Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Army											Date: February 2015	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 1: *Basic Research*					R-1 Program Element (Number/Name) PE 0601101A *I In-House Laboratory Independent Research*							
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
Total Program Element	-	21.255	13.427	13.018	-	13.018	12.381	11.971	11.540	11.723	-	-
91A: *ILIR-AMC*	-	16.606	12.579	12.107	-	12.107	11.457	11.031	10.583	10.747	-	-
91C: *ILIR-Med R&D Cmd*	-	3.031	-	-	-	-	-	-	-	-	-	-
91D: *ILIR-Corps Of Engr*	-	0.811	-	-	-	-	-	-	-	-	-	-
F16: *ILIR-SMDC*	-	0.807	0.848	0.911	-	0.911	0.924	0.940	0.957	0.976	-	-

A. Mission Description and Budget Item Justification

This program element (PE) supports basic research at the Army laboratories through the In-House Laboratory Independent Research (ILIR) program. Basic research lays the foundation for future developmental efforts by identifying fundamental principles governing various phenomena and appropriate pathways to exploit this knowledge. The ILIR program serves as a catalyst for major technology breakthroughs by providing laboratory directors flexibility in implementing novel research ideas, by nurturing promising young scientists and engineers, and is used to attract and retain top doctoral degreed scientists and engineers. The ILIR program also provides a source of competitive funds for peer reviewed efforts at Army laboratories to stimulate high quality, innovative research with significant opportunity for payoff to Army warfighting capability.

This Program Element (PE) supports ILIR at the Army Materiel Command's (AMC) six Research, Development, and Engineering Centers (Project 91A); at the six U.S. Army Medical Research and Material Command Laboratories (Project 91C); the seven laboratories within the Corps Of Engineers' U.S. Army Engineer Research and Development Centers (Project 91D); and at the U.S. Space and Missile Defense Command (SMDC) Technical Center (Project F16).

Work in the PE provides a foundation for applied research initiatives at the Army laboratories and research, development and engineering centers.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the AMC, MRMC, and ERDC (multiple sites); and the SMDC Technical Center (Huntsville,AL).

Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Army					Date: February 2015
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 1: *Basic Research*			R-1 Program Element (Number/Name) PE 0601101A / *In-House Laboratory Independent Research*		
B. Program Change Summary ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**
Previous President's Budget	21.792	13.464	13.762	-	13.762
Current President's Budget	21.255	13.427	13.018	-	13.018
Total Adjustments	-0.537	-0.037	-0.744	-	-0.744
• Congressional General Reductions	-	-0.037			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.537	-			
• Adjustments to Budget Years	-	-	-0.744	-	-0.744

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army			Date: February 2015
Appropriation/Budget Activity 2040 / 1	R-1 Program Element (Number/Name) PE 0601101A / *In-House Laboratory Independent Research*	Project (Number/Name) 91A / *ILIR-AMC*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
91A: *ILIR-AMC*	-	16.606	12.579	12.107	-	12.107	11.457	11.031	10.583	10.747	-	-

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

This project funds basic research within the Army Materiel Command's (AMC) Research, Development, and Engineering Centers (RDECs) and lays the foundation for future developmental efforts by identifying the fundamental principles governing various phenomena and appropriate pathways to exploit this knowledge.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this project is performed by the Edgewood Chemical and Biological Center, Aberdeen Proving Grounds, MD within AMC, the Armaments Research, Development, and Engineering Center, Picatinny, NJ, the Tank and Automotive Research, Development, and Engineering Center, Warren, MI, the Natick Soldier Research, Development, and Engineering Center, Natick, MA, the Aviation and Missile Research, Development, and Engineering Center, Huntsville, AL, and the Communications and Electronics Research, Development, and Engineering Center, Ft. Monmouth, NJ.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: Edgewood Chemical Biological Center	0.921	0.997	1.018
Description: Funds basic research in chemistry, biology, biotechnology, and aerosol for counter improvised explosive devices (IEDs), obscurants, and/or target defeat. Work in this project provides theoretical underpinnings for PE 0602622A (Chemical, Smoke, and Equipment Defeating Technologies). ***FY 2014 Accomplishments:*** Conducted fundamental research to develop an understanding of: rational molecular and nano-system design; synthetic biology; nano-scale chemical and biological sensing and signaling; molecular toxicology; interfacial phenomena of particulate matter (solid/liquid) with chemical surfaces; synthesis of new materials for protection, decontamination, and detection; and the mathematics involved in data processing and interpretation. ***FY 2015 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** 91A / *ILIR-AMC*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Conduct fundamental research to develop an understanding of rational molecular and nano-system design, synthetic biology, nano-scale chemical and biological sensing and signaling, molecular toxicology, interfacial phenomena of particulate matter (solid/liquid) with chemical surfaces, and synthesis of new materials for protection, decontamination, and detection, and research the mathematics involved in data processing and interpretation. ***FY 2016 Plans:*** Will further fundamental research to understand rational molecular and nano-system design, synthetic biology, nano-scale chemical and biological sensing and signaling, molecular toxicology, interfacial phenomena of particulate matter (solid/liquid) with chemical surfaces, and synthesis of new materials for protection, decontamination, and detection, and research the mathematics involved in data processing and interpretation.			
Title: Armaments Research, Development and Engineering Center ***Description:*** Funds basic research in weapons component development, explosives synthesis/detection and area denial. Work in this project provides theoretical underpinnings for PE 0602307A (Advanced Weapons Technology). ***FY 2014 Accomplishments:*** Continued to solicit on a yearly basis new efforts to further basic research in areas such as advanced materials and nanotechnologies, more powerful energetics including those with insensitive munition (IM) properties, counter terrorism technologies, power and energy systems, smaller more lethal warheads and composite materials. ***FY 2015 Plans:*** Continue to solicit on a yearly basis new efforts to further basic research in areas such as advanced materials and nanotechnologies, more powerful energetics including those with IM properties, counter terrorism technologies, power and energy systems, smaller more lethal warheads and composite materials. ***FY 2016 Plans:*** Will further basic research in areas such as advanced materials and nanotechnologies, more powerful energetics including those with IM properties, counter terrorism technologies, power and energy systems, smaller more lethal warheads and composite materials.	1.619	1.695	1.655
Title: Tank-Automotive Research, Development and Engineering Center ***Description:*** Funds basic research in ground vehicle technologies to include power, mobility, and unmanned systems. Work in this project provides theoretical underpinnings for PE 0602601A (Combat Vehicle and Automotive Technology). ***FY 2014 Accomplishments:***	1.157	1.496	1.452

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** 91A / *ILIR-AMC*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Researched novel nanofluid coolants and lubricants; investigated statistical theories and algorithms for multi-disciplinary design optimization; researched the combustion properties of new fuels; explored novel on-chip microwave nonreciprocal devices; researched manned/unmanned teaming and cooperative mobility behaviors; and studied electromagnetic wave reflection from nano-structured non-reciprocal metamaterials for non-reflective, cloak-type coatings. ***FY 2015 Plans:*** Investigate shock wave localization and propagation in layered media; research the combustion properties of new fuels; investigate discrete element modeling for granular terrain – vehicle interaction; study on-wafer microwave nonreciprocal devices (isolators and circulators) based on artificial magnetic metamaterials and naturally anisotropic ferrite materials; research manned/unmanned teaming and cooperative mobility behaviors; research incremental learning for autonomous systems; and research optical limiter techniques and materials for laser protection. ***FY 2016 Plans:*** Will conduct research in off-road mobility and terramechanics, materials for shock wave mitigation, nano-lubricants, analytical framework for autonomy-enabled systems, combustion for military logistics fuels, and modeling of cognitive burdens. In-house research efforts will address several Army-identified major research efforts for the future including materials science and multiscale modeling, intelligent/autonomous systems, and human sciences.			
Title: Natick Soldier Research, Development and Engineering Center ***Description:*** Funds basic research in food sciences, textiles, and lightweight materials with potential for individual protection. Work in this project provides theoretical underpinnings for PE 0601102A (Defense Research Sciences), Project H52 (Equipment for the Soldier). ***FY 2014 Accomplishments:*** Explored the unique physics of photonic nanomaterials for revolutionizing the performance and size of systems such as infrared (IR) detectors, power generation and remote imaging; continued to explore the relationship between peptide structure on tailored structures for controlling and optimizing the destructive efficacy of antimicrobial peptides for multiple applications. ***FY 2015 Plans:*** Explore the unique physics of photonic nanomaterials for revolutionizing the performance and size of systems such as IR detectors, power generation and remote imaging; continue to explore the relationship between peptide structure on tailored structures for controlling and optimizing the destructive efficacy of antimicrobial peptides for multiple applications. ***FY 2016 Plans:***	1.272	1.396	1.350

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** 91A / *ILIR-AMC*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Will create a new 2D computational modeling approach to enhance understanding of interactions between fluids (e.g., airflow) and structural forces to provide a foundation for design of parachutes and fabric shelters; examine novel approaches to tailor textile surface chemistry and/or integration of advanced materials to allow creation of surfaces exhibiting true multifunctionality.			
Title: Aviation and Missile Research, Development and Engineering Center: Missile Efforts ***Description:*** Funds basic research in guided missile and rocket systems, directed energy weapons, unmanned vehicles, and related components. Work in this project provides theoretical underpinnings for PE 0602303A (Missile Technology). ***FY 2014 Accomplishments:*** Investigated paucity of attractors phenomenon in dynamical systems; developed theory of harmonic generation and Raman scattering from surfaces in nano-cavity environments; studied optical propagation phenomena in the plasmonic regime in semiconductor and metal-based nanostructures and metamaterials; explored remote sensing of trace gases in the atmosphere using infrared/terahertz double resonance active interrogation; assessed enhancement of infrared emissivity/absorptivity of polar materials near optical phonon resonances by surface phonon coupling and metamaterial effects. ***FY 2015 Plans:*** Perform a pioneering demonstration of surface-enhanced analyte sensing and damage using plasmonic metal nanostructures; perform experimental test of analytic density matrix models in pump-probe spectroscopy; demonstrate chaotic dynamics in hybrid and non-smooth systems; pioneer innovative terahertz (THz) imaging techniques by combining state-of-the-art coherent imaging hardware and computational imaging methodologies; identify novel propagation phenomena that can dramatically modify/ enhance linear and nonlinear interactions with artificial, metal-based plasmonic materials and semiconductors; and perform an experimental study of plasmonic nanostructures in the enhanced transmission regime for applications to beam steering. ***FY 2016 Plans:*** Will continue experimental test of analytic density matrix models in precision pump-probe spectroscopy; demonstrate chaotic dynamics in hybrid and non-smooth systems; pioneer innovative THz imaging techniques by combining state-of-the-art coherent imaging hardware and computational imaging methodologies; develop novel high performance signal processing techniques for chaotic waveforms in radar and communications.	2.156	2.808	2.608
Title: Aviation and Missile Research, Development and Engineering Center: Aviation Efforts ***Description:*** Funds basic research for aviation enabling technologies in the areas of aerodynamics, structural dynamics, and material science. Work in this project provides theoretical underpinnings for PE 0602211A (Aviation Technology). ***FY 2014 Accomplishments:***	1.562	1.595	1.553

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** 91A / *ILIR-AMC*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Continued basic aerodynamic science research in the areas of vorticity dynamics, compressible dynamic stall, bluff body flow separation and flow physics; and investigated advanced boundary layer flow control phenomenon including fluidic oscillators and plasma devices. ***FY 2015 Plans:*** Continue basic fluid dynamic research in the areas of vorticity dynamics, unsteady flow separation, and flow control to identify fundamental governing principles; complete analysis of wing/vortex interaction; conduct detailed measurements of boundary layer response to flow control; and continue work to increase control authority of plasma devices. ***FY 2016 Plans:*** Will explore novel approaches to increase flow control authority for rotating wing applications using plasma; develop experimental techniques to better measure and understand flow structures in the wake of multi-rotor configurations and their performance in hover; and explore novel control allocation strategies to optimize pilot work load for future vertical lift configurations with redundant controls.			
Title: Communications-Electronics Research, Development, and Engineering Center	2.379	2.592	2.471
Description: Funds basic research for communication and network enabling technologies in the areas of antenna design, network management, power generation and storage, and also sensors. Work in this project provides theoretical underpinnings for PE 0602705A (Electronics and Electronic Devices). ***FY 2014 Accomplishments:*** Conducted research into signals exploitation techniques by investigating algorithms for intelligently and rapidly searching wide bands of radio frequency (RF) spectrum for short duration signals by mathematically representing the shape of a specific RF signals; researched new algorithms based on mathematical models and new routing schemes for scalable and secure mobile ad hoc network (MANET)-based Real-Time Peer-to-Peer (P2P) Voice-over-IP (VoIP)/Multimedia Network; synthesized and evaluated high energy cathode materials for application to electrochemical capacitors for increased energy density and longer cycle life; investigated the feasibility of real-time, in-vacuo band edge thermometry for heteroepitaxy of II-VI thin films on semiconductor substrates for advanced IR detectors; and researched the synthesis of dense Bismuth Selenide thin films, maximizing the material properties of conduction on the surface and insulating properties in the bulk, for use in RF front end electronics. ***FY 2015 Plans:*** Conduct research on a novel class of quasi-orthogonal waveforms that will allow radar systems to perform their primary target detection mission while simultaneously allowing data sharing with other systems; investigate a new compressive sensing approach to adaptive target detection, which can potentially ease antenna integration requirements for future multi-band/multi-aperture systems and improve the spatial resolution for target detection; investigate the fundamental distributed reformation			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** 91A / *ILIR-AMC*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
reactions which affects species production, soot (coke) formation with more favorable reformed product gases; investigate the fundamental electrochemical properties of applied composite solid electrolyte interface for lithium electrochemical cells; investigate how Compressive Sensing (CS) affects image quality and develop metrics and model for CS; investigate how carrier transport phenomenology in epitaxial multilayer structures contribute to the performance of infrared focal plane arrays (FPAs); and investigate graph anomaly detection to identify network intrusions using traffic flow graph analysis and anomaly detection. ***FY 2016 Plans:*** Will conduct research in data flow analysis as a supplemental theory for use in Satisfiability Modulo Theory (SMT) solvers to improve vulnerability detection by utilizing data-flow graphs coupled with SMT solvers; investigate an analytic method to calculate the probability and efficiency of message transmission via dynamic opportunistic devices across an undefined and uncooperative network; research the ability to perform signal processing by manipulating modes within a multi-mode optical fiber by utilizing the statistics of transmission properties and techniques for spatial division multiplexing to perform single and multi signal filtering within the optical fiber; investigate the performance of infrared detectors by researching high quantum efficiency Gallium-free long wave infrared nBn detectors grown on an aluminum antimonide (AlSb) lattice; research liquid phase heat transfer as a function of flow instability and vorticity intensity in microchannels with microcylinders with tip clearances to determine the optimum micro cylinder design in microchannels in 3D stacked circuit architectures for electro-optics, radar, electronic warfare, communication and intelligence systems; investigate the fundamental electrochemical properties of applied composite solid electrolyte interface for lithium and divalent electrochemical cells; and investigate game theory based machine learning techniques to determine the feasibility of coordinating electronic warfare and tactical communications.			
Title: Peer Reviewed Proposal Efforts ***Description:*** Funds peer reviewed proposals in basic research to provide increased quality and responsiveness in exploring new technological concepts that are highly relevant to Army needs. This funding also enhances recruitment, development, and retention of outstanding scientists and engineers engaged in high quality basic research for the Army, which provides a constant flow of new knowledge to Army laboratories. Beginning in FY15, ILIR funds in this category are redistributed to the RDECs within this project to align with DoD Instruction 3201.04 (In-House Laboratory Independent Research Program) requirements. ***FY 2014 Accomplishments:*** Solicited new basic research efforts aimed at developing and maintaining a cadre of active research scientists who can distill and extend results from worldwide research in areas of interest to the Army.	5.540	-	-
Accomplishments/Planned Programs Subtotals	16.606	12.579	12.107

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** 91A / *ILIR-AMC*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army			Date: February 2015
Appropriation/Budget Activity 2040 / 1	R-1 Program Element (Number/Name) PE 0601101A / *In-House Laboratory Independent Research*	Project (Number/Name) 91C / *ILIR-Med R&D Cmd*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
91C: *ILIR-Med R&D Cmd*	-	3.031	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This project fosters investigator-driven medical and force-health protection basic research initiatives performed at the six U.S. Army Medical Research and Materiel Command laboratories. Research areas address countermeasures against infectious diseases, defense against environmental extremes and operational hazards to health, mechanisms of combat trauma and innovative treatment and surgical procedures, and medical chemical/biological warfare threats.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Walter Reed Army Institute of Research, Silver Spring, MD; U.S. Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD; US Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD; U.S. Army Institute of Environmental Medicine, Natick, MA; U.S. Army Institute of Surgical Research, Fort Sam Houston, TX; U.S. Aeromedical Research Laboratory, Fort Rucker, AL; and the Telemedicine and Advanced Technology Research Center, Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: Independent Research Efforts	3.031	-	-
Description: Funds basic research in medical and force health protection. ***FY 2014 Accomplishments:*** The program funded innovative in-house basic research proposals that focused on research to explore treatments and countermeasures against militarily relevant infectious diseases; defense against environmental extremes and operational hazards to health; mechanisms of combat trauma and innovative treatment and surgical procedures; and medical chemical/biological warfare threats.			
Accomplishments/Planned Programs Subtotals	3.031	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** 91C / *ILIR-Med R&D Cmd*

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army			Date: February 2015
Appropriation/Budget Activity 2040 / 1	R-1 Program Element (Number/Name) PE 0601101A / *In-House Laboratory Independent Research*	Project (Number/Name) 91D / *ILIR-Corps Of Engr*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
91D: *ILIR-Corps Of Engr*	-	0.811	-	-	-	-	-	-	-	-	-	-

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

This project funds In-house Laboratory Independent Research (ILIR) in the areas of geospatial research and engineering, military engineering, and environmental quality/installations at the seven laboratories within the Corps of Engineer's U.S. Army Engineer Research and Development Center (ERDC).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the U.S. Army ERDC, Vicksburg, MS.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: Geospatial Research and Engineering/Military Engineering/Environmental Quality and Installations	0.811	-	-
Description: Funds basic research in the areas of geospatial research and military engineering as well as environmental quality and installations. ***FY 2014 Accomplishments:*** Quantified the fundamental coupling effects and transfer functions of fiber optic cable sensors inside of protective conduit within realistic and variable geologic media; determined parameters and built physics-based seismic propagation models for fiber, conduit, and geomaterial interaction.			
Accomplishments/Planned Programs Subtotals	0.811	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** 91D / *ILIR-Corps Of Engr*

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army			Date: February 2015
Appropriation/Budget Activity 2040 / 1	R-1 Program Element (Number/Name) PE 0601101A / *In-House Laboratory Independent Research*	Project (Number/Name) F16 / *ILIR-SMDC*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
F16: *ILIR-SMDC*	-	0.807	0.848	0.911	-	0.911	0.924	0.940	0.957	0.976	-	-

A. Mission Description and Budget Item Justification

This project provides In-house Laboratory Independent Research (ILIR) at the US Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT), Technical Center. This basic research on lasers and directed energy lays the foundation for future developmental efforts on high energy lasers and directed energy systems by identifying the fundamental principles governing various directed energy phenomena.

Work in this project is related to, and fully coordinated with, efforts in PE 0602307A (Advanced Weapons Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work is performed by the USASMDC/ARSTRAT, Technical Center, Huntsville, AL

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: SMDC In-house Laboratory Independent Research (ILIR)	0.807	0.848	0.911
Description: Funds basic research to investigate laser propagation phenomenology for application in modeling and simulation and future directed energy weapons design. Activities in this program transition to High Energy Laser Technology in PE 0602307A (Advanced Weapons Technology).			
FY 2014 Accomplishments: Completed laser beam propagation experiments and provided data for model anchoring. Continued spectroscopic research, improved modeling and simulation capabilities, and began design for flowing rare earth laser.			
FY 2015 Plans: Demonstrate a diode pumped rare earth gas laser and begin assessing scalability and potential for very high efficiency operation; complete spectroscope research on Xenon as a potential rare earth gas laser for transition to advanced beam control efforts; complete 1.06 micron laser atmospheric propagation research for transition to solid state laser effects; and complete initial assessment of all-weather tracker phenomenology for transition to advanced beam control efforts.			
FY 2016 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 1	**R-1 Program Element (Number/Name)** PE 0601101A / *In-House Laboratory Independent Research*	**Project (Number/Name)** F16 / *ILIR-SMDC*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Will complete inductive RF line widths, absorption, plasma control, and lifetimes investigations for an efficient Xenon laser; begin development of a Xenon high power laser scaling model; and complete comparison of different RF pumping mechanisms.			
Accomplishments/Planned Programs Subtotals	0.807	0.848	0.911

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A