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

February 2003

BUDGET ACTIVITY
2 - Applied Research

PE NUMBER AND TITLE
0602720A - Environmental Quality Technology

	COST (In Thousands)	FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
	Total Program Element (PE) Cost	16692	26747	18252	17157	18035	20467	20228	19600
048	IND OPER POLL CTRL TEC	1256	2587	3837	4203	3420	3484	3541	3625
835	MIL MED ENVIRON CRIT	2196	2936	3277	3626	3738	3809	3888	3978
895	POLLUTION PREVENTION	0	0	0	1189	3631	6343	5888	5885
896	BASE FAC ENVIRON QUAL	2757	7000	9157	8139	7246	6831	6911	6112
EM1	WASTE MINIMIZATION AND POLLUTION RESEARCH	1919	0	0	0	0	0	0	0
EN8	MOLECULAR & COMPUTATIONAL RISK ASSESSMENT	1343	0	0	0	0	0	0	0
F25	MIL ENV RESTOR TECH	3101	8885	1981	0	0	0	0	0
F28	RANGE SAFETY TECH DEMO	4120	2003	0	0	0	0	0	0
F39	ENVIRONMENTAL RESPONSE & SECURITY PROTECTION PROG	0	3336	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 regulations mandated by all Federal, state and local environmental/health laws and to reduce the cost of this compliance. The program element investments provide the Army with a capability 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 element develops pollution control technology, which assists installations in complying with environmental regulations at less cost. The program element also provides technology to mitigate noise impacts and maneuver area damage resulting from Army training activities. The work in this program element is aligned with the Army's vision for the Objective Force and adheres to Defense Reliance Agreements on civil engineering and environmental quality with oversight provided by the Joint Engineers and Armed Services Biomedical Research Evaluation and Management. The cited work is also consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and Project Reliance. The program element contains no duplication with any effort within the Military Departments. Work is performed by the U.S. Army Engineer Research and Development Center and the U.S. Army Armament Research, Development and Engineering Center (ARDEC). This program supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds have been provided to the program.

B. Program Change Summary	FY 2002	FY 2003	FY 2004	FY 2005
Previous President's Budget (FY 2003)	23569	23018	25521	26860
Current Budget (FY 2004/2005 PB)	16692	26747	18252	17157
Total Adjustments	-6877	3729	-7269	-9703
Congressional program reductions				
Congressional rescissions		-1191		
Congressional increases		5600		
Reprogrammings	-6347	-153		
SBIR/STTR Transfer	-530	-527		
Adjustments to Budget Years			-7269	-9703

Change Summary Explanation: Funding – FY 2004/2005: Funds realigned to PE 63728, Project 03E to accelerate environmental restoration technology development.

FY03 Congressional Adds:
Rangesafe, Project F28 ($2100); Environmental Response and Security Protection, Project F39 ($3500).

Projects with no R-2As:
- ($2100) Rangesafe, Project F28: The objective of this Congressional Add is to develop and evaluate technologies for remediation of Army firing ranges. No additional funding is required to complete this project.
- ($3500) Environmental Response and Security Protection, Project F39: 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.

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

February 2003

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

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
048	IND OPER POLL CTRL TEC	1256	2587	3837	4203	3420	3484	3541	3625

A. Mission Description and Budget Item Justification: This project provides applied research and technologies to enable the Army to reduce or eliminate the effects of legal and regulatory environmental restrictions, as well as to avoid fines and facility shutdowns. These new 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 due to Army Transformation. The cited work is consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and Project Reliance. The program element contains no duplication with any effort within the Military Departments. Work is performed by the U.S. Army Engineer Research and Development Center. This project supports the Objective Force Transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds have been provided to the project.

Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
Installation Operations - In FY02, determined physical and chemical interactions between selected energetic materials and building materials under long-term exposure situations to prevent contamination and minimize hazardous waste. In FY03, formulate 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 to reduce disposal costs, protect human health and the environment and maintain sustainable installations. In FY05, formulate an automated decision support system for environmental management system implementation that Army installations can use in complying with national and regional environmental regulations. Mature physiochemical and biosorbent treatment technologies for wastewater from munitions production allowing cost effective treatment while maintaining mission readiness. Identify and develop alternative technologies and processes to improve solid waste management and reduce operational, logistical, and environmental requirements for deployed troops.	748	1914	2478	2675
Land Planning and Management/Sustainable Live-Fire Range Design and Maintenance – In FY02, identified range load and condition durability factors associated with environmental compliance. In FY03, complete first order range risk assessment framework with mission impact identification factors. In FY04, develop a risk assessment quantification methodology to evaluate level of environmental risk related to training range designs. In FY05, prepare an engineering analysis of costs, effectiveness, and life-cycle operations and maintenance requirements of environmentally compliant range designs to reduce and facilitate maintenance, cleanup (munitions and scrap), and erosion control. Training and Test Range Noise Control – In FY02, updated Small Arms Range Noise Assessment Model and Blast Noise impact assessment software to improve capability to forecast training noise impacts. In FY03, improve 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, 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.	508	673	1359	1528
Totals	1256	2587	3837	4203

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

February 2003

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

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
835	MIL MED ENVIRON CRIT	2196	2936	3277	3626	3738	3809	3888	3978

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 and field 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 cited work is consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and Project Reliance. The program element contains no duplication with any effort within the Military Departments. Work is performed by the Center for Health Promotion and Preventive Medicine (CHPPM), and the U.S. Army Engineer Research and Development Center. This project supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds have been provided to the project.

Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
Land Remediation/Hazard/Risk Assessment Tools for Military Unique Compounds – In FY02, constructed the framework of a rigorous ARAMS to seamlessly link models of exposure/effects with toxicological data for military relevant contaminants. In FY03, determine exposure assessment process descriptors for migration of unexploded ordnance (UXO) constituents, explosives, propellants, smokes, and illuminants to improve fate and transport components of ARAMS. Provide high quality toxicological data for the contaminants of concern for integration into ARAMS to expand applicability of models. Distributed Source Contamination on Army Ranges – In FY04, determine exposure assessment process descriptors for migration of UXO constituents, explosives, propellants, smokes, and illuminants. In FY05, integrate acceptable environmental endpoints into ARAMS for use in estimating environmentally protective cleanup requirements. Long Term Monitoring for Army Ranges – In FY04, generate a compendium of analytical methods applicable to military contaminants and establish the scientific basis for real-time in situ monitoring systems. 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.	2196	2936	3277	3626
Totals	2196	2936	3277	3626

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

February 2003

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

COST (In Thousands)	FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
895 POLLUTION PREVENTION	0	0	0	1189	3631	6343	5888	5885

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 developed 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 work is performed by the U.S. Army Research Laboratory (ARL), Aberdeen Proving Ground, MD and provides required technologies for advanced development programs at the U.S. Army Armament Research, Development and Engineering Center (ARDEC), Picatinny Arsenal, NJ, the Edgewood Biological and Chemical Center, Aberdeen Proving Ground Edgewood Area, MD, and the Aviation and Missile Research, Development and Engineering Center, (AMRDEC), Huntsville, AL. The cited work is consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and Project Reliance. The project contains no duplication with any effort within the Military Departments. This project supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds were provided to the project.

Accomplishments/Planned Program	FY 2002	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	0	1189
Totals	0	0	0	1189

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

February 2003

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

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
896	BASE FAC ENVIRON QUAL	2757	7000	9157	8139	7246	6831	6911	6112

A. Mission Description and Budget Item Justification: The objective of this project is to provide environmental assessment, monitoring, and modeling technologies to support sustainable use of the Army's training facilities, lands, firing ranges, and airspace to reduce or eliminate environmental restrictions on military uses. The Army will have 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 force transformation, and to support the Objective 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 the use of those resources to mission and environmental compliance. It will also provide advanced methods to restore lands damaged during training activities. Technologies will allow operation and maintenance of installation facilities and training range resources, complying with the many environmental requirements without interrupting operations or training activities. The cited work is consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and Project Reliance. The program element contains no duplication with any effort within the Military Departments. Work is performed by the U.S. Army Engineer Research and Development Center. This project supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds were provided to the project.

Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
Threatened and Endangered Species (TES) Management to Reduce Operational Constraints – In FY03, complete cost-effective, Army-wide inventory of TES and identified monitoring techniques for high priority TES. Establish 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, complete analysis of effects of military training and land management on high priority TES species to support reduction/elimination of training restrictions.	0	2940	3265	3565
Predictive Risk Assessment and Management for Army Ranges and Training Lands – In FY03, evaluate range design, construction, and maintenance requirements against current and future environmental compliance requirements. In FY04, complete a risk assessment matrix that identifies environmental compliance risks to ranges and incorporates approaches for mitigation of risks. In FY05, develop design criteria and operation and maintenance criteria for sustainable ranges that incorporate environmental compliance considerations.	0	2030	2648	1587

Accomplishments/Planned Program (continued)	FY 2002	FY 2003	FY 2004	FY 2005
Land Planning and Management – In FY02, developed geospatial modeling environment to integrate military mission and resource impact assessment tools. In FY03, complete noise source characterization protocols and initial human response characterization to assess noise impact of operations. Develop Army Training and Testing Area Carrying Capacity (ATTACC) protocols that incorporate scientific improvements in wind erosion and soil compaction factors. In FY04, develop 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, 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 sustainment. Provide tools that will improve erosion control practices and prioritization of sites for land rehabilitation in support of sustainable training lands.	1521	1820	3019	2987
Installation Operations/Hazardous Air Pollutants (HAP) – In FY02, developed activated carbon absorber system for cost-effective solvent recovery from cleaning and chemical stripping operations. In FY03, develop integrated strategies to control emissions from combustion sources. In FY04, develop technologies for controlling and/or recycling chlorinated solvents from vehicle manufacturing and rework sources.	1236	210	225	0
Totals	2757	7000	9157	8139

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

February 2003

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

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
F25	MIL ENV RESTOR TECH	3101	8885	1981	0	0	0	0	0

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 ranges that support enhanced readiness for the Objective 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 the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and Project Reliance. The program element contains no duplication with any effort within the Military Departments. Work is performed by the U.S. Army Engineer Research and Development Center. This project supports the Objective Force transition path of the Transformation Campaign Plan (TCP).

Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
Unexploded Ordnance (UXO) Identification and Discrimination - In FY02, developed advanced multi-sensor prototypes and data analysis technologies for false alarm reduction. Validated UXO signature models for emerging sensors. Validated UXO sensing and analysis technologies in standard UXO test sites. In FY03, develop optimum site characterization protocols for UXO sites. Construct advanced UXO sensor fusion analysis algorithms to apply to developing UXO detection/discrimination capabilities.	1713	1958	0	0
Hazard/Risk Assessment Tools for Military Unique Compounds - In FY02, completed Army Risk Assessment Modeling System (ARAMS) version 1.0 for risk based assessment. In FY03, integrate predictive exposure and effects models with toxicity databases to determine exposure and toxicity indexes of explosives, propellants, smokes and illuminants.	809	612	0	0

Accomplishments/Planned Program (continued)	FY 2002	FY 2003	FY 2004	FY 2005
In Situ Remediation Technologies for Contaminated Groundwater and Soils - In FY02, demonstrated in the laboratory in situ heavy metals extraction from soils and in situ chemical/biological treatment for TNT/RDX, and developed a protocol for in situ remediation of RDX in groundwater. In FY03, mature processes for recycling metal contaminated extracts for soils treatment systems. Perform pilot-scale evaluation of in situ biodegradation for TNT and in situ reactive barriers and/or reactive barriers coupled with biodegradation for explosives in groundwater. In FY04, complete pilot-scale evaluation of in situ biodegradation for TNT and of advanced electro-kinetic treatment technologies for lead contaminants.	579	3144	1411	0
Characterization, Evaluation and Remediation of Distributed Source Contamination on Army Ranges - In FY03, conduct integrated assessment and evaluation of distributed source contamination on live fire training ranges. Quantify and evaluate predictive models for distributed source contamination on live fire training ranges in the laboratory. In FY04, adapt hazardous waste site restoration processes and techniques for application to distributed contamination sources on live fire ranges.	0	1951	570	0
Military Impacts on Threatened and Endangered Species and Land Planning and Utilization for Army Ranges - In FY03, determine military impacts on six priority Threatened and Endangered Species and improve Army Training and Testing Area Capacity protocols.	0	1220	0	0
Totals	3101	8885	1981	0