY 2010 and M256A1 kits will be replaced through attrition.</li><li>• Joint Chemical Biological Coverall for Combat Vehicle Crewmen (JC3) production began in the third quarter of FY09. The first 150 garments were delivered to the Army and Marine Corps in Fall 2009 with 15,538 being delivered thereafter. JC3 is a flame, petroleum, oil, and lubricant resistant semi-permeable garment that protects Warfighters against CB threats. It provides combat vehicle crewmen-specific capability and design that was previously unavailable. In FY10, 6,050 JC3 were delivered to the Army and Marine Corps.</li><li>• Two JPM-CBMS programs submitted Investigational New Drug (IND) applications to the Food and Drug Administration in FY09: the Improved Nerve Agent Treatment System (INATS) and the Medical Radiation Countermeasure program (MRADC). The INATS Program was the second DoD organization to submit their IND electronically, saving both time and money.</li><li>• DoD submitted an Emergency Use Authorization (EUA) to the Food and Drug Administration (FDA) for the H1N1 Pandemic Influenza A Assay. This effort was executed at the request of the Centers for Disease Control and Prevention (CDC) and allowed the DoD to aid in a public health crisis. The FDA approved this submission at the end of FY 2009. An EUA authorizes the use of unapproved medical products or unapproved uses of approved medical products during a declared public health emergency. Under this new EUA, the DoD's JBAIDS was used to run the CDC's test, which aided in more rapid diagnosis of H1N1 influenza infections so that deployed troops could quickly begin appropriate medical treatment.</li><li>• The Filovirus Vaccine program completed a MDD with the JPEO-CBD in August 2009. Five out of 14 total Technology Transition Agreements developed and approved by the JPM-CBMS and the tech base support this effort. Filovirus Vaccine candidates transitioned to advanced development in FY10 and achieved Milestone A in August 2010.</li><li>• Since 2009, the JPM-CBMS continued fielding of four different products: provision of doses of Anthrax Vaccine Adsorbed; doses of smallpox vaccine; doses of Vaccinia Immune Globulin; retrofit of JBAIDS systems.</li><li>• The Critical Reagents Program (CRP) obtained International Organization for Standardization (ISO) 9001 registration as well as ISO 17025/34 compliance for support laboratories. In a year's time, the CRP continued to make more than 200 products supporting multiple interagency and intra-agency requests and nine foreign governments.</li></ul>

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

<b>Security Cooperation and Partner Activities</b>
<ul style="list-style-type: none"><li>• DTRA developed and continues to administer and maintain the Global Initiative Information Portal, a web-based portal to promote information sharing pertaining to the suppression of acts of nuclear terrorism and their facilitation among the partner nations of the Global Initiative to Combat Nuclear Terrorism.</li><li>• The DoD <i>International Counterproliferation Program</i> conducted 26 training events in 13 FSU or Eastern European countries, and two additional NATO workshops in Western Europe in FY10. The training was conducted in partnership with the FBI and DHS, and focused on WMD investigations, border security, and hazardous material response.</li></ul>
<b>Active Defense</b>
<ul style="list-style-type: none"><li>• Fielded and deployed 23 Aegis BMD ships and 111 Standard Missile-3 (SM-3) Block IA missiles for defense against short to intermediate range ballistic missiles in support of regional ballistic missile defense and European Phased Adaptive Approach Phase I.</li><li>• Completed operational fielding of 30 Ground Based Interceptors for long range ballistic missile defense of the U.S. homeland against limited ballistic missile attack.</li><li>• The Air Force continued to implement Integrated Defense (ID) for its installations. Integrated Defense is defined as the application of active and passive defense measures, employed across the legally-defined ground dimension of the operational environment, to mitigate potential risks and defeat adversary threats to USAF operations, including CBRN threats.</li></ul>
<b>WMD Consequence Management</b>
<ul style="list-style-type: none"><li>• As a result of the 2010 QDR, the DoD began restructuring its CBRN Consequence Management enterprise. The original enterprise consisted of the Weapons of Mass Destruction – Civil Support Teams (WMD-CSTs), CBRN Enhanced Response Force Packages (CERFPs), and three CBRN Consequence Management Response Forces (CCMRFs). The restructured force will maintain the WMD-CSTs and CERFPs, but significant changes will be made with the three CCMRFs, and new capability will allow for regional response assets.</li></ul> <p>In order to increase its ability to respond more rapidly to an incident in the homeland with more robust critical life-saving capability, the first CCMRF will be restructured into a Defense CBRN Response Force (DCRF). The DCRF will include approximately 5,200 personnel sourced primarily from the active component (multi-service) that responds as directed by the Secretary of Defense (Sec-Def) through the Commander, U.S. Northern Command (CDR USNORTHCOM). DCRF capabilities include: CBRN incident assessment; search and extraction; decontamination of DoD personnel and equipment; evacuee and casualty decontamination; first responder and emergency equipment decontamination; Level II medical care (patient triage, along with trauma and emergency medical care); patient holding; ground and rotary-wing air patient movement (MEDEVAC and CASEVAC); Level III medical care (surgical and intensive care); force health protection; military personnel and equipment operational security; site accessibility horizontal and vertical engineering; veterinary; logistics; general purpose support; C2; aviation lift; mortuary affairs; transportation; and civil and military interoperable communications capabilities.</p> <p>To address the potential for multiple, simultaneous disasters/incidents, the second existing and third planned CCMRFs will be replaced with two smaller Command and Control CBRN Response Elements (C2CREs) focused on providing C2 and logistics capabilities for Title 10 follow-on forces. The two C2CREs will include approximately 1,500 personnel each and be sourced from both the active and reserve components that respond as directed by the SecDef through CDRUSNORTHCOM. The two dedicated C2CREs, capabilities include limited CBRN assessment, search and extraction, decontamination, emergency medical, Level II medical, security, engineering, C2, civil and military interoperable communications, logistics, and transportation.</p> <p>Complementing the evolution of the DCRF and C2CREs, DoD also will draw on existing National Guard (NG) forces to build a Homeland Response Force (HRF) in each of the ten Federal Emergency Management Agency (FEMA) regions. The ten HRFs provide a Title 32 CBRN Response capability, but may also respond to an incident in a Title 10 role. Additionally, the HRF C2 element will facilitate Federal CBRN response planning with JFHQ-States in their respective FEMA regions. Each HRF will be sourced by the NG and are controlled by the governor unless Federalized. There are 566 personnel in each HRF (up to 25% full time manning in each) for a total of 5,660 personnel. Capabilities include CBRN assessment, search and extraction, casualty decontamination, emergency medical triage and treatment, security, and C2. DoD's current restructuring of its CBRN response forces will begin October 1, 2011, and be complete by October 1, 2012.</p> <ul style="list-style-type: none"><li>• DOD developed and approved the CBRN Consequence Management Initial Capabilities Document (ICD). The CBRN CM ICD presents 21 recommendations (Materiel and Non-materiel) to address the entire CM mission area.</li><li>• USEUCOM is completing a Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) Change Recommendation for OCONUS consequence management, describing and proposing theater-based CBRN solutions and capabilities, both for installation protection and assisting friends and allies.</li><li>• USSTRATCOM, through the USSTRATCOM Center for Combating Weapons of Mass Destruction, is developing an operations concept for using CONUS-based CBRN CM capabilities to support combatant commands' responses to CBRN incidents overseas.</li><li>• DoD and DHS completed cooperation on the Interagency Biological Restoration Demonstration (IBRD) to provide a coordinated systems approach to the recovery and restoration of wide-urban areas following the aerosol release of a biological agent. A follow-on project to develop guidance on wide area chemical and radiological events is underway. DOS and DOD are exploring the expansion of this cooperative interagency effort with the Trans-Atlantic Biological Revitalization Demonstration (TACBRD) within the European area of operation in calendar year 2011.</li></ul>

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

<b>WMD Consequence Management (continued)</b>
<ul style="list-style-type: none"><li>• USARPAC created an Active Component (Title 10) CBRN Response Capability within the 71st (Hawaii) and 95th (Alaska) Chemical Companies. Both elements achieved initial operational capability (IOC) during 3rd/4th Quarter of FY10, respectively. These units have the capability to conduct CBRN CM independently in an operational environment in order to provide the COCOM Commander a dismounted reconnaissance capability with the mission to identify and mitigate CBRN hazards on the battlefield; provide augmentation to first responders during CBRNE incidents in the PACOM AOR to include military installations on foreign soil; provide augmentation during Defense Support to Civil Authority (DSCA) operations; and to bridge a capability gap in the CBRN CM Enterprise by enhancing WMD-CSTs and CERFP (Title 32) for Hawaii, Alaska and U.S. territories within the PACOM JOA.</li><li>• The USAF has initiated a rewrite of Service-level doctrine, policy, and guidance for the deployment and employment of USAF resources in support of civil authorities in minimizing the damage and recovering from domestic CBRN mass casualty attacks.</li><li>• The Office of the Deputy Assistant to the Secretary of Defense for Nuclear Matters (ODATSD(NM)) continued to further consequence management goals via exercises and exchanges through its relationship with the North Atlantic Treaty Organization (NATO).</li></ul>
<b>Intelligence</b>
<p>DoD has been supporting IC efforts in Nuclear Forensics, for example:</p> <ul style="list-style-type: none"><li>• ODATSD(NM) enhanced collaboration with the United Kingdom and France in the areas of nuclear detection, collection, and forensics.</li><li>• DTRA is managing the R&amp;D of collection, analysis and evaluation capabilities for post-detonation National Technical Nuclear Forensics (NTNF).</li><li>• ODATSD(NM) co-chaired the Attribution Working Group under the Office of Science and Technology Policy's Nuclear Defense Research and Development Subcommittee.</li><li>• The Air Force began executing DoD's NTNF responsibilities, which include fielding the objective DoD NTNF capability; providing support to nuclear forensic activities; planning, programming, and budgeting to satisfy NTNF requirements; and supporting combatant commands in which NTNF operations occur.</li></ul>

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

<b>Interdiction</b>
<ul style="list-style-type: none"> <li>• The DOE NNSA <i>Second Line of Defense (SLD) Core Program</i>, working closely with DHS, completed installations of equipment to detect the illicit trafficking of nuclear and other radiological materials at an additional 81 strategic borders, airports, and strategic feeder ports in Russia and other countries, for a total of 365 sites completed.</li> <li>• The <i>SLD Core Program</i> also concluded cooperation agreements with Israel, Jordan, Lebanon, Poland, and Croatia.</li> <li>• The <i>SLD Megaports Initiative</i> completed installations at an additional 15 Megaports, for a cumulative total of 34 Megaports completed.</li> <li>• The <i>Megaports Initiative</i> also concluded agreements with Bangladesh, Djibouti, Jordan, Lebanon, Argentina, Cambodia, Italy, Malta, South Korea, Vietnam, United Arab Emirates (UAE), and Kenya.</li> </ul>
<b>Elimination</b>
<ul style="list-style-type: none"> <li>• The <i>Nuclear Detonation Detection Program</i> delivered three operational space-based nuclear detection sensors to the Air Force on time in support of Air Force launch schedules—sustaining the nation's capability to monitor and report nuclear detonations that occur on or above the earth's surface. It also completed development and testing of the next-generation sensor suite for detecting nuclear explosions above the atmosphere and is now the baseline for future geosynchronous payloads.</li> <li>• The <i>Nuclear Detonation Detection Program</i> also delivered seismic and radionuclide technologies to enhance ground-based components of the United States Atomic Energy Detection System.</li> <li>• The <i>Proliferation Detection Program</i> conducted a mock warhead counting exercise using neutron imaging of multiple sources at realistic distances and initiated a series of source physics experiments at NNSS in support of CTBT verification technology development.</li> </ul>
<b>Threat Reduction Cooperation</b>
<ul style="list-style-type: none"> <li>• The Zheleznogorsk (Russia) <i>Plutonium Production Elimination Project</i> is currently expected to meet its December 2010 completion date on cost and schedule. The completion will provide district heat, allowing shutdown of the Zheleznogorsk reactor and eliminate 400 kg of plutonium production annually.</li> <li>• The <i>GTRI Program</i> converted or verified shutdown of 10 additional research reactors from HEU to LEU fuel.</li> <li>• The <i>GTRI Program</i> removed an additional 905 kg of HEU and plutonium, and over 7500 excess radiological sources.</li> <li>• The <i>GTRI Program</i> protected an additional 216 buildings worldwide with vulnerable nuclear and radiological materials.</li> <li>• The <i>INMPC Program</i> completed material protection, control, and accounting (MPC&amp;A) upgrades to 16 buildings containing weapons-usable material at Russian civilian sites.</li> <li>• The <i>MCC Program</i> downblended an additional 2.2 metric tons (MT) of HEU from international sites.</li> <li>• The <i>ONIS Program</i> placed an additional 21 MPC&amp;A regulations in the development phase; trained over 1,100 physical protection and material control specialists for Rosatom; and provided protective force upgrades to 11 Rosatom sites.</li> <li>• The <i>Navy Complex Program</i> completed refurbishment of the Kamchatka Classroom Facility in central Russia.</li> <li>• The <i>Rosatom Weapons Program</i> completed security upgrades at 32 additional buildings containing weapons-usable material in Russia and the FSU.</li> <li>• The <i>FMD Program</i> coordinated an agreement between DOE and Rosatom, on a document outlining key elements of a monitoring and inspection regime designed to confirm that the two parties to the PMDA are meeting the terms and conditions of the Agreement.</li> <li>• The <i>FMD Program</i> completed downblending of an additional 15 MT of surplus U.S. highly enriched uranium.</li> <li>• The <i>International Nuclear Materials Protection and Cooperation</i> program prevents nuclear terrorism by working in Russia, the Middle East, Horn of Africa, southeast Asia, 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, airports and sea ports to prevent and detect the illicit transfer of nuclear material. Its subprograms completed installation and supported sustainability of nuclear material protection, control and accounting (MPC&amp;A) systems at one additional building with weapons usable material and assisted in consolidating excess weapons-usable material by blending down a cumulative total of 12.9 metric tons of HEU to LEU.</li> </ul>
<b>Offensive Operations</b>
<ul style="list-style-type: none"> <li>• Completed 2009 and 2010 Annual Stockpile Assessments to help ensure our nuclear stockpile remains a viable strategic deterrent.</li> </ul>

## **IC SELECTED ACTIVITIES TO MEET COMBATING WMD GOALS**

The IC provides strategic, tactical, and operational intelligence on WMD threats to all U.S. Government organizations, a critical enabling function that cuts across all ACEs. The National Counterterrorism Center, under the Office of the Director of National Intelligence (ODNI), leads our nation's effort to combat terrorism at home and abroad by analyzing the threat, sharing that information with our partners, and integrating all instruments of national power to ensure unity of effort.

The ODNI's National Counterproliferation Center (NCPC) was established by the Intelligence Reform and Terrorism Prevention Act of 2004 (Section 1022). The Center conducts strategic counterproliferation planning for the IC to support policy efforts to dissuade, prevent, deter, and otherwise counter the proliferation of WMD, their delivery systems, and related materials and technologies. It works with the IC to identify critical-intelligence gaps or shortfalls in collection, analysis, or exploitation, and develop solutions to ameliorate or close these gaps; identify long-term proliferation threats and requirements; and develop strategies to ensure that the IC is positioned to address these threats. NCPC also works with elements inside and outside of 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.

IC activities in support of the CWMD mission are reported annually to Congress in the classified document *Report to the Director of National Intelligence on the State of the Counterproliferation Intelligence Community, and the State of the Counterterrorism Mission in the Intelligence Community: Annual Report to the Director of National Intelligence*.

## **DHS SELECTED ACTIVITIES TO MEET COMBATING WMD GOALS**

The *National Strategy for Homeland Security* and the *Homeland Security Act of 2002* served to mobilize and organize the nation in the mission of securing the homeland from terrorist attacks. This complex mission requires a focused effort. To this end, one primary reason for the establishment of DHS was to provide the unifying core for the vast national network of organizations and institutions involved in efforts to secure our nation. DHS coordinates with FBI, DoD, DOE, the IC, DOS, and other Federal departments to enhance CWMD capabilities. The Domestic Nuclear Detection Office (DNDO) was chartered within DHS on April 15, 2005, through National Security Presidential Directive (NSPD)-43/Homeland Security Presidential Directive (HSPD)-14 to coordinate efforts of Federal, State, and local partners to improve the Nation's capability to detect and report unauthorized attempts to import, possess, store, develop, or transport nuclear or radiological material for use against the Nation, and to enhance further this capability over time.

The DHS Chemical and Biological Division (CBD), within the Science and Technology Directorate, enables comprehensive understanding and analyses of biological and chemical threats in the domestic domain; develops pre-event assessment, discovery, and interdiction capabilities for biological and chemical threats; develops capability for warning, notification, and timely analysis of biological and chemical attacks; optimizes technologies and processes for recovery from biological and chemical attacks; enhances the capability to identify biological and chemical-attack sources; and develops vaccines and diagnostics for high-priority foreign animal diseases. 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 departments and 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 CWMD mission areas address primarily the Passive Defense and Consequence Management ACEs.

The DHS Office of Health Affairs OHA support provides early detection of biological and chemical events within the Health Threats Resilience (HTR) Division. The Division actualizes early detection through the BioWatch program, the National Biosurveillance Integration Center (NBIC), and the Chemical Defense Program (CDP). Both the BioWatch and the Chemical Defense activities are critical pieces of overall threat architectures which are necessary to provide overarching guidance of efforts to prevent and respond to catastrophic chemical and biological events. Resources for BioWatch and Chemical Defense activities are leveraged to integrate all national biological and chemical defense capabilities, horizontally and vertically, in order to develop and affect end-to-end capabilities.

BioWatch provides bio-aerosol environmental monitoring capability within our nation's high-risk cities for early detection of biological incidents. Currently, BioWatch covers more than 30 of the largest metropolitan areas within the U.S. BioWatch is also developing a next-generation automated biodetection system, Generation-3 (Gen-3).

NBIC was established by Implementing Recommendations of the 9/11 Commission Act of 2007 (9/11 Act, P.L. 110-53) to enhance the federal government's capability to rapidly identify and monitor biological events of national concern. NBIC collects, analyzes, integrates, and shares human, animal, plant, food, and environmental biosurveillance information.

OHA also provides specialized expertise to address the unique challenges posed by chemical incidents. DHS OHA leads a number of the Department's chemical defense activities and provides medical advice and assistance to DHS components and interagency partners in developing preparedness and response requirements related to chemical events. The OHA Chemical Defense Program (CDP) provides federal, state, and local stakeholder communities with the knowledge and tools to build and sustain a viable framework for preparedness and response to high consequence chemical events.

DHS activities with direct relevance to CWMD include the following:

- Developing the underlying strategy that guides the U.S. Government's nuclear detection efforts.
- Developing a Global Nuclear Detection Architecture (GNDA) that will contribute to a robust, layered defense for the United States.
- Conducting and coordinating radiological/nuclear detection technology R&D programs, ensuring collaboration between DHS, DoD, DOE, DOS, the FBI, and other agencies.
- Leading the activities of the National Technical Nuclear Forensics Center (NTNFC), an Interagency activity embedded within DHS DNDO, address NTNFC integration and stewardship across the U.S. Government as required by NSPD-17/HSPD-4, and providing leadership to the National Nuclear Forensics Expertise Development Program codified by the Nuclear Forensics and Attribution Act (P.L. 111-140).
- Enhancing and coordinating Federal, State, and local efforts to detect and protect against nuclear and radiological terrorism against the United States.
- Screening cargo at overseas seaports to detect and interdict terrorists' weapons and other illicit material before arrival on U.S. shores.

- Leading the development, among executive branch departments, of a coordinated architecture for bio-monitoring that includes biosurveillance, aerosol detection, clinical syndrome detection, mail room observation, and suspicious substance management.
- Increasing the nation's preparedness against chemical and biological threats through improved threat awareness, advanced surveillance and detection, and protective countermeasures.
- Developing policies, methods, plans, and applied technologies to restore large urban areas, DoD installations, and critical infrastructures following a biological attack.
- Serving as the lead federal facility to conduct and facilitate the technical forensic analysis and interpretation of materials recovered following a biological attack in support of the appropriate lead Federal agency.

DHS activities in the CWMD mission areas are highlighted in Table 5.

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

<b>Interdiction</b>
<ul style="list-style-type: none"> <li>• DHS/DNDO worked with DOE/National Nuclear Security Administration (NNSA), Nuclear Regulatory Commission (NRC), and the manufacturers and users of irradiators to develop low-cost engineering upgrades to make cesium chloride (CsCl) irradiators less vulnerable to terrorist attack.</li> <li>• DHS/DNDO partnered with other nations, the International Atomic Energy Agency (IAEA), and the European Union through the Global Initiative to Combat Nuclear Terrorism to develop model guidelines for a GNDA that will serve as a plan for an integrated defense-in-depth strategy.</li> <li>• DHS/DNDO conducted a red team assessment of the California Highway Patrol's PRND capability.</li> <li>• DHS/DNDO established the Graduated Rad/Nuc Detector Evaluation and Reporting (GRaDER) Program to facilitate independent testing and assessment of commercially available rad/nuc detection equipment against American National Standards Institute (ANSI) N42 performance standards to inform the government procurement and grant process.</li> <li>• DHS/DNDO executed 23 distinct data collection or test campaigns for rad/nuc detection systems.</li> <li>• In partnership with CBP, DHS/DNDO completed the Congressionally mandated Pax/Bag pilot program to examine the operational feasibility of deploying and operating RN scanning equipment in the international commercial aviation passengers and bag environment.</li> </ul>
<b>Passive Defense</b>
<ul style="list-style-type: none"> <li>• DHS/DNDO implemented six additional PRND programs at the state and local level.</li> <li>• DHS/DNDO developed an initial operating capability for the JOINT Analysis Center Collaborative Information System, an interactive database and tool that serves the GNDA.</li> <li>• In FY11, DHS S&amp;T's Chemical and Biological Defense Program is completing operational testing of new chemical detection systems enabling detection of a broad set of toxic industrial chemicals and chemical warfare agents in a single device. The Autonomous Rapid Facility Chemical Agent Monitor is intended to promote early detection of release of toxic chemical agents in facilities and has already been commercialized in one version. The Lightweight Autonomous Chemical Identification System will provide responders a portable chemical detection system for a broader array of agents that currently possibly in fielded devices. Subsequent to final successful testing, these devices will be commercialized for access by the response community.</li> <li>• Lead the development for the National-Level Framework for Chemical Defense for use by all federal, state, and local chemical defense stakeholders.</li> <li>• Completed testing and evaluation program for candidate autonomous biodetection technology for BioWatch Gen-3.</li> <li>• In FY10, DHS S&amp;T completed the development of Bio-agent Autonomous Network Detector.</li> </ul>
<b>WMD Consequence Management</b>
<ul style="list-style-type: none"> <li>• DHS S&amp;T continued to lead interagency efforts to advance the coordination of the nation's laboratory response networks to provide requisite analytical support in surveillance, characterization, and restoration from attacks with CBR agents via air, food, and water against humans, animals, and plants.</li> <li>• In FY10, DHS and DoD completed the Interagency Biological Restoration Demonstration, a joint initiative that seeks to reduce the time and resources necessary to recover and restore wide urban areas, military installations, and critical infrastructure following a large-scale biological attack. A follow-on project to develop guidance on wide area chemical and radiological events is underway.</li> <li>• Completed the <i>DHS Strategy for Improving the National Response and Recovery from an IND Attack</i> (April 2010), and is pursuing R&amp;D initiatives to implement the strategy.</li> </ul>

**Table 5. Highlights of DHS’s Progress in Meeting Combating WMD Goals  
(continued)**

<b>WMD Consequence Management (continued)</b>
<ul style="list-style-type: none"> <li>• Established the Domestic Emergency Support Team (DEST) to augment the FBI’s Joint Operations Center in the event of a CBRNE or WMD incident, and to support operation in a contaminated environment.</li> <li>• OHA FAVD has organized interagency veterinary resources in the event of an outbreak of a foreign animal disease.</li> <li>• In FY10, DHS S&amp;T completed the Facility Restoration project to develop guidelines for restoration of chemically-contaminated facility.</li> <li>• DHS OHA is conducting a demonstration project in a major metropolitan area focused on enhancing chemical defense preparedness and response emphasizing partnerships with federal, state and local stakeholders. The project emphasizes moving beyond technology and detection operations to a more robust preparedness and response program meeting the needs of all stakeholders and providing an integrated plan and approach to high consequence chemical events.</li> </ul>
<b>Intelligence</b>
<ul style="list-style-type: none"> <li>• The NTNFC assisted in preparing pre-detonation NTNF exercise scenarios and supported FBI-led NTNF exercises</li> </ul>

**DOS SELECTED ACTIVITIES TO MEET COMBATING WMD GOALS**

DOS leads the interagency policy process on nonproliferation and manages global U.S. security policy, principally in the following areas: nonproliferation, including the missile and nuclear threat areas, as well as chemical, biological, and conventional weapons proliferation; arms control, including negotiation, ratification, verification and compliance, and implementation of agreements on strategic, non-conventional, and conventional forces; regional security and defense relations regarding U.S. security commitments worldwide; the use of U.S. military forces in unilateral or international peacekeeping roles; and arms transfers and security-assistance programs and arms-transfer policies. DOS also provides foreign policy input into the interagency processes overseeing research and development of nonproliferation, arms control and counterterrorism technologies that have applications to CWMD missions.

Within DOS, the Under Secretary of State for Arms Control and International Security serves as Senior Adviser to the President and the Secretary of State for issues of arms control, nonproliferation, and disarmament. The Bureau of International Security and Nonproliferation (ISN) leads U.S. efforts to prevent the spread of WMD (nuclear, chemical, and biological weapons) and their delivery systems and is responsible for managing a broad range of nonproliferation, counterproliferation, and arms control functions. The Bureau of Arms Control, Verification and Compliance negotiates and implements arms control and disarmament agreements involving weapons of mass destruction and their means of delivery as well as certain conventional weapons. The Bureau leads U.S. efforts to: develop arms control policies for the implementation of existing agreements and negotiation of future agreements; advance missile defense and space policy in support of U.S. national security policies and objectives; and promote and implement bilateral and multilateral arms control, transparency, and confidence-building measures.

DOS activities that address CWMD include the following:

- The DOS will advance the agenda outlined in President Obama’s April 2009 speech in Prague. The President outlined a long-term goal of a world free of nuclear arms. The “road to zero” will be very long. Future treaties addressing steps toward this goal may further reduce the U.S. and Russian stockpiles, and they will at some point also involve other nuclear powers as well. U.S. verification rights and assets must be maintained going forward, and some new restrictions on delivery systems are possible.

- Promoting international consensus on WMD proliferation through bilateral and multi-lateral diplomacy.
- Addressing WMD-proliferation threats posed by non-State actors and terrorist groups by improving physical security, using interdiction and sanctions, preventing the spread of WMD and applicable expertise, and actively participating in the Proliferation Security Initiative, the Global Initiative to Combat Nuclear Terrorism, the G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (G-8 Global Partnership), and promoting the aims of the United Nations Security Council Resolution (UNSCR) 1540 and other international nonproliferation regimes.
- Working closely with international institutions and organizations to reduce and eliminate the threat posed by WMD.
- Supporting efforts of foreign partners to prevent, protect against, and respond to the threat or use of WMD by terrorists.
- Ensuring that appropriate verification requirements and capabilities are fully considered and integrated throughout the development, negotiation, and implementation of new treaties, agreements, and commitments.
- Assessing other nations' compliance with arms control, nonproliferation, and disarmament treaties, agreements, and commitments.
- Serving as the principal policy liaison to the U.S. Intelligence Community for verification and compliance matters.
- Ensuring the effective implementation of existing nuclear–arms-control treaties and agreements with Russia.
- Negotiating policy initiatives and international agreements that improve strategic stability and create the international security environment necessary to reduce the threat from nuclear weapons worldwide.
- Leading U.S. efforts to develop and implement the elimination and verification requirements for the denuclearization of North Korea.
- Working bilaterally and multilaterally with the international community to resolve longstanding concerns regarding other States' compliance with their arms control, disarmament, and nonproliferation obligations.
- Establishing the scientific, institutional, and organizational arrangements to ensure that the U.S. Government can discriminate effectively between naturally occurring outbreaks of disease and a biological weapons attack and identify the perpetrator.
- Managing the Key Verification Assets (V) Fund and co-chairing the interagency Nonproliferation and Arms Control Technology Working Group (NPAC TWG) and Technical Support Working Group (TSWG), which identify and develop arms control, nonproliferation, and counterterrorism technologies that can also find applications to CWMD missions.
- Leading the interagency's Foreign Consequence Management efforts.

DOS activities in the CWMD mission areas are highlighted in Table 6.

**Table 6. Highlights of DOS's Progress in Meeting Combating WMD Goals**

<b>Threat Reduction Cooperation</b>
<ul style="list-style-type: none"> <li>• Working closely with DOE and other USG agencies, ISN focused its scientific engagement, redirection, and biological security efforts in countries and regions where the threat of terrorism and proliferation is greatest, including Pakistan, Iraq, Indonesia, and other key nations and regions. For scientist redirection activities in Russia and the former Soviet Union, ISN focused efforts on ensuring self-sustainability for key personnel and their institutes.</li> <li>• AVC managed the V-Fund, which provides stopgap funding to preserve existing assets, provide impetus for new acquisitions, and support R&amp;D on new technologies.</li> <li>• AVC expects to support the Verification and Monitoring Task Force.</li> <li>• AVC co-chaired the NPAC TWG, which coordinates the R&amp;D response to arms control and nonproliferation.</li> </ul>
<b>Passive Defense</b>
<ul style="list-style-type: none"> <li>• The Office of the Coordinator for Counter-Terrorism (S/CT) co-chaired the TSWG, interagency R&amp;D forum for combating terrorism.</li> <li>• The TSWG CBRN Countermeasures subgroup developed useful technologies in the Passive Defense and WMD Consequence Management mission areas.</li> </ul>
<b>Security Cooperation and Partner Activities</b>
<ul style="list-style-type: none"> <li>• ISN, along with the Department of the Treasury, ensured implementation of Executive Order 13382, which authorizes the U.S. Government to freeze assets and block transactions of designated entities and persons engaged in proliferation activities.</li> <li>• ISN led negotiations with selected countries on peaceful nuclear cooperation and managed diplomatic aspects of the Global Nuclear Energy partnership.</li> <li>• ISN successfully promoted geographic expansion of the G-8 Global Partnership to address WMD threats worldwide.</li> <li>• ISN furthered the goals of the Global Initiative to Combat Nuclear Terrorism and promoted UNSCR 1540.</li> <li>• AVC continued focused verification and compliance efforts with North Korea, Iran, Russia, China, Libya, and Iraq and promoted full compliance with agreements and commitments.</li> <li>• DOS continues to lead U.S. participation in the Forensics Engagement Working Group and the Nuclear Trafficking Response Group.</li> </ul>

## **FUNDING OF CPRC-REPORTED PROGRAMS**

Improving the Nation's capabilities to meet and respond to the threat of WMD requires continued and substantial investment throughout many U.S. Government organizations. This report includes appropriations for more than \$28.8 billion in FY09 and \$28.0 billion in FY10, and planned investment of \$30.2 billion in FY11 and \$30.3 billion in FY12 from DoD, DOE, DOS, and DHS. The IC's total investment in CWMD is not included in these CPRC-reported summary figures due to the classification associated with the IC budget, but there are some portions of the IC budget reported in Volume II. All budget figures for FY09 and FY10 are adjusted to reflect enactment. FY11 and FY12 figures are consistent with the respective President's Budgets. More detailed budget information on DoD, DOE, DOS, and DHS programs is presented in Volume II, Chapter 4 and Appendix C.

## 2011 CPRC RECOMMENDATIONS

The 2011 CPRC Report Recommendations address shortfalls identified in this report. High-level guidance and strategy documents, as well as submissions by subject matter experts were instrumental in developing this list. They are presented with their associated ACEs. The recommendations are numbered for readability, not priority.

Following are the unclassified recommendations of the CPRC. Additional classified recommendations submitted by the IC can be found in Volume II of the report. In general, these recommendations are for consideration by U.S. Government Departments and Agencies with WMD-related responsibilities. In some cases, implementation of a specific recommendation may require participation from not only CPRC member agencies and departments, but also from other WMD stakeholders.

### ***Recommendation 1: Strengthen CBRN Detection and Defeat Capabilities***

*Develop, test, and deploy improved capabilities for detection, characterization, and defeat of CBRN threats.*

***Applicable ACEs:*** *Passive Defense, Interdiction, Offensive Operations, Elimination, WMD Consequence Management, Intelligence*

Rapid, accurate CBRN detection is fundamentally important to decision-making and all aspects of planning and response.

- Continue to develop technologies that increase the range at which CBRN weapons and related components or materials can be detected and identified, enabling a wider search area and an increased probability of interdicting devices, whether at fixed transit and border points or through gap areas over land, at sea, or in the air.
- Pursue real-time detection and identification of biological-threat agents, enabling timely and focused response.
- Work with international partners through appropriate venues to promote communication, coordination, cooperation, and capacity building.
- Pursue improved WMD-defeat technologies that minimize unintended effects.

### ***Recommendation 2: Build Partner Capacity for Countering WMD***

*Support the development, testing, and deployment of improved partner capacity to counter nuclear, biological, and chemical threats, including enhanced global CBRN surveillance, detection, and reporting.*

***Applicable ACEs:*** *Threat Reduction Cooperation, Passive Defense, WMD Consequence Management*

International partnerships are essential for improving preparedness and global resilience against WMD threats and enabling swift defeat of threats. Enhanced capability and capacity to counter WMD can also serve as an effective deterrent to enemy use.

- Support efforts of partner countries to advance medical, public health, agricultural, and veterinary-systems capabilities to respond to and recover from CBRN event.
- Work with partner countries and regions to develop and exercise plans for consequence management.
- Engage partner countries to optimize CBRN-threat identification, assessment, and response.
- Explore opportunities with partner countries and regions to conduct joint development and procurement of medical countermeasures.
- Assist partner countries in the development of surveillance and reporting processes in compliance with International Health Regulations.

***Recommendation 3: Conduct Research and Development to Improve Nuclear Weapons Verification and Transparency***

*Prioritize investments and share information to strengthen U.S. capabilities for treaty verification and nuclear-security technologies, including the development of transparency measures.*

***Applicable ACE: Threat Reduction Cooperation***

The *Nuclear Posture Review Report* cites the need for a comprehensive national research and development program to support expanded work on nuclear-weapons-verification technologies and the development of transparency measures.

- Focus R&D efforts to support a comprehensive verification strategy, enabling continued reductions in nuclear weapons, while maintaining strategic stability.
- Develop innovative new technologies to support national collection and cooperative measures as future arms control regimes transition from a focus on delivery systems toward warhead lifecycle monitoring and fissile material safeguards and controls.
- Develop capabilities for detecting and monitoring nuclear-material production, effective warhead counting, and enhancing transparency and confidence-building measures.
- Improve monitoring and verification of low-yield or clandestine nuclear events.

***Recommendation 4: Improve WMD Forensics***

*Develop, test, and deploy capabilities for improved WMD forensics in support of national attribution efforts, including improvements in coordination among national and local organizations.*

***Applicable ACEs: Intelligence, WMD Consequence Management, Passive Defense***

Strong forensic capabilities support attribution and help deny potential enemies the sanctuary of anonymity.

- Fully support requested investments in, and work on technologies for, WMD forensics..
- Ensure the availability of information and all-source analysis to support timely attribution.
- Build partner capacity and promote international cooperation, collaboration, and transparency on WMD-forensic data collection and interpretation.

***Recommendation 5: Execute Comprehensive Intelligence Plans***

*Improve the IC's ability to counter the proliferation of WMD and their means of delivery by State and non-State actors in 21st Century environments.*

***Applicable ACEs: Intelligence***

The IC uses the *National Intelligence Plan for Countering WMD Proliferation* to support planning.

- Emphasize Motivations, Intentions, and Disincentives. Move beyond the traditional approach of treating WMD proliferation as primarily a technical-intelligence problem. Promote a multi-disciplinary IC approach to assessing and addressing the political, economic, cultural, and other security issues related to counterproliferation.
- Counter Proliferation. Encourage CP professionals to go beyond simply reporting on proliferators' progress by identifying opportunities for decision makers to reverse that progress.
- Look "Over-the-Horizon." Partner with senior policymakers to develop collection and analytic strategies for emerging, over-the-horizon WMD threats, positioning the IC to warn stakeholders of such threats, and provide the insights needed.
- Focus on the WMD and Terrorism Nexus. Work closely with the Counterterrorism Community to ensure that all resources are leveraged within the respective communities to deny terrorists and rogue States access to CBRN capabilities.
- Work to Close Gaps. Develop IC strategic plans and consistently apply performance metrics to eliminate critical intelligence gaps on the U.S. Government's highest priority WMD-proliferation concerns.
- Enable Real Information Sharing. Ensure WMD analysts and collectors are receiving access to the full set of technical and non- technical information needed to understand and counter WMD proliferation.

***Recommendation 6: Underwrite the Future of CWMD RDT&E***

*Improve long-term capability to address CBRN issues through development and retention of a technical cadre, balanced investments, and technology watch.*

***Applicable ACEs: All***

Improved coordination is needed to articulate and support approved CWMD RDT&E initiatives that will attract, inspire, and retain the next-generation's scientists, and seek higher risk research as a hedge against future uncertainties and means for enabling game-changing capabilities.

- Attract, motivate, and retain CWMD scientists and engineers.
- Ensure that CWMD R&D investments maintain an effective balance among basic, applied, and advanced technology efforts.
- Avoid strategic surprise through aggressive technology watch for emerging “Over-the – Horizon” threats. Identify emerging technology-based threats to enable development of risk-management strategies.

## **CONCLUSION**

CPRC member organizations continue to make improvements in capabilities to address the threat of weapons of mass destruction. Improving integration and coordination for CWMD 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 CWMD capabilities already available. Numerous Federal entities engage in CWMD research and development. The challenge is to coordinate all these activities in order to integrate solutions to this problem more effectively.

## ABBREVIATIONS AND ACRONYMS

ACE	Area for Capability Enhancement
AOR	area of responsibility
ANSI	American National Standards Institute
AP	Additional Protocol
ASD(GSA)	Assistant Secretary of Defense for Global Strategic Affairs
ASD(NCB)	Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs
AVC	Bureau of Arms Control, Verification and Compliance (DOS)
BKMS	Biodefense Knowledge Management System
BMDS	Ballistic Missile Defense System
BTR	Biological Threat Reduction
BW	biological warfare
C2	command and control
C2CRE	Command and Control CBRN Response Element
CB	chemical and biological
CBA	capabilities-based assessment
CBD	Chemical and Biological Division (DHS)
CBDP	Chemical and Biological Defense Program
CBP	U.S. Customs and Border Protection (DHS)
CBR	chemical, biological, and radiological
CBRN	chemical, biological, radiological, and nuclear
CBRNE	chemical, biological, radiological, nuclear, and high-yield explosives
CERFP	Chemical, Biological, Radiological, Nuclear, and High-yield Explosives Enhanced Response Force Package
CCMRF	CBRNE Consequence Management Response Forces
CM	consequence management
COI	community of interest
CONPLAN	concept plan
CONOP	concept of operations
CONUS	continental United States
CP	counterproliferation
CPRC	Counterproliferation Program Review Committee
CSI	Container Security Initiative
CST	Civil Support Team
CTR	Cooperative Threat Reduction
CW	chemical warfare, chemical weapon
CWMD	combating weapons of mass destruction
DARPA	Defense Advanced Research Projects Agency
DCRF	Defense CBRN Response Force
DEST	Domestic Emergency Support Team
DHHS	Department of Health and Human Services
DHS	Department of Homeland Security
DHS S&T	DHS Science & Technology Directorate
DIA	Defense Intelligence Agency
DNDO	Domestic Nuclear Detection Office (DHS)
DNI	Director of National Intelligence
DoD	Department of Defense
DOE	Department of Energy
DOJ	Department of Justice
DOS	Department of State
DOTMLPF	doctrine, organization, training, materiel, leadership and education, personnel, and facilities
DTRA	Defense Threat Reduction Agency

EMP	electromagnetic pulse
EPA	Environmental Protection Agency
FBI	Federal Bureau of Investigation
FCM	foreign (WMD) consequence management
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency (DHS)
FY	fiscal year
GBI	Ground Based Interceptors
GEF	Guidance for Employment of the Forces
GND	Global Nuclear Detection Architecture
GTRI	Global Threat Reduction Initiative
HAZMAT	hazardous material
HDBT	hard and deeply buried target
HDBTD	hard and deeply buried target defeat
HRF	Homeland Response Force
HSPD	Homeland Security Presidential Directive
IAEA	International Atomic Energy Agency
IBRD	Interagency Biological Restoration Demonstration
IC	Intelligence Community
ICBM	intercontinental ballistic missile
ICD	Initial Capabilities Document
IND	Improvised Nuclear Device
ISN	Bureau of International Security and Nonproliferation (DOS)
ISR	intelligence, surveillance, and reconnaissance
J-8	Force Structure, Resources, and Assessment Directorate (Joint Staff)
JBPDS	Joint Biological Point Detection System
JCD	Joint Capabilities Document
JCTD	Joint Capability Technology Demonstration
JCIDS	Joint Capabilities Integration and Development System
JPEO-CBD	Joint Program Executive Office for Chemical and Biological Defense Programs
JSCP	Joint Strategic Capabilities Plan
JSGPM	Joint-Service General-Purpose Mask
JSLIST	Joint Service Lightweight Integrated Suite Technology
JSTDS-SS	Joint Service Transportable Decontamination System—Small Scale
MAGTF	Marine Air Ground Task Force
MDA	Missile Defense Agency
MOA	memorandum of agreement
MOU	memorandum of understanding
MPC&A	material protection, control, and accounting
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, and chemical
NCPC	National Counterproliferation Center
NDAA	National Defense Authorization Act
NIRT	Nuclear Incident Response Team
NNSA	National Nuclear Security Administration (DOE)
NP	nonproliferation
NPAC TWG	Nonproliferation and Arms Control Technology Working Group
NPR	Nuclear Posture Review

NSPD	National Security Presidential Directive
NTA	non-traditional [chemical] agent
NTNF	National Technical Nuclear Forensics
O&M	operation and maintenance
OASD(HA)	Office of the Assistant Secretary of Defense for Health Affairs
OCONUS	outside the continental United States
ODATSD(NM)	Office of the Deputy Assistant to the Secretary of Defense for Nuclear Matters
ODNI	Office of the Director of National Intelligence
OUSD(AT&L)	Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics
PEP	Prepositioned Equipment Program
PRND	Preventive Radiological and Nuclear Detection Pilot Project
QDR	Quadrennial Defense Review
R&D	research and development
RDT&E	research, development, test, and engineering
RDA	research, development, and acquisition
RN	radiological-nuclear
SC	Standing Committee
SCC-WMD	USSTRATCOM Center for Combating Weapons of Mass Destruction
SLD	Second Line of Defense program
SOF	special operations forces
TIM	toxic industrial material
TSWG	Technical Support Working Group
UAV	unmanned aerial vehicle
UNSCR	United Nations Security Council Resolution
USAF	United States Air Force
USARPAC	United States Army Pacific
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
USMC	United States Marine Corps
USNORTHCOM	United States Northern Command
USSTRATCOM	United States Strategic Command
V-Fund	Key Verification Assets Fund
WMD	weapons of mass destruction
WMD-CST	Weapons of Mass Destruction Civil Support Team

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## DEDICATION

*Melvin S. Sakazaki*  
*April 20, 1957 – November 20, 2010*

This the 15<sup>th</sup> CPRC Report, is dedicated to the late Mel Sakazaki, the lead CPRC staffer who was instrumental in the production of eight of these reports. Mel passed away after a long fight with cancer. Those of us who worked with him, learned from him, and shared his friendship miss him very much.

Mel was modest and self-effacing and would undoubtedly say that this dedication isn't necessary. He took little credit for his work, but we all knew that his writing, analysis, and dogged attention to detail enriched everything he produced in support of the CPRC and its goals.

His knowledge of government CWMD efforts was truly encyclopedic. It's no understatement to say that Mel could have written the report single-handedly. It's entirely fitting that the 2009 report, his final, was described by many CPRC members as the best to date.