ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2004

BUDGET ACTIVITY
2 - Applied Research

PE NUMBER AND TITLE
0602720A - Environmental Quality 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	26461	30824	17026	17880	20198	19819	19149
048	IND OPER POLL CTRL TEC	2542	3712	4127	3378	3444	3466	3535
835	MIL MED ENVIRON CRIT	2885	3170	3507	3621	3685	3738	3809
895	POLLUTION PREVENTION	0	0	1126	3448	6017	5567	5548
896	BASE FAC ENVIRON QUAL	8203	8858	8147	7312	6926	6915	6122
EM5	ENVIRONMENTAL QUALITY APPLIED RSCH - AMC (CA)	0	6390	0	0	0	0	0
F25	MIL ENV RESTOR TECH	7495	1916	119	121	126	133	135
F28	RANGE SAFETY TECH DEMO	2002	0	0	0	0	0	0
F35	ENVIRONMENTAL QUALITY APPLIED RESEARCH (CA)	0	6778	0	0	0	0	0
F39	ENVIRONMENTAL RESPONSE & SECURITY PROTECTION PROG	3334	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 program element 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 that is 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 2003	FY 2004	FY 2005
Previous President's Budget (FY 2004)	26747	18252	17157
Current Budget (FY 2005 PB)	26461	30824	17026
Total Adjustments	-286	12572	-131
Congressional program reductions		-287	
Congressional rescissions			
Congressional increases		13600	
Reprogrammings	-286	-741	
SBIR/STTR Transfer			
Adjustments to Budget Years			-131

Significant Change Explanation.
FY04 - Four FY04 Congressional adds totaling $13600 were added to this PE.

Projects with no R-2As:
- ($4698) Army UXO Research and Development, Project F35: The objective of this one year Congressional add is to conduct Unexploded Ordnance (UXO) related research and development. No additional funding is required to complete this project.
- ($939) Bio/Chemical Materials Environmental Modeling, Project F35: The objective 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.
- ($939) Surface Finishing Sustainability, Project F35: The objective of this one year Congressional add is to conduct surface finishing sustainability research. No additional funding is required to complete this project.
- ($6200) Hawthorne Army Depot, Project EM5: The objective of this one year Congressional add is to upgrade the depot. 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
2 - Applied Research	**0602720A - Environmental Quality Technology**	**048**

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
048	IND OPER POLL CTRL TEC	2542	3712	4127	3378	3444	3466	3535

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 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 due to the Future Force. 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 noise pollution from training operations and 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 2003	FY 2004	FY 2005
Industrial Activities Readiness - In FY03, formulated protocol for energetic compound biological treatment of munitions production wastewater under anaerobic conditions leading to more cost effective compliance with effluent environmental quality standards. In FY04, determine 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, will mature physiochemical and biosorbent treatment technologies for wastewater from munitions production allowing cost effective treatment while maintaining mission readiness. Will identify and mature alternative technologies and processes to improve solid waste management and reduce operational, logistical, and environmental requirements for deployed troops.	1881	2370	2641
Sustainable Live-Fire Range Design and Maintenance – In FY03, completed first order range risk assessment framework that identifies mission impact risk factors. In FY04, develop a risk assessment quantification methodology to evaluate level of environmental risk related to training range planning and designs. Mature a risk assessment protocol that identifies environmental compliance risks to ranges and incorporates approaches for mitigation of these risks. In FY05, will mature application of the range risk assessment protocol through a framework of integrated range and munitions modeling. Training and Test Range Noise Control – In FY03, improved weapons acoustic source information for model input. In FY04, improve sound propagation algorithms for air-to-ground and ground-to-ground noise model enhancement. In FY05, will 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.	661	1277	1486
Small Business Innovative Research/Small Business Technology Transfer Programs	0	65	0
Totals	2542	3712	4127

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

February 2004

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

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
835	MIL MED ENVIRON CRIT	2885	3170	3507	3621	3685	3738	3809

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 concentration levels that will protect the environment and human health from adverse effects. The main product of this research is the Army Risk Assessment and Modeling System (ARAMS). This PC-based platform links models of fate and transport to the exposure and effects models and databases of explosives and their degradation by-products. This reduces 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 2003	FY 2004	FY 2005
Land Remediation/Hazard/Risk Assessment Tools for Military Unique Compounds; Long Term Monitoring for Army Ranges; Characterization, Evaluation and Remediation of Distributed Source Contamination on Army Ranges – In FY03, released version 1.1 of ARAMS with process descriptors for explosives fate and transport, aquatic explosives uptake, and in vitro bioavailability data for humans. This capability transitioned to advanced development. In FY04, generate a compendium of analytical methods applicable to military contaminants and establish the scientific basis for real-time in situ long term monitoring systems. Investigate the characterization and transport of distributed explosives contaminants relative to active/inactive military testing and training ranges. In FY05, will 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. Will continue studies to determine the fate and transport properties and characteristics of military relevant contaminants associated with training and testing ranges.	2885	3098	3507
Small Business Innovative Research/Small Business Technology Transfer Programs	0	72	0
Totals	2885	3170	3507

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

February 2004

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

COST (In Thousands)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
895 POLLUTION PREVENTION	0	0	1126	3448	6017	5567	5548

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 the DoD High-Performance Computing network; 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 2003	FY 2004	FY 2005
Pollution Prevention - In FY05, mature environmentally benign additives for gun propellants and microbial additives to rapidly degrade unexploded ordnance (UXO). Mature non-polluting, low toxicity rocket missile propellants.	0	0	1126
Totals	0	0	1126

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

February 2004

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

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
896	BASE FAC ENVIRON QUAL	8203	8858	8147	7312	6926	6915	6122

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 2003	FY 2004	FY 2005
Threatened and Endangered (T&E) Species Management to Reduce Operational Constraints – In FY03, completed Army-wide inventory of priority T&E species issues and identified monitoring techniques for high priority T&E species. Established methodological and statistical protocols for determination of endangered species population viability to prevent training restrictions. In FY04, expand impact assessment protocols developed for the Red-cockaded Woodpecker to examine habitat impacts from land management practices. In FY05, will analyze the effects of military training and land management on high priority T&E species to support the reduction/elimination of training restrictions.	2998	3141	3585

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
Predictive Risk Assessment and Management for Army Ranges and Training Lands – In FY03, evaluated range design, construction, and maintenance requirements against current and future environmental compliance requirements. In FY04, analyze selected range design features and recommend improvements to reduce environmental compliance requirements. Assess range munitions load and environmental factors that may impact long-term sustainability of range operations. In FY05, will 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. Will mature design and operation and maintenance criteria for sustainable ranges that incorporate environmental compliance considerations.	2087	2530	1548
Land Planning and Management – In FY03, completed noise source characterization protocols and initial human response characterization to assess noise impact of operations. Matured Army Training and Testing Area Carrying Capacity (ATTACC) protocols to incorporate scientific improvements in wind erosion and soil compaction factors. In FY04, formulate particulate matter emission estimation models for tactical vehicle engines and chemical/physical particulate matter control technologies for unpaved surfaces. Link mission-use constraints to a community growth model. In FY05, will complete noise dose-response model augmentation and noise mitigation practice development for typical training operations. Will 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. Will mature Military Landuse Evolution and impact Assessment Model (MLEAM) to facilitate strategic plans to support long term military landuse sustainment. Will provide tools that will improve erosion control practices and prioritization of sites for land rehabilitation in support of sustainable training lands.	2896	2880	3014
Installation Operations/Hazardous Air Pollutants (HAP) – In FY03, developed integrated strategies to control emissions from combustion sources. In FY04, mature demilitarization furnace air emission control system that will include metal adsorption and high temperature filtration. Transition HAP applied research products to advanced technology demonstration.	222	175	0
Small Business Innovative Research/Small Business Technology Transfer Programs	0	132	0
Totals	8203	8858	8147

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

February 2004

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602720A - Environmental Quality Technology**	**F25**

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
F25	MIL ENV RESTOR TECH	7495	1916	119	121	126	133	135

A. Mission Description and Budget Item Justification: The objective of this project is to provide cost effective technologies required to clean up Department of Defense (DoD) hazardous waste sites, including active installations under the Installation Restoration Program, those indicated for closure under the DoD Base Realignment and Closure Program and the Formerly Used Defense Sites Program. Technologies focus on cost-effective and efficient remediation of active training lands that support enhanced readiness for the Future Force. The thrust of this effort is to expedite site cleanup, reduce the cost of cleanup of contaminated soil, groundwater, and structures, and ensure that human health and the environment are protected. Research is conducted in several major areas: innovative and cost-effective site identification, characterization, and monitoring technologies, groundwater systems; and treatment technologies to remediate soil and groundwater contaminated with military-unique contaminants such as explosives/energetics, chemical agents, heavy metals, and other organics. Emphasis is placed on the development of in-situ remediation technologies and real or near real-time sensing technologies for Unexploded Ordnance (UXO). Development of existing technologies provides near-term solutions while adding to the knowledge base applicable to successful development of more complex in-situ technologies. 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 2003	FY 2004	FY 2005
Unexploded Ordnance (UXO) Identification and Discrimination - In FY03, matured optimum site characterization protocols to provide site adaptive UXO detection. Completed advanced UXO sensor fusion analysis algorithms to apply to new and developing UXO sensors resulting in enhanced false target rejection and increased detection/discrimination capabilities. Transitioned UXO applied research products to advanced technology development.	1649	0	0
Hazard/Risk Assessment Tools for Military Unique Compounds - In FY03, integrated predictive exposure and effects models with toxicity databases to determine exposure and toxicity indexes of explosives, propellants, smokes and illuminants as part of the Army Risk Assessment Modeling System (ARAMS). Transitioned hazard/risk assessment applied research products to advanced technology development.	525	0	0

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
In Situ Remediation Technologies for Contaminated Groundwater and Soils - In FY03, matured processes for recycling metal contaminated extracts for cost-effective restoration of inorganics contaminated military sites. Performed pilot-scale evaluation of in place bio-decontamination of TNT and of in place reactive barriers and/or reactive barriers coupled with bio-decontamination of explosives in groundwater for cost-effective restoration of explosives contaminated military sites. In FY04, complete pilot-scale evaluation of in situ biodegradation for TNT and of advanced electro-kinetic treatment technologies for lead contaminants for significantly improved in-place decontamination. In FY05, transition applied research in-place remediation technology products to advanced technology development.	2623	1353	119
Characterization, Evaluation and Remediation of Distributed Source Contamination on Army Ranges - In FY03, conducted an integrated assessment and evaluation of predictive models for widely distributed contamination on live fire training ranges. In FY04, adapt hazardous waste site restoration processes and techniques for application to distributed contamination sources on live fire ranges. Transition applied research products to advanced technology development.	1649	552	0
Military Impacts on Threatened and Endangered (T&E) Species and Land Planning and Utilization for Army Ranges - In FY03, completed Army-wide inventory of priority T&E species issues.	1049	0	0
Small Business Innovative Research/Small Business Technology Transfer Programs	0	11	0
Totals	7495	1916	119