ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2004

BUDGET ACTIVITY	PE NUMBER AND TITLE
3 - Advanced technology development	**0603004A - Weapons and Munitions Advanced Technology**

	COST (In Thousands)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
	Total Program Element (PE) Cost	61206	53737	67622	74572	61701	68913	76618
232	ADVANCED MUNITIONS DEM	57837	27748	48177	41605	44237	45638	47567
43A	ADV WEAPONRY TECH DEMO	3369	6568	99	111	123	129	131
L94	ELECTRIC GUN SYS DEMO	0	19421	19346	19356	0	0	0
L96	HIGH ENERGY LASER TECHNOLOGY DEMO	0	0	0	13500	17341	23146	28920

A. Mission Description and Budget Item Justification: This Program Element (PE) matures and demonstrates affordable, smaller and/or lighter advanced weapons and munitions technologies to increase battlefield lethality and survivability for the Future Combat Systems (FCS) and the Future Force. Within Project 232 specific efforts include: FCS 120mm Line Of Sight (LOS) Beyond Line Of Sight (BLOS) System Advanced Technology Demonstration (ATD) and the Mounted Combat System (MCS) Ammunition System Technologies (MAST); Mid Range Munition (MRM); Advanced Light Armament for Combat Vehicles; Objective Non-Line Of Sight (NLOS) Mortar Technology; and High Energy Laser Technology Demonstrations. MAST will mature technologies to enhance the capabilities of FCS Increment 1 120mm LOS/BLOS armament system and munition suite. Objective NLOS Mortar Technology demonstrates a 120mm breech loaded recoiling mortar for under armor application. The Fire Control-Node Engagement Technology (FC-NET) program will mature a common fire control system for FCS gun and missile weapon systems. Advanced Acoustic Seismic Sensors provides networked acoustic/seismic sensors and aero-acoustic propagation models for the Networked Sensors for the Objective Force ATD. Beginning in FY04, Project L94 will mature enabling technologies for an Electromagnetic (EM) Gun armament system, leading to key sub-system demonstrations in FY06. EM Gun has the potential to revolutionize the future battlefield by its unique performance characteristics, including hypervelocity lethality effects and greatly reduced logistics burden. Efforts beginning in FY05 include: Common Smart Submunition; Lightweight Dismounted Mortar Weapon; Future Intelligent Munition; and MCS Ammunition Technologies. Beginning in FY06, FCS Armament Munitions will mature technologies used for affordable sub-munitions, smart mortar munitions and lighter weight launchers for the next generation of armaments and munitions. Also, in FY06 a new project, L96, designed to integrate a solid-state laser device into a high-energy laser weapon system will begin. This program adheres to Tri-Service Reliance Agreements on conventional air-surface weaponry, with oversight provided by the Joint Directors of Laboratories. Work in this PE is related to, and fully coordinated with, efforts in PE 0602624A (Weapons and Munitions Technology), PE 0602618A (Ballistics Tech), PE 0604802A (Weapons and Munitions - Engineering Development), and PE 0602307A (Advanced Weapons Technology). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and the Defense Technology Area Plan (DTAP). The program element contains no duplication with any effort within the Military Departments. This work is performed by the U.S. Army Armament Research, Development and Engineering Center (ARDEC), at Picatinny Arsenal, New Jersey.

B. Program Change Summary	FY 2003	FY 2004	FY 2005
Previous President's Budget (FY 2004)	63230	47752	72404
Current Budget (FY 2005 PB)	61206	53737	67622
Total Adjustments	-2024	5985	-4782
Congressional program reductions		-463	
Congressional rescissions			
Congressional increases		6650	
Reprogrammings	-2024	-202	
SBIR/STTR Transfer			
Adjustments to Budget Years			-4782

Significant Change Explanation.
FY04 - Three FY04 Congressional adds totaling $6650 were added to this PE.

FY04 Congressional Adds with no R-2As:
($964) Micro-Electromechanical System (MEMS) Reliability Assessment Program, Project 43A: The purpose of this one year Congressional add is to assess the reliability of MEMS devices. No additional funds are required to complete this project.

($4097) Technology Demonstration for the Prevention of Material Degradation, Project 43A: The purpose of this one year Congressional add is to demonstrate technologies for the prevention or minimization of the effects of material degradation on Army materiel. No additional funds are required to complete this project.

($1350) Development Mission Integration, Project 43A: The purpose of this one year Congressional add is to provide demonstrations of integrated armament technologies for armament systems to include integration activities on surrogate ground/air platforms. No additional funding is required to complete this project.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

February 2004

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603004A - Weapons and Munitions Advanced Technology**	**232**

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
232	ADVANCED MUNITIONS DEM	57837	27748	48177	41605	44237	45638	47567

A. Mission Description and Budget Item Justification: This project matures and demonstrates munitions enhancement for the FCS 120mm LOS BLOS System ATD and Mounted Combat System (MCS) Ammunition System Technologies (MAST) and matures emerging technologies in lightweight structures, smart materials, acoustic/seismic sensors and in-flight update architectures. Mid Range Munition (MRM) is a gun launched precision munitions capable of defeating high value heavy armor and other targets out to 8+km. The objective of this accelerated effort is to modify existing munitions components, including reducing the size of the guidance and control elements, and demonstrate the MRM BLOS capability for FCS increment I. MAST will mature technologies to enhance the capabilities of FCS Increment 1, 120mm LOS/BLOS armament system and munition suite. LOS/BLOS/NLOS Gun Technologies will apply advanced recoil mechanism and lightweight materials to gun systems to enhance range performance while driving overall system weight lower. The Advanced Light Armament for Combat Vehicles (ALACV) program will mature air bursting munitions and advanced kinetic energy penetrators for medium caliber applications. Lightweight Dismounted Mortar Weapon and Objective Non Line Of Sight (NLOS) Mortar Technology will be demonstrated under this project. The 81mm dismounted mortar effort will ease man transportability and reduce soldier combat load through an improved design and the application of lightweight advanced materials and structures. The 120mm breech loaded mortar will provide requisite FCS NLOS firepower performance levels with a design optimized for lightweight and thermal balance. Future Intelligent Munition (FIM) and Common Smart Submunition (CSS) efforts will pursue critical subsystem evaluations leading to final system demonstrations. FIM will provide a special purpose munition for unmanned terrain dominance with significant reduction in logistic burden and cost due to fewer munitions required per area coverage. CSS offers increased operational efficiency through multiple kills per munition and affords greater flexibility for carrier applications and enables utilization of a variety of delivery systems. FC-NET will provide a common software package that will recommend weapon-target pairings for missiles and guns and will be expandable to include future weapon types. Advanced Acoustic Seismic Sensors demonstrates networked acoustic/seismic sensors for target tracking and cueing of secondary sensor systems. The cited work is consistent with the Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and the Defense Technology Area Plan (DTAP). ARDEC, Picatinny Arsenal, New Jersey and the Army Research Laboratory, Aberdeen Proving Ground, MD perform in-house efforts.

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
Objective NLOS Mortar Technology: In FY03, performed thermal and dynamic stability analyses for mortar optimization; selected mortar technical approach and completed preliminary designs. In FY04, build and assemble the breech loaded mortar and begin single shot firing. In FY05, live fire tests will be conducted to demonstrate rates of fire commensurate with threshold requirements.	2978	2281	1975
ALACV: In FY03, demonstrated integrated medium caliber air bursting projectile lethality of four-fold increase in lethal area over traditional point-detonating warhead against personnel targets. Demonstrated 30% increase in behind armor effects using advanced penetrators.	2100	0	0
120mm LOS BLOS System: In FY03, demonstrated firing of multi-role cannon with swing chamber and case telescoped ammunition cartridge; demonstrated, at subscale, feasibility of achieving 25% increase in energy (retaining current sensitivity) using Gen II Electrothermal Chemical (ETC) propellant; demonstrated fire control software & hardware in a System Integration Laboratory; conducted testing of auto ammo handling system and load/unload sequence reliability; completed turret design. Demonstrated defeat of advanced threat armor at extended ranges with integrated novel penetrator & composite sabot. Demonstrated all remaining MRM subsystems/ systems in a relevant environment; fabricated guidance and control hardware and seeker/sensor hardware and conducted high-g testing. In FY04, conduct lethality testing of KE novel penetrator against heavy armor; demonstrate prototype MRM projectile in a guide-to-hit test conducted at ambient temperature that shall launch, survive, deploy, sense, maneuver and hit a target at 5km; conduct Rail Gun tests of multi-mode sensor components for Enhanced MRM; conduct secondary armament turreted slew system and firing demonstration. In FY05, will fabricate dual mode seeker for MRM, complete software development, conduct high-g test and conduct MRM Captive Flight Test.	51809	22957	16494
MCS Ammunition Systems Technologies (MAST): In FY05, will complete fabrication, assembly and conduct subsystem air frame and warhead testing of Line Of Sight-Multi Purpose (LOS-MP) munition. Will integrate warhead and fuzing subsystems into airframe and demonstrate LOS MP against air burst and concrete wall targets at Government Proving Grounds (TRL6). Will complete initial design, fabricate and conduct initial airframe testing at ambient temperature of Enhanced KE (TRL4).	0	0	12884

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
Networked Sensors for the Future Force (NSfFF) ATD: In FY04, demonstrate acoustic algorithm in real-time system and acoustic/seismic propagation model; integrate suite of acoustic/seismic sensors in the Networked Sensors for the Future Force ATD; develop low cost, distributed and networked unattended ground sensors. In FY05, will demonstrate the acoustic & seismic propagation and sensor system model on a platform to conduct an initial evaluation of a sensor emplacement tactical decision aid for optimum system performance; will integrate and demonstrate sensor systems in the NSfFF ATD.	0	995	988
FC-NET: In FY03, adapted software to Fire Control Computer and supported feasibility demonstration. In FY04, optimize algorithms and architecture to support demonstration in a simulated environment and initiate transition of Netted Effects to Objective Force Warrior (OFW). In FY05, will provide full functional Netted Effects Software configured for insertion into OFW architecture to support capstone demonstration.	950	747	741
Common Smart Submunition: In FY05, will conduct tower tests to verify and validate performance metrics for detection, discrimination and classification of potential targets in benign and countermeasured scenarios.	0	0	7688
NLOS-C Non Lethal Personnel Suppression: In FY05, will conduct non-lethal malodorant effectiveness and dispersion analysis; will refine design based on analysis; will conduct initial gun launch and payload dispense test.	0	0	3950
Lightweight Dismounted Mortar Weapon: In FY05, will conduct engineering evaluations and ballistically demonstrate a full-scale, lightweight barrel prototype.	0	0	3457
Small Business Innovative Research/Small Business Technology Transfer Programs	0	768	0
Totals	57837	27748	48177

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

February 2004

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603004A - Weapons and Munitions Advanced Technology**	**L94**

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
L94	ELECTRIC GUN SYS DEMO	0	19421	19346	19356	0	0	0

A. Mission Description and Budget Item Justification: This project demonstrates state of the art technology of major electromagnetic armament sub-systems at a tactical scale. The project provides a comprehensive mission area analysis/utility assessment, and will resolve system level issues including synchronization/compatibility of twin rotating machines, technology scalability, thermal management, and full-energy system performance. Electromagnetic guns have the potential to revolutionize the future battlefield by their unique performance characteristics, such as hypervelocity and stealth launch, their elimination of vulnerable propellants, their synergistic relationship with hybrid electric vehicles, and by their significant reduction in sustainment burden. The cited work is consistent with the Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and the Defense Technology Area Plan (DTAP). ARDEC, Picatinny Arsenal, New Jersey and the Army Research Laboratory, Adelphi, Maryland perform in-house efforts.

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
Electric Gun System Demo: In FY04, prepare detailed subsystem designs for Pulsed Power Supply (PPS), launcher, and Integrated Launch Package (ILP); mature models and simulations to demonstrate component, end-to-end and system-level performance; conduct a full-scale kinetic energy penetrator hypervelocity lethality assessment; order long-lead items. In FY05, will perform critical material/component evaluations including tests on composite rotors and barrels, low-density and high-strength metals, insulation systems, thermal management systems, high energy/high power switches; will fabricate and test subscale launcher and ILP; will fabricate components for prototype PPS rotating machines; will design pulse power supply torque management system and mount; will design and fabricate full scale launcher, mount, recoil, and ILPs, including both kinetic energy and high-explosive projectiles; will interface system simulation with FCS Simulation and Modeling for Acquisition, Requirements, and Training (SMART) process and will begin preparations for armament sub-system demonstrations.	0	18855	19346
Small Business Innovative Research/Small Business Technology Transfer Programs	0	566	0
Totals	0	19421	19346