ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2005

BUDGET ACTIVITY
2 - Applied Research

PE NUMBER AND TITLE
0602720A - Environmental Quality Technology

	COST (In Thousands)	FY 2004 Actual	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	30642	22369	16417	17379	16897	16420	16279	16562
048	IND OPER POLL CTRL TEC	3646	4000	2828	2902	2977	3007	3033	3056
835	MIL MED ENVIRON CRIT	3099	3383	3065	3140	3250	3281	3310	3334
895	POLLUTION PREVENTION	0	1079	3406	4532	3708	4014	3766	3957
896	BASE FAC ENVIRON QUAL	8724	7941	7118	6805	6962	6118	6170	6215
EM5	ENVIRONMENTAL QUALITY APPLIED RSCH - AMC (CA)	6428	4793	0	0	0	0	0	0
F25	MIL ENV RESTOR TECH	1927	117	0	0	0	0	0	0
F35	ENVIRONMENTAL QUALITY APPLIED RESEARCH (CA)	6818	1056	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: The objective of this program element is to provide technologies that will improve the Army's ability to comply with requirements mandated by federal, state and local environmental/health laws and to reduce the cost of this compliance while supporting the long-term sustainment of Army training and testing activities. 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). Work in this program element is performed by 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.

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2005)	17026	17880	20198
Current Budget (FY 2006/2007 PB)	22369	16417	17379
Total Adjustments	5343	-1463	-2819
Net of Program/Database Changes			
Congressional Program Reductions	-328		
Congressional Rescissions			
Congressional Increases	6100		
Reprogrammings			
SBIR/STTR Transfer	-429		
Adjustments to Budget Years		-1463	-2819

Change Summary Explanation:
FY07 - Funds realigned ($2819K) to higher priority requirements.

Two FY05 Congressional adds totaling $6100 were added to this PE.

FY05 Congressional adds with no R-2A:
($1056) Biological/Chemical Materials Environmental Modeling, Project F35: The purpose of this one year Congressional add is to modify and enhance the Army Risk Assessment Modeling System to address environmental terrorism threats. No additional funding is required to complete this project.

($1056) Hawthorne Army Depot, Project EM5: The purpose of this one year Congressional add is to upgrade the Hawthorne Army Depot. No additional funding is required to complete this project.

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February 2005

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

COST (In Thousands)		FY 2004 Actual	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	3646	4000	2828	2902	2977	3007	3033	3056

A. Mission Description and Budget Item Justification: This applied research project provides technologies to enable the Army to reduce or eliminate 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. New and innovative technologies are essential for the effective control and reduction of military unique hazardous and non-hazardous wastes on military installations. 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, to include deconstruction processes. The intent is to provide compliance through sustainable environmental protection technologies. Additional work is focused on decreasing noise pollution from training operations and 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). Work in this project is performed by the U.S. Army Engineer Research and Development Center that is headquartered at Vicksburg, Mississippi.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Industrial Activities Readiness - In FY04, determined best practices for Army recycled-concrete, other construction/demolition debris, and other Army solid waste including that contaminated by lead-based paint and energetic compounds in order to reduce disposal costs, protect human health and the environment and maintain sustainable installations. In FY05, mature physiochemical and biosorbent treatment technologies for wastewater from munitions production allowing cost effective treatment while maintaining mission readiness. In FY06, will complete a review of promising energetic materials treatment technologies for the safe removal and reuse of energetics contaminated building materials at Army Ammunition Plants. In FY07, will develop bench treatment technologies for perchlorate commingled with explosives.	1412	1478	1780	1964

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Sustainable Live-Fire Range Design and Maintenance – In FY04, developed a risk assessment quantification methodology to evaluate level of environmental risk related to training range planning and designs; matured a risk assessment protocol that identifies environmental compliance risks to ranges and incorporates approaches for mitigation of these risks. In FY05, mature application of the range risk assessment protocol through a framework of integrated range and munitions modeling. Training and Test Range Noise Control – In FY04, improved sound propagation algorithms for air-to-ground and ground-to-ground noise model enhancement. In FY05, integrate noise models for artillery, small arms and aircraft to better characterize the full effects of military training noise on people in the vicinity of installations. In FY06, will investigate human response to infrequent noise events. In FY07, will integrate noise tools into Army range design protocols.	2234	2522	1048	938
Totals	3646	4000	2828	2902

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February 2005

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

COST (In Thousands)		FY 2004 Actual	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	3099	3383	3065	3140	3250	3281	3310	3334

A. Mission Description and Budget Item Justification: This applied research project provides 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 will 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 rational safe 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). Work in this project is performed by the U.S. Army Engineer Research and Development Center that is headquartered at Vicksburg, Mississippi, and the Center for Health Promotion and Preventive Medicine located at Aberdeen, Maryland.

Accomplishments/Planned Program	FY 2004	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 FY04, generated a compendium of analytical methods applicable to military contaminants and established the scientific basis for real-time in situ long term monitoring systems; investigated the characterization and transport of distributed explosives contaminants relative to active/inactive military testing and training ranges. In FY05, provide 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; continue studies to determine the transport properties and characteristics of military relevant contaminants associated with training and testing ranges; will evaluate 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.	3099	3383	3065	3140
Totals	3099	3383	3065	3140

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2 - Applied Research	**0602720A - Environmental Quality Technology**	**895**

COST (In Thousands)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
895	POLLUTION PREVENTION	0	1079	3406	4532	3708	4014	3766	3957

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). Work in this project is performed by the Army Research Laboratory in collaboration with the Armaments Research, Development and Engineering Center (ARDEC), Picatinny Arsenal, NJ and the Aviation and Missile Research, Development and Engineering Center (AMRDEC), Huntsville, AL.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Rockets and Missile Propellants - In FY05, begin to model and conduct small-scale laboratory evaluations of environmentally benign rocket and missile propellants. In FY06, will test new prototype propellants. In FY07, will transition first generation of environmentally benign rocket and missile propellants, including minimum signature propellants that are lead and perchlorate free, and gelled propellants that do not contain hydrazine or monomethylhydrazine. Conventional Munitions and Pyrotechnics – In FY05, evaluate new non-toxic, non-polluting burn rate modifiers, deterrents, and modifiers. In FY06, will design novel non-polluting propellants, explosives and pyrotechnics, and complete performance evaluation of environmentally benign explosives. In FY07, will identify and develop methods for neutralizing low order detonated exploded ordnance through internally induced microbial attack. Primers, Initiators and Fuzes – in FY07, begin to model and identify environmentally benign primers, initiators and fuzes that are free from persistent, toxic, and bio-accumulative chemicals.	0	1079	3406	4532
Totals	0	1079	3406	4532

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February 2005

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

COST (In Thousands)		FY 2004 Actual	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	8724	7941	7118	6805	6962	6118	6170	6215

A. Mission Description and Budget Item Justification: The objective of this 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. The Army will be provided 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 will 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 will also provide advanced methods and technologies to restore lands damaged during training activities and allow sustained use of installation facilities and training land resources. 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). Work in this project is performed by the U.S. Army Engineer Research and Development Center that is headquartered at Vicksburg, Mississippi.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Threatened and Endangered Species (TES) Management to Reduce Operational Constraints – In FY04, expanded impact assessment protocols developed for the red-cockaded woodpecker to examine habitat impacts from land management practices. In FY05, analyze the effects of military training and land management on high priority TES to support the reduction/elimination of training restrictions. In FY06, will develop spatial assessment technology for seven high priority species on Army lands and produce refined population and population goal analysis protocols that are region-based. In FY07, will quantify impacts of military land management on TES.	3163	3556	3785	2985

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Predictive Risk Assessment and Management for Army Ranges and Training Lands – In FY04, analyzed selected range design features and recommend improvements to reduce environmental compliance requirements; assessed range munitions load and environmental factors that may impact long term sustainability of range operations. In FY05, prepare an engineering analysis of costs associated with life-cycle operations and maintenance of environmentally compliant range designs to reduce and facilitate maintenance, cleanup of munitions and scrap, and erosion control; refine design and operation of maintenance criteria for sustainable ranges that incorporate environmental compliance considerations. In FY06, will complete a range compliance monitoring and carrying capacity module focusing on munitions that will be incorporated into the modeling platform consistent with the Installation Training and Maintenance (ITAM) Army Training and Testing Area Carrying Capacity (ATTACC) methodology.	2580	1605	166	0
Reconfigurable and Joint Ranges – In FY04, formulated particulate matter emission estimation models for tactical vehicle engines and chemical/physical particulate matter control technologies for unpaved surfaces; linked mission-use constraints to a community growth model. In FY05, complete noise dose-response model augmentation and noise mitigation practice development for typical training operations; mature 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; mature Military Landuse Evolution and impact Assessment Model (MLEAM) to facilitate strategic plans to support long term military landuse sustainment. In FY06, will conduct cost benefit analysis for land rehabilitation projects that will improve erosion control practices and prioritization of sites for land rehabilitation in support of sustainable training lands. In FY07, will develop ATTACC protocols that incorporate non-military land and natural resource stressors.	2780	2780	3167	3820
Installation Operations/Hazardous Air Pollutants (HAP) – In FY04, matured demilitarization furnace air emission control system that will include metal adsorption and high temperature filtration; transitioned HAP applied research products to advanced technology demonstration.	201	0	0	0
Totals	8724	7941	7118	6805