CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY: **RDT&E DEFENSE-WIDE/ BA2 - Applied Research**

PE NUMBER AND TITLE: **0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**

COST (In Thousands)		FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
	Total Program Element (PE) Cost	252343	266999	203731	187744	176347	186331	187026	Continuing	Continuing
CB2	CHEMICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)	128194	87984	110984	99931	91149	93975	94292	Continuing	Continuing
CI2	CONGRESSIONAL INTEREST ITEMS (APPLIED RESEARCH)	0	39480	0	0	0	0	0	0	39480
TB2	MEDICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)	93501	100935	54738	51114	50205	52457	52506	Continuing	Continuing
TC2	MEDICAL CHEMICAL DEFENSE (APPLIED RESEARCH)	29057	36627	36034	34726	33021	37927	38257	Continuing	Continuing
TR2	MEDICAL RADIOLOGICAL DEFENSE (APPLIED RESEARCH)	1591	1973	1975	1973	1972	1972	1971	Continuing	Continuing

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DATE
February 2008

BUDGET ACTIVITY
RDT&E DEFENSE-WIDE/
BA2 - Applied Research

PE NUMBER AND TITLE
0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

A. Mission Description and Budget Item Justification: The use of chemical and biological weapon systems in future conflicts is an increasing threat. Funding under this PE sustains a robust program, which reduces the danger of a chemical and/or biological (CB) attack and enables U.S. forces to survive and continue operations in a CB environment. The medical program focuses on development of vaccines, pretreatments, therapeutic drugs, and on casualty diagnosis, patient decontamination, and medical management. In the physical sciences area, the emphasis is on continuing improvements in CB defense materiel, including contamination avoidance, decontamination, and protection systems. This program also provides for applied research in the areas of real-time sensing and immediate biological countermeasures. This PE also provides concept and technology demonstrations of new system concepts that will shape the development for environmental monitoring, medical surveillance, and data mining/fusion/analysis subsystems. The work in this PE is consistent with the Chemical Biological Defense Program Research, Development, and Acquisition (RDA) Plan. Efforts under this PE transition to or provide risk reduction for Advanced Technology Development (PE: 0603384BP), Advanced Component Development and Prototypes (PE: 0603884BP) and System Development and Demonstration (PE: 0604384BP). Where appropriate, scientific discovery and advances are shared within the broader DoD Research, Development, Test and Engineering (RDT&E) Program. This project includes non-system specific development directed toward specific military needs and therefore is correctly placed in Budget Activity 2.

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BUDGET ACTIVITY: **RDT&E DEFENSE-WIDE/ BA2 - Applied Research**

PE NUMBER AND TITLE: **0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**

B. Program Change Summary:		FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2008 PB)		258862	305327	216705
FY09 President's Budget (FY 2009 PB)		252343	266999	203731
Total Adjustments		-6519	-38328	-12974
a. Congressional General Reductions		0	-77808	0
b. Congressional Increases		0	39480	0
c. Reprogrammings		-4006	0	0
d. SBIR/STTR Transfer		-2514	0	0
e. Other Adjustments		0	0	-12974

Change Summary Explanation:

Funding: FY08 - Congressional increases to enhance projects within the science and technology base (+$39,480K CI2). Congressional general reductions and other adjustments (-$26,760K CB2; -$50,777K TB2; -$254K TC2; -$17K TR2).

Schedule: N/A

Technical: N/A

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

COST (In Thousands)		FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
CB2	CHEMICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)	128194	87984	110984	99931	91149	93975	94292	Continuing	Continuing

A. Mission Description and Budget Item Justification:

Project CB2 CHEMICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH): The chemical and biological (CB) defense science and technology (S&T) program is devoted to the discovery, evaluation, and exploitation of technology. This project provides physical applied research to develop future, multi-disciplinary, multi-functional capabilities across critical operational areas: sense, shape, shield and sustain. These projects support the seamless addition of state-of-the-art-technologies, both evolutionary as well as revolutionary, into an integrated collection of systems across the spectrum of capabilities requisite to support CB missions. To achieve this, the activities are organized into four capability areas: detection, information systems technology, protection/hazard mitigation (decontamination), and threat agent science. This project focuses on horizontal integration of CB defensive technologies across the Joint Services.

B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Threat Agent Science	35214	15267	24115

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Threat Agent Sciences, Science Information Support - FY 07 - Completed OSD policy development efforts. Supported the Joint Community for policy development in support of CB Defense Operations. Completed data collection and generation to support policy development.	850	0	0
Threat Agent Sciences, Agent Characterization and Simulant Development - FY 07 - Continued research into Non traditional Agents (NTA) chemistry, characterizing synthetic pathways and NTA products, and developed NTA simulants. Continued simulant and methodology development projects to address requirements in programs of record, as aligned by the Test and Evaluation (T&E) community. Initiated simulant correlation studies to define operational envelopes in which simulants may be used for Developmental Tests and Operational Tests (DT/OT). FY 08 - Continue research into NTA chemistry, characterizing synthetic pathways and NTA products, and developing NTA simulants. Characterize novel & emerging BWAs and CWAs based on structure, physiochemical properties, and interactions. Design and demonstrate simulant and methodology development for testing protective equipment for the T&E community. Continue simulant correlation studies to define operational envelopes in that simulants may be used for DT/OT. Characterize simulant use and application. Establish analytical approaches and criteria for simulant selection, verification and validation, and correlation to agent performance. Initiate development of NTA simulants for limited set of physicochemical properties. Examine BWA & CWA masking technologies. FY 09 - Continue research into NTA chemistry, characterizing synthetic pathways and NTA products, and developing NTA simulants. Incorporate newly prioritized agents as identified by the intelligence community and operational users. Complete simulant and methodology development for protective equipment testing in collaboration with the T&E community. Continue simulant correlation studies to define operational envelopes in that simulants may be used for DT/OT. Incorporate computational chemistry research into simulant design and selection and methodologies for use in DT/OT. Continue development of NTA simulants matching material interaction properties and simulants for novel applications of traditional agents. Characterize masked agents.	4777	2037	5652

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DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: CB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Threat Agent Sciences, Low Level Toxicology, Low Level Chemical Warfare Agent Exposure Effects and Countermeasures (DTO CB51) - FY 07 - Completed extended inhalation studies that define extended time, low-level exposures to nerve agents GF and VX. Delivered scientifically-based acute exposure standards to the traditional chemical warfare agents for integration into operational risk management tools. Delivered refined human health risk assessment for HD inhalation exposures suitable for incorporation into Operational Risk Management processes.	5189	0	0
Threat Agent Sciences, Low Level Toxicology - Methodology Development - FY 07/08/09 - Initiate and complete development of technically demanded exposure and analytic methods for selected very low volatile chemical threat agents, such as non-traditional agents (NTAs) in support of DTO CB51 and DTO CB69.	1334	774	956
Threat Agent Sciences, Operational Toxicology - Chemical Warfare Agent Operational Exposure Hazard Assessment Research, NTA and Contact Toxicity (DTO CB69) - FY 07 - Initiated and completed research to establish the operational risk standards for military personnel potentially exposed to non-traditional chemical warfare agents as well as selected traditional threat agents. FY 08 - Using foundation studies, initiate under Low Level Toxicology, expanded and targeted studies that will directly lead to a human health risk assessment exposure standard for medical applications. For non-medical applications, studies will support efforts to establish detection and decontamination limits for technology development. FY 09 - Complete DTO CB69.	6657	2522	5057
Threat Agent Sciences, Operational Toxicology - Toxicokinetic and Toxicodynamic Modeling of Biological Agents - FY 07/08/09 - Initiate and complete development of empirically based mathematical models to characterize population dynamics of bacterial germination and migration within the body (toxicokinetics), and addressed infection of targeted tissue under natural and altered physiological states (toxicodynamics).	667	333	478

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Threat Agent Sciences, Agent Fate - Lab/Large-Scale Wind Tunnel Studies - FY 07 - Initiated studies of thickened Chemical Warfare Agents (CWAs). Refined protocols for laboratory wind tunnels and collected data on thickened CWAs evaporation. FY 08 - Implement protocols for laboratory wind tunnels and collect additional data on thickened CWAs evaporation and low volatility chemicals. FY 09 - Using protocols previously developed for laboratory wind tunnels, complete data collection for evaporation studies on thickened CWAs and low volatility chemicals for relevant substrates and nanotechnology developments.	3307	1698	2047
Threat Agent Sciences, Agent Fate - Fundamental Laboratory Measurements - FY 07 - Initiated kinetic studies of the fate of thickened CWAs on operationally relevant surfaces. FY 08 - Continue kinetic studies of the fate of thickened CWAs on operationally relevant surfaces to investigate newly identified phenomena. FY 09 - Continue kinetic studies of the fate of thickened CWAs on operationally relevant surfaces to investigate newly identified phenomena. Integrate characterization of new phenomena into models to be transitioned to the Joint Effects Model (JEM).	1333	699	819
Threat Agent Sciences, Agent Fate - Predictive Modeling - FY 07 - Developed evaporation models of thickened CWA using data from lab-scale wind tunnel data and field trials. Transitioned data to the Joint Effects Model (JEM). FY 08/09 - Complete the development of evaporation models of thickened CWAs on operationally relevant materials based data from lab-scale wind tunnel data and field trials. Continue the transition of data to the JEM.	2400	1411	1474

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

Accomplishments/Planned Program (Cont):	**FY2007**	**FY2008**	**FY2009**
Threat Agent Sciences, Agent Fate - Environmental Fate of Non-traditional Agents (NTA) (DTO CB68) - FY 07 - Initiated research to develop data sets of persistence and residual NTA concentration on operationally relevant surfaces (concrete, asphalt, painted surfaces, sand, soil, etc.). Characterized reactivity of the NTAs with surfaces, as well as surface penetration and the fate of NTAs over time. Methodology development is a primary thrust of this first year of this effort. FY 08 - Continue research to develop data sets of persistence and residual NTA concentration on operationally relevant surfaces (concrete, asphalt, painted surfaces, sand, soil, etc.). Characterize reactivity of the NTAs with surfaces, as well as surface penetration and the fate of NTAs over time. FY 09 - Continue research to develop data sets of persistence and residual NTA concentration on operationally relevant surfaces (concrete, asphalt, painted surfaces, sand, soil, etc.) and expand studies to include newly prioritized agents. Characterize reactivity of the NTAs with surfaces, as well as surface penetration and the fate of NTAs over time. Complete DTO and leverage the resulting data for use with future technology development.	3500	1303	2150
Threat Agent Sciences, Computational Chemistry - Quantitative Structure Activity Relationship (QSAR) - FY 07 - Transitioned Commercial off-the-shelf (COTS) QSAR toolsets to the CBDP. Identified and refined applicable QSAR developed by academia and industry, e.g., in pesticide studies, for use in the CBDP to describe interactions between conventional CWA and surfaces/materials of operational interest. FY 08 - Continue to identify and refine applicable QSAR developed by academia and industry, e.g., in pesticide studies, for use in the CBDP to describe interactions between conventional CWA and surfaces/materials of operational interest. Complete QSAR identification and final report.	1333	1123	0

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Threat Agent Sciences, Computational Chemistry - Quantum-Chemical Modeling (QCM) of CWA Interactions - FY 07 - Initiated Quantum-Chemical modeling effort to compute the interaction of CWA simulants and real CWAs on oxide surfaces and other surfaces/materials of operational interest. FY 08 - Continue Quantum-Chemical modeling effort to compute the interaction of CWA simulants and real CWAs on oxide surfaces and other surfaces/materials of operational interest. Benchmark and validate the capabilities to predict specific interactions of operational interest. FY 09 - Transition capabilities to Agent Characterization and Simulant Development to provide simulant design and selection methodology.	1200	1417	1701
Threat Agent Sciences, Computational Chemistry - QCM Tool Development - FY 07 - Initiated QCM dataset to develop QSAR between NTAs and surfaces/materials of operational interest. Established expertise and developed a baseline for well-characterized substrates before moving towards human toxicology QSAR toolsets. FY 08 - Continue development of QCM dataset to capture QSAR differences between NTAs and surfaces/materials of operational interest. FY 09 - Complete QCM dataset implementation to establish QSAR between NTAs and surfaces/materials of operational interest. Utilize expertise and baseline against well-characterized substrates and move toward human toxicology QSAR toolsets. Integrate computational chemistry capabilities into experimental planning and data utilization work.	2667	1950	3781
Total	**35214**	**15267**	**24115**

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

	FY 2007	FY 2008	FY 2009
Congressional Interest Items	25803	0	0

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Zumwalt Program for Countermeasures to Biological and Chemical Threats - FY 07 - Improved model development and sensor systems for the detection and identification of chemical and biological hazardous materials.	1288	0	0
Low-Cost Protective Chem-Bio Shelters - FY 07 - Refined evaluation of down-selected technologies for target applications.	2575	0	0
Theater Level Modeling of Chemical, Biological, Radiological, Operational Effects (CBROE) at the Level of Individual Soldier - FY 07 - Refined development algorithms and code-based tools to leverage the benefits of CBROE modeling methods into theater-level warfare models.	991	0	0
Chemical Biological Defense Program Initiative Fund - FY 07 - Solicited proposals from degree-granting universities, nonprofit organizations, or commercial concerns to include small businesses, in support of the CBDP to fund chemical and biological defense science and technology projects across a wide-range of military operations. Funded five projects that addressed toxin identification as a diagnostic tool, immunomodulators to enhance vaccine responses, vaccines optimization, and animal models for biological agent countermeasure development.	9902	0	0
Nanowire Mesh Fabrics for Chem/Bio Defense - FY 07 - Refined assessment of optimized materials against simulants and chemical warfare agents.	991	0	0

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Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Escape Hood - FY 07 - Developed the first draft of the 3M National Institute for Occupational Safety and Health (NIOSH) approved CBRN/Smoke Escape Hood product description, using the information from the Volatile Organic Compounds (VOC) analysis and the requirements of the NIOSH CBRN Air-Purifying Escape Respirators and Self-Contained Escape Respirators standard.	1783	0	0
Fault Protected Drives for Laser Diodes for Defense Use - FY 07 - Improved the reliability and lifetime of UV laser diodes. Improved the basic qualities of UV sources that enabled the production of prototype chemical and biological agent detection systems for protecting both our soldiers and civilian populations.	991	0	0
Specific Gas Detector - FY 07 - Developed a protocol to routinely produce and characterize various optimum catalytic oxides and oxide combinations for chemical properties and detection specificity. Identified thermodynamically optimum sensor structures onto which optimum catalytic oxides may be applied, and adapted at least one of these sensing structures to the optimum thermodynamic and electronic signal conditioning topology for specific gas species detection.	991	0	0
Personal Protection Against Infectious Agents - FY 07 - Determined the biological significance of experimental modifications to filtration media incorporated into respiratory masks for the purpose of altering viral penetration or viability. Evaluated the effect of antimicrobial agents on NIOSH-approved filtering face-piece respirators to help reduce the user's exposure to airborne viruses.	1783	0	0
Chemical Warfare Agent Fate Model Verification and Validation Phase 2 - FY 07 - Utilized the data generated from the Agent Fate DTO and the upcoming core Agent Fate Program for the purpose of developing, verifying, and validating a first principles model of chemical agent surface evaporation, absorption, and desorption on porous media.	991	0	0

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RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

Accomplishments/Planned Program (Cont):	**FY2007**	**FY2008**	**FY2009**
Chemical/Biological Infrared Detection System - FY 07 - Defined and developed the sampling sub-systems for biological (aerosolized) warfare agents that will be interfaced with optical identification approaches. The proposed identification approach utilizes Fourier Transform Infrared Spectroscopy as the agent identifier, where the main advantages of this approach are that they are 1) reagentless, 2) operate in complex air environments, 3) provide fast detection, 4) high sensitivity, and 5) high selectivity for bacterial spores with minimal false alarms.	1090	0	0
ND Center for Environmental Networked Embedded Sensor Technology (CENEST) - FY 07 - Developed and demonstrated an embedded network for detecting, tracking, and remediating toxic chem-bio agents released into ground, water, and/or air.	2427	0	0
Total	**25803**	**0**	**0**

	FY 2007	**FY 2008**	**FY 2009**
Information Systems Technology	23561	20115	26650

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Accomplishments/Planned Program	FY2007	FY2008	FY2009
Information Systems Technology, CBDP Decision Capability - FY 07 - Continued building the analytical framework. Continued to identify gaps in capability to conduct rapid program analysis and conducted feasibility assessments for tool(s) development. Continued development of representative prototype models for each of the capability areas. Identified critical enhancements based upon the early prototype of the multivariate decision support tool. Initiated decision support data inscription technology research. Continued development of Nuclear Biological Chemical Casualty and Resource Estimation Support Tool (NBC CREST). Initiated medical modeling area of research. FY 08 - Complete user-driven requirements analysis and develop prototype CBRN Investment Planning and Analysis Tool. Validate and verify NBC CREST 5.0, a set of human response models for CBRN agent exposure, based on NATO's Allied Medical Publication 8 (AMedP-8), for utilization by Joint Program Manager, Information Systems (JPM-IS). Select and implement a respiratory tract model and develop a prototype particle size distribution (PSD) health effects model. Initiate development of secondary infection models for disease spread based on small-world networks and an extension of the Susceptible-Exposed-Infectious-Removed (SEIR) epidemiological model to account for heterogeneous mixing among sub-populations in order to provide a well-founded model for casualty estimates in JEM involving infectious/contagious diseases, both bioagent-induced and naturally occurring (Predicting Effects Due to Infectious/Contagious Diseases for JEM). Continue building the analytical framework and identify gaps in capability to conduct rapid program analysis and conduct feasibility assessments for tool(s) development. Continue development of representative prototype models for each of the capability areas. Continue decision support data inscription technology and initiate distributed modeling research.	2686	5421	12706

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Bullet Text (cont)	FY2007	FY2008	FY2009
FY 09 - Continue research of modeling in the medical area. Transition NBC CREST to JOEF. Complete the implementation of the respiratory tract model and development of the prototype PSD health effects model. Continue development of secondary infection models for disease spread based on small-world networks and an extension of the SEIR epidemiological model to account for heterogeneous mixing among sub-populations in order to provide a well-founded model for casualty estimates in JEM involving infectious/contagious diseases, both bioagent-induced and naturally occurring (Predicting Effects Due to Infectious/Contagious Diseases for JEM). Continue building the analytical framework and identifying gaps in capability to conduct rapid program analysis and conduct feasibility assessments for tool(s) development. Continue development of representative prototype models for each of the capability areas. Initiate development of a web-based system for storage and access of CB M&S and IT development data and knowledge. Continue decision support data inscription technology and distributed modeling research.	2686	5421	12706
Information Systems Technology, Sensor Data Fusion - FY 07 - Selected the most appropriate tools for outdoor Source Term Estimation (STE). Tested first-generation outdoor STE and Sensor Placement Tool (SPT) algorithms against existent field data. Initiated building interior STE effort. Initiated Hazard Refinement (HR) algorithm development based on selected STE algorithm. Collected high-resolution field trial data for Verification and Validation (V&V) of outdoor STE, HR and SPT algorithms. Began development of initial biological background model to reduce sensor false alarms in a realistic environmental background. FY 08 - Process high-resolution field trial data and make available via data server to test first-generation outdoor STE, HR and SPT algorithms. Complete V&V of first-generation SPT algorithm. Begin development of second-generation SPT algorithm to include optimal hazard prediction capability. Complete prototype algorithm for building interior STE and begin development of building interior HR algorithms. Continue biological background model development to reduce sensor false alarms and produce a first generation prototype.	2400	5241	4980

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Bullet Text (cont)	**FY2007**	**FY2008**	**FY2009**
FY 09 - Complete testing and V&V of first-generation outdoor STE/HR and second-generation SPT algorithms. Complete development, testing and V&V of building interior STE and HR algorithms. Initiate development of advanced STE, HR and SPT tools for use in complex environments (e.g., variable terrain, urban, water.) Complete biological background model development to reduce sensor false alarms and incorporate a first generation model into virtual environment software. Initiate development of a tool that continuously refines and updates the contamination footprint through rapid assimilation of limited and disparate information into meteorological, transport and dispersion, and virtual environment models.	2400	5241	4980
Information Systems Technology, Battle Space Management - FY 07 - Continued Sensor Data Fusion (SDF) and source term location technologies. Developed the exchange and multi-level fusion of actionable information with real world Command and Control (C2) systems in DoD, Coalition and Homeland Security and Homeland Defense (HLS/HLD) domains. Supported JWARN Component Interface Device (JCID) development by modifying our existing Extensible Markup Language (XML) thin server for chemical sensors to meet JCID requirements and demonstrated its operation for JWARN. FY 08 - Continue SDF and source term location technologies for eventual integration with the Joint Effects Model (JEM) and the Joint Operational Effects Federation (JOEF). Demonstrate the exchange and multi-level fusion of actionable information with real world C2 systems in DoD, Coalition and HLS/HLD domains to be transitioned to JWARN under BA3 Advanced Technology Development in FY 09. Transition modified XML thin server for chemical sensors to meet JCID requirements to JWARN. FY 09 - Integrate SDF and source term location technologies into JEM and JOEF programs. Investigate and begin development of next generation technologies and net-centric enterprise integration capabilities. Explore Nano, Bio, Information Technology and Cognitive Science (NBIC) solutions in support of the Information Systems Technology.	6050	2836	2990

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Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Information Systems Technology, Chemical and Biological Hazard Environment Prediction - FY 07 - Continued development of data assimilation techniques to improve forecasts of near-surface characteristics important for hazard prediction. Continued development of models for high altitude, urban, littoral and coastal environments, and indoor scenarios to be used by the Joint Effects Model (JEM). Initiated development of variable resolution database containing highly refined estimates of "typical" atmospheric conditions for any given location and time. Began modeling of key physics for large scale events for the high altitude intercept module of JEM. Initiated validation of wind tunnel and FAST3D-CT with Oklahoma City Scale Model (OKC) field trial data. Published FY 07 validation report. Evaluated mesoscale model forecasts study using available observations for improved coastal and urban dispersion predictions. FY 08 - Complete development of data assimilation techniques to improve forecasts of near-surface characteristics important for hazard prediction. Complete development of models for high altitude, urban, littoral and coastal environments, and indoor scenarios to be used by JEM. Continue development of variable resolution database containing highly refined estimates of "typical" atmospheric conditions for any given location and time. Continue modeling of key physics for large scale events for the high altitude intercept module of JEM and provide validation procedures for urban contaminant transport models. Complete validation of wind tunnel and FAST3D-CT with urban field trial data and publish FY 08 validation report. Initiate development of advanced numerical weather prediction parameterizations and ensemble techniques. Deliver initial legacy source models, Industrial Facilities (IFAC), Industrial Transportation (ITRANS), and Chemical Biological Facilities (CBFAC) to JEM. FY 09 - Expand and improve data assimilation techniques to develop a multi-scale four-dimensional model. Continue development of advanced numerical weather prediction capabilities. Initiate optimization of methods to significantly improve performance of transport and dispersion hazard models for JEM. Develop advanced modeling for chemical, biological, and industrial source models (IFAC, ITRANS, and CBFAC).	4579	2836	1988

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Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Information Systems Technology, Chemical and Biological Warfare Effects on Operations - FY 07 - Continued integration with theater-level models and began initial testing with US Transportation Command (TRANSCOM) and other selected Combatant Commands (COCOMs) and investigated aggregation methodology for the CBRN in Tactical and Theatre Level Simulation Model. Investigated and developed building interior modeling capability. Initiated development of an Agent Fate model for eventual transition to the Joint Effects Model (JEM). Completed the Simulated Training and Analysis for Fixed Facilities/Sites (STAFFS) and contamination model linkages to be delivered under Advanced Technology Development (BA3). Completed the Chemical-Improvised Explosive Device (C-IED) study to be used for further developments and research focused on the Joint Operational Effects Federation (JOEF) and the CBRN Data Backbone efforts. Identified ongoing optimized sensor employment tool and initiated refinement for delivery to the Joint Warning and Reporting Network (JWARN) and JOEF. FY 08 - Integrate methodologies for CB effect on theater level models and test in Joint Forces Command (JFCOM) experiment to transition under BA3. Continue development of building interior modeling to transition to JOEF under BA3. Continue development of Agent Fate model and initiate transition to JEM under BA3. Conduct studies on CB effects for mobile forces and shipboard to be transitioned to JOEF in FY 09. Conduct studies on consequence management (CM) information system tools for DoD, including foreign CM and domestic CM and deliver a prototype CM system for JOEF. Deliver initial optimized sensor employment tool to JWARN and JOEF. Initiate studies and identify methodology development for CBRN decision support tools. FY 09 - Deliver methodology for CB effects on mobile forces and shipboard models to JOEF. Refine design and expand prototype system for CM and continue development of Incident Management/CM inclusions in consequence systems. Refine and expand methodology for CBRN decision support tools.	7846	3781	3986
Total	**23561**	**20115**	**26650**

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RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

	FY 2007	FY 2008	FY 2009
Decontamination	7221	5623	0

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Decontamination, Solution Chemistry - FY 07 - Completed chamber testing on chlorine dioxide-based candidates and transitioned to the Joint Portable Decontamination System (JPDS). Initiated research on technologies to develop hydrogen peroxide at their point-of-use. FY 08 - Complete research and publish findings on technologies to develop hydrogen peroxide at their point-of-use.	1685	2020	0
Decontamination, Solid Phase - FY 07 - Completed development of an improved filtration system for hydrofluoro ethers solvent cleaning systems and transitioned to the JSSED/JMDS program as a product improvement. Initiated new research to develop reactive sorbent nano-active suspensions and sprayable powders for Joint Service Transportable Decontamination System (JSTDS) - Small Scale (SS) including modifications of the technologies for decontamination in extreme weather conditions. FY 08 - Complete efforts to develop reactive sorbent nano-active suspensions and sprayable powders for JSTDS and consolidate efforts under Protection capability area in FY 2009.	1747	940	0
Decontamination, Alternative Process - FY 07 - Completed research on gaseous decontamination system to modify system to handle extreme weather conditions. Initiated research to demonstrate alternative decontamination processes using gas, kinetic, energetic, and/or novel approaches. FY 08 - Continue to investigate novel approaches to develop new decontamination processes and consolidate effort under Protection capability area in FY 2009.	1919	1643	0

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Decontamination, Process Fundamentals - FY 07 - Completed research into methodology for the metal catalyzed alcoholysis of neutral organophosphates and organophosphates, including chemical G- and V-agents under neutral conditions and ambient temperature. Continued research efforts to develop an aerosol-based decontamination application and determine the efficacy effects using aerosolized activated hydrogen peroxide. Continued development of a decontamination assurance spray that was initiated as part of Small Business Innovative Research (SBIR), and initiated research to determine the effect of droplet sized decontaminant on the efficacy of aerosolized peroxy-based decontaminants. FY 08 - Complete research efforts to develop an aerosol-based decontamination application and determine the efficacy effects using aerosolized activated hydrogen peroxide. Complete research to determine the effect of droplet sized decontaminant on the efficacy of aerosolized peroxy-based decontaminants.	1870	1020	0
Total	**7221**	**5623**	**0**

	FY 2007	FY 2008	FY 2009
Detection	23127	27263	32043

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Point Detection, Integrated CB -	6660	4600	7299

FY 07 - Continued feasibility assessment of first generation breadboard based on millimeter wave spectroscopy for biological detection. Completed Raman spectroscopy for the detection/identification of biological materials. Completed investigations in solid state visible and UV receivers to replace photomultiplier tube for improved size, weight, power, reliability, and cost. Continued microelectronic machine sized solid state Fourier Transformed Infrared (FTIR) point sensor system. Initiated feasibility studies on assays for biological materials based on multiphoton, multi-wavelength processes. Initiated development of novel use of laser technology to separate biological materials for enhanced detection of biological warfare agents in water. Initiated development of novel laser sources and evaluation of discrimination capability and optical design aspects for BW aerosol detection with these sources. Initiated feasibility studies on the use of novel nanowire-array sensors for enhanced sensitivity and selectivity in the detection of biological warfare materials.

FY 08 - Complete feasibility assessment of first generation breadboard based on millimeter wave spectroscopy for biological detection. Complete microelectronic machine sized solid state FTIR point sensor system. Continue feasibility studies on assays for biological materials based on multiphoton, multi-wavelength processes. Continue development of novel use of laser technology to separate biological materials for enhanced detection of biological warfare agents in water. Continue development of novel laser sources and evaluation of discrimination capability and optical design aspects for BW aerosol detection with these sources. Continue feasibility studies on the use of novel nanowire-array sensors for enhanced sensitivity and selectivity in the detection of biological warfare materials. Initiate feasibility study into nanoscale detection systems.

FY 09 - Complete feasibility studies on assays for biological materials based on multiphoton, multi-wavelength processes. Complete development of novel use of laser technology to separate biological materials for enhanced detection of biological warfare agents in water. Complete development of novel laser sources and evaluation of discrimination capability and optical design aspects for BW aerosol detection with these sources. Complete feasibility studies on the use of novel nanowire-array sensors for enhanced sensitivity and selectivity in the detection of biological warfare materials. Continue feasibility study into nanoscale detection systems.

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Detection, Biological and Chemical Stand-off Technology - FY 07 - Continued the development of models to predict passive standoff technology responses to aerosols. Continued the study on the detection modalities to detect sentinel species from biological chemical warfare materials and processes. Continued the studies to investigate the optimal performance parameters for hyperspectral technology to detect biological materials. Continued studies to optimize/convert detection algorithms to imaging technology. Initiated validation and modeling studies to increase the level of discrimination of biological materials in the infrared electromagnetic spectral regions based upon DISC/DIAL and polarization spectra techniques. FY 08 - Complete models to predict passive standoff technology responses to aerosols. Continue the study on the detection modalities to detect sentinel species from biological warfare materials and processes. Complete studies to investigate the optimal performance parameters for hyperspectral technology to detect biological materials. Complete studies to optimize/convert detection algorithms to imaging technology. Complete and transition validation and modeling studies on the level of discrimination of biological materials in the IR electromagnetic spectral regions based upon adsorption, scattering, and polarization spectra techniques to the Joint Biological Standoff Detection System (JBSDS) Increment 2.	4170	3945	0

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

Accomplishments/Planned Program (Cont):	**FY2007**	**FY2008**	**FY2009**
Detection of CB Contamination on Surfaces - FY 07 - Continued the development of technology to meet the needs to detect contamination on surfaces in a post decontamination application. Initiated feasibility studies on post-decontamination verification using standoff detection methodology other than Raman based Laser Interrogation of Surface for Agents (LISA). FY 08 - Continue the development of technology to meet the needs to detect contamination on surfaces in a post decontamination application. Complete efforts using off-gassing techniques and Raman based LISA. Complete feasibility studies on post-decontamination verification using standoff detection methodology. FY 09 - Continue the development of technology to meet the needs to detect contamination on surfaces in a post decontamination application. Evaluate and assess technology for down-selection from non-Raman optical standoff techniques vs. Raman based LISA vs off-gassing techniques for brassboard design.	3995	4800	7000
Point Detection, Biological Identification - FY 07 - Initiated development of portable technology to completely sequence entire pathogen genomes based upon the sequencing thru synthesis concept. Leveraged technology from the National Institutes of Health efforts to reduce cost at their genomic centers. FY 08 - Continue development of portable technology to completely sequence entire pathogen genomes based upon the sequencing thru synthesis concept. Complete breadboard design and initiate build of prototype system and transition to BA3. FY 09 - Complete development and demonstrate portable technology to completely sequence entire pathogen genomes. Initiate new techbase concept development of nano-scale biological agent identification and sensing technologies.	4103	8200	9744

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

Accomplishments/Planned Program (Cont):	**FY2007**	**FY2008**	**FY2009**
Point Detection, Chemical - FY 07 - Initiated transition of technology from Defense Advanced Research Projects Agency (DARPA) on the development of a micro gas analyzer (MGA) based on Micro Electro-Mechanical Systems (MEMS) technology. Focused on real-time (less than 5 sec) detection/identification of sub miosis sensitivity levels (parts per trillion) and the expansion of the number of detectable materials to include the high priority Toxic Industrial Chemicals (TICs). FY 08 - Complete transition of MGA technology from DARPA. Initiate development of MGA technology for integration into a possible next generation chemical warfare agent detector. FY 09 - Continue development of MGA technology as the replacement technology for next generation chemical warfare agent detector.	4199	5718	8000
Total	**23127**	**27263**	**32043**

	FY 2007	**FY 2008**	**FY 2009**
Protection	13268	18661	28176

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Protection, Percutaneous Protection, Reduced Physiological Burden - FY 07 - Initiated work to develop a processable interpenetrating polymer network comprising of a soft breathable passive network interspersed with a conducting polymer network whose permeability properties can be electrically controlled. Developed elastic, conformable CB protective fabrics with selectively permeable properties for advanced warfighting ensembles. Optimized polymers and blends for application in elastomeric permselective membranes, characterized their permeation characteristics, and evaluated their physical properties. Produced fabric laminates for laboratory evaluation. Technologies support future protective ensembles. Restructured efforts for enhanced protection into the development of an integrated CB protective fabric that incorporates elements of previous efforts on enhanced percutaneous protection (aerosol Non-Traditional Agents (NTA), biological agents, liquid NTAs, and Toxic Industrial Chemicals (TICs)) and self-detoxifying materials into a single integrated effort. For FY 2008, this effort will be titled "Individual Protection, Integrated Protective Fabric" and combines Integrated Protective Fabrics Enhanced Protection and Reduced Burden.	900	0	0
Individual Protection, Percutaneous Protection, Enhanced Protection (Aerosol NTAs and Bio) - FY 07 - Produced and evaluated an optimized second-generation prototype garment employing both aerosol barrier materials and advanced closures. Developed one square meter non-woven polymer membranes material, incorporated into a prototype fabric system and assessed performance. Restructured efforts for enhanced protection into the development of an integrated CB protective fabric that incorporated elements of previous efforts on enhanced percutaneous protection (aerosol NTA, biological agents, liquid NTAs, and TICs) and self-detoxifying materials into a single integrated effort. For FY 2008, this effort will be titled "Individual Protection, Integrated Protective Fabric" and combines Integrated Protective Fabrics Enhanced Protection and Reduced Burden.	1287	0	0

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

Accomplishments/Planned Program (Cont):	**FY2007**	**FY2008**	**FY2009**
Individual Protection, Percutaneous Protection, Enhanced Protection (Liquid NTAs and TICs) - FY 07 - Based on FY06 evaluations, optimized novel fiber/fabrics and conducted fabric characterization and simulant permeation testing. Conducted preliminary physical and chemical testing of candidate materials for glove and boot applications. Restructured efforts for enhanced protection into the development of an integrated CB protective fabric that incorporates elements of previous efforts on enhanced percutaneous protection (aerosol NTA, biological agents, liquid NTAs, and TICs) and self-detoxifying materials into a single integrated effort. For FY 08, this effort will be titled "Individual Protection, Integrated Protective Fabric" and combines Integrated Protective Fabrics Enhanced Protection and Reduced Burden.	1475	0	0
Individual Protection, Integrated Protective Fabric - FY 08 - Complete work on identifying and assessing nanocatalytic and nano-particle reactive materials with detoxifying and anti-microbial properties and down-selecting candidate materials. Continue development of test methodologies. Continue the development of elastic, conformable CB protective fabrics with selectively permeable properties. Continue development of processable interpenetrating polymer networks whose permeability properties can be electrically controlled. Initiate work on fabric residual life indicators. Initiate selection and development of novel sorbents leap-ahead improvements over activated carbon technologies. Initiate development and selection of ultralight and tactile barrier materials for gloves and boots. Continue fabrication and testing of prototype integrated fabrics to determine protection, mechanical properties, and heat transfer characteristics. Continue use of computational methods for assessment and refinement of prototypes. Initiate ensemble design conceptual work based on lessons gathered in the human performance project.	0	4600	5800

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Bullet Text (cont)	FY2007	FY2008	FY2009
FY 09 - Complete development of test methodologies. Continue development of elastic, conformable CB protective fabrics with selectively permeable properties. Continue development of processable interpenetrating polymer networks whose permeability properties can be electrically controlled. Continue work on fabric residual life indicators that can be automatically integrated. Continue development of novel sorbents leap-ahead improvements over activated carbon technologies. Complete development work on ultra light and tactile barrier materials for gloves and boots. Continue fabrication and testing of prototype integrated fabrics to determine protection, mechanical properties, and heat transfer characteristics. Continue use of computational methods for assessment and refinement of prototypes. Continue ensemble design conceptual work based on lessons gathered in the human performance project. Initiate fabrication of prototype ensembles for evaluation and demonstration. Resulting technologies/knowledge will transition to an integrated fabric development project in support of the Future Force Warrior Demonstration of the Soldier-as-a-System Ground Program and Joint Chemical Ensemble (JCE) in FY 10.	0	4600	5800
Individual Protection, Human Performance - FY 08 - Continue the comprehensive study to reduce physiological burden on the human performance parameters for various warfighter subgroups in the performance of their mission when CB protective systems are employed. Identify trade space between physiological and psychological comfort with regards to warfighter effectiveness. Initiate work to develop an overall comfort and performance model for CB protective equipment. Continue human subject studies on effects of breathing rates and resistance during high work rates and develop a human response model. FY 09 - Complete the comprehensive study to reduce physiological burden on the human performance parameters for various warfighter subgroups in the performance of their mission when CB protective systems are employed. Publish findings on trade space between physiological and psychological comfort with regards to warfighter effectiveness. Continue work to develop an overall comfort and performance model for CB protective equipment. Complete human subject studies on the effects of breathing rates and resistance during high work rates. Transition results into the comfort and performance model. Additionally, use results to develop a draft standard for Air Purifying Respirator (APR) qualification.	0	2902	2851

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

Accomplishments/Planned Program (Cont):	**FY2007**	**FY2008**	**FY2009**
Individual Protection, Self-Decontaminating Processes - FY 09 - Continue efforts from FY 08 Decontamination Alternative Processes and Solid Phase to develop self decontaminating processes using gas, kinetic, energetic, and/or novel approaches.	0	0	6135
Respiratory Protection, Enhanced CBRN/NTA/TIC Protection - FY 07 - Initiated Individual Protection, Respiratory/Ocular Protection projects. Initiated the investigation of intelligent seal enhancement materials and technologies that will provide improvements in the field protection factor performance and comfort of a respirator. Defined the key development parameters associated with respiratory protective systems and analyzed advanced concept options based on these parameters by establishing geometric relationships with operational performance. Continued to develop a dual-cavity respirator with increased levels of respiratory protection that provide a real-time indication of mask fit. Initiated project to develop the next generation filter for individual protection with objective of decreasing weight and breathing resistance, reducing the profile, and increasing protection against TICs. Continued to develop metal-organic frameworks as tuneable sorbents for advance air purification technologies in protective masks. Initiated development of a process to grow alumina nanofiber on a silica matrix to optimize size and density of nanofibers.	1826	4910	5850

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CB2**

Bullet Text (cont)	**FY2007**	**FY2008**	**FY2009**
FY 08 - Initiate the integration of the protective mask designs with developmental helmet systems to provide seamless compatibility of CB protection with ballistic protection and integration of communication and optical systems and incorporate into designs under BA3 efforts. Continue the investigation of intelligent seal enhancement materials and technologies that will provide improvements in the field protection factor performance and comfort of a respirator. Continue to define the key development parameters associated with respiratory protective systems and incorporate data and lessons from the human performance project. Continue to develop a dual-cavity respirator with increased levels of respiratory protection that provide a real-time indication of mask fit. Continue project to develop the next generation filter for individual protection. Continue to develop metal-organic frameworks as tuneable sorbents for advanced air purification technologies in protective masks. Initiate development of nanofiber-based filters with high efficiency, reduced pressure drop and reduction in weight and cube. Continue development of a process to grow alumina nanofiber on a silica matrix to optimize size and density of nanofibers. Initiate effort to develop a sorptive and reactive capacity residual life indicator for mask filters. Initiate reactive hybrid approaches for individual protection filtration.	1826	4910	5850
FY 09 - Complete integration of the protective mask designs with developmental helmet systems to provide seamless compatibility of CB protection with ballistic protection and integration of communication and optical systems and incorporate into designs under BA3 efforts. Complete the investigation of intelligent seal enhancement materials and technologies that will provide improvements in the field protection factor performance and comfort of a respirator. Continue to define the key development parameters associated with respiratory protective systems and incorporate data and lessons from the human performance project. Complete work on the dual-cavity respirator with increased levels of respiratory protection that provide a real-time indication of mask fit and integrate concept into the final design. Continue project to develop the next generation filter for individual protection. Complete development of metal-organic frameworks as tuneable sorbents for advance air purification technologies in protective masks. Complete the down-selection of ceramic and polymer nanofiber-based filters. Continue reactive hybrid approaches for individual protection filtration. Develop and fabricate initial prototypes and evaluate performance.			

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Protection, Advanced Air Purification (AAP) System Model (DTO CB61) - FY 07 - Developed several potential system configuration designs. Completed work on a trade study tool for the optimization, sensitivity analysis, and assessment of AAP systems. Defined standard AAP test methods and procedures. Supported AAP demonstration programs (design review, requirements review, test plan) and incorporated demonstration data into the AAP database. Optimized the demonstration to best meet the intended application's requirements. Closed a critical data gap by linking full-scale simulant results to lab scale simulant and agent results. Characterized chemical performance of the demonstrator at untested conditions. Characterized scaling properties and integration sensitivities of demonstrator. Verified agent performance at full-scale and provided data to AAP model required to estimate agent performance. Completed DTO and transitioned the Air Purification Evaluation Tool to Overarching Collective Protection (COLPRO) Model.	500	0	0
Protection, Improved Single-Pass Filters - FY 07 - Investigated adding ethylene oxide, nitrogen dioxide and carbon monoxide functionalities to CP filters. Transitioned results of investigations on polishing sorbent technology Pressure Swing Adsorption (PSA), Temperature Swing Adsorption (TSA) and Pressure/Temperature Swing Adsorption (P/TSA) to JPM COLPRO. Completed sorbent work on enhanced performance of single-pass filters and regenerative systems and transitioned data to DTO CB61. Resulting technologies/knowledge transitioned to an integrated fabric development project in support of the Ground Soldier System for Future Combat Systems. Initiated the development of a highly efficient particulate filter that uses charged sub-micron water droplets and transitioned effort to Novel Air Purification Technologies.	1185	0	0

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	CB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Protection, Novel Air Purification Technologies - FY 08 - Initiate a project to develop energetic, reactive, media-less, air purification technologies that reduce size, weight, and lifecycle costs of removing Chemical and Biological agents and Toxic Industrial Chemicals (TICs) from both make-up and recirculation air in buildings, shelters or platforms. Initiate development of an acoustic fractionator that removes particulates down to the submicron level using standing sound waves. Initiate development of a hybrid plasma filter that provides both vapor particulate removal and destruction capabilities. Initiate development of a new air purification technology based on selective ionization and contaminant extraction. Initiate development of a novel, low pressure drop, High Efficiency Particulate Arrestance (HEPA) filter, which provides increased dust capacity and extended filter life through the use of irregularly shaped high surface area submicron fibers. Continue development of a highly efficient particulate filter that uses charged sub-micron water droplets from efforts under Improved Single-Pass Filters. FY 09 - Continue to develop energetic, reactive, media-less, air purification technologies that reduce size, weight, and lifecycle costs of removing Chemical and Biological agents and TICs from both make-up and recirculation air in buildings, shelters, or platforms. Continue development of an acoustic fractionator that removes particulates down to the submicron level using standing sound waves. Continue development of a hybrid plasma filter that provides both vapor particulate removal and destruction capabilities. Continue development of a new air purification technology based on selective ionization and contaminant extraction. Continue development of a novel, low pressure drop, HEPA filter, which provides increased dust capacity and extended filter life through the use of irregularly shaped high surface area submicron fibers. Complete demonstration of a highly efficient media less particulate filter that uses charged sub-micron water droplets and down-select among technological approaches for further development.	0	3100	3900
Protection, Regenerative and Reactive Air Purification - FY 07 - Optimized Temperature Swing Adsorption (TSA) and Electrical Swing Adsorption (ESA) operating parameters, adsorber design and test. Demonstrated air purification system based on selective ionization and contaminant extraction technology. Continued development of Reactive Air Purification technologies and transition to COLPRO System Integration in FY 2008.	2460	0	0

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: CB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Protection, Shelter Systems and Contamination Control Area (CCA)/Airlock/Toxic Free Area (TFA) (CCA/A/TFA) - FY 07 - Identified novel technologies for application in the CCA/A/TFA and developed initial CATFA processing system design and transitioned to COLPRO System Integration in FY 2008.	1770	0	0
Protection, Shelter Materials, Coatings and Materials Treatments, Reactive or Self-Decontaminating - FY 07 - Performed laboratory demonstration of coatings that will form a gas impermeable film for expedient encapsulation and CB hardening of existing structures. Performed vapor challenge with integrated shelter system components. Performed casting of barrier films upon hard & soft substrates and performed simulant permeability testing of microcrystalline and nanocrystalline cellulose barrier films and transitioned to COLPRO System Integration in FY 2008.	1865	0	0
Protection, COLPRO System Integration - FY 08 - This effort transitions technologies from previous efforts of Regenerative and Reactive Air Purification, Shelter Systems and CCA/A/TFA, and Shelter Materials, Coatings and Materials Treatments, Reactive or Self-Decontaminating. Continue project to investigate alternate system solutions and technologies for COLPRO. Technologies may include, but will not be limited to, micro fine detoxifying aerosol fogs to facilitate entry and mitigate cross contamination into the COLPRO system, internal self-detoxifying surfaces for walls and ductwork, expedient retrofit kits, self-detoxifying and expedient strippable coatings, rapid isolation and purge schemes, and novel and innovative air flow and recirculation schemes. Expand study of system and alternatives and initiate efforts addressing specific technological gaps for COLPRO development. FY 09 - Continue project to investigate alternate system solutions and technologies for COLPRO. Technologies may include, but will not be limited to, micro fine detoxifying aerosol fogs to facilitate entry and mitigate cross contamination into the COLPRO system, internal self-detoxifying surfaces for walls and ductwork, expedient retrofit kits, self-detoxifying and expedient strippable coatings, rapid isolation and purge schemes, and novel and innovative air flow and recirculation schemes. Complete the study of system alternatives and initiate efforts addressing specific technological gaps for COLPRO development.	0	3149	3640
Total	**13268**	**18661**	**28176**

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY: **RDT&E DEFENSE-WIDE/ BA2 - Applied Research**

PE NUMBER AND TITLE: **0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**

PROJECT: **CB2**

	FY 2007	FY 2008	FY 2009
SBIR/STTR	0	1055	0

Accomplishments/Planned Program	FY2007	FY2008	FY2009
SBIR - FY 08 - Small Business Innovative Research.	0	1055	0
Total	**0**	**1055**	**0**

C. Other Program Funding Summary:

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	To Compl	Total Cost
CB3 CHEMICAL BIOLOGICAL DEFENSE (ATD)	103420	20499	19242	21745	14112	14178	13695	Cont	Cont
TT3 TECHBASE TECHNOLOGY TRANSITION	15616	7817	8241	8389	8253	9343	9445	Cont	Cont

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CI2**

COST (In Thousands)		FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
CI2	CONGRESSIONAL INTEREST ITEMS (APPLIED RESEARCH)	0	39480	0	0	0	0	0	0	39480

A. Mission Description and Budget Item Justification:

Project CI2 CONGRESSIONAL INTEREST ITEMS (APPLIED RESEARCH):

B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Congressional Interest Items	0	38911	0

Accomplishments/Planned Program	FY2007	FY2008	FY2009
CBDP Initiative Fund Applied Research - FY 08 - Solicit proposals from degree-granting universities, nonprofit organizations, or commercial concerns to include small businesses, in support of the CBDP to fund chemical and biological defense science and technology projects across a wide-range of military operations. Upon technical evaluation and selection of proposals, provide a report detailing the number of projects funded and areas of research.	0	7885	0
Rapid Forensic Evaluation of Microbes in Biodefense.	0	986	0
Chem/Bio IR Detection System.	0	1577	0
Rapid Detection of Bacterial Pathogens.	0	1577	0

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DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: CI2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Zumwalt National Program for Countermeasures to Bio Chem Threats - FY 08 - Continue research to improve model development and sensor systems for the detection and identification of chemical and biological hazardous materials.	0	985	0
Point-of-Care Diagnostic System - FY 08 - Develop a gel-drop, microarray device as a biological agent identification and diagnostic system. This system will provide an enhanced capability to rapidly detect, locate, identify, and confirm the presence or absence of any standard or non-standard NBC hazard.	0	986	0
Virus Mutation and Virus Transfer from Humans to Animals - FY 08 - Conduct research on virus mutation and human to animal transfer.	0	2957	0
HyperAcute Vaccine Development - FY 08 - Research and develop a new vaccine technology for use against viral biological warfare agents.	0	1459	0
Antibody-based Therapeutic against Smallpox.	0	986	0
Novel Viral Biowarfare Agent Identification and Treatment (NOVBAIT) - FY 08 - Research a new approach for the identification and treatment of viral diseases caused by exposure to biowarfare agents.	0	3154	0
Mixed Oxidants for Chemical and biological Decontamination - FY 08 - Develop a rapidly effective, mild oxidants for military applications.	0	3942	0
Self-Decontaminating Polymer System for Chem and Bio Warfare - FY 08 - Develop a self-decontaminating fabric materials containing polymer-based coating systems impregnated with reactive materials for CBWA destruction, which can be activated on demand.	0	5519	0
Multifunctional Particles for Defeating Chem and Bio Warfare Agents (CBWA) - FY 08 - Conduct research to improve the absorbent materials used in clothing designed to protect against chemical and biological agents.	0	986	0

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**CI2**

Accomplishments/Planned Program (Cont):	**FY2007**	**FY2008**	**FY2009**
Research on a Molecular Approach to Hazardous Materials Decontamination.	0	1182	0
Biosurety Development and Management Program - FY 08 - Conduct research to develop a program to help secure laboratories working with biological agents.	0	788	0
Countermeasures to Chemical/Biological Control-Rapid Response - FY 08 - Research support of biodefense and emerging infectious disease.	0	3942	0
Total	**0**	**38911**	**0**

	FY 2007	**FY 2008**	**FY 2009**
SBIR/STTR	0	569	0

Accomplishments/Planned Program	**FY2007**	**FY2008**	**FY2009**
SBIR - FY 08 - Small Business Innovative Research.	0	569	0
Total	**0**	**569**	**0**

C. Other Program Funding Summary: N/A

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CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**TB2**

COST (In Thousands)		FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
TB2	MEDICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH)	93501	100935	54738	51114	50205	52457	52506	Continuing	Continuing

A. Mission Description and Budget Item Justification:

Project TB2 MEDICAL BIOLOGICAL DEFENSE (APPLIED RESEARCH): This project area funds applied research developing vaccines, therapeutic drugs, and diagnostic capabilities which provide an effective medical defense against validated biological threat agents including bacteria, toxins, and viruses. Innovative biotechnology approaches will be incorporated to advance medical systems designed to rapidly identify, diagnose, prevent, and treat disease due to exposure to biological threat agents. Categories for this project area include core science and technology program areas in medical biological defense capability areas (Pretreatments, Diagnostics, Therapeutics) and directed research areas such as the Defense Technology Objectives (DTO), the Chemical and Biological Defense Initiative (CBDI) fund and the Transformational Medical Technologies Initiative (TMTI). The TMTI was launched in FY06 as a key Quadrennial Defense Review initiative to respond to the threat of emerging or intentionally bioengineered biological threats. It augments the core science and technology area by expanding the novel programs currently funded under the core Therapeutics program and introducing new technologies for developmental focus. The TMTI is a novel experiment to develop drugs that are broad spectrum in nature by using non-traditional and high risk approaches to accelerate the development and licensure of new medicines. Applied research efforts supported under this initiative are focused on the evaluation of broadspectrum therapeutic candidates with activity against intracellular pathogen and hemorrhagic fever virus infection, and rapid resequencing technologies. Teaming the core program and TMTI provides a complementary strategy (single agent versus broad spectrum, conventional versus emerging threats and established model systems versus expanded integration of novel technology, respectively) towards the development of effective medical countermeasures against biothreat agents.

B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Congressional Interest Items	7331	0	0

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Multi-purpose Biodefense Immuno Array - FY 07 - Developed protein microarrays to measure immune responses to hemorrhagic virus, two pox viruses and bacillus anthracis proteomes. The arrays will provide new knowledge to aid in the development of new vaccines, therapeutics and diagnostics.	1090	0	0
Botulinum Neurotoxin Research (Only for Research on fluorescence resonance energy transfer assays and antagonists) - FY 07 - Developed a new assay designed to detect Botulinum (A-G) in the environment and on exposed animals, humans, and culture cells.	2377	0	0
Alternative Delivery Methods for Recombinant Protein Vaccines - FY 07 - Developed countermeasures against bioterrorist attack by evaluating advanced vaccine delivery platforms that can be deployed rapidly and that allow self-vaccination.	1882	0	0
FY 07 - Asymmetrical Protocols for Biological Defense Enhancement.	991	0	0
FY 07 - National Center for Integrated Civilian-Military Medical Response and Homeland Defense (only for DoD military activities).	991	0	0
Total	**7331**	**0**	**0**

	FY 2007	FY 2008	FY 2009
Transformational Medical Technologies Initiative	48537	61564	17430

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: TB2

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Multiagent (Broad Spectrum) Medical Countermeasures -	48537	61564	17430
FY 07 - Initiated evaluation of novel compounds for anti-bacterial effects against intracellular bacterial pathogens in preparation for Investigational New Drug (IND) submission. Continued pre-IND studies for antisense RNA therapeutics against hemorrhagic fever virus pathogens. Evaluated novel inhibitors for effectiveness against hemorrhagic fever viruses and intracellular bacterial pathogens. Initiated evaluation of genetic methods for identifying broad spectrum host pathway therapeutic targets. Initiated evaluation of specific compounds designed to inhibit key pathogen and/or host target molecules.			
FY 08 - Pursue drug discovery and development efforts for antimicrobial compounds, antibody technologies, host directed therapeutics, and adjunctive therapies to augment innate immunity or attenuate pathogenesis or sepsis cascades. Continue the evaluation of novel compounds for anti-bacterial effects against intracellular bacterial pathogens in support of IND submission. Evaluate and validate studies of antisense RNA therapeutic candidate drugs against hemorrhagic fever virus pathogens in preparation and support of IND studies. Continue the evaluation of novel inhibitors of hemorrhagic fever viruses and intracellular bacterial pathogens. Continue the evaluation and development of genetic methods for identifying broad spectrum host pathway therapeutic targets. Initiate studies designed to develop and characterize novel immunoadjuvant compounds. Expand the evaluation of specific compounds designed to inhibit key pathogen and/or host target molecules. Initiate development of flexible platform technologies for therapeutic discovery, development, and manufacturing that are rapidly adaptable to newly identified threats. Efforts are designed to support eventual Food and Drug Administration (FDA) licensure of new non-licensed anti-microbial compounds, or new indications for licensed products for use in the treatment of biological warfare casualties.			

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY: **RDT&E DEFENSE-WIDE/ BA2 - Applied Research**

PE NUMBER AND TITLE: **0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**

PROJECT: **TB2**

Bullet Text (cont)	FY2007	FY2008	FY2009
FY 09 - Accelerate drug development efforts for lead antimicrobial compounds, antibody technologies, host directed therapeutics, and adjunctive therapies to augment innate immunity or attenuate pathogenesis or sepsis cascades. Continue to evaluate novel compounds for anti-bacterial effects against intracellular bacterial pathogens. Further evaluate and validate studies of antisense RNA therapeutic candidate drugs against hemorrhagic fever virus pathogens in preparation and support of IND studies. Maintain efforts to evaluate novel inhibitors of hemorrhagic fever viruses and intracellular bacterial pathogens. Develop genetic methods for identifying broad spectrum host pathway therapeutic targets and begin the evaluation of new approaches to inhibit these therapeutic targets. Evaluate promising immunoadjuvant compounds in combination with lead therapeutic candidates. Continue to expand the evaluation of specific compounds designed to inhibit key pathogen and/or host target molecules. Pursue promising platform technology development.	48537	61564	17430
Total	**48537**	**61564**	**17430**

	FY 2007	FY 2008	FY 2009
Diagnostics	9142	9102	7605

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Diagnostic Technologies -	6416	7502	7605

FY 07 - Used animal models exposed to biothreat agents to identify the optimal matrices/tissues for biological pathogen identification and determined testing windows of diagnostic opportunity using Service developed assays. Expanded design of multiplexed assays to include immunoassays. Optimized confirmatory tests for ricin and botulinum toxins. Continued research directed at increasing sample concentration and extending pathogen viability prior to testing. Augmented database for a DARPA transitioned broad range pathogen detection system capable of potentially identifying genetically engineered strains. Utilized proteomics data to design immunologic assays for biological pathogen detection. Maintained technological assessment of components of next generation diagnostic devices. Developed a decision matrix to effectively assess next generation diagnostic devices. Investigated technologies capable of integrating nucleic acid and immunodiagnostic testing to support the JBAIDS next generation diagnostic capability. Pursued rapid sequencing methods to enhance diagnostic capabilities of existing Polymerase Chain Reaction (PCR)-based assays. Initiated development of real time PCR assays to identify genes responsible for antibiotic resistance in biothreat agents. Continued to use recombinant DNA technologies to enhance immunologic reagent production.

FY 08 - Apply decision matrix to developmental testing on next generation diagnostic devices with an emphasis on technologies capable of integrating sample preparation and nucleic acid and immunodiagnostic testing. Initiate a study of laboratory based research targeting the diagnostic implications of toxins in the body and their relevant analytical parameters. For additional agents, use animal models exposed to BWAs to identify the optimal matrices/tissues for biological pathogen identification and determine test windows of diagnostic opportunity. Incorporate multiplexed immunoassays onto existing platforms. Test recombinant DNA reagents on existing immunodiagnostic platforms. Complete a study directed at increasing sample concentration and extending sample viability prior to testing. Complete initial build/validation of a database for a DARPA transitioned broad range pathogen detection system capable of potentially identifying genetically engineered strains. Adapt existing PCR assays to a rapid sequencing platform. Continue to develop real time PCR assays to identify genes responsible for antibiotic resistance in biothreat agents. Validate immunologic assays designed from proteomics data.

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DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: TB2

Bullet Text (cont)	FY2007	FY2008	FY2009
FY 09 - Continue to apply decision matrix to developmental testing on next generation diagnostic devices with emphasis on technologies capable of integrating sample processing, nucleic acid and immunodiagnostic testing. Based on results, assess/expand study using animal models exposed to biothreat agents in order to identify the optimal matrices/tissues for biological pathogen identification and test windows of diagnostic opportunity using Service developed assays. Promote use of recombinant DNA reagent production and incorporate onto existing systems. Develop improved test assays utilizing new technologies and approaches that enhance diagnosis of early exposure to BWAs. Complete a study of laboratory based research targeting the diagnostic implications of toxins in the body.	6416	7502	7605
Diagnostics, Methodology to Facilitate Development of Biological Warfare Threat Agent Detection and Medical Diagnostic Systems (DTO CB56) - FY 07 - Pursued elevation of previously transitioned assays to test and evaluation with priority for assays selected for JBAIDS Block I. Completed DTO CB56.	1326	0	0
Diagnostics, Rapid Detection, Threat Assessment and Attribution of Genetically Engineered Biothreat Organisms Using Microarray-Based Resequencing Technologies (DTO CB64) - (Transitioned from Emerging Threats) - FY 07 - Demonstrated greater than threefold scale-up of high-throughput experimental protocols and systems for rapid high-throughput microarray-based resequencing. Resequenced 10 B. anthracis and 10 Y. pestis group genomes; released data to other relevant DoD projects. Expanded biothreat agent collection. Evaluated microarray feature size reduction/increased density on two platforms. Developed resequencing and genotyping arrays for 10 Arenaviruses and 5 Filoviridae viruses. FY 08 - Demonstrate threefold scale-up of experimental protocols and systems. Resequence 30 B. anthracis and 30 Y. pestis group genomes, releasing data to other relevant DoD projects. Expand strain collection, focusing on agents most relevant to warfighters. Evaluate further microarray feature improvements on two microarray platforms. Develop resequencing and genotyping arrays for 15 Bunyaviridae and Togaviradae viruses. Transfer data to the Critical Reagents Program. Complete DTO CB64.	1400	1600	0
Total	**9142**	**9102**	**7605**

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DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

	FY 2007	FY 2008	FY 2009
Emerging Threats	2479	0	0

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Emerging Threats, Genetically Engineered Threats - FY 07 - Performed research to support the development of countermeasures for genetically engineered threats that support the Therapeutics program.	2479	0	0
Total	**2479**	**0**	**0**

	FY 2007	FY 2008	FY 2009
Pretreatments	12714	10282	11869

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Pretreatments, Multiagent Vaccines, Western and Eastern Equine Encephalitis (WEE/EEE) Vaccine Constructs for a Combined Equine Encephalitis Vaccine (DTO CB58) -	1262	500	0

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**TB2**

Bullet Text (cont)	FY2007	FY2008	FY2009
FY 07 - Initiated the evaluation of inactivated, site-directed mutagenized, and/or attenuated viral vaccines. Performed studies in animals for efficacy of multiagent viral vaccine candidates. Assessed a combined Venezuela Equine Encephalitis (VEE), EEE, and WEE, vaccine by identifying and characterizing WEE and EEE vaccine constructs that would be appropriate to combine into a single vaccine with a VEE inactivated-attenuated vaccine candidate, or with alternative VEE vaccine candidates made in the DNA- or replicon-based vaccine platforms. Conducted antigen interference studies for the combined VEE/WEE/EEE vaccine in the definitive animal model. Accelerated the construction and evaluation of VEE/WEE/EEE vaccine candidate constructs in various delivery platforms in preparation for down-selection of vaccine candidate platforms. FY 08 - Complete the evaluation of inactivated, site-directed mutagenized, and/or attenuated viral vaccines. Perform dose ranging studies in non-human primates (NHPs) for efficacy of multiagent viral vaccine candidates. Optimize a combined VEE, EEE, and WEE vaccine. Conclude antigen interference studies for the combined VEE/WEE/EEE vaccine in the definitive animal model. DTO CB58 ends in FY 2008.	1262	500	0

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DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Pretreatments, Multiagent Vaccines, Multi-agent (molecular) Vaccines for Bio-Warfare Agents (DTO CB65) - FY 07 - Expressed select bio-threat agent target antigens and assessed immune response and protective efficacy in animal models alone and in combination with anthrax and plague elements. Developed the use of Virus-Like Particles (VLPs) for multiagent vaccine development. Characterized the underlying protective response and evaluated for possible interference between vaccine components and the immune response. Further explored alternative genetic vaccine delivery strategies and adjuvant formulations. Conducted a comparative analysis of genomic and recombinant vaccine candidates for efficacy. Assessed multiepitope DNA vaccine constructs. Initiated development of a multivalent vaccine delivery platform based on Bacillus cereus spore display. FY 08 - Assess immune response and efficacy of multivalent vaccines which include anthrax and plague elements. Define protective responses and evaluate possible interference between vaccine components and the immune response in multiagent formulations. Continue to explore alternative genetic vaccine delivery strategies and adjuvant formulations for the development of immunity against intracellular bacterial pathogens. Conduct efficacy testing of genomic and recombinant vaccine candidates. Optimize multiepitope DNA vaccine constructs. Further evaluate a multivalent spore display vaccine platform. FY 09 - Optimize multiagent vaccines which include anthrax and plague components in animal models. Characterize the underlying protective response and evaluate for possible interference between vaccine components and the immune response. Optimize alternative genetic vaccine delivery strategies and novel adjuvant formulations for the development of vaccines against intracellular bacterial pathogens. Finalize efficacy testing of genomic and recombinant vaccine candidates. Complete testing of genomic and recombinant vaccine candidates, particularly multiepitope DNA vaccine constructs. Test spore-based vaccines in animal models. Complete DTO CB65 in FY 09.	3400	3000	4000

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DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Pretreatments, Multiagent Vaccines - (Formerly under Animal Models and Resuscitative Intervention) - FY 07 - Formulated and assessed candidate anthrax/plague/toxin and anthrax/plague/melioidosis multi-agent vaccines in animal models. Determined efficacy/immune response and optimization studies of new antigen vaccine formulations considering alternative adjuvants, routes of administration, and dosage schedules. Evaluated novel delivery systems for enhanced vaccine delivery and efficacy in support of the rapid development of multiagent vaccines. Investigated whether CpG oligonucleotides provide enhancement as vaccine adjuvants. Explored aspects of the innate immune response for possible adjuvant effects applicable to vaccine development. FY 08 - Conduct further animal studies for development of candidate anthrax/plague/toxin and anthrax/plague/melioidosis multi-agent vaccine. Perform studies to determine in vitro correlates of immunity for select candidate vaccine projects. Pursue optimization studies of new antigen vaccine formulations considering alternative adjuvants, routes of administration, and dosage schedules. Review candidate vaccines for down-selection to primary candidates. FY 09 - Further assess candidate multi-agent vaccines in animal models, and consider the inclusion of alternative agents. Explore novel platforms and vaccine formulations. Pursue advanced genetic vaccine delivery strategies for selected vaccines and evaluate efficacy in animal models.	2390	1731	1342

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DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Pretreatments, Vaccine Research Support -	3594	2444	6527
FY 07 - Evaluated immune response to enhanced next generation anthrax and plague vaccine candidates. Began evaluating the protective efficacy of intact catalytic and translocation domains of botulinum neurotoxins (BoNT) as vaccines. Evaluated cellular immune responses to selected filovirus vaccine candidates. Concluded animal model development for Ebola Sudan strain.			
FY 08 - Validate additional intracellular bacterial pathogen target antigens in mice. Test the immune response and efficacy of intact functional domains of BoNT as vaccines. Evaluate the immune response to and efficacy of enhanced next generation anthrax and/or plague vaccine candidates in animal models. Test the efficacy of killed but metabolically active vaccine against Brucellosis. Further define and evaluate in vitro correlates of immunity for specific threat agents (eg., Tularemia, plague, and anthrax). Pursue development of filovirus immunoassays and examine contributions of the cellular immune response. Evaluate the immune response to a pan-filovirus vaccine formulation incorporating virus like particles in animals.			
FY 09 - Further characterize immune correlates of protection elicited by a pan-filovirus vaccine in animal models. Optimize filovirus immunoassays and evaluate their ability to predict protection. Explore additional intracellular pathogen target antigens using animal model systems including the use of alternative vaccine delivery platforms. Further evaluate the protective efficacy of intact functional domains of BoNT in small animal models. Extend the characterization of next generation anthrax and/or plague vaccine candidates to additional small animal models. Pursue the use of immunomodulatory peptides or dendritic cell targeting peptides to enhance vaccine efficacy in animal models.			

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BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: TB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Pretreatments, Vaccine Technology Development - (formerly under Resuscitative Intervention) - FY 07 - Evaluated a Bacillus generic molecular vaccine in animal models. Continued development of gene-based poxvirus vaccines and determined immune response and efficacy in animal models. Continued the exploration of candidate vaccine efficacy in conjunction with Toll-like receptors (TLR)-agonist delivery. Determined cross-reactive epitopes/antigens which may confer immunity against selected bio-threat agents. Pursued efforts in vaccine development to include the evaluation of novel immunization platforms and therapeutic immunization strategies for post-exposure treatment. FY 08 - Optimize gene-based poxvirus vaccines and determine immune response and efficacy in non-human primate models. Test the ability of TLR-agonist to enhance vaccine efficacy in animal models. Initiate evaluation of cross-reactive antigens which may confer immunity against selected bio-threat agents in animal models. Assess immune response to epitopes of selected bio-threat target antigens. Pursue the use of immunomodulatory peptides or dendritic cell targeting peptides to enhance vaccine efficacy in animal models. FY 09 - Vaccine Technology Development efforts transition to Vaccine Research Support in FY 09.	2068	2607	0
Total	**12714**	**10282**	**11869**

	FY 2007	FY 2008	FY 2009
Therapeutics	13298	18750	17834

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Therapeutics, Therapy for Smallpox and Other Pathogenic Orthopox Viruses (DTO CB54) - FY 07 - Conducted advanced efficacy studies of the oral prodrug of cidofovir as a therapy for smallpox, to support preparation of a new drug application (NDA) package for the FDA. Performed FDA required studies to support transition of ST-246, as an oral therapeutic for orthopox virus infection, to advanced development. Additional studies to support the transition of oral therapeutics to advanced development will be supported by the Viral Therapeutics program (TB3) in 2008. Completed DTO CB54.	1800	0	0
Therapeutics, Therapy for Ebola and Marburg Virus Infections (DTO CB67) - FY 07 - Initiated evaluation of therapeutic technologies developed in DTO CB63 against Ebola virus and Marburg virus in vitro and in animal models. Technologies include antisense nucleotides, recombinant human monoclonal antibodies, small interfering RNAs (siRNAs), small molecules, and therapeutic vaccines. Improved existing animal models for filoviral hemorrhagic fever. Initiated preliminary comparative efficacy studies to identify best performing strategies. FY 08 - Optimize dose and regimen for therapeutic technologies in relevant animal models of Ebola virus and Marburg virus. Evaluate lead candidates for specific viral therapeutic requirements including pharmacokinetics and pharmacodynamics. FY 09 - Complete proof-of-concept studies for lead candidate technologies as they transition to development.	2251	1372	811

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Therapeutics, Viral - FY 07 - Maintained a multi-pronged approach to discovery and development of antiviral technologies against conventional threat agents in vitro and in vivo. Incorporated in silico screening into the drug discovery process. Assessed lead candidates for specific viral therapeutic requirements such as dose, route, pharmacokinetics, and pharmacodynamics. Investigated the use of metal nanoparticles as antiviral therapeutics. Explored immunomodulatory and host-response interventions as adjuvants to antiviral therapeutics. FY 08 - Optimize key dosing, administration, and pharmacological characteristics of leading antivirals in non-human primate models. Utilize, in silico, in vitro, and in vivo models to consider novel and currently available antiviral technologies as therapeutics against conventional viral threat agents. Screen metal based nanomaterials for their ability to inhibit isolated viral enzymes. Develop immunomodulatory and host response interventions as adjuvants to antiviral therapeutics. Develop small molecule screening program(s) for therapeutic candidates against CDC Category A & B viral pathogens. FY 09 - Determine dose dependent inhibition of viral expression by nanomaterial based therapeutics in an in vitro model system. As therapeutics effective against well characterized threats progress to advanced development, conduct proof-of-concept studies aimed at identifying therapeutic candidates for poorly characterized CDC category A and B threats. Screen multiple compound libraries for small molecule inhibitors of category A & B viral pathogens.	2340	588	430

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TB2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Therapeutics, Bacterial - FY 07 - Refined conceptual development and executed in vivo testing of novel broad-based innate immunomodulator therapeutics approaches against conventional threats and poorly characterized threats. Considered specific licensed and investigational antibacterial technologies for use against these agents. Initiated development of a nanobody based immunotherapeutic against plague. Developed a screening assay to identify small molecule therapeutic candidates that mimic bacteriophage activity. Completed proof-of-concept evaluation of antimicrobial peptides as therapeutics against category A and B bacterial threat agents. FY 08 - Conduct proof-of-concept evaluation of a nanobody based immunotherapeutic against plague. Evaluate small molecules with bacteriophage-like activity against plague. Expand development of antimicrobial peptides as anti-bacterial therapeutics with activity against specific threat agents, focusing on treatment for the already symptomatic anthrax patient. FY 09 - Complete initial evaluation of a nanobody based immunotherapeutic against plague, and extend application to other gram negative bacteria if successful. Screen small molecules with bacteriophage-like activity against plague in vitro, and extend application of assay to other gram negative bacteria. Balance efforts to evaluate potential single agent bacterial therapeutics with those having broad spectrum activity. Identify and screen inhibitors of bacterial phosphatases for protective effects in cellular and animal models.	2841	6168	6000

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**TB2**

Accomplishments/Planned Program (Cont):	**FY2007**	**FY2008**	**FY2009**
Therapeutics, Toxin - FY 07 - Selected lead monoclonal antibodies with therapeutic potential by employing in vitro and in vivo assay systems. Increased efforts to identify new Staphylococcal Enterotoxin B (SEB) inhibitors. Examined therapeutic potential of drug candidates with activity against ricin, SEB, and Botulinum Neurotoxin (BoNT) in vitro and in vivo. FY 08 - Design and develop monoclonal antibodies with improved binding activity utilizing data generated from structural analysis of the BoNT receptor site. Identify potential inhibitors from compound repositories and peptide libraries using computer modeling and co-crystal analysis. Evaluate small molecule, monoclonal antibody and single chain antibodies against SEB. FY 09 - Evaluate next generation monoclonal antibodies for in vitro and in vivo efficacy against BoNT. Characterize lead compounds for potency and specificity via protease inhibition studies, cell-based assays, and in vivo bioassays. Initiate development of non-toxic mutants of BoNT as therapeutics with the potential to restore synaptic activity following neuroparalysis due to intoxication. Develop a cell based high throughput screening system for BoNT therapeutics derived from mouse embryonic stem cells. Evaluate immunomodulatory compounds for pre and post-exposure therapy for SEB intoxication.	4066	10622	10593
Total	**13298**	**18750**	**17834**

	FY 2007	**FY 2008**	**FY 2009**
SBIR/STTR	0	1237	0

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BUDGET ACTIVITY: **RDT&E DEFENSE-WIDE/ BA2 - Applied Research**

PE NUMBER AND TITLE: **0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**

PROJECT: **TB2**

Accomplishments/Planned Program	FY2007	FY2008	FY2009
SBIR - FY 08 - Small Business Innovative Research.	0	1237	0
Total	**0**	**1237**	**0**

C. Other Program Funding Summary:

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	To Compl	Total Cost
TB3 MEDICAL BIOLOGICAL DEFENSE (ATD)	87067	95527	252331	227287	128222	121096	112771	Cont	Cont

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**TC2**

COST (In Thousands)		FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
TC2	MEDICAL CHEMICAL DEFENSE (APPLIED RESEARCH)	29057	36627	36034	34726	33021	37927	38257	Continuing	Continuing

A. Mission Description and Budget Item Justification:

Project TC2 MEDICAL CHEMICAL DEFENSE (APPLIED RESEARCH): This project funds medical chemical defense applied research and emphasizes the treatment and prevention of chemical casualties as well as the investigation of new medical countermeasures to include prophylaxes, pretreatments, antidotes, skin decontaminants and therapeutic drugs to protect U.S. forces against known and emerging chemical warfare threat agents. Capabilities are maintained for reformulation, formulation and scale-up of candidate compounds using current Good Laboratory Practices (cGLP).

B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Congressional Interest Items	991	0	0

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Mustard Gas Antidote Research Consortium (STIMAL) - FY 07 - Developed an antidote to mustard gas (HD) exposure.	991	0	0
Total	**991**	**0**	**0**

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DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: TC2

	FY 2007	FY 2008	FY 2009
Diagnostics	2432	1248	1400

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Diagnostic Technologies - FY 07 - Accelerated applied research experiments aimed at improving detection methods in clinical samples for metabolites, adducts and/or relevant biomarkers resulting from chemical warfare agent (CWA) exposure. Continued to develop alternate sample collection/extraction technology(s) such as solid phase micro-extraction as a rapid screening method to verify exposure to CWA; completed fiber selection for nerve agents and evaluation of head space versus direct immersion for nerve agents. Pursued adaptation of the DoD developed whole blood cholinesterase assay for organophosphate exposure to automation/high throughput; examined changes in marker profiles after exposure to low level amounts of nerve agents and organophosphate pesticides and conducted feasibility studies for incorporating this method in a hand-held platform. Characterized relationship between dose, route-of-exposure, time-concentration of measured biomarker for the fluoride detection assay to detect VX nerve agent. FY 08 - Continue development of alternate sample collection/extraction technology(s) such as solid phase micro-extraction as a rapid screening method to verify exposure to CWA; complete reproducibility studies for hydrolysis compounds and optimize fibers for select agents. Initiate development of a beta-lyase urinary metabolite assay to detect chemical agent exposure. Develop a sample extraction technique and test method to detect the presence of chemical warfare analytes from hair samples. Assess the feasibility of transitioning established lab-based procedures such as fluoride reactivation to field portable technology.	1432	1248	1400

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BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: TC2

Bullet Text (cont)	FY2007	FY2008	FY2009
FY 09 - Complete/make recommendations for alternate sample collection/extraction technology(s) such as solid phase micro-extraction as a rapid screening method to verify exposure to CWA. In animal models, evaluate the combined sample extraction and analysis procedure pre-and post CWA exposure to assess the feasibility of detecting chemical warfare analytes in hair samples. Incorporate promising immunodiagnostic and molecular technologies for hand-held CWA diagnostic platforms developed under the SBIR program into the core program for further development. Technologies include DNA aptamers, molecularly imprinted polymers (MIPS), lateral flow immunoassay and high affinity antibodies in conjunction with electrochemical and or fluorometric amplification/detection.	1432	1248	1400
Diagnostics, Animal Models - FY 07 - Continued to conduct animal studies for detecting biomarkers of CWA exposure in biological samples; completed studies exploring the longevity of biomarkers. Conducted metabolic profile (metabonomic) studies by examining blood from guinea pigs exposed to agent and assessed the potential of this method as a diagnostic technique. Efforts transitioned to Diagnostic Technologies (TC3) in FY 08.	1000	0	0
Total	**2432**	**1248**	**1400**

	FY 2007	FY 2008	FY 2009
Pretreatments	6497	8112	8384

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TC2

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Pretreatments, Nerve Agent, Bioscavengers - FY 07 - Investigated recombinant methods and expression systems for larger scale production and purification of recombinant and catalytic bioscavenger proteins. Performed initial evaluation studies of catalytic bioscavenger molecules in genetic knock-out mice. Developed knock-out murine models for evaluation of recombinant and catalytic bioscavenger molecules. Concluded studies of the 3-D structure of human bioscavenger proteins. Continued development of peptide drugs as potential bioscavenger molecules. Identified new native/recombinant catalytic bioscavengers molecules. Defined methods to improve/modify the catalytic efficiency of selected bioscavenger molecules. Evaluated more efficient delivery formulations. Refined methods to significantly reduce or eliminate the inherent immunogenicity of recombinant bioscavenger molecules. FY 08 - Evaluate recombinant methods and expression systems for larger scale production and purification of recombinant and catalytic bioscavenger proteins. Conduct studies of catalytic bioscavenger molecules in genetic knock-out mice. Continue to develop peptide drugs as potential bioscavenger molecules in animal models for safety and efficacy. Explore novel native/recombinant catalytic bioscavenger molecules. Utilize novel methods to improve/modify the catalytic efficiency of selected bioscavenger molecules. Assess new, more efficient delivery formulations. FY 09 - Refine recombinant methods and expression systems for larger scale production and purification of recombinant and catalytic bioscavenger proteins. Investigate catalytic bioscavenger molecules in genetic knock-out mice. Optimize dose and route of administration of peptide drugs as potential bioscavenger molecules. Assess efficacy of novel catalytic bioscavenger molecules. Evaluate bioscavenger molecules with increased catalytic efficiency. Test new, more efficient delivery formulations in animal models.	6497	8112	8384
Total	**6497**	**8112**	**8384**

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: TC2

	FY 2007	FY 2008	FY 2009
Therapeutics	19137	26857	26250

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Therapeutics, Respiratory and Systemic - FY 07 - Identified relevant endpoints for in vivo models. Screened compounds as therapeutic countermeasures against single and multiple agent exposures. FY 08 - Complete protocol and in vivo model optimization. Utilize human tissue model of inhalational exposure to screen therapeutics to protect against lung injury. Evaluate and down-select candidate compounds focusing on countermeasures effective against multiple agent exposures. FY 09 - Continue focus on broad based therapeutics effective against multiple agents and routes of exposures.	3411	4039	3937

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)	TC2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Therapeutics, Cutaneous and Ocular - FY 07 - Completed efforts to develop in vitro tissue assays and designed screening protocols to down-select candidate compounds. Initiated protocols and screened novel compounds, as well as FDA approved drugs, as therapeutics to counteract the effects of cutaneous and ocular exposure to chemical agents using in vitro and in vivo techniques. Characterized the depth of cutaneous vesicant injury. Compared the effectiveness of novel technologies to replace the M291 skin decontamination kit (SDK), focusing on products to decontaminate wounds and around the eyes. Characterized the treatment effect of compounds on neovascularization in ocular tissue, using small animal models and focusing on both gross and molecular injury and healing as a function of time. FY 08 - Maintain screening efforts to evaluate new and FDA approved compounds, and down-select those shown to be efficacious using in vitro and in vivo techniques. Determine the best candidate technologies for preventing and reversing damage to the eye following vesicant agent exposure. FY 09 - Evaluate safety, efficacy, dosing and relevant pharmacokinetic and pharmacodynamic profiles of candidate countermeasures, and practicality of use in the modern combat environment. Evaluate cell based therapeutic technologies.	2711	1905	1940

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: TC2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Therapeutics, Neurologic - FY 07 - Explored potential broad spectrum reactivators to nerve agent challenge. Synthesized prospective candidate reactivators and conducted reactivation studies to determine efficacy and toxicity in vitro/in vivo. Optimized therapy for effective treatment of seizures under all potential field conditions (immediate or delayed treatment). Screened putative neuroprotectants that have demonstrated effectiveness in neuronal rescue, particularly Food and Drug Administration (FDA)-approved products which may have additional neuroprotective activity. Applied screening protocols to novel compounds. FY 08 - Expand the search for improved reactivators. Evaluate bioscavengers as post-exposure therapeutics against nerve agents. Further evaluate FDA approved products demonstrating neuroprotective activity for in vivo efficacy against nerve agent exposure. FY 09 - Identify and develop broad-spectrum improved reactivators based on the mechanism of action of reactivation. Initiate testing of centrally acting acetylcholinesterase reactivators for efficacy using in vitro and in vivo models (small animal models). Down-select novel and FDA approved anticonvulsants, neuroprotectants, anti-epileptics, and receptor agonists and antagonists for neuroprotective activity against nerve agents. Define and optimize the utility of therapeutic bioscavengers.	8139	8861	9232
Therapeutics, Medical Toxicology - Non Traditional Agents (NTAs) and Other Agents - FY 07 - Investigated the potential for transient or sustained systemic toxicity resulting from exposure to NTAs and selected chemical warfare agents. Identified potential mechanisms of toxicity. FY 08 - Extend the fidelity of predictive and computational tools by expanding the scope of validation studies to include multiple classes of NTAs. FY 09 - Quantify the nature, scope, and time course of exposure/effects using biochemical, toxicological, physiological, and modeling methods as required for therapeutic and clinical strategy design.	3831	2235	2225

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: February 2008

BUDGET ACTIVITY: RDT&E DEFENSE-WIDE/ BA2 - Applied Research

PE NUMBER AND TITLE: 0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)

PROJECT: TC2

Accomplishments/Planned Program (Cont):	FY2007	FY2008	FY2009
Therapeutics, Non Traditional Agents (NTAs) - FY 08 - Evaluate the efficacy of currently available therapeutics for treatment resulting from exposure to NTAs and selected chemical warfare agents. Focus on therapies for respiratory injury following inhalational exposure and non-cholinergic mediated neurological injury, using small animal models. Investigate the efficacy of the bioscavengers as post-exposure therapy. FY 09 - Evaluate pre-existing and new commercially available compounds for respiratory and neurological injury in small animal models and begin transition to large animal models (e.g. non-human primate). Initiate testing of novel compounds as therapies in small animal models. Define and optimize the utility of therapeutic bioscavengers against NTAs.	0	9817	8916
Therapeutics, Animal Models - FY 07 - Improved advanced non-human primate testing for chemical warfare agent exposure. Evaluated alternate models to meet FDA rules in a cost-effective manner. Transitioned to other thrust areas in FY 08.	1045	0	0
Total	**19137**	**26857**	**26250**

	FY 2007	FY 2008	FY 2009
SBIR/STTR	0	410	0

Accomplishments/Planned Program	FY2007	FY2008	FY2009
SBIR - FY 08 - Small Business Innovative Research.	0	410	0
Total	**0**	**410**	**0**

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY: **RDT&E DEFENSE-WIDE/ BA2 - Applied Research**

PE NUMBER AND TITLE: **0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**

PROJECT: **TC2**

C. Other Program Funding Summary:

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	To Compl	Total Cost
TC3 MEDICAL CHEMICAL DEFENSE (ATD)	15740	28726	26567	28961	30493	31539	31836	Cont	Cont

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CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**TR2**

COST (In Thousands)		FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
TR2	MEDICAL RADIOLOGICAL DEFENSE (APPLIED RESEARCH)	1591	1973	1975	1973	1972	1972	1971	Continuing	Continuing

A. Mission Description and Budget Item Justification:

Project TR2 MEDICAL RADIOLOGICAL DEFENSE (APPLIED RESEARCH): This area funds applied research to develop medical countermeasures against radiological and nuclear threats. Innovative technical approaches will be used to develop products to mitigate the health consequences resulting from exposures to both external ionizing radiation and internalized alpha- and beta-particles, including gamma-emitting radionucleotides. The availability of radioprotectants and post-irradiation therapeutic agents will enhance survivability of warfighters and serve to significantly minimize the development of acute radiation syndromes and subsequent development of cancer.

B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Radiological Medical Countermeasures	1591	1945	1975

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**TR2**

Accomplishments/Planned Program	FY2007	FY2008	FY2009
Radiation Medical Countermeasures - FY 07 - Continued radioprotective efficacy studies and explored additional new compounds for radioprotective efficacy studies. Assessed the more promising candidates to determine the radiological treatment dose efficacy for radioprotection and developed protocols for evaluation in a rodent model system. Assessed cytokine expression in rodents for most promising candidates against acute radiation syndromes. FY 08 - Evaluate three to four drug candidates for radioprotective efficacy as radioprotectants, radioprotectant prophylaxis, and/or post-irradiation therapeutic agents. Using promising candidates, initiate preliminary studies for preclinical efficacy of combined agents, if any, which confer protective or palliative effects against radionuclides with minimal toxic side effects. FY 09 - Down-select at least one promising drug candidate that has radioprotective efficacy. Determine the preclinical efficacy of combined agents that confer protective or palliative effects against radionuclides with minimal toxic side effects. Explore current Good Laboratory Practice (cGLP) test capability for selected candidate drugs against acute radiation syndromes according to the Food and Drug Administration (FDA) animal rule.	1591	1945	1975
Total	**1591**	**1945**	**1975**

	FY 2007	FY 2008	FY 2009
SBIR/STTR	0	28	0

CBDP BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)

DATE: **February 2008**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E DEFENSE-WIDE/ BA2 - Applied Research	**0602384BP CHEMICAL/BIOLOGICAL DEFENSE (APPLIED RESEARCH)**	**TR2**

Accomplishments/Planned Program	**FY2007**	**FY2008**	**FY2009**
SBIR - FY 08 - Small Business Innovative Research.	0	28	0
Total	**0**	**28**	**0**

C. Other Program Funding Summary:

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	To Compl	Total Cost
TR3 MEDICAL RADIOLOGICAL DEFENSE (ATD)	1995	2169	4878	2466	986	0	0	0	12494