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Exhibit R-2, PB 2011 Army RDT&E Budget Item Justification									DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 2040: Research, Development, Test & Evaluation, Army BA 3: Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603728A: Environmental Quality Technology Demonstrations							
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	16.782	16.121	15.878	0.000	15.878	18.709	16.569	16.882	17.177	0	133.996
002: ENVIRONMENTAL COMPLIANCE TECHNOLOGY	2.027	2.117	2.131	0.000	2.131	2.194	2.253	2.300	2.345	Continuing	Continuing
025: POLLUTION PREVENTION TECHNOLOGY	3.509	3.621	3.659	0.000	3.659	3.718	3.780	3.847	3.907	Continuing	Continuing
03E: ENVIRONMENTAL RESTORATION TECHNOLOGY	9.650	9.886	10.088	0.000	10.088	12.797	10.536	10.735	10.925	Continuing	Continuing
A. Mission Description and Budget Item Justification											
<p>This program element (PE) matures and demonstrates technologies that assist Army installations in becoming environmentally compatible without compromising the readiness or training critical to the success of the future force. 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 material. Technologies demonstrated within this program element are transitioned from PE 0602720A (Environmental Quality Technology). 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, and the US Army Research, Development, and Engineering Command (RDECOM), Aberdeen Proving Ground, MD.</p>											

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APPROPRIATION/BUDGET ACTIVITY		R-1 ITEM NOMENCLATURE			
2040: Research, Development, Test & Evaluation, Army		PE 0603728A: Environmental Quality Technology Demonstrations			
BA 3: Advanced Technology Development (ATD)					
B. Program Change Summary (\$ in Millions)					
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	15.468	15.706	16.023	0.000	16.023
Current President's Budget	16.782	16.121	15.878	0.000	15.878
Total Adjustments	1.314	0.415	-0.145	0.000	-0.145
• Congressional General Reductions		-0.085			
• Congressional Directed Reductions					
• Congressional Rescissions		0.000			
• Congressional Adds		0.500			
• Congressional Directed Transfers					
• Reprogrammings	1.595	0.000			
• SBIR/STTR Transfer	-0.281	0.000			
• Adjustments to Budget Years	0.000	0.000	-0.145	0.000	-0.145

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Exhibit R-2A, PB 2011 Army RDT&E Project Justification								DATE: February 2010			
APPROPRIATION/BUDGET ACTIVITY 2040: <i>Research, Development, Test & Evaluation, Army</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603728A: <i>Environmental Quality Technology Demonstrations</i>				PROJECT 002: <i>ENVIRONMENTAL COMPLIANCE TECHNOLOGY</i>			
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
002: <i>ENVIRONMENTAL COMPLIANCE TECHNOLOGY</i>	2.027	2.117	2.131	0.000	2.131	2.194	2.253	2.300	2.345	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates 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 forward operating bases, to satisfy increasingly stringent waste, wastewater and air pollutant discharge requirements. Army facilities are subject to fines and facility shutdowns for violation of federal, state, and local environmental regulations. This technology is essential to control and reduce the generation of waste to satisfy hazardous waste reduction goals, and to avoid future environmental costs and liabilities to the Army. Efforts under this project enable the Army to reduce environmental constraints at installations while complying with the myriad of federal, state, and host country environmental regulations and policy. 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 as well as protect the critical resources, i.e. land, air, and waters of the Army. 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 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1 Installation Operations: Demonstrate environmentally safe and cost-effective technologies to manage and reduce the increase in noise and pollution concerns associated with training ranges. In FY09, completed complaint risk guidelines and a new noise modeling calculation engine for peak noise events based on statistical data and numerical analysis propagation algorithms. Developed new noise complaint criteria to provide defensible guidelines regarding appropriate installation action in response to noise complaints, to maintain both amicable community relations and mission accomplishment. Completed large-scale propagation demonstration to provide foundational weather and blast noise data to enable improved understanding and prediction algorithms for blast noise from training and testing. In FY10, develop and utilize a cell-based sensor for detecting toxins with on-board reactive oxygen species electrode. Develop a portable device to measure low frequency characteristics of	2.027	2.100	2.131	0.000	2.131

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
ground surfaces to provide accurate single event noise assessments for managing the training noise environment. In FY11, will complete integration of cell-based sensor components and will initiate a test phase for field evaluation of perchlorate and lead. Will initiate demonstration of noise mapping software utilizing real-time meteorology to enable the Army's Operational Noise Program and Sustainable Range Program. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO						
Program #2 Small Business Innovative Research/Small Business Technology Transfer Programs FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base		0.000	0.017	0.000	0.000	0.000

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<u>B. Accomplishments/Planned Program (\$ in Millions)</u>					
				FY 2009	FY 2010
				Base FY 2011	OCO FY 2011
				Total FY 2011	
OCO FY 2011 Plans: FY 2011 OCO					
Accomplishments/Planned Programs Subtotals				2.027	2.117
				2.131	0.000
				2.131	
<u>C. Other Program Funding Summary (\$ in Millions)</u>					
N/A					
<u>D. Acquisition Strategy</u>					
N/A					
<u>E. Performance Metrics</u>					
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.					

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
025: <i>POLLUTION PREVENTION TECHNOLOGY</i>	3.509	3.621	3.659	0.000	3.659	3.718	3.780	3.847	3.907	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates pollution prevention advanced technologies required for sustainable operation of Army weapon systems, to include compliance with regulations mandated by federal, state, and local environmental and health laws. Technology thrusts under this project include: demonstration of new coating materials, systems, and processes to exceed all existing, new and projected national laws and local regulations and demonstration of advanced technologies to enable sustainment of propellant, explosive and pyrotechnic production and maintenance facilities and training ranges through elimination or significant reduction of environmental impacts. These technologies will ensure that advanced energetic materials required for future force's high performance munitions are developed that meet weapons lethality and survivability goals and that are compliant with environmental and health laws. The project transitions technologies from PE 0602720A, project 895. 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, MD, Armaments Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ, Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL, and Edgewood Chemical Biological Center (ECBC), Edgewood, MD.

B. Accomplishments/Planned Program (\$ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1 Sustainable Painting Operations: In FY09, matured advanced hazardous air pollutant (HAP)-free primer and topcoat formulations for all applications of the chemical agent resistant coating system. Efforts in this area transition to PE 0603804A, project K42. Conventional Ammunition: In FY09, scaled up synthesis to kilogram quantities of environmentally benign Royal Demolition Explosive (RDX) replacement candidates, to include high nitrogen compounds, for demonstration in munitions. In FY10, assess performance of potential RDX replacements in representative compositions. In FY11, will perform material qualification testing and assess performance of representative compositions for eventual transition into an end-item. Pyrotechnics: In FY09, refined processing techniques. In FY10, evaluate low-toxicity colored smoke formulations in a relevant	3.509	3.519	3.659	0.000	3.659

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
environment. In FY11, will demonstrate a perchlorate-free countermeasure in a relevant end-item. Rocket and Missile Propellants: In FY09, demonstrated gelled hydrazine monopropellant replacement. In FY10, demonstrate hypergolic propulsion system as potential alternative to ammonium perchlorate. In FY11, will develop flight-scale hardware for hydrazine and ammonium perchlorate replacement rocket motors. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO					
Program #2 Small Business Innovative Research/Small Business Technology Transfer Programs FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base	0.000	0.102	0.000	0.000	0.000

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<u>B. Accomplishments/Planned Program (\$ in Millions)</u>						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
<i>OCO FY 2011 Plans:</i> FY 2011 OCO						
Accomplishments/Planned Programs Subtotals		3.509	3.621	3.659	0.000	3.659
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A						
<u>D. Acquisition Strategy</u> N/A						
<u>E. Performance Metrics</u> 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.						

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
03E: <i>ENVIRONMENTAL RESTORATION TECHNOLOGY</i>	9.650	9.886	10.088	0.000	10.088	12.797	10.536	10.735	10.925	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will mature and demonstrate technologies transitioned from PE 0602720A (Environmental Quality Technology), project 835 that improve the Army's ability to achieve cost-effective environmental restoration and management of contamination resulting from Army training or operations at its installations, active and inactive ranges, its rework and production facilities, and on the battlefield. Advanced development activities address the management/mitigation of materials released to the natural environment and residual environmental effects of military training and operations. The emphasis of this effort includes restoration of legacy materials, e.g. traditional explosives and energetic; management of new materials, e.g., nanomaterials and emerging contaminants; and mitigation of residual impacts from implementation of sustainable technologies and processes. Technologies matured within this project enable the Army to cost effectively address current and future environmental liabilities resulting from the use of militarily relevant materials in the environment and implementation of the new family of sustainable technologies for energy production. 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 and life cycle analysis techniques that can more accurately display the environmental liabilities associated with fielding new systems and technologies. This program includes pilot scale field studies to establish technological feasibility and assess performance and productivity of the risk assessment techniques. 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 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1 Unexploded Ordnance (UXO): In FY09, conducted field evaluations of specialized instrumentation for targets, berms, and bunkers for monitoring impacts and condition assessment. Investigated innovative technologies for range unexploded ordnances (UXO) maintenance and for mitigation of unique and emerging UXO. In FY10, identify range monitoring and maintenance systems for sustainable range operations. Retain identification and characterization of unique and emerging UXO and initiate development of protocols for adaptive detection. In	1.728	2.068	3.077	0.000	3.077

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY11, will complete performance characterization of maintenance technologies, complete identification and characterization of unique and emerging UXO and complete protocols for implementation of adaptive, real time UXO detection, remediation, ordnance impact and monitoring. Will develop detection and discrimination methodologies for unique and emerging UXO. Will complete identification and characterization of unique and emerging UXO. Will continue working on adaptive, real time UXO detection and remediation, methodologies. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO						
Program #2 Hazard/Risk Assessment Tools for Toxicity of Munitions Constituents (MCs): In FY09, conducted cross-species validation of Munitions Constituents (MC) effects. Initiated advanced protocols for rapid screening and monitoring of ecological impact of MCs. Developed advanced computational chemistry predictions of chemical structures and physical properties of adsorbed explosives in soils. Conducted technology demonstration of exposure quantification metrics for select representative nanomaterials. In FY10, devise mathematical models of effects and toxicity due to existing MCs. Characterize multiple stressor impacts on toxicity. Identify developmental pathways affected by MCs and toxicity mechanisms in alternate ecological species, and complete a cross species validation of MC effects. Devise computational chemistry predictive methods of chemical structures and physical properties of MC adsorbed soils, MC reactivity and decomposition, and chemical mechanisms of MC		4.353	6.851	7.011	0.000	7.011

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
breakdown by soil microbes. In FY11, will complete construction of a computational biology tool for predictive toxicology. Will define hydraulic, biological, geophysical, and chemical models for integration into a training range environmental evaluation and characterization system. Will identify approaches for environmental life-cycle assessment of nanomaterials to support advanced Warfighter technologies development. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO						
Program #3 In Situ Remediation Technologies for Contaminated Groundwater and Soils: In FY09, finalized and validated remediation/management of inorganic residues on small arms firing ranges (SAFRs) with process guidance, specifications, and protocols. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010		0.149	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Base FY 2011 Plans: FY 2011 Base					
OCO FY 2011 Plans: FY 2011 OCO					
Program #4 Characterization, Evaluation and Remediation of Distributed Source Contamination on Army Ranges: In FY09, conducted field evaluations of advanced spatial components for range risk assessment in range assessment modeling system (ARAMS). Continued to quantify the effects of wildfire control practices on active ranges. Performed field evaluation of on-site, topical alkaline hydrolysis of impact area explosives. In FY10, provide the capability to rapidly and accurately quantify MC sources, distribution, and transport in soil and surface water and to cost-effectively manage residual MCs on active Army training ranges. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO	2.275	0.517	0.000	0.000	0.000
Program #5	1.145	0.293	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Long Term Monitoring Applications: In FY09, completed advanced development of in situ biosensor technologies implemented in direct push wells. Conducted final field evaluation of a novel analytical instrument (negative ion miniature mass spectrometer) for monitoring multiple contaminants under a wide range of site conditions. In FY10, complete the development of a rapid, sensitive, near real time on-site assessment of Army-related contamination. FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010 Base FY 2011 Plans: FY 2011 Base OCO FY 2011 Plans: FY 2011 OCO					
Program #6 Small Business Innovative Research/Small Business Technology Transfer Programs FY 2009 Accomplishments: FY 2009 FY 2010 Plans: FY 2010	0.000	0.157	0.000	0.000	0.000

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<u>B. Accomplishments/Planned Program (\$ in Millions)</u>						
		FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
<i>Base FY 2011 Plans:</i> FY 2011 Base						
<i>OCO FY 2011 Plans:</i> FY 2011 OCO						
Accomplishments/Planned Programs Subtotals		9.650	9.886	10.088	0.000	10.088
<u>C. Other Program Funding Summary (\$ in Millions)</u>						
N/A						
<u>D. Acquisition Strategy</u>						
N/A						
<u>E. Performance Metrics</u>						
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.						

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