Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Chemical and Biological Defense Program										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*				R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	48.663	52.617	50.566	-	50.566	53.478	51.436	61.040	61.101	Continuing	Continuing
CB1: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	31.697	-	-	-	-	-	-	-	-	0.000	31.697
IS1: *CHEM/BIOLO DEFENSE - INFORMATION SCIENCES (BASIC RESEARCH)*	-	2.259	-	-	-	-	-	-	-	0.000	2.259
LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*	-	24.838	34.563	-	34.563	36.147	33.814	40.389	40.389	Continuing	Continuing
PS1: *CHEM/BIO DEFENSE - PHYSICAL SCIENCES (BASIC RESEARCH)*	-	18.064	16.003	-	16.003	17.331	17.622	20.651	20.712	Continuing	Continuing
TB1: *MEDICAL BIOLOGICAL DEFENSE (BASIC RESEARCH)*	13.544	7.456	-	-	-	-	-	-	-	0.000	21.000
TC1: *MEDICAL CHEMICAL DEFENSE (BASIC RESEARCH)*	2.644	-	-	-	-	-	-	-	-	0.000	2.644
TR1: *MEDICAL RADIOLOGICAL DEFENSE (BASIC RESEARCH)*	0.778	-	-	-	-	-	-	-	-	0.000	0.778

A. Mission Description and Budget Item Justification

This Program Element supports the Joint Service basic research program for Chemical, Biological, and Radiological (CBR) defense. The objective of the basic research program is to advance fundamental knowledge and understanding of the sciences with an emphasis in exploring new and innovative research for combating or countering chemical, biological and radiological weapons. Moreover, basic research supports a Joint Force concept of a lethal, integrated, supportable, highly mobile force with enhanced capability by the individual service member. Specifically, the program promotes theoretical and experimental research and studies in the physical, life and information sciences. A portion of this program element directly supports basic research efforts for the transformational medical technologies program. The work in this program element is consistent with the Chemical Biological Defense Program Research, Development and Acquisition (RDA) Plan. Basic research technological breakthroughs support applied research (PE 0602384BP) activities. Basic research activities described in this budget justification leverage existing research programs and activities within the DoD and other government agencies and promotes cross-pollination between government and academia, as well as sponsors promising efforts of world class scientists. The projects in this PE are placed in BA1, because they are basic research efforts directed towards non-specific or non-unique military applications.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Chemical and Biological Defense Program	DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*

The Projects within this BA change in FY12 to reflect the research areas of Information Sciences (IS1), Life Sciences (LF1), and Physical Sciences (PS1), but Medical Biological Defense (TB1) is retained. The projects of CB1 (Chemical/Biological Defense), TC1 (Medical Chemical Defense), and TR1 (Medical Radiological Defense), will not be used after FY11. The TB1 (Medical Biological Defense) project will not be used after FY12, with efforts moving into Project LF1 (Life Sciences).

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	49.508	52.617	54.573	-	54.573
Current President's Budget	48.663	52.617	50.566	-	50.566
Total Adjustments	-0.845	-	-4.007	-	-4.007
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.593	-			
• Other Adjustments	-0.252	-	-4.007	-	-4.007

Change Summary Explanation

Funding: Adjustments less than 10% of total program.

Schedule: N/A

Technical: N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT CB1: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
CB1: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	31.697	-	-	-	-	-	-	-	-	0.000	31.697

A. Mission Description and Budget Item Justification

This project (CB1) supports basic research efforts in fundamental science phenomenology to include: life sciences; physical sciences; environmental sciences; mathematics; psychology and social sciences; and engineering. The objective of the Basic Research program is to successfully support the advancement of fundamental knowledge and understanding of the sciences with an emphasis on exploring new and innovative research for Chemical and Biological (CB) Defense. It includes new study areas, such as: nanoscale sciences; chemical, biological, and bio-inspired sciences; surface and signature sciences (with an emphasis on Non-Traditional Agents (NTAs); and information sciences. The aim is to promote innovative concepts and directions of research, which could lead to transformational capabilities to enhance the performance and ensure the safety of the Warfighter. Research in nanoscale sciences (nanoelectromechanical systems, molecular motors, and nanometer imaging) may bring about improvements in protection, decontamination and other core CB defense fields. Research in chemical, biological, and bio-inspired sciences includes research in concepts such as synthetic biology, biomimetics, and other emerging areas of science to build a foundation for developing novel smart materials. This will combine multiple functionalities into a common autonomous unit or network. Surface and signature sciences focuses on the study of physical and chemical properties, especially with regard to NTAs, that seek to improve physical capabilities such as detection and decontamination. Informational Sciences includes research in understanding cognitive and physiological effects on human decision-making, behavior and performance, and modeling and simulation of CB threats. Breakthroughs and advances in functional capabilities gained from these scientific disciplines could impact the entire chemical and biological defense science and technology program. Basic research activities described in this budget advance fundamental knowledge and understanding of the sciences. These efforts may be transitioned to applied research or advanced technology development initiatives. Due to the exploratory, academic, and theoretical nature of basic research efforts, projects described in this justification typically have a duration period, from conception to completion, of three to five years. Promising basic research efforts will be further exploited for their application to chemical and biological defense in Budget Activity 2 (Applied Research) or Budget Activity 3 (Advanced Technology Demonstrations). The basic research efforts promote cross-pollination between government and academia, as well as sponsorship of promising efforts of world class scientists while promoting the development of young researchers.

In FY12, all Project CB1 research will be realigned to Project LF1 - Life Sciences (Basic Research), PS1 - Physical Sciences (Basic Research), and IS1 - Information Systems (Basic Research).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: 1) Basic Research Core	8.340	-	-
Description: Chemical, Biological, and Bio-Inspired Science: Focuses on discovering fundamental phenomena that could impact chemical and biological defense. In FY12, all Chemical, Biological, and Bio-Inspired Science efforts are re-aligned to a new project within BA1 - Life Sciences (Basic Research) (LF1).			
FY 2011 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT CB1: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Continued developing novel tools to investigate cells and cell mechanisms. Continued to investigate and leverage developments in bioscience, bio-inspired science, and chemical sciences to support and improve fundamental scientific understanding. Leveraged and merged developments with other basic research areas such as information sciences and surface and signature sciences. Initiated efforts in response to identified science gaps.			
Title: 2) Basic Research Core ***Description:*** Information Science: Leverages new developments in information and computation to impact modeling and other chemical and biological defense efforts. In FY12, all Information Science efforts are re-aligned to a new project within BA1 - Information Sciences (Basic Research) (IS1). ***FY 2011 Accomplishments:*** Continued investigating genetic algorithms and studying effects of heightened sensory input during chemical biological warfare events. Utilized efforts in information sciences to inform other areas of core chemical and biological defense programs, such as modeling and computational efforts.	5.692	-	-
Title: 3) Basic Research Core ***Description:*** Surface and Signature Sciences: The study of physical and chemical properties that seeks to improve physical capabilities, such as, detection and decontamination. In FY12, all Surface and Signature Sciences efforts are re-aligned to a new project within BA1 - Physical Sciences (Basic Research) (PS1). ***FY 2011 Accomplishments:*** Continued studying interactions of chemical and biological agents with biological and environmental matrices, and developed novel tools to investigate surface and signature sciences to address capability gaps. Studied signature sciences and surface interactions.	8.965	-	-
Title: 4) Basic Research Core ***Description:*** Nano-Scale Sciences: Improve understanding of nano-scale materials (scale of 1-100 nanometers in length) for use in chemical and biological defense. In FY12, all Nano-Scale Science efforts are re-aligned to a new project within BA1 - Physical Sciences (Basic Research) (PS1). ***FY 2011 Accomplishments:*** Completed investigations into new textiles with a higher resistance to oily substances or with adjustable porosity. Completed study of compounds which mimic biological organisms and nano-scale sensing technologies for identification of agents. Studied interfaces between nano-materials and living cells, and study systems found in nature for creative solutions for future protection concepts. Advancements made in nano-scale sciences may apply to and be leveraged by other basic research areas such as	8.700	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT CB1: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
biosciences and bio-inspired sciences, surface and signature science, informational science, and threat agent science (TAS) activities funded in Budget Activity 2.			
Accomplishments/Planned Programs Subtotals	31.697	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• IS1: *CHEM/BIOLO DEFENSE - INFORMATION SCIENCES (BASIC RESEARCH)*	0.000	2.259	0.000		0.000	0.000	0.000	0.000	0.000	0.000	2.259
• LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*	0.000	24.838	34.563		34.563	36.147	33.814	40.389	40.389	Continuing	Continuing
• PS1: *CHEM/BIO DEFENSE - PHYSICAL SCIENCES (BASIC RESEARCH)*	0.000	18.064	16.003		16.003	17.331	17.622	20.651	20.712	Continuing	Continuing
• CB2: *CHEMICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)*	85.789	97.774	44.331		44.331	41.819	40.951	52.243	52.243	Continuing	Continuing
• CB3: *CHEMICAL BIOLOGICAL DEFENSE (ATD)*	21.219	23.818	20.034		20.034	18.343	18.893	17.357	17.357	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT IS1: *CHEM/BIOLO DEFENSE - INFORMATION SCIENCES (BASIC RESEARCH)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
IS1: *CHEM/BIOLO DEFENSE - INFORMATION SCIENCES (BASIC RESEARCH)*	-	2.259	-	-	-	-	-	-	-	0.000	2.259

A. Mission Description and Budget Item Justification

This project (IS1) advances fundamental knowledge in mathematics, modeling and bioinformatics. Research efforts include exploration of macro- and micro-scale meteorological effects on CB agent transport and dispersion that can lead to new and improved algorithms for hazard prediction and new CB decision support tools; and computational algorithm development of biological processes that can lead to new or improved medical countermeasures.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: 1) Information Sciences (Basic Research) ***Description:*** Information Science (Basic Research) focuses on advancing knowledge of in-silico modeling techniques for both physical and physiological environments to enable a greater understanding of CB threats. ***FY 2012 Plans:*** Develop quantitative computational models for metabolic networks of pathogens which include interactions with host cell environments. Use computational models to identify interactions that are candidate targets for medical countermeasures.	-	2.227	-
Title: 2) SBIR ***FY 2012 Plans:*** Small Business Innovative Research.	-	0.032	-
Accomplishments/Planned Programs Subtotals	-	2.259	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• CB1: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	31.697	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	31.697
• CB2: *CHEMICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)*	85.789	97.774	44.331		44.331	41.819	40.951	52.243	52.243	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT IS1: *CHEM/BIOLO DEFENSE - INFORMATION SCIENCES (BASIC RESEARCH)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• CB3: *CHEMICAL BIOLOGICAL DEFENSE (ATD)*	21.219	23.818	20.034		20.034	18.343	18.893	17.357	17.357	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*	-	24.838	34.563	-	34.563	36.147	33.814	40.389	40.389	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project (LF1) supports research efforts in fundamental science phenomenology in microbiology, biochemistry, pathogenic mechanisms, cell and molecular biology, and immunology that are investigating molecular signatures, mechanisms of action, recognition, catalysis, and biomimetics. Efforts in Life Sciences (Basic Research) include: innovative biotechnology approaches with potential application for rapidly identifying, diagnosing, preventing, and treating disease resulting from exposure to biological or chemical agents, or from radiological exposure; biological and bio-inspired science addressing concepts such as synthetic biology, biomimetics; and other emerging areas of science to build a foundation for developing novel materials. Ultimately, knowledge gained through research in this area supports the development of medical and physical countermeasures against biological or chemical agents in areas such as diagnostics, detection, biosurveillance, protection (both physical and vaccine) and therapeutic intervention.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: 1) Life Sciences (Basic Research)	-	24.540	34.563
Description: Life Sciences (Basic Research) focuses on fundamental efforts to investigate molecular signatures, mechanisms of action, recognition, catalysis and biomimetics, as well as agent interactions and evolution. ***FY 2012 Plans:*** Elucidate interactions between biological (bacterial, viral or toxin) or chemical agents and their host and host cells to understand mechanisms of pathogenesis and/or protective immunity. Examine polymicrobial interactions that may impact the growth of biological agents and/or their course of disease. Investigate immunological and physiological bases for tolerance to, or protection against, organophosphorous agents. Characterize the host response to ionizing radiation and mechanisms of injury. Study the evolution of viral and bacterial families at the genomic and phenotypic levels and characterize molecular signatures of virulence and/or manipulation in the laboratory (e.g., genetic modification and culturing). Explore the mechanisms by which viruses modulate virulence and target host species. Understand mechanisms behind the functionality of biological systems. Explore novel techniques for the design and synthesis of biomimetic reagents for affinity and reactivity. ***FY 2013 Plans:*** Continue previous work emphasizing efforts to understand pathogens, novel threats and host responses (including human and zoonotic). Investigate and evaluate systemic biological responses following exposure of living systems to CB agents. Improve understanding of polymicrobial interactions influencing response to or course of disease. Exploit advances in systems biology to mine "omics" experimental designs involving agents and hosts to provide new biomarkers, targets and options. "omics" informally			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
refers to a field of study in biology ending in -omics, such as genomics or proteomics. Explore materials in biotic/abiotic interface and biomimetics to enable functional molecular development (such as robust synthetic enzymes).			
Title: 2) SBIR ***FY 2012 Plans:*** Small Business Innovative Research.	-	0.298	-
Accomplishments/Planned Programs Subtotals	-	24.838	34.563

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• CB1: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	31.697	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	31.697
• TB1: *MEDICAL BIOLOGICAL DEFENSE (BASIC RESEARCH)*	13.544	7.456	0.000		0.000	0.000	0.000	0.000	0.000	0.000	21.000
• TC1: *MEDICAL CHEMICAL DEFENSE (BASIC RESEARCH)*	2.644	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	2.644
• TR1: *MEDICAL RADIOLOGICAL DEFENSE (BASIC RESEARCH)*	0.778	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.778
• CB2: *CHEMICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)*	85.789	97.774	44.331		44.331	41.819	40.951	52.243	52.243	Continuing	Continuing
• TB2: *MEDICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)*	51.158	86.679	0.000		0.000	0.000	0.000	0.000	0.000	0.000	137.837
• TC2: *MEDICAL CHEMICAL DEFENSE (APPLIED RESEARCH)*	31.970	34.614	0.000		0.000	0.000	0.000	0.000	0.000	0.000	66.584
• TM2: *TECHBASE MED DEFENSE (APPLIED RESEARCH)*	0.000	0.000	118.208		118.208	110.294	97.308	130.654	130.654	Continuing	Continuing
• TR2: *MEDICAL RADIOLOGICAL DEFENSE (APPLIED RESEARCH)*	2.083	0.806	0.000		0.000	0.000	0.000	0.000	0.000	0.000	2.889

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*	

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• CB3: *CHEMICAL BIOLOGICAL DEFENSE (ATD)*	21.219	23.818	20.034		20.034	18.343	18.893	17.357	17.357	Continuing	Continuing
• TB3: *MEDICAL BIOLOGICAL DEFENSE (ATD)*	153.437	172.394	0.000		0.000	0.000	0.000	0.000	0.000	0.000	325.831
• TC3: *MEDICAL CHEMICAL DEFENSE (ATD)*	25.486	21.789	0.000		0.000	0.000	0.000	0.000	0.000	0.000	47.275
• TR3: *MEDICAL RADIOLOGICAL DEFENSE (ATD)*	2.402	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	2.402

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT PS1: *CHEM/BIO DEFENSE - PHYSICAL SCIENCES (BASIC RESEARCH)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
PS1: *CHEM/BIO DEFENSE - PHYSICAL SCIENCES (BASIC RESEARCH)*	-	18.064	16.003	-	16.003	17.331	17.622	20.651	20.712	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project (PS1) advances fundamental scientific knowledge in physical science areas that include chemistry, physics, materials science, environmental sciences, and nanotechnology that could potentially lead to transformational CB defensive capabilities enhancing Warfighter performance and safety. Research results in physics, chemistry and materials sciences have potential application in point and standoff detection, as well as protection and decontamination. Surface and environmental sciences focus on the study of physical and chemical properties and phenomena of interactions, especially with regard to Non Traditional Agents (NTAs), that seek to improve capabilities such as detection, protection, and decontamination. Research in nanotechnology and nanoscale sciences, such as nanoelectromechanical systems, molecular motors, nanomechanical resonance sensing, and nanometer imaging, has potential application across CB capability areas to provide significant enhancement by, for example, decreasing detection response times, increasing medical countermeasure effectiveness against a wider array of threat agents, and providing currently unavailable modalities like detection imbedded in fabrics.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: 1) Physical Sciences (Basic Research)	-	17.805	16.003
Description: Physical Sciences (Basic Research) focuses on fundamental scientific phenomena including chemistry, physics, materials science, environmental science, and nanotechnology. ***FY 2012 Plans:*** Explore improved surface and interfacial analytical methods for chemical and biological detection, particularly nanoscale chemical and biological sensing/detection, with the goal of more sensitive and selective recognition of molecular or surface interaction signatures. Investigate advances in materials science that might ultimately contribute to enhanced protection and improved detection capabilities. Initiate studies in the design, synthesis, and fundamental understanding of novel materials for improved filtration and decontamination of chemical or biological threats. Initiate studies in spectroscopic methods, novel detection approaches, and materials science for detecting chemical or biological threats on surfaces. Initiate studies to improve fundamental understanding of fluidic behavior at the nanoscale, as well as new spectra for potentially improved point detection capabilities. Explore how computational chemistry and physics, including theoretical predictions of optical and THz signatures, might contribute to improved analytical methods and materials science. ***FY 2013 Plans:*** Explore development of multifunctional material design and synthesis that identifies materials that integrate functionality with durability to improve CB protection by increasing protection factors (resistance or filtration) and reducing physical burden. Create			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT PS1: *CHEM/BIO DEFENSE - PHYSICAL SCIENCES (BASIC RESEARCH)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
novel decontamination options (through design and synthesis of novel materials/solutions) that are more broadly applicable to multiple chemicals or biologicals with less potential to harm equipment. Seek advanced options (through both experimental and theoretical efforts) for threat identification such as new spectra of signatures (THz and more) as well as other recognition elements (e.g., fluidic behavior) that reduce the requirements for consumables or logistics while increasing specificity. Explore integration of functionality that may provide dynamic capabilities for CB defense countermeasures.			
Title: 2) SBIR ***FY 2012 Plans:*** Small Business Innovative Research.	-	0.259	-
Accomplishments/Planned Programs Subtotals	-	18.064	16.003

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• CB1: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	31.697	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	31.697
• CB2: *CHEMICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)*	85.789	97.774	44.331		44.331	41.819	40.951	52.243	52.243	Continuing	Continuing
• CB3: *CHEMICAL BIOLOGICAL DEFENSE (ATD)*	21.219	23.818	20.034		20.034	18.343	18.893	17.357	17.357	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT TB1: *MEDICAL BIOLOGICAL DEFENSE (BASIC RESEARCH)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
TB1: *MEDICAL BIOLOGICAL DEFENSE (BASIC RESEARCH)*	13.544	7.456	-	-	-	-	-	-	-	0.000	21.000

A. Mission Description and Budget Item Justification

This project (TB1) supports basic research of vaccines, diagnostic tools, and therapeutic drugs to provide effective medical defense against validated biological threat agents including bacteria, toxins, and viruses. Research efforts advance promising innovative biotechnology approaches with the potential to rapidly identify, diagnose, prevent, and treat disease due to exposure to biological threat agents. This project supports core science efforts that may be applied to biological defense capability areas, such as Pretreatments, Diagnostics, and Therapeutics.

This project includes basic research to support Transformational Medical Technologies (TMT) efforts. The program was launched to respond to the threat of emerging or intentionally bioengineered biological threats. Research efforts evaluate the molecular characteristics of the interaction between host and pathogen, characterize the host's response to infection/intoxication and identify common mechanisms and/or pathways. The research also studies the correlates of immunity (common response against different pathogens), and looks for pre-symptomatic bio-markers.

In FY12, all Project TB1 research (other than Transformational Medical Technologies (TMT) efforts are realigned to Project LF1 - Life Sciences (Basic Research). In FY13, all remaining Project TB1 research (Transformational Medical Technologies (TMT)) will be realigned to Project LF1 - Life Sciences (Basic Research).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: 1) Biological Based (Basic Research)	8.494	-	-
Description: Research to understand biological agents of interest, their pathways, virulence, immunization factors and identification. In FY12, all Biological Based (Basic Research) efforts are realigned to Life Sciences (Basic Research) (LF1). ***FY 2011 Accomplishments:*** Conducted studies of pathogenic mechanisms for viral and bacterial biothreat agents and toxins. Clarified mechanisms of host-pathogen interaction to identify mechanisms of pathogenesis and/or correlates of protective immunity against biothreat agents. Defined novel and/or shared antigens from viral and bacterial threat agents to be used in the design of future treatment options. Defined the contribution of post-translational modification to the structure and biology of BoNT. Researched novel constructs for affinity reagents for the identification of biological warfare agents and biomarkers.			
Title: 2) Transformational Medical Technologies	-	7.349	-
Description: Platform Technologies are stand-alone enabling technologies that support MCM development and when strategically aligned, provide a system of systems response capability to an adverse biological event - from the identification of an unknown pathogen to the development of an approved countermeasure ready for delivery to the Warfighter and the nation.			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT TB1: *MEDICAL BIOLOGICAL DEFENSE (BASIC RESEARCH)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
The enabling technologies are divided into five platform areas: Pathogen Characterization, Target Identification, Countermeasure Discovery, Countermeasure Evaluation, and Bioinformatics. ***FY 2012 Plans:*** Continue basic research efforts previously funded under the Transformational Medical Technologies Initiative. Continue to increase investment in the exploration of genetic approaches to describe host susceptibility to infectious disease and immune response. Investigate alternatives to animal models using markers of virulence, and therapeutic toxicity and efficacy. Assess developments in technologies for formulation and delivery of MCMs. In FY13, all research in this area is re-aligned into Life Sciences (Basic Research) (LF1).			
Title: 3) Transformational Medical Technologies Initiative ***Description:*** Platform Technologies are stand-alone enabling technologies that support MCM development and when strategically aligned, provide a system of systems response capability to an adverse biological event - from the identification of an unknown pathogen to the development of an approved countermeasure ready for delivery to the Warfighter and the nation. The enabling technologies are divided into five platform areas: Pathogen Characterization, Target Identification, Countermeasure Discovery, Countermeasure Evaluation, and Bioinformatics. Effective FY12 this effort is funded as the Transformational Medical Technologies. ***FY 2011 Accomplishments:*** Continued to investigate new drug-based platforms which may be able to generate families of broad spectrum drugs to protect against bio-threat agents. Developed components to evaluate which technologies are appropriate for each aspect of the countermeasure development. Continued to support discovery of conserved host and pathogen directed targets for the development of broad spectrum drugs against BW agents. Continued to develop leading edge technologies to assist in pathogen characterization, target identification, countermeasure discovery and countermeasure evaluation.	5.050	-	-
Title: 4) SBIR ***FY 2012 Plans:*** Small Business Innovative Research.	-	0.107	-
Accomplishments/Planned Programs Subtotals	13.544	7.456	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT TB1: *MEDICAL BIOLOGICAL DEFENSE (BASIC RESEARCH)*	

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*	0.000	24.838	34.563		34.563	36.147	33.814	40.389	40.389	Continuing	Continuing
• TB2: *MEDICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)*	51.158	86.679	0.000		0.000	0.000	0.000	0.000	0.000	0.000	137.837
• TM2: *TECHBASE MED DEFENSE (APPLIED RESEARCH)*	0.000	0.000	118.208		118.208	110.294	97.308	130.654	130.654	Continuing	Continuing
• TB3: *MEDICAL BIOLOGICAL DEFENSE (ATD)*	153.437	172.394	0.000		0.000	0.000	0.000	0.000	0.000	0.000	325.831
• TM3: *TECHBASE MED DEFENSE (ATD)*	0.000	0.000	182.330		182.330	171.399	147.651	136.326	136.326	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT TC1: *MEDICAL CHEMICAL DEFENSE (BASIC RESEARCH)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
TC1: *MEDICAL CHEMICAL DEFENSE (BASIC RESEARCH)*	2.644	-	-	-	-	-	-	-	-	0.000	2.644

A. Mission Description and Budget Item Justification

This project (TC1) emphasizes the understanding of the basic action mechanisms of nerve, blister, blood, and respiratory agents within the body. Basic studies are performed to delineate biological mechanisms for identified and emerging chemical threats to generate required information for initial design and synthesis of chemical medical countermeasures.

In FY12, all Project TC1 research will be realigned to Project LF1 - Life Sciences (Basic Research).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: 1) Chemical Based (Basic Research) (CBBR)	2.644	-	-
Description: Research focuses on understanding chemical agents, their mechanism of action, toxicity, cellular injury, and identification. In FY12, all Chemical Based (Basic Research) efforts are re-aligned to a new project within BA1 - Life Sciences Basic Research (LF1). ***FY 2011 Accomplishments:*** Researched pathways of molecular mechanisms of injury associated with chemical warfare agents. Conducted mechanistic studies using appropriate in vitro models to identify the biochemical cascade of effects following chemical agent exposure. Generated basic information for initial design and synthesis of medical countermeasures, located in Budget Activity 2, Project TC2.			
Accomplishments/Planned Programs Subtotals	2.644	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*	0.000	24.838	34.563		34.563	36.147	33.814	40.389	40.389	Continuing	Continuing
• TC2: *MEDICAL CHEMICAL DEFENSE (APPLIED RESEARCH)*	31.970	34.614	0.000		0.000	0.000	0.000	0.000	0.000	0.000	66.584

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT TC1: *MEDICAL CHEMICAL DEFENSE (BASIC RESEARCH)*	

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• TM2: *TECHBASE MED DEFENSE (APPLIED RESEARCH)*	0.000	0.000	118.208		118.208	110.294	97.308	130.654	130.654	Continuing	Continuing
• TC3: *MEDICAL CHEMICAL DEFENSE (ATD)*	25.486	21.789	0.000		0.000	0.000	0.000	0.000	0.000	0.000	47.275
• TM3: *TECHBASE MED DEFENSE (ATD)*	0.000	0.000	182.330		182.330	171.399	147.651	136.326	136.326	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT TR1: *MEDICAL RADIOLOGICAL DEFENSE (BASIC RESEARCH)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
TR1: *MEDICAL RADIOLOGICAL DEFENSE (BASIC RESEARCH)*	0.778	-	-	-	-	-	-	-	-	0.000	0.778

A. Mission Description and Budget Item Justification

This project (TR1) emphasizes the research and study of medical countermeasures to protect the Warfighter against radiation exposure. Specifically, this project identifies the basic action mechanisms of Acute Radiation Syndrome (ARS) and Delayed Effects of Acute Radiation Exposure (DEARE), as well as, develops possible radioprotectants (Pretreatments), post-irradiation exposure treatments (Therapeutics), and the ability to identify exposure to radiation (Diagnostics). These Basic Research efforts advance promising technology with the potential to rapidly identify, diagnose, prevent, and mitigate ARS and/or DEARE in the event of a radiological incident.

In FY12, all Project TR1 research will be realigned to Project LF1 - Life Sciences (Basic Research).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: 1) Medical Radiological Defense	0.778	-	-
Description: Research focuses on understanding mechanisms of injury from radiation exposure. In FY12, all Medical Radiological Defense efforts are re-aligned to a new project with BA1 - Life Sciences (Basic Research) (LF1). ***FY 2011 Accomplishments:*** Continued projects begun in FY10 to understand cellular and molecular responses to ionizing radiation and identify biomarkers of radiation exposure.			
Accomplishments/Planned Programs Subtotals	0.778	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• LF1: *CHEMICAL/BIOLOGICAL DEFENSE - LIFE SCIENCES (BASIC RESEARCH)*	0.000	24.838	34.563		34.563	36.147	33.814	40.389	40.389	Continuing	Continuing
• TM2: *TECHBASE MED DEFENSE (APPLIED RESEARCH)*	0.000	0.000	118.208		118.208	110.294	97.308	130.654	130.654	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2013 Chemical and Biological Defense Program			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601384BP: *CHEMICAL/BIOLOGICAL DEFENSE (BASIC RESEARCH)*	PROJECT TR1: *MEDICAL RADIOLOGICAL DEFENSE (BASIC RESEARCH)*	

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• TR2: *MEDICAL RADIOLOGICAL DEFENSE (APPLIED RESEARCH)*	2.083	0.806	0.000		0.000	0.000	0.000	0.000	0.000	0.000	2.889
• TM3: *TECHBASE MED DEFENSE (ATD)*	0.000	0.000	182.330		182.330	171.399	147.651	136.326	136.326	Continuing	Continuing
• TR3: *MEDICAL RADIOLOGICAL DEFENSE (ATD)*	2.402	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	2.402

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A