The Department of Defense Chemical and Biological Defense

2018 Annual Report to Congress

The estimated cost of report or study for the Department of Defense is approximately $41,000 in Fiscal Years 2017-2018. This includes $23,000 in expenses and $18,000 in DoD labor.

Generated on 2018 Apr 08 RefID: B-D2AFA68

APPROVED FOR OPEN PUBLICATION BY DEFENSE OFFICE OF PREPUBLICATION AND SECURITY REVIEW (18-C-0744)

Executive Summary

Pursuant to title 50, United States Code, section 1523, the 2018 Department of Defense (DoD) Chemical and Biological Defense Annual Report to Congress provides the required assessment of the overall readiness of DoD to fight and win in a chemical and biological warfare contaminated environment. This year's report focuses on the readiness of the Department to respond to current and emerging threats and highlights important collaborations, research, and development activities to address novel threats.

> ***2018 National Defense Strategy –***
>
> Defense Objective:
>
> *"Dissuading, preventing, or deterring state adversaries and non-state actors from acquiring, proliferating, or using weapons of mass destruction"*

The recent release of the 2017 National Security Strategy and the 2018 National Defense Strategy (NDS) have highlighted the priority of defense against Weapons of Mass Destruction (WMD) and efforts to detect and protect against chemical, biological, radiological, and nuclear (CBRN) threats. As noted in the NDS, North Korea's recent actions and efforts to "seek out or develop weapons of mass destruction (WMD) – nuclear, chemical, and biological" have increased the complex security environment in the region and pose a continuing challenge to the U.S. military advantage. Additionally, the NDS highlights the emerging threat potentially posed by the "recent advances in bioengineering" that may increase "the potential, variety, and ease of access to biological weapons." Both of these challenges exist now and will continue to be areas of concern in the near future. The continued investments of the Department directly support the NDS and respond to WMD threats.

Highlighted in this report are opportunities to strengthen the readiness of the Joint Force to operate in a contaminated environment. Throughout the last decade of conflict the Joint Force has experienced a relative decline in readiness to operate in a contaminated environment. With the changing strategic environment and increased CBRN threats (e.g., in Iraq, Syria, and North Korea), the Military Departments/Services are re-focusing priority on training and equipping across the Joint Force to enhance readiness to respond to current and emerging CBRN threats. To improve supporting capabilities across the Joint Force, the Department continues to resource two key focus areas: 1) novel and synchronized approaches to improve situational awareness, decision making, and response through Integrated Early Warning; and 2) direct investment in CBRN defense readiness and capabilities required on the Korean peninsula. Combined, these focused efforts addressing training and equipping will improve readiness across the Joint Force.

To improve our knowledge and capabilities to respond to emerging threats, the Department has enhanced collaborations with international and interagency partners to address issues associated with emerging biotechnology, specifically the ease of use of synthetic biology, and advanced understanding in the threat of pharmaceutical-based agents and response capabilities. These critical partnerships and collaborative efforts continue to strengthen support of the strategic approach outlined in the NDS.

While Fiscal Year (FY) 2017 investments positively impacted CBRN defense readiness of the Joint Force, the Department will continue to pursue opportunities and expand partnerships to seek improved capabilities. We applied funding to the highest identified operational risk areas and those that meet the Military Departments'/Services' priority requirements to address these and a multitude of varying missions across the spectrum of conflict. The end-state of these actions will improve the operational readiness of our Forces to address the threats facing the Nation at home and abroad.

Table of Contents

Introduction

The 2018 Department of Defense (DoD) Chemical and Biological Defense Annual Report to Congress provides the required assessment—pursuant to title 50, United States Code, section 1523—of the overall readiness of DoD to fight and win in a chemical and biological (CB) contaminated environment. DoD faces chemical, biological, radiological, and nuclear (CBRN) threats that are complex, diverse, and pose enduring risks to our Joint Force and the homeland. Adversary capabilities, regional instability, and emerging technologies make it easier for State and non-State actors to develop CBRN weapons. The Chemical and Biological Defense Program (CBDP) Enterprise is an integral contributor to a global systems approach to countering weapons of mass destruction (CWMD) and other pertinent mission areas.

The CBDP develops and acquires capabilities that allow the Joint Force to deter, prevent, protect, mitigate, respond to, and recover from CBRN threats and effects as part of a layered, integrated defense. The CBDP Enterprise is responsible for the planning, prioritization, requirements, and management of research, development, test, and evaluation (RDT&E) and supporting infrastructure (intellectual and physical) necessary to support Joint Force operations in a CBRN environment and in support of CWMD missions.

In furtherance of the 2017 National Security Strategy and 2018 National Defense Strategy (NDS), the CBDP is committed to strengthening the U.S. Armed Forces' ability to operate in a CBRN-contaminated environment. This report identifies the actions taken in FY 2017, and plans beyond FY 2017, to restore warfighting readiness that enables a more lethal Joint Force capable of operating in contaminated environments.

Readiness of the Joint Force to Operate in a CB-contaminated Environment[1]

With the changing strategic environment and the increased CBRN threats (e.g., in Iraq, Syria, and North Korea), the Military Departments/Services are adapting to increase the focus on training and equipping the force. Overall, the readiness of the Joint Force is improving with current and future efforts focused on improving training and enhancing logistical processes and methods to ensure CBRN defense items are effectively and efficiently delivered and maintained across the Joint Force. DoD efforts in FY 2017 and beyond have supported, and will continue to support, the increased readiness of the Joint Force to operate in a contaminated environment.

A. U.S. Army

DoD efforts to increase readiness and modernize capabilities have resulted in the best trained and equipped Army CBRN-defense forces ever; however, Army leaders recognize a CBRN skill atrophy in maneuver forces and reduced readiness of forces' ability to operate in a contaminated environment as a result of previous commitments to counter-insurgency operations. In FY 2017, Army readiness improvements were accomplished through the procurement of improved CBRN defense equipment, identification of requirements for CBRN defense equipment to meet evolving threats, enhanced force structure, and enhancements in training.

[1] Title 50 U.S. Code 1523 (a) 1: The overall readiness of the Joint Force to fight in a chemical-biological warfare environment and shall describe steps taken and planned to be taken to improve such readiness.

The consolidated near-term CBRN Joint Service priorities articulated the Dismounted Reconnaissance Sets, Kits, and Outfits (DR SKO) and Joint Service Lightweight Integrated Suit Technology (JSLIST) systems needed to fill capability gaps. To this end, the CBDP fielded DR SKO to 29 units across the Army, improving CBRN defense force readiness and increasing their ability to conduct CBRN assessment and exploitation missions. The program completed fielding to the Active component and is on track to complete the Reserve component by FY 2019. The Army also provided funding to procure personal JSLIST protective suits, and RDT&E for tactical disablement capabilities. Additionally, the Army validated a requirement for the Joint Service General Purpose Mask (JSGPM) M53A1—a variant of modernized protective masks approved by the National Institute for Occupational Safety and Health—providing improved protection and interoperability for both warfighting and homeland defense missions.

Army units maintain a capability to communicate CBRN hazards present on the battlefield, focusing and incorporating the fundamental principles of CBRN Operations: avoid, protect, and mitigate. The Army uses the Joint Effects Model (JEM) and Joint Warning and Reporting Network (JWARN) to provide CBRN warning and reporting to their units across the battlefield.

Army units meet the challenges of Combat Training Center rotations by deploying with all Modified Table of Organization and Equipment assigned chemical defense equipment and training with individual protective equipment (IPE) for all Soldiers (JSLIST, boots, gloves, and mask). The Army completed an update to the U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS), Maneuver Support Center of Excellence and the U.S. Army Medical Department, Center, and School, Health Readiness Center of Excellence CBRN Defense Charter, which strengthened collaboration for the development of a consolidated and prioritized CB defense capability list to support the Army Strategic Portfolio Analysis and Review (SPAR) and inform other Military Departments/Services. This effort improves readiness by consolidating two Centers of Excellence priority lists and promoting efficacy via the Army's Executive Agent role in the CBDP. The SPAR process continues to assess the CBDP equipment modernization strategy and establishes Army's priorities, objectives, and resource decisions.

B. U.S. Navy

To ensure Sailors are ready and prepared to fight in a CB-contaminated warfare environment, afloat and shore-based chemical, biological, radiological (CBR) readiness status for Navy forces is closely monitored, evaluated, and sustained by Navy logistical support organizations, prior to each and every deployment, or at agreed upon periodicities. Through centralized sustainment efforts, the Navy's IPE-Readiness Improvement Program (RIP) (IPE-RIP) ensures that afloat and deployed expeditionary Sailors are provided with correctly maintained and properly fitted IPE and a chemical protective mask, ready for immediate retrieval in response to the dictated mission-oriented protective-posture condition. Historically, maintenance and logistics functions required to maintain material readiness of this equipment has required an extraordinary number of organizational man-hours to sustain. Pre-deployment readiness visits by the Naval Sea Systems Command IPE-RIP Team significantly relieve the ship's force of this burden.

Throughout FY 2017, the execution of this maintenance policy has resulted in significant improvements in fleet CBR readiness. In addition to the Navy's centralized sustainment efforts

and care of IPE and protective masks, RIP teams managed ballistic personnel protections for Anti-terrorism/Force Protection afloat forces, and provided protective CBRN equipment to Navy individual augmentees as they process through designated Army training centers. The Navy has shifted away from its traditional lifecycle replacement program and implemented a condition-based obsolescence program to improve the readiness of fleet CBRN-defense equipment.

C. U.S. Air Force

In FY 2017, the U.S. Air Force (USAF) assessed its ability to survive and operate in a CB warfare environment and identified several areas requiring additional focus to increase USAF operational readiness. Focus areas include addressing challenges relating to manpower at the unit level, training for base populace/technicians, sufficiency of collective protection, and technical limitations on legacy CB defense systems.

The USAF continues to work through its CBRN challenges. The USAF has developed tactics, techniques, and procedures (TTPs) and concepts of operation to reduce risks associated with identified technology gaps in detection, decontamination, and protection capabilities and is working with the CBDP to invest in new technologies to buy down current risk. The Air Force Chief of Staff established working groups to ensure full spectrum readiness is achieved across four major areas; CWMD Operations, Ability to Survive and Operate, Readiness (Training and Exercise), and performance of Mission Essential Tasks (MET). CBRN defense operations is a key component in each of the three focus groups.

In concert, the USAF is currently conducting a Manpower Study to capture optimal task load and right levels of CBRN defense resourcing and has funded the USAF organize, train, and equip requirements across the CBRN spectrum. In FY 2017, the USAF increased the frequency of CBRN defense training for airmen and reinvigorated compliance evaluations.

D. U.S. Marine Corps

In May 2017, the U.S. Marine Corps (USMC) implemented a policy to ensure that all commanders are using the same metrics to evaluate and report CBRN defense readiness. The policy provides a method for automated calculations to inform the commander of the quantified weighted value of Individual, Team, and Unit training. While this policy does not directly improve readiness, it provides a standard that guides training priorities and allows aggregate readiness to be assessed more effectively.

All three Marine Expeditionary Forces have incorporated CBRN defense into operational inspection programs. Headquarters USMC is reviewing existing operational inspection programs to develop standardization.

Operational units have increased logistical planning for CBRN defense equipment deployment. Marine Forces Pacific (MARFORPAC) planned, coordinated, supported, and integrated 16 CWMD Building Partner Capacity theater security cooperation engagements with partner nations, adjacent Military Service components, and agencies. MARFORPAC is fully integrating CBRN defense/CWMD into planning, coordination, and execution of the Training, Exercise, and Employment Plans.

E. National Guard Bureau

Chief, National Guard Bureau (CNGB) continues to monitor and assist States in organizing, training, and equipping 57 Weapons of Mass Destruction- Civil Support Teams (WMD-CSTs), 10 Homeland Response Forces (HRFs), and 17 Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Enhanced Response Force Packages (CERFP) capable of saving lives and mitigating suffering during a major or catastrophic domestic CBRN incident. WMD-CSTs remain capable of responding to the full-spectrum of CBRN incidents from toxic industrial materials to chemical warfare agents. CNGB continues to make changes in the National Guard (NG) forces of the CBRN Response Enterprise organization, training and equipment to improve overall readiness, prevention, and response capabilities. In FY 2017, the National Guard Bureau (NGB) allocated Air National Guard Joint Incident Site Communications Capabilities, which provide rapidly deployable interoperable (Federal, State, and local responders) communications to each HRF and CERFP, thereby improving command and control.

Supported by the CBDP, the WMD-CST, CERFP, and HRFs have made major improvements in their CBRN capabilities, however, capability challenges continue to impact operational readiness. One effort is to provide the NG forces of the CRE force a coherent solution that provides a tactical level Common Operating Picture capability to accurately capture situational awareness information; expedite management and sharing of mission-critical information internally (unit-level) and externally with other NG support organizations and DoD/civilian Federal response partners; enable timely decision making; and, aid in overall effective response support. Additionally, NGB is developing a system of systems known as NG CRE Information Management System (NG CIMS) to provide the WMD-CSTs, CERFPs and HRFs a standard tool suite for maintaining a common operating picture and shared situational awareness (SSA). The intent is to provide NG CIMS to all WMD-CSTs, HRFs and CERFPs to meet the direction of the Joint Requirements Oversight Council Memorandum to close near-term CNGB SSA capability gaps.

Challenges with the Common Analytical Laboratory System (CALS) program are requiring the NGB, in coordination with the CBDP, to initiate an un-programmed modernization program for the Analytical Laboratory System (ALS). This effort will modernize and upgrade obsolete equipment in the ALS to maintain the NG WMD CST capability. These steps are being taken to avoid readiness issues until CALS full operational capability (FOC) is achieved.

WMD-CSTs require an enhanced capability for chemical point and area detection for low-level off-gassing and non-traditional agents (NTAs). While the Next Generation Chemical Detectors (1-4) are targeted to provide required enhancements, fielding is not expected until FY 2019 or beyond. Recently, DoD tasked WMD-CSTs to support Federal, State, and local law enforcement agencies with detection and identification of fentanyl and carfentanil. These pharmaceuticals severely challenge WMD-CST detection capabilities.

NGB, with the support of the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD), has fielded additional CBRN Talon IV robots to mitigate gaps in remote CBRN detection for the WMD-CSTs. NGB is fielding the Rapid Alarm and Identification

Device – Monitor to HRFs and CERFPs to assist in the determination of the presence of chemical contamination upon completion of the decontamination process.

WMD-CSTs require an enhanced capability to detect biological agents in real-time. The Joint Biological Tactical Detection System will address these enhancements, with fielding anticipated in FY 2022 and beyond. NGB is fielding an additional Instantaneous BioAnalyzer and Collector (IBAC) sensor to support WMD-CSTs split survey team operations; IBAC provides interim bio-detection capability for WMD-CSTs.

WMD-CSTs require enhancements to quickly survey a large area for radiological materials or sources of radiological contamination. The Advanced Radiological Nuclear Detection Family of Systems (ARND FoS) will address these requirements with fielding anticipated in FY 2020. The NG Man-Portable Radiological Detection System provides a capability to detect and identify nuclear materials and is the NGB interim solution for radiological detection requirements until the ARND FoS is fielded. NGB is fielding radiological detection systems to HRFs and CERFPs that provide the means to rapidly screen victims during a radiological incident and increase through-put of Mass Casualty Decontamination (MCD) and medical triage elements.

NGB has limited capability to monitor the health of NG personnel of the CRE while wearing Personal Protective Equipment when operating in a CBRN environment. NGB, with the support of JPEO-CBD, will field an interim Physiological Monitoring System solution for the WMD-CSTs in FY 2018.

HRFs' and CERFPs' only means to perform MCD requires water. HRFs and CERFPs require an alternative MCD capability for cold weather environments or where a large source of water is unavailable. NGB is working with the Joint Science and Technology Office (JSTO) and JPEO-CBD to explore alternative (doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTmLPF-P)) solutions within CBDP science and technology (S&T) and advanced development contamination mitigation efforts.

F. U.S. Special Operations Command

U.S. Special Operations Command (USSOCOM), the Theater Special Operations Commands (TSOCs) and Special Operations Force (SOF) Components are poised to fight in CBRN environments. SOF Components and TSOCs apply CBRN capabilities to meet the operational CWMD requirements of the geographic Combatant Commands and emerging capability needs are successfully integrated into USSOCOM. However, near- and mid-term logistical availability issues exist that limit SOF Warfighter access to select materiel capabilities.

TSOCs and SOF Components are reporting issues with the availability of select CBRN materiel assets. Deployed forces indicate issues associated with Theater-based resupply and forward positioned logistical supporting activities. Shortages in these materiel assets will force the SOF operator to change/modify TTPs in stride and may impact interoperability and the ability to surge select assets in the near term. USSOCOM initiated readiness-based assessments of the TSOCs focused on Title 10 - Train, Man, and Equip requirements. Corrective actions are in progress to address equipping via Joint Table of Allowance (JTA) updates; implementation of a CWMD Fusion Cell and cyclical implementation of Staff Assistance Visits. TSOCs JTA updates and

equipment management processes at the unit level are under revision to increase the forward positioned Headquarters CBRN force protection capabilities.

USSOCOM employs several mechanisms to gather feedback on force readiness. USSOCOM, TSOCs and SOF Component Headquarters conduct cyclical CBRN/CWMD capability assessments to identify DOTmLPF-P gaps and integrate them into the USSOCOM Strategic Planning Process, CWMD Core Activity Plan/Assessment for validation and prioritization. USSOCOM maintains dialog with deployed and deploying Special Operations Task Force entities to identify current status, issues, and shortfalls for action and coordinates corrective action/assistance as required. USSOCOM also participates regularly in the CBDP efforts to integrate requirements among the Joint Force, including industrial base (IB) assessments, logistics and sustainment workings groups, and requirements development venues.

Required Capabilities to Operate in a CB-contaminated Environment[2/3]

The required capabilities to operate in a CB-contaminated environment include the ability to communicate through and within all echelons of the Force; conduct CBRN reconnaissance to search, properly identify, and mark the area to reduce unnecessary exposure to the agent; conduct or assist in personnel and equipment decontamination; initiate individual protection measures (including medical countermeasures (MCMs)) to ensure unconstrained operations; and implement collective protection to conduct CB casualty management to a level where a patient no longer requires CBRN IPE. Enclosure A includes all CB-related capabilities[4] fielded to the Joint Force.

A. Training[5]

This section details the status of CBRN defense training and readiness among the Joint Force as well as measures taken by the Military Departments/Services to include realistic CBRN simulations in war games, battle simulations, and training. CBRN medical defense training provided by the CBDP Enterprise for healthcare providers and planners occurs through the Armed Forces Radiobiology Research Institute, Defense Medical Readiness Training Institute, U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), and U.S. Army Medical Research Institute of Chemical Defense (USAMRICD). Across the Military Departments/Services, there has been an emphasis to modernize CBRN training courses, either through consolidation, enhancement, or leveraging new technologies. Efforts have been made across the Military Departments/Services to employ more realistic CBRN simulations in war games and exercises. The number of students trained on CBRN-related training courses is included in Enclosure B.

---

[2] Title 50 U.S. Code 1523 (a) 2: Requirements for the chemical and biological warfare defense program, including requirements for training, detection, and protective equipment, for medical prophylaxis, and for treatment of casualties resulting from use of chemical or biological weapons.
[3] Title 50 U.S. Code 1523 (b) 3: Measures taken to ensure the integration of requirements for chemical and biological defense equipment and material among the Armed Forces
[4] Title 50 U.S. Code 1523 (b) 1: The quantities, characteristics, and capabilities of fielded chemical and biological defense equipment to meet wartime and peacetime requirements for support of the Joint Force, including individual protective items.
[5] Title 50 U.S. Code 1523 (b) 4: The status of nuclear, biological, and chemical warfare defense training and readiness among the Joint Force and measures being taken to include realistic nuclear, biological, and chemical warfare simulations in war games, battle simulations, and training exercises.

U.S. Army

Army CBRN defense training, integrated with unit training requirements, is challenging and realistic. Army leaders at every echelon incorporate CBRN defense in unit training at individual and collective levels as a condition of the battlefield. Conducting individual- and squad-level collective training in a simulated CBRN environment leads to greater confidence and enhances teamwork required to fight and win in a CBRN environment. Unit Decontamination Teams are designated and trained using organic M26 Joint Service Transportable Decontamination Systems. Incorporating decontamination with other collective CBRN defense tasks during training enhances a unit's ability to remove contamination and restore combat power quickly.

Over FY 2017, collective exercises have included more complex CWMD scenarios where units can practice operating in a CBRN environment with more realistic WMD targets that they might encounter on the modern battlefield. These enhanced WMD targets enable the maneuver and technical forces to practice isolating, securing, and exploiting these threats in their area of operation.

Enhanced CBRN defense training of maneuver forces and their enablers, integrated with the unit's METs, were tested at Home Station during Warfighter Exercises and during Combat Training Center rotations to ensure Soldiers, leaders, and units achieve and maintain combat operations proficiency during CBRN conditions. CBRN tasks provide the foundation to enable units to respond and operate within a specified CBRN condition allowing the achievement of their mission.

Following the fielding of 29 DR SKOs, units successfully completed Doctrine and Tactics Training (DTT) for 504 Soldiers. After new equipment training, units received DTT to improve small team tactical training, learn doctrinal principles, better understand system employment, and refine individual/collective skills required to effectively conduct dismounted reconnaissance and surveillance with DR SKO.

USACBRNS at Fort Leonard Wood, Missouri, continues to train, educate, and develop the best qualified CBRN Warriors and civilian specialists for the Nation and its international partners. In FY 2017, USACBRNS hosted and conducted more than 80 resident and non-resident CBRN courses, graduating more than 6,000 students from all Military Services and more than a dozen countries. USACBRNS exceeded all requirements across DOTmLPF-P domains and earned an accreditation rating of "Institution of Excellence" from the U.S. Army Training and Doctrine Command. USACBRNS completed development of the Instructor Facilitated Synthetic Learning Environment Scenarios (IFSLES) and Advanced Concepts technology. The goals of these projects are to increase student engagement across the curriculum and to minimize passive student learning through technology enabled instructional systems.

USAMRICD's Chemical Casualty Care Division (CCCD) participated in a number of training initiatives to advance the readiness of the force to address medical effects of CBRN contamination. USAMRICD CCCD, in coordination with USAMRIID, continued development and implementation of new technologies into their medical training courses. Specifically in FY 2017, USAMRICD CCCD developed the Wide Area Virtual Environment 3D training

system to enable advanced simulations into the Medical Management of Chemical and Biological Casualties (MCBC) course; the Field Management of Chemical and Biological Casualties (FCBC) course; the Hospital Management of CBRNE (HM-CBRNE) Incidents course; and the Emerging Threats course. USAMRICD CCCD incorporated human (adult and infant) and working dog mannequins into these courses, expanding the casualty population base to meet the expanding population threat. USAMRICD CCCD also supported the development of a classified USSOCOM chemical medical management course for medical and operational personnel and developed an MCBC training program for the Turkish Ministry of Health in Turkey. In addition to their collaboration on the courses above, USAMRIID also teaches the Field Identification of Bio-Warfare Agents (FIBWA) and the Biological Agent Identification and Counterterrorism Training courses; these courses are taught on site at USAMRIID and off-site in support of military units around the world.

U.S. Navy

In FY 2017, the Navy reviewed and updated multiple Navy Training System Plans for enhanced Nuclear, Biological, and Chemical Defense and took measures to update the course curricula for Shipboard CBR Defense (CBRD) Operations and Training Specialists, as well as the CBRD training sections of the Damage Control Assistant Senior Enlisted Course. A number of CBR operational and system specific computer based training modules were made available to Sailors through My Navy Portal with topics related to the following systems: Joint Biological Point Detection System, Navy Shipboard Collective Protection, CBR Personnel Casualty Treatment, and many others. In addition, an interactive CB defense Preventive Maintenance System video library has been developed and will be disseminated during FY 2018. This library will provide Sailors with additional assistance in performing preventative maintenance on CB defense equipment, which will help ensure systems are operationally available thereby increasing readiness.

The Navy has incorporated training scenarios for enhanced CBRN warning and reporting, and hazard prediction into the humanitarian aid/disaster recovery portion of the 2017 Rim of the Pacific war game exercise. Exercise participants will use cloud-based software to model CBRN and toxic industrial materiel hazards resulting from natural disasters and warn other exercise participants. The JWARN 2 and JEM 2 software suite, hosted on the Defense Information Systems Agency milCloud, will be used to predict and communicate hazard locations, characteristics, and outlook in support of military groups from 25 participating nations.

In FY 2017, the Navy conducted a Total Ship Survivability Trial (TSST) onboard USS AMERICA (LHA-6), as required for each new ship class. The primary objective of TSST was to determine if installed chemical warfare defense systems performed and functioned as designed. This test event also provided opportunities for the enhancement and/or revision of standard TTPs for operating these systems. Lessons learned were adopted and incorporated as developmental TTPs.

U.S. Air Force

In FY 2017, the USAF provided basic CBRN defense survival skills training to ~100,000 Airmen and CBRN defense awareness training to ~100,000 military and civilians. USAF medical services incorporated CBRN training into Expeditionary Medical Support and Public Health Emergency Management that trained ~200 Airmen. Additionally, USAF technicians received over 22 different CBRN defense-related courses; see Enclosure B for details. Over the past several years, the insertion of CBRN events into established war games, simulations, and training exercises diminished across the Air Force. More emphasis is required to incorporate CBRN simulations to ensure the Joint Force is appropriately trained, equipped, and synchronized. The USAF is working on installation-focused CBRN defense scenarios for Phase I/II operations where simulations in war games and battle simulations may be considered.

U.S. Marine Corps

CBRN defense for the USMC is incorporated into planning and exercises starting at the Marine Forces level, and subsequently directed to subordinate commands, to include the incorporation of conducting MET in a CBRN defense environment.

Marine Forces Reserve (MARFORRES) incorporated CBRN training objectives and readiness goals into training plans across the Force. MARFORRES implemented a Mobile Training Team program that utilizes Active Reserve personnel to provide instruction and certification to subordinate units nationwide. MARFORRES also plans to add CBRN Consequence Management Platoons to the 4th Marine Division and the 4th Marine Aircraft Wing, beginning in FY 2019. Aviation units have increased integration of CBRN defense operations into flight operations.

USMC is integrating CBRN defense into its exercises, including Spartan Fury and Spartan Dawn. During the initial implementation, USMC identified a gap in the training augmentation force. As a result, USMC is currently adjusting the structure of these exercises to address the gap. The Marines Corps Logistical Operations Group exercise, Operation Assured Resolve, is conducted with a CBRN threat and requires the training audience to conduct detailed planning for CBRN Defense logistics and force protection. Additionally, the USMC will incorporate CBRN defense into the USMC premier combat arms exercise—the Integrated Training Exercise—beginning in FY 2018.

National Guard Bureau

CNGB is sustaining training of NG forces of the CRE to meet mission requirements and continues to develop, improve, and adapt individual and joint collective training venues, such as CNGB VIGILANT GUARD, to address systemic training issues and emerging threats. NGB coordinated the development and establishment of individual training courses to enhance WMD-CST, HRF, and CERFP operational capabilities in a radiological/nuclear (R/N) environment. Additionally, NGB developed an emerging threat training course to maintain WMD-CST awareness and understanding of NTAs. In coordination with U.S. Northern Command, CNGB has included elements of the Defense CBRN Response Forces and Command and Control CBRN Response Elements into NGB HRF and CERFP joint exercise programs to enhance interoperability. In FY 2017, NGB experimented with the use of simulants to determine

value in HRF and CERFP MCD training. NGB is now working to integrate Department of Energy recommended simulants and Virtual Radiation Training/Ubiety System into HRF/CERFP exercise training program and external evaluations.

USSOCOM

USSOCOM notes that constraints have impacted training execution, operations, and TTP refinements in FY 2017 for the emerging CWMD tactical force in both the Theater SOF and Conventional Forces. While CBRN training opportunities are integrated in some collective exercises, including the Joint Requirements Office for CBRN Defense-sponsored CASSANDRA Homeland Defense Exercise and the Elysium IV exercises, they are not widely integrated for full scale execution to stress the CBRN/CWMD challenges to the force and supporting logistics processes. Shortfalls in small unit collective training and combat training center events also exist and corrective actions are underway by USSOCOM and SOF Component Headquarters to correct and tailor training requirements to the relevant geographic threat.

For USSOCOM, CBRN and CWMD scenarios are being integrated into Senior Leader Seminars and Table Top Exercises (TTXs). Additionally, CWMD/CBRN vignettes are integrated into select SOF exercises, and SOF vignettes and scenarios are provided to support the material development TTXs for CBRN and CWMD capabilities.

B. Detection

The CBDP develops and fields a comprehensive portfolio of CBR detection and identification equipment to the Joint Force. In FY 2017, the CBDP research and development detection portfolio focused on integrated technologies to provide early warning and identification of CBRN threats to commanders to enable faster tactical decision making. The CBDP is currently on track to deliver the required detection equipment capabilities to the Joint Force.

The CBDP operationally deployed the Joint U.S. Forces Korea Portal and Integrated Threat Recognition system—a first-of-its kind, layered CB threat detection system—to Busan, Pier 8, in FY 2017. The system showcases an integrated, layered defense concept that provides early situation awareness through integration of force protection sensors, CB standoff systems, point CB detectors, sample collection, sample analysis, sample identification, and information sharing from the installation level and beyond.

The CBDP continued supporting the Integrated Early Warning (IEW) Advanced Technology Demonstration (ATD) and Enhanced Capability Demonstration (ECD), which is a comprehensive effort to combine awareness and understanding to facilitate effective decision making at the tactical level so the Force can continue military operations in a CBRN environment. The IEW ATD incorporates CB point and standoff detection systems with force protection sensors on a common, Service-oriented, architecture with integrated decision logic algorithms. This system enables confident decision-making for the commander during all phases of an operation (pre-, during-, and post-attack) and substantially improves situational understanding by providing up to 6-12 minutes of additional warning to a maneuver force under a fixed-site scenario. In FY 2017, ECD efforts initiated the development of new algorithms for systems, including for the detection of liquid filled rounds, in order to leverage existing systems in the field and integrate U.S. Army tactical logistics management systems with CBRN Decision

Support Tools. Additionally, new dashboards were developed to allow a unit leader to monitor the physiological status, to include heat strain indices, of unit members via a tablet or computer. Physiological status monitors were also integrated to display data on existing individual soldier Nett Warrior-enabled devices and Tactical Assault Kit systems providing enhanced tactical situational understanding.

To support the IEW ATD efforts, the Edgewood Chemical Biological Center (ECBC) Layered Sensing Initiative demonstrated improved IEW and situational understanding by consuming sensor and contextual data from multiple surveillance systems, stationary and mobile CB sensors, and aerosol plume mapping and tracking. Data from these sensing modalities converge in the U.S. Army's interoperable Common Operational Environment Sensor Computing Environment that enables near-instantaneous cross-cueing, and networked sensor data analytics to enhance situational understanding.

C. Protective Equipment

The CBDP provides personal and collective protection equipment to the Joint Force, to include reconnaissance equipment, and is currently on track to deliver the required protective equipment capabilities to the Joint Force.

In FY 2017, the DR SKO program achieved initial operational capability (IOC) for the Army. DR SKO is a comprehensive set of equipment to conduct and support dismounted reconnaissance and sensitive site assessment missions. DR SKO provides protective equipment for personnel; detection, identification, sampling, and marking equipment for CBR contamination; decontamination for personnel and equipment; and associated support items. DR SKO users include the U.S. Army, U.S. Navy, USAF, USMC, Reserves, and NG WMD-CSTs. The CBRN DR SKO program also stood up an organic production facility at Pine Bluff Arsenal, Arkansas, to provide production resilience and to support the Government/organic IB.

In FY 2017, 127,207 Uniform Integrated Protection Ensemble (UIPE) Increment 1 (UIPE Inc. 1) protective suits were delivered to USSOCOM. The UIPE Inc. 1 program attained IOC for USSOCOM in FY 2016 and is on path to achieve FOC.

The CBDP continued delivering JSGPM to the Military Departments/Services. To date, more than 1 million protective masks have been delivered since the program began Full Rate Production in FY 2007. The JSGPM effort is on schedule to attain FOC for the U.S. Army by the end of calendar year 2019.

The CBDP fielded 30 Chemically Contaminated Human Remains Transfer Cases (C-CHRT) in response to the U.S. Central Command's Joint Urgent Operational Need Statement for a capability and TTPs to safely recover, package, transport, and render final disposition of chemically-contaminated human remains for DoD affiliated personnel. The C-CHRT provides the materiel solution capability in a triple layer transport protection for the package per Code of Federal Regulations 49 and Air Force Manual 24-204, while the recovery, transport, and final disposition requirements are being developed by the Contaminated Human Remains Tiger Team. International Air Transport Association waivers and certifications were approved in April 2017. The C-CHRTs gives the geographic Combatant Commanders the additional option (internment

and/or storage) to repatriate chemically-contaminated human remains based on incident situation.

D. Medical Prophylaxis and Treatment of Casualties

During FY 2017, the CBDP Enterprise, through the Assistant Secretary of Defense for Health Affairs, procured 712,420 MCM doses (anthrax and smallpox vaccine) from the Strategic National Stockpile to implement biological defense vaccination programs. The CBDP Enterprise managed, administered, and distributed the MCMs as needed to support operations.

The CBDP approved the production and fielding of 50 Next Generation Diagnostic System FilmArray V2.0G systems of which 33 were fielded to the USAF. Total Package Fielding included the Biological Warfare Agent "Warrior Panel", which is the first Food and Drug Administration (FDA)-cleared test for the medical diagnosis of hemorrhagic fever caused by Ebola and Marburg viruses, in addition to tests for Anthrax, Plague, Tularemia, and Q-Fever. Approval of Full Rate Production and fielding to the U.S. Army and U.S. Navy is anticipated in 2018. The FilmArray V2.0G is based on an FDA-cleared commercial FilmArray device, with a ruggedized computer and custom software required to process the Warrior Panel.

DoD engaged the FDA on the topic of the context and proper "on-label" use of the FDA-approved medical chemical warfare pretreatment, pyridostigmine bromide (PB). This MCM plays an important role in readiness against certain nerve agent threats by increasing survival to those exposed to the threat. DoD received FDA "General Advice" that clarifies the operational use of PB. FDA agreed with DoD and published the position that "because any threat of exposure to a chemical nerve agent may include possible exposure to organophosphorus nerve agents, including Soman, the use of PB as prophylaxis against the lethal effects of potential Soman nerve agent poisoning when confronted with a threat of exposure to chemical nerve agents is consistent with the indicated use described in approved labeling." This "General Advice" about the approved use of this pretreatment will result in follow-on force health protection guidance from the Office of the Assistant Secretary of Defense for Health Affairs (OASD(HA)) and updated Military Service doctrine clarifying expanded uses of this drug product for any risk of exposure to Soman and related threats. Consistent with this finding, the program office directed increased ordering and availability of the pretreatment.

CBDP supported a market research study of MCMs for Acute Radiation Syndrome (ARS). The study identified a broad representation of recent and current ARS MCM candidates in development between 2006 and 2017 and provided recommendations to address current and future challenges for achieving DoD R/N medical defense capability.

Status of Research and Development (R&D) and Acquisition Programs[6]

A. Advances in Science and Technology

In FY 2017, the Enterprise made significant advancements in medical and physical S&T research. This includes addressing significant technical questions for priority topics, such as

[6] Title 50 U.S. Code 1523 (b) 2: The status of research and development programs, and acquisition programs, for required improvements in chemical and biological defense equipment and medical treatment, including an assessment of the ability of the Department of Defense and the industrial base to meet those requirements.

pharmaceutical-based agents (PBA), synthetic biology, and materials science and the evaluation of their impact on CBRN defense readiness of the Joint Force.

The CBDP is broadening understanding of the hazards of PBA effects on the Joint Force, to provide critical source term, dissemination, environmental fate, and toxicological data—key data that will allow for the development of new defense technologies and TTPs, where needed. In FY 2017, the CBDP organized and coordinated research resulting in a human toxicity estimate for a high priority PBA, and identified a number of metabolites, the intermediate products of metabolic reactions. Additionally, the CBDP collaborated across the U.S. Government and with international partners to characterize the behaviors of a priority PBA in a realistic environment, supporting testing and validation of currently fielded equipment and procedures, ultimately reducing risk to the Warfighter. A multinational approach will leverage complementary experiments, resources, facilities, and infrastructure providing cost savings and broadening available environments and information. The CBDP performers also developed a new methodology to allow for the rapid development of an operational risk assessment for PBAs and identified and published human phase I and II metabolites for carfentanil for the first time. This aids in developing diagnostics, forensics, and attribution.

The CBDP initiated the development of a comprehensive S&T strategy to address emerging biotechnology to include synthetic biology for defense purposes, in furtherance of a comprehensive understanding of both potential risks and benefits associated with emerging biotechnology.

S&T managers have significantly advanced and leveraged novel materials science to develop a continuous-wear CBRN protective suit with improved protection from current and emerging threat agents, while maintaining the same comfort and thermal properties of the duty uniform—a level never before achieved in CBRN protective uniforms. The CB Lightweight Improved Thermal Ensemble employs new garment design strategies—including the application of novel garment coatings, select protective filter liners, and enhancements to the hood/mask interface—to demonstrate that newly engineered CB protective materials can be optimized to enable percutaneous protection while minimizing the thermal burden on the Warfighter. These technology developments are being transitioned to the JPEO-CBD to shape and inform trade-space options for the next generation CB uniform, the UIPE Family of Systems.

The CBDP continued to investigate the effectiveness of an Ebola virus (EBOV) therapeutic candidate. This candidate has demonstrated survival benefit in the EBOV nonhuman primate challenge model. This drug could potentially be used in combination with other therapeutics such as the broad spectrum antiviral currently undergoing clinical development via the FDA Animal Rule. This candidate successfully transitioned from S&T to advanced development in FY 2017.

The Defense Threat Reduction Agency (DTRA) R&D Directorate's Chemical and Biological Technologies Department (RD-CB) continued to facilitate strategic workforce development by engaging students interested in pursuing science, technology, engineering, and mathematics (STEM) education and careers. The decrease in American STEM students and professionals is recognized as a national security issue. Alumni from the program have followed career paths in

universities and the Military Academies. Our STEM efforts have helped ensure a future lethal force through a minimal monetary investment. In FY 2017, JSTO provided residential STEM internships for 60 high school students, 30 middle school students, and 10 teachers at the Joint Science and Technology Institute (JSTI). Additionally, 10 cadets from the Service academies and seven postdocs were also sponsored for summer research opportunities at various DoD laboratories and academic institutions.

In FY 2017, CBDP hosted five events with 48 scientists and engineers participating in a variety of operational scenarios as part of the "Scientists in the Foxhole" program. This program develops opportunities for CWMD scientists and engineers that are relatively new to DoD and places them with Soldiers, Sailors, Airmen, and Marines as they train and conduct their mission in a CBRN environment. Embedding scientists and engineers with the Warfighter enables the participants to experience and understand the needs of the Warfighter and the types of missions performed while protecting themselves from CBRN threats. These opportunities stimulate ideas towards technology innovations to enhance enduring CBRN defense capability needs.

Empowering the Development of Genomics Expertise (EDGE) bioinformatics was collaboratively developed between the Los Alamos National Laboratory and the Naval Medical Research Center to allow DoD and the Chemical and Biological Defense Program to rapidly analyze big data generated from genomic studies to characterize, detect, and identify biological threat agents and emerging and advanced diseases. EDGE bioinformatics allows for scientists to be able to rapidly analyze their microbial genomic data in minutes to hours compared to what took a team of specially trained bioinformaticians days to weeks. EDGE bioinformatics won two R&D100 awards in FY 2017; one was a special recognition award for "Market Disruptor – Products." The R&D100 innovation award committee defines "Market Disruptor" as a potential "game-changer" that can displace established technologies. The R&D100 Awards have served as the most prestigious innovation awards program honoring the best inventions to come out of research and development in the last year. The R&D committee is composed of individuals from all walks of research life, from small businesses and universities to major laboratories and firms.

The PRESymptomatic AGent Exposure Detection (PRESAGED) project was sponsored by DTRA RD-CB and led by MIT Lincoln Laboratory in collaboration with USAMRIID. PRSEAGED is a robust machine learning-based algorithm that uses real-time incipient symptoms, such as fever, without regard to the particular pathogen (virus or bacterium), exposure route, pathogen dose, or animal species. PRESAGED has also shown the potential to provide early warning on entirely novel pathogens, suggesting that this approach will be robust in detecting emergent diseases. The unique machine learning algorithm led to PRESAGED also received an R&D100 award in FY 2017.

In FY 2017, the Advanced Development and Manufacturing of Antibody Technologies technology demonstration at the Advanced Development Manufacturing (ADM) was initiated. The initial output is a combination monoclonal antibody (mAb) product that targets botulinum neurotoxins A and B. Upon completion, the mAb platform technology will be used to begin developing other mAb MCM with the potential to be used as an interim fielding capability.

B. DARPA Coordination[7]

In order to maintain coordination and integration with the CBDP, the Defense Advanced Research Projects Agency (DARPA) regularly collaborates with the CBDP Enterprise. DARPA provides programmatic updates, technology transition opportunities, and technical expertise to the CBDP in the areas of threat reduction, biodefense, diagnostics, viral forecasting, regulatory reviews, biosurveillance, and MCM development. DARPA hosted and attended joint meetings with USSOCOM, the Naval Special Warfare Development Group, JPEO-CBD, USAMRIID, USAMRICD, JSTO, and U.S. Army Medical Component Armed Forces Research Institute of Medical Sciences. To ensure proper coordination with the CBDP, DARPA participates in the CWMD and the Armed Services Biomedical Research Evaluation and Management Communities of Interest.

C. Advanced Development

In FY 2017, the Enterprise made significant advancements in medical and physical CBRN defense capabilities to the Joint Force.

In FY 2017, the JPEO-CBD participated in several equipment demonstrations using equipment from the Joint CBRN Advanced Capability Sets (JCACS) ECD. JCACS provide personal protection equipment, CBRN sensors, communication equipment and a Talon Unmanned Ground Vehicle (UGV) to the Army Warfighter Assessment 16.1. The JCACS ECD also provided a Subterranean Mission Package (Talon UGVs, MPU5 Radios and Helmet Cameras) to the 23rd CBRN Battalion in support of WARRIOR STRIKE and provided radiation detection equipment to several demonstrations manned by the 20th CBRNE Command's Nuclear Disablement Teams. The equipment generally performed well and will either inform future Programs of Record or feed into subsequent JCACS Increments.

To support improved modeling and simulation of the effects of CBRN weapon strikes and incidents, DoD continues to advance the JEM program. In FY 2017, the JEM program updated and fielded Increment 1 software to the NG portions of the CRE to include WMD-CST, CERFP, and HRF. This decision was predicated upon a successful limited fielding, New Equipment Training (NET) events, Life Cycle Sustainment Plan, Operational Evaluation Report from the Operational Test Agencies, and an independent Verification, Validation and Accreditation report. To date, the JEM Program Management Office has successfully fielded to 57 WMD-CSTs, 10 HRFs, 17 CERFPS, 10 CBRN Task Forces, 1 NG Coordination Center, 1 Naval Air System Command, and DTRA. Additionally, the JEM Program Office and the Joint Project Manager for Information Systems, Product Support Team conducted NET training at six Contiguous United States locations completing the final operational NET event in third Quarter 2017. With the successful fielding, JEM 2.0 is available for use throughout the National Guard CBRN Response Enterprise and DTRA Technical Reach back.

[7] Title 50 U.S. Code 1523 (b) 10: A description of the coordination and integration of the program of the Defense Advanced Research Projects Agency (DARPA) on basic and applied research and advanced technology development on chemical and biological warfare defense technologies and systems under section 1522(c)(2) of this title with the overall program of the Department of Defense on chemical and biological warfare defense, including—(A) an assessment of the degree to which the DARPA program is coordinated and integrated with, and supports the objectives and requirements of, the overall program of the Department of Defense; and (B) the means by which the Department determines the level of such coordination and support.

In FY 2017, DoD successfully conducted the transfer of equipment, materials, and training for the Mass Casualty Decontamination with Detector Suite to the Moroccan Royal Armed Forces Engineering Brigade, Chemical Company located in Kenitra, Morocco. These capabilities support partner capacity and demonstrate efforts strengthening alliances.

D. Test and Evaluation

The Director, Deputy Under Secretary of the Army – Test and Evaluation continued to provided T&E oversight, policy, guidance, strategy, and test standards for acquisition programs and T&E infrastructure to the CBDP, to ensure the highest quality test data is available for the evaluation of CBR defense systems and reduced risk to the Warfighter. This T&E support to acquisition programs includes test threat support documentation and coordination with defense intelligence agencies, developing and approving T&E Master Plans, and review and approval of operational test plans for adequacy of data to facilitate acquisition decisions and the fielding of equipment to the Joint Force.

In FY 2017, DUSA-TE sponsored and led T&E stakeholder projects to improve CBR T&E. These efforts included a development of a database tool to identify and assess relevant CB backgrounds and interferents that inhibit the performance of CBR detectors in an operational environment and a model to predict human response to off-gassing and resuspension of chemical agents from contaminated objects. This model assists in predicting the health effects of unprotected personnel in a variety of scenarios, such as those in the immediate vicinity of a large vehicle that is off-gassing a chemical agent vapor. Additionally, West Desert Test Center upgraded the Simulant Agent Resistance Test Manikin (SMARTMAN) for protective mask testing to mimic operationally relevant high breathing rates associated with Warfighter tasks required in a CBRN environment.

DUSA-TE coordinated multiple bilateral international CB T&E collaborations in FY 2017. These focused on advancing Technology Readiness Levels of field detection capabilities for improved battlefield awareness, and on the development of Tactics, Techniques, and Procedures for enhanced interoperability of the Warfighter in a shared CB battlefield environment. Additional T&E collaboration efforts related to characterizing chemical compound phenomenology to better inform defensive countermeasures for emerging threats occurred under a multi-lateral agreement, where each participating country contributed unique subject matter expertise and technology for the benefit of the global CB community. In the area of personal protection, DUSA-TE worked with international partners to establish test standards and to plan for the collaborative validation of test infrastructure. This collaboration results in improved T&E methodologies, increased cost sharing, cooperation and data exchange, and ensures cross-national expertise for the enduring CB mission.

No individuals have been used as subjects of any CB agent tests in the United States since 1975. Human biological agent testing ended on November 25, 1969, and human chemical agent testing ended on July 25, 1975. OASD(HA) continues to work with the Department of Veterans Affairs to identify and locate previous human test subjects so they can receive appropriate attention. To provide the public with the information on human exposures related to historic CB testing, the OASD(HA) maintains CB exposure databases for DoD and updates the CB exposures sections of the Environmental Exposures website (http://www.health.mil/Military-Health-Topics/Health-Readiness/Environmental-Exposures) as needed.[8]

[8] Title 50 U.S. Code 1523 (b) 9: A description of any program involving the testing of biological or chemical agents on human subjects that was carried out by the Department of Defense during the period covered by the report.

E. Industrial Base

The CBDP conducts an annual evaluation of the IB to identify risks to DoD CBR Defense capabilities. The CBDP addresses IB risks through active monitoring and development of risk mitigation strategies to address risks before issues emerge. To support these efforts, the CBRN IB Working Group developed an assessment process, Transformational Analysis (TA), which utilizes fragility and criticality (FaC) metrics to determine the health of the CBRN IB and, by association, the health of aligned systems, and system technology. The FaC metrics for this process were developed in accordance with DoD Instruction 5000.60 "Defense IB Assessments." The TA of the CBRN IB is a prognosis decision support tool to conduct a near- and mid-term predictive analysis of key manufacturers and manufacturing sector capabilities. This supports acquisition and sustainment while ensuring that an IB capability is present to sustain the readiness of our Warfighters and meet future National Security Strategy requirements. The assessment is being integrated into an annual CBRN IB Report and further supports the CBDP Enterprise Risk Management.

In addition to TA, the CBRN IB was also assessed using market research, critical manufacturer reviews, surveying, financial assessments, and system assessments. The 2016 IB assessment process determined that the CBRN manufacturing sector is currently stable when assessed at the overall capability area level. However, areas of concern were identified within most of the capability areas at the manufacturer level. Certain IB capabilities are deteriorating due to reductions in Military Service requirements, extensions to the service life of items, and increasing reliance on single-source manufacturers. This continuous evolution will be monitored through continuing situational awareness of the IB.

Army Materiel Command has expressed concerns about Army pre-positioned stock funding and expenditures. The reductions that occurred over the last several years has adversely affected the CBRN IB sustainment due to lowered stockage levels and spending. In addition, Military Construction funding was requested to support organic base facility upgrades. Pine Bluff Arsenal is one of the targets for this funding. The United States Army Tank-automotive and Armaments Command stood up a working group to study the concept of a centralized sustainment strategy for CBRN equipment at Pine Bluff. The Business Case Analysis for this study is expected to be completed in FY 2018.

A small number of manufacturers are critical suppliers on numerous CBRN systems. Ongoing reductions in CBRN-related procurements created areas of concern and risk that must be considered as IB-related decisions are made. These areas require additional monitoring throughout 2018 and beyond.

F. CBDP Infrastructure

The CBDP continues to address the recommendations put forth by the Government Accountability Office (GAO) report 15-257, "Designated Entity Needed to Identify, Align, and Manage DOD's Infrastructure" to ensure sustainment of critical infrastructure and intellectual capital needed for the continued success of the Enterprise. In June 2017, the GAO issued a follow-up report acknowledging the designation of the Deputy Assistant Secretary of Defense for Chemical and Biological Defense (DASD(CBD)) as the CBDP infrastructure manager, completing one of the five recommendations made by GAO. The report further acknowledged

the program's progress with development of the infrastructure manager's roles and responsibilities. Updates to DoD Directive 5160.05E, "Roles and Responsibilities Associated with the Chemical and Biological Defense Program" further documented the role of the DASD(CBD) as the Infrastructure Manager by outlining how the DASD(CBD) will execute overall coordination, integration, and oversight of DoD infrastructure required to perform CBDP-related RDT&E and operational mission support.

In support of the Infrastructure Manager role, the following activities took place in FY 2017 advancing infrastructure management across the CBDP:

CBDP Infrastructure Communication Portal

A web-based Infrastructure Communication Portal was activated in the CBDP Enterprise Max.gov collaboration area. The portal is used to collect and consolidate documentation and data related to the CBDP Infrastructure. The web-based portal allows for easy collaboration and information sharing within the Enterprise.

CBDP Infrastructure Working Integrated Product Team Infrastructure Monitoring

The CBDP Infrastructure Working-level Integrated Product Team developed a monitoring mechanism for laboratory infrastructure supporting CBDP efforts. The purpose of the tool is to document and monitor laboratory and other infrastructure used in support of CBDP efforts at DoD, Interagency, Industrial, Academic, and International Developmental and Operational Test Facilities. The tool will support identification of capabilities within the Enterprise and provide detailed information to all stakeholders. Initial population of the tool has been completed and the data will be verified and consolidated. The final version of the tool will be uploaded to the CBDP Infrastructure Communication Portal and updated regularly.

CBDP Infrastructure Studies

Two complementary infrastructure related studies were completed, identifying CBDP Infrastructure capabilities and competencies at DoD laboratories: the U.S. Army RDT&E Composition and Disposition Study for the CBDP and the DTRA RD-CB led Core Competency Study of the DoD Service Laboratories. Information from both studies will be leveraged to complete additional CBDP Infrastructure Management tasks.

Medical Countermeasure Advanced Development and Manufacturing

The U.S. Government requires a robust MCM pipeline supported by an integrated infrastructure based on strategic partnerships between the Government and industry to establish dedicated, cost-effective, reliable, and sustainable capabilities for the advanced development and manufacturing of MCM to address national security needs. The ADM center in Alachua, Florida, is the DoD's premier MCM manufacturing facility. The facility became operational in FY 2017, and the DoD intends to use the ADM to develop and manufacture MCMs to protect Warfighters against CBRN threats. The contractor-owned/contractor-operated Biosafety Level (BSL) 3 facility is currently Good Manufacturing Practice-compliant and is capable of manufacturing bench- to large-scale, including horizontal scaling for surge events. The ADM effort incentivizes small innovator biopharmaceutical companies by providing access to expertise and technology to facilitate successful MCM development and FDA approval.

G. Chemical Weapons Convention and Inspection Readiness[9,10]

In addition to working with international partners and the Organisation for the Prohibition of Chemical Weapons (OPCW), DoD continues to provide support around the world to reduce chemical weapon threats in compliance with Article X of the Chemical Weapons Convention (CWC). In FY 2017, DoD executed *ex gratia*, for the government of Panama, the destruction of eight old chemical weapons on San Jose Island, Panama.

DoD and DTRA have undertaken preparations to prepare for and to assist in the implementation of the CWC. As the Defense Treaty Inspection Readiness Program no longer exists, the responsibility for preparing defense installations for inspections under the CWC is with the inspected facility. In FY 2017, 24 OPCW inspections and visits to chemical weapons storage, Schedule l, and destruction facilities were hosted. The inspections verified that removal of chemical weapons or Schedule 1 chemicals from the facilities were not in violation of CWC and that the amount of Schedule 1 chemicals for purposes not prohibited by CWC did not exceed the DoD allotment (900 kilograms) of the U.S. maximum of 1 metric ton (1000 kilograms). DoD, the Military Departments/Services, and Components maintained CWC implementation and compliance plans, and CWC Challenge Inspection (CI) Response Plans. DoD and the Military Departments/Services continued to maintain their preparedness for a CI by conducting annual exercises and training.

DoD continues to prepare for and to assist in the implementation of the CWC, including activities such as training for inspectors, hosting CWC Implementation Working Group Meetings, meeting CWC reporting deadlines, and proceeding with the destruction of the U.S. chemical weapons stockpile.

DoD hosted a visit to the Blue Grass Chemical Agent Destruction Pilot Plant by representatives of OPCW Executive Council. Pueblo Chemical Agent-Destruction Pilot Plant chemical weapons destruction operations continued.

The ECBC Forensic Analytical Center, one of two OPCW-designated laboratories in the United States, successfully passed its annual OPCW Proficiency Test with its 22nd "A" score to date. The ECBC Forensic Analysis Center also passed its 2017 OPCW Biomedical Proficiency test with an A score.

[9] Title 50 U.S. Code 1523 (b) 7: A description of the chemical warfare defense preparations that have been and are being undertaken by the Department of Defense to address needs which may arise under article X of the Chemical Weapons Convention.

[10] Title 50 U.S. Code 1523 (b) 8: A summary of other preparations undertaken by the Department of Defense and the On-Site Inspection Agency to prepare for and to assist in the implementation of the convention, including activities such as training for inspectors, preparation of defense installations for inspections under the convention using the Defense Treaty Inspection Readiness Program, provision of chemical weapons detection equipment, and assistance in the safe transportation, storage, and destruction of chemical weapons in other signatory nations to the convention.

Management Initiatives[11]

The CBDP is taking measures to improve overall management and coordination of the Enterprise. Specifically, the DASD(CBD) is leading Enterprise components to integrate and align activities toward fulfillment of the CBDP mission through leading Enterprise-wide initiatives and efforts. In FY 2017, the CBDP continued to use the Enterprise Reviews to streamline problem identification and decision-making for high-level concerns and items of interest across the program.

Although the CBDP components individually conduct planning, the CBDP Enterprise is developing a process that integrates existing component planning efforts and common data to synchronize research, development, and acquisition activities and investments. This process, known as Single Stream Planning, is intended to support future Force capabilities and provide the information needed, including a common lexicon, to ensure CBDP leadership can balance vital modernization efforts and readiness to mitigate mid- and far-term risk.

In FY 2017, the CBDP established an Enterprise Risk Management framework in support of new requirements from the Office of Management and Budget to ensure an integrated and holistic approach to risk review and management. This framework will serve to inform strategy and objectives—balancing risks with opportunities and informing the broad-based risk CBDP is willing to accept in pursuit of its mission/vision.

In FY 2017, the CBDP initiated the Agile Medical Paradigm (AMP), which is the CBDP strategic framework to optimize DoD delivery of MCMs. A Task Force was chartered and tasked with developing a Roadmap for the implementation of the framework. The AMP Roadmap includes policy and technology-based solutions to address the root causes of MCM development inefficiencies within DoD as well as metrics for assessing progress in execution of the solutions.

The CBDP has begun a close collaboration with the Office of the Assistant Secretary of Defense for Research and Engineering in the area of synthetic biology in order to improve efficiency and maximize return on investments in this rapidly growing technical area. Engagement, through the Office of the Under Secretary of Defense for Policy, with National Security Council staff, and the interagency over an extended period, produced a Deputies-endorsed annual process for evaluating future national security risk from genome editing and synthesis and balancing those concerns with maintaining competitive technological and economic opportunities. Communication across DoD, interagency, and to the broader technical community are all being coordinated. To this end, the first Synthetic Biology for Defense Conference was held in September 2017. This conference convened speakers from across DoD, academia, and industry to present advances, equities, and investments in synthetic biology to a largely DoD audience.

In FY 2017, the CBDP initiated a study of the threat potentially posed by synthetic biology with the National Academies of Science, Engineering, and Medicine. A group of experts from academia, National Laboratories, and industry were assembled to build a framework for assessing the risks associated with this rapidly advancing field. This framework was published

[11] Title 50 U.S. Code 1523 (b) 5: Measures taken to improve overall management and coordination of the chemical and biological defense program.

earlier this year and is currently being used by the committee to identify and prioritize areas of concern. This analysis will be published in the second quarter of FY 2018 and will be followed by a classified workshop to facilitate candid discussions of potential threats and mitigation strategies.

The CBDP established several consortiums among DoD stakeholders, and also supported several consortium among academia and industry to speed development of critical medical and non-medical capabilities for the Enterprise. Building multi-investigator/collaborative teams affords great potential for advancing CB basic and applied research through use of novel capabilities and opening new research opportunities for the CBDP. A Medical CBRN Defense Consortium was established for a period of 20 years. This Consortium currently has 149 members, including pharmaceutical and biotechnology companies, 12 501(c) non-profits, and 15 universities. The CBDP also supported the Consortium for Energy, Environment, and Demilitarization, which includes potential partners in industry, research institutions, and industry that could potentially provide solutions for the UIPE Family of Systems program. Additionally, a Defense Synchrotron Consortium was established to support CBDP S&T efforts in synchrotron-based material characterization for materials and surface science programs. The S&T portfolio requires highly complex material research and characterization. Synchrotron techniques offer extremely bright light sources for this research; however, these techniques historically are underutilized or unexplored by DoD researchers for CB-related research.

The CBDP oversees CBRN survivability efforts to ensure mission critical systems are survivable and sustainable in a CBRN environment. The CBDP oversaw two major efforts during FY 2017 to improve CBRN survivability, including the creation of a Defense Acquisition University continuous learning module intended to be a foundational course to understand the basic aspects of CBRN survivability for all acquisition career fields. Upon completion of the module, students will be able to understand the CBRN threat environment, CBRN operational effects, and apply CBRN survivability policy to the requirements and systems engineering process. Additionally, the CBDP published a DoD Military Standard, “Design Criteria for CBRN System Contamination Survivability.” This military standard applies to all mission critical systems in development and legacy systems undergoing upgrade or improvement to enable material developers to design military systems to be CBR contamination survivable.

In FY 2017, the Chemical Biological Suit Proof Challenge was undertaken by JPEO-CBD to inform individual protective suit and ensemble acquisition by the JPEO-CBD Joint Project Manager for Protection which provides and sustains for the Joint Force state-of-the-art individual and collective CBRN protection systems, as well as CBRN decontamination capabilities. The Challenge was another way the CBDP led innovation outside traditional defense acquisition pathways. In January 2017, 12 prizes totaling $250,000 were awarded to winners of the Proof Challenge, ranging from students to engineers in a variety of fields, for capturing innovative ideas in providing the best possible CBRN protective suits for the U.S. Military. The challenge concept was established to both cast the widest net possible and to incentivize innovation through both typical (e.g., industry days, requests for proposals, etc.) and atypical acquisition approaches, including the Proof Challenge.

In FY 2017, the Pacific Shield Task Force was established by the JPEO-CBD with the objective to build CBRN capability packages that support the Army's plans to deploy and conduct military operations in a high-risk WMD environment. Task force deliverables will be centered on developing and delivering solutions to capability gaps identified by the Eighth Army CWMD Operational Need Statement. The task force will conduct prototyping and experimentation to increase understanding of technology and its impact on warfighting capability. This Pacific Task Force will be focused on driving down technical risk, gaining Warfighter feedback to better inform requirements, and ensuring that concepts going forward into acquisition not only provide the needed capability, but equipment and materiel solutions that are timely and affordable.

Issues Encountered or Areas for Improvement[12]

DoD and the CBDP continued efforts in response to the incomplete inactivation and shipments of *Bacillus anthracis* (anthrax) spores by an Army laboratory in 2015. In response to the recommendations of the Army Biosafety Task Force, the Secretary of the Army moved the Life Sciences Division at Dugway Proving Ground from under the functional control of the U.S. Army Test and Evaluation Command (ATEC) to ECBC on July 1, 2016. Under the guidance of the Secretary of the Army as the DoD executive agent for biosafety and biosecurity, DoD labs continue to implement the recommendations from multiple GAO and DoD Inspector General investigations to enhance the program.

Efforts are now under way to bring the BioTesting Division (BTD), formerly the BioTesting Branch, back to full operational capacity. Attaining this objective is centered on implementing and validating processes and procedural constructs mandated by the Department of the Army and provisions for registering with the Centers for Disease Control and Prevention (CDC) to allow for laboratory work at the BSL-3 Level. The Biological Select Agents and Toxins registration as previously held by ATEC was closed out in May 2017. In June 2017, efforts required to submit a new registration package to the CDC were started. As part of the transition to full operation status, all laboratory safety controls and procedures were revised and reviewed. The Army Materiel Command performed an on-site inspection of the BTD Laboratories and authorized BSL-2 operations in August 2017.

Conclusion

In FY 2017, the Department applied funding to the highest identified operational risk areas and those that meet the Military Departments'/Services' priority requirements to address these and a multitude of varying missions across the spectrum of conflict. These FY 2017 investments positively impacted CBRN defense readiness of the Joint Force; however, the Department will continue to pursue opportunities to seek improved capabilities and expand partnerships. The end-state of these actions will improve the operational readiness of our Forces to address the threats facing the Nation at home and abroad.

[12] Title 50 U.S. Code 1523 (b) 6: Problems encountered in the chemical and biological warfare defense program during the past year and recommended solutions to those problems for which additional resources or actions by the Congress are required.

ENCLOSURE A: FY 2017 FIELDING QUANTITIES

JPEO-CBD Joint Project Manager (JPM)	Product/System	Total Fielded to the Warfighter (Military Departments/Services and/or Combatant Commands)
JPM Nuclear, Biological, and Chemical Contamination Avoidance	CBRN Dismounted Reconnaissance Sets, Kits, and Outfits	105
	Improved Point Detection System - Lifecycle Replacement	30
	M4A1 Joint Chemical Agent Detector	285
	M98 Joint Biological Point Detection System	4
	Nuclear, Biological, and Chemical Reconnaissance Vehicle, Virtual Crew Training	1
JPM Guardian	Radiac Set AN/PDR 75A (Personal Dosimeter)	2,845
	Audio Visual Notification System	2
	Blauer HZ9420FVG Class2 Suit	1,470
	Blauer XRT Response Team Suit	8,530
	HAPSITE Chemical Identification System	1
	OnGuard HAZMAX Boot 87012	10,675
	Lightweight Inflatable Decon System	17
	M4A1 Joint Chemical Agent Detector	107
	OneSuit Pro Certified Class 1 Ensemble	1,600
JPM Protection	Contaminated Human Remains Transfer Case	30
	Joint Service Aircrew Mask, Rotary Wing MPU5 variant	327
	Joint Service General Purpose Mask	210,581
	Uniform Integrated Protection Ensemble Increment 1	127,207
JPM Medical Countermeasure Systems (JPM MCS)	Joint Biological Agent Identification and Diagnostic System Assay Kits	357
	Antidote Treatment Nerve Agent, Autoinjector	402,475
	Next Generation Diagnostics System Increment 1	33
JPM Information Systems	Joint Effects Model	Web-based software application provided to various host Command and Control (C2) systems and is fielded to Military Departments/Services and Combatant Commands as part of the host C2 system fielding plans.
	Joint Warning and Reporting Network	Web-based software application provided to various host C2 systems and is fielded to Military Departments/Services and Combatant Commands as part of the host C2 system fielding plans.
	Global Biosurveillance Portal	GBSP is a cloud-based software system. GBSP does not field any particular application but provides access to the system as part of the program fielding plan.
Total Products/Systems Fielded		**766,682**
JPM MCS	Anthrax Vaccine Adsorbed	538,320
	Smallpox Vaccine	174,100
Total MCMs Acquired from the Strategic National Stockpile (Doses)		**712,420**

ENCLOSURE B: FY 2017 CWMD AND CBRN RESPONDER TRAINING AND EDUCATION

US Army Medical Department Center and School Courses	Attendees
Joint – Joint Biological Agent Identification and Diagnostic System (JBAIDS) Schoolhouse (Navy)	9
Joint – JBAIDS Schoolhouse (USAF)	27
Joint – Next Generation Diagnostic System Schoolhouse (Navy)	2
Joint – Next Generation Diagnostics System Schoolhouse (USAF)	17
FY 2017 Total Number of Students	**55**

USAF CBRN Defense Courses	Attendees
BioCapture 650	34
CBRN Contamination Control Area	105
CBRN Fundamentals	87
Contamination Control Station	118
Dry Filter Unit	49
FirstDefender RMX	50
M4A1 Joint Chemical Agent Detector	120
M4 Joint Chemical Agent Detector	146
MultiRAE Plus	27
MultiRAE Pro	30
Plume Modeling	69
Principles of CBRN Detection Technology	17
TruDefender FTX	45
AF Emergency Management Program	12,434
AERO First and Emergency Responder	4,900
CBRN Defense Awareness	~100,00
CBRN Defense Survival Skills	~100,000
Contamination Control Team	172
Control Center Operations	5,160
Emergency Operations Center	3,134
Shelter Management Team	580
Unit EM Representative	2,490
Response Task Force	215
FY 2017 Total Number of Students	**~229,982**

USN Courses	Attendees
Shipboard CBR Defense Operations and Training Specialist Course	99
Damage Control Assistant Senior Enlisted – CBRN-D; San Diego	125
Damage Control Assistant Senior Enlisted – CBRN-D; Norfolk	118
Department of Defense Joint Explosive Ordnance Disposal (Common Core) (Navy – 103, USMC – 88, USAF – 93, USA – 152)	436
FY 2017 Total Number of Students	**778**

USACBRNS Courses	Attendees
USACBRNS Distance Learning Courses	
CBRN Specialist	130
CBRN Captains Career (RC) Phase 1	74
CBRN Captains Career (RC) Phase 3	33
USACBRNS Resident Courses	
CBRN Basic Officer Leader-Branch	276
CBRN Captains Career	108
CBRN Captains Career (RC) Phase 2	44
CBRN Captains Career (RC) Phase 4	42
CBRN Warrant Officer Basic	7
CBRN Warrant Officer Advanced	16
Basic Radiological Safety	103
Advanced Radiological Safety	43
Radiological Packaging	10
CBRN Recon for Brigade Combat Teams	167
CBRN Pre-Command	13
Decontamination Procedures (Non-US)	158
Biological Integrated Detection System	95
Joint Senior Leader	99
CBRN Specialist	1,633
Civil Support Team Operations	73
Civil Support Team Pre-Command Course	61
Civil Support Skills	187
CBRN Responders	427
CBRN Responders Tech	75
CBRN Mass Casualty Decontamination	255
CBRN Dismounted Reconnaissance	84
Technical Escort	232
Analytical Laboratory System Operator	29
Unified Command Suite Operator	23
Shipboard CBR-D Operations & Training Specialist (USN)	75
Nuclear Biological Chemical Defense (USMC)	98
CBRN Basic Warrant Officer (USMC)	15
CBRN Planner (USMC)	26
Emergency Management Craftsman (USAF)	52
Emergency Management Apprentice (USAF)	167
CBRN Advanced Leader Course (ALC) Phase 1	183
CBRN ALC Phase 2	262
CBRN ALC Phase 3	242
CBRN Senior Leader Course (SLC) Phase 1	170
CBRN SLC Phase 2	125
CBRN SLC Phase 3	125
FY 2017 Total Number of Students	**6,037**

NGB Sponsored Leader Development and Education Courses	Attendees
Chemical Warfare Agent/Biological Warfare Agent (CWA/BWA)	136
Emerging Threats	263
Nuclear Weapons Incident Response Training (NWIRT) Basic	45
Applied Radiological Response Technique Level (ARRT) 1	456
Survey Equipment Capabilities Course (formerly Basic Survey Equip)	24
Applied Radiological Response Techniques (ARRT) 2	90
Advanced Radiological Detection Training	213
Advanced HAPSITE ER Training (formerly GCMS)	5
Basic Defense Readiness Capabilities (DRC)	27
HAZMAT Awareness	376
IS 700.a Intro to NIMS	376
IS 100.b Intro to IC	376
IS 200.b ICS for Single Resources	376
IS 300 Intermediate ICS	228
IS 400 Advanced ICS	228
IS 800.b National Response Framework	205
IS 300 Intermediate ICS	376
Civil Support Skills Course	154
CST Pre-Command Course	60
IED Awareness	13
Analytical Laboratory System Basic Operators Course	25
Advanced Shimadzu (formerly Advanced GCMS)	14
Basic Microscopy	9
Advanced Microscopy	2
CST Operations Course	71
FIBWA	23
CompTIA Boot Camp (Network Technician I)	5
Unified Command Suite (UCS) Basic	20
CCENT (Network Technician II)	5
Windows MCSA (Network Admin I)	5
Windows Server (Network Admin II)	11
UCS Intermediate IT Course	11
UCS Intermediate Radio Course	11
Cisco Certified Network Professional	11
Emergency Vehicle Operations	376
Pro Board Certifying Confined Space/Collapsed Structure	8
Joint Effects Model (JEM) 2.0	130
Physiological System Monitoring	122
Dismounted Reconnaissance Sets, Kits, and Outfits Fielding	51
CBRN Talon IV Robot	93
Man-Portable Radiological Detection System	224
HRF/CERFP Search and Extraction Course	460
HRF/CERFP Mass Casualty Decontamination Course	464

NGB Sponsored Leader Development and Education Courses	Attendees
HRF/CERFP WMD Command Post Operations Course	426
FY 2017 Total Number of Students	**6,604**

Defense Medical Readiness Training Institute Courses	Attendees
Emergency Preparedness Response Course (EPRC) Clinicians Course (distance learning)	23,234
EPRC Operator/Responder Course (distance learning)	28,728
EPRC Basic Awareness Course (distance learning)	42,272
EPRC Executive/Commander's Course (distance learning)	6,672
EPRC Clinicians Course (on-site),	71
EPRC Operator/Responder Course (on-site)	6
EPRC Basic Awareness Course (on-site)	26
Public Health Emergency Course for Public Health Officers and Medical Emergency Managers	200
FY 2017 Total Number of Students	**101,209**

Armed Forces Radiobiology Research Institute Courses	Attendees
Medical Effects of Ionizing Radiation	651
FY 2017 Total Number of Students	**651**

USAMRICD Courses	Attendees
FCBC Course	321
MCBC Course	294
HM-CBRNE Incidents Course	141
Off-Site (New England CERF-P, APG)	110
Off-Site (528th Sustainment Brigade, Fort Bragg)	28
Off-Site (86th Combat Support Hospital, Fort Campbell)	96
Off-Site (SOC Europe)	51
Off-Site (1st Marine Division, Camp Pendleton)	194
Off-Site (USSOCOM, Fort Bragg)	20
Off-Site (Marine Corps Special Operations Command, Aberdeen Proving Ground)	9
Off-Site (2nd Infantry Division Korea)	98
Off-Site (10th Mountain Division, Ft Polk)	89
Off-Site (82nd Airborne Division, Fort Bragg)	45
Off-Site (Fort Bragg)	43
Classified	237
Turkey Train-the-Trainer Course	116
FY 2017 Total Number of Students	**1,892**

USAMRIID Courses	Attendees
FIBWA	18
FIBWA - Civil Support Team (CST)	22
FIBWA - Manager's Course	17
FIBWA - EZ (advanced laboratory skills for Ebola response)	40
FCBC Course	379
MCBC Course	321
HM-CBRNE Incidents Course	139
Off-Site (Fort Polk)	89
Off-Site (Camp Pendleton)	194
Off-Site (Fort Campbell)	96
Off-Site (APG-S)	110
Off-Site (Fort Bragg)	28
Off-Site (APG-S)	9
Off-Site (Fort Bragg)	45
Off-Site (Fort Bragg)	20
Off-Site (Germany)	16
Off-Site (Korea)	98
FY 2017 Total Number of Students	**1,641**

ECBC Courses	Attendees
Biological Agents/Small Scale Production	22
Chemical Agents/Small Scale Production	66
Advanced CBRNE for CSTs	44
Emerging Threats	286
CBRN Planner Course	36
Chem Bio Agent Topics	52
Chemical Warfare Agents/Biological Warfare Agents	32
Advanced Chem Bio	120
Decon Topics	8
Advanced Sampling	72
Single Day Field Training Exercises	870
FY 2017 Total Number of Students	**1,608**

ENCLOSURE C: FY 2017 TECHNOLOGY TRANSITIONS

Transition Partner	Project Title	Project Description
JPEO-CBD - Global Biosurveillance Portal	Biosurveillance Ecosystem (BSVE) Capabilities	This transition of BSVE Technical Drop (TD) 3 includes enhanced mapping of results. TD3 makes available new data sources and analytic applications. These enhancements facilitate increased situational awareness and integrated early warning of biological threats.
DHHS - Biomedical Advanced Research and Development Authority (BARDA)	Novel Mechanism Antibacterials for Gram Negative Biothreats	Gepotidacin is a small-molecule broad-spectrum antibacterial with a novel mechanism of action and demonstrated therapeutic efficacy against gram negative bacteria, including those of biodefense concern. Based on this promising activity, BARDA invested in its development for public health application, and DTRA/DoD has continued investment in the biodefense indications coordinating with the BARDA program to leverage their ongoing clinical efforts.
	MB-2003: An Ebola Virus Countermeasure	This therapeutic drug has transitioned to BARDA, which is pursuing the product to licensure against a Zaire indication. ZMapp® is a monoclonal antibody that has shown efficacy against several Ebola strains (Zaire, Sudan, Bunidbago) in pre-clinical testing. It has potential as pre-exposure prophylaxis.
JPEO-CBD – Medical Countermeasure Systems (MCS) Biological Defense Therapeutics (BDTx)	Characterization of GS-5734 Efficacy against Filoviruses in Nonhuman Primate Disease Models	This product transitioned to MCS-BDTx and is currently undergoing Phase IIb clinical trials against an Ebola Zaire indication. GS-5734 is a small molecule antiviral therapeutic that has been shown to be effective against filoviruses (such as Ebola) in non-human primate tests. It has potential as a post-exposure prophylaxis and possibly as a post-symptomatic therapeutic drug.
JPEO-CBD – Defense Biological Product Assurance Office (DBPAO)	Ruggedized Antibody Program: Single Domain Antibodies (sdAbs) – Toxins	This effort transitioned test kits for a number of dangerous toxins that do not require cold storage. This effort addresses the limitations and burdens associated with temperature-controlled transportation and distribution. Medical test kits require cold storage which limits their use in many field forward environments.
	Enhanced *Burkholderia* Assays & Database of Targets	This transitioned a test to identify the extremely difficult to detect biological threat agent *Burkholderia*. The test can also identify whether the agent is resistant to a number of antibiotics.
Special Operations Forces Rapid Capability Development and Deployment	Evaluation of Sample Prep Technologies	This transition consisted of a market survey of Commercial Off-The Shelf (COTS, or near-COTS) and Government Off-The Shelf (GOTS) sample preparation technologies that was conducted to determine the ease of sample preparation and quality of nucleic acid extraction from bacterial cells, spores, and of viral RNA for PCR detection.
JPEO-CBD – MCS-Diagnostics	*Burkholderia* Data from Field Forward Diagnostics (FFDx) Lateral Flow Immunoassay	This transition generated clinical data for an experimental handheld test for *Burkholderia* that can be used at the point-of-need/care.
	FilmArray Severe Acute Systemic Febrile Illnesses Pouch OCONUS Clinical Data to detect Dengue, *Plasmodium falciparum, Y. pestis, Burkholderia spp*. in whole blood specimens	This effort generated clinical data for detecting a number of biological threat agents from human blood. These results support the development of future medical diagnostics and supplement information needed by the FDA for medical use approval.

Transition Partner	Project Title	Project Description
JPEO-CBD – MCS-BDTx	Characterization of GS-5734 Efficacy against Filoviruses in Nonhuman Primate Disease Models	This product transitioned and is currently undergoing Phase IIb clinical trials against an Ebola Zaire indication. GS-5734 is a small molecule antiviral therapeutic that has been shown to be effective against filoviruses (such as Ebola) in non-human primate tests. It has potential as a post-exposure prophylaxis and possibly as a post-symptomatic therapeutic drug.
OSD, CBDP, USAMRICD, JRO, JPEO-CBD	Aerosol, *in silico* and *in vitro* evaluation of toxicity of NTAs in various animal models	Transition data packet detailing the potency, effects, and threat of a non-traditional agents to Warfighters.
OSD, CBDP, USAMRICD, JRO, JPEO-CBD	Aerosol, *in silico* and *in vitro* evaluation of toxicity of NTAs in various animal models	Transitioned data packet showing differences between W18 and common opioids. Research informing the data packet showed the chemical activity of potential opioids of interest. Research also determined that it was not a mu opioid receptor agonist and not an opioid as previously suspected.
DASD, IC	Integrated Approach to the Total Assessment of Emerging Chemical Threat Agents	Classified Data Packet prepared and shared with USG and IC stakeholders informing assessments and collections of potential threats. Research informing the data packet provided an analysis of multiple classified threats using a quick-turn synthesis and evaluation.
OSD, CBDP, USAMRICD, JRO, JPEO-CBD, DTRA Reachback	Aerosol, *in silico* and *in vitro* evaluation of toxicity of NTAs in various animal models	Published report ECBC TR 1440 that evaluates suspected opioid agonists through *in silico* and *in vitro* techniques, discussing factors that drive predictive human response and toxicity estimates of opioids.
CBDP, DTRA Reachback	Environmental Persistence of Biological Aerosols in Outdoor and Simulated Environments	Transitioned a report with data describing single particle behavior characteristics alluded from the development of a new optical trap to evaluate single particle behavior to model aerosols. Data in the report will inform development of predictive aerosol models in the CBDP community.
CBDP, DTRA Reachback	Environmental Persistence of Biological Aerosols in Outdoor and Simulated Environments	Transitioned a report with data describing both decay of BWAs in the environment, and weather effects aerosolized BWAs. This data will be used to improve detector performance, CONOPS, and accuracy of hazard modeling in the CBDP community.
JPEO-CBD, DTRA Reachback, IC	Integrated Approach to the Total Assessment of Emerging Chemical Threat Agents	Published report ECBC TR 1469 demonstrating and evaluating the persistence of chemical hazards and explaining the potential hazard of VX on foliage to the Warfighter.
DTRA and CBDP	Identifying the Mechanisms of Ebola Virus Environmental Stability in Drying Human Blood	Provided data showing that Ebola (Makona) remains viable longer in dried blood, versus other biological matrices (e.g., vomit, feces), and thus poses a lingering contamination hazard from military assets and equipment.
USCENTCOM, DTRA	Analysis of CWA Contaminated Swine Remains	Provided data packet from research using a swine model that shows CWA contaminated remains pose a residual hazard to caregivers and mortuary personnel after decontamination. Information was sent to USCENTCOM in response to a Joint Urgent Operational Need request.
OSD, CBDP, USAMRICD, JRO, JPEO-CBD	Aerosol, *in silico* and *in vitro* evaluation of toxicity of NTAs in various animal models	Provided data (via briefings and reports) to the CBD enterprise showing how different isoforms of VX display a range of toxicities. This data will inform development of future MCMs.

Transition Partner	Project Title	Project Description
JPEO-CBD, DTRA Reachback & Modeling, IC	Outdoor Dispersion Trials	Shared a comprehensive report amongst the stakeholder community to inform development or evaluation of CONOPs, doctrine, and defensive capabilities; the report was from live agent outdoor dispersion trials to measure the hazard posed by PBAs released from operationally relevant devices.
JPEO-CBD, DTRA Reachback, IC	Integrated Approach to the Total Assessment of Emerging Chemical Threat Agents	Published report (ECBC TR 1412) informing agent dispersion models and improved understanding of PBA behavior in relevant dispersion mechanisms for capability development.
DHS S&T, EPA, DoD	Technical Coordination Working Group Biological Subgroup	Created Technical Collaborative Working Group (TCWG) - Intelink SharePoint collaboration site to assist in coordinating and sharing information amongst the interagency members of the TCWG Biological Threat subgroup.
JPEO-CBD – JPM Protection	Air Purification Integration for Individual Protection	Transitioned a technology for the ammonia-specific adsorbents used in respirator filters such as the M61 canister for the Joint Service General Purpose Mask (JSGPM). This technology meets objective requirements for ammonia protection defined in the JSGPM Capability Production Document (CPD).
	Integrated Fabric Protective System (IPFS), Balance of Initial Data	Transitioned garment design, agent permeation, and test method technologies for into the Uniform Integrated Protective Ensemble (UIPE) Family of Systems (FoS).
	Blister Agent Contamination Indicator Decontamination Assurance System (CIDAS)	Transitioned blister agent contamination indicator spray with enhanced signal, shelf life, and red color, providing the Warfighter with an easy to use system to reveal the location of blister agent on military surfaces or to confirm the absence of agent following decontamination operations. This technology supports CIDAS.
	IPFS CB Lite	Transitioned garment design concepts, component and system aerosol protection testing, and thermal burden assessments package for an extra lightweight CB protective garment (CBLite). This technology feeds into the UIPE FoS program.
	IPFS U.K. DSTL Agent Data	Transitioned initial assessment of the Porton Man fixture at Defence Science and Technology Laboratory (DSTL), in Porton Down, U.K. This included data of live-agent whole-system testing of various prototype and in-service lightweight garments. This data is expected to lead to test procedures and agreements that will allow use of this fixture within the UIPE FoS program.

ENCLOSURE D: ACRONYM LIST

ACRONYM	DEFINITION
ADM	Advanced Development and Manufacturing
AMP	Agile Medical Paradigm
ARND FoS	Advanced Radiological Nuclear Detection Family of Systems
ARS	Acute Radiation Syndrome
ATD	Advanced Technology Demonstration
ATEC	Army Test and Evaluation Command
BSL	Biosafety Level
BTD	BioTesting Division
CALS	Common Analytical Laboratory System
CB	Chemical and Biological
CBDP	Chemical and Biological Defense Program
CBR	Chemical, Biological, and Radiological
CBRD	Chemical, Biological, and Radiological Defense
CBRN	Chemical, Biological, Radiological, and Nuclear
CBRNE	Chemical, Biological, Radiological, Nuclear and High Yield Explosive
CCCD	Chemical Casualty Care Division
C-CHRT	Chemically-Contaminated Human Remains Transfer Case
CERFP	CBRNE Enhanced Response Force Packages
CI	Challenge Inspection
CIMS	CRE Information Management System
CNGB	Chief National Guard Bureau
CRE	CBRN Response Enterprise
CWC	Chemical Weapons Convention
CWMD	Countering Weapons of Mass Destruction
DARPA	Defense Advanced Research Projects Agency
DASD(CBD)	Deputy Assistant Secretary of Defense for Chemical and Biological Defense
DoD	Department of Defense
DOTmLPF-P	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy
DR SKO	Dismounted Reconnaissance Sets, Kits, and Outfits
DTRA	Defense Threat Reduction Agency
DTT	Doctrine and Tactics Training
EBOV	Ebola virus
ECBC	Edgewood Chemical Biological Center
ECD	Experiment and Capability Demonstration
EDGE	Empowering the Development of Genomics Expertise
FaC	Fragility and Criticality
FCBC	Field Management of Chemical and Biological “incidents course”

ACRONYM	DEFINITION
FDA	Food and Drug Administration
FIBWA	Field Identification of Bio-Warfare Agents
FOC	Full Operational Capability
FY	Fiscal Year
GAO	Government Accountability Office
HM-CBRNE	Hospital Management of CBRNE
HRF	Homeland Response Forces
IB	Industrial Base
IBAC	Instantaneous BioAnalyzer and Collector
IEW	Integrated Early Warning
IFSLES	Instructor Facilitated Synthetic Learning Environment Scenarios
IOC	Initial Operational Capability
IPE	Individual Protective Equipment
IPE-RIP	Individual Protective Equipment-Readiness Improvement Program
JCACS	Joint CBRN Advanced Capability Set
JEM	Joint Effects Model
JPM	Joint Project Manager
JPEO-CBD	Joint Program Executive Office for Chemical and Biological Defense
JSGPM	Joint Service General Purpose Mask
JSLIST	Joint Service Lightweight Integrated Suit Technology
JSTI	Joint Science & Technology Institute
JSTO	Joint Science and Technology Office
JTA	Joint Table of Allowance
JWARN	Joint Warning and Reporting System
mAb	Monoclonal Antibody
MARFORPAC	Marine Forces Pacific
MARFORRES	Marine Forces Reserve
MCBC	Management of Chemical and Biological Casualties
MCD	Mass Casualty Decontamination
MCM	Medical Countermeasure
MET	Mission Essential Task
NDS	National Defense Strategy
NET	New Equipment Training
NG	National Guard
NGB	National Guard Bureau
NTA	Non-traditional Agent
OASD(HA)	Office of the Assistant Secretary of Defense for Health Affairs
OPCW	Organisation for the Prohibition of Chemical Weapons
PB	Pyridostigmine Bromide
PBA	Pharmaceutical-based Agents

ACRONYM	DEFINITION
PRESAGED	PRESymptomatic AGent Exposure Detection
R&D	Research and Development
RD-CB	R&D Directorate's Chemical and Biological Technologies Department
RDT&E	Research, Development, Test, and Evaluation
RIP	Readiness Improvement Program
S&T	Science and Technology
SOF	Special Operations Force
SMARTMAN	Simulant Agent Resistance Test Manikin
SPAR	Strategic Portfolio Analysis and Review
SSA	Shared Situational Awareness
STEM	Science, Technology, Engineering, and Mathematics
TA	Transformational Analysis
T&E	Test and Evaluation
TSOC	Theater Special Operations Commands
TSST	Total Ship Survivability Trial
TTP	Tactics, Techniques, and Procedures
TTX	Table Top Exercises
UGV	Unmanned Ground Vehicle
UIPE	Uniform Integrated Protection Ensemble
USACBRNS	U.S. Army Chemical, Biological, Radiological, and Nuclear School
USAF	U.S. Air Force
USAMRICD	U.S. Army Medical Research Institute of Chemical Defense
USAMRIID	U.S. Army Medical Research Institute of Infectious Diseases
USMC	U.S. Marine Corps
USSOCOM	U.S. Special Operations Command
WMD	Weapons of Mass Destruction
WMD-CST	WMD Civil Support Teams