Exhibit R-2, **RDT&E Budget Item Justification:** FY 2018 Defense Threat Reduction Agency											**Date:** May 2017	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I BA 2: Applied Research*					**R-1 Program Element (Number/Name)** PE 0602718BR I **Counter Weapons of Mass Destruction Applied Research*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	831.914	149.302	154.857	157.908	-	157.908	160.417	160.386	162.878	166.692	Continuing	Continuing
RA: *Information Sciences and Applications*	160.287	29.133	29.127	30.270	-	30.270	32.325	28.286	29.083	30.077	Continuing	Continuing
**RD: *Detection Technologies*	0.000	15.083	15.936	14.769	-	14.769	17.005	18.451	17.677	18.035	Continuing	Continuing
RE: *Counter-Terrorism Technologies*	7.677	0.795	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
**RF: *Forensics Technologies*	196.608	10.525	10.008	10.274	-	10.274	10.345	10.560	10.771	10.991	Continuing	Continuing
RG: *Defeat Technologies*	75.082	10.946	11.304	11.060	-	11.060	11.290	11.530	11.770	12.017	Continuing	Continuing
RI: *Nuclear Survivability*	98.286	30.896	34.051	34.103	-	34.103	34.736	35.438	36.161	36.896	Continuing	Continuing
RL: *Nuclear & Radiological Effects*	130.489	28.333	28.668	29.228	-	29.228	29.640	30.324	30.999	31.695	Continuing	Continuing
RM: *WMD Counterforce Technologies*	79.780	12.873	12.097	14.552	-	14.552	12.612	12.852	13.129	13.395	Continuing	Continuing
***RR: *Countering WMD Test and Evaluation*	62.395	10.718	13.666	13.652	-	13.652	12.464	12.945	13.288	13.586	Continuing	Continuing
****RU: *Basic Research for Countering WMD*	21.310	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.310

Note

 *Program Element 0602718BR name changes from WMD Defeat Technologies to Counter Weapons of Mass Destruction Applied Research beginning in FY 2018.
 **Project RF-Detection and Forensics Technologies subdivided into Projects RD-Detection Technologies and RF-Forensics Technologies in FY 2016.
 ***Project RR title changes from Combating WMD Test and Evaluation to Countering WMD Test and Evaluation beginning in FY 2017.
 ****Project RU title changes from Fundamental Research for Combating WMD to Basic Research for Countering WMD beginning in FY 2017.

A. Mission Description and Budget Item Justification

The Defense Threat Reduction Agency (DTRA) Counter Weapons of Mass Destruction (WMD) Applied Research program element funds the expansion and application of basic scientific knowledge in order to develop novel materials, devices, systems, and methods supporting next generation concepts and technologies that enable advances in WMD surveillance, detection, defeat, prevention, nonproliferation, counterproliferation, consequence management, and treaty verification.

Exhibit R-2, **RDT&E Budget Item Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* I BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602718BR I **Counter Weapons of Mass Destruction Applied Research*	

This Applied Research portfolio is aligned with strategic planning objectives as well as with Science and Technology (S&T) investment direction which is established annually by DTRA. The objectives directly support policy and planning guidance from the Office of the President, the Department of Defense (DoD), and the broader WMD threat reduction community.

The portfolio advances DTRA's Countering WMD (CWMD) mission by balancing the following imperatives: invest in DTRA's applied research capabilities and increase the CWMD technology base to maximize future pay-off; capitalize on opportunities to deliver innovative, cost-effective solutions to technical challenges that must be resolved prior to system-specific technology investigations and development; and ensure applied research efforts are directly aligned to mission-specific capability requirements of DTRA, the Military Departments, Combatant Commanders, other DoD and federal agencies, and international partners.

B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	152.915	154.857	163.514	-	163.514
Current President's Budget	149.302	154.857	157.908	-	157.908
Total Adjustments	-3.613	0.000	-5.606	-	-5.606
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.613	-			
• Realignments	-	-	-5.606	-	-5.606

Change Summary Explanation

The decrease in FY 2018 from the previous President's Budget submission is due to a shift in investment priorities to fund a test and technology capability gap in this program element and incremental Service Requirement Review Board reductions, as part of the Department of Defense reform agenda, for consolidation and reduction of service contracts.

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I* *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RA *I* *Information Sciences and Applications*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
RA: *Information Sciences and Applications*	160.287	29.133	29.127	30.270	-	30.270	32.325	28.286	29.083	30.077	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Information Sciences and Applications project develops concepts and technologies in the areas of high-speed information processing, modeling and simulation, signal detection, and data-driven decision analysis in support of the Defense Threat Reduction Agency's (DTRA's) technical reachback teams. This project develops and maintains continuously improving collaborative architectures and Chemical, Biological, Radiological, Nuclear and High-yield Explosives (CBRNE) modeling & simulation codes that drive an integrated suite of decision support tools serving the Combatant Commands, other Department of Defense (DoD) agencies, and national and international Countering Weapons of Mass Destruction (CWMD) partners. This effort also provides management and support of the Threat Reduction Advisory Committee through FY 2017. The committee is a senior-level federal advisory committee, which provides independent expert advice on CWMD to the Secretary of Defense through the Under Secretary of Defense for Acquisition, Technology, and Logistics, and the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Matters. This effort also funds the Next Generation Nuclear Professionals (NextGen) activities. This outreach effort encourages collaboration between those currently in the nuclear field and those who are considering entering that field. The effort consists of conferences, working groups, a debate series, publications, international outreach, an online presence, and a Nuclear Scholars effort.

The increase from FY 2017 to FY 2018 is due to the net effect of increased investment in hazard and effects characterization and technology-driven WMD threat forecasting and decreased investment in advanced analytics and operations analysis, modeling, and simulations.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
Title: RA: Information Sciences and Applications	29.133	29.127	30.270
Description: Project RA develops concepts and technologies in the areas of high speed information processing, modeling and simulation, signal detection, and data-driven decision analysis. *FY 2016 Accomplishments:* - Delivered Integrated Weapons of Mass Destruction Toolset (IWMDT) V4.0 with 100% updated commercial-off-the-shelf software necessary for compliance with Defense Information Systems Agency Information Assurance standards. This release updates and enhances nuclear models, 3D mapping and scenario visualization capabilities, and supports explicit vulnerability modeling for the Defense Intelligence Agency and U.S. Army Nuclear and Chemical Agency. - Delivered Virtual Radiation Through Ubiety System (VIRTUS) 1.0 to the Department of Energy Counter Terrorism Operations Support and National Guard Bureau. This baseline virtual training suite of applications for smartphones serves as the basis of curricula training for first responders performing radiation searches and for new sensor familiarization for 57 Weapons of Mass Destruction (WMD) Civil Support Teams.			

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I* *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RA *I* *Information Sciences and Applications*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Deployed and provided training on Enhanced Mapping and Positioning System (EMAPS) at training exercises in the San Diego, CA area with the 9th, 42nd, 91st WMD Civil Support Team (CST), Customs and Border Patrol, Department of Energy Radiological Assistance Program Team 7, and Federal Bureau of Investigation. EMAPS is currently the only capability enabling mapping and tracking of personnel in GPS-denied settings. The 9th CST will be generating an official requirement for EMAPS to the National Guard Bureau. - Deployed CITRUS text analytic technology to Sandia National Laboratory for use and evaluation with real world application. This technology was demonstrated to be effective in a WMD counter-trafficking mission. - Collaborated with the U.S. Air Force to successfully connect and distribute data from airborne cloud instantiations to ground cloud instantiations via a commercial mesh network. This collaboration prepared two national labs to deploy technology flight tests with integrated advanced analytic imagery based-capabilities. - Participated in an interagency, large-scale test series of dense gas release. Analyzed data and developed models to improve atmospheric hazard predictions to enhance Consequence Management decision support. - Developed environmental degradation parameters of airborne chemical agents to better characterize collateral effects after a strike on a WMD facility. - In support of the U.S. Strategic Command (USSTRATCOM), developed capabilities to support analysis of higher order effects, such as infrastructure and economic impacts, from nuclear strike. - Developed high fidelity Force-on-Force (phenomenology and effects) computational modeling and simulation capabilities integrated with real and virtual sensor responses. - Developed high fidelity radiation detection trainer technologies utilizing mobile devices and augmented reality displays to enable training with virtual radiation source surrogates. - Integrated commercial graphical processor technologies to enable near real-time high fidelity radiation transport calculations. - Integrated new first principle high fidelity blast and nuclear fallout codes into the DOD/DHS/DOE radiation particle transport code suite. - Developed a CWMD sensor framework with the Night Vision Laboratory to enable real-time data fusion of deployed sensors with modeling and simulation tools. - Continued to develop and deploy mobile device-based situational awareness, mission planning, and training tools for the warfighter featuring up-to-date capabilities for route planning, force tracking, and geo-tagging items of interest. - Continued to develop, deploy, and support implementation of faster than real-time analysis code with large-scale exercises in support of nuclear physical security threat and vulnerability assessments. - Continued to develop and deploy automated methods to consolidate multiple geospatial terrain types into a single virtual globe capable of supporting multiple modeling and simulation platforms. *FY 2017 Plans:*			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 I 2	**R-1 Program Element (Number/Name)** PE 0602718BR I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RA I *Information Sciences and Applications*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Initiate development of concepts and explore capabilities for enabling data collection, fusion, and analysis supporting DTRA's Technology-Driven WMD Threat Forecasting program. - Continue to conduct a large-scale test series in collaboration with interagency on dense gas release and to develop models to improve atmospheric hazard predictions and consequence management. Develop enhancements and modifications to codes supporting analysis of test results. - Continue to develop and integrate a CWMD sensor framework in collaboration with the Night Vision Laboratory and Common CBRN Sensor Interface sponsors (DTRA's Nuclear Technologies and Counterterrorism Technologies Divisions and the Joint Program Executive Office for Chemical and Biological Defense) to enable real-time data fusion of deployed sensors with modeling and simulation tools. - Continue to develop environmental degradation parameters of airborne non-traditional chemical agents to better characterize collateral effects after a strike on a WMD facility. - Continue to develop high fidelity Force-on-Force (phenomenology and effects) computational modeling and simulation capabilities integrated with real and virtual sensor responses. - Continue to develop and enhance high fidelity radiation detection training applications for use in mobile devices. - Continue to develop augmented reality displays for mobile devices to enable training with virtual radiation source surrogates. - Continue to develop data anomaly detection and analysis technology as part of DoD Distributed Common Ground/Surface System and Intelligence Community Information Technology Enterprise-compliant architectures. - Continue to develop enhancements to modeling, simulation, and data architecture capabilities for analysis of higher order effects from nuclear detonation, to include physical infrastructure, political, and economic impacts. - Continue to develop automated methods to consolidate multiple geospatial terrain types into a single virtual globe capable of supporting multiple modeling and simulation platforms. - Continue to develop mobile device-based route planning, force tracking, and geo-tagging applications to support warfighter-unique CWMD missions. - Continue to develop faster-than-real-time analysis code for use in large-scale nuclear physical security threat and vulnerability assessments, and conduct independent validation and verification for DoD level accreditation. - Continue to manage and support the Threat Reduction Advisory Committee. The Committee will be completing a top to bottom review of the chemical, biological, and nuclear issues on the Korean Peninsula. - Continue Project on Advanced Systems and Concepts for Countering WMD through the Naval Postgraduate School, and grant 20 to 25 research awards that support CWMD efforts. - Continue NextGen activities. The effort will attempt to expand interest in the nuclear enterprise by engaging the French nuclear non-governmental organizations. *FY 2018 Plans:*			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 I 2	**R-1 Program Element (Number/Name)** PE 0602718BR I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RA I *Information Sciences and Applications*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continue to pursue methodologies and explore capabilities for enabling data collection, toolset automation, and distributed analysis / synthesis of emerging and disruptive technology information that supports the Technology-Driven WMD Threat Forecasting program. - Continue to develop data anomaly detection and analysis technology as part of DoD Distributed Common Ground/Surface System and Intelligence Community Information Technology Enterprise-compliant architectures. - Continue to develop enhancements to modeling, simulation, and data architecture capabilities for analysis of higher order effects from nuclear detonation, to include physical infrastructure, political, and economic impacts. - Continue maturation of DTRA Experimental Laboratory capabilities in support of whole-of-government CWMD research and development mission areas. - Enhance the software stack to include a minimum of two new nuclear effect phenomenology code capabilities in support of the Mission Planning Analysis System (MPAS) allowing the use of the user interface and web services to acquire effects assessments within the USSTRATCOM operational environment - Continue to develop high fidelity Force-on-Force (phenomenology and effects) computational modeling and simulation capabilities integrated with real and virtual sensor responses. - Continue to conduct a large-scale test series in of with interagency on dense gas release and to develop enhancement of models to improve atmospheric hazard predictions; improvement of models reduces uncertainty of analyses used by staff planners and first responders. Develop enhancements and modifications to codes supporting analysis of test results. - Complete development of environmental degradation parameters of airborne non-traditional chemical agents to characterize collateral effects after a strike on a WMD facility; improvement of models reduces uncertainty in collateral effects from WMD in support of combat operations. - Continue to develop and integrate a CWMD sensor framework in collaboration with the Night Vision Laboratory and Common CBRN Sensor Interface sponsors (DTRA's Nuclear Technologies and Counterterrorism Technologies Divisions and the Joint Program Executive Office for Chemical and Biological Defense) to enable real-time data fusion of deployed sensors with modeling and simulation tools. - Continue to develop and enhance high fidelity radiation detection training applications for use in mobile devices. - Continue to develop augmented reality displays for mobile devices to enable training with virtual radiation source surrogates. - Continue to develop automated methods to consolidate multiple geospatial terrain types into a single virtual globe capable of supporting multiple modeling and simulation platforms. - Continue to develop mobile device-based route planning, force tracking, and geo-tagging applications to support warfighter-unique CWMD missions.			
Accomplishments/Planned Programs Subtotals	29.133	29.127	30.270

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I* *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RA *I* *Information Sciences and Applications*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603160BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	11.494	11.422	10.229	-	10.229	11.983	12.183	12.468	12.733	Continuing	Continuing
• 154/0605502BR: *Small Business Innovation Research*	10.473	-	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

Competitive selection of most appropriate performers to fulfill science and technology development needs. Performer base includes best-of-breed researchers across DoD and other government agency laboratories, academia, industry, and international partner organizations.

E. Performance Metrics

Percentage of CWMD technologies selected for transition to advanced technology development (6.3) and advanced component development and prototypes (6.4).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency											Date: May 2017	
Appropriation/Budget Activity 0400 *I* 2					R-1 Program Element (Number/Name) PE 0602718BR *I* *Counter Weapons of Mass Destruction Applied Research*						Project (Number/Name) **RD *I* *Detection Technologies*	
COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
**RD: *Detection Technologies*	0.000	15.083	15.936	14.769	-	14.769	17.005	18.451	17.677	18.035	Continuing	Continuing

Note
 *Project RF-Detection and Forensics Technologies subdivides into Projects RD-Detection Technologies and RF-Forensics Technologies in FY 2016.

A. Mission Description and Budget Item Justification
The Detection Technologies mission is to conduct Research, Development, Test, & Evaluation to (1) identify, develop, and exploit signatures associated with nuclear threat enablers such as nuclear expertise, financing, or unique materials to advance U.S. capabilities to detect and interdict such threats; and (2) locate, identify, and track special nuclear material and improve detection factors such as range, time, sensitivity, or accuracy to enhance Service/Special Mission Unit capabilities. These efforts support Department of Defense (DoD) requirements for countering terrorism, counter/nonproliferation, and homeland defense.

The increase from FY 2016 to FY 2017 is due to increased investment in radiation detection and nuclear threat detection intelligence, surveillance, and reconnaissance. The decrease from FY 2017 to FY 2018 is due to a shift in investment priorities to fund test and technology development requirements and full effects modeling.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: RD: Detection Technologies *Description:* Project RD develops direct and indirect technologies for the detection of radiation and non-radiative signatures associated with nuclear threats, and to advance warfighter capabilities to rapidly locate, characterize, and counter such threats. *FY 2016 Accomplishments:* - Discovered/identified nuclear threat signatures, characteristics, and corresponding detection modalities and collection systems. - Developed algorithms for rapidly and effectively analyzing all-source intelligence to identify nuclear threats. - Developed prototype systems to remotely monitor small and wide areas that may produce or contain nuclear threats. - Developed algorithms to synthesize the collection and analysis of multiple nuclear threat signatures to improve assessment confidence and cuing of potential nuclear threat events. - Executed robust and operationally relevant testing and evaluation of developmental radiation detection systems to determine and select the best performing technologies and techniques for further development and transition to user groups. - Down-selected sensor materials for integration into detection systems. - Down-selected detection system algorithms for processing and integration into detection systems to improve user capabilities. - Researched and developed advanced three-dimensional imaging technologies for high-resolution source characterization and identification to provide new and improved capabilities to detect, locate, identify, and characterize threat materials. - Investigated viability of ultra-low power, long-duration programmable remote radiation monitoring systems.	15.083	15.936	14.769

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602718BR / *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** **RD / *Detection Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Investigated organic semiconductors and photo-detectors to improve detection system performance. ***FY 2017 Plans:*** - Continue to develop technologies to identify and catalogue nuclear threat signatures and characteristics and to formulate corresponding detection modalities and collection systems. - Continue to develop algorithms and tools for rapid analysis of all-source intelligence to identify nuclear threats. - Continue to develop initial technologies and subsystems to remotely monitor small and wide areas that may produce or contain nuclear threats. - Continue to develop algorithms and tools to synthesize the collection and analysis of multiple nuclear threat signatures in order to improve assessment confidence and cuing of potential nuclear threat events. - Continue to test and evaluate developmental radiation detection systems to identify the best performing technologies and techniques for transition to advanced technology development efforts. - Develop technologies for next generation nuclear imaging devices with neutron and dual gamma and neutron imaging capability, enabling warfighters to rapidly pinpoint and identify detected radioisotopes. - Develop technologies enabling interoperable architectures for enhanced, real-time mission analysis and common operational pictures within a shared or distributed area of operations. - Develop techniques and technologies for alternative signature detection, processing, and exploitation methods to detect and locate nuclear threats. - Develop novel detection materials and advanced Helium-3 replacement technologies into prototype radiation detection systems to increase range, sensitivity, and accuracy of detection and enable warfighters to more rapidly locate targeted material. - Develop, integrate, and demonstrate prototype radiation detection algorithms to enhance the range of detectability of targeted material. ***FY 2018 Plans:*** - Continue to develop radiation and nuclear threat detection systems to identify the best performing technologies and techniques for transition to advanced technology development efforts. - Continue to develop technologies for next generation nuclear imaging devices with dual gamma and neutron imaging capability, enabling warfighters to rapidly pinpoint and identify detected radioisotopes. - Continue to develop technologies to enable interoperable architectures for enhanced, real-time mission analysis and common operational pictures within a shared or distributed area of operations. - Continue to develop and integrate novel detection materials and advanced helium-3 replacement technologies into prototype radiation detection systems to increase range, sensitivity, and accuracy of detection and enable warfighters to rapidly locate targeted material. - Continue to develop, integrate, and demonstrate prototype radiation and nuclear threat detection algorithms, electronics and communications capabilities to enhance the range of detectability of targeted material.			

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I* *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** **RD *I* Detection Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Initiate investigation of computer learning and computer vision technologies to enhance nuclear threat situational awareness and nuclear threat identification. - Initiate investigation of various sensor capabilities for far-field identification and tracking of nuclear threats. - Identify exploitable observables to inform technology development and investigate emerging technologies that indicate the presence of nuclear threats.			
Accomplishments/Planned Programs Subtotals	15.083	15.936	14.769

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603160BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	26.415	17.775	17.556	-	17.556	18.530	20.697	21.250	21.681	Continuing	Continuing

Remarks

D. Acquisition Strategy

Competitive selection of most appropriate performers to fulfill science and technology development needs. Performer base includes best-of-breed researchers across the Department of Defense and other government agency laboratories, academia, industry and international partner organizations.

E. Performance Metrics

Percentage of CWMD technologies selected for transition to advanced technology development (6.3) and advanced component development and prototypes (6.4).

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency	**Date:** May 2017

Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I* *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RE *I* *Counter-Terrorism Technologies*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
RE: *Counter-Terrorism Technologies*	7.677	0.795	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Counter-Terrorism Technologies project is an over-arching project that develops and transitions a full spectrum of new technologies to counter emergent Weapons of Mass Destruction (WMD) thus enabling warfighters to improve their ability to detect, disable, interdict, neutralize, and destroy chemical, biological, nuclear production, storage, and weaponization facilities. See paragraph C. for other program funding.

The decrease from FY 2016 to FY 2017 is due to the relative impact of a one-time increase in the year of budget execution in FY 2016 for investment in a chemical sampling tool.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: RE: Counter-Terrorism Technologies	0.795	-	-
Description: Project RE provides research and development (R&D) support to Joint U.S. Military Forces, specifically United States Special Operations Command (USSOCOM), in the areas of Explosive Ordnance Disposal Device Defeat; Counter WMD technologies for warfighters; the USSOCOM Countering WMD – Terrorism Support program, and oversight of counterproliferation R&D resources sent directly to USSOCOM for warfighter-unique counterproliferation technologies.			
FY 2016 Accomplishments: - Developed a chemical sampling tool to fit a specific form factor. This tool prevents chemical hazard exposure to personnel and the environment.			
Accomplishments/Planned Programs Subtotals	0.795	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603160BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	107.265	102.976	103.869	-	103.869	105.915	108.099	110.632	112.871	Continuing	Continuing

Remarks

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RE *I Counter-Terrorism Technologies*

D. Acquisition Strategy

 N/A

E. Performance Metrics

 Number of technologies developed and delivered, and/or proof of concept, or successful Military Utility Assessments conducted that increase the potential mission
 success and reduce the number of current gaps in Special Operations Forces capabilities to counter weapons of mass destruction.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017

Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602718BR / *Counter Weapons of Mass Destruction Applied Research	Project (Number/Name) **RF / Forensics Technologies

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
**RF: *Forensics Technologies*	196.608	10.525	10.008	10.274	-	10.274	10.345	10.560	10.771	10.991	Continuing	Continuing

Note

 *Project RF-Detection and Forensics Technologies subdivides into Projects RD-Detection Technologies and RF-Forensics Technologies in FY 2016.

A. Mission Description and Budget Item Justification

The Forensics Technologies project develops post-detonation nuclear forensics technologies providing accurate, rapid, and reliable means to collect, analyze, and evaluate prompt data and debris from a nuclear or radiological event in support of exploitation and attribution efforts. These forensics technologies also enable the Defense Threat Reduction Agency (DTRA) and its trusted partners to detect, locate, identify, track, and interdict nuclear and radiological threats, including weapons and material and enablers to their acquisition and development. In accordance with Department of Defense Directive S-2060.04, DTRA serves as the U.S. Government lead for post-detonation National Technical Nuclear Forensics (NTNF) research and development (R&D). As the central NTNF R&D coordinator, DTRA works in consultation with interagency partners to develop and improve ground-based capabilities supporting exploitation and attribution missions.

The decrease from FY 2016 to FY 2017 is due to decreased investment in prompt nuclear effects exploitation for attribution. The increase from FY 2017 to FY 2018 is due to increased investment in nuclear device characterization for forensics.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: RF: Forensics Technologies	10.525	10.008	10.274
Description: Project RF develops post-detonation nuclear forensics technologies providing accurate, rapid and reliable means to collect, analyze, and evaluate prompt data and debris from a nuclear or radiological event in support of exploitation and attribution efforts. *FY 2016 Accomplishments:* - Accelerated development of the propagation of prompt diagnostics phenomenology to support the deployment of ground-based sensor capabilities in three U.S. cities for post-detonation prompt diagnostics under the DISCREET OCULUS program. - Developed, tested, and demonstrated upgraded technical capabilities for prompt diagnostics, debris collection, sample analysis, and modeling to support nuclear device reconstruction, and forensics data to decrease timeline, lower uncertainties, and increase confidence in technical nuclear forensics conclusions. Utilized cooperative R&D relationship with the UK to conduct peer review of nuclear forensics technologies and validation of U.S. DISCREET OCULUS system models. *FY 2017 Plans:*			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** **RF *I* Forensics Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Develop, test, and evaluate new and improved technologies for prompt diagnostics, debris collection, data analysis, debris diagnostics, and technical capability modeling to support nuclear device reconstruction, as well as to decrease timeline, lower uncertainty, and increase confidence in technical nuclear forensics conclusions supporting attribution. - Develop, test, and evaluate new and improved technologies and processes for National Technical Nuclear Forensics validation and verification in order to decrease timeline, lower uncertainty, and increase confidence in technical nuclear forensics conclusions supporting attribution. - Investigate and develop novel concepts enabling radical reductions in the time required to reach target areas, to collect fallout debris and conduct analyses in the field, and to obtain significant forensic results and attribution conclusions. - Investigate and develop techniques and algorithms to analyze, combine, and integrate speed-of-light (SoL) and speed-of-sound (SoS) phenomena in an urban environment to increase the effectiveness of nuclear detonation yield determinations. - Evaluate and expand current understanding of propagation and transport of prompt diagnostics phenomenologies (SoL, SoS) in an urban environment to support the planned deployment of ground-based sensor capabilities (U.S. Prompt Diagnostics System). - Conduct interagency and international research evaluation events to assess process improvements and identify potential capability gaps in forensic conclusion confidence, timeliness, and accuracy. - Engage with partner nations under appropriate international agreements to improve the understanding of prompt phenomenology, improve modeling tools, and improve sensor technologies. - Expand international collaboration in the area of experiments and modeling in order to improve device reconstruction tools and analysis. *FY 2018 Plans:* - Continue to develop and evaluate new and improved prompt diagnostics, debris collection, analysis and diagnostics, and device modeling concepts and methodologies to support nuclear device reconstruction, as well as decrease timelines for, lower uncertainty of, and increase confidence in technical nuclear forensics conclusions supporting attribution. - Continue to engage with partner nations under appropriate international agreements to improve understanding of prompt phenomenology, improve modeling tools, and improve sensor technologies. - Continue to develop and improve techniques and algorithms to analyze, combine, and integrate speed-of-light (SoL) and speed-of-sound (SoS) phenomena in an urban environment to increase the effectiveness and accuracy of nuclear detonation yield determinations and weapon characterizations. - Initiate investigation and evaluation of innovative ground-based prompt diagnostic sensor concepts and technologies, such as ubiquitous networks and sensors with reduced size, weight, and power consumption, to improve sensor portability and expand operational capability and flexibility. - Continue to expand international collaboration in the areas of experiments and weapons modeling to improve device reconstruction tools and analysis.			

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I* *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** **RF *I* *Forensics Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Continue to develop and evaluate new and improved validation and verification technologies and methodologies, such as surrogate debris and representative isotopes, to support post-detonation National Technical Nuclear Forensics laboratory analysis and decrease timelines, lower uncertainties, and increase confidence in technical nuclear forensics conclusions supporting attribution. - Continue to investigate and develop novel concepts enabling radical reductions in the time required to conduct ground fallout debris collections, conduct analyses in the field, and obtain nuclear forensic results.			
Accomplishments/Planned Programs Subtotals	10.525	10.008	10.274

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603160BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	40.373	38.540	40.286	-	40.286	42.580	40.925	42.144	43.124	Continuing	Continuing
• 123/0605000BR: *Counter Weapons of Mass Destruction Systems Development*	7.156	4.568	6.727	-	6.727	6.710	5.367	5.899	6.172	Continuing	Continuing

Remarks

D. Acquisition Strategy

Competitive selection of most appropriate performers to fulfill science and technology development needs. Performer base includes best-of-breed researchers across DoD and other government agency laboratories, academia, industry, and international partner organizations.

E. Performance Metrics

Percentage of Counter WMD technologies selected for transition to advanced technology development (6.3) and advanced component development and prototypes (6.4).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017

Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602718BR / *Counter Weapons of Mass Destruction Applied Research	Project (Number/Name) RG / Defeat Technologies

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
RG: *Defeat Technologies*	75.082	10.946	11.304	11.060	-	11.060	11.290	11.530	11.770	12.017	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Defeat Technologies project develops innovative kinetic and non-kinetic weapon technologies to expand traditional and asymmetric options available to Combatant Commanders to deny, disrupt, and defeat adversarial use of Weapons of Mass Destruction (WMD) while minimizing collateral effects. Technology development focuses on the physical or functional defeat of WMD threat materials, an adversary's ability to deliver the same, and the physical and nonphysical support networks enabling both. It does so through the systematic identification and maturation of technologies capable of defeating WMD agents or agent-based processes and selecting technologies for integration into weapons, delivery systems, or rapid WMD elimination capabilities. This effort includes developing specific WMD agent/agent-based process simulants, sub-scale test infrastructure, and sampling capability required for effective development, testing, and evaluation of next-generation Countering WMD (CWMD) capabilities. The project places a high priority on understanding, characterizing, and validating potential weapon effects within mathematical confidence as it relates to the unintended release of hazardous threat materials. Technologies with the potential for weapon and capability integration are transitioned to the advanced technology development effort under this project. On a limited basis, technology test data is shared with coalition partners.

The increase from FY 2016 to FY 2017 is due to increased investment in CWMD weapons technologies. The decrease from FY 2017 to FY 2018 supports the funding profile for CWMD weapons technologies' planned activities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: RG: Defeat Technologies	10.946	11.304	11.060
Description: Project RG develops innovative kinetic and non-kinetic weapon technologies to expand traditional and asymmetric options available to Combatant Commanders to deny, disrupt, and defeat adversarial use of WMD while minimizing collateral effects. ***FY 2016 Accomplishments:*** - Developed and demonstrated autonomous air and ground vehicle collaboration for the Modular Autonomous Countering WMD System, Increment B. This demonstration proved interoperability concepts for a robust family-of-systems approach to functionally defeating targets of interest, integrating mapping, improved communications, sensor/payload execution, and intelligence gathering capabilities. - Conducted static demonstration of initial capability of access denial and denial-of-use technologies against WMD representative targets. - Completed electronics susceptibility to electromagnetic fields algorithm development and characterization testing. - Down-selected electromagnetic source and initiated system development and integration. - Conducted sub-scale tests to assess capability to accurately measure WMD simulant released in a plume.			

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602718BR / *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RG / *Defeat Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Continued classified system design and integration work and initiated demonstrations. *FY 2017 Plans:* - Continue classified component/system design and development. - Continue static demonstrations of access denial and denial-of-use technologies against representative WMD threats. - Conduct sub-scale tests of new standoff weapon payloads to defeat chemical and biological warfare targets. - Continue sub-scale tests to assess capability to accurately measure WMD simulant released in a plume. - Continue to develop electromagnetic source to functionally defeat WMD threats. *FY 2018 Plans:* - Continue static demonstrations of access denial and denial-of-use technologies against representative WMD threats. - Conduct scaled demonstrations of access denial and denial-of-use technologies against representative WMD threats. - Continue sub-scale tests of new standoff weapon payloads to defeat chemical and biological warfare targets. - Continue sub-scale tests of emergent technologies to accurately measure WMD simulant released in a plume.			
Accomplishments/Planned Programs Subtotals	10.946	11.304	11.060

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603160BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	21.002	20.710	22.161	-	22.161	22.557	23.031	23.145	23.619	Continuing	Continuing

Remarks

D. Acquisition Strategy

Competitive selection of most appropriate performers to fulfill science and technology development needs. Performer base includes best-of-breed researchers across DoD and other government agency laboratories, academia, industry, and international partner organizations.

E. Performance Metrics

Percentage of CWMD technologies selected for transition to advanced technology development (6.3) and advanced component development and prototypes (6.4).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602718BR / *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RI / *Nuclear Survivability*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
RI: *Nuclear Survivability*	98.286	30.896	34.051	34.103	-	34.103	34.736	35.438	36.161	36.896	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Nuclear Survivability project develops innovative technologies for the protection of mission-essential personnel, critical military and national defense capabilities, and associated control and support systems during a nuclear event. Research under this project supports the mission critical systems identified under Department of Defense Instruction 3150.09, Chemical, Biological, Radiological, and Nuclear Survivability Policy. The Defense Threat Reduction Agency is designated by the Department of Defense (DoD) as the center of excellence for electromagnetic pulse (EMP) survivability assessments. The System Vulnerability and Assessment effort develops nuclear assessment capabilities to support operational planning, weapons effects predictions, and strategic system design. This activity also provides the DoD's nuclear design and protection standards for new and existing systems, e.g., command and control facilities and aircraft. Key systems include the Nuclear Command and Control System, the net-centric thin-line, and both military and civilian satellites and associated support systems. The radiation hardened nano-electronics effort develops and demonstrates radiation-hardened, high-performance prototype nano-electronics to meet DoD space and strategic system requirements. Experimental Capabilities activities provide the warfighter with unique x-ray, gamma ray, and EMP test capabilities in support of system survivability development, certification, and sustainment. This effort leverages research from and coordinates with the National Nuclear Security Administration (United States) and the Atomic Weapons Establishment (United Kingdom) to develop enabling technologies for improved nuclear weapon effects experimentation capabilities. Nuclear Technology Analysis Support provides detailed planning related to policy, strategy, objectives, and programmatic integration. This project also supports international collaboration, user groups, case study reviews, and the Joint Atomic Information Exchange Group. The Human Survivability effort conducts research to develop and validate mortality and morbidity models associated with radiological and nuclear weapon effects.

The increase from FY 2016 to FY 2017 is due to the net effect of increased investment in system vulnerability and assessment, nuclear weapons effects experimentation, and nuclear technology analysis support and decreased investment in radiation-hardened nano-electronics.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2016	FY 2017	FY 2018
Title: RI: Nuclear Survivability	30.896	34.051	34.103

Description: Project RI provides the capability for DoD nuclear forces and their associated control and support systems and facilities to avoid, repel, endure, or withstand attack or other hostile action, to the extent that essential functions can continue or be resumed after the onset of hostile action.

FY 2016 Accomplishments:
- Completed redesign and testing of critical communications radios for new fleet of presidential helicopters to meet C3 systems survivability standards for High-Altitude Electromagnetic Pulse (HEMP) events. This technology transitioned to the U.S. Navy and the White House Military Office.
- Initiated HEMP survivability testing and risk assessments for the F-15E Dual Capable Aircraft platform as part of Continuous Wave Illumination planning and testing efforts. This was the first such test for a combat Dual Capable Aircraft.

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RI *I Nuclear Survivability*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Transitioned Single Event Transient research and mitigation from legacy to 32 nanoscale technology nodes. - Developed innovative techniques to produce 5X improvement in warm x-ray (10-50 keV) test capability for Double-Eagle simulator. - Performed a System Generated Electro-Magnetic Pulse radiation effects experiment for 2-dimensional code validation on the National Ignition Facility (NIF). - Initiated development of Satellite System Nuclear Survivability protection design handbook. - Initiated a low power design using one 1-D grid design guidelines in a RadHard foundry. - Conducted electromagnetic pulse assessments on defense critical infrastructure for electric power and telecommunications networks. - Upgraded electron-beam (cold x-ray) test capability at the DTRA West Coast Facility to allow testing at 2X current capability. - Updated cost estimates to harden methodology protocols for aircraft, missile, and satellite systems. - Published MIL-STD-4023, High-Altitude Electromagnetic Pulse Protection for Maritime Assets and Comprehensive Atmospheric Nuclear Environment military standards. - Updated MIL-STD-188-125 -1/2, High-Altitude Electromagnetic Pulse Protection for Fixed and Transportable Facilities and Systems. - Updated MIL-HDBK-423 High-Altitude Electromagnetic Pulse Protection for Fixed facilities. - Published Aircraft High Altitude EMP Protection Handbook. - Published Satellite System Nuclear Survivability Protection Military Standard. *FY 2017 Plans:* - Complete manufacture of maskless e-beam lithography tool prototype in a trusted foundry. - Develop and integrate the latest human radiation exposure models into current predictive modeling software. - Develop model to evaluate synergistic effects of nuclear weapon combined injuries. - Develop advanced warm x-ray source concepts. - Develop well-characterized x-ray test environments at the NIF. - Continue to develop a RadHard-by-Design microprocessor with less than 22nm commercial technology. - Evaluate High Altitude Electromagnetic Pulse (HEMP) threat survivability for Aegis Ashore-Poland and satellite communication ground facilities. - Investigate electromagnetic pulse effects on power grid transformers, as part of a collaborative research effort with the United Kingdom on critical civilian and defense infrastructure. - Provide nuclear scintillation expertise to DoD and Service Program Executive Offices (PEOs) to assist in certification of disturbed channel simulators and new survivable satellite communication systems. - Publish a Surface/Near-Surface Nuclear Weapon Environment Military Standard to assist DoD and Service PEOs.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 I 2	**R-1 Program Element (Number/Name)** PE 0602718BR I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RI I *Nuclear Survivability*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Publish update to MIL-STD-188-125-1, HEMP Protection for Ground-Based C4I Facilities Performing Critical, Time-Urgent Missions: Part 1 Fixed Facilities. - Publish Nuclear Disturbed Communications Environment Annex to the Consolidated Afloat Networks and Enterprise Services Military Standard to assist DoD and Service PEOs. *FY 2018 Plans:* - Initiate nuclear countermeasure and glass penetration injury criteria modeling in DTRA's existing Health Effects from Radiological & Nuclear Environments (HENRE) R&D computer code and, upon validation and verification, update United States Strategic Command (USSTRATCOM) and DTRA operational codes; this modeling will assist DoD and other federal agencies in selecting and supporting specific nuclear countermeasures. - Complete development of and implement a methodology for comprehensive analysis of the DoD Chemical, Biological, Radiological, and Nuclear Mission-Critical Reports for nuclear survivability and hardening of Mission-Critical Systems/Equipment per DoDI 3150.09. - Continue to evaluate High Altitude Electromagnetic Pulse (HEMP) threat survivability for Aegis Ashore-Poland and satellite communication ground facilities. - Continue to investigate electromagnetic pulse effects on power grid transformers, as part of a collaborative research effort with the United Kingdom on critical civilian and defense infrastructure. - Continue to provide nuclear scintillation expertise to DoD and Service Program Executive Offices (PEOs) to assist in certification of disturbed channel simulators and new survivable satellite communication systems. - Publish update to MIL-STD-188-125-1, HEMP Protection for Ground-Based C4I Facilities Performing Critical, Time-Urgent Missions: Part 1 Fixed Facilities and update to MIL-HDBK-423 HEMP Protection for Ground-based, Mission-Critical Facilities Part 1 Fixed Facilities, Part I. - Publish Nuclear Disturbed Communications Environment Annex to the Consolidated Afloat Networks and Enterprise Services Military Standard to assist DoD and Service PEOs. - Complete HEMP Certification recommendation to USSTRATCOM for the Missile Defense Complex, Ft. Greely, AK. - Apply advanced electron beam diagnostics to characterize the PITHON test capability at the DTRA West Coast Facility for strategic reentry systems survivability. - Continue to develop or initiate development of and demonstrate an advanced warm x-ray spectrometer to reduce uncertainties and design margins for code validation and electronics certification. - Demonstrate an advanced Single Wire Radiator array warm x-ray source on Double-EAGLE at the DTRA West Coast Facility for strategic reentry systems survivability. - Demonstrate multi-point x-ray sources at the National Ignition Facility to improve cold x-ray test capabilities for strategic and missile defense systems.			

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RI *I Nuclear Survivability*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Demonstrate a large-area direct laser impulse test capability at the National Ignition Facility for strategic system survivability certification. - Complete study of satellite solar power array response phenomenologies in pulsed x-ray environments. - Support Missile Defense Agency cold x-ray survivability experiments at the National Ignition Facility. - Continue to develop the 16/14nm Radiation Hardened by Design (RHBD) Library. - Continue development of Complementary e-Beam Lithography (CeBL) technologies to reduce the cost of low volume DoD radiation hardened micro and nano-electronics. - Continue development of RHBD Single Event Effects (SEE) mitigation techniques for <32nm digital CMOS and Analog Mixed Signal Devices. - Complete development of the Satellite System Natural & Nuclear Environment Protection Standard. - Complete exploration of technology-agnostic radiation hardening for Boolean logic and multipliers using the principles of information theory and transition results to the 14nm RHBD program.			
Accomplishments/Planned Programs Subtotals	30.896	34.051	34.103

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603160BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	6.621	6.561	6.658	-	6.658	6.729	6.854	6.992	7.132	Continuing	Continuing

Remarks

D. Acquisition Strategy

Competitive selection of most appropriate performers to fulfill science and technology development needs. Performer base includes best-of-breed researchers across the DoD and other government agency laboratories, academia, industry, and international partner organizations.

E. Performance Metrics

Percentage of CWMD technologies selected for transition to advanced technology development (6.3) and advanced component development and prototypes (6.4).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017

Appropriation/Budget Activity 0400 I 2	R-1 Program Element (Number/Name) PE 0602718BR I *Counter Weapons of Mass Destruction Applied Research	Project (Number/Name) RL I Nuclear & Radiological Effects

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
RL: *Nuclear & Radiological Effects*	130.489	28.333	28.668	29.228	-	29.228	29.640	30.324	30.999	31.695	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Nuclear and Radiological Effects project develops modeling tools to: support military operational planning, weapons effects predictions, and strategic system design decisions; consolidate validated modeling tools into the Joint Information Environment for integrated functionality; predict system responses to nuclear and radiological weapons producing electromagnetic, thermal, blast, shock, and radiation environments; provide detailed adversary nuclear infrastructure characterization to enhance counterforce operations and hazard effects; and, develop foreign nuclear weapon outputs.

The increase from FY 2016 to FY 2017 is due to increased investment in targeting support. The increase from FY 2017 to FY 2018 is due to increased investment in full effects modeling.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2016	FY 2017	FY 2018
Title: RL: Nuclear & Radiological Effects	28.333	28.668	29.228

Description: Project RL develops nuclear and radiological assessment modeling tools to support military operational planning, weapons effects predictions, and strategic system design decisions.

FY 2016 Accomplishments:
- Delivered air blast, fallout, fire, and Source Region Electromagnetic Pulse models to United States Strategic Command (and other nuclear targeting and consequences of execution users) for improved nuclear targeting using nuclear effects that have not been considered in the past.
- Developed System Generated Electromagnetic Pulse simulation codes by adapting physics in the Maxwell's Equations Equivalent Circuit code and the Improved Concurrent Electromagnetic Particle-In-Cell high performance computing code.
- Continued to develop a selected historical nuclear weapon outputs and effects standard database for validating Nuclear Weapons Effects codes.
- Continued implementation of first principle modeling tools for nuclear fire initiation and spread in urban and suburban environments.
- Via the Nuclear Weapons Effects Network, continued modeling economic and social consequences of nuclear detonation effects and collateral building damage due to nuclear-induced air blast, assessed nuclear dust/debris effects on airborne systems, and modeled nuclear fire initiation, allowing these considerations to be part of targeting analyses.
- Improved high altitude nuclear effects functionality for use in analyzing satellite and missile defense responses to a nuclear environment.

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RL *I Nuclear & Radiological Effects*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Improved foreign nuclear weapon outputs, environment models, and Effects Manual 1 (EM-1) chapters. *FY 2017 Plans:* - Deliver initial nuclear induced fire initiation and spread modeling capability. - Develop nuclear weapons effects tools and analyses for effective targeting, including methods to evaluate the consequences of execution of a given course of action. - Develop enhanced High Altitude Radiation Phenomenology functionality for use on modern computer systems. - Develop initial weapon output spectrum extension required by missile defense systems to ensure critical systems can accomplish their designated missions when exposed to a nuclear weapons environment. - Develop a consistent, state-of-the-art combined effects methodology to ensure critical systems can accomplish their designated missions when exposed to a nuclear weapons environment. - Continue to develop an authoritative source of foreign and historical nuclear weapon outputs to aid in the development of uniform nuclear survivability standards, hardening technologies, and the experimental test capabilities. - Maintain a virtual interagency and international coalition combining capabilities of existing government and industry organizations into cohesive "networks" of people, knowledge, and infrastructure to synchronize research and development across the nuclear weapon effects community of interest. *FY 2018 Plans:* - Continue to develop nuclear weapons effects tools and analyses for effective targeting, including methods to evaluate the consequences of execution of a given course of action. - Continue to develop enhanced High Altitude Radiation Phenomenology functionality for use on modern computer systems. - Continue to develop initial weapon output spectrum extension required by missile defense systems to ensure critical systems can accomplish their designated missions when exposed to a nuclear weapons environment. - Continue to develop combined effects methodologies to ensure critical systems can accomplish their designated missions when exposed to a nuclear weapons environment. - Continue to develop an authoritative source of foreign and historical nuclear weapon outputs to aid in the development of uniform nuclear survivability standards, hardening technologies, and experimental test capabilities.			
Accomplishments/Planned Programs Subtotals	28.333	28.668	29.228

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I* *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RL *I* *Nuclear & Radiological Effects*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603000BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	0.000	3.528	3.500	-	3.500	3.456	3.457	3.455	3.455	Continuing	Continuing

Remarks

 *Prior year funds related to this this project in program element number 0605000BR.

D. Acquisition Strategy

 Competitive selection of most appropriate performers to fulfill science and technology development needs. Performer base includes best-of-breed researchers across
 DoD and other government agency laboratories, academia, industry, and international partner organizations.

E. Performance Metrics

 Percentage of Counter WMD technologies selected for transition to advanced technology development (6.3) and advanced component development and prototypes
 (6.4).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency										Date: May 2017	

Appropriation/Budget Activity 0400 / 2				R-1 Program Element (Number/Name) PE 0602718BR / *Counter Weapons of Mass Destruction Applied Research						Project (Number/Name) RM / WMD Counterforce Technologies	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
RM: *WMD Counterforce Technologies*	79.780	12.873	12.097	14.552	-	14.552	12.612	12.852	13.129	13.395	Continuing	Continuing

A. Mission Description and Budget Item Justification

The WMD Counterforce Technologies Project develops Countering Weapons of Mass Destruction (CWMD) weapon effects modeling algorithms, full and sub-scale test series required to investigate CWMD weapon effects and sensor performance, and visualization and situational awareness tools to support the next generation DTRA Technical Reachback cell. These activities are critical enablers for the development of advanced CWMD planning tools. Advanced Energetics develops energetic materials and weapon design technology providing advanced defeat capabilities for engaging hard and deeply buried targets that are well beyond current high explosive blast/frag warhead technology.

The decrease from FY 2016 to FY 2017 is due to the net effect of decreased investment in advanced materials/energetics and increased investment in weapons effects and planning tools. The increase from FY 2017 to FY 2018 is due to increased investment in advanced materials/energetics and weapons effects and planning tools.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2016	FY 2017	FY 2018
Title: RM: WMD Counterforce Technologies	12.873	12.097	14.552

Description: Project RM provides novel and enhanced weapons energetic materials and structures, full-scale testing of counter WMD weapon effects, weapon effects modeling, weapon delivery optimization, and technical reachback services.

FY 2016 Accomplishments:
- Developed and demonstrated reactive material for enhanced breaching capabilities for Special Operations Forces (SOF). Incorporation of this material into shotgun shells for SOF breaching operations increases operational effectiveness and reduces tactical risk to the warfighter.
- Performed signature analysis of pilot-scale Chemical Warfare Agent emissions to define chemical search system requirements. This research addresses modeling capability deficits for characterization of pilot-scale emissions and transport, and exploits temporal and spatial signature exploitation opportunities to support prototype development of chemical search tools.
- Completed calibration of the Computational High-Fidelity Agent Release Model using new test data, improving the current capability to assess CWMD strikes and providing insight into sources of modeling uncertainty being addressed by the Agent Defeat Modeling and Simulation Baseline project.
- Tested and demonstrated Hybrid Enhanced Blast Explosives and reactive cases for simulated biological agent defeat.
- Developed and demonstrated small-scale Hybrid Enhanced Blast Explosives.
- Developed fast running engineering models for dispersion of chemical/biological agents via the Agent Release Model and Complex Hazardous Air Release Model.
- Conducted component level, small-scale testing for chemical/biological source term modeling.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RM *I WMD Counterforce Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Modeled response of mega columns to near-contact charges. - Modeled and tested reactive case technologies for Joint Multi-Effects Warhead System and various warheads. - Conducted field tests to support optimization and improved effectiveness of explosive formulations for chemical, biological, radiological, and nuclear agent defeat. - Conducted lab and field tests of two new explosive formulations tailored (temperature, pressure, and outgases) for WMD defeat operations. - Improved modeling capability for weapon post-detonation reaction using reactive case technologies. - Improved modeling capability for agent defeat using novel weapon energetic payloads. - Enhanced computational fluid and structure codes for chemical/biological source term modeling. - Completed technology gap analysis for chemical/biological source term modeling. ***FY 2017 Plans:*** - Demonstrate upgraded Hybrid Enhanced Blast Explosives for improved agent defeat capability. - Complete medium-scale testing of a new combined effects weapon case that provides enhanced blast and reactive fragments. - Complete scaled testing of two new explosive formulations tailored (temperature, pressure, and outgases) for WMD defeat operations. - Complete calculations and tests to develop agent defeat weapon effects models, to include phenomena and events such as dynamic pressure/fragment, agent release, thermal effects and defeat, particle shattering, agent dispersion, combustion modeling, and agent fate. - Complete calculations and tests to develop hardened structure weapon effects models, to include phenomena and events such as dynamic pressure, blast propagation through failing walls, blast and fragmentation on structural elements, multi-hit penetration in high-strength concrete, bunker collapse, blast and debris environment from embedded detonation, and penetration mechanics in ultra-high performance concrete. - Complete high performance computing (HPC) requirements collection, HPC modernization program frontier proposal submission, and HPC resource allocation for improved WMD defeat modeling. ***FY 2018 Plans:*** - Continue to demonstrate upgraded small scale Hybrid Enhanced Blast Explosives for improved agent defeat capability. - Deliver agent defeat weapon effects models to include post blast agent release and dispersion from multiple agent release mechanisms, agent mass transport, break-up and phase change, and agent fate for Modeling and Simulation (M&S) planning tool enhancements. - Complete tests to deliver data for updating chemical agent source term models within the Integrated Munitions Effects Assessment (IMEA) and for calibration and validation of Second-order Closure Integrated Puff (SCIPUFF).			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** RM *I WMD Counterforce Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Complete calculations and mid / large-scale tests, and deliver weapons effects models to include blast and debris environment from embedded detonation, blast dynamic pressure, fragmentation, and blast through blast doors.			
Accomplishments/Planned Programs Subtotals	12.873	12.097	14.552

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603160BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	19.374	23.138	24.663	-	24.663	25.447	25.892	26.473	27.006	Continuing	Continuing

Remarks

D. Acquisition Strategy

Competitive selection of most appropriate performers to fulfill science and technology development needs. Performer base includes best-of-breed researchers across DoD and other government agency laboratories, academia, industry, and international partner organizations.

E. Performance Metrics

Percentage of CWMD technologies selected for transition to advanced technology development (6.3) and advanced component development and prototypes (6.4).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** ***RR *I Countering WMD Test and Evaluation*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
***RR: *Countering WMD Test and Evaluation*	62.395	10.718	13.666	13.652	-	13.652	12.464	12.945	13.288	13.586	Continuing	Continuing

Note
 **Project RR title changes from Combating WMD Test and Evaluation to Countering WMD Test and Evaluation beginning in FY 2017.

A. Mission Description and Budget Item Justification
 The Countering WMD Test and Evaluation project provides a unique national test bed capability for simulated Weapons of Mass Destruction (WMD) facility characterization, weapon-target interaction, and WMD facility defeat testing. The test bed facility provides structured and systematic end-to-end test event planning, preparation, management, execution, and data analysis. The test bed offers test instrumentation (data acquisition systems and optics), scientific analysis and predictions, test article construction, test article/test bed remediation, tunnel mining, architectural and engineering design, systems engineering and integration, and test data management. The facility leverages fifty years of expertise in investigating weapons effects and target response across the spectrum of hostile environments that could be created by proliferant nations or terrorist organizations with access to advanced conventional weapons or WMD. Subject matter experts design full and sub-scale testing strategies focusing on weapon-target interaction with fixed soft and hardened facilities to include above ground facilities, cut-and-cover facilities, and deep underground tunnels. This capability does not exist anywhere else within the Department of Defense (DoD) and supports the counterproliferation pillar of the National Strategy to Counter WMD.

The increase from FY 2016 to FY 2017 is due to increased investment in environmental compliance, the WMD national test bed, and test and technology support to revitalize DTRA's CWMD test and evaluation capability.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: RR: Countering WMD Test and Evaluation	10.718	13.666	13.652
Description: Project RR provides a unique national test bed capability for the study of weapon-target interaction, simulated WMD facility characterization, and WMD facility defeat testing to evaluate the implications of WMD and other special weapon use against U.S. military and civilian assets. *FY 2016 Accomplishments:* - Conducted CWMD testing and demonstration at Nevada National Security Site to defeat credible and threat-based scenarios with transition into several related projects/planned events. - Tested chemical, biological, radiological, nuclear, and high explosive (CBRNE) sensors, WMD countermeasures, remote geological sensing, and battle management systems designed for surveillance and tracking targets used for WMD activities. - Performed tests in support of Treaty Verification Technology program and Source Physics Experiment to support Comprehensive Test Ban Treaty initiatives.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 I 2	R-1 Program Element (Number/Name) PE 0602718BR I *Counter Weapons of Mass Destruction Applied Research	Project (Number/Name) ***RR I Countering WMD Test and Evaluation

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Initiated testing at Nevada National Security Site in support of the nonproliferation portion of the National Center for Nuclear Security portfolio. - Continued support of WMD sensor testing and developed new test capabilities at the Technical Evaluation Assessment and Monitor Site to detect and prevent nuclear grade material from entering the United States, U.S. territories, and Allied Nations through air, rail, and shipping ports. - Continued to maintain current inventory of infrastructure and instrumentation, extending the life-cycle of these items as long as possible, to ensure test beds meet customers' advanced technology testing needs. - Continued to document, prioritize, and support test infrastructure requirements. - Conducted environmental remediation and compliance activities at the Nevada National Security Site, White Sands Missile Range, and Kirtland AFB in accordance with Environmental Protection Agency, safety, and environmental guidelines. Secured major demolition and restoration efforts of major test articles, ensuring they are safely closed and sealed at acceptable standards. - Conducted collection campaigns with interagency participation specific to relevant CWMD data collection requirements. *FY 2017 Plans:* - Develop and test CBRNE sensors, WMD countermeasures, remote geological sensing, and battle management systems designed for surveillance and tracking of WMD targets. - Continue to develop technical and testing capabilities in support of the Transatlantic Collaborative Biological Resiliency Demonstration, a DoD effort to shape interagency approaches to counter a wide area biological event. - Continue testing at the Nevada National Security Site in support of the nonproliferation portion of the National Center for Nuclear Security portfolio. - Continue WMD sensor testing at the Technical Evaluation Assessment and Monitoring site to develop capabilities for detection of nuclear grade material. - Conduct Special Project CWMD testing and demonstrations at the Nevada National Security Site to defeat credible and threat-based scenarios with transition into several related projects/planned events. - Continue environmental remediation and compliance activities at New Mexico and Nevada test sites to meet federal and state environmental guidelines. Remediate major test articles within acceptable standards. - Conduct collection campaigns with interagency participation specific to warfighter CWMD data requirements. - Design diagnostics and instrumentation in support of the Department of Energy and National Laboratories Treaty Verification Technology program and Source Physics Experiment to support Comprehensive Test Ban Treaty initiatives. - Provide required test planning, design, execution, and reporting to ensure the successful execution of the DTRA Agent Defeat Warfighter Capability Strategic Initiative. - Reconstitute and sustain the current inventory of research, development, test and evaluation infrastructure and instrumentation. *FY 2018 Plans:*			

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** ***RR *I Countering WMD Test and Evaluation*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018**
- Continue to support Combatant Commands with development and testing of Chemical, Biological, Radiological, Nuclear, and high-Explosive (CBRNE) sensors, weapons of mass destruction (WMD) countermeasures, remote geological sensing, and battle management systems designed for surveillance and tracking of WMD targets. - Support Combatant Command exercises and planning events at the Nevada Test Bed in order to develop existing missile defeat technologies, tools, and capabilities. - Continue pursuit of state-of-the-art chemical and biological testing capabilities with participation in the Integrated Early Warning program, the inter-agency Layered Sensing Initiative, the Integrated Sensor Architecture, and the Army Technical Support and Operational Analysis (TSOA) in order to satisfy identified warfighting gaps. - Extend testing at the Nevada National Security Site in support of the nonproliferation portion of the National Center for Nuclear Security portfolio. - Continue to develop nuclear material detection capabilities through testing of candidate technologies at the Technical Evaluation Assessment and Monitoring Site. - Continue to test and demonstrate credible and threat-based WMD attack scenarios at the Nevada National Security Site for DTRA and partner agency projects supporting development of warfighter-identified missile defeat capability requirements. - Continue to conduct diagnostics, instrumentation, and explosives handling research in support of Department of Energy and National Laboratories Source Physics Experiments, supporting Treaty Verification Technology and Comprehensive Test Ban Treaty initiatives. - Initiate reconstitution of instrumentation and diagnostics sensors infrastructure capabilities in support of Counter-WMD technology development projects. - Continue planning the design and execution of tests characterizing a chemical/biological plume generated by an explosive event in support of the Defense Threat Reduction Agency (DTRA) Agent Defeat Modeling and Simulation Baseline (ADMB) initiative. - Continue to design and build testbeds in small-, mid-, and large-scale environments capable of capturing data needed to improve and validate high-fidelity modeling and simulation tools used to predict weapons effects on WMD storage facilities. - Initiate decoupling test program using conventional explosives to develop modern seismic-acoustic data sets at varying levels of coupling, for the purpose of deriving signatures that are similar to recent nuclear test detonations for treaty verification purposes. - Reconstitute the Photogrammetry Laboratory equipment inventory (static & dynamic) for pre- and post-test characterization of geology deriving seismic-acoustic signatures, and providing imagery for warfighter planning and targeting analyses.			
Accomplishments/Planned Programs Subtotals	10.718	13.666	13.652

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** ***RR *I Countering WMD Test and Evaluation*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 26/0603160BR: *Counter Weapons of Mass Destruction Advanced Technology Development*	2.000	0.000	12.500	-	12.500	12.500	12.500	12.500	12.500	Continuing	Continuing

Remarks

D. Acquisition Strategy

Competitive selection of most appropriate performers to fulfill science and technology development needs. Performer base includes best-of-breed researchers across DoD and other government agency laboratories, academia, industry, and international partner organizations.

E. Performance Metrics

Percentage of CWMD technologies selected for transition to advanced technology development (6.3) and advanced component development and prototypes (6.4).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Defense Threat Reduction Agency		Date: May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** ****RU *I Basic Research for Countering WMD*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
****RU: *Basic Research for Countering WMD*	21.310	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.310

Note

 ***Project RU title changes from Fundamental Research for Combating WMD to Basic Research for Countering WMD beginning in FY 2017.

A. Mission Description and Budget Item Justification

 The Basic Research for Countering Weapons of Mass Destruction (CWMD) project conducts technology reviews of the Defense Threat Reduction Agency's (DTRA's) Basic Research Program to identify promising emerging science with potential to be matured into CWMD technologies. The advancement of technology and science into applied technology development efforts focuses upon increasing the stability and utility of mid- to long-term, moderate risk but high payoff science, and emerging technologies for transition to other DTRA applied technology programs. This effort serves as the bridge between the bench scientist and the applied technologist.

 Activities in this project are complete.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: RU: Basic Research for Countering WMD	0.000	-	-
Description: This project provides (1) strategic studies to support the Department of Defense (DoD), (2) decision support tools and analysis to support CWMD research and development investments, and (3) early applied research for technology development. *FY 2016 Accomplishments:* N/A			
Accomplishments/Planned Programs Subtotals	0.000	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 1/0601000BR: DTRA Basic Research	38.288	35.436	37.201	-	37.201	37.340	37.563	38.609	-	Continuing	Continuing

Remarks

Exhibit R-2A, **RDT&E Project Justification:** FY 2018 Defense Threat Reduction Agency		**Date:** May 2017
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I *Counter Weapons of Mass Destruction Applied Research*	**Project (Number/Name)** ****RU *I Basic Research for Countering WMD*

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories, and Department of Energy National Laboratories.

E. Performance Metrics

Project performance is measured via a combination of statistics including the number of publications generated, number of students trained in sciences and engineering supporting DoD's educational goals, number of participating research organizations, and the percentage of participating universities on the U.S. News & World Report "Best Colleges" list. Additional performance indicators include the publication of an annual basic research technical and external programmatic review report. Each study/project will commence within three months of customers' requests and results delivered within three months of completion.