ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE
2 - Applied Research	**0602720A - Environmental Quality Technology**

COST (In Thousands)		FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total Program Element (PE) Cost		22358	17859	17923	17131	16650	16507	16796
048	IND OPER POLL CTRL TEC	3997	2788	3010	3019	3049	3076	3099
835	MIL MED ENVIRON CRIT	3381	3022	3256	3293	3326	3355	3380
895	POLLUTION PREVENTION	1078	3357	4592	3757	4069	3817	4011
896	BASE FAC ENVIRON QUAL	7939	7016	7065	7062	6206	6259	6306
EM5	ENVIRONMENTAL QUALITY APPLIED RSCH - AMC (CA)	4791	0	0	0	0	0	0
F25	MIL ENV RESTOR TECH	117	0	0	0	0	0	0
F35	Environmental Quality Applied Research (CA)	1055	1676	0	0	0	0	0

A. Mission Description and Budget Item Justification: The objective of this applied research program element is to provide technologies that support the long-term sustainment of Army training and testing activities by improving the Army's ability to comply with requirements mandated by federal, state and local environmental/health laws reducing the cost of this compliance. This program provides the Army with capabilities to decontaminate or neutralize Army-unique hazardous and toxic wastes at sites containing waste ammunition, explosives, heavy metals, propellants, smokes, chemical munitions, and other organic contaminants; as well as technology to avoid the potential for future hazardous waste problems, by reducing hazardous waste generation through process modification and control, materials recycling and substitution. This program matures technologies to predict and mitigate range and maneuver constraints associated with current and emerging weapon systems, doctrine, or regulations. Research is transitioned to PE 0603728A (Environmental Quality Technology Demonstrations). 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 U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, the Center for Health Promotion and Preventive Medicine located at Aberdeen, Maryland, and the Army Research Laboratory located at Aberdeen, Maryland, execute the project work.

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2006)	22369	16417	17379
Current BES/President's Budget (FY 2007)	22358	17859	17923
Total Adjustments	-11	1442	544
Congressional Program Reductions		-78	
Congressional Rescissions		-180	
Congressional Increases		1700	
Reprogrammings	-11		
SBIR/STTR Transfer			
Adjustments to Budget Years			544

One FY06 Congressional add totaling $1700 was added to this PE.

FY06 Congressional add with no R-2A (appropriated amount shown):
($1700) Chemical Materials and Environmental Modeling Project.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602720A - Environmental Quality Technology**	**048**

COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
048 IND OPER POLL CTRL TEC	3997	2788	3010	3019	3049	3076	3099

A. Mission Description and Budget Item Justification: The objective of this applied research project is to provide technologies to enable the Army to reduce or eliminate environmental impacts both in the United States and abroad. These technologies reduce the effects of legal and regulatory environmental restrictions on installation facilities, training and testing lands, and ranges, as well as to avoid fines and facility shutdowns within the United States and reduce environmental impacts to the warfighter abroad. New and innovative technologies are essential for the effective control and reduction of military unique hazardous and non-hazardous wastes on military installations worldwide. Efforts include a focus on the impacts of new materiel that will enter the Army inventory within the next decade and beyond. This project focuses on industrial pollution sources from production facilities, facility contamination, and other waste streams providing compliance through sustainable environmental protection technologies. Efforts abroad include a focus on technologies to provide deployed forces with environmentally safe and cost effective technologies and/or processes to achieve maximum diversion, minimization, or volume reduction of basecamp/field waste. Additional work is focused on environmental risk assessment for ranges. 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 U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.

Accomplishments/Planned Program	FY 2005	FY 2006	FY 2007
Industrial Compliance and Pollution Prevention Readiness - In FY05, matured physiochemical and biosorbent treatment technologies for wastewater from munitions production allowing cost effective treatment while maintaining mission readiness. Developed program to investigate new industrial contaminant streams resulting from insensitive munitions production, specifically dinitroanisole (DNAN) and N-Methyl-P-Nitroaniline (MNA). Determined optimal processing parameters to produce cellulose by-product. In FY06, will mature bench treatment technologies for perchlorate commingled with explosives. In FY07, will maximize adhesive and agglomerative properties of cellulosic component and will transfer polymer component to reduce barrier/fortification requirements. Will initiate reductive treatment/transformation studies for DNAN and MNA, and use structural activity analysis to predict fate and treatment effectiveness. Will identify environmental risk components of future urban and close battle ranges.	1620	2788	3010
Sustainable Live-Fire Range Design and Maintenance - In FY05, matured application of the range risk assessment evaluation protocol as a web and Geographic Information System based range planning tool.	2377	0	0
Total	3997	2788	3010

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602720A - Environmental Quality Technology**	**835**

COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
835 MIL MED ENVIRON CRIT	3381	3022	3256	3293	3326	3355	3380

A. Mission Description and Budget Item Justification: The objective of this applied research project is to provide quantitative means to determine the environmental and human health effects resulting from exposure to explosives, propellants, and smokes produced in Army industrial, field, and battlefield operations or disposed of through past activities. The end results of this research are determinations of acceptable residual contaminant concentration levels that protect the environment and human health from adverse effects. This research supports the Army Risk Assessment and Modeling System (ARAMS). The ARAMS links models of expected result and transport to the exposure and effects models and databases of explosives and their degradation by-products. New research using toxicogenomics and molecular modeling tools for toxicity and exposure assessment will further reduce the uncertainty associated with both the probability of exposure and the ultimate effect if exposed. Interim products are U.S. Environmental Protection Agency approved health advisories and criteria documents to be used in risk assessment procedures. The Army uses these criteria during negotiations with regulatory officials to set scientifically and economically appropriate cleanup and discharge levels at Army installations. The Long-Term Monitoring program provides a means of monitoring military unique contaminants during remedial actions and site closure during near-real-time in situ monitoring using miniaturized sensors for use in the field. This will reduce or eliminate the costly and lengthy operation of off-site analyses and enhance overall monitoring capabilities by providing continuous/autonomous detection/analysis. 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 U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, and the Center for Health Promotion and Preventive Medicine located at Aberdeen, Maryland, execute the project work.

Accomplishments/Planned Program	FY 2005	FY 2006	FY 2007
Land Remediation/Hazard/Risk Assessment Tools for Military Unique Compounds; Long Term Monitoring for Army Ranges; Characterization/Assessment and Remediation of Distributed Source Ordnance Related Compounds (ORCs) on Army Ranges - In FY05, provided screening tools for the development of an in situ, real-time contaminant concentration level monitoring system for long term monitoring for installations and ranges to significantly reduce the need for laboratory testing and the associated sample handling requirements. Continued studies to determine the transport properties and characteristics of military relevant contaminants associated with training and testing ranges. Evaluated new and innovative toxicogenomic and computational biology methods to develop predictive toxicology models that improve ecological risk assessment and range management of ORCs. In FY06, will identify rapid, statistically based sampling and innovative analytical methods and protocols for ORCs assessment on Army ranges. Will identify novel contaminant extraction and field measurement methods for on-site long term monitoring. Will design a computational biology virtual simulation for predictive toxicology analogous to a "Canary in a Coal Mine" for mammalian organisms. In FY07, will identify novel contaminant detection systems and measurement protocols for near-real-time, on-site long term monitoring. Will integrate a distributed source contaminant transport model into the ARAMS. Will continue development of a computational biology virtual simulation for predictive toxicology analogous to a "Canary in a Coal Mine" for mammalian organisms.	3381	3022	3256
Total	3381	3022	3256

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602720A - Environmental Quality Technology**	**895**

COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
895 POLLUTION PREVENTION	1078	3357	4592	3757	4069	3817	4011

A. Mission Description and Budget Item Justification: The goal of this project is to provide energetics/munitions technologies required to reduce/eliminate the environmental footprint resulting from the manufacture, maintenance, use, and surveillance of Army ordnance. This program will mature revolutionary technologies to eliminate or significantly reduce the environmental impacts that threaten the sustainment of energetics production and maintenance facilities, and training ranges. The project supports the transformation of the Army by ensuring that advanced energetic materials required for Future Combat System (FCS) high-performance munitions (gun, rocket, missile propulsion systems and warhead explosives) are devised to meet weapons lethality/survivability stretch goals in parallel with, and in compliance to, foreseeable sustainment requirements. Specific technology thrusts include environmentally-benign designer energetic molecules engineered by molecular modeling and simulation using DoD High-Performance Computing resources; novel energetics that capitalize on the unique behavior of nano-scale structures; chemically engineered explosive and propellant formulations produced with minimal environmental waste, long-storage lifetime, rapid/benign environmental degradation properties, and efficient extraction and reuse; and fuses, pyrotechnics, and initiators that are free from toxic chemicals. 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), and supports the Army Strategy for the Environment. Work in this project is performed by the Research, Development & Engineering Command's (RDECOM) Army Research Laboratory (ARL) in collaboration with the Armaments Research, Development and Engineering Center (ARDEC), Picatinny Arsenal, NJ, the Aviation and Missile Research, Development and Engineering Center (AMRDEC), Huntsville, AL., and the Edgewood Chemical Biological Center (ECBC), Edgewood MD.

Accomplishments/Planned Program	FY 2005	FY 2006	FY 2007
Rocket and Missile Propellants - In FY05, identified and modeled environmentally benign rocket and missile propellants and engine concepts. In FY06, conduct small-scale testing of new prototypes. Conventional Ammunition - In FY05, matured environmental performance evaluation method for new high explosives. Identified insensitive, non-toxic high explosives candidates. In FY06, select candidates for evaluation and synthesis. In FY07, will refine synthesis procedures, perform large-scale testing, and evaluate environmental performance of final candidates. Pyrotechnics - In FY05, identified and performed limited laboratory testing on non-toxic pyrotechnic formulations. In FY06 - Refine pyrotechnic formulations and composition processing In FY07 - Perform compatibility and performance testing on final candidates. Manufacturing - In FY05 - Identified and evaluated performance of non-hazardous pyrotechnic binders. In FY06 - Identify and evaluate non-polluting manufacturing processes for pyrotechnic and explosive manufacture. In FY07 - Conduct bench-scale tests to mature novel processes.	1078	3357	4592
Total	1078	3357	4592

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February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602720A - Environmental Quality Technology**	**896**

COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
896 BASE FAC ENVIRON QUAL	7939	7016	7065	7062	6206	6259	6306

A. Mission Description and Budget Item Justification: The objective of this applied research project is to provide environmental risk assessment, analysis, monitoring, modeling and mitigation technologies to support sustainable use of the Army's facilities, training lands, firing ranges, and airspace to reduce or eliminate environmental constraints to military missions. This project provides the Army the technical capability to manage, protect and improve the biophysical characteristics of training and testing areas needed for realistic ranges and training lands to accommodate the Current and Future Force. Technologies within this project enable users to match mission events and training schedules with the resource capabilities of specific land areas and understand how the use of those resources affect mission support and environmental compliance. The project provides advanced methods and technologies to restore lands damaged during training activities and allow sustained use of installation facilities and training land resources. The project also provides tools and technologies to avoid training restrictions and costs due to training and testing noise. 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 U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.

Accomplishments/Planned Program	FY 2005	FY 2006	FY 2007
Threatened and Endangered Species (TES) Management to Reduce Operational Constraints - In FY05, analyzed the effects of military training and land management on high priority TES to support the reduction/elimination of training restrictions. In FY06, complete spatial assessment technology for high priority species on Army lands and mature new inventory and monitoring protocols for select species to reduce TES management costs. In FY07, will complete new techniques for preparation of population goals on Army lands to ensure the Army is only responsible for its fair share of species recovery.	3554	4352	3563
Predictive Risk Assessment and Management for Army Ranges and Training Lands - In FY05, prepared an engineering analysis of costs associated with life-cycle operations and maintenance of environmentally compliant range designs to reduce and facilitate maintenance, and produced improved range designs and construction techniques for firing and defilade positions, target berms, range roads and trails, and low water crossings to reduce compliance risk. Completed development of a range security software tool to provide objective determination of security measures for range asset protection, and completed a munitions load and screening model for munitions capacity for live fire training ranges. In FY06, complete integration of munitions carrying capacity model as a component platform consistent with the Installation Training and Maintenance (ITAM) Army Training and Testing Area Carrying Capacity (ATTACC) methodology.	1604	224	0
Reconfigurable and Joint Ranges - In FY05, completed noise dose-response model augmentation and noise mitigation practice development for typical training operations to include nighttime training. Matured technology for field measurement of particulate matter concentrations from Army training activities that enable estimates of impacts of training on local and regional air quality. Matured capability to predict encroachment impacts of proposed regional plans on military installations and their ability to support future training and testing. In FY06, conduct cost benefit analysis for land rehabilitation projects that will improve erosion control practices and prioritization of sites for training land rehabilitation. Identify culturally influenced components for incorporation into Future Force urban ranges. Will mature improved guidance on noise complaint risk associated with training noise levels. In FY07, will mature ATTACC protocols that incorporate non-military land and natural resource stressors.	2781	2440	3502
Total	7939	7016	7065