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**Exhibit R-2, RDT&E Budget Item Justification:** FY 2018 Defense Advanced Research Projects Agency **Date:** May 2017

<b>Appropriation/Budget Activity</b> 0400: Research, Development, Test & Evaluation, Defense-Wide / BA 2: Applied Research	<b>R-1 Program Element (Number/Name)</b> PE 0602383E / BIOLOGICAL WARFARE DEFENSE
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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	-	24.682	21.250	13.014	-	13.014	13.469	14.346	14.346	14.346	-	-
BW-01: BIOLOGICAL WARFARE DEFENSE	-	24.682	21.250	13.014	-	13.014	13.469	14.346	14.346	14.346	-	-

**A. Mission Description and Budget Item Justification**

The Biological Warfare Defense project is budgeted in the Applied Research Budget Activity because its focus is on the underlying technologies associated with the detection, prevention, treatment and remediation of biological, chemical, and radionuclide threats.

Efforts to counter existing and emerging biological, chemical and radiological threats included: countermeasures to stop the pathophysiologic processes that occur as a consequence of an attack; host immune response enhancers, medical diagnostics for the most virulent pathogens and their molecular mechanisms; collection of environmental trace constituents to support chemical mapping, tactical and strategic biological, chemical, and radiological sensors; and integrated defense systems. This program also includes development of a unique set of platform technologies and medical countermeasures synthesis that will dramatically decrease the timeline from military threat detection to countermeasure availability.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>
Previous President's Budget	24.265	21.250	11.014	-	11.014
Current President's Budget	24.682	21.250	13.014	-	13.014
Total Adjustments	0.417	0.000	2.000	-	2.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.190	0.000			
• SBIR/STTR Transfer	-0.773	0.000			
• TotalOtherAdjustments	-	-	2.000	-	2.000

**Change Summary Explanation**

FY 2016: Increase reflects reprogrammings offset by the SBIR/STTR transfer.

FY 2017: N/A

FY 2018: Increase reflects program repricing in Defense Against Mass Terror Threats.

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018</b>
<b>Title:</b> Defense Against Mass Terror Threats  <b>Description:</b> The objective of the Defense Against Mass Terror Threats program is to identify and develop technologies that have the potential to significantly improve U.S. ability to reduce the risk of mass casualties in the wake of a nuclear attack. Challenges in reducing U.S. vulnerability to a nuclear attack include monitoring radiation levels and exposure in urban areas and mitigating the lethal short- and long-term effects of ionizing radiation. A major goal of this program is to develop new sensors and sensing networks that can economically and reliably provide wide-area monitoring of radionuclide signatures.  <b>FY 2016 Accomplishments:</b> <ul style="list-style-type: none"> <li>- Developed high performance radiation detectors for wide-area monitoring and implemented novel manufacturing approaches for low-cost production.</li> <li>- Developed and studied concepts-of-operations for wide-area radiation monitoring networks.</li> </ul> <b>FY 2017 Plans:</b> <ul style="list-style-type: none"> <li>- Optimize system models and detection algorithms utilizing multiple sensor inputs for wide-area monitoring of radiation.</li> <li>- Integrate detection algorithms with high performance radiation detectors to form a sensor network for wide-area monitoring.</li> <li>- Demonstrate a wide-area, radiation monitoring, sensor network at large scale through simulation and representative pilot data collections.</li> </ul> <b>FY 2018 Plans:</b> <ul style="list-style-type: none"> <li>- Refine system features and functionality of sensor network based on pilot data collections and user feedback.</li> <li>- Demonstrate, operationalize, and transition full-scale monitoring capability with operational partner.</li> </ul>		14.732	14.168	13.014
<b>Title:</b> Medical Countermeasures  <b>Description:</b> To further develop an expedited medical countermeasure capability, emerging technologies will be integrated to address the safety and efficacy considerations in the risk/benefit package necessary to successfully counter naturally emerging or engineered biological warfare threats and new emerging chemical and radiological threats. These technologies will also be focused on reduction of time, risk, and costs associated with new therapeutic development. For example, this program will develop in vitro tissue constructs (IVTC) that will emulate human response to therapeutic compounds, thereby significantly reducing the cost and time for evaluating safety and efficacy of therapeutics.  <b>FY 2016 Accomplishments:</b> <ul style="list-style-type: none"> <li>- Demonstrated an expanded set of IVTCs able to reproduce the function of seven human physiological systems.</li> <li>- Designed and built additional modules that are compatible with the expanded set of IVTCs and enable the platform to sustain the integrated IVTCs for three weeks.</li> </ul>		9.950	7.082	-

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018</b>
<ul style="list-style-type: none"> <li>- Demonstrated that the expanded set of seven IVTCs individually responded and reacted to test compounds in a manner consistent with the known effects of those compounds on the corresponding human tissues.</li> <li>- Demonstrated that a modular arrangement of the expanded set of seven IVTCs can be used to predict the absorption, distribution, metabolism and elimination that the test compounds are known to exhibit in human physiological systems.</li> </ul> <p><b>FY 2017 Plans:</b></p> <ul style="list-style-type: none"> <li>- Demonstrate an expanded set of IVTCs able to reproduce the function of ten human physiological systems.</li> <li>- Design and build additional modules that are compatible with the expanded set of IVTCs and enable the platform to sustain the integrated IVTCs for four weeks.</li> <li>- Demonstrate that the expanded set of ten IVTCs individually respond and react to test compounds in a manner consistent with the known effects of those compounds on the corresponding human tissues.</li> </ul>				
<b>Accomplishments/Planned Programs Subtotals</b>		24.682	21.250	13.014
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>E. Acquisition Strategy</b> N/A				
<b>F. Performance Metrics</b> Specific programmatic performance metrics are listed above in the program accomplishments and plans section.				