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

June 2001

BUDGET ACTIVITY
6 - MANAGEMENT SUPPORT

PE NUMBER AND TITLE
0605805A - Munitions Standardization Effectiveness & Safety

COST (In Thousands)		FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost		18312	16622	16072	0	0	0	0	0	0	0
296	PYROTECHNIC RELIABILITY & SAFETY	767	788	904	0	0	0	0	0	0	0
297	MUN SURVIVABILITY & LOG	3803	4180	4249	0	0	0	0	0	0	0
857	DOD EXPLOSIVES SAFETY STANDARDS	752	754	775	0	0	0	0	0	0	0
858	ARMY EXPLOSIVES SAFETY MANAGEMENT PROGRAM	0	493	499	0	0	0	0	0	0	0
859	LIFE CYCLE PILOT PROCESS	0	0	2511	0	0	0	0	0	0	0
862	FUZE TECHNOLOGY INTEGRATION	0	0	2009	0	0	0	0	0	0	0
F21	NATO SMALL ARMS EVAL	476	486	491	0	0	0	0	0	0	0
F24	CONVENTION AMMO DEMIL	12514	9921	4634	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification:

PLEASE NOTE: This administration has not addressed FY2003-2007 requirements. All FY 2003-2007 budget estimates included in this book are notional only and subject to change.

This Program Element supports continuing technology investigations. It provides a coordinated tri-service mechanism for the collection and free exchange of technical data on the performance and effectiveness of all non-nuclear munitions and weapons systems in a realistic operational environment. It provides for NATO interchangeability testing; joint munitions effectiveness manuals used by all services; development of standardization agreements (STANAGS) and associated Manuals of Proof and Inspection (MOPI); operation of the North American Regional Test Center (NARTC); evaluation of demilitarization methods for existing conventional ammunition; evaluation of useful shelf life, safety, reliability and producibility of pyrotechnic munitions; and improvement of explosives safety criteria for DOD munitions via the DOD Explosives Safety Board. Pyrotechnic Reliability and Safety (M296) supports pyrotechnic research, development and testing to identify, characterize and resolve reliability, safety, storage and manufacturing issues that impact production availability and field use of pyrotechnics. It will result in the development and demonstration of new, safe, reliable and environmentally acceptable munitions. Munitions Survivability and Logistics (D297) will make Army units more survivable by testing and demonstrating munitions logistics system solutions that prevent or minimize catastrophic explosive events and accelerate ammunition resupply. The Army Explosives Safety Management Program (M858) is a new start for FY 2001. The U.S. Army Technical Center for Explosives Safety will use the funds in this project to evaluate current explosives safety standards, using risk management philosophy to develop new, scientific and risk-based standards to meet U. S. Army explosives requirements. The Life Cycle Pilot Program(LCPP)(M859) and the Fuze Technology Integration program (M862) are FY 2002 new starts. The LCPP program will assess production base capabilities and needs over the acquisition life cycle of various ammunitions, address the producibility of ammunition, and transition to type classification and production, and address the ability of the production base to cost effectively produce quality products on schedule. The Fuze Technology Integration program (D862) will improve performance and lower the cost for existing proximity fuzes and enable

new applications in submunitions and medium caliber fuzes by addressing advanced proximity fuze sensor technology, Micro-electromechanical Systems (MEMS), Safe and Arms (S&A) technology, and Electronic S&A (ESA)technology for smart munitions.

B. Program Change Summary	FY 2000	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2001 PB)	18800	11276	10604	0
Appropriated Value	19037	16776	0	
Adjustments to Appropriated Value	0	0	0	
a. Congressional General Reductions	0	0	0	
b. SBIR / STTR	-488	0	0	
c. Omnibus or Other Above Threshold Reductions	-74	0	0	
d. Below Threshold Reprogramming	0	0	0	
e. Rescissions	-163	-154	0	
Adjustments to Budget Years Since FY2001 PB	0	0	5468	
Current Budget Submit (FY 2002/2003 PB)	18312	16622	16072	0

Change Summary Explanation:
Funding: FY2002/F2003 - New start Project 859 and Project 862

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June 2001

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
6 - MANAGEMENT SUPPORT	**0605805A - Munitions Standardization Effectiveness & Safety**	**297**

COST (In Thousands)		FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
297	MUN SURVIVABILITY & LOG	3803	4180	4249	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This project supports the Army Transformation by making Army units more survivable through the investigation, testing and demonstration of munitions logistics system solutions that prevent or minimize catastrophic explosive events and accelerate ammunition resupply. Key thrusts are munitions storage area survivability, insensitive munitions technology integration and compliance, weapon system rearm, munitions configured load enablers and advanced packaging and distribution system enhancements. Within each thrust, a broad array of solutions will be identified, tested, and evaluated against developed system measures of effectiveness. Optimum, cost effective solutions that enable the rapid projection of lethal and survivable forces will be demonstrated. The early stages of force deployment are especially critical. Theater ammunition storage areas are vulnerable and present the enemy with lucrative targets. These areas and distribution nodes contain the only available munitions stocks in theater. Loss of these munitions could cripple the force, jeopardize the mission, and result in high loss of life. This project mitigates vulnerabilities and ensures a survivable fighting force.

FY 2000 Accomplishments

- 1100 Completed software design architecture and development of safety and survivability planning information modules for a prototype munitions storage area planning software tool that allows soldiers to quickly design survivable and efficient ammunition field storage sites.
- 87 Completed 3-D hydrocode computation and analysis of the dynamics of the detonation of a munitions stack in a field storage area to reduce existing quantity-distance requirements for the storage of ammunition
- 443 Designed, developed and demonstrated a prototype manipulator/end effector and develop 3-D motion simulation and real time visualization models for a smart munitions handling crane that will leverage the reduced ammunition force structure and facilitate rapid configuration and reconfiguration of munitions loads in theater
- 180 Designed and fabricated a Palletized Loading System (PLS) Shoe interface platform that makes the Container Roll On Roll Off Platform (CROP) compatible with strategic USAF aircraft and a self powered roller platform that facilitates the transfer of 463L pallets between Army and Air Force trucks and handling equipment
- 72 Designed and fabricated a truck mounted ammunition resupply module and transfer mechanism that will provide Interim Brigade Combat Team (IBCT) towed howitzer units with ready-to-fire ammunition at the firing section

FY 2000 Accomplishments (Continued)

- 250 Tested less heat sensitive propellants and continue design evaluation for alternative projectile venting systems that relieve gas pressure for M915 and XM916 DPICM projectiles to reduce reaction to unplanned stimuli
- 135 Completed the evaluation of technologies that reduce a munition's reaction to fragment impact and ammunition packaging materials that incorporate a propellant fire extinguishing capability (to reduce reaction to unplanned stimuli) and continue to identify system application candidates
- 234 Evaluated alternative ignition concepts and minimum venting requirements for an active venting system for artillery and other munitions to help minimize the reaction in cook-off environments
- 88 Evaluated the concept of mixing low temperature gas generating material in high explosives, which generate high pressure and burst the warhead without violent reaction under cook-off environments, thereby helping the munition meet the requirement to withstand unplanned stimuli
- 300 Completed warhead shaped charge liner redesign modeling and conduct evaluation of the loading process for PAX2A (a less sensitive explosive replacement of Comp A-5 in the Missile Launched Rocket System (MLRS) M85 grenade to help the MLRS meet the requirement to withstand unplanned stimuli)
- 72 Continued reviews of munitions in development and production to determine if they meet DoD 5000.2-R requirement to withstand unplanned stimuli and recommend technical approaches to meet the requirement
- 153 Evaluated venting concepts, complete packaging design and conducted engineering tests for a 2.75" Rocket container that reduces the reaction to unplanned stimuli
- 208 Identified specific insensitive munitions (IM) technologies that can be applied to individual Army munitions, populated database of Army munitions compliance status with DoD 5000.2-R requirement that all munitions be designed to withstand unplanned stimuli, and identified IM improvement priorities
- 166 Conducted engineering testing of candidate corrosion prevention materials to determine suitability for use inside munitions packaging
- 315 Completed design and fabrication of lightweight packaging prototype for large munitions that will reduce prototype development time and cost, production unit cost, and ultimately the manpower and handling required to move heavy/bulky munitions through the logistics system. Conducted baseline tests of prototype

Total 3803

FY 2001 Planned Program

- 770 Complete development and integration of safety and survivability planning information modules, develop linkage to the Standard Army Ammunition System (SAAS), and conduct engineering testing of a prototype munitions storage area planning software tool
- 350 Conduct initial user evaluation and design multi-layer control software for a smart munitions handling crane to build ammunition configured loads
- 90 Demonstrate a Palletized Loading System (PLS) Shoe interface platform that makes Container Roll On Roll Off Platforms (CROP) compatible with USAF aircraft and a self powered roller platform that facilitates the transfer of 463L pallets between Army and Air Force trucks and handling equipment
- 32 Demonstrate a truck mounted ammunition resupply module and transfer mechanism that will provide IBCT towed howitzer units ready-to-fire ammo at the firing section
- 161 Complete engineering tests and demonstrate forklift automation enhancements to permit rapid building of ammunition configured loads, reduce manpower requirements and increase distribution velocity for all in theater munitions handling operations.
- 200 Analyze test results and modify, if necessary, less heat sensitive propellants for M915 and XM916 Dual Purpose Improved Conventional Munition (DPICM) projectiles. Complete engineering tests for modified/improved component hardware and transition to PM
- 568 Design and fabricate prototype ignition devices for a munitions active venting system to help minimize the reaction in cook-off environments
- 495 Develop and evaluate alternate low temperature gas generating materials and mixtures to help minimize the reaction in cook-off environments
- 400 Complete warhead shaped charge liner contour design optimization, conduct engineering tests and continue loading evaluation for a less sensitive High Explosive for MLRS
- 111 Conduct reviews of munitions in development and production to determine if they meet the DoD 5000.2-R requirement to withstand unplanned stimuli and recommend technical approaches to meeting the requirement
- 155 Conduct baseline tests, modified existing design, fabricate prototypes, and conduct fast/slow cook-off tests of Insensitive Munitions (IM) packaging for 2.75" rockets
- 135 Complete development of and maintain Army Insensitive Munitions (IM) compliance status database
- 115 Conduct ammunition container scoring stress analysis and develop concepts for using container scoring to improve munitions IM characteristics

FY 2001 Planned Program (Continued)

- 127 Complete long-term predictive testing and evaluation of corrosion prevention materials suitable for use inside munitions packaging and prepare final report
- 371 Develop concepts and design prototype lightweight (up to a 50% reduction) containers, utilizing advanced materials, for medium and small caliber ammunition that will reduce the logistics footprint, increase handling efficiency and reduce environmental impact compared to currently fielded containers
- 100 Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR)

Total 4180

FY 2002 Planned Program

- 815 Complete modifications and field testing of a prototype munitions storage area planning software tool and transition to PM Standard Army Ammunition System (SAAS)/Global Combat Support System-Army (GCSS-A). Continue software capability upgrades.
- 250 Develop operator/driver interface and instrumentation for the smart munitions handling crane to facilitate the building of ammunition configured loads.
- 200 Integrate operator aids and conduct engineering tests of an automated ammunition handling forklift that will facilitate the building of ammunition configured loads.
- 100 Develop preliminary design concepts of a smart cargo tiedown system for the PLS CROP, flatracks, and trailer, or truck cargo beds that will reduce in-theater munitions reconfiguration/resupply times and increase transportation safety
- 100 Analyze the explosives safety hazards in storage and transport caused by incompatible munitions in proposed Strategic Configured Loads (SCL) and develop concepts for mitigating these hazards.
- 275 Develop concepts for projectile venting systems that relieve gas pressure in DPICM artillery munitions to improve their ability to withstand unplanned stimuli. Complete preliminary hardware component designs.
- 640 Complete thermoelectric power generator development and design integration and conduct engineering tests for an active venting system for the 2.75" Rocket
- 400 Continue the development of alternate low temperature gas generating material and mixtures to help minimize the reaction in cook-off environments. Conduct safety, characterization, stability, long-term, and demonstration tests

FY 2002 Planned Program (Continued)

- 300 Conduct performance test on submunitions, refine warhead liner design, and complete manufacturing process development for a less sensitive High Explosive for MLRS
- 139 Conduct reviews of munitions in development and production to determine if they meet the DoD 5000.2-R requirement to withstand unplanned stimuli and recommend technical approaches to meeting the requirement
- 120 Continue to populate and maintain Army insensitive munitions (IM) compliance status database
- 210 Develop and test a prototype munitions packaging using container scoring technology
- 200 Identify candidate munitions, conduct bullet and fragment tests and evaluation to determine IM thresholds, and down select IM barrier materials that will reduce the reaction to unplanned stimuli
- 500 Conduct engineering testing and user evaluation and modify design of prototype lightweight, advanced materials containers for medium and small caliber ammunition

Total 4249

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June 2001

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
6 - MANAGEMENT SUPPORT	**0605805A - Munitions Standardization Effectiveness & Safety**	**859**

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
859 LIFE CYCLE PILOT PROCESS	0	0	2511	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This project is a new start which supports future ammunition development through continuing technology investigations and industrial assessments. It will assess production base capabilities and needs over the life cycle of various ammunition; address the ultimate producibility of ammunition items and transition them to type classification and production; assist PMs/developers to identify industry capabilities and associated technology requirements, and address the ability of the production base to cost effectively produce quality products on schedule. Total Ownership Cost Reduction is an important part of the Life Cycle Pilot Process (LCPP). LCPP provides the Research, Development, and Acquisition community the resources to prototype critical technologies and the information to establish affordable, environmentally safe and modern processes that support a wide range of munitions needs.

FY 2000 Accomplishments

Project not funded

FY 2001 Planned Program

Project not funded

FY 2002 Planned Program

- 1200 Perform production base readiness assessments to analyze present capabilities and identify trends in munitions and industrial technology
- 611 Develop "pilot" (prototype) critical technologies necessary to establish a quality, affordable, and environmentally safe process that supports a wide range of munitions
- 700 Identify technologies required to support total life cycle of munitions from research and development to demilitarization/disposal

Total 2511

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

June 2001

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
6 - MANAGEMENT SUPPORT	**0605805A - Munitions Standardization Effectiveness & Safety**	**862**

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
862 FUZE TECHNOLOGY INTEGRATION	0	0	2009	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This program is a new start which supports technology investigations in the areas of munition fuzing and safe and arming (S&A). The program addresses four major areas: Advanced proximity fuze sensor technology integration, including Ultrawideband (UWB)sensor and signal processor technology; Micro-electromechanical Systems(MEMS), and Safe and Arm (S&A) technology, and Electronic Safe and Arm (ESA) technology for smart munitions. Development and demonstration of fuzing technology will improve munitions effectiveness for the Future Combat System, cannon artillery, mortars, small and medium caliber ammunition, tanks, mines, countermines, demolitions, rockets, and missiles, with potential multi-service applications. Proximity fuze technology will improve performance and lower the cost for existing proximity fuzes and enable new applications in submunitions and medium caliber fuzes. MEMS S&A technology is needed to develop a MEMS S&A device that will meet MIL-STD requirements for direct and indirect fire munitions. ESA technology for smart munitions will miniaturize, ruggedize, and reduce the cost of components currently proven in missile applications and make them relevant to gun-fired munitions.

FY 2000 Accomplishments

Project not funded

FY 2001 Planned Program

Project not funded

FY 2002 Planned Program

•	933	Evaluate proximity sensor technologies, inclusive of the ultrawideband (UWB), all digital processor and clutter resistant air target sensors
•	251	Develop and evaluate novel penetration techniques
•	194	Investigate medium caliber fuzing ranging technology
•	211	Conduct fuze second environmental sensor evaluation
•	225	Develop MEMS S&A mechanical design. Evaluate micro-energetic initiator methods
•	195	Develop, evaluate and test gun-hardened, reduced volume ESA components
Total	2009	

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June 2001

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
6 - MANAGEMENT SUPPORT	**0605805A - Munitions Standardization Effectiveness & Safety**	**F24**

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
F24 CONVENTION AMMO DEMIL	12514	9921	4634	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This project supports a continuing technology evaluation of demilitarization methods for existing conventional ammunition and conventional ammunition recovered from formerly used defense sites (FUDS). It will complete the development and demonstration of new, safe, and environmentally acceptable alternatives to open burning/open detonation (OB/OD) for recovery/recycle/reclamation equipment and processes to reduce the extremely large stockpile of munitions in the resource recovery disposition account and recovered munitions from FUDS.

FY 2000 Accomplishments

- 400 Continued testing, evaluation, and prove-out of pilot scale plasma arc technology
- 4941 Completed design of cryofracture demilitarization technology pilot plant for Anti-Personnel Landmine (APL) and other munitions
- 1228 Completed pilot plant checkout and initiated testing and evaluation of Super Critical Water Oxidation (SCWO) system for cacinogenic dyes
- 150 Completed system assemblage and initiated component and system prove-out for explosives re-work system
- 125 Initiated development of recycle/reuse technology for magnesium/aluminum
- 3000 Continued development and demonstrations of stationary and transportable contained detonation technology
- 170 Initiated development of smoke generating fog oil recovery technology
- 2500 Initiated efforts at Blue Grass Army Depot to insert, evaluate and enhance resource recovery and reuse options using explosive re-work, propellant conversion and molten salt oxidation technologies

Total 12514

FY 2001 Planned Program

- 2060 Continue testing, evaluation, and prove-out of pilot scale plasma arc technology
- 3772 Continue cryofracture development for demilitarization of APL and other munitions
- 2391 Initiate development of recovery/reuse technology for explosives
- 683 Continue development of recycle/reuse technology for magnesium/aluminum
- 720 Continue development of smoke generating fog oil recovery technology
- 295 Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR)

Total 9921

FY 2002 Planned Program

- 850 Complete testing, evaluation and prove-out of pilot scale plasma arc technology
- 1834 Continue cryofracture development for demilitarization of APL and other munitions
- 550 Continue development of resource recovery/reuse technology for explosives
- 650 Continue development of recycle/reuse technology for magnesium/aluminum
- 750 Complete development of smoke generating fog oil recovery technology

Total 4634