The Department of Defense Chemical and Biological Defense

2017 Annual Report to Congress

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Introduction[1]

The U.S. Department of Defense (DoD) Chemical and Biological Defense Program (CBDP) Enterprise develops and acquires capabilities that allow the Joint Force to deter, prevent, protect against, mitigate, respond to, and recover from chemical, biological, and radiological (CBR) threats and effects within a layered and integrated defense. The CBDP Enterprise conducts the planning, prioritization, and management of the research, development, test, and evaluation (RDT&E); acquisition; and supporting infrastructure activities (physical and intellectual) necessary to support Joint Force operations in a CBR environment and in support of countering weapons of mass destruction (CWMD). Rapid advancements in technology are making it easier for an adversary, whether State or non-State, to develop chemical and biological (CB) weapons. This includes threats from non-State actor groups such as the Islamic State of Iraq and Syria (ISIS) and emerging threats like the misuse of synthetic biology.

The DoD CBDP 2017 Annual Report to Congress provides the required assessment pursuant to section 1523, title 50, United States Code, which assesses DoD's overall readiness to fight and win in a CB warfare environment. The DoD faces CB threats that are complex, diverse, and pose enduring risks to the Joint Force, the homeland, and U.S. allies and partners. The Fiscal Year (FY) 2016 investment positively impacted the readiness of the Joint Force as it relates to the CB defense posture through equipping the force, preventing surprise, maintaining infrastructure, and leading the Enterprise. The CBDP fielded 20 systems totaling 386,970 products and 721,210 vaccine doses (anthrax and smallpox) in FY 2016, made significant advancements in RDT&E activities, and supported Joint Urgent Operational Needs Statements (JUONS). In FY 2016, the CBDP continued to provide support around the world to reduce chemical weapon threats and made significant advancements in science and technology (S&T) to help reduce the risk of surprise to the Joint Force. The CBDP continues to maintain infrastructure through the maintenance of physical and intellectual infrastructure capabilities and training and education activities. Finally, the CBDP continues to lead the Enterprise through processes like the Enterprise Review and through challenges including the biological select agents and toxins (BSAT) moratorium. Highlighted within this report are some of the many FY 2016 accomplishments of the CBDP, resulting in a greater readiness of the Joint Force.

A. CBDP Response to ISIS and Other State/Non-State Actors

In 2016, the Director of National Intelligence, confirmed that ISIS had succeeded in making and deploying chemical weapons in Iraq and Syria. In response to requests, the Joint Staff examined the emerging and future ISIS threat and validated the need to field and integrate detectors that could improve the ability to command and control during WMD incidents. Improved capabilities will be integrated into existing capabilities through FY 2017 to achieve these goals.

The CBDP will continue to evaluate the ability to provide CBR defense capabilities based upon future changes in threat and identification of suitable Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) solutions. The capabilities developed by the CBDP and the supporting institutional infrastructure will be leveraged to address these threats now and into the future.

[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.

B. CBDP Activities Related to Synthetic Biology

Synthetic biology, which spans from the basic principles of genetic engineering to the advanced application of engineering principles for biological design, remains an essential field for biological defense. Synthetic biology is critically important to the development of medical countermeasures (MCMs), detection technologies, materials for protective equipment, and other technologies with applicability to CBR defense. In addition to opening up new areas of technology development, synthetic biology may also create efficiencies by improving manufacturing processes, drug candidate testing, and other aspects of the product development pathway. This saves the Department time and money, and may help to decrease the risk of technical failures.

The Department must be positioned to both leverage synthetic biology opportunities as well as address the potential for nefarious use of biotechnology, such as enhancing select agents or the engineering of novel pathogens. To improve understanding of the risks and opportunities presented by emerging synthetic biology techniques, the CBDP initiated an 18-month study with the National Academies of Sciences, Engineering, and Medicine. The study will evaluate the changing nature of the biodefense threat and guide an assessment of the potential security vulnerabilities related to advances in biotechnology. The study will also lay out the trajectory of scientific advances, identify potential areas of vulnerability, and suggest mitigation strategies.

Although synthetic biology is important to consider within the threat landscape, we cannot look to constrain the technologies themselves as a means of risk mitigation, or we risk stalling our own research and development (R&D) programs that use those technologies to develop life-saving countermeasures. Synthetic biology is a diverse array of technologies and techniques that have been used for more than a decade to innovate and improve defense capabilities. As such, the majority of CB programs utilize some aspect of synthetic biology. Current examples include the development of Filovirus vaccines and therapeutics, the development of the recombinant plague vaccine, novel approaches to overcome antibiotic resistance, and the rapid development of monoclonal antibody therapies.

The CBDP coordinates its efforts closely within DoD and with the interagency partners to keep abreast of synthetic biology opportunities and risks, and to coordinate investments accordingly. The Public Health Emergency Medical Countermeasures Enterprise remains a critical forum for coordination of technology development in this area. The CBDP is also engaged in multiple working groups that include the Department of Health and Human Services (HHS), the Department of Homeland Security (DHS), the Intelligence Community, the Department of State, law enforcement, and industry.

CBDP leadership has coordinated with leading academics to enhance DoD knowledge on both the promise and peril of synthetic biology, and has also worked to increase synthetic biology understanding of future Warfighters and scientists through several educational outreach efforts. Additionally, the CBDP is working with the Office of the Assistant Secretary of Defense for Research and Engineering (OASD(R&E)) to establish synthetic biology interactions with our international partners.

The CBDP has also been working closely with OASD(R&E), the Office of the Deputy Assistant Secretary of Defense for Countering Weapons of Mass Destruction, the National Security Council staff, and the Office of Science and Technology Policy on National policy for genome editing and synthesis.

Equip the Force[2]

The CBDP Enterprise is enabling the Joint Force to conduct military operations successfully in a CBR environment and support CWMD operations. This section details the FY 2016 CBDP Enterprise accomplishments in providing CBR defense capabilities to the Joint Force.

A. Advances in Diagnostics

The CBDP Enterprise has invested in a number of efforts to enhance diagnostic capabilities against CB threats that provide DoD with the ability to make better, more accurate, and rapid force health protection decisions in response to biological threats.

In FY 2016, the CBDP developed a diagnostic panel that allows forward deployed personnel with minimal training and in low-resource environments to perform diagnostic tests rapidly and accurately. This panel was granted waived status by the U.S. Food and Drug Administration (FDA) under the Clinical Laboratory Improvement Amendments of 1988 (CLIA) and was the result of an R&D collaboration between the CBDP and industry. This marks the first-ever highly multiplexed molecular diagnostic test to be granted a CLIA-waiver by the FDA.

The CBDP also conducted a successful operational assessment (OA) with the Next Generation Diagnostics System (NGDS) Increment 1 program. The objective of the OA was to provide data to evaluate the operational effectiveness, suitability, and survivability in support of the FY 2016 Milestone C limited production decision and initial fielding for the U.S. Air Force (USAF) in FY 2017. The NGDS Increment 1 program will replace the legacy Joint Biological Agent Identification and Diagnostic System (JBAIDS) beginning in FY 2017.

B. Advances in Medical Countermeasures

The CBDP continues to make steady advances in the area of MCMs against CB threats to the force. These efforts develop advanced vaccines and therapeutic drugs that provide safe and effective medical defense against priority threats.

In FY 2016, a cocktail of three monoclonal antibodies directed against Ebola Zaire virus was transitioned to clinical development at HHS. DoD continues to address product limitations in the areas of logistics, administration, and spectrum of use. FDA licensure of this countermeasure is anticipated in 2021.

The CBDP-supported Ebola vaccine was granted Breakthrough Product Status by the FDA and European Medicines Agency (EMA). This will expedite review of the vaccine by FDA and EMA regulators, accelerating licensure, potentially reducing cost, and speeding availability of the vaccine. This vaccine is the first to have demonstrated efficacy against Ebola in humans.

[2] 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

The CBDP evaluated the efficacy of moxifloxacin against inhalational *Bacillus anthracis* (anthrax). Study results showed a significant protection from mortality after an inhalational challenge with anthrax.

The Recombinant Botulinum Vaccine program gained FDA concurrence on specifications for drug product, stability plan for drug product, and use of the mouse immunogenicity animal model to demonstrate comparability. This feedback from the FDA will help advance the vaccine towards FDA licensure.

Additionally, the CBDP partnered with the HHS Biomedical Advanced Research and Development Authority and industry for the advanced development of a promising antibiotic that could, if successful, counter plague, anthrax, tularemia, and multidrug resistant bacteria. The partnership offers enhanced development of a promising product with a large pharmaceutical company with a proven track record of delivering FDA-approved products.

C. Advances in Non-Traditional Chemical Agent Defense

The CBDP worked to improve understanding of non-traditional agents (NTAs), establish standards for NTA protection, and upgrade fielded systems that provide NTA detection. Collectively, these improvements help the force avoid NTA contamination and increase the body of NTA defense knowledge, which in turn informs future R&D. The CBDP is actively working with multiple U.S. Government agencies and international partners to more effectively address multiple NTA threats.

Specifically, the CBDP established interim human inhalation toxicity estimates, based on animal models, for select NTAs. Combined with previously characterized percutaneous hazard data, this enables the RDT&E community to develop improved standards for respiratory protection and informs the development of tactics, techniques, and procedures (TTPs) that the Warfighter uses to assess, respond to, and mitigate NTA hazards.

In FY 2016, the Nuclear Biological Chemical Reconnaissance Vehicle-Sensor Suite (NBCRV-SS) upgrade entered the Technology Maturation and Risk Reduction acquisition phase through the approval of a Program Acquisition Strategy. A request for proposals was released to industry, which will allow DoD to develop the Chemical Surface Detector (CSD), enabling the NBCRV to detect and identify ground contamination at higher vehicle speeds. The CSD is one of four new sensors included in the NBCRV-SS upgrade program to improve reliability, increase maneuver speed during survey and reconnaissance missions, add NTA detection and identification capability, and reduce sustainment costs.

D. Fielding of Prioritized Capabilities for the Joint Force[3]

The CBDP fielded numerous CB defense capabilities to meet wartime and peacetime requirements of the Joint Force. A total of 386,970 systems were fielded during FY 2016, and the CBDP acquired 721,210 MCM doses from the Strategic National Stockpile (SNS). Military

[3] 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.

Services and Combatant Commands administered and distributed the MCMs as needed to support operations.

The below paragraphs highlight notable accomplishments in FY 2016. Enclosure A provides specifics on numbers of products (capabilities) fielded. Enclosure B provides detail on fielding accomplishments.

Detection

The CBDP continued fielding the Joint Chemical Agent Detector (JCAD) M4A1 to U.S. Army and National Guard units. There were 527 M4A1 JCADs fielded in FY 2016. The JCAD M4A1 and the JCAD M4 systems provide low-cost portable chemical warfare agent detection capability to individual Service members.

The CBDP continued fielding the CBR Dismounted Reconnaissance Systems (DRS) to the Joint Force. Since the start of fielding in FY 2014, the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) has fielded 124 DRS systems: 74 U.S. Army (USA), 11 U.S. Navy (USN), 8 U.S. Marine Corps (USMC), and 31 National Guard (NG) Weapons of Mass Destruction Civil Support Teams (WMD-CSTs), providing an Initial Operational Capability (IOC) for the USA, USN, USMC, and NG. The fielding of DRS addresses critical shortfalls in Warfighter capabilities and enhances the Joint Services' capability to respond to CBR incidents.

JPEO-CBD is working with the Army Robotics Program Manager (PM) to integrate CBR sensors into the Army TALON IV Robotics Program. This will provide the NG WMD-CSTs with remote detection CBR capability. Existing TALON IV systems, returning from theater, are being refurbished by the Army Robotics PM in support of a FY 2017 fielding to the WMD-CSTs.

Information Systems

The Global Biosurveillance Portal (G-BSP) program achieved IOC. This capability will provide a web-based, cloud-hosted enterprise environment that will facilitate collaboration, communication, and information sharing in support of the detection, management, and mitigation of man-made and naturally occurring biological events. G-BSP also facilitates the fusion of multiple unclassified information sources for greater situational awareness and decision support.

In FY 2016, the Joint Effects Model (JEM) Increment 2 achieved approval of a requirements definition package and a fielding decision supporting baseline capabilities and improved command and control integration. This will provide Warfighters with the ability to accurately model and predict the impact of chemical, biological, radiological, and nuclear (CBRN) and toxic industrial material threats and effects. JEM supports planning to mitigate the effects of WMDs and to provide rapid estimates of hazards and effects integrated into a common operating picture.

JPEO and the National Guard Bureau assessed existing technologies that would support the NG CBRN Response Enterprise Information Management System, which would provide an integrated sensor network.

Protection
The Uniform Integrated Protection Ensemble (UIPE) Increment 1 achieved IOC. This capability affords Special Operations Warfighters the flexibility to integrate proactively a lightweight, CB protective suit into existing combat uniforms or mission-related clothing (civilian clothing or indigenous wear), thus allowing the conduct of core activities where low visibility is a required or desired attribute.

The Joint Service General Purpose Mask (JSGPM) program received National Institute for Occupational Safety and Health certification of the M53E1 C420 Powered Air-Purifying Respirator system. This certification gives the military the ability to use the mask both in homeland and overseas operations and broadens the family of systems available to the Warfighters across a broader range of missions.

The Joint Service Aircrew Mask for the Joint Strike Fighter (JSAM-JSF) production contract was awarded, with initial deliveries projected for FY 2017. The total value is up to $82.5 million with a five-year base period and five one-year options. JSAM-JSF provides F-35 pilots ocular, respiratory, and above-the-neck percutaneous protection from CB warfare agents. JSAM-JSF is a critical piece of the pilot CB flight equipment ensemble required to meet the JSF program's Force Protection Key Performance Parameter (KPP).

E. Non-materiel Solutions to Capability Gaps
The CBDP evaluates non-materiel solutions to capability gaps prior to resourcing materiel solutions and, when fielding materiel solutions, integrates them into existing Joint Force TTPs. The Joint Requirements Office for Chemical, Biological, Radiological, and Nuclear Defense (JRO-CBRND) supports the Military Services, Combatant Commands (CCMDs), and the Joint Requirements Oversight Council by implementing the Joint Capabilities Integration and Development System to identify, assess, and approve Joint Military CBRN defense requirements.

FY 2016 JRO-CBRND accomplishments include the development and validation of an initial MCM Concept of Operations (CONOPS) Development Plan; development and validation of the Joint Concept and Transition Plan for Preventing the Use or Transfer of WMD; development and validation of the DOTMLPF-P Change Recommendation for CWMD Leader and Development Education and Training; development of the CWMD Education Community Consortium Charter; and development and sponsorship of the inaugural National Capital Region CWMD Staff Officer Orientation Seminar.

Collectively these accomplishments further define how the Joint Force operates in a CBRN environment, uses CBRN Defense capabilities to support CWMD missions, and educates the force on CWMD. Additional details on each of these accomplishments are provided in Enclosure C, tables C-1 and C-2.

The Defense Biological Product Assurance Office (DBPAO) managed multiple private industry and Government support laboratory contracts to provide biological warfare agent detection assays to customers in FY 2016. These assays are employed by an assortment of clients,

including the Pentagon Force Protection Agency, DHS BioWatch Division, NG WMD-CSTs, and the Defense Threat Reduction Agency (DTRA) Cooperative Biological Engagement Program for applications and missions ranging from R&D through the advanced development of MCMs.

The JPEO-CBD conducted a User Assessment with USAF emergency management personnel to evaluate use of CBRN Application's JEM and Joint Warning and Reporting Network (JWARN) hosted in a cloud environment. This event was highly successful in showing the versatility of using a cloud-hosted environment for the dissemination and use of CBRN information and applications.

Prevent Surprise

A. Chemical Weapons Convention (CWC) Implementation Activities[4,5]

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 CWC. In FY 2016:

- DoD hosted 18 OPCW inspections and visits to chemical weapons storage, Schedule l, and destruction facilities. The inspections verified no undetected removal of chemical weapons from the facilities and that the amount of Schedule 1 chemicals for purposes not prohibited by the CWC did not exceed the DoD allotment (900 kilograms) of the U.S. maximum of 1 metric ton (1000 kilograms).
- DoD provided training sessions to inspectors from the OPCW.
- DoD, the Military Departments/Services, and Components maintained CWC implementation and compliance plans, and CWC Challenge Inspection (CI) Response Plans. The Military Services continued to maintain their preparedness for a CI by conducting annual exercises and DoD training.
- The Edgewood Chemical Biological Center (ECBC) Forensic Analytical Center, one of two OPCW-designated laboratories in the United States, successfully passed its April 2016 OPCW Proficiency Test with its twenty-first "A" score to date.
- Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) operations commenced with the initial transfer of chemical weapons from the Pueblo Chemical Depot (PCD) stockpile. Destruction operations will now be on-going at PCAPP until the U.S. chemical weapons stockpile at PCD is destroyed.

B. Advances in Science and Technology Research

In FY 2016, the CBDP, in coordination with the Defense Advanced Research Projects Agency (DARPA), made significant advancements in S&T research, particularly in developing new CBR

[4] 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.

[5] 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.

defense technologies and conducting CB threat studies and assessments. Additional S&T highlights can be found in Enclosure D.

New CBR Defense Technologies

A low-cost, handheld capability, Colorimetric Sensor Arrays (CSAs), was developed by the CBDP in FY 2016. CSAs will rapidly detect and identify liquid chemical warfare agents and other toxic compounds in the field with higher confidence than currently fielded paper-based technology, thus facilitating force protection decisions and decontamination actions. The CSAs are multiplexed assays consisting of printed indicator dyes on a small piece of paper (approximately 1 square inch in size). The indicator dyes respond uniquely to different chemical compounds, with the color change pattern providing a distinct molecular fingerprint. The CBDP provided field demonstrations of the CSA technology to multiple user groups in the Republic of Korea and U.S. Pacific Command (USPACOM) in June 2016. These demonstrations and discussions with the user community led to enhancements in the development and employment of CSA devices.

The CBDP has integrated the Mobile Field Kit (MFK) CBRN into the Man-Portable Radiological Detection System. MFK CBRN will provide the basis for sensor information management for other CBRN sensors.

The CBDP collaborated with the Defense Science and Technology Laboratory, an executive agency of the United Kingdom's Ministry of Defence, on the Urban Transport and Dispersion program, which includes development of an Urban Dispersion Model, an Urban Source Term Estimation capability, and an Urban Sub-System to link indoor and outdoor hazard prediction models. This review highlighted recent technical accomplishments, discussed progress on action items identified during the previous workshop, and identified a path forward for the upcoming year. This program continues to provide valuable capability to the JEM program of record.

The CBDP components developed an improved blister agent indication formulation with improved sensitivity. Additionally, the Contamination Indicator Decontamination Assurance System (CIDAS) team is working to dramatically reduce the cost (approximately ten times) of the nerve agent indicator spray through large-scale production using tobacco as a production platform.

DARPA Coordination[6]

DARPA collaborated with the CBDP Enterprise by providing programmatic updates, presentations, and technical expertise in the areas of threat reduction, biodefense, diagnostics, viral forecasting, regulatory reviews, and biosurveillance. DARPA hosted and attended joint meetings with JPEO-CBD, JSTO, U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), and U.S. Army Medical Research Institute for Chemical Defense (USAMRICD)

[6] 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.

to review synergistic efforts, which included innovative diagnostic sample collection, preservation, and analysis technologies for maturation to address specific Warfighter needs.

Maintain Infrastructure

The CBDP Enterprise maintains infrastructure to meet current and future needs for personnel, equipment, and facilities. Emerging needs are met by modifying new development of physical and intellectual infrastructure capabilities. Training, education, and exercises are important activities conducted across the Department to support readiness and response to counter current and emerging threats.

A. Maintenance of CBDP Physical and Intellectual Infrastructure

CBDP Designated Infrastructure Manager

Consistent with Government Accountability Office report 15-257 "Designated Entity Needed to Identify, Align, and Manage DOD's Infrastructure" and the direction provided in the Joint Explanatory Statement of the Committee of Conference accompanying Section 221 of the National Defense Authorization Act (NDAA) for FY 2016, Public Law 114-92, the Department designated the Deputy Assistant Secretary of Defense for Chemical and Biological Defense (DASD(CBD)) as the appropriate official to provide overall coordination, integration, and oversight functions for CBDP infrastructure. An infrastructure Working Integrated Product Team, consisting of CBDP infrastructure stakeholders, was formed to document the various implementation activities necessary to ensure sustainment of critical infrastructure and intellectual capital that are maintained to ensure continued success of the enterprise.

Additionally, Section 221 of the NDAA for FY 2016 (Public Law 114-92) provided that the Secretary of Defense shall submit to Congress a report addressing the requirements, program goals, metrics, costs, and an independent cost-benefit analysis on the DoD MCM Advanced Development and Manufacturing (ADM) capability. The supporting independent cost-benefit analysis was concluded in July 2016 and recognized that the DoD MCM ADM capability provides an important benefit to the Department through priority access to dedicated facilities. Access to these dedicated facilities lowers the risk to MCMs development and fielding for prioritized DoD threats.

State-of-the-Art Capabilities

In FY 2016, the DoD MCM ADM achieved IOC and continues to move forward to provide a dedicated capability that will lower DOD MCM development risk and support MCM fielding against prioritized threats. The MCM ADM capability is a dedicated, state-of-the-art facility intended to provide development and manufacturing services to separately funded MCM products. The ADM makes possible and accelerates the fulfillment of DoD's unique requirements for specific CBR MCMs. Historically, large established and successful pharmaceutical companies have been unwilling to join in ventures with the U.S. Government to address DoD's requirements given the limited market potential for the resulting end products. DoD dependence on inexperienced firms to fulfill its requirements often results in schedule slippage, increased costs, and, ultimately, an inability to obtain FDA approval. The MCM ADM will allow small innovators to access expertise and technology to navigate the complex processes and challenges of MCM development and production, ensuring DoD's needs are met, broadening

the community of potentially capable and interested performers. Ensuring these performers succeed for DoD is fundamental to the purpose of the MCM ADM.

The ECBC established the Non-Traditional Agent Defense Test System (NTADTS) advanced test capability. This system provides multiple fixtures including large-scale custom gloveboxes for the testing of defense equipment, and the safe handling of live chemical agents and emerging threat compounds. The NTADTS supports testing of decontamination, collective and individual protection, and contamination avoidance commodity area items. In FY 2016, the NTADTS was used for chemical detector program of record testing of several compounds in various environmental conditions.

Industrial Base Update

The CBDP conducts an annual evaluation of the industrial base (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 Industrial Base Working Group (IBWG) 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 CBDP Enterprise Risk Management.

In addition to the TA analysis, the CBRN IB was also assessed using market research, critical manufacturer reviews, surveying, financial assessments, and system assessments. These major projects included: Organic IB (OIB) Workload Analysis, Defense Production Act Title III Activated Carbon Capacity Expansion Project, Emerging Contaminants Study, and focused market research. The FY 2016 IB assessments determined that the overall CBRN manufacturing sector is currently stable. However, specific areas of concern were identified within most of the capability areas at the manufacturer level. Reductions in CBDP procurement have created risks that must be considered as IB-related decisions are being made.

The CBDP worked in conjunction with the U.S. Army Medical Materiel Development Activity and the Pine Bluff Arsenal to initiate an organic production effort for the Chemical Protective Patient Wrap (CPPW). The effort included creating a technical data package, starting a draft technical manual, and creating a conceptual production layout for future manufacturing at Pine Bluff Arsenal. The production line will enable more consistent production and reliable future availability of the CPPW.

An OIB for producing low-density CBRN protective clothing items was also initiated at Pine Bluff Arsenal. Producing multiple, low-density items at a steady-state eliminates a force readiness issue due to industry not maintaining adequate production lines for low-density items,

resulting in no replenishment or surge capability. The Phase 2 program will include additional low-density CBRN defense items sharing similar production methods.

Test and Evaluation

The Deputy Under Secretary of the Army (DUSA), Test and Evaluation (T&E), as the CBDP T&E Executive, provides T&E oversight, strategy, and guidance for acquisition programs and T&E infrastructure, and establishes T&E policy and standards. In FY 2016, the CBDP continued improvement in the process for establishment of federal interagency CBR T&E standards through the T&E Capabilities and Methodologies Integrated Product Team (TECMIPT). Specific TECMIPT highlights included publication of the Low Volatility Agent Permeation T&E standard, which was recognized as an Outstanding Achievement by the Defense Standardization Program Office. Additionally, the TECMIPT completed an 18-month effort to develop voluntary consensus standards for 10 biological agent detection assays requested from across the CBDP Enterprise. In coordination with AOAC International, TECMIPT Biological Subject Matter Experts (SMEs) worked with more than 40 SMEs from 29 U.S. Government, academic, and industry partner organizations to develop these standards, which characterize the currently available technologies for agent assays and analytical methods associated with how those assays will be used. These standards were developed for use in a laboratory or in the field by trained operators within DoD. They also provide guidance to the materiel developer and the T&E community by providing exclusivity tables, which are lists of closely related materials that can cause false alarms for biological detectors. Exclusivity tables allow vendors to improve the performance of their detectors, which reduces the cost of testing and adds rigor to the T&E process.

The CBDP continued to improve the effectiveness of the TECMIPT in its role of providing T&E Infrastructure recommendations to the T&E Executive. A working group was formed to coordinate, consolidate, and synchronize disparate T&E infrastructure planning, development, and modernization efforts across the CBDP Enterprise to support testing against validated Warfighter requirements.

DUSA T&E supported acquisition programs (traditional and urgent need) with threat documentation and coordination with defense intelligence agencies, co-approved T&E Master Plans with JPEO-CBD, reviewed and staffed test plans for adequacy of data to facilitate acquisition decisions and the fielding of equipment to Warfighters.

The CBDP also supported international CB T&E collaborations for improved test quality and cost efficiency, through DASD(CBD)'s International Coordination Group, North Atlantic Treaty Organization (NATO), the European Defense Agency, the CBR Memorandum of Understanding with United Kingdom, Canada and Australia, and numerous individual country collaborations. The CBDP also co-sponsored and coordinated the participation of Canada, Poland, South Korea, France, and Norway in the Sophos/Kydoimos (S/K) Challenge, an annual two-week outdoor CB sensor collaborative test event held at Dugway Proving Ground.

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. The Office of the Assistant Secretary of Defense for Health Affairs (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 the 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.[7]

B. Support of Joint Force CBRN Defense Capabilities Through Education, Training, and Exercises[8]

Enclosure E lists FY 2016 CWMD, CBRN Responder, and medical personnel training and education courses. Additional policy, training, and education highlights are listed below.

U.S. Army

U.S. Army Chemical, Biological, Radiological, and Nuclear School (USACBRNS) at Fort Leonard Wood, Missouri, continues to train, educate, and develop the best-qualified CBRN military and civilian specialists for the Nation and its international partners. In FY 2016, the USACBRNS hosted and conducted more than 80 resident and non-resident CBRN courses, graduating more than 6,200 students from all Military Services and more than a dozen countries.

In FY 2016 the USACBRNS increased efforts to improve CBRN Readiness through proponent review of Army Regulation (AR) 350-1 in an effort to offer clarity and definitive guidance for CBRN unit training, and an effort to specify and require the use of shared CBRN collective tasks and unit readiness reporting. The USACBRNS is also coordinating with the Combined Arms Center on providing updated student materials for the entire spectrum of Pre-Command Courses.

To ensure all CBRN training is relevant, consistent, and common across the Army, the USACBRNS piloted the CBRN Defense course at several installations in order to gain feedback for revisions and modifications to the two-week Program of Instruction. This effort supports improved content and availability of the CBRN Defense Course. Additionally, 12 CBRN Warrant Officers graduated from the first CBRN Warrant Officer Advanced Course. These officers will provide technical and tactical guidance to CBRN organizations, as well as Division and Corps staff support.

In FY 2016 the USACBRNS expanded the credentialing program by adding the opportunity for students to participate in the International Association of Emergency Managers' Apprentice Emergency Manager certification program. Additionally, in FY 2016, the school implemented Soldier 2020 Gender Integration and High Physical Demand Task training initiatives. The Gender Integration training has been developed to train and educate Army leaders on the findings and recommendations of the Gender Integration Studies and is implemented in all Professional Military Education within the USACBRNS. Also, development began in FY 2016 for the Instructor Facilitated Synthetic Learning Environment Scenarios (IFSLES). The main

[7] 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.
[8] 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.

goals of the CBRN IFSLES technology project is to increase student engagement across the curriculum and to minimize passive student learning through technology enabled instructional systems.

Additional expanded educational partnerships with Academia were pursued in FY 2016 through collaboration with the Missouri State University and its Defense and Strategic Studies program to potentially offer a CWMD Master's degree to participating Officers within the CBRN Officer Advanced course. Also, rigor was increased in the Professional Military Education through the inclusion of training provided by DTRA's Defense Nuclear Weapons School and Dugway Proving Ground.

In FY 2016, the Maneuver Support Center of Excellence (MSCoE) and Health Readiness Center of Excellence implemented a Memorandum of Agreement (MOA) to develop resourcing prioritization collaboratively for a best mix of medical and traditional CB defense equipment to efficiently buy down risk to the force. As Army co-claimants in the Joint CBDP, this MOA partners two entities previously competing for the same resources, resulting in a consolidated Army position and informing the other Military Services via Army's Executive Agent role in the CBDP.

U.S. Navy

The Navy updated training systems, plans, course curricula, and shipboard practices using the standards outlined by the current version of the Naval Ships' Technical Manual Chapter 470 for Shipboard Biological Warfare/Chemical Warfare Defense and Countermeasures. These nuclear, biological, and chemical (NBC) defense training and readiness enhancements include the integration and employment of shipboard decontamination training units at Navy's Surface Warfare Officers School (SWOS) Engineering Learning Sites in Yokosuka, Japan; Pearl Harbor, Hawaii; and Mayport, Florida during FY 2016. The Navy also developed and successfully demonstrates a CB Defense Shipboard Preventative Maintenance Video Library Tool Set developed in accordance with current Maintenance Requirement Cards for hand-off and use by Commander, Surface Forces Pacific, Shipboard's Maintenance and Material Managers, SWOS, and Fleet Shipboard Damage Control Leadership teams. Additionally, the Navy scheduled and completed two shipboard training exercises for the detailed review and effectiveness of Collective Protection System Casualty Decontamination Station Operations at the unit level. Live field exercises were conducted aboard USS Makin Island (LHD-8) in February 2016, and again in August 2016 – providing valuable individual and unit-level training to sixty (60) Medical, Damage Control, and Marine Expeditionary Unit personnel. These training tools and planned exercises not only increased CBR readiness within the fleet, but strengthened the Navy's ability to fully assess and conform with the strict guidelines and standards advocated within DoD 3150.09, CBRN Survivability Policy.

U.S. Air Force

Air Force nuclear emergency response teams are provided a 10-day Nuclear Emergency Team Operations II course offering hands-on training in basic nuclear physics, biological effects of radiation, radiation detection equipment, contamination control stations, surveys and response process. In FY 2016, 79 responders have completed the training. The Air Force also trained 86 Emergency Managers to plot CBRN incidents supporting warning and reporting of suspected

hazards through the CBRN Control Center Mobile Training course. Additionally, the Air Force has three Silver Flag sites where CBRN responders spend seven days honing skills in a bare base environment before a deployment. The Air Force is currently developing a supplemental course for CBRN responders to further develop the skills acquired at Silver Flag training sites.

U.S. Marine Corps

The Marine Corps incorporated CBRN awareness, understanding, and operational planning into training and readiness manuals at all levels. Operating in a CBRN environment is incorporated into annual training and operational planning, and incorporated into annual exercises per the individual and unit training standards outlined in the Marine Corps Common Skills manuals and Marine Corps Order 3400.3G, CBRN Defense Training Requirements. The CBRN Training and Readiness Manual has been revised to incorporate training requirements to conduct CBRN sensitive site exploitation and assessment in accordance with revised CBRN assessments worldwide (Marine Corps Intelligence Activity 2015 – 2025 Future Operating Environment) and operational planning for the 2015 Marine Corps Security Environment Forecast. The collected training courses at Fort Leonard Wood are under revision to incorporate these new training events and will be submitted to the American Council for Education for accreditation upon completion. The Marine Corps is developing a revised *CBRN Defense Operating Concept* to address the objectives of *The Marine Corps Operating Concept* and *Cooperative Strategy for 21st Century Seapower*. The developing concept specifically addresses the means, ways, and ends for improving the capability to train, organize, and equip the Marine Air Ground Task Force (MAGTF) to operate and succeed in an operational environment under CBRN conditions and where CWMD is the primary mission of the MAGTF.

National Guard

NG WMD-CSTs conduct 1) radiological broad area search and detection missions in support of federal and state; and 2) post-incident broad area search, detection mission, and environmental threat assessments in support of federal and state consequence management operations. Capability requirements for NG WMD-CSTs to support these missions include special materiel detection and identification, vehicular-mounted radiological detection, meshed-sensor networks, and interagency training for individual/collective radiological detection/identification provided by DHS and the Department of Energy. Additionally, the National Guard plans, coordinates, and distributes funding for essential individual and collective training for the WMD-CSTs, CBRN Enhanced Response Force Packages, and Homeland Response Forces to provide life-saving capabilities during a major or catastrophic domestic CBRN incident.

Office of the Assistant Secretary of Defense (Health Affairs) (OASD(HA))

The Deputy Secretary of Defense memorandum, "Clarifying Guidance for Smallpox and Anthrax Vaccine Immunization Programs," signed on November 12, 2015, clarified mandatory requirements and voluntary availability for anthrax and smallpox vaccinations of DoD personnel, family members, and DoD contractor personnel. The mandatory requirements are based on information received from the CCMDs. In addition, CBRN medical defense training provided by the OASD(HA) or funded by the Defense Health Program for healthcare providers and planners occurs through the Armed Forces Radiobiology Research Institute (AFRRI), Defense Medical Readiness Training Institute (DMRTI), USAMRIID, and USAMRICD. AFRRI provided numerous Medical Effects of Ionizing Radiation Courses in FY 2016. DMRTI

provided basic Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives (CBRNE) Training to the tri-service medical personnel corps. USAMRIID and USAMRICD provided in-residence courses in FY 2016, including the Field Management of CB Casualties Course, Medical Management of CB Casualties Course, and Hospital Management for CBRNE (HM-CBRNE) Incidents Course. In addition, the DASD for Health Readiness Policy and Oversight, in coordination with the DASD(CBD), discussed DoD funding and management issues related to R&D of MCMs against radiological and nuclear threats and effects at a Radiation Health Effects Research Program Review and Analysis.

Lead the Enterprise

The DASD(CBD) is leading the Enterprise components to integrate and align activities toward fulfillment of the CBDP mission through identifying issues and areas for improvements, as well as leading Enterprise-wide initiatives and efforts.

A. Issues Encountered or Areas for Improvement[9]

The DoD and CBDP continued the response to the incomplete inactivation and shipments of anthrax spores by an Army laboratory in 2015. In FY 2016, the Secretary of the Army designated the Surgeon General of the Army as the Executive Agent Responsible Official (EA RO) for the DoD BSAT Biosafety Program. To support oversight activities, the BSAT Biosafety Program Office was established to advise the EA RO for the DoD BSAT Biosafety Program on biosafety and all matters that pertain to risk associated with BSAT operations. The EA RO also provides oversight of DoD BSAT laboratory biosafety operations, serves as a unified DoD interface with external regulatory agencies, ensures safety and standardization of procedures used in DoD BSAT laboratories, and identifies industry-wide best practices to enhance biosafety across the full spectrum of DoD BSAT operations. As such, the program manages the Biosafety and Scientific Review Panel, inspection of DoD laboratories, harmonization of DoD BSAT-related regulations and procedures, coordinating interaction and information with the Centers for Disease Control and Prevention (CDC), establishing a Defense Business System to track and manage BSAT across DoD, providing laboratory biosafety oversight, and advancing BSAT-related scientific research to address knowledge gaps.

To improve how DoD prescribes conditions for inactivation and viability testing of BSAT, the Secretary of the Army was directed to conduct additional research addressing existing gaps in scientific knowledge encompassing the BSAT Program. In response, the CBDP initiated development and validation of a standardized method for preparing *B. anthracis* spores for research work at DoD and other laboratories. The lack of a standardized spore preparation method has caused a lack of confidence in test data because of low reproducibility. This method will be submitted both for peer review in the scientific literature and as a standard method for DoD and industry-wide acceptance. The CBDP also determined the dose of gamma rays that provides a sterility assurance level of a million-to-one odds against spore survival while leaving the spore structure sufficiently intact for research purposes. Following further review, these optimized methods would further increase the safety of DoD research involving anthrax spores.

[9] 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.

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 to the ECBC on July 1, 2016. This is important to the nation because it is the only DoD facility certified to test developmental equipment with aerosolized Biosafety Level 3 agents, it has been renamed the BioTesting Branch (BTB) and is now part of the Biosciences Division within the ECBC Research and Technology Directorate. The transition of the BTB to the ECBC will enable the DoD BSAT Biosafety Program to meet end-to-end enterprise tracking, reporting, and auditability requirements within an approved governance, risks, and compliance framework. Direct liaison with and oversight by the EA RO will ensure Laboratory Directors or the Major Range and Test Facility Base Commander are empowered and supported in their operational environment.

In response to 2015 inspections at U.S. Government facilities funded by DBPAO to manufacture, store, and distribute these inactivated antigens, the CDC released its final decision on the select agent status of two DBPAO-inactivated antigen products. The DBPAO was notified that the testing conducted on *Yersinia pestis* (Product ID YERS003) did not contain mixed populations of attenuated and virulent bacteria nor did *B. anthracis* (Product ID BACI224) contain a virulent pXO2 plasmid, proving products had been classified correctly as non-select agents. The CDC's Division of Select Agents and Toxins ultimately determined that both products remain exempt from the BSAT list, which, by definition "does not pose a severe threat to public health and safety."

The DBPAO released an article on the safety and security of inactivated *B. anthracis* spores in the American Society for Microbiology's *Microbe*[10]. The article discusses the *B. anthracis* spore inactivation problem, including new insights into how to approach this problem to avoid future mishaps and potential solutions to mitigate the safety and security risks associated with producing, inactivating, and shipping *B. anthracis* spores. This article was a timely opinion piece that communicated to the general public concern over the spore mishap and illustrated proactive engagement in understanding and rectifying the technical issues and finding alternate materials and solutions.

B. Management Initiatives[11]

The CBDP Enterprise continues to use the Enterprise Reviews to streamline problem identification and decision-making. The Enterprise Reviews will address high-level concerns and items of interest across the CBDP Enterprise.

[10] Sozhamannan, Shanmuga; Smith, Michael A.; Setlow, Peter; Hanna, Philip C., "On the Origin of Live Spores in Gamma-Irradiated Spore Preparations: a Perfect Example of Poisson Distribution?" *Microbe*, 11 (2016): 4.

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

Path Forward

The efforts of the CBDP remain an important cornerstone to the DoD's ability to counter weapons of mass destruction. The Department's efforts to defend against WMD will strengthen as the CBDP Enterprise continues to develop and field capabilities to counter WMD threats; address numerous national, Departmental, Military Service, and CCMD priorities; and allocate available resources to balance modernization goals and objectives.

The CBDP Enterprise will continue to focus on the following strategic priorities:

- Early Warning – Provide a range of detection and identification systems that interface with information systems to provide timely and effective warning of CBR hazards to enable Joint Force decisions to mitigate operational impacts.
- Integrated and Layered Defense – Deliver comprehensive protection and mitigation capabilities that leverage a combination of physical protection, hazard mitigation, and MCMs, complemented by early warning capabilities that address the spectrum and time evolution of CBRN events, to minimize operational impacts to the Joint Force.
- Avoid, Prevent, and Prepare for Surprise – Conduct research and develop capabilities to characterize emerging and future CBR threats effectively in conjunction with interagency, international, industry, and academic partners. These efforts will inform future CBDP RDA efforts while facilitating leap-ahead technological advances and operational innovation.

Current DoD efforts strengthen and expand CBR defense capabilities to prevent, protect against, mitigate, respond to, and recover from CBR threats and effects as part of an integrated, layered defense, as well as improve the Warfighter's ability to find, track, interdict, and eliminate CBR weapons or emerging threats. The Enterprise will continue to improve the ability of the Warfighter to operate in a CBR environment and counter weapons of mass destruction, while balancing the challenge of reduced defense spending. These reductions will continue to constrain the ability of the CBDP to develop, procure, and sustain Joint Service priority capabilities. The combination of evolving CB threats, reduced budgets, and uncertain fiscal futures forces the CBDP to focus its limited resources to address the highest priorities and greatest risks. This environment translates into increasingly complex program management decisions with little margin for error. The CBDP relies on a highly specialized base of expertise to research, develop, test, evaluate, acquire, field, train, and maintain the capabilities to counter current and emerging threats.

ENCLOSURE A: FY 2016 FIELDING QUANTITIES

JPEO-CBD JPM	Product/System	Total Fielded to the Warfighter (Military Services and CCMDs)
JPM NBCCA	DRS	16
JPM NBCCA	Improved Point Detection System – Lifecycle Replacement	17
JPM NBCCA	M4A1 JCAD	527
JPM NBCCA	M98 Joint Biological Point Detection System	2
JPM NBCCA	NBCRV VCT	8
JPM Guardian (JPM GN)	Ortec MicroDetective	61
JPM GN	HAPSITE SPME	57
JPM GN	LIDS	5
JPM GN	OneSuit Pro	8
JPM GN	Blauer HZ9420FVG Class2	5,811
JPM GN	Blauer XRT	6,179
JPM GN	HAZMAX Boot	11,403
JPM GN	CBRNF12B Filter	9,608
Joint Project Manager for Protection (JPM P)	JSGPM	109,047
JPM P	UIPE Inc 1	34,264
JPM Medical Countermeasure Systems (JPM MCS)	JBAIDS Assay Kits	755
JPM MCS	JBAIDS Laptop (Retrofit)	231
JPM MCS	Convulsant Antidote for Nerve Agent	1,600
JPM MCS	Antidote Treatment - Nerve Agent, Auto-Injector	198,012
JPM MCS	Soman Nerve Agent Pretreatment Pyridostigmine	9,359
Total Products/Systems Fielded		**386,970**

JPM MCS	Anthrax Vaccine Adsorbed	524,310
JPM MCS	Smallpox Vaccine	196,900
Total MCMs Acquired from the SNS (Doses)		**721,210**

ENCLOSURE B: JPEO-CBD ACCOMPLISHMENTS

ACCOMPLISHMENTS / VALUE
Conducted a Cooperative Vulnerability and Penetration Assessment (CVPA) and Adversarial Assessment. The Joint U.S. Forces Korea Portal and Integrated Threat Recognition (JUPITR) System navigated through the new Defense Information System Agency's Risk Management Framework to identify cybersecurity vulnerabilities. In addition to the risk management process, Army Research Laboratory Survivability/Lethality Directorate conducted a cybersecurity vulnerability assessment known as CVPA. Following the CVPA, the Threat Systems Management Office followed with an Adversarial Assessment. Test results were evaluated by Army Evaluation Command (AEC) and provided to JUPITR leadership in the form of detailed test reports and top-level outcomes are reported in the AEC's Capabilities and Limitations Report. These assessments enable the program office to identify and fix potential cybersecurity vulnerabilities prior to deploying and for future product upgrades.
Developed an Acquisition Process for Advanced Technology Demonstrations (ATDs) and Enhanced Capability Demonstrations. The pending JUPITR system Material Release Approval led to an acquisition strategy developed to support rapid deployment of materiel capability to USFK. The JUPITR team worked with the U.S. Army Test and Evaluation Command, MSCoE, and the JRO-CBRND to create an acquisition process that supports the timeline required for advanced technology demonstration while addressing safety, suitability, survivability, and effectiveness. The JUPITR acquisition strategy relies on an Initial Deployment where collection of reliability, availability, and maintainability data will further define capabilities through equipment down-selects and incentivized operation and maintenance performance.
JWARN successfully participated in the Brave Beduin Exercise in Skive, Denmark. The Brave Beduin Exercise is a multinational exercise focusing on CBRN defense warning and reporting utilizing NATO publications, Allied Tactical Publication (ATP), and Allied Engineering Publication 45. JWARN's participation demonstrated the ability to pass and receive NBC reports and messages across other member nations' systems utilizing ATP standards.
Established a Medical Countermeasure Systems Other Transaction Agreement (OTA) Consortium, to assist collaboration with industry partners on developing candidate MCMs for CB defense. An OTA is a special vehicle used by Federal agencies for obtaining or advancing R&D or prototypes. The reason for creating OTAs is that the Government needs to obtain leading-edge R&D (and prototypes) from commercial sources, but some performers are unwilling or unable to comply with voluminous procurement regulations and processes. The OTA contract was awarded through JPM-MCS on April 8, 2016 to the Medical CBRN Defense Consortium (MCDC) for a period of 20 years with a potential cumulative value up to $10B. The MCDC currently has more than 50 members, including pharmaceutical companies, biotechnology companies, universities, non-profits, and other entities. Anticipated projects include treatments against bacterial, viral, and chemical agents as well as drug delivery devices.
Held The ChemBio Suit Design Challenge (Proof Challenge) Event to identify innovative and novel protective garment technologies for countering CB threats. The Proof Challenge was undertaken to inform individual protective suit and ensemble acquisition by the JPM P, which provides and sustains for the Joint Force, state-of-the-art individual and collective CBRN protection systems, as well as CBRN decontamination capabilities. In order to capture new ideas for providing the best possible CBRN protective suits for the U.S. military, the JPEO-CBD seeks both to cast as wide a net as possible and incentivize innovation through both typical acquisition approaches (e.g., industry days, requests for proposals (RFPs), etc.) and atypical acquisition approaches such as a Proof Challenge. The event is part of an overall acquisition effort to arrive at a solution. Currently fielded individual protection capabilities can be improved upon with respect to mobility, dexterity/tactility, heat management, and seamless integration between suit components.

ENCLOSURE C: REQUIREMENTS INTEGRATION ACCOMPLISHMENTS[12]

Table C-1. FY 2016 Approved Requirements Integration Accomplishments and Capability Document Highlights[13]

TITLE	DESCRIPTION
CBRND Equipment (Non-Medical)	
Combined Joint Task Force-Operation Inherent Resolve JUONS Request for CB Standoff Detection Capabilities	June 1, 2016: Deputy Director for Requirements, J8 Partially validated USCENTCOM JUON CC-0557
Common Analytical Laboratory System (CALS) Clarification for USMC Chemical Biological Incident Response Force	November 9, 2015: Chief, Chemical Defense Equipment-Requirements Branch (CDE-R) JRO-CBRND
CALS Clarification for USA Preventative Medicine Detachment Requirement for Inclusion of Additional Accessories of the HAPSITE ER as Part of CALS Man-portable Configuration	January 22, 2016: Chief, CDE-R JRO-CBRND
Clarification of USMC Requirements for Accessories to the CALS	February 19, 2016: Chief, CDE-R JRO-CBRND
Quantity Increase for Navy Joint Biological Tactical Detection System (JBTDS)	May 18, 2016: Director, JRO-CBRND
USMC Non-Key Performance Parameter (N-KPP) Changes for the JBTDS Capability Development Document (CDD)	June 13, 2016: Director, JRO-CBRND
N-KPP Changes to the CALS CDD	June 15, 2016: Director, JRO-CBRND
UIPE Increment 2 Draft CDD	Approved June 2016 in support of FY 2017 milestone A
Next Generation Joint Service Mask Leak Tester, Analysis of Alternatives	Completed September 2016
JWARN Requirements Definition Package (RDP)-2, Approved on October 21, 2015	Identified Joint and Service requirements, cost, and IOC date for specified command, control, communication, and computer host (C4H) systems to host JWARN software to provide CBRN warning and reporting (W&R) capabilities.
JEM RDP-2, December 8, 2015	Identified Joint and Service requirements, cost, and IOC date for specified C4H systems to host JEM software to provide CBRN Hazard predict (H-P) capabilities.
JWARN Capability Drop (CD) 1.3, January 8, 2016	Identified Additional Performance Attributes (APAs) to be developed and fielded in JWARN CD 1.3 to support CBRN W&R requirements identified in JWARN RDP-1.

[12] 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.
[13] 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.

TITLE	DESCRIPTION
JEM CD 1.2, May 16, 2016	Identified APAs to be developed and fielded in JEM CD 1.2 to support CBRN H-P Requirements in JEM RDP-1.
JWARN CD 2.1, June 24, 2016	Identified APAs to be developed and fielded in JWARN CD 2.1 to support CBRN W&R requirements identified in in JWARN RDP-2
JEM CD 2.1, June 24, 2016	Identified APAs to be developed and fielded in JEM CD 2.1 to support CBRN H-P Requirements in JEM RDP-2
CBRND Medical	
Joint Medical Chemical Warfare Agent Therapeutic Pharmaceuticals: Advanced Anticonvulsant System (AAS) Increment	Revised June 2016: AAS will provide a broad spectrum capability to counter the effects of traditional and non-traditional nerve agents. AAS will treat nerve agent-induced seizures and reduce subsequent neurological damage when used with fielded therapeutic systems (atropine and pralidoxime chloride). AAS will replace the currently fielded anticonvulsant capability, the Convulsant Antidote for Nerve Agents

Table C-2. Experiments and Studies

EXPERIMENT/ STUDY	DESCRIPTION	COLLABORATING ORGANIZATION(S)
Revisions to the Chemical NTA Category of Interest	This guide serves as a living document that is being modified to mitigate evolving CBRN threats to the joint forces. It continues to be grounded in the NTA Strategy set forth by the Office of the Secretary of Defense and will provide recommendations to the Military Services and CBDP leadership on requirements for countering a specific family of chemicals.	DTRA, National Ground Intelligence Center (NGIC), DIA, Joint Staff J-7
Joint CBRN Operational Risk Assessment	JRO-CBRND used the results of previous CASSANDRA exercises to highlight operational risks and challenges that the Warfighter will face in operational areas of the future. Utilizing the Chairman's Risk Assessment and the Combatant Commanders and Service Chiefs Comprehensive Joint Assessment, the JRO-CBRND developed a comprehensive analytical framework to evaluate risks associated with CBRN defense.	Combatant Commanders, JPEO-CBD, DTRA, DIA
Operational Chemical Challenge Study	This study focused on NTAs and their effects in operational areas and to the environment, as well as their impacts to the Warfighter. It identified the differences in Service use and employment of personal protective equipment and relates it to respective Military Services' warfighting mission.	JPEO-CBD, NGIC, DTRA

EXPERIMENT/ STUDY	DESCRIPTION	COLLABORATING ORGANIZATION(S)
Operating in an Infectious Disease Environment Capability Assessment	This assessment, directed by the Deputy Secretary of Defense, was initiated to provide an assessment of DoD's future requirements to mitigate the risk to DoD personnel operating in an environment where there may be a risk of contracting an infectious disease of operational concern.	Joint Staff Surgeon's Office, JPEO-CBD, OSD Policy
Advanced Threat to Risk Analysis on the Impacts of Ricin Toxins to Operational Forces	This study was initiated to analyze the toxin ricin (and its near relatives) and assess the operational impact and risk to the force. It will provide an assessment of existing defensive systems and the challenges the family of ricin toxin presents to protecting the force. The objective is to characterize and quantify the risk and develop countermeasures.	DTRA, JPEO-CBD
Joint Concept for Operating in CBRN Environments	This concept study was initiated to focus on how the Joint Force Commander conducts operations while defending against, responding to, and recovering from a CBRN hazard in the 2030 timeframe. This assessment will focus on capabilities that will create a more integrated, tailored, and layered CBRN defense, to give commanders more flexible options.	Joint Staff, J-7
Joint Concept for Preventing the Use or Transfer of WMD	JRO-CBRND developed this concept at the direction of the Director of the Joint Staff in order to provide an innovative framework for the entire Joint Force. The completed study revealed the need for additional analysis focused on how to posture the Joint Force to execute tasks associated with the concept.	Joint Staff, J-7; USSOCOM; (U.S. Strategic Command USSTRATCOM); the Military Services
Joint Concept for Preventing the Use or Transfer of WMD Transition Plan	After completing the Joint Concept for Preventing the Use or Transfer of WMD study, JRO-CBRND developed the transition plan that focuses more closely on the identified capability gaps. This concept will yield recommendations for materiel and non-materiel solutions via capability assessments (2) and capability studies (4). This transition plan identified the need for additional studies and will result in implementation strategies for the Joint Force and an innovative framework for future capabilities development.	Joint Staff, J-7; USSOCOM; USSTRATCOM; the Military Services
Control of WMD Study	This study was initiated to investigate options for utilizing a "Joint Force structure to control the movement of/from or access to WMD and WMD sites" concept. This includes options for isolating, intercepting, seizing, securing, and consolidating WMD.	Joint Staff, J-7
CWMD Command and Control (C2) Study	This study was initiated to conduct a thorough analysis of the C2 aspects associated with CWMD activities in a theater-level campaign and a global crisis response situation.	Joint Staff, J-7

EXPERIMENT/ STUDY	DESCRIPTION	COLLABORATING ORGANIZATION(S)
WMD Deterrence Study	This study was initiated to explore the strategic and operational level deterrence considerations and associated options for State and non-State actors of concern. This will include the Joint Force's role in escalation and flexible response options, should deterrence fail.	Joint Staff, J-7; National Defense University, OSD Policy
Disable and Dispose of WMD Capabilities Assessment	This assessment was initiated and will identify requirements, gaps, and potential solutions for providing the Joint Force with capabilities to disable "critical and at-risk" components of a WMD program. It will also focus on requirements needed to set conditions for final disposition of the WMD program or disposing of selected parts of the WMD program.	Joint Staff, J-7; DTRA
Prevent the Transfer of WMD Capabilities Assessment	This assessment was initiated and will identify requirements, gaps, and potential solutions for providing the Joint Force with capabilities to conduct proliferation network analysis. It will also focus on requirements to plan and execute crisis response to prevent the transfer of WMD between actors of concern.	Joint Staff, J-7
WMD Target Battle and Collateral Damage Assessment	This study was completed at the direction of the Joint Requirements Oversight Council. It identified requirements and potential solutions to provide the Joint Force with a capability to conduct unmanned, remote post-WMD strike battle and collateral damage assessments. The study noted that the RQ-7B Shadow UAS-equipped WMD Aerial Collection System (WACS) was the most mature system available, but was limited. Comprehensive CBRN Hazard Awareness post-strike requires support from the traditional ISR assets.	Joint Staff, J-7, Combatant Commands, the Military Services, National Reconnaissance Office, Joint Staff J-2, DIA, NASIC, DTRA

ENCLOSURE D: DTRA/JSTO ACCOMPLISHMENTS

ACCOMPLISHMENT / VALUE
Partnered with industry to develop a handheld molecular diagnostic test for the detection of Ebola RNA that is suitable for use in austere environments. The new test's cartridge is self-contained and requires minimal training to operate. The test has been independently evaluated using Ebola virus under simulated clinical conditions. The platform technology allows for rapid pathogen detection for critical clinical decision-making and patient management.
Transitioned more than 900 different whole genome sequences of *Burkholderia pseudomallei*, it's near neighbors, and unique isolates to JPEO-CBD. The sequences will be used to enhance current diagnostic and detection tests that will support force health protection of Warfighters deployed in locations where *B. pseudomallei* is endemic.
Conducted a Biosurveillance Ecosystem (BSVE) User Evaluation and Feedback Session. This event provided each of the approximately 35 participants with individual BSVE access for the session, training on use of the open source system, and hands-on participation in a scenario exercise. User participation and feedback are critical in assisting with developing new technologies and capabilities for the BSVE to support biosurveillance and public health analysis needs. In addition to this event, an element of the BSVE, "Single Sign On," (SSO) was transitioned to Joint Project Manager for Information Systems (JPM IS) G-BSP. The SSO capability permits the G-BSP users seamless access to all BSVE data feeds and analytic functionality.
The JECP Product Manager granted accreditation to the JECP Systems Performance Model (SPM) version 1.2 for the intended use of supplementing laboratory, chamber, and field test data with simulation results to estimate the CB protection performance of the JECP System and its components. The core capabilities of the JECP SPM include: • Representing JECP test scenarios using single and complex shelter configurations with a uniform exterior contaminant concentration that can vary with time. • Representing the transport and dispersion of contaminated air into and within shelter due to ingress and egress events and control units. • Ability to model behavior using data about terrain, fan assemblies, filters, overpressures regulation, and absorption and desorption of contaminant vapor on personnel clothing and interior of the shelter.
Published a peer-reviewed article in *Atmospheric Environment* describing a mathematically efficient framework for characterizing unknown CB sources released into the atmosphere. The methodology is able to infer various CB parameters (e.g., location/time of release, mass, release rate, etc.) as well as the low-level wind field that is required to accurately predict downwind dispersion patterns and associated areas of potential contamination. The methodology has been translated into a computational algorithm that has been integrated into JEM, developed and fielded by the JPM IS. JEM will now be capable of providing users with more accurate hazard area calculations in the absence of detailed source information.
Initiated joint funding of an Other Transaction Authority agreement with industry to facilitate the transition of a novel mechanism of action, antibiotic candidate, gepotidacin. Continued clinical evaluations to establish a clean safety profile. Drafted an Emergency Use Protocol that may allow expanded access opportunities for the Warfighter. Completed meetings with the FDA on a clear path forward for "Animal Rule" submission.
With JPEO-CBD, created an ATD contract mechanism for utilizing the ADM facility in Alachua, FL. Continued activities to scale up the manufacture of a cocktail of previously identified prophylactic and therapeutic monoclonal antibodies to botulinum neurotoxins serotypes A and B for rapid development intended to be a fraction of the commercial cost. Initiated manufacturing of monoclonal antibodies for use in animal and human safety and efficacy studies.

ACCOMPLISHMENT / VALUE
Provided synthetic routes of production and physicochemical properties of priority NTAs to support countermeasure development to internal users, intelligence community, and U.S. Government interagency partners (including initial metabolite studies). Characterized a number of threat agents in FY 2016. The information produced is disseminated through collaboration with DoD and interagency stakeholders and through a number of technical reports. This information is used to inform CONOPS, TTPs, and capability development.
Demonstrated expression of butyrylcholinesterase (BuChE) via Adeno-Associated Virus in mice resulting in 100% protection from death from butyrylcholine (a competitive inhibitor of acetylcholine). Researchers have demonstrated that expression of BuChE, a potential organophosphorus nerve agent prophylactic, can be significantly increased in mice and provide improved protection. Although this research is in its early phases, it shows significant promise for enhancing the Warfighter's protection against this category of agents.
Delivered data on Ebola virus disinfection capabilities that resulted in new disinfection standard operating procedures adopted by the U.S. Coast Guard. The National Biodefense Analysis and Countermeasures Center characterized the stability of Ebola virus in several bodily fluids on multiple surfaces of military relevance. In addition, the efficacy of several common disinfection techniques on these surfaces was analyzed and a highly effective procedure was identified.
Began transitioning prototype filter concepts and evaluation data packages to the JPM P in support of the JSGPM program. This transition provides test information from prototypes developed under the Guild/3M Rapid Innovation Fielding project and evaluated as part of the Air Purification Nano-Structured Media for Individual Protection project; and includes 1) a test report outlining three prototype designs comparing performance to the M61 filter specification, 2) an optimized filter concept evaluation report, 3) a proposed specification for cobalt (Co), zinc (Z), silver (A), and triethylenediamine (T) (CoZZAT) sorbent media report, and 4) toxicity clearances for CoZZAT, broad spectrum carbon, and ammonia removal carbon.
UIPE II Integrated Protective Fabric System (IPFS) Part 2 -These deliverables are used by the JPM-P to help develop the UIPE II garment design. The data is used to inform tradeoffs for competing parameters and technologies so that specific properties can be adjusted to meet overall requirements. Transition shall occur through the IPFS program and its Technology Transition Agreement (TTA). TTA with Addendum 2 has been conceptually approved and awaits final signatures. Increment 2 transition package planned for fourth quarter of FY 2016 will contain IPFS data to include CBLITE garment design, test results, thermal performance data, and trade space analysis.
Conducted a proof-of-concept Demonstration as part of S/K Challenge III event to show feasibility of a comprehensive integrated early warning family of systems, in support of U.S. Northern Command and USPACOM Area of Responsibility stakeholders, MSCoE concept of operations, and JPEO-CBD program of record development.
JSTO continued to partner with members of the CBD community to offer residential STEM internships to students and teachers through the Joint Science & Technology Institute (JSTI). JSTO added a one week residential middle school program for 24 middle school students from Washington, D.C., Maryland, and Virginia. The high school residential program expanded to 60 students from across the nation and eight countries (DoD dependents). The teacher program expanded to eight teachers. JSTI continues to increase STEM literacy and encourage interest in STEM.
JSTO XCEL (eX-vivo Capabilities for Evaluation and Licensure) program's Pulmonary Lung Model (PulMo) at Los Alamos national Lab won a "2016 R&D 100 Award," often known as the Oscar of Innovation. The PuLMo is a miniature, tissue-engineered lung organ system developed to revolutionize the screening and evaluation of new drugs or toxic agents. PuLMo can gather drug/agent safety data under human conditions while minimize animal testing, saving resources (time and money) and de-risk clinical trials in MCM R&D. The ability to incorporate these models as adjunctive predictive, toxicology endpoints may provide greater capabilities in front-loading predictive science

ACCOMPLISHMENT / VALUE
and to provide improvements in regulatory science initiatives, and is being recognized as being among the leaders in development of integrated functional models to augment drug development paradigms.
Scientists in the Foxhole Program – JSTO has established a "Scientists in the Foxhole" program that develops opportunities for C-WMD Scientists and Engineers that are relatively new to DoD and place them with Soldiers, Sailors, Airmen and Marines as they train and conduct their mission in a CBRN environment. Embedding Scientists and Engineers with the Warfighters enables the participants to experience and understand the needs of the Warfighters and the types of missions performed while protecting themselves from Chemical, Biological and Radiological threats. These opportunities will stimulate ideas towards technology innovations that will enhance enduring CBRN defense capability needs. For FY 2016, JSTO hosted 5 events with 44 Scientists and Engineers participating in a variety of operational scenarios.

ENCLOSURE E: CWMD AND CBRN RESPONDER TRAINING AND EDUCATION

JRO-CBRND Sponsored Leader Development and Education Courses	Attendees
Joint and Combined Warfighting School CWMD Focus Study and Purple Guardian Exercise	358
USACBRNS CBRNE Senior Staff Planners Course	13
USA Command and General Staff College, CWMD, & Homeland Security	996
USA Chemical, Engineer, and Military Police Captain Careers Course	511
USA CBRN Captain Careers Course WMD-Elimination Table Top Exercise	37
Joint Senior Leaders Course	97
Military Police Pre-Command Course	3
Joint Land Aerospace Sea Simulation Exercise	148
Joint Land Aerospace Sea Simulation Prep	105
National Response to Catastrophic and Disruptive Threats	232
Air War College, Global Challenge Exercise 16	250
Joint Special Operations University, Combatting Terrorism Course	58
USMC Warrant Officer Basic Course	12
USMC Staff Planners' Course	14
USA/USAF Command and Staff Colleges, Joint Interagency	358
USACBRNS Reserve /National Guard Courses	267
USAF Institute of Technology Course CBRN Advanced Leader Course (ALC)	47
USAF Institute of Technology Course CBRN Senior Leader Course (SLC)	22
Military Police Officer Transition Course	53
National Capital Region CWMD Staff Officer Orientation Seminar	54
FY 2016 Total Number of Students	**3,635**

Defense Medical Readiness Training Institute Courses	Attendees
Clinician's Course (distance learning)	23,804
Operator/Responder Course (distance learning)	29,276
Basic Awareness Course (distance learning)	48,611
Executive/Commander's Course (distance learning)	3,933
Clinician's Course (on-site)	353
Basic Awareness Course (on-site)	153
FY 2016 Total Number of Students	**106,130**

Armed Forces Radiobiology Research Institute Courses	Attendees
Medical Effects of Ionizing Radiation Course	1,158
HM-CBRNE Incidents Course	101
FY 2016 Total Number of Students	**1,259**

USACBRNS Courses	Attendees
USACBRNS Distance Learning Courses	
CBRN Specialist	106
CBRN Captains Career (RC) Phase 1	68
CBRN Captains Career (RC) Phase 3	18
Biological Integrated Detection System (BIDS)	67
USACBRNS Resident Courses	
CBRN Basic Officer Leader-Branch	304
CBRN Captains Career	102
CBRN Captains Career (RC) Phase 2	73
CBRN Captains Career (RC) Phase 4	42
CBRN Warrant Officer Basic	12
CBRN Warrant Officer Advanced	12
Basic Radiological Safety	64
Advanced Radiological Safety	38
Radiological Packaging	21
CBRN Recon for Brigade Combat Teams	170
CWMD Senior Staff Planners	15
CBRN Pre-Command	17
Decontamination Procedures (Non-US)	201
BIDS	115
Joint Senior Leader	76
CBRN Specialist	1,860
Civil Support Team Operations	39
Civil Support Team Pre-Command Course	52
Installation Emergency Management Planning	24
Civil Support Skills	163
CBRN Responders	441
CBRN Mass Casualty Decontamination	205
CBRN Dismounted Reconnaissance	99
Technical Escort	249
Analytical Laboratory System Operator	36
Unified Command Suite Operator	23
Shipboard Chemical, Biological, and Radiological-Defense (CBR-D) Operations & Training Specialist (USN)	192
Nuclear Biological Chemical Defense (USMC)	193
CBRN Basic Warrant Officer (USMC)	12
CBRN Planner (USMC)	16
CBRN ALC Phase 1	151
CBRN ALC Phase 2	190
CBRN ALC Phase 3	184
CBRN Senior Leader Course (SLC) Phase 1	117
CBRN SLC Phase 2	108
CBRN SLC Phase 3	111

USACBRNS Courses	Attendees
FY 2016 Total Number of Students	**6,213**

U.S. National Guard Courses	Attendees
Civil Support Team Pre-Command Course	63
The Civil Support Team Operations	49
Analytical Laboratory System Operator	34
Unified Command Suite Operator	14
Civil Support Skills	168
CST Intermediate Communications	25
Field Identification of Bio-Warfare Agents (FIBWA)	27
Joint Bio Agent ID System	19
Airload Planners Course	22
GC/MS Advanced Course	47
Microscopy Course	10
Dugway Course – CWA/BWA	45
Dugway Course - Advanced Decontamination	63
ECBC Course – Small Scale Chem Production	18
ECBC Course – Advanced Sampling	36
ECBC Course – Basic Chem Bio for CSTs	82
ECBC Course – Advanced Chem Bio for CSTs	120
ECBC Course – Emerging Threats Course	38
ECBC Course – Small Scale Chem Bio Production	46
FY 2016 Total Number of Students	**926**

U.S. Army Medical Department Center and School Courses	Attendees
Basic Officer Leadership Course (BOLC) (Active Component)	1,039
BOLC (RC)	877
BOLC (Uniformed Services University of the Health Sciences)	56
BOLC (Health Professions Scholarship Program Vet Corps)	35
Rad Hazards Operations Course	21
Laser Microwave Course	2
U.S. Army Medical Department CBRN Preparedness Overview	6,414
FY 2016 Total Number of Students	**8,444**

USAF Courses	Attendees
Emergency Management Craftsman Course (USAF)	88
Emergency Management Apprentice Course (USAF)	177
CBRN Control Center Operations	102
FY 2016 Total Number of Students	**367**

USAMRICD Courses	Attendees
HM-CBRNE Incidents Course	101
Field Management of Chemical and Biological Casualties Course (FCBC)	403

USAMRICD Courses	Attendees
Medical Management of Chemical and Biological Casualties Course	369
Emerging Threats Course	56
Medical Management of Chemical and Biological Casualties Course	209
Special Operations Forces Medical Course	70
FY 2016 Total Number of Students	**1,208**

USAMRIID Courses	Attendees
FCBC	403
HM-CBRNE Incidents Course	101
MCBC – Medical Management of Chemical and Biological Casualties	369
FIBWA	13
FIBWA – Managers Course	23
FIBWA – ALS Challenge	8
FIBWA – Special Interest	7
FIBWA – Ebola Zaire	4
FIBWA – 1st Area Medical Laboratories Sustainment	4
FIBWA – CST	27
FIBWA – Chemical/Biological Incident Response Force	4
FY 2016 Total Number of Students	**963**

ECBC Courses	Attendees
3 - Basic Chem Bio Courses	72
2 - Target Recognition Courses	48
2 - Advanced Chem Bio Courses	32
12 - CBRNE Courses for CSTs	266
2 - Basic Chem Bio Courses for DR SKO	48
3 - Emerging Threats Courses for CBRNE Responders	72
2 - Advanced Sampling Courses	28
2 - CBRN Planner Courses	20
2 - Marine Chief Warrant Officer Courses	20
23 - CST Full Team Exercises	506
FY 2016 Total Number of Students	**1,112**

ENCLOSURE F: ACRONYM LIST

ACRONYM	DEFINITION
AAS	Advanced Anticonvulsant System
ADM	Advanced Development and Manufacturing
AEC	Army Evaluation Command
AFRRI	Armed Forces Radiobiology Research Institute
ALC	Advanced Leader Course
APA	Additional Performance Attribute
AR	Army Regulation
ATD	Advanced Technology Demonstration
ATP	Allied Tactical Publication
BIDS	Biological Integrated Detection System
BOLC	Basic Officer Leadership Course
BSVE	Biosurveillance Ecosystem
BuChE	Butyrylcholinesterase
C2	Command and Control
C4H	Command, Control, Communication, and Computer House
CALS	Common Analytical Laboratory System
CB	Chemical and Biological
CBDP	Chemical and Biological Defense Program
CBR	Chemical, Biological, and Radiological
CBRN	Chemical, Biological, Radiological, and Nuclear
CCMD	Combatant Commands
CD	Capability Drop
CDC	Centers for Disease Control and Prevention
CDD	Capability Development Document
CDE-R	Chief, Chemical Defense Equipment-Requirements Branch
CLIA	Clinical Laboratory Improvement Amendments
CONOPS	Concept of Operations
COZZAT	Cobalt (Co), Zinc (Z), Silver (A), and Triethylenediamine (T)
CPPW	Chemical Protective Patient Wrap
CSA	Colorimetric Sensor Arrays
CSD	Chemical Surface Detector
CVPA	Cooperative Vulnerability and Penetration Assessment
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
DBPAO	Defense Biological Product Assurance Office
DHS	Department of Homeland Security
DIA	Defense Intelligence Agency
DMRTI	Defense Medical Readiness Training Institute
DoD	Department of Defense

ACRONYM	DEFINITION
DOTmLPF-P	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy
DRS	Dismounted Reconnaissance Systems
DTRA	Defense Threat Reduction Agency
EA RO	Executive Agent Responsible Official
ECBC	Edgewood Chemical Biological Center
EMA	European Medicines Agency
FCBC	Field Management of Chemical and Biological Casualties Course
FDA	Food and Drug Administration
FIBWA	Field Identification of Bio-Warfare Agents
FY	Fiscal Year
GAO	Government Accountability Office
G-BSP	Global Biosurveillance Portal
H-P	Hazard Predict
HHS	U.S. Department of Health and Human Services
HM-CBRNE	Hospital Management for CBRNE
IB	Industrial Base
IFSLES	Instructor Facilitated Synthetic Learning Environment Scenarios
IOC	Initial Operational Capability
IPFS	Integrated Protective Fabric System
ISIS	Islamic State of Iraq and Syria
JBAIDS	Joint Biological Agent Identification and Diagnostic System
JBTDS	Joint Biological Tactical Detection System
JCAD	Joint Chemical Agent Detector
JECP	Joint Expeditionary Collective Protection
JEM	Joint Effects Model
JPEO-CBD	Joint Program Executive Office for Chemical and Biological Defense
JPM	Joint Project Manager
JPM GN	Joint Project Manager - Guardian
JPM IS	Joint Project Manager for Information Systems
JPM MCS	Joint Project Manager for Medical Countermeasure Systems
JPM NBCCA	Joint Project Manager for Nuclear, Biological and Chemical Contamination Avoidance
JPM P	Joint Project Manager for Protection
JRO-CBRND	Joint Requirements Office for Chemical, Biological, Radiological, and Nuclear Defense
JSAM-JSF	Joint Service Aircrew Mask for the Joint Strike Fighter
JSGPM	Joint Service General Purpose Mask
JSTO	Joint Science and Technology Office
JUONS	Joint Urgent Operational Needs Statement
JUPITR	Joint U.S. Forces Korea Portal and Integrated Threat Recognition
JWARN	Joint Warning and Reporting Network
KPP	Key Performance Parameter
MAGTF	Marine Air-Ground Task Force

ACRONYM	DEFINITION
MCDC	Medical CBRN Defense Consortium
MCM	Medical Countermeasure
MFK	Mobile Field Kit
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
N-KPP	Non-key Performance Parameter
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, and Chemical
NBCRV	Nuclear, Biological, Chemical Reconnaissance Vehicle
NBCRV-SS	Nuclear, Biological, Chemical Reconnaissance Vehicle-Sensor Suite
NDAA	National Defense Authorization Act
NG	National Guard
NGDS	Next Generation Diagnostics System
NGIC	National Ground Intelligence Center
NTA	Non-traditional Agent
NTADTS	Non-Traditional Agent Defense Test System
OA	Operational Assessment
OASD(HA)	Office of the Assistant Secretary of Defense for Health Affairs
OASD(R&E)	Office of the Assistant Secretary of Defense for Research and Engineering
OIB	Organic Industrial Base
OPCW	Organisation for the Prohibition of Chemical Weapons
OTA	Other Transaction Agreement
PCAPP	Pueblo Chemical Agent-Destruction Pilot Plant
PCD	Pueblo Chemical Depot
R&D	Research and Development
RC	Reserve Component
RDP	Requirements Definition Package
RDS	Radiological Detection System
RDT&E	Research, Development, Test and Evaluation
RNA	Ribonucleic acid
RTAP	Response Training and Assessment Program
S/K	Sophos/Kydoimos
S&T	Science and Technology
SLC	Senior Leader Course
SME	Subject Matter Expert
SNS	Strategic National Stockpile
SPM	Systems Performance Model
SSO	Single Sign On
SWOS	Surface Warfare Officers School
T&E	Test and Evaluation
TECMIPT	T&E Capabilities and Methodologies Integrated Product Team
TIS	Transport Isolation System
TTA	Technology Transition Agreement

ACRONYM	DEFINITION
TTP	Tactics, Techniques, and Procedures
UIPE	Uniform Integrated Protection Ensemble
USA	U.S. Army
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
USCENTCOM	U.S. Central Command
USMC	U.S. Marine Corps
USN	U.S. Navy
USPACOM	U.S. Pacific Command
USSOCOM	U.S. Special Operations Command
USSTRATCOM	U.S. Strategic Command
W&R	Warning and Reporting
WMD-CST	Weapons of Mass Destruction Civil Support Team