Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*					R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	53.883	35.218	37.798	-	37.798	40.431	49.228	56.742	56.350	Continuing	Continuing
H18: *Weapons & Munitions Technologies*	-	11.785	16.596	13.200	-	13.200	13.161	15.086	21.339	20.262	Continuing	Continuing
H19: *Asymmetric & Counter Measure Technologies*	-	15.753	7.762	9.049	-	9.049	11.989	15.319	10.486	12.046	Continuing	Continuing
H1A: *WEAPONS & MUNITIONS TECH PROGRAM INITIATIVE*	-	14.941	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
H28: *Warheads/ Energetics Technologies*	-	11.404	10.860	15.549	-	15.549	15.281	18.823	24.917	24.042	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 funding increase for indirect fire weapons and tunable pyrotechnics.

A. Mission Description and Budget Item Justification

This program element (PE) investigates, designs and evaluates enabling technology to develop lethal and nonlethal weapons and munitions with increased performance and the potential for lower weight, reduced size, and improved affordability. Project H18 focuses on weapons and munitions development. Project 19 researches technologies to maintain the lethality of US weapons as well as directed energy (DE) capabilities and subsystems to support the weaponization of high power microwave (HPM), and short pulse lasers. Project H28 evaluates munition components such as fuzes, power, warheads with tailorable effects, and insensitive munition compliant energetic materials.

Work in this PE is related to, and fully coordinated with, PE 0602303A (Aviation Advanced Technology), 0602105A (Materials Technology), PE 0602618A (Ballistics Technology), PE 0602772A (Advanced Tactical Computer Science and Sensor Technology), PE 0602782A (Command, Control, Communications Technology), PE 0603004A (Weapons and Munitions Advanced Technology), and, PE 0603008A (Electronic Warfare Advanced 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 in this PE is primarily performed by the Armament Research, Development, and Engineering Center (ARDEC) at Picatinny Arsenal, NJ, in cooperation with the Army Research Laboratory (ARL) at Aberdeen Proving Ground, MD; the Communications-Electronics Research, Development, and Engineering Center (CERDEC),

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army	DATE: April 2013
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Fort Belvoir, VA;, the Tank Automotive Research, Development, and Engineering Center (TARDEC), Warren, MI; and the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	54.727	35.218	33.613	-	33.613
Current President's Budget	53.883	35.218	37.798	-	37.798
Total Adjustments	-0.844	0.000	4.185	-	4.185
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.809	-			
• Adjustments to Budget Years	-	-	4.185	-	4.185
• Other Adjustments 1	-0.035	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H18: *Weapons & Munitions Technologies*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
H18: *Weapons & Munitions Technologies*	-	11.785	16.596	13.200	-	13.200	13.161	15.086	21.339	20.262	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project designs, investigates, and evaluates component technologies to enable affordable precision munitions as well as provide increased lethality and performance with reduced logistics and advanced direct/indirect fire capabilities.

This project sustains Army science and technology efforts supporting the Ground portfolio.

Work in this project is related to, and fully coordinated with efforts in projects H19 and H28 (also in PE 0602624A), PE 0602105A (Materials Technology), PE 0602303A (Aviation Advanced Technology), PE 0602618A (Ballistics Technology), PE 0602782A (Command Control, Communication Technology), project 232 in PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603008A (Electronic Warfare Advanced Technology), and PE 0603772A (Advanced Tactical Computer Science and Sensor Technology).

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 Armament Research, Development, and Engineering Center (ARDEC), at Picatinny Arsenal, NJ in collaboration with a the Army Research Laboratory (ARL), Aberdeen Proving Ground, MD; the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL; and the Communications-Electronics Research, Development, and Engineering Center (CERDEC), Fort Belvoir, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Novel Propulsion Technology for the Future	3.029	4.035	3.521
Description: This effort explores propellant technologies such as powder coextrusion and grain coatings, while retaining insensitive properties, for employment in gun launch environments as well as directional thrusters including those that deliver a broad spectrum of effects. It also conduct experiments with these propellants to increase the range of artillery and mortars rocket assisted projectiles.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H18: *Weapons & Munitions Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Modeled propulsion systems and conducted trade studies for candidate conventional and new chemical ingredients, formulations, and configurations to maximize the performance of chemical propellants while improving their insensitivity to unplanned stimuli; formulated promising propellants and evaluated them for performance and insensitivity. ***FY 2013 Plans:*** Investigate new propulsion ingredients for scale up of formulations to provide extended range; design, fabricate and evaluate new charge systems using coextrusion of multiple materials as well as coatings for burn rate modification. ***FY 2014 Plans:*** Will conduct experiments on rocket propulsion systems concepts to extend the range of 155mm artillery and 120mm mortar; will determine ballistic applications for co-extruded propellants; will leverage advancements in combustible cartridge case technologies to improve projectile propulsion; will design and develop optimal propellant configurations for specific applicable systems; will develop 120mm mortar propellant for 120mm systems for improved range and cost; will develop and optimize advanced propellant for 81mm extended range system compliant with automated direct/indirect fire mortar (ADIM).			
Title: Advanced Munition Payloads ***Description:*** This effort investigates novel payloads and related components for integration into gun-fired munitions and missiles to enable DoD cluster munition replacement policy. ***FY 2012 Accomplishments:*** Investigated environments that provided useful data for the development of components- setback, expulsion and impact; matured components and validated effectiveness and reliability through component and bench level testing. Efforts described here are coordinated and complimentary to related efforts in PE 0603004A/Project 232.	3.342	0.000	0.000
Title: Advanced Weapons Technology ***Description:*** This effort investigates innovative weapon technologies such as recoil energy mitigation, affordable precision, extended range/guided technologies, and advanced propelling for future medium caliber direct fire systems that could provide similar or greater lethality than current systems. ***FY 2012 Accomplishments:*** Continued to mature most promising weapon technologies and evaluated for transition to advanced development; conducted additional small scale research into multiple novel weapon system candidate technologies. ***FY 2013 Plans:***	2.214	3.178	2.297

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Continue to mature hydrogen propellant ignition and remote automated gun firing in medium caliber weapons for transition to advanced development; conduct additional small scale research into multiple novel weapon system candidate technologies; develop precision technologies for extended/guided range applications. ***FY 2014 Plans:*** Will mature most promising weapon technologies to enable swarming munitions that provide highly lethal target tailorable effects such as advanced miniature fuze and power systems and munition architectures for synergistic effects; will evaluate for transition to advanced development; will conduct additional small scale research into multiple novel weapon system candidate technologies, including fire control decision support services, and enhanced sniper technologies for improved precision at extended ranges.			
Title: Fire Control Target Recognition ***Description:*** This effort designs and develops networked fire control hardware and software that can be integrated with existing command and control architectures. ***FY 2012 Accomplishments:*** Modeled fire control hardware and fire control and target recognition algorithms and conducted trade studies for candidate technologies to maximize the performance of weapon systems, while maintaining commonality for future application to multiple weapon system calibers and configurations. ***FY 2013 Plans:*** Design and investigate target data and weapon effects for improved mission planning planning; design and investigate weapon placement coordination; design weapons and effects database; investigate small unit fire control hardware; conduct experiments to validate design efforts.	1.120	2.300	0.000
Title: Line-of-Sight (LOS) Course Correction Munition Technology ***Description:*** This effort investigates and evaluates technologies such as small thrusters fired to the side of the round to correct trajectory and to improve precision and lower collateral damage in munitions. ***FY 2012 Accomplishments:*** Designed and developed components for line-of-sight (LOS) course correction munitions, i.e. warhead, sensor, communication link and guidance/Control; investigated performance enhancements of a LOS Course correction munitions. ***FY 2013 Plans:*** Integrate line-of-sight (LOS) course correction subsystem for ballistic testing; measure both structure and function of LOS course correction subsystem integrated into surrogate munition for performance and success.	2.080	2.800	0.000
Title: Precision Munition Technologies	0.000	4.283	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H18: *Weapons & Munitions Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Description: This effort designs and investigates scalable and modular enabling technologies such as novel decelerators, advanced explosive detonators, and advanced control actuators for gun-launched munitions. ***FY 2013 Plans:*** Investigate sensor targeting algorithm solutions for all-weather operations (to include experiments with semi-active laser sensors and other suitable options); investigate and mature affordable control actuation system components; conduct high-g survivability experiments.			
Title: Novel Penetrator Designs ***Description:*** This effort provides novel direct fire capabilities against advanced heavy armor threats by investigating several projectile configurations and non depleted uranium (DU) materials to achieve flight stability and effectiveness against new armored targets. ***FY 2014 Plans:*** Will optimize components for better function and launch survival; will design and modify non-DU kinetic energy (NexGen KE) functional projectile leading to the tech demo.	0.000	0.000	1.691
Title: Extended Range Projectile Technology ***Description:*** This effort develops various methods of low cost extended range technologies for 60mm through 120mm mortar. Target acquisition will improve with the incorporation of semi-active laser (SAL), video and GPS Guidance, Navigation and Control (GNC) state of the art technologies. The warfighter/Command & Control on a PDA and/or computer will be able to see beyond line-of-sight targets and change directions of projectiles while in flight. ***FY 2014 Plans:*** Will mature component technologies such as aerodynamic shapes, tail fins, lift surfaces,improved propellant and base bleed for 60mm through120mm mortar projectiles; conduct experiments for directing the projectile onto target at ranges beyond 500 meters; validate and mature electronic components for insertion into projectiles.	0.000	0.000	0.997
Title: Affordable Precision Technologies ***Description:*** This effort investigates technologies that provide affordable precision capabilities for projectiles fired into GPS denied environments. ***FY 2014 Plans:*** Will conduct experiments to validate the concept of utilizing commercial-off-the-shelf (COTS) inertial sensors for guided munition applications; determine the feasibility of applying arrayed sensor concepts to gun launched munitions in order to determine	0.000	0.000	1.695

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
position within navigation grade accuracies; validate target recognition algorithms adapted for use with the imaging modalities selected.			
Title: Enabling Printed Explosives, Power Sources & Electronics for Munitions ***Description:*** This effort develops and accelerates the state-of-the-art in materials printing, direct write, flexible electronics, and conformal systems for the warfighter. ***FY 2014 Plans:*** Will develop Printed Electronics, Energetics, Materials, & Sensors (PEEMS) technologies for armament applications; investigate ink development, device fabrication, and testing of printed electronics for current and future armament system; determine the utility of PEEMS technologies for munitions fuzing, sensing, security, and logistics.	0.000	0.000	0.704
Title: Air Dropped Guided Munition Technology ***Description:*** This effort develops and integrates component technologies that will enable a precision delivery and function of a 81mm mortar to defeat moving targets of opportunity in complex terrain. ***FY 2014 Plans:*** Will mature designs and analyze integration of Proximity Fuze system, with a wrap around antenna, and semi active laser seeker components, designed and developed to fit the volume and form factor of low cost and light weight air drop 60-81mm munitions.	0.000	0.000	1.295
Title: Extended Range Indirect Fire Weapon Technology ***Description:*** This effort initially investigates and determines the viability of candidate extended range indirect fire weapon technologies that facilitate hyper-velocity launch and result in ranges beyond 60km. The effort subsequently addresses the component level technological gaps. ***FY 2014 Plans:*** Will identify candidate technologies that can be used to facilitate hyper-velocity launch; will investigate viability of candidate technologies; will develop concepts utilizing the most promising technologies; will indentify the subcomponent technological gaps that need to be addressed early.	0.000	0.000	1.000
Accomplishments/Planned Programs Subtotals	11.785	16.596	13.200

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H19: *Asymmetric & Counter Measure Technologies*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
H19: *Asymmetric & Counter Measure Technologies*	-	15.753	7.762	9.049	-	9.049	11.989	15.319	10.486	12.046	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project designs and develops technologies to support asymmetric countermeasures such as radio frequency and ultra-short pulse directed energy and efforts to maintain the lethality and overmatch of US weapons. Work in this project is related to, and fully coordinated with, efforts in projects H18 and H28 (also in PE 0602624A), PE 0602618A (Ballistics Technology), and projects 232 and L94 in PE 0603004A (Weapons and Munitions Advanced Technology).

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

This work is performed by the Armament Research, Development, and Engineering Center (ARDEC), at Picatinny Arsenal, NJ, and the Army Research Laboratory (ARL) at Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Novel Battlefield Effectors	1.970	0.800	1.208
Description: This effort investigates unique weapon and munitions enabling technologies to achieve tunable effects on targets and that are capable of providing a full range of effects from non-lethal to highly lethal via a single weapon or munition.			
FY 2012 Accomplishments: Continued to develop most promising effector technologies and evaluate for transition to advanced development; conducted additional research into multiple novel battlefield effector candidate technologies.			
FY 2013 Plans: Continue to investigate most promising effector technologies and evaluate for transition to advanced development; conduct additional research into multiple novel battlefield effector candidate technologies.			
FY 2014 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H19: *Asymmetric & Counter Measure Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Will continue to investigate additional new and promising effector technologies and evaluate them for transition to advanced development; conduct experiments to enable size, weight, power and cost (SWaP-C) reduction of solid state active denial technologies to allow for handheld applications and for use on the design of other novel battlefield effector candidate technologies.			
Title: Active Denial Technologies ***Description:*** This effort develops non-lethal, counter-personnel directed energy (DE) technology that can repel personnel up to 100 meters. . ***FY 2012 Accomplishments:*** Completed design and build of a palletized system to validate that solid state active denial technology could achieve desired range (100 meters); conducted experiments and determined personnel incapacitation or repel effects were achievable. ***FY 2013 Plans:*** Complete integration and conduct experiments of the solid state active denial technology system to achieve the desired range of 100 meters.	3.160	1.761	0.000
Title: Counter Countermeasure (CCM) Technologies for weapons and munitions ***Description:*** This effort investigates guidance signal reduction, inertial measurement unit, and antenna design technologies to enable continued effectiveness of US weapon systems against enemy countermeasures including Active Protection Systems (APS), Global Positioning System (GPS) jamming, and active seeker jamming. ***FY 2012 Accomplishments:*** Continued to develop most promising CCM technologies and evaluate for transition to advanced development; conducted additional small scale research into multiple counter countermeasure candidate technologies. ***FY 2013 Plans:*** Continue to investigate most promising CCM technologies and evaluate for transition to advanced development; conduct additional small scale research into multiple counter countermeasure candidate technologies; conduct various experiments to determine effectiveness against future threats. ***FY 2014 Plans:*** Will design CCM systems to protect against known vulnerabilities and evaluate for transition to advanced development; will investigate multiple counter countermeasure candidate technologies; explore susceptibilities and remediation techniques for	4.268	2.241	0.907

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
armament systems; conduct various experiments to measure effects of directed energy and develop modeling and simulation to understanding underlying physics.			
Title: Novel Penetrator Designs ***Description:*** This effort provides novel direct fire capabilities against advanced heavy armor threats by investigating several projectile configurations and non depleted uranium materials to achieve flight stability and effectiveness against new armored targets ***FY 2012 Accomplishments:*** Designed and developed novel penetrator designs concepts and conduct penetration experiments against range targets. ***FY 2013 Plans:*** Down select to one penetrator design based on FY12 penetrator experiments and integrate into projectile cartridge for functional testing; execute a ballistic test to validate range and penetration requirements that support system performance and lethality goals.	3.015	2.960	0.000
Title: Directed Energy (DE) Standoff Enabler ***Description:*** This effort investigates the capability for stand-off neutralization technology of improvised explosive devices (IED) utilizing high power, DE sources. ***FY 2012 Accomplishments:*** Designed and developed DE standoff improvised explosive device (IED) neutralization technology; conducted research on high voltage and RF coupling to laser induced plasma filaments; matured components required to achieve multi-mode anti-materiel DE effects	3.340	0.000	0.000
Title: Fire Control Target Recognition & Classification ***Description:*** This effort incorporates the latest technologies, advanced algorithms, and fire control optical systems that will provide a target recognition and classification capability that currently does not exist. ***FY 2014 Plans:*** Will utilize systems engineering to investigate the state-of-the-art of optics, microprocessors and target recognition/classification algorithms based on market surveys of private industry/academia/other government agencies' sensor technologies; establish, develop and mature the associated fire control system requirements and performance goals; generate and evaluate concepts for software and hardware architectures for optimal fire control system performance and size, weight and power considerations.	0.000	0.000	2.014
Title: Recoil Reduction Disruptive Technologies	0.000	0.000	2.002

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H19: *Asymmetric & Counter Measure Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Description: This effort investigates technologies to reduce recoil momentum and energy waste for integration onto lighter vehicle platforms for increased mobility, using rarefaction wave gun and supporting technologies. ***FY 2014 Plans:*** Will investigate fundamental means of radical recoil reduction to enable large caliber weapons to be lightweight and integrated to lightweight manned and unmanned vehicles; fund research into rarefaction wave gun and supporting technologies for use in supersonic up to hypervelocity launchers.			
Title: Improvised Explosive Device (IED) Neutralization Technologies ***Description:*** This effort investigates multiple radio frequency (RF) functions to neutralize IEDs utilizing a common set of hardware and software, on a ground vehicle. It develops novel RF waveforms to neutralize a broad spectrum of IEDs and their electronic triggering devices. Results to transition to explosive hazard predonation system effort in PE 0603004A/Project 232 in FY2014/15. ***FY 2014 Plans:*** Will mature existing IED neutralization systems; conduct research to include the development of IED neutralization waveforms utilizing a modular exciter architecture, and development of a beam steering directional antenna to focus high power RF towards predicted threat zones to neutralize the IED; validate the increased performance of a convoy / route clearance based IED neutralization system by interfacing with IED detection sensor systems.	0.000	0.000	2.014
Title: Integrated Decision Enhancing Capabilities for Fire Control ***Description:*** This effort develops target database and target management capability for company and below operations ***FY 2014 Plans:*** Will develop software for integration and collaboration of remote weapon station for lethal/non lethal effects; develop software for the processing and integration of sensor/target information; develop LOS/BLOS fires capability for company and below within program of record architecture.	0.000	0.000	0.904
Accomplishments/Planned Programs Subtotals	15.753	7.762	9.049

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H19: *Asymmetric & Counter Measure Technologies*

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H1A: *WEAPONS & MUNITIONS TECH PROGRAM INITIATIVE*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
H1A: *WEAPONS & MUNITIONS TECH PROGRAM INITIATIVE*	-	14.941	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Weapons and Munitions Technology applied research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Program Increase	14.941	0.000	0.000
Description: This is a Congressional Interest Item. ***FY 2012 Accomplishments:*** This Congressional add funded multiple efforts in weapons and munitions System Concepts and Technology (SC&T), ARDEC core competencies, and efforts to support the Squad as a Strategic Formation.			
Accomplishments/Planned Programs Subtotals	14.941	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H28: *Warheads/ Energetics Technologies*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
H28: *Warheads/ Energetics Technologies*	-	11.404	10.860	15.549	-	15.549	15.281	18.823	24.917	24.042	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project investigates and designs enabling warhead and energetic technologies such as novel warhead architectures, new propellant techniques, and high-density explosives to produce smaller, lighter, more effective, multi-role warheads.

This project sustains Army science and technology efforts supporting the Ground portfolio.

Work in this project is related to, and fully coordinated with efforts in projects H18 and H19 in this PE, PE 0602303 (Aviation Advanced Technology), PE 0602618A (Ballistics Technology), and project 232 in PE 0603004A (Weapons and Munitions Advanced Technology).

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

This work is performed by the U.S. Army Armament Research, Development, and Engineering Center (ARDEC), at Picatinny Arsenal, NJ in collaboration with the Army Research Laboratory (ARL) at Aberdeen Proving Ground, MD; and the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Scalable Warhead Technology	4.356	4.210	4.176
Description: This effort designs scalable and adaptive explosives and reactive materials technology for either gun or missile-launched weapons and munitions that can deliver a broad spectrum of effects with reduced collateral damage.			
FY 2012 Accomplishments: Matured scalable and adaptive technology components for small to medium caliber munitions; determined levels of reduced collateral damage using scalable and adaptive technologies.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602624A: *Weapons and Munitions Technology*	PROJECT H28: *Warheads/ Energetics Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Design and test brassboard designs for shaped charge and explosively formed penetrator (EFP) with scaled up lethality; determine through modeling and simulation the range of lethal to less than lethal effects for scalable warheads. ***FY 2014 Plans:*** Will design and conduct experiments for spin compensated shaped charges, enhanced fragmentation and multiple explosively formed penetrator (MEFP) warheads; will investigate scalable technologies as they relate to lethal to less than lethal effects; will develop designs for non-axisymmetric EFP warheads.			
Title: Energetic Materials and Warheads ***Description:*** This effort designs energetic materials with controlled energy release for precision munition and counter-munition applications. ***FY 2012 Accomplishments:*** Conducted scaled-up experiments with new pyrotechnic formulations, high efficiency energetics formulations and warheads with novel energetic material; validated the performance enhancements of new pyrotechnics, energetics and warheads. Also, modeled structural materials which exhibited potential for explosive characteristics and conducted trade studies for candidate conventional and new chemical ingredients, formulations, and configurations to maximize the performance of structural materials while improving their insensitivity to unplanned stimuli. ***FY 2013 Plans:*** Continue to investigate most promising technologies like structural energetics, solventless propellants, and nanoinsensitive nitramines and evaluate them for transition to advanced development; conduct additional small scale research into multiple energetic materials and warheads candidate technologies for medium and large cal ammunition. ***FY 2014 Plans:*** Will continue to investigate most promising technologies such as disruptive energetics, micro-thrusters and tailorable propellants,highly effective miniature lethal mechanisms, and nano insensitive nitramines; will also conduct evaluation for transition into novel swarming munitions, advanced warheads, medium and large cal ammunition; will seek new applications based on measured performance.	1.784	1.950	2.893
Title: Insensitive Munitions Multi-Scale Reactive Modeling (IM-MSRM) ***Description:*** The IM-MSRM effort designs and investigates new M&S tools for the design and development of insensitive munitions. ***FY 2012 Accomplishments:***	0.700	0.700	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Investigated and matured continuum models of thermal kinetics ignition based on meso and molecular/atomic level predictions. ***FY 2013 Plans:*** Continue to investigate and develop atom level computer code modifications to create material models; develop mixed mode (blast/fragmentation) analytical capability and detonation shock dynamics to improve the representations of physics and chemistry in explosives and provide more accurate supercomputer design tools for the U.S. insensitive munitions design community			
Title: Explosives Research ***Description:*** This effort develops high energy/high performance, multi-purpose insensitive munitions (IM) explosives. ***FY 2012 Accomplishments:*** Designed and develop new insensitive formulations using IM MSRM modeling and simulation tools; began to validate the models with experiments of new insensitive energetics ingredients; and investigated different caliber munitions for the application of the new energetics. ***FY 2013 Plans:*** Begin optimization and scale-up of promising ingredients formulations and tailored explosives for mixed-mode and combined effects; conduct baseline design and testing of novel components as well as structures based on nano-energetics, energetic fibers and reactive alloys, explosive inks, multipoint initiation. ***FY 2014 Plans:*** Will determine most promising compounds to enable tailored energy release and combined effects; investigate and characterize new insensitive energetic ingredients; design and develop novel concepts for explosive initiation and formulation; scale up and test Nano energetic materials in TRL-4-5 experiments; develop nano-enhanced melt pour ingredients for reduced sensitivity and cost.	4.564	4.000	3.996
Title: Material Development for Water Purification ***Description:*** This effort originated from a material development for armament systems and was found to have a dual use application. The effort (also known as Adaptive Armament Reactive Interface Domains/AARID) is intended to provide a capability to enhance contingency basing water efficiency via recycling with secondary contributions to reduction of waste and power. Lesser focus advantages are on sustainment, greater logistics flexibility, and reduced Warfighter threat from supply convoys. ***FY 2014 Plans:*** Will investigate cycle time and water flow, determining rate of reaction for decontamination, validate the coating to lend itself useful for robustness of current filters, and design and develop laboratory systems for conducting experiments.	0.000	0.000	0.499
Title: Explosives Safety for Automated Base Camp Planning	0.000	0.000	0.300

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Description: This effort determines data interoperability requirements between explosive safety and base camp planning software tools; designs an integrated tool that increases explosive safety for base camps by managing the risk due to interaction between changes in Net Explosive Weight, geography, facilities and force structure. In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection - Basing. ***FY 2014 Plans:*** Will determine data interoperability requirements of explosives safety, risk assessment, and base camp planning tools leading to the development of the design architecture for an automated comprehensive base camp planning software suite.			
Title: Tunable Pyrotechnics ***Description:*** This effort develops smoke and flare countermeasure for passive protection for ground and air combat platforms, and hand held signals for illumination and signaling. This will increase warfighter and aircraft survivability. ***FY 2014 Plans:*** Will investigate ultraviolet countermeasure (UVCM) flare reformulation with modeling & simulation and validate in scale up experiments; will develop and validate laser beam rider countermeasure (LBRCM) designs with functional experiments; will design & develop image seeking countermeasure (ISCM) flare configurations;. will mature and validate white illumination hand held signal designs.	0.000	0.000	3.685
Accomplishments/Planned Programs Subtotals	11.404	10.860	15.549

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.