Exhibit R-2, PB 2010 Army RDT&E Budget Item Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research					R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology					
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	16.651	19.799	15.902						Continuing	Continuing
EM5: ENVIRONMENTAL QUALITY APPLIED RSCH - AMC (CA)	1.158	2.990	.000						Continuing	Continuing
F35: Environmental Quality Applied Research (CA)	.000	.797	.000						Continuing	Continuing
048: IND OPER POLL CTRL TEC	2.937	3.028	3.128						Continuing	Continuing
835: MIL MED ENVIRON CRIT	3.173	3.288	3.284						Continuing	Continuing
895: POLLUTION PREVENTION	3.601	4.023	3.729						Continuing	Continuing
896: BASE FAC ENVIRON QUAL	5.782	5.673	5.761						Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) provides 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 and 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 develops 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 the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, the Army Science and Technology Master Plan, and supports the Army Strategy for the Environment.

Work in this PE is performed by the US Army Engineer Research and Development Center (ERDC), Vicksburg, MS, the Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, MD, and the Army Research Laboratory (ARL), Aberdeen Proving Ground, MD.

Exhibit R-2, PB 2010 Army RDT&E Budget Item Justification	DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	**R-1 ITEM NOMENCLATURE** PE 0602720A Environmental Quality Technology

B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	20.076	16.064	15.766	
Current BES/President's Budget	16.651	19.799	15.902	
Total Adjustments	-3.425	3.735	.136	
Congressional Program Reductions	.000	-.065		
Congressional Rescissions	.000	.000		
Total Congressional Increases	.000	3.800		
Total Reprogrammings	-3.082	.000		
SBIR/STTR Transfer	-.343	.000		

Change Summary Explanation

FY08 funding decrease was due to transfer of congressional interest items.
FY09 funding increase is due to congressional adds.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification			DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology		PROJECT NUMBER EM5

COST ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
EM5: ENVIRONMENTAL QUALITY APPLIED RSCH - AMC (CA)	1.158	2.990	.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Environmental Quality applied research.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Propelling Agent for Slurry Gel	1.158	.000	.000	
MLRS Disposal System (pending transfer to 633103)	.000	2.906	.000	
SBIR/STTR	.000	.084	.000	
Total	1.158	2.990	.000	

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology					PROJECT NUMBER F35	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
F35: Environmental Quality Applied Research (CA)	.000	.797	.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Environmental Quality applied research.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Range Scrap Disposal, Hawthorne Army Depot (pending transfer to 633103)	.000	.776	.000	
SBIR/STTR	.000	.021	.000	
Total	.000	.797	.000	

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology					PROJECT NUMBER 048	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
048: IND OPER POLL CTRL TEC	2.937	3.028	3.128						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will provide technologies to enable the Army to reduce or eliminate environmental impacts both in the United States and abroad. These technologies reduce the impact of legal and regulatory environmental restrictions on installation facilities, training and testing lands and ranges, as well as 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 and field waste. Additional work is focused on environmental risk assessment for ranges associated with noise and air quality.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, the Army Science and Technology Master Plan, and supports the Army Strategy for the Environment.

Work in this project is performed by the US Army Engineer Research and Development Center (ERDC), Vicksburg, MS.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
Industrial Compliance and Pollution Prevention Readiness: In FY08, completed development of a structural activity relationship (SAR) predictive model for insensitive munitions treatment kinetics. Completed initial design of miniaturized enzyme electrodes for detection of biomarkers, and a sensor to demonstrate living cell behavior to toxins. Completed algorithms for weather and nonlinear effects on sound propagation. Completed an investigation of high-amplitude nonlinear blast wave emission from Army weapons that enables enhanced accuracy of noise footprint prediction. In FY09, develop new sensing modalities using mimicked human physiological responses to detect acutely toxic substances in water. Also, begin development of attenuation functions in frequency and distance using a variety of sound propagation calculation models.	2.937	2.990	3.128	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology	PROJECT NUMBER 048

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY10, will develop physiologically relevant chip/organ response on micro-fluidic sensing platforms. Will also finalize blast noise propagation attenuation functions for incorporation into blast noise models and assessment tools.				
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.038	.000	
Total	2.937	3.028	3.128	

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology					PROJECT NUMBER 835	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
835: MIL MED ENVIRON CRIT	3.173	3.288	3.284						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will provide a 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 munitions constituents (MCs) and munitions and explosives of concern (MECs) contaminant concentration levels that minimize adverse effects on the environment and human health. This research is supported by the previously developed Army Risk Assessment and Modeling System (ARAMS) that links models and databases of expected result and transport to the exposure and effects of explosives and their degradation by-products. The Long-Term Monitoring program reduces or eliminates the costly and lengthy operation of off-site analyses and enhances overall monitoring capabilities by providing continuous/autonomous detection/analysis. The program of Characterization/Assessment of Distributed Source MCs on ranges yields knowledge and technologies to quantify MC transport and fate (what substances become through assimilation, chemical reactions and decay) in terrestrial range environments. New research in toxicogenomics, nanomaterial technologies, and computational/molecular modeling tools for toxicity and exposure assessment further reduces the uncertainty associated with both the probability of exposure and the ultimate effect if exposed. Interim products are US 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 limits at Army installations.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, the Army Science and Technology Master Plan, and supports the Army Strategy for the Environment.

Work in this project is preformed by the US Army Engineer Research and Development Center (ERDC), Vicksburg, MS.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.074	.000	
Effects of Munitions Constituents/Munitions and Explosives of Concern: In FY08, designed a laboratory-scale gene signature array microchip sensor, evaluated field negative ion miniature mass spectrometry for detection of MCs, defined statistically valid range characterization/sampling protocols for MC sources, constructed a toxicogenomic assessment framework for several organisms as modeling platforms, identified methods for	3.173	3.214	3.284	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology	PROJECT NUMBER 835

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
computational chemistry prediction of effects of explosives dissolved in water, and identified analytical approaches to characterize nanomaterial properties to support toxicological and remediation. In FY09, evaluate in-situ biosensor technologies for direct push wells (installed by pushing or hammering the drive rods as opposed to drilling or augering), finalize protocols for MC residue reduction, further the mathematical modeling of biological impacts due to existing MCs and devise computational chemistry methods for the prediction of reactivity and toxicity of explosives and decomposition products dissolved in water. Identify exposure quantification metrics for select representative nanomaterials. Explore a common framework to consolidate tools for comprehensive, multi-stressor range environmental risk assessments. In FY10, will establish mathematical biological models forecasting MC toxicology. Will complete computational chemistry methods for the prediction of explosives degradation in water and explore methods for predicting MC binding and movement in soil. Will establish a nanomaterial periodic table and framework for integrating environmental attributes with nanotechnology development.				
Total	3.173	3.288	3.284	

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology					PROJECT NUMBER 895	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
895: POLLUTION PREVENTION	3.601	4.023	3.729						Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this project is to develop pollution prevention technologies required to reduce/eliminate the environmental footprint resulting from the manufacture, maintenance, use and surveillance of Army ordnance and other weapon systems. This project matures revolutionary technologies to eliminate or significantly reduce the environmental impacts that threaten the sustainment of production and maintenance facilities, training ranges and operational areas. The project supports the transformation of the Army by ensuring that advanced energetic materials required for 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 Department of Defense (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. Other focus areas include base camp energy reduction initiatives, elimination of waste streams in contingency operations and heavy metal reductions from surface finishing processes. The project develops technologies for advanced development under PE 0603728, project 025.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, the Army Science and Technology Master Plan, 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), Aberdeen Proving Groudn, MD, 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.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
Rocket and Missile Propellants: In FY08, modeled performance of propellant-engine combinations. In FY09, optimize and evaluate performance of propellants in new engine. In FY10, will design and model next generation environmentally benign propellant ingredients. Conventional Ammunition:	3.601	3.910	3.729	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology	PROJECT NUMBER 895

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY08, refined green chemistry synthesis procedures and performed full chemical and physical characterization of new explosive molecules. In FY09, model performance of new environmentally benign explosive molecules in weapons systems. In FY10, will design novel, environmentally benign explosive compositions consisting of new molecules. Pyrotechnics: In FY08, optimized characteristics of low-toxicity smoke formulations. In FY09, investigate environmentally sustainable simulators, flares, delays, and signals. In FY10, will down-select candidate compositions for environmentally friendly obscurants. Heavy Metal Reduction: In FY10, will evaluate chromate/cadmium-free materials and processes in a laboratory environment. Zero Footprint Camp: In FY10, will evaluate technologies in a laboratory environment that reduce base camp energy and water supply demands.				
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.113	.000	
Total	3.601	4.023	3.729	

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology					PROJECT NUMBER 896	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
896: BASE FAC ENVIRON QUAL	5.782	5.673	5.761						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will 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. 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 effect mission support and environmental compliance. The project provides novel methods and technologies to restore lands damaged during training activities and allow sustained use of installation facilities and training land resources. The project supports readiness and full use of training lands through development of threatened and endangered species monitoring technology and management technologies for species at risk. The project also provides tools and technologies to avoid training restrictions and costs due to training and testing noise and reduce constraints on training lands associated with invasive species.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, the Army Science and Technology Master Plan, and supports the Army Strategy for the Environment.

Work in this project is performed by the US Army Engineer Research and Development Center (ERDC), Vicksburg, MS.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
Threatened and Endangered Species (TES) Management to Reduce Operational Constraints: In FY08, completed projects identifying effects of noise and physiological stress of transient training activities on the Indiana bat and gopher tortoise, conducted research in support of a Candidate Conservation Agreement for gopher tortoise, and enhanced Light Detection and Ranging (LIDAR) applications for habitat assessment. Completed projects to reduce potential constraints on military training associated with the Indiana Bat Recovery Plan and a possible Endangered Species Act listing petition for the gopher tortoise. In FY09, evolve research from high priority species that are listed to research involving a multi-species approach for improved detection of species at risk and predictive synthesis models for effects of military disturbance on species at risk.	3.079	2.939	1.545	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602720A Environmental Quality Technology	PROJECT NUMBER 896

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY10, will complete development of detection techniques, multi-species population and risk prediction models and understanding of advanced genetic methods to manage species at risk. This will assist the Army in reducing the number of future listed species and their associated constraints on military training.				
Predictive Risk Assessment and Management for Army Ranges and Training Lands: Technologies developed in this effort are also aimed at minimizing Training Land/Natural Resource Conflicts for Sustained Mission Support. In FY08, developed and evaluated strategies to mitigate high priority invasive species impact on training. In FY09, complete algorithms for weather and nonlinear effects on sound propagation for determining discrete noise impacts and describing variance in noise level decay with distance. In FY10 will complete biometric sampling for detecting and assessing species invasiveness on Army ranges and training lands. Will begin multi-platform optical remote sensing systems development to measure training and prescribed fire emissions, monitor fenceline conditions, and visualize large scale plume generation and transport. Will also develop unified landscape utility metrics for mission and resource condition to maximize landscape resources supporting evolving training doctrine.	2.703	2.734	4.216	
Total	5.782	5.673	5.761	

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.