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ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)							DATE February 2000		
BUDGET ACTIVITY 3 - Advanced Technology Development				PE NUMBER AND TITLE 0603004A Weapons and Munitions Advanced Technology					
COST (In Thousands)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	24049	58042	29738	12201	18369	16871	36546	Continuing	Continuing
DL94 Electric Gun Systems Demonstration	0	0	0	0	0	0	0	Continuing	Continuing
D43A Advanced Weaponry Technology Demonstration	12966	37054	16029	6304	8525	11058	20152	Continuing	Continuing
D232 Advanced Munitions Demonstration	11083	16083	13709	5897	9844	5813	16394	Continuing	Continuing
D244 Warheads and Energetics Center of Excellence	0	4905	0	0	0	0	0	4905	4905

**A. Mission Description and Budget Item Justification:** The objective of this Program Element (PE) is to demonstrate affordable, smaller and/or lighter advanced weapons and munitions technologies that will increase battlefield lethality and survivability. This PE funds several direct and indirect fire weapon demonstrations that include the Direct Fire Lethality (DFL) Program, the Tank Extended Range Munition (TERM), the Precision Guided Mortar Munition (PGMM), the Future Direct Support Weapon System (FDSWS) and Multi-role Direct/Indirect Fire for Future Combat Systems (FCS) Armament. In the area of combat vehicle anti-armor munitions, advanced explosively formed penetrator (EFP) warheads exploit technologies in explosives, liner materials and modeling, and demonstrate increased armor penetration through advanced warhead concepts. Work in this program element is consistent with the Army 2010 and beyond, including enabling technologies for the FCS, the Army Science and Technology Master Plan, the Army Modernization Plan, and Project Reliance. This program is primarily managed by the U.S. Army Armament Research, Development and Engineering Center (ARDEC), Picatinny Arsenal, NJ. 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) and PE 0604802A (Weapons and Munitions – Engineering Development).

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<b>B. Program Change Summary</b>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Previous President's Budget (FY 2000 / 2001 PB)	24858	39893	38686
Appropriated Value	25055	58643	
Adjustments to Appropriated Value			
a. Congressional General Reductions	-197		
b. SBIR/STTR	-453		
c. Omnibus or Other Above Threshold Reductions		-208	
d. Below Threshold Reprogramming	-258		
e. Rescissions	-98	-393	
Adjustments to Budget Years Since (FY 2000 / 2001 PB)			-8948
Current Budget Submit (FY 2001 PB)	24049	58042	29738

Change Summary Explanation: Funding - FY2001: Funds realigned to higher priority requirements

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BUDGET ACTIVITY <b>3 - Advanced Technology Development</b>				PE NUMBER AND TITLE <b>0603004A Weapons and Munitions Advanced Technology</b>				PROJECT <b>D43A</b>		
COST (In Thousands)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost	
D43A Advanced Weaponry Technology Demonstration	12966	37054	16029	6304	8525	11058	20152	Continuing	Continuing	
<p><b>Mission Description and Justification:</b> This project includes lethality enhancements for the DFL, TERM, PGMM, FDSWS and the Multi-role Direct/Indirect Fire for FCS Programs. The DFL program will enhance tank lethality of current and future kinetic energy (KE) penetrator munitions, particularly against explosively reactive armor (ERA) appliqué arrays now available on fielded threat systems. The TERM will provide an affordable extended range precision munition for the Abrams tank and enabling technologies of FCS, providing a 700% increase in lethal battlespace, engaging high priority targets in both line-of-sight and beyond line-of-sight. The PGMM demonstration will feature an affordable laser guided mortar munition with an extended range glide capability that will double current 120mm mortar range capabilities and dramatically improve mortar accuracy. The FDSWS will explore technologies to significantly lower the weight of large caliber artillery systems through the application of advanced methods of recoil management, materials and structures. Smart munition sensor technologies capable of locating targets in clutter will also be evaluated, this will include side by side comparative testing with smart submunition sensor suites. These concepts are candidates for technology insertions and provide significant enhancements over existing systems. This effort will support the area denial technology demonstration scheduled for FY 2001. In-house efforts are accomplished by ARDEC, Picatinny Arsenal, NJ and the U.S. Army Research Laboratory (ARL), Aberdeen Proving Ground, MD. Major contractors include: Alliant Tech Systems, Minneapolis, MN; Science Applications International Corp. (SAIC), McLean, VA; LTV Aerospace, Dallas, TX; Textron, Lowell, MA; Talley Defense, Mesa, AZ; Parker Kinetics Design, Austin, TX; Nomura Enterprise, Rock Island, IL; Loral, Dallas, TX; PRIMEX-Flinchbaugh, Red Lion, PA; Textron, Inc., Willington, MA; Technical Solutions Incorporated (TSI), Mesina Park, NM; Motorola, Scottsdale, AZ; Lockheed Martin, Orlando, FL; MEI Technology, Lexington, MA; Computing Device International, Minneapolis, MN; Singer Kearfott, Wayne, NJ; Diehl GmbH., Rothenbach, Germany; Design Systems Technologies Inc. (DSTI), Rockville, MD, Alliant Tech Systems, Allegheny Ballistics Laboratory, Rocket City MD, Raytheon/TI Systems, Tucson, AZ.</p> <p><b>FY 1999 Accomplishments:</b></p> <ul style="list-style-type: none"> <li>• 5974 - Conducted PGMM fin deployment live fire tests; conducted navigation sensor trade studies; participated in the Military Operations in Urban Terrain (MOUT) ) Advanced Concept Technology Demonstration (ACTD) via simulation; selected and tested new gyro.</li> <li>• 829 - Supported automated towed howitzer extended user evaluation under the Rapid Force Projection Initiative (RFPI ) ACTD.</li> <li>• 2390 - Performed modeling and simulation of 5700 lb. FDSWS weapon including electro-rheological (ER) fluid recoil system; fabricated hardware for ER fluid recoil system testbed.</li> <li>• 1295 - Continued integrated design of dual novel penetrator system for defeat of future armor targets with less than 5 megajoules of energy on target.</li> <li>• 2478 - Completed initial system designs for TERM concepts, downselected to two concepts for sensor demonstrations.</li> </ul> <p>Total 12966</p>										
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<p><b>FY 2000 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 10057 - Conduct sensor demonstrations of TERM concepts using simulation and Captive Flight Tests (CFT). - Define TERM fire control system and munition concept design.</li> <li>• 11300 - Conduct PGMM system hi-g tests via parachute round firings; conduct wind tunnel tests; conduct flight integrity live fire tests; complete gyro integration; flight integrity live fire tests. - Conduct simulation and modeling effort for area denial; procure and test prototype weapon system and sensor hardware.</li> <li>• 11361 - Define combined laser detection and ranging (LADAR), millimeter wave radar and infrared sensor suite requirements to detect low observable targets; conduct captive flight test to evaluate W BAND (94 gigahertz) millimeter wave radar and LADAR sensor suite for next generation smart munition applications. - Conduct FDSWS live fire demonstration of 6750 lb. weapon; complete fabrication of 5700 lb. weapon; start virtual simulations; perform ER fluid research including fluid characterization, software control methodology; materials and structures modeling, and power supply design</li> <li>• 2118 - Conduct integrated demonstrations of novel dual penetrator systems to establish enhanced defeat of complex armor with less than 5 megajoules of energy on target.</li> <li>• 1365 - Procure and evaluate prototype quantities of 120mm, one-tenth range training rounds to verify performance and reusability. - Develop and procure a small, lightweight, low energy laser ignition system for 155mm howitzers for a technology demonstration.</li> <li>• 853 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.</li> </ul> <p>Total 37054</p> <p><b>FY 2001 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 5900 - Conduct subsystem technology demonstrations of TERM concepts including warhead, propulsion and Hi G testing. - Demonstrate defeat of advanced threat armors and active protection systems through simulation and/or live fire. - Design air bursting warheads for a medium caliber lightweight armament system for future combat vehicles. - Refine novel, dual KE penetrator for robust defeat of advanced complex armors with less than 5 megajoules of energy on target at extended ranges.</li> <li>• 5164 - Conduct hardware in-the-loop simulations and perform PGMM ATD laser round demonstration firings. - Build and test area denial hardware and conduct system demonstration.</li> <li>• 4965 - Perform operational evaluation of 5700 lb. FDSWS weapon and validate virtual simulations.</li> </ul> <p>Total 16029</p>		
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BUDGET ACTIVITY <b>3 - Advanced Technology Development</b>				PE NUMBER AND TITLE <b>0603004A Weapons and Munitions Advanced Technology</b>				PROJECT <b>D232</b>		
COST ( <i>In Thousands</i> )	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost	
D232 Advanced Munitions Demonstration	11083	16083	13709	5897	9844	5813	16394	Continuing	Continuing	
<p><b><u>Mission Description and Justification:</u></b> This project includes the DFL program which will enhance tank KE penetrator lethality, particularly against ERA appliqué arrays now available on fielded threat systems, through use of a precursor defeat mechanism. Additionally it will demonstrate range and lethality enhancements for tank munitions and emerging technologies needed to defeat active protection systems (APS). This project demonstrates advanced warhead and cartridge concepts, utilizing novel EFP and shaped charged (SC) designs, that can be applied to product improvements to fielded and developmental anti-armor munitions, (e.g., wide area munitions (WAM), and 120mm chemical energy (CE) cartridge.) It advances warhead technology to enhance the lethality of smart projectiles by providing multi-role, multi-effect warheads capable of defeating point and area targets. In-house efforts are accomplished by ARDEC, Picatinny Arsenal, NJ and the ARL, Aberdeen Proving Ground, MD. Major contractors include: Alliant Tech Systems, Minneapolis, MN; SAIC, McLean, VA; LTV Aerospace, Dallas, TX; Textron Defense Systems, Wilmington, MA; Talley Defense, Mesa, AZ; Parker Kinetics Design, Austin, TX; Nomura Enterprise, Rock Island, IL; Loral, Dallas, TX; PRIMEX-Flinchbaugh, Red Lion, PA; Alliant Tech Systems-Allegheny Ballistics Laboratory, Rocket City MD and Raytheon/TI Systems, Tucson, AZ.</p> <p><b>FY 1999 Accomplishments:</b></p> <ul style="list-style-type: none"> <li>• 4996 - Completed DFL ATD precursor penetrator integrated cartridge design. <ul style="list-style-type: none"> <li>- Conducted technology maturation demonstrations for optimum novel penetrator function and armor penetration utilizing tactical composite sabot and propulsion system.</li> </ul> </li> <li>• 3572 - Demonstrated via modeling and simulation TERM technical feasibility and operational force effectiveness. <ul style="list-style-type: none"> <li>- Completed TERM concept designs and downselect.</li> </ul> </li> <li>• 2515 - Conducted tests of long stand-off warheads (downselected in FY1998) and matured candidates for counter active protection systems.</li> </ul> <p>Total 11083</p> <p><b>FY 2000 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 7210 - Demonstrate novel penetrator to achieve up to 70% increase in armor penetration over the M829A2 munition at extended ranges. <ul style="list-style-type: none"> <li>- Complete design of advanced KE munition for defeat of explosive reactive armor.</li> </ul> </li> <li>• 8513 - Develop TERM multi-sensor technologies to achieve sufficient footprint for long range engagement. <ul style="list-style-type: none"> <li>- Complete CFT verification of sensor technology.</li> </ul> </li> <li>• 360 - Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR) Programs.</li> </ul> <p>Total 16083</p>										
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<i>COST (In Thousands)</i>	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost	
D244 Warheads and Energetics Center of Excellence	0	4905	0	0	0	0	0	4905	4905	
<p><b><u>Mission Description and Justification:</u></b> This one-year Congressional plus-up will design and demonstrate SC and EFP warheads that are more lethal, lighter and smaller with multiple effects for high performance against armor, masonry, wall and bunker targets. It develops explosives for future warheads with increased energy and reduced sensitivity which are affordable and easy to demilitarize. This project will develop propulsion systems providing increased performance with Insensitive Munitions (IM) compliance and reduced gun tube wear. This effort will augment current efforts and support FCS requirements. Efforts will be performed by members of the National Warheads and Energetics Consortium under the Warheads and Energetics Center, Picatinny Arsenal, NJ and the ARL, Aberdeen Proving Ground, MD. Major contractors include Alliant Tech Systems, MN; SAIC, McLean, VA; Textron Defense Systems, Wilmington, MA; Aerojet, Sacramento, CA; Geocenters, Wharton, NJ; Hunting Engineering, London, U.K.; Dynamit Nobel, Nurenburg, GE.</p> <p><b>FY 1999 Accomplishments:</b> Project not funded in FY 1999</p> <p><b>FY 2000 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 1068 - Synthesize, scale-up and develop processes to manufacture new explosives, i.e.: TNAZ, CL-20, PAX 2A and polynitrcubanes.</li> <li>• 925 - Develop high performance/ low flame temperature gun propellant to reduce tube wear and erosion.</li> <li>• 1130 - Design, fabricate and test EFP warheads for active protection system.</li> <li>• 1650 - Complete designs, fabricate and test SC and EFP warheads with novel liner materials, configurations, and explosives.</li> <li>• 132 - Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR) Programs.</li> </ul> <p>Total 4905</p> <p><b>FY 2001 Planned Program:</b> Program completed in FY00.</p>										
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