

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

BUDGET ACTIVITY		PE NUMBER AND TITLE					
3 - Advanced technology development		0603728A - Environmental Quality Technology Demonstrations					
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
Total Program Element (PE) Cost	16651	14887	15519	15760	15995	16385	16789
002 ENVIRONMENTAL COMPLIANCE TECHNOLOGY	1926	2013	2063	2088	2103	2150	2199
025 POLLUTION PREVENTION TECHNOLOGY	3312	3509	3622	3699	3772	3857	3943
03E ENVIRONMENTAL RESTORATION TECHNOLOGY	8315	9365	9834	9973	10120	10378	10647
03F Environmental Quality Tech Demonstrations (CA)	3098						

A. Mission Description and Budget Item Justification: The objective of this advanced technology development program element is to mature and demonstrate technologies that assist Army installations in becoming environmentally compatible without compromising the readiness or training critical to the success of the Future Force. Technologies demonstrated within this program element are transitioned from PE 0602720A (Environmental Quality Technology). This program includes technology demonstrations for: restoration of sites contaminated with toxic and/or hazardous materials (such as unexploded ordnance [UXO]) resulting from Army operations; pollution prevention to minimize the Army's use and generation of toxic chemicals and hazardous wastes; compliance with environmental laws by control, treatment, and disposal of hazardous waste products; and conservation of natural and cultural resources while providing a realistic environment for mission activities. This program demonstrates technological feasibility, assesses the technology and its producibility, and transitions mature technologies from the laboratory to installations. Technologies developed by this program element improve the Army's ability to achieve environmental restoration and compliance at its installations, at active and inactive ranges and other training lands, and at its rework and production facilities. Technologies demonstrated focus on reducing the cost of treating hazardous effluents and remediating Army sites contaminated by hazardous/toxic materiel. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement, and supports the Army Strategy for the Environment. The US Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, and the US Army Research, Development, and Engineering Command, headquartered at Aberdeen Proving Ground, MD, execute the project work.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE		
3 - Advanced technology development	0603728A - Environmental Quality Technology Demonstrations		
<u>B. Program Change Summary</u>	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2008/2009)	17098	14982	16449
Current BES/President's Budget (FY 2009)	16651	14887	15519
Total Adjustments	-447	-95	-930
Congressional Program Reductions		-95	
Congressional Rescissions			
Congressional Increases			
Reprogrammings	-31		
SBIR/STTR Transfer	-416		
Adjustments to Budget Years			-930

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 3 - Advanced technology development		PE NUMBER AND TITLE 0603728A - Environmental Quality Technology Demonstrations					PROJECT 002	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	
002 ENVIRONMENTAL COMPLIANCE TECHNOLOGY	1926	2013	2063	2088	2103	2150	2199	

A. Mission Description and Budget Item Justification: The objective of this advanced technology development project is to mature and demonstrate technologies transitioned from PE 0602720A (Environmental Quality Technology), projects 048 and 896 that assist Army installations in achieving environmental compliance. These technologies reduce the cost of treating hazardous effluents from Army installations, including ammunition plants, depots and arsenals, to satisfy increasingly stringent wastewater and air pollutant discharge standards. Army facilities are now subject to fines and facility shutdowns for violation of federal, state, and local air and wastewater discharge regulations. This technology is essential to control and reduce the generation of waste to satisfy hazardous waste reduction goals, and to avoid future hazardous waste disposal costs and liabilities to the Army. Efforts under this project enable the Army to reduce pollution at installations while complying with the myriad of federal, state, and host country regulations dealing with hazardous wastewater, air emissions, and solid wastes. Technologies demonstrated also reduce the cost of resolving training noise compliance issues for the Army, avoid reductions in availability of training facilities, and sustain the viability of testing and training ranges. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement, and supports the Army Strategy for the Environment. The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Installation Operations: Demonstrate environmentally safe and cost-effective technologies to manage and reduce the increase in noise concerns associated with training ranges. In FY07, integrated noise prediction and management tools into Army range design protocols. In FY08, complete initial blast noise complaint risk study criteria and develop impulse noise prediction models. In FY09, will complete complaint risk guidelines and a new noise modeling calculation engine for peak noise events based on statistical data and numerical analysis propagation algorithms.	1926	2013	2063
Small Business Innovative Research/Small Business Technology Transfer Programs			
Total	1926	2013	2063

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 3 - Advanced technology development	PE NUMBER AND TITLE 0603728A - Environmental Quality Technology Demonstrations					PROJECT 025	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
025 POLLUTION PREVENTION TECHNOLOGY	3312	3509	3622	3699	3772	3857	3943

A. Mission Description and Budget Item Justification: The objective of this project is to mature and demonstrate pollution prevention advanced technologies required to comply with regulations mandated by federal, state, and local environmental and health laws. Technology thrusts under this project include: (1) demonstration of new coating materials, systems, and processes to comply with existing and new national laws and local regulations; (2) demonstration of advanced nanocomposite packaging systems and advanced technologies for the reuse/recycling of waste during deployed operations in order to reduce logistics, health and force protection impacts; (3) demonstration of advanced technologies to enable sustainment of rocket and missile propellant production and maintenance facilities and training ranges through elimination or significant reduction of environmental impacts. These technologies are transitioned from PE 0602720A, project 895, and will ensure that advanced energetic materials required for the Future Force's high performance munitions are developed that are compliant with environmental and health laws and meet weapons lethality and survivability goals. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement, and supports the Army Strategy for the Environment. Work in this project is performed by the Research, Development, and Engineering Command's (RDECOM) Army Research Laboratory (ARL) located at Aberdeen, MD, Natick Soldier Research, Development and Engineering Center (NSRDEC) located at Natick, MA, Armaments Research, Development, and Engineering Center (ARDEC) located at Picatinny Arsenal, NJ, Aviation and Missile Research, Development, and Engineering Center (AMRDEC) located at Huntsville, AL, and Tank-Automotive Research, Development, and Engineering Center (TARDEC) located at Warren, MI.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Sustainable Painting Operations: In FY07, reformulated hazardous air pollutant (HAP)-free sealants and adhesives used in weapon system maintenance, production, and industrial processes. In FY08, design and evaluate touch-up kits containing HAP-free paints for on-system field maintenance. In FY09, will investigate HAP-free coatings for production of medium and large caliber ammunition. Zero Footprint Camp: In FY07, matured and evaluated advanced nanocomposite packaging technologies to reduce the amount of packaging debris generated during deployed operations. In FY08, optimize nanocomposite packaging structures and evaluate prototype packages in an operational environment. Compliant Ordnance Lifecycle: In FY07, demonstrated alternatives to perchlorate and hydrazine propellants and non-toxic pyrotechnic compositions. In FY08, evaluate environmental health of new propellants, pyrotechnics and explosives, refine alternative rocket propellants/motor combinations, and demonstrate solventless processing of smoke compositions. In FY09, will scale-up synthesis of environmentally benign RDX replacement candidates for demonstration in munitions, will demonstrate hydrazine monopropellant replacement, and will refine solventless processing techniques.	3312	3410	3622
Small Business Innovative Research/Small Business Technology Transfer Programs		99	
Total	3312	3509	3622

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 3 - Advanced technology development		PE NUMBER AND TITLE 0603728A - Environmental Quality Technology Demonstrations					PROJECT 03E	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	
03E ENVIRONMENTAL RESTORATION TECHNOLOGY	8315	9365	9834	9973	10120	10378	10647	

A. Mission Description and Budget Item Justification: The objective of this advanced technology development project is to mature and demonstrate technologies transitioned from program element (PE) 0602720A (Environmental Quality Technology), project 835 that improve the Army's ability to achieve cost-effective environmental restoration of contaminated (unexploded ordnance, military unique compounds, and energetic materials) sites at its installations, active and inactive ranges, its rework and production facilities, and in the battlefield. Technologies matured within this project enable the Army to cost effectively address current environmental liabilities resulting from soil and groundwater contamination. Current and planned efforts enable the Army to efficiently characterize, evaluate, assess, and remediate soil and groundwater at installations, ranges, facilities, and during battlefield operations. Efforts also identify ways to economically comply with the myriad of federal, state, and host country regulations dealing with contaminated soil and groundwater. A key aspect of this work is the enhancement of risk assessment techniques that can more accurately display the environmental risks associated with munitions residues. This program includes pilot scale field studies to establish technological feasibility and assess performance and productivity of the risk assessment techniques, and includes technology transition from the laboratory to demonstration/validation funded under PE 0603779A (Environmental Quality Technology - Dem/Val), project 04E. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement, and supports the Army Strategy for the Environment. The US Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.

Accomplishments/Planned Program:	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Unexploded Ordnance (UXO). In FY07, developed and evaluated a model for active range real-time UXO discrimination and the Management Aid for UXO Detection Efforts (MAUDE) software application which assesses key geophysical and environmental site parameters and assists the site remediation manager with sensor/method/system site-specific selection guidelines for active range remediation. In FY08, complete development of rapid computational modeling for active range scenarios. Conduct field evaluations of: rapid route survey and evaluation systems; target/berm/bunker survey and assessment systems; and a multi-sensor projectile impact assessment, positioning, and characterization system for range operations. In FY09, will conduct field evaluations of specialized instrumentation for targets, berms, and bunkers for monitoring impacts and condition assessment. Will investigate innovative technologies for range UXO maintenance and for mitigation of unique and emerging UXO.	2162	2260	1761
Hazard/Risk Assessment Tools for Toxicity of Munitions Constituents (MCs) and Munitions and Explosives of Concern (MECs). In FY07, matured migration of Adaptive Risk Assessment Modeling System (ARAMS) to the higher order modeling technique, adapted ARAMS to live fire range assessment, and continued preparation of geospatial environmental risk visualization techniques for incorporation into the Intelligent Preparation of the Battlefield (IPB) process. In FY08, initiate advanced toxicogenomic molecular tools to quantitatively assess MEC exposure, mathematical models of toxicity and effects due to existing, well characterized MEC, predicting multiple stressor impacts on toxicity, MEC toxicity mechanisms in ecological species, and species developmental pathways affected by MECs. In FY09, will conduct cross-species validation of MEC effects. Will initiate advanced protocols for rapid screening and monitoring of ecological impact of MECs. Will develop advanced computational chemistry predictions of chemical structures and	1540	2405	4436

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE		PROJECT
3 - Advanced technology development	0603728A - Environmental Quality Technology Demonstrations		03E
physical properties of adsorbed explosives and organophosphorus compounds in soils. Will conduct technology demonstration of exposure quantification metrics for select representative nanomaterials.			
In Situ Remediation Technologies for Contaminated Groundwater and Soils. In FY07, completed in situ physical and biological cleanup processes for explosives in groundwater with process guidance, specifications, and protocols and continue to mature in situ chemical and plant uptake treatment methods to immobilize inorganics on berms at small arms training ranges. In FY08, mature near-surface biostabilization and phytostabilization technologies for inorganics on small arms firing ranges (SAFRs). Construct integrated assessment models for inorganics on SAFRs. In FY09, will finalize and validate remediation/management of inorganic residues on SAFRs with process guidance, specifications, and protocols.	1530	855	150
Characterization, Evaluation and Remediation of Distributed Source Contamination on Army Ranges. In FY07, completed a real-time detection capability for high concentration source zones for explosives and propellants and evolved geo-statistical methods to predict contaminant distribution patterns; matured in situ explosive treatment processes for distributed contamination on active ranges. In FY08, complete field evaluation of statistically valid range characterization/sampling protocols for MC sources on active range soils and surface waters. Continue maturing on-site, topical alkaline hydrolysis of impact area explosives and quantifying the effects of wildfire control practices on active ranges. In FY09, will conduct field evaluations of advanced spatial components for range risk assessment in Adaptive Risk Assessment Modeling System (ARAMS). Will quantify the effects of wildfire control practices on active ranges. Will perform field evaluation of on-site, topical alkaline hydrolysis of impact area explosives.	1939	2308	2319
Long Term Monitoring Applications. In FY07, integrated direct-push wells coupled to in situ real time sensing and analysis technologies, and evaluated integrated long term monitoring system designs for near real-time sampling, measurement, analysis, and information transmission. In FY08, complete advance development of prototype gene signature array microchip sensor for MCs. Evaluate field detection of MCs and emerging contaminants with negative ion miniature mass spectrometry. Conduct field evaluation of catalytic DNA and Surface Plasmon Resonance (SPR) affinity array sensors. In FY09, will complete advanced development of in situ biosensor technologies implemented in direct push wells. Will conduct final field evaluation of a novel analytical instrument (negative ion miniature mass spectrometer) for monitoring multiple contaminants under a wide range of site conditions.	1144	1385	1168
Small Business Innovative Research/Small Business Technology Transfer Programs		152	
Total	8315	9365	9834