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

DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

	COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
	Total Program Element (PE) Cost	58711	64386	12758	14041	14308	14912	17988	19569	Continuing	Continuing
D048	Industrial Operations Pollution Control Technology	2324	2362	2184	2384	2541	2705	3264	3469	Continuing	Continuing
A821	Bioremediation Education Science and Technology (BEST) Centers	3747	0	0	0	0	0	0	0	0	3747
A822	Facility Environmental Mangement and Monitoring System	4683	1987	0	0	0	0	0	0	0	6670
A823	Hawaii Small Business Development Center	5059	3973	0	0	0	0	0	0	0	9032
A829	National Defense Center for Environmental Excellence (NDCEE) Technology	8940	14901	0	0	0	0	0	0	0	23841
A835	Military Medical Environmental Criteria	3506	3134	2426	2865	2927	3098	3374	3778	Continuing	Continuing
A876	Plasma Energy Pyrolysis System	5621	2980	0	0	0	0	0	0	0	8601
A877	Western Environmental Technology Office Environmental Support	6558	3974	0	0	0	0	0	0	0	10532
A895	Pollution Prevention Technology	0	609	0	0	0	0	1551	2190	Continuing	Continuing
A896	Base Facility Environmental Quality	2973	4294	4676	5196	5144	5299	5722	5858	Continuing	Continuing
A908	Commercialization of Technology to Reduce Defense Costs Initiative	4683	5961	0	0	0	0	0	0	0	10644
A917	Computer Based Land Management	3747	2484	0	0	0	0	0	0	0	6231
A946	Electronic Equipment Demanufacturing	0	5960	0	0	0	0	0	0	0	5960

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PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A947 Sustainable Green Manufacturing	0	2980	0	0	0	0	0	0	0	2980
AF25 Military Environmental Restoration Technology	3123	3323	3472	3596	3696	3810	4077	4274	Continuing	Continuing
AF26 Agricultural-Based Bioremediation	3747	3974	0	0	0	0	0	0	0	7721
AF27 ARO Chemical/Hazardous Material Disposal	0	1490	0	0	0	0	0	0	0	1490

A. Mission Description and Budget Item Justification: This Program Element (PE) provides technology that allows the Army to comply with regulations mandated by all Federal, State and local environmental/health laws and to reduce the cost of this compliance. Examples of key laws include the Superfund Amendments and Reauthorization Act of 1986 and the Defense Environmental Restoration Act (the DoD equivalent of this law), in addition to the Resource Conservation and Recovery Act of 1984, as amended. This PE provides 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. The current DoD estimate for the total Army cost of completing this cleanup program is eight to ten billion dollars. This PE also provides 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 PE develops pollution control technology, which assists installations to comply with environmental regulations at less cost. The PE also provides technology to mitigate noise impacts and maneuver area damage resulting from Army training activities. The work in this program element is consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, 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.

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PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

B. Program Change Summary	FY 1998	FY 1999	FY 2000	FY 2001
Previous President's Budget (FY 1999 PB)	56131	13842	14617	15706
Appropriated Value	61919	64842		
Adjustments to Appropriated Value				
a. Congressional General Reductions	-1788	-456		
b. SBIR / STTR	-1279			
c. Omnibus or Other Above Threshold Reductions	-419			
d. Below Threshold Reprogramming	+278			
e. Rescissions				
Adjustments to Budget Years Since FY 1999 PB			-1859	-1665
Current Budget Submit (FY 2000/2001 PB)	58711	64386	12758	14041

Change Summary Explanation: Funding - FY 1999 – Congressional increase to program (+51000).
FY2000/2001 - funds reprogrammed for higher priority requirements (FY00 –1859/FY01 –1665).

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BUDGET ACTIVITY: 2 - Applied Research	PE NUMBER AND TITLE: 0602720A Environmental Quality Technology	PROJECT: D048

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D048 Industrial Operations Pollution Control Technology	2324	2362	2184	2384	2541	2705	3264	3469	Continuing	Continuing

Mission Description and Justification: This project provides pollution control technologies required to reduce the cost of treating hazardous toxic effluent from the operation of Army industrial installations, which include ammunition plants, depots and arsenals, and to satisfy increasingly stringent wastewater discharge standards under the Clean Water Act and relevant state regulations. Federal facilities are now subject to fines and facility shutdowns for violation of federal, state, and local air and wastewater discharge regulations. This new technology is essential to control and reduce generation of hazardous waste, to satisfy hazardous waste reduction goals and to avoid future hazardous waste disposal costs and liabilities to the Army. This project will provide compliance tools to control toxic air pollutants regulated under the Clean Air Act amendments. Efforts will focus on new energetic materials, which will enter the Army inventory within the next decade to assure that ammunition plants will remain compliant. Changes in solid, liquid, and gaseous emissions resulting from pollution prevention efforts will require technology changes to existing treatment systems to compensate. The primary developing agency is the U.S. Army Construction Engineering Research Laboratories, Champaign, IL.

FY 1998 Accomplishments:

- 2324 - Developed adaptive tuning control algorithms for industrial wastewater treatment plant automation.
  - Developed biofilter technology for treatment of volatile organic compounds (VOC) from industrial operations.
  - Developed improved biological treatment technologies for energetic wastewater employing sulfate reduction environments.
  - Developed engineered gelatin technology for stabilization of industrial waste streams contaminated with heavy metals.
  - Developed technology to permit safe demolition of buildings at ammunition plants which are contaminated with energetics, asbestos, lead and other hazards.

Total 2324

FY 1999 Planned Program:

- 2350 - Develop technology for electrochemical reduction of energetic compounds in water.
  - Develop biological treatment technology for munitions production using sulfate-reducing bacteria.
  - Develop thermal plasma techniques for the pyrolytic destruction of organic energetic wastes and the vitrification of heavy metal-bearing wastes.
- 12 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 2362

FY 2000 Planned Program:

- 2184 - Develop biofilter technology criteria for treating mixed air streams.
  - Develop technology for electrochemical reduction of energetic compounds in water.

Total 2184

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BUDGET ACTIVITY: 2 - Applied Research	PE NUMBER AND TITLE: 0602720A Environmental Quality Technology / PROJECT: D048

FY 2001 Planned Program:

•	2384	- Develop sonolytic and catalytic photolysis for energetic wastes treatment. - Complete biofilter technology development for controlling munitions production VOCs. - Develop biological treatment technology development for munitions wastewater under sulfate-reducing conditions.
Total	2384	

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

DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A821

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A821 Bioremediation Education Science and Technology (BEST) Centers	3747	0	0	0	0	0	0	0	0	3747

Mission Description and Justification: Funds for this project were provided by Congress in FY98. Work will be completed in FY00 using only the FY98 funds. Bioremediation Education, Science and Technology Centers (BEST) have been developed to address research needs of bioremediation through a partnership between a major university, a national laboratory, and a science consortium located at a historically black college or university (HBCU). The goals for the centers established under this program are to become a national resource for multidisciplinary research and education in bioremediation sciences. In FY93, the Department of the Army was appropriated funds to establish BEST Centers. The U.S. Army Corps of Engineers (USACE) was assigned as the Army's executive agent for administering the BEST Program. The U.S. Army Engineer Waterways Experiment Station (WES) administers the BEST Program for the USACE. WES, through a Broad Agency Announcement (BAA) process, awarded a three-year cooperative agreement for operation of a BEST Center to: The Regents of the University of California, Lawrence Berkeley Laboratory (LBL). The LBL was awarded the BAA for establishment of a BEST Center under Cooperative Agreement Number DACA39-95-2-0005. The BEST Center consists of the University of California Lawrence Berkeley Laboratory (LBL); Jackson State University (JSU), Jackson, MS; and the Ana G. Mendez University System (AGMUS), San Juan, Puerto Rico.

FY 1998 Accomplishments:

- 3747 - Established MS, BS, and Ph.D. programs in environmental science, biology, and microbiology, a Rotating Scholars program, and a BEST Seminar Program.
  - Delivered high school teacher and middle school summer bioremediation science workshops; organized a K-12 bioremediation science fair; established BEST education program for 64 undergraduate, 21 graduate, and 4 post-doctoral participants; and established BEST Web site, student web pages and a web-based graduate bioremediation course.
  - Developed an in-situ stable isotope monitoring system for petroleum hydrocarbon degradation at DoD site, a microbial community monitoring system for industrial activated sludge hydrocarbon and metal treatment, an in-situ x-ray and Gamma-ray spectroscopy for speciating toxic metals, and determined microbial community diversity for various toxic metal impacted environments producing BEST presentations at 72 scientific meetings and 37 peer-reviewed journal articles by BEST student and faculty.

Total 3747

FY 1999 Planned Program: Program not funded in FY 1999.

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A822

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A822 Facility Environmental Mangement and Monitoring System	4683	1987	0	0	0	0	0	0	0	6670

Mission Description and Justification: Funds for this project were provided by Congress in FY98 and FY99. Based on technology demonstrated at Tobyhanna Army Depot (TYAD) under the Facility Environment Management and Monitoring System (FEMMS), the technology will be transferred to the Radford Army Ammunition Plant (RFAAP) as the basis for REDMAP. This Congressionally mandated pollution prevention project is managed by the Army to institute the Radford Environmental Development and Management Program (REDMAP) at the Radford Army Ammunition Plant, Virginia for the development of an integrated environmental and pollution prevention (P2) management and control system. In addition, since all DoD facilities are required to implement Executive Order (E.O.) 12856 by 1999 (so that Federal facilities comply with the mandated Pollution Prevention Act (PPA) of 1990 and Executive Order 12856 of August 3, 1993), these funds will focus on issues related to implementation of E.O. 12856 at RFAAP.

FY 1998 Accomplishments:

- 220 - Initiated program development. During FY98:
  Performed baseline site review of RFAAP for FEMMS modules and P2 projects.
  Finalized list of FEMMS modules and projects for RFAAP.
  Began design of Environmental Information System and Air Modeling FEMMS Modules for RFAAP.
- 4463 - Evaluated pollution prevention technologies to: replace/reduce sodium hydroxide as a cleaning agent, reduce sulfates at an RFAAP acid-screen house, and reuse/recycle/separate nitrocellulose replacement materials for clay pan liners used in open burning.
  - Implemented environmental management projects in: Environmental Information System, Air Dispersion Modeling/Emergency Response System, Virginia Pollutant Discharge Elimination System Monitoring and Control System, Selective Catalytic Reduction/Molecular Sieve Control Upgrade, and Propellant Explosive Pyrotechnic Tracking System.

Total 4683

FY 1999 Planned Program:

- 1934 - Complete the remaining FEMMS Modules: Electrostatic Precipitator (ESP), Propellant Explosive Pyrotechnic (PEP) Tracking System, Virginia Pollutant Discharge Elimination System (VPDES, i.e., Wet Wells and Outfalls), and integrate modules into the Environmental Information System (EIS).
  - Complete high priority environmental management projects which had high implementation savings potential (e.g., reduction of sulfates). Also, complete requirements and alternatives analysis on a new set of environmental projects and implement highest priority, highest payback options - (e.g., recycle/reuse of energetic manufacturing process fluids, aqueous-based and acidic-based streams).
- 53 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 1999
BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602720A Environmental Quality Technology
	PROJECT A822

Total 1987

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)		DATE: February 1999
BUDGET ACTIVITY: 2 - Applied Research	PE NUMBER AND TITLE: 0602720A Environmental Quality Technology	PROJECT: A823

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A823 Hawaii Small Business Development Center	5059	3973	0	0	0	0	0	0	0	9032

Mission Description and Justification: This Congressionally-mandated project is a continuation of an effort begun in FY 93 under project A830. Funds for this project were provided by Congress in FY98 and FY99. The project has technology policy goals favoring activities that meet dual-use and employment-creating criteria. The former refers to commercializing products that are used by Armed Services personnel as well as the civilian population. The latter is offered as a contribution to U.S. economic revitalization. The approach involves private-public partnerships to carry out activities leading to the commercialization of these products. These include but are not limited to pharmaceuticals, industrial products, and food products derived from the agricultural resources of transitioning sugar plantations in Hawaii. Advisory personnel from federal agencies (primarily the Departments of Defense and Agriculture) and state agencies participate at the work group and oversight committee levels.

FY 1998 Accomplishments:

- 5059 - Developed agricultural-industrial products having potential for dual-use and commercialization, focusing on native Hawaiian agricultural crops with potential application for medicine/food/bioremediation use in the military.

Total 5059

FY 1999 Planned Program:

- 3868 - Complete the development of agricultural industrial products having potential for dual-use and commercialization, focusing on native Hawaiian agricultural crops with potential for medicine/food/bioremediation use in the military.
- 105 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 3973

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A829

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A829 National Defense Center for Environmental Excellence (NDCEE) Technology	8940	14901	0	0	0	0	0	0	0	23841

Mission Description and Justification: This Congressionally mandated project is managed by the Army on behalf of the Office of the Deputy Undersecretary of Defense for Environmental Security (DUSD-ES). The mission of the NDCEE is four-fold: (1) Demonstrate and export new environmentally-acceptable technology to the industrial base; (2) train the industrial base on the use of the new technology; (3) perform research and development, where necessary, to mature a new technology prior to demonstrating and exporting the new technology to the industrial base and (4) assist DoD in technology transfer. The NDCEE, which is located in Johnstown, Pennsylvania, has the goal of resolving the environmental technology and management requirements of the DoD community and commercial industrial base. The primary in-house development agency is the U.S. Army Materiel Command's Armament Research, Development, and Engineering Center, Picatinny Arsenal, NJ. The NDCEE has positioned itself as a critical resource for the Deputy Undersecretary of Defense for Environmental Security for environmental management and technology validation and integration. Major programs support by the center include the Joint Group on Acquisition Pollution Prevention, Toxins Reduction Investment and Management (TRIM), environmental cost accounting standards development and the DoD fuel cell program. Agreements have been signed with Air Force Center for Environmental Excellence and U.S. Army Center for Health Promotion and Preventive Medicine, 4 EPA Offices, 2 Department of Energy Offices, the Navy Facilities Engineering Service Center, and the Federal Laboratory Consortium. This project transferred to PE 0708045A beginning in FY00.

FY 1998 Accomplishments:

- 8940 - Expanded environmental technology by installing supercritical carbon dioxide painting, laser paint stripping, expanded Flashjet xenon stripping and sputtering equipment. Demonstrated environmentally acceptable technologies on DoD components, conducted technology transfer activities (requirements determination, technology selection, equipment selection, installation, de-bugging, training) for DoD facilities.
  - Provided Support to DoD/Army ISO 14000 Pilot Program.
  - Developed the Environmental Cost Analysis Methodology (ECAM).
  - Developed the Risk-Based Tiered Approach (RBTA) for environmental risk assessments.
  - Developed an EPA approved Standardized Test Protocol for Organic Coatings.
  - Completed the Congressionally-directed Nitrem process demonstration.

Total 8940

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FY 1999 Planned Program:

- 14507 - Compete the Congressionally-directed "Materials and Processes Partnership for Pollution Prevention (MP4)" program. This will include:
  Assessing DoD pollution prevention technology needs.
  Conducting requirements analysis to establish goals and requirements for new technology or management solutions.
  Developing, testing, and demonstrating technology and management solutions including cost and health risk impacts.
  Transitioning new technologies and processes to the Army industrial base and other DoD and commercial sites.
- 394 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 14901

FY 2000 Planned Program: Program to transfer to PE 0708045A.

FY 2001 Planned Program: Program to transfer to PE 0708045A.

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BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A835

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A835 Military Medical Environmental Criteria	3506	3134	2426	2865	2927	3098	3374	3778	Continuing	Continuing

Mission Description and Justification: This project evaluates human health and environmental 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 human health and the environment from adverse effects. The products of this research are US Environmental Protection Agency approved health advisories and criteria documents to be used in risk assessment procedures. These criteria are used by the Army during negotiations with regulatory officials to set scientifically and economically rational safe cleanup and discharge levels at Army installations. The primary developing laboratories are the US Army center for Environmental Health Research (CEHR), Ft. Detrick, MD, the Center for Health Promotion and Preventive Medicine (CHPPM), Edgewood, MD, and the Waterways Experiment Station (WES), Vicksburg, MS.

FY 1998 Accomplishments:

- 1866 - Performed toxicological evaluations and metabolism studies on munitions and degradation products. (CHPPM)
  - Developed toxicity predictions of munitions by-products using structure activity relationships. (CHPPM)
  - Completed cross-species extrapolation of results from immunotoxicity studies in mammalian and non-mammalian bioassays. (CEHR/CHPPM)
  - Applied specific sentinel environmental toxicity hazard assessment methods as part of integrated hazard assessment of sites at Army installations. (CEHR)
  - Performed interlaboratory and field validation of specific sentinel environmental toxicity hazard assessment methods. (CEHR)
- 1640 - Developed exposure and effects models and decision-making framework for ecological risk assessment. (WES)
  - Developed fate and transport of UXO, military-unique compounds, and microbial biomarkers. (WES)
  - Identified biomarkers to monitor bioattenuation and effects of military-unique compounds. (WES)

Total 3506

FY 1999 Planned Program:

- 3051 - Develop munitions biomarkers and bioeffects and conduct toxicological evaluation of munitions and degradation products. (CHPPM)
  - Develop toxicity predictions using structure activity relationships. (CHPPM)
  - Perform cross-species extrapolation of mammalian and non-mammalian bioassays (CEHR/CHPPM), apply sentinel biomonitoring systems (CEHR), and apply methods for integrated environmental assessment of contaminated sites at Army installations (CEHR).
  - Develop fate and transport of military-unique compounds. (WES)
  - Identify biomarkers to monitor bioattenuation and effects of military-unique compounds. (WES)
  - Develop exposure and effects models and decision-making framework for ecological risk assessment. (WES)

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	PROJECT A835

FY 1999 Planned Program: (continued)

•	83	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.
Total	3134	

FY 2000 Planned Program:

•	1211	- Develop toxicity values for use in a Risk Assessment Modeling System (RAMS). (CHPPM) - Develop biomarkers to assess various toxic endpoints as well as bioaccumulation. (WES/CHPPM) - Perform interlaboratory and field validation of specific sentinel environmental toxicity hazard assessment methods. (CEHR) - Apply specific sentinel environmental toxicity hazard assessment methods as part of integrated hazard assessment of sites at Army installations. (CEHR)
•	1215	- Develop comprehensive exposure model and integrate with RAMS. (WES) - Develop screening level model for UXO. (WES) - Identify parameters for bioaccumulation of explosives in specific endpoints. (WES)
Total	2426	

FY 2001 Planned Program:

•	1431	- Develop comprehensive risk assessment linkages for RAMS. (WES/CHPPM) - Develop effects information to input into comprehensive RAMS. (CHPPM) - Perform interlaboratory and field validation of specific sentinel environmental toxicity hazard assessment methods (CEHR) - Apply specific sentinel environmental toxicity hazard assessment methods as part of integrated hazard assessment of sites at Army installations. (CEHR)
•	1434	- Determine effects of environmental parameters on UXO chemical signatures. (WES) - Develop population model for assessment of environmental effects. (WES) - Develop comprehensive risk assessment linkage for RAMS, linking contaminant fate and transport with effects databases for multiple endpoints. (WES)
Total	2865	

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BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A876

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A876 Plasma Energy Pyrolysis System	5621	2980	0	0	0	0	0	0	0	8601

Mission Description and Justification: Funds for this project were provided by Congress in FY97 through FY99. This project provides a compliance and pollution control technology required reducing the cost of treatment and disposal of hazardous and toxic site waste streams resulting from production or deactivation of military items or components. Plasma arc technology application enables the military to reduce the need for landfills and their future liability-related issues in a one step, safe, and economic process. The project will deliver an effective compliance technology to control and dispose of recalcitrant hazardous and toxic wastes regulated under Resource Conservation and Recovery Act amendments, in addition to satisfying the increasingly stringent emission standards of the Clean Air Act relevant to open burning/open detonation practices within the military. A plasma arc processing unit can reduce the significant costs associated with the many steps involved in other conventional hazardous waste treatment technologies, such as: sample characterization lead time, health and safety exposure risks to workers, and increased risks to the general public from accidents involving the excavated and transported wastes. The development and field demonstration of plasma arc technology will provide the user community with a much-needed tool for military hazardous waste processing and disposal on a flexible basis. In particular, developing a mobile unit's specifications, design, and blueprints will enable the Army, working with the Air Force, to converge on a mobile unit configuration and cut the time for field implementation.

FY 1998 Accomplishments:

- 5621 - Developed plans and obtained permits for mobile system for field demonstration.
  - Designed and procured mobile unit for field applications.
  - Selected demonstration locations and finalized plans.
  - Program will continue in FY99 with the FY98 funds and includes:
    Demonstrating the mobile PEPS capability at three demonstration sites to test the capability to handle hazardous wastes on-site.
    Completing information processing for the preparation of Federal, State, and local permit applications.

Total 5621

FY 1999 Planned Program:

- 2902 - Complete procurement of mobile unit components and system integration.
  - Complete shake-down and mobility testing.
  - Obtain National Environmental Protection Act and other operating permits.
- 78 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 2980

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	PROJECT A876

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A877

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A877 Western Environmental Technology Office Environmental Support	6558	3974	0	0	0	0	0	0	0	10532

Mission Description and Justification: This Congressionally-directed effort with the Western Environmental Technology Office (WETO) provides for the transfer of environmental compliance technologies required to reduce the cost for treating hazardous and toxic pollutants from Army industrial operations which include Army ammunition plants, depots, and arsenals, and to help satisfy increasingly stringent environmental regulations on DoD and the Department of Energy (DOE). Those environmental requirements include wastewater discharge standards under the Clean Water Act and relevant State regulations, hazardous air pollutant emission standards under the Clean Air Act Amendments (CAAA), requirements under Federal Facilities Compliance Act and Resource Conservation and Recovery Act and other regulations. The U.S. Army Construction Engineering Research Laboratories (CERL) works closely with the Industrial Operations Command (IOC) to transfer environmental compliance and pollution prevention technologies to IOC installations. This project will support the transfer of environmental technologies to IOC installations. This enables the Army to reduce environmental compliance costs and future environmental liability costs. The technology transfer projects under this project should result in model industrial operations with environmental compliance, which will help accelerate technology transfer to similar industrial operations within DoD. The primary technology transfer agency is the U.S. Army Construction Engineering Research Laboratories, Champaign, IL. WETO is a privatized former component of DOE (as of September 1996). WETO will evaluate and demonstrate technologies to help DOE meet a requirement to clean up its sites.

FY 1998 Accomplishments:

- 6558 - Program was initiated late in FY98 and will continue into FY99 with carry-over FY98 funds. Work will include:
  Evaluation of technologies to remove and detoxify metals and energetics in wastewater and to treat oily waste and solvents.
  Fabrication of a pilot-scale, mobile, plasma-arc, military waste destruction system.

Total 6558

FY 1999 Planned Program:

- 3869 - Complete design services and cost-benefit analyses in support of environmental compliance at Army industrial installations.
- 105 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 3974

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 1999
BUDGET ACTIVITY: 2 - Applied Research	PE NUMBER AND TITLE: 0602720A Environmental Quality Technology / PROJECT: A895

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A895 Pollution Prevention Technology	0	609	0	0	0	0	1551	2190	Continuing	Continuing

Mission Description and Justification: The objective of this project is to develop pollution prevention technologies that directly support Army training, maintenance, and industrial support/manufacturing. Investment in pollution prevention technologies enhances Army Warfighting by maintaining readiness as well as ensuring uninterrupted training. The goal of this project is to increase the availability of Army systems and to reduce life cycle costs by 15-30% through the elimination or reduction in the usage of hazardous/toxic substances in the design, manufacture, maintenance, and disposal of Army materiel. This project funds four specific tasks: (1) the continued development of new primer compositions for small caliber ammunition known as Metastable Interstitial Composites (MICs). This task is part of the integrated Green Bullet initiative and is the technology to eliminate lead salt compounds used in today's military small arms primers; (2) the elimination of electrodeposition of hazardous chromium from chromic acid to bore surfaces of medium caliber gun barrels through the use of Cylindrical Magnetron Sputtering technology and the employment of new coating materials. This task is part of the integrated Green Gun Barrel Initiative; (3) the development of a new, non-toxic, low volatile organic compounds (VOC), wash primer for use as a metal surface pretreatment for both ferrous and non-ferrous surfaces to eliminate the high cost of installing and operating mandated air quality compliance systems at the application facilities; and (4) the development of novel in-process surface/solvent diagnostics technology for metal cleaning operations to minimize solvent usage where use of organic solvents cannot currently be eliminated. Having automated diagnostics for both the metal surface cleanliness and the solvent contaminant level will assure the minimization of hazardous waste generation for metal plating and coating processes. The project addresses high priority Army environmental quality technology user requirements and supports compliance with pollution reduction goals set forth in Presidential Executive Order 12856. This project is managed for the Army Materiel Command by the Industrial Ecology Center located at the U.S. Army Armaments Research, Development, and Engineering Center, Picatinny Arsenal, NJ.

FY 1998 Accomplishments: Project not funded in FY 1998.

FY 1999 Planned Program:

•	593	- Establish critical manufacturing/processing baseline; test and evaluate control parameters for MIC synthesis. - Complete fabrication of test apparatus and apply new coatings to test specimens using a cylindrical magnetron sputtering (CMS) approach. - Identify and evaluate candidate water-based and high solid polymer wash primers for adhesion, salt spray resistance, and appearance. - Complete measurement of spectra versus concentration for representative contaminants and develop algorithms for quantification from observed spectral features.
•	16	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.
Total	609	

FY 2000 Planned Program: Project not funded in FY 2000.

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FY 2001 Planned Program: Project not funded in FY 2001.

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

DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A896

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A896 Base Facility Environmental Quality	2973	4294	4676	5196	5144	5299	5722	5858	Continuing	Continuing

Mission Description and Justification: This project provides the Army with the technical capability to protect and improve the biological and physical characteristics of fixed installation training and testing areas needed to sustain readiness while also conserving protected natural and cultural resources, including threatened and endangered species. Technology developed within this project will enable training and testing land users to match usage events and schedules to the capabilities of specific land areas, and will also provide advanced methods to restore lands damaged in readiness exercises. Efforts under this project will also enable the Army to prevent pollution in facilities base operations, and to comply with the myriad Federal, state, and host country environmental regulations dealing with hazardous and non-hazardous water, wastewater, air emission, solid waste (including sediment discharge) and noise. An additional effort is the development of environmental monitoring and modeling capabilities to support environmentally sustainable installation lands and facilities. The primary developing agency is the U.S. Army Construction Engineering Research Laboratories, Champaign, IL.

FY 1998 Accomplishments:

- 2973 - Developed cause/effect relationships between training activities and impacts on threatened and endangered species.
  - Completed addition of weather statistics and terrain effects on improved noise propagation models.
  - Identified and characterized the mechanisms that cause volatile organic carbon emissions from solvent and petroleum product usage.
  - Completed geomorphologic/probability-modeling guidance for survey of archeological sites.
  - Evaluated military vehicle emissions on global warming.

Total 2973

FY 1999 Planned Program:

- 4294 - Develop validated risk assessment models to determine the effects of Army activities on habitat disturbance.
  - Provide knowledge, approach, and tools to match training land use and land capacity in selected ecoregions.
  - Develop decision support methodologies for assessment and mitigation of maneuver training impacts on threatened and endangered species.
  - Complete guidance for identifying pollution prevention alternatives for Army applications.

Total 4294

FY 2000 Planned Program:

- 4051 - Develop validated risk assessment models to determine the effects of Army activities on habitat disturbance for threatened and endangered species.
  - Develop process-based erosion/deposition models suitable to installation watershed scales.
  - Validate integration of multiple factors for determining land based carrying capacity.

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	PROJECT A896

FY 2000 Planned Program: (continued)

- Develop spatial and temporal guidance for management of revegetation of military lands.
- Develop wastewater/stormwater treatment technologies.
- Develop pollution prevention strategies for air emissions control.
- Conduct research into system upgrade technologies to meet Safe Drinking Water Act (SDWA) regulations.

•	625	- Begin development of Hazardous Air Pollutant (HAP) control technologies for hazardous organic materials.
Total	4676	

FY 2001 Planned Program:

•	4471	- Validate the use of remote instrumentation to evaluate changes in animal activity as a result of installation activities.
		- Model the effects of erosion control and revegetation technologies in support of reducing impacts and improving sustained uses.
		- Develop decision support methodologies for selection of land rehabilitation and maintenance alternatives.
		- Develop compliance and mobilization environmental standards for troop installations.
		- Conduct research into system upgrade technologies to meet SDWA regulations.
•	725	- Continue development of Hazardous Air Pollutant (HAP) control technologies for hazardous organic materials.
Total	5196	

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A908

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A908 Commercialization of Technology to Reduce Defense Costs Initiative	4683	5961	0	0	0	0	0	0	0	10644

Mission Description and Justification: Funds for this project were provided by Congress in FY98 and FY99. The objective of this technology commercialization program is to significantly lower Department of Defense procurement costs through integration of the technology commercialization process from the laboratory workbench to end product users. Advanced methodologies will be utilized for identification, optimization, and commercialization of developed at federal defense and non-defense laboratories. An Interagency Agreement has been signed with the Federal Laboratory Consortium (FLC) to assist in implementation of this program. This partnership will support DoD by identifying, developing, testing, evaluating, and transitioning state-of-the-art methods and technologies to improve quality, efficiency, and compliance and promote reduction of defense procurement costs.

FY 1998 Accomplishments:

- 4683 - Technology Demand survey conducted. Examined Militarily Critical Technologies List and Army and DoD Environmental Technology Requirements; compiled industry technology roadmaps and other documents; and participated in national and regional FLC/Technology Transfer meetings.
  - Completed technology transition protocols to identify engineering, performance, and test requirements to validate technologies for field/installation applications.
  - Planning completed for systematic assessments and verification of technologies through multilevel testing and demonstration.
  - Market assessment and matching conducted to initially match technology to problems including dynamic underground stripping, high solids anaerobic digestion, laser technology to aid manufacturing, acoustic Doppler non-destructive testing, chemical sensors, remotely operated vehicles for demining and environmental uses, blast resistant flexible fiber composites, and simulation/visualization technologies. Overarching DoD Integrated Process Team established to assist in identification and matching technologies to problems.
  - Thirteen technologies have been assessed/selected for potential commercialization, two Cooperative R&D Agreements were negotiated, and links to venture capital identified.

Total 4683

FY 1999 Planned Program:

- 5803 - Complete requirement and technology matching to fully populate database of available DoD/Federal Laboratory technologies, points of contacts. Vendor/commercial technologies matrixed against manufacturing, sustainment, and environmental needs.
  - Expand role of DoD Integrated Process Team in technology matching.
  - Prioritize DoD needs and complete qualitative and quantitative scoring for selection of DoD/Federal Laboratory technologies.

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BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602720A Environmental Quality Technology
	PROJECT A908

FY 1999 Planned Program: (continued)

- Develop licensing and marketing plans for selected technologies, demonstrate and validate technologies as needed (with assistance of Laboratory and DoD Centers of Excellence), and assist in developing financial plans and resourcing for vendors/licensee as appropriate.
- Complete this program in FY99 by assisting DoD Labs in the development of cooperative R&D/ Licensing agreements.

•	158	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.
Total	5961	

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A917

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A917 Computer Based Land Management	3747	2484	0	0	0	0	0	0	0	6231

Mission Description and Justification: Funds for this project were provided by Congress in FY98 and FY99. These funds improve DoD land managers' ability to characterize and monitor broad-scale changes occurring across training and testing lands by utilizing and exploiting remote sensing geographic information systems and field survey and monitoring technologies. Improvements should be made in data acquisition, data display and visualization, and integration of these data into dynamic landscape models. Accurate, effective, and predictive methodologies and models for land condition assessment are needed that correlate and predict the relationship between military use and the patterns and nature of impacts associated with each type of use under varying climatic and landscape conditions. The program develops, tests, and refines these methodologies and models that industry has not pursued.

FY 1998 Accomplishments:

- 3747 - Developed collaborative work plan, defined tasks through workshops, and developed statements of work for each task.
- - Work will be continued into FY99 using carry-over FY98 funds and will include:
  Testing and evaluation of multi-tiered vegetation mapping tools.
  Designing and testing of protocols for network computing with geospatial data and models.
  Designing, acquisition, and implementation of a stream stage monitoring system and soil moisture predictive system to improve real-time scheduling of training activities.
  Designing and testing of tools for quality analysis and validation of geospatial data.
  Designing and testing of procedures and computer-based tools for analysis of change thresholds on military lands.
  Testing of long-term soil impacts of military vehicles on variable soil texture surfaces.
  Designing and testing of computer-based instructions and self-learning modules for integrated resource management plans.

Total 3747

FY 1999 Planned Program:

- 2418 - Evaluate Wind-Erosion Modeling Options for Integration into the Army's land capability model at sites with extensive wind erosion problems (such as Ft. Bliss, TX and Marine Corps Air Ground Combat Center at 29 Palms).
  - Evaluate and test Computer-based learning modules as elements of the decision support capabilities of the Land Management System (LMS).
  - Evaluate vegetation mapping results and lessons learned from FY98 multi-tiered vegetation mapping efforts at Ft. Hood, TX.
  - Evaluate real-time weather and soil moisture data with training usage plans and training distribution model for near term damage and safety assessments.
  - Support protocol development process (workshops, publications) for the Land Management System (LMS).

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 1999
BUDGET ACTIVITY: 2 - Applied Research	PE NUMBER AND TITLE: 0602720A Environmental Quality Technology / PROJECT: A917

FY 1999 Planned Program: (continued)

- Complete and apply TES and ecological modeling tools developed in support of Ft. Hood at additional sites (Marine Corps Air Ground Combat Center, Ft. Benning, etc).

•	66	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.
Total	2484	

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

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

DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A946

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A946 Electronic Equipment Demanufacturing	0	5960	0	0	0	0	0	0	0	5960

Mission Description and Justification: The objective of this Congressionally-funded Electronics Equipment Demanufacturing program is to develop and demonstrate technologies and processes for the reuse, recycle, or disposal of manufactured electronic equipment used by the Department of Defense and its suppliers. Shortened electronics equipment product life cycles have led to early obsolescence and the 20-year accumulation of hundreds of millions of tons of scrap or surplus commercial and Government electronic equipment. Some of this equipment is classified. Today, there are few alternatives to sending much of this equipment to landfills. The managed reuse of electronic equipment may reduce future procurement costs and will reduce landfill and disposal costs through the separation of hazardous materials.

FY 1998 Accomplishments: Program not funded in FY 1998**.**

FY 1999 Planned Program:

- 5802 - Complete requirements analysis to identify and evaluate potential technologies.
  - Develop, demonstrate, and implement advanced, environmentally acceptable demanufacturing processes at demanufacturing technology demonstration center.
  - Complete and transition demanufacturing technologies to other DoD agencies and commercial sites.
- 158 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 5960

FY 2000 Planned Program: Program not funded in FY 2000**.**

FY 2001 Planned Program: Program not funded in FY 2001**.**

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: A947

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
A947 Sustainable Green Manufacturing	0	2980	0	0	0	0	0	0	0	2980

Mission Description and Justification: The objective of this Congressionally-funded project is to help the Army reduce pollution in its key manufacturing processes by introducing clean technologies and techniques onto weapon system and related production lines. This is a Congressionally mandated program managed by the Army and consisting of team members that include the National Defense Center for Environmental Excellence, New Mexico State University, and the New Jersey Institute of Technology. New Mexico State University will leverage experiences with predictive modeling and micro-sensor technologies. This program augments efforts to comply with Executive Orders 12856 Greening the Government through Waste Prevention and 13101 Recycling and Federal Acquisition which mandate use of environmentally preferable products and services in all Federal acquisition programs.

FY 1998 Accomplishments: Program not funded in FY1998**.**

FY 1999 Planned Program:

- 2902 - Complete efforts in corrosion prevention and control, training, and modeling and simulation. Corrosion prevention and control efforts will address reduction of corrosion in new and fielded systems through surface protection, material compatibility, embedded sensors, modeling and simulation, lubricants, surveillance modernization, and packaging.
  - Complete training development efforts that address the needs of the DoD and industry to raise awareness, interest, and competence in managing environmental technologies and concerns.
  - Complete development of modeling techniques that simulate and predict life-cycle effects/characteristics for more efficient and effective use of resources.
- 78 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 2980

FY 2000 Planned Program: Program not funded in FY2000**.**

FY 2001 Planned Program: Program not funded in FY2001**.**

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: AF25

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
AF25 Military Environmental Restoration Technology	3123	3323	3472	3596	3696	3810	4077	4274	Continuing	Continuing

Mission Description and Justification: This project provides cost effective technologies required to clean up 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. 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; 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. 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 primary developing agency is the U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

FY 1998 Accomplishments:

- 3123 - Completed advanced groundwater sampler/biosensor system as part of the Site Characterization and Analysis Penetrometer System (SCAPS) and initiate evaluation of electromagnetic induction technologies for unexploded ordnance (UXO) detection.
  - Developed Groundwater Modeling System (GMS) Version 2, housing a remedial module with fate/transport packages for explosives and metals.
  - Developed improved chemical analytical techniques for detecting and quantifying special organic compounds in complex media.
  - Provided technical data package of advanced concepts for in-situ biological treatment of explosives-contaminated media.
  - Developed chemical extraction technologies for heavy metals-contaminated soils and continued development of metal speciation and physical separation treatment in soils and groundwater.
  - Completed an evaluation of electromagnetic induction technologies for potential unexploded ordnance (UXO) detection.

Total 3123

FY 1999 Planned Program:

- 3242 - Develop an enhanced instrumentation package for the SCAPS and continue development of UXO detection technologies and of on-site data visualization and analysis capabilities.
  - Incorporate in-situ bioremediation and electrokinetics design modules into the GMS version 2 model.
  - Develop advanced biological ex-situ (bioreactors) and in-situ treatment of contaminated soils and physical/chemical methods for groundwater.
- 81 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 3323

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BUDGET ACTIVITY: 2 - Applied Research	PE NUMBER AND TITLE: 0602720A Environmental Quality Technology
PROJECT: AF25	

FY 2000 Planned Program:

- 3472 Complete multi-sensor UXO data collection and demonstrate 50% reduction of false alarms at well characterized UXO test sites.
  - Develop engineering approach for delivery of amendments for in situ treatment or for hydrological modifications to groundwater systems to affect enhanced biodegradation and complete bench scale parameter optimization for reactive barrier enhancement.
  - Complete vapor-phase biological activity enhancing amendment delivery (proof-of-concept) in soil columns, develop engineering approach for delivery of amendments to the vadose zone, and complete correlation of soil/sediment characteristics with contaminant bioavailability.
  - Demonstrate first generation electro-kinetic treatment technologies for lead and Develop prototype instrumentation for on line detection of metal contaminated soils.

Total 3472

FY 2001 Planned Program:

- 3596
  - Develop predictive models for advanced UXO detection sensors (multi- frequency electromagnetic, GPR, vector magnetic, seismic/acoustic, and microgravimetry) and complete advanced UXO sensor data collection effort at a well documented site.
  - Complete pilot-scale demonstration in-situ biodegradation for TNT and demonstrate in-situ reactive barriers and/or reactive barriers coupled with biodegradation for explosives in groundwater.
  - Complete pilot-scale demonstration of in-situ biodegradation for explosives in soils and sediment.
  - Develop aggressive chemical metal treatment for small arms training ranges demonstrate the recycle of metal contaminated extracts for soils treatment systems.

Total 3596

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: AF26

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
AF26 Agricultural-Based Bioremediation	3747	3974	0	0	0	0	0	0	0	7721

Mission Description and Justification: Funds for this project were provided by Congress in FY97 through FY99. FY1998 Agriculture-Based Bioremediation work has the U.S. Army Environmental Center (AEC) and the U.S. Army Engineer Waterways Experiment Station (WES) demonstrating technologies to restore contaminated military and civilian sites, especially those located in fragile Pacific island ecosystems. In FY99, WES will continue the effort through added research, development, and demonstrations. AEC provides user input and assistance. Demonstrating bioremediation technologies that are agriculturally-based will enhance the Army's ability to restore contaminated sites with fewer dollars and in a way that is widely accepted by the stakeholder community. Using fewer dollars for restoration purposes will allow those dollars to be directed to the readiness stance of the overall military. Stakeholder acceptance, both regulatory and public, is enhanced by employing "green technology." These green technologies, by being efficient and less costly, meet an ever growing requirement to produce clean sites with fewer dollars. Focusing on fragile Pacific island ecosystems could enable the Army to gain regulatory acceptance by the Environmental Protection Agency's Region IX, a major force behind gaining acceptance throughout the remaining regions.

FY 1998 Accomplishments:

- 3747 - The work continues into FY99 with FY98 funds A portion (~50%) of the program focused on data collection to improve scientific and technical assessments of the projects. A broad agency announcement (BAA) was released soliciting new projects to be funded with the remainder of the FY98 funds. Three projects have been selected and demonstration results will be transferred to Hawaiian government agencies, private sector, and academia. A technology transfer agreement was executed with the University of Hawaii.

Total 3747

FY 1999 Planned Program:

- 3869 - The BAA will be extended to solicit additional and complimentary projects. DoD projects will be completed that emphasize agricultural remediation of petroleum contaminated soils and remediation of contaminated sediments using manufactured soil technology.
- 105 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 3974

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

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DATE: February 1999

BUDGET ACTIVITY: 2 - Applied Research

PE NUMBER AND TITLE: 0602720A Environmental Quality Technology

PROJECT: AF27

COST (*In Thousands*)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
AF27 ARO Chemical/Hazardous Material Disposal	0	1490	0	0	0	0	0	0	0	1490

Mission Description and Justification: This Congressionally-funded project will have the Army Research Office (ARO) research ways to conduct on-site chemical and hazardous materials disposal in an environmentally acceptable manner. ARO will identify projects that have promise for on-site disposal (i.e. restoration/remediation) that can be evaluated or developed with a one-time investment. ARO would fund those research projects over a three year period with these funds.

FY 1998 Accomplishments: Program not funded in FY 1998.

FY 1999 Planned Program:

- 1451 - Develop a Broad Agency Announcement (BAA) asking for project proposals for a "Site Restoration - Chemical and Hazardous Materials Disposal Program" which emphasize collaboration with Army scientists/engineers and technology transfer at the end of each project.
  - Select and complete three of the projects identified under the BAA using these funds by FY01.
- 39 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 1490

FY 2000 Planned Program: Program not funded in FY 2000.

FY 2001 Planned Program: Program not funded in FY 2001.

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