Environmental Quality Technology Program

"Addressing Defense Requirements with Tomorrow's Technology"

29th Environmental and Energy Symposium & Exhibition

Program Brief

April 9, 2003

Environmental Quality Technology Program

Army Environmental Quality Technology (EQT): *Why a Corporate Program?*

- Benefit of the EQT program -

  Serves as a Total Army "Toolbox" by:

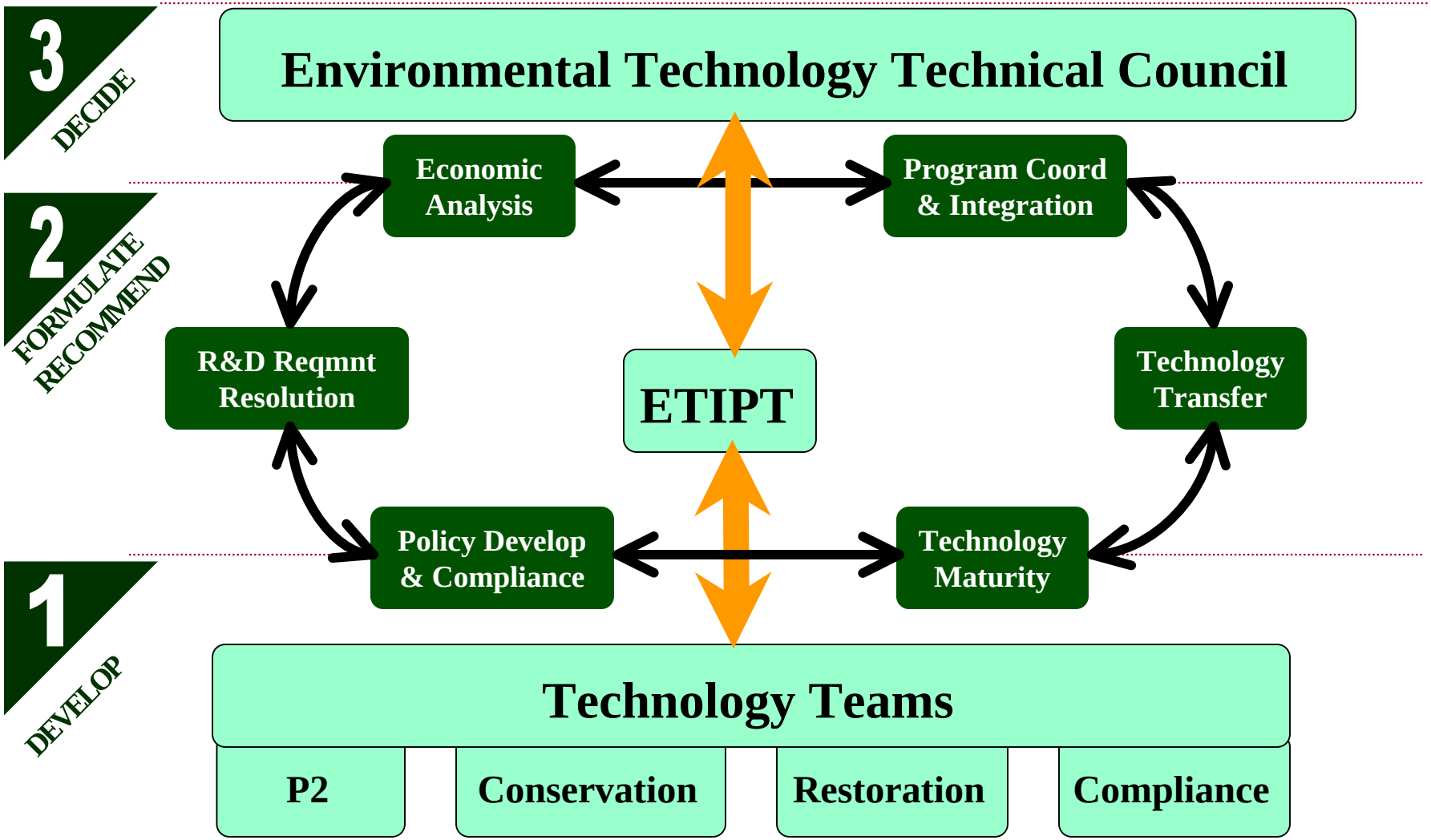
  - Supporting programs to help reduce total ownership costs
  - Making additional resources available for Readiness and Modernization through cost avoidances achieved by this program

- Responsive to Defense Planning Guidance (DPG)
  - Address Army's High-Priority EQT Research, Development, Test, and Evaluation (RDT&E) Requirements

Environmental Quality Technology

- Defense Planning Goals (DPG) GOALS:
  - EQT program must address all high-priority requirements
  - Program must yield high return-on-investment (ROI) with pay-back period not greater than to 5 years from completion of demonstration/validation
- February (1999) SECARMY policy memo:
  - Promulgates "Corporate Approach" of the EQT program to the safety and occupational health programs, and
  - Coordination by PMs for their systems' ESOH impacts
- May (1999) memo co-authored by the VCSA and Army Acquisition Executive (AAE) identifies PM consideration for/and investments in EQT as an Army high-priority effort

EQT Tiered Oversight



Environmental Quality Technology Program

Leadership is Engaged

SECRETARY OF THE ARMY
WASHINGTON

February 9, 1999

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Environmental Technology Program Management and Oversight

The offices of the ASA(IL&E) and the ASA(RD&A) established an innovative approach to program management and oversight with the inception of the Environmental Technology Technical Council (ETTC) and the issuance of the Environmental Quality Technology (EQT) Investment Strategy. Through these efforts, the ETTC has corporately developed and is implementing environmental quality research and development (R&D) programs for the "Total Army" in the FY00–05 POM.

The process employed affords senior Army leadership the ability to prioritize needs, focus resources and ensure cost-efficient investments for technology maturation, transfer, and exploitation. The net result places a virtual "Tool Box" of innovative technologies in our hands to address high priority R&D needs while reducing total ownership costs, enhancing mission capabilities, and environmental stewardship.

In light of these benefits, I wish to exploit this success by including the consideration of EQT in Army safety and health programs. Consequently, the ETTC's role should be expanded to ensure that EQT is considered in all Environment, Safety and Health (ESH) programs where appropriate. All EQT initiatives resourced with research, development, test, and evaluation funds related to ESH shall be coordinated, planned, and programmed as necessary through the ETTC. Additionally, all environmental quality related engineering and manufacturing development programs should also be coordinated with the ETTC.

I am pleased with the efforts of the Army team that has brought this to fruition. To that end, I also encourage all of you to take an active role in the ETTC by addressing today's needs with tomorrow's technology.

Louis Caldera

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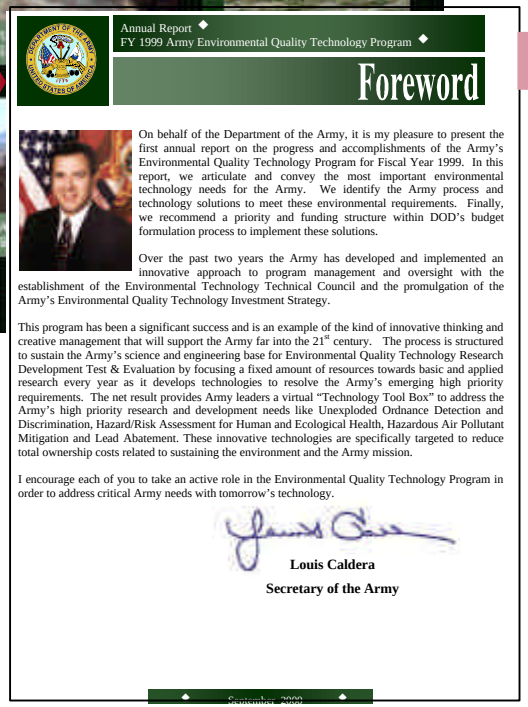


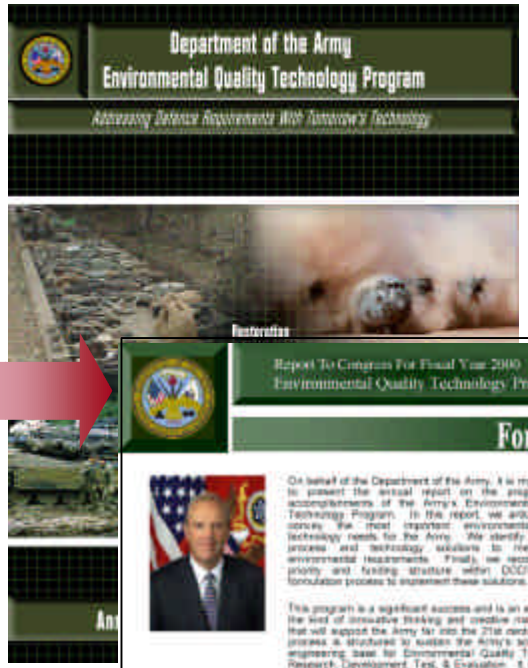
On behalf of the Department of the Army, it is my pleasure to present the first annual report on the progress and accomplishments of the Army's Environmental Quality Technology Program for Fiscal Year 1999. In this report, we articulate and convey the most important environmental technology needs for the Army. We identify the Army process and technology solutions to meet these environmental requirements. Finally, we recommend a priority and funding structure within DOD's budget formulation process to implement these solutions.

Over the past two years the Army has developed and implemented an innovative approach to program management and oversight with the establishment of the Environmental Technology Technical Council and the promulgation of the Army's Environmental Quality Technology Investment Strategy.

This program has been a significant success and is an example of the kind of innovative thinking and creative management that will support the Army far into the 21st century. The process is structured to sustain the Army's science and engineering base for Environmental Quality Technology Research Development Test & Evaluation by focusing a fixed amount of resources towards basic and applied research every year as it develops technologies to resolve the Army's emerging high priority requirements. The net result provides Army leaders a virtual "Technology Tool Box" to address the Army's high priority research and development needs like Unexploded Ordnance Detection and Discrimination, Hazard/Risk Assessment for Human and Ecological Health, Hazardous Air Pollutant Mitigation and Lead Abatement. These innovative technologies are specifically targeted to reduce total ownership costs related to sustaining the environment and the Army mission.

I encourage each of you to take an active role in the Environmental Quality Technology Program in order to address critical Army needs with tomorrow's technology.

Louis Caldera
Secretary of the Army



FY 04-09 High Priority EQT RDT&E Requirements

EQT High Priority Requirements	
	Pillar
Cost Effective Technologies to Remove, Characterize, and Dispose or Reuse Sources of Lead Paint	COM
Hazardous Air Pollutant (HAP) Emission Control	COM
Unexploded Ordnance (UXO) Detection and Identification	RES
Hazard/Risk Assessment of MUCs	RES
Sustainable Army Live-Fire Range Design and Maintenance	COM
Threatened and Endangered Species Surveys and Monitoring	CON
Sustainable Painting Operations for the Total Army (SPOTA)	P2
Particulate Matter/Dust Control	COM
Training and Test Range Noise Control	COM
Land Capability and Characterization	CON
Solid Waste Diversion	P2
Reducing Impacts of Threatened and Endangered Species on Military Training, Testing, and Other Operations	CON
Characterization, Evaluation, and Remediation of Distributed Source Contamination (UXO-C) on Army Ranges	RES
Reduce/Eliminate Pollution for Compliant Plating Processes	P2
Long Term Monitoring for Military Unique Compounds	RES
In-Situ Treatment Technologies for Inorganics Contaminated Soils	RES
Enhanced and In-Situ Treatment Technologies for Explosives and Organics in Groundwater	RES
Ordnance Manufacture, Maintenance, Use, and Surveillance to Enable Sustainable Ranges	P2
Soil/Sediment and Shallow Water Unexploded Ordnance (UXO) Recovery/Removal/Remediation	RES
Hazard Assesment Models for UXO Sites	RES

EQT Significant Accomplishments

- Newly authorized RDT&E demonstration/validation program element established in FY00 with OASA(I&E) oversight.
- Conducting UXO DoD technology validation at NDCEE.
- Secretary of the Army endorsed Annual Report to Congress to satisfy new Congressional requirement to report on DOD EQT programs.
- Army has five fully funded EQT programs:

Potential Cost Avoidance - $3.8 B	POM
✓Lead Paint Removal Technologies (Compliance)	00-05
✓Hazardous Air Pollutants Control (Compliance)	00-05
✓UXO Identification and Discrimination (Restoration)	02-07
✓Hazardous/Risk Assessment of Military Unique Compounds (Restoration)	02-07
✓Sustainable Army Live-Fire Range Design & Maintenance (Compliance)	03-07

Environmental Quality Technology Program

Removal, Treatment and Disposal Technologies for Lead-Based Paint (LBP) Contamination

Objectives:

Demonstrate innovative technologies to provide Army installations environmentally safe and cost effective removal of lead based paint hazards. Conduct demonstrations to mature technology to assist Army installations in becoming environmentally compliant in a cost-effective manner and without compromising mission readiness.

Approach:

Improve environmental compliance through:

- Thermal spray vitrification.
- Microwave assisted removal.
- Self-healing overcoatings.
- Lead based paint hazard management system.
- Electrokinetic extraction for soils.

Justification:

Overcoatings and encapsulants reduce the lead dust and health risk. Thermal spray removal and microwave-assisted removal render the waste non-hazardous and reduce the lead dust during lead hazard abatement and disposal (AERTA requirement 2.3.k).

Overcoatings Demonstration Holston AAP Bridge,

Thermal Spray LBP Removal

Microwave LBP Removal

Program Schedule

Milestone/Product	FY02	FY03	FY04	FY05	FY06	FY07
Demonstrate Lead Abatement Technologies for Steel Structures						
Demonstrate Lead Abatement Technologies for Non-Residential Buildings						
Demonstrate Lead Abatement Technologies for Family Housing & Child Occupied Facilities						
Develop and Demonstrate Treatments for Lead in Soil						

RDT&E BA3 (0603728A 002)

Accomplishments:

· Demonstrated feasibility of removing lead originating from lead based paint from soil using electromigration to reduce lead level below EPA's level of concern of 400 ppm at Fort Drum.

- Demonstrated environmentally acceptable chemical strippers and thermal spray for removal of LBP and decision tree for optimal selection of technologies for control and abatement of LBP Hazards on steel structures.
- In FY03, demonstrate lead hazard removal technologies for buildings that result in non-hazardous waste that leaches less than 5ppm lead and produces no hazardous pollutants. Develop a decision tree based on field demonstrations for optimum selection of cost effective technologies.

Hazardous Air Pollutant (HAP) and Volatile Organic Compound Emission Control

Objective:

Develop and demonstrate cost effective Hazardous Air Pollutants (HAPs) and Volatile Organic Compound (VOC) emission control technologies that impact Army activities and operations regulated by the National Emissions Standards for Hazardous Air Pollutants (NESHAP), Occupational Safety & Health Administration (OSHA) and States.

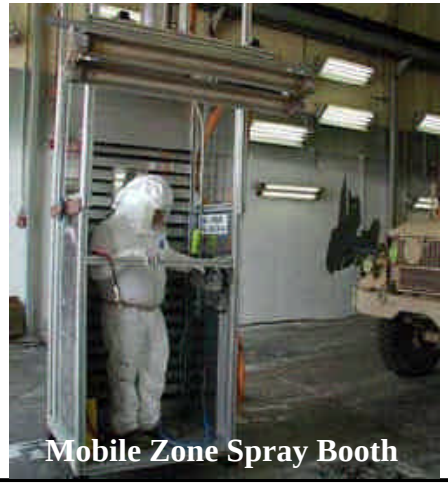
Approach:

Develop & demonstrate technologies for controlling and/or recycling:

- Hazardous organic solvent emissions
- Inorganic HAPs from surface treating.
- Toxic combustion sources.
- Chlorinated solvents.

Justification:

Addresses control of HAP emissions regulated under NESHAP prior to deadlines identified in AERTA requirement 2.1.g.



Mobile Zone Spray Booth

XCEM

Accomplishments:

- Completed developmental testing of Zero Emission Cr Electroplating System at Anniston Army Depot.
- Demonstration of continuous emission monitor (XCEM) at Tooele Army Depot, meeting EPA Performance Specification for 5 metals.
- Demonstrated Improved Mobile Zone Spray Booth Recirculation exceeding the 81% VOC removal efficiency requirement for control devices at Fort Hood. Recent user interest: Army Reserves, UT; and Ft. Eustis
- In FY03, demonstrate hazardous organic solvent emissions technologies to remove 95% of HAPs and 20% cost reduction (baseline -10,000 cfm unit at $65/cfm).
- By FY05, demonstrate combustion source HAP control from hazardous waste incinerators (chemical and conventional demilitarization) and non-natural gas boilers to meet NESHAP requirements.

Program Schedule

Milestone/Product	FY02	FY03	FY04	FY05	FY06	FY07
Combustion Source HAP Development						
Hazardous Organic HAP Technology Demonstrations						
Combustion Source HAP Demonstration						
Inorganic HAP Technology Demonstration						
Chlorinated Solvents Technology Demonstration Development						

RDT&E BA2 (0602720A 896) RDT&E BA3 (0603728A 002)

Unexploded Ordnance (UXO) Identification and Discrimination

Objective:

Develop technologies that are non-intrusive and can accurately identify UXO from scrap and shrapnel, and that identify the configuration and type of ordnance.

Approach:

- Develop models of electromagnetic, magnetic, Ground Penetrating Radar (GPR) and Chemical signatures of UXOs in representative environmental / geophysical conditions.
- Develop and evaluate enhanced sensors for buried UXO detection / discrimination.
- Develop advanced multi-sensor technologies for false alarm reduction.
- Validate technologies at standard UXO test sites.

Justification:

Multi-sensor approach addresses UXO discrimination focus on AERTA 1.6.a. Decreased false alarm rate reduces number of items to be excavated, thereby reducing removal costs and safety risks.

Geonics EM-63 with GPS positioning, Fort Ord, CA, 2002

Program Schedule

Milestone/Product	FY02	FY03	FY04	FY05	FY06	FY07
Site Characterization and Screening Approaches						
UXO/Sensor Modeling, Analysis and Processing						
Sensor Design and Enhancement						
UXO Multi-Sensor Systems Design						

RDT&E BA1 (61102 BT25) RDT&E BA2 (62720 AF25)
RDT&E BA3 (63728 D03E) RDT&E BA4 (63779 DO4E)

Accomplishments:

- Developed validated UXO signature models of emerging sensors to support multi-sensor systems development and improved analysis techniques.
- In FY03, provide technical and performance specifications for an optimized UXO detection/discrimination systems.
- By FY04, transition handheld sensor technologies and advanced discrimination algorithms to users.
- By FY05, demonstrate a 90%-95% probable UXO detection/discrimination system to reduce false alarm rates by 90% (10 false alarm rate decrease from current capabilities) at or above currently achievable Pd (90%-95%).

Environmental Quality Technology Program

Hazard/Risk Assessment of Military Unique Compounds (MUC)

Objective:

Develop an Army Risk Assessment Modeling System (ARAMS) to provide consistent and verifiable procedures to assess human and ecological health risks of Military Unique Compounds (MUC) at Army environmental restoration sites.

Approach:

- Screening-level models and spatially-explicit, comprehensive models of contaminant fate and transport.
- Multi-media exposure pathway assessment with uptake and transfer to environmental endpoints.
- Linked effects databases and options for higher-order effects models.
- Integrated modeling platform reducing time/cost to conduct risk assessments at Army sites.

Justification:

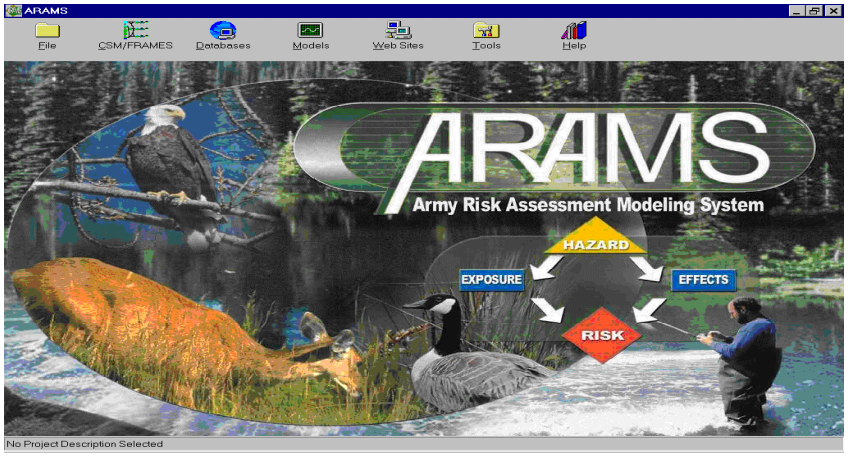
Development of ARAMS (a knowledge model integration tool) provides consistent use of the existing 200 plus risk assessment models described in AERTA requirement 1.1.a and 1.5.g.

Program Schedule

Milestone/Product	FY02	FY03	FY04	FY05	FY06	FY07
Exposure Assessment						
Effects Assessment						
Risk Characterization						

RDT&E BA1 (0601102A H68/S04/T25) DT&RE BA2 (0602720A F25/835)

RDT&E BA3 (0603728A 03E)



Accomplishments:

- Developed final program for Hazard/Risk advanced development and technology demonstration.
- Released version 1.0 of the ARAMS with process descriptors for explosives fate and transport, aquatic explosives uptake, and *in vitro* bioavailability data for humans.
- In FY03, release version 1.1 of the ARAMS with process descriptors for range compounds (propellants, smokes, illuminants) fate and transport, terrestrial explosives uptake, and expand fate/transport and toxicology databases.
- By FY04, complete ARAMS 2.0 with higher order assessment methods, i.e., Geographic Information System based spatially explicit wildlife exposure model and contaminant fate and transport models.
- By FY05, complete ARAMS 2.1 with tutorials and case studies of cost effectiveness for enhanced tech transfer.

Environmental Quality Technology Program

Sustainable Army Live-Fire Range Design and Maintenance

Objective:

Provide range risk assessment and management techniques integrating explosive safety, environmental compliance, and natural resources management with the objective of ensuring operational capability of the live-fire training environment. Technologies to be targeted toward range planning, design and maintenance activities.

Approach:

· Identify environmental compliance risk to ranges and develop a functional planning and management protocol for assessment of risk.

· Review doctrinal range designs, military construction, and Objective Force (OF) requirements to evaluate and develop range design components to be implemented to address environmental requirements.

· Develop long-term planning, construction, carrying capacity and operational protocols that will reduce environmental constraints, compliance and maintenance requirements.

Justification:

· Addresses AERTA requirement 2.5.e and will support sustainment of live training capabilities and facilities in the future

Program Schedule

Milestone/Product	FY02	FY03	FY04	FY05	FY06	FY07
Range Risk Assessment Model						
Range Design Specifications						
Munitions Capacity Model						
Range Surveillance Tools						
Demonstration/Validation						
Technology Transfer						

RDT&E BA2 (0602720A 896) RDT&E BA4 (0603779A 04E)
RDT&E BA6 (0605857A M06E)

Accomplishments:

· Developed range risk and design assessment methodology.

· By FY04, complete development of a range design risk assessment model.

· By FY05, identify range design specification requirements and best management practices, incorporating environmental compliance.

· By FY05, complete development of a munitions carrying capacity model for range sustainment.

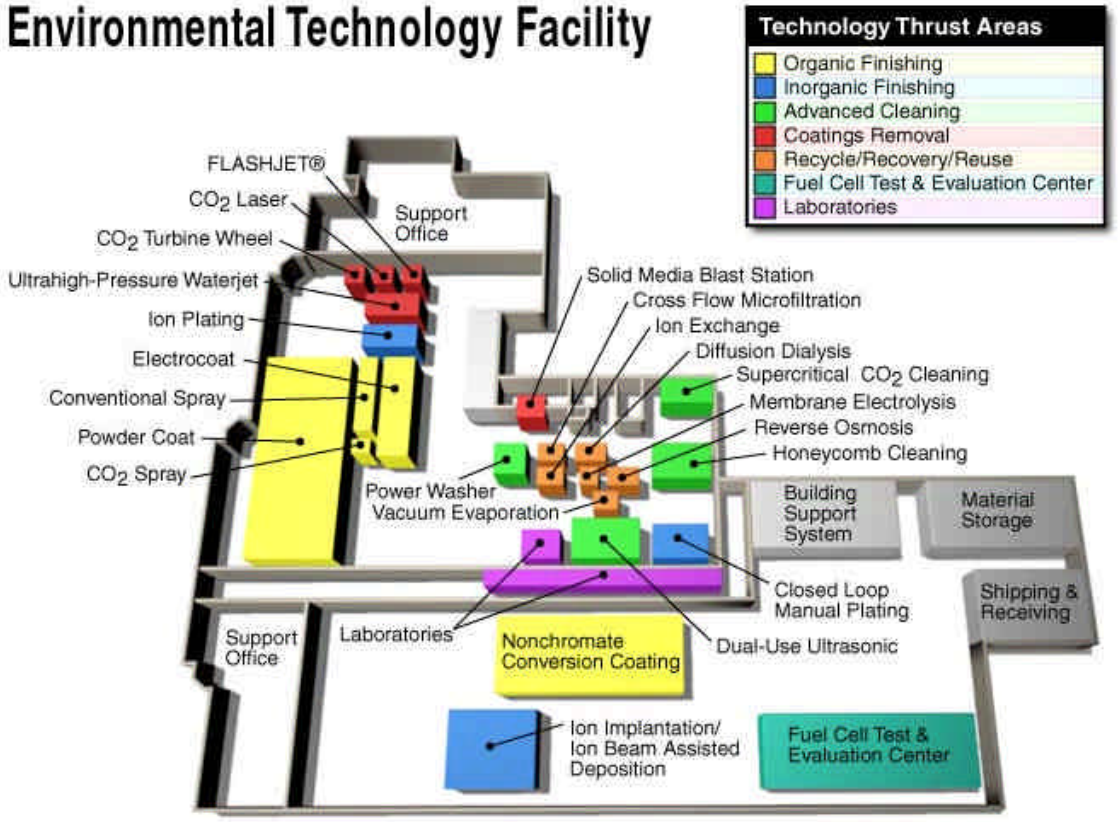
· By FY06, complete demonstration/validation of range design and retrofit packages.

· By FY07, technology transfer of risk, design, and capacity packages into standard range program.

National Defense Center for Environmental Excellence

"Addressing Defense Requirements with Tomorrow's Technology"

Environmental Technology Facility



NDCEE

- Congressionally chartered to facilitate research, development, test and evaluation (RDT&E) from basic research through demonstration, validation and technology transfer of innovative environmental quality technologies aimed at reducing total ownership costs in support of national defense.
- The OASA(I&E) is designated the DoD Executive Agent (EA) for the NDCEE
- EA provides DoD oversight of budget, policy, and execution IAW DOD Approved NDCEE Operating Principles
- UXO technology mission added to NDCEE charter by the National Defense Authorization Act for Fiscal Year 2001, Army UXO technology program funded in FY02 and FY03 for $8 Million

Demanufacturing of Electronic Equipment for Reuse and Recycling (DEER2)

Objectives:

- Explore new methods and improve existing technologies and processes for the reuse, recycle, or disposition of End-of-Life electronic equipment used by the Department of Defense and Federal Agencies at the DEER2- Demanufacturing Technology Center (DTC).

Justification:

Recovery of electronic equipment/parts and materials will:

- Reduce hazardous material and waste in DoD facilities (presently discards greater than 30 million pounds/yr of electronics).
- Reduce future procurement costs and landfill disposal costs for electronic equipment (anticipate $1M/yr in recycling fees returned to government and $300K/yr in HW disposal costs avoided).
- Comply with regulatory requirements; (i.e., Executive Order 13101).

Demanufacturing Technology Center, Largo, FL

Program Schedule

Tasks/Milestones	FY02	FY03	FY04
Project Management Plan			
Technology Transfer			
Exploration			
Implementation/Operation/Demo.			
Task Closure			

Approach:

- Address additional demanufacturing subtasks identified by the Mission Need Statement and make improvements to existing technologies demonstrated and validated by Task N.228.
- Transition results and technologies to DoD and industry sites.

Accomplishments:

- Developed project management plan (FY02).
- Revise and update mission need statement (FY02/03).
- Deliver Information Reports (FY03).
- Deliver Module TDP/O&M Manuals updates (FY03).
- Transfer System Modules (FY03).
- Deliver System TDP/O&M Manual update and Final Report (FY03) .
- Train Lone Star Army Ammunition Plant personnel on use of the equipment (FY03).
- Transition the system to Lone Star Army Ammunition Plant (FY03).

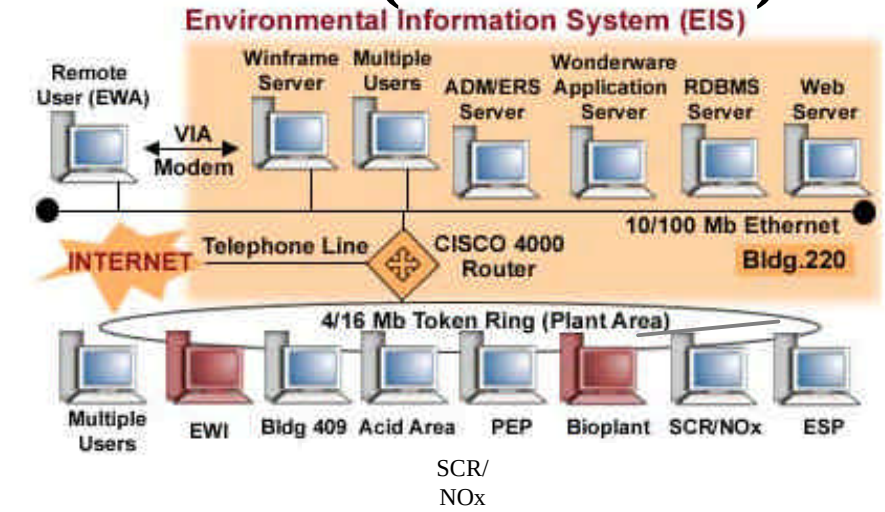
Managing Army Technologies for Environmental Enhancements (MANATEE)

Objective:

- Further develop and enhance the module-based environmental management system implemented at Radford Army Ammunition Plant (RFAAP) under Tasks N.125 and N.225 RFAAP Environmental Development and Management Program (REDMAP).

Justification:

- The results of this task will improve the environmental posture at RFAAP as well as improve the efficiency of the production process by increasing the recovery and reuse of process chemicals, which will lower production costs.



SCR/
NOx

Schedule:

Tasks/Milestones	FY02	FY03	FY04
Project Management Plan			
Kickoff Meeting			
Control Systems Upgrades (7 subtasks)			
Ethanol Mass Balance			
Distillation Column Study/Ugrade Design			
Biodegradation of Propellant Constituents			
Pictorial Record			

Approach:

- Designed to reduce the risk sometimes associated with implementing new technologies. It consists of six key elements that form the backbone of virtually all NDCEE tasks. These elements are: Baseline Analysis, Identify Alternatives, Technology Demonstration, Technology Justification, Technology Implementation, and Follow-up.
- The MANATEE Team includes: Office of the Deputy Assistant Secretary of the Army - Environmental Safety and Occupational Health - Executive Agent Team, Radford Army Ammunition Plant, and the NDCEE.

Accomplishments:

- Complete the Project Management Plan (FY03).
- Prepared a systems design paper (FY03).
- Upgrade the control systems (FY03).
- Complete the ethanol mass balance and distillation upgrade study (FY03).
- Develop a pictorial record (FY03).
- Implement the MANATEE Technologies (FY03).

Non-Hazardous Solid Waste

Objective:

Identify, develop and demonstrate technologies capable of rapid, on-site volume reduction, conversion, decomposition and/or transformation of waste materials into useful products; achieving a diversion rate (from landfill and incineration) of greater than 40%.

Justification:

The Army has identified Nonhazardous Solid Waste (NHSW) as its top pollution prevention mission need, prompted by Executive Order E.O. 13101, which requires a 40% reduction of landfilled solid waste by 2005; 50% by 2010.

Typical deconstruction at Ft. Ord

Schedule:

Tasks	FY02	FY03
1 Program Management		
2 Solid Waste Research		
3 Deconstruction Evaluation		
4 MSW Demonstration		
5 Engineering Evaluation		
6 Technology Transfer		

Approach:

Construction and Demolition (C&D) Debris:

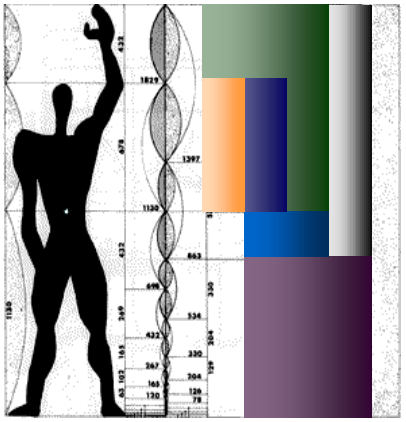
- Categorize Department of Defense (DoD) waste streams, management practices, regulatory barriers and disposal costs.
- Evaluate material recovery technologies for lead-based paint (LBP).
- Develop waste material diversion models through resale, conversion and/ or reuse in new construction.

Municipal Solid Waste (MSW):

- Demonstrate and validate the Bouldin & Lawson (B&L) proprietary waste conversion process performance.

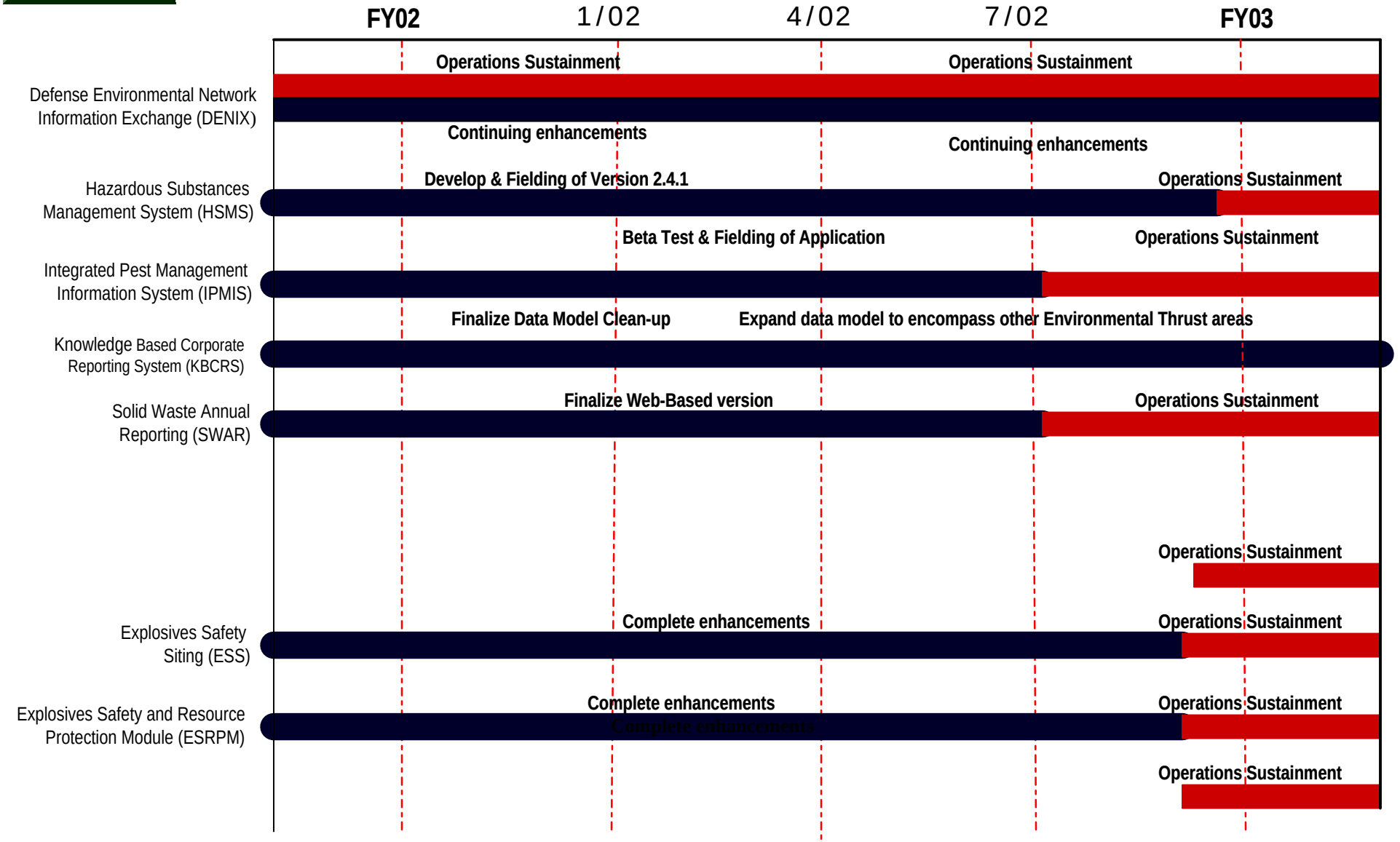
Accomplishments:

- MSW conversion gross feasibility (FY03).
- Mechanical processing of LBP-coated siding (FY03).
- Landfill evaluation for LBP-coated siding (FY03).
- Identification/evaluation of new conversion technologies (FY03).
- Interactive-Technology Transfer products (FY03).



EITM Program

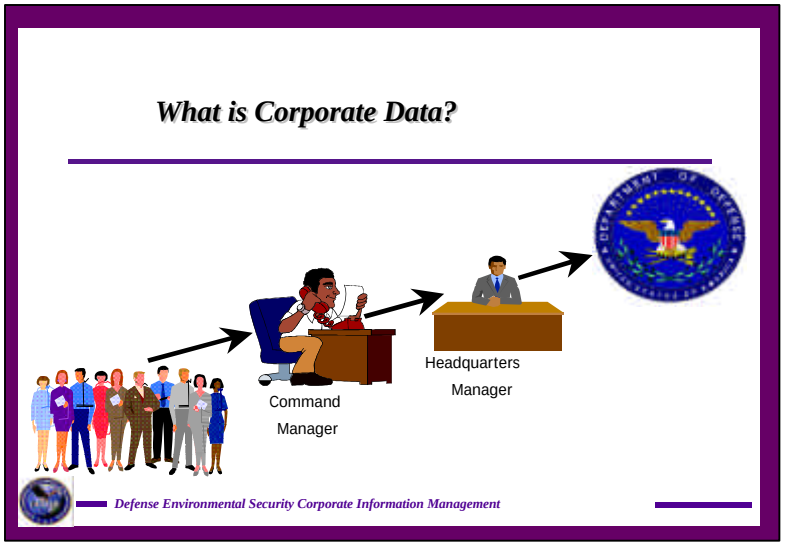
Information Systems Transition Strategy



Overview of Corporate Data

➢ What is corporate data?

- ➢ Information that is passed upward from the various services and agencies through command managers and headquarters managers to the Department of Defense (and beyond).
- ➢ Information that represents the DoD as a whole.



Knowledge-Based Corporate Reporting System

KBCRS Features

- Standardized corporate-level information.
- Streamlined data collection/ no data manipulation
- Powerful tools for information access
- Secure, but accessible from anywhere via web

KBCRS

Access thru DENIX

Congress

OSD

Components

Public

Organization Schematic

EITM

Corporate Systems

Navy

Army

Air Force

DLA

Others

Component Dependent Data Collection

Navy

Army

Air Force

DLA

Others

Knowledge-Based Corporate Reporting System

Filter

KBCRS DB

KBCRS Analysis and Reporting

Congress

OSD

Components

Public

Data Flow Schematic

ESOH Information Technology Management Program

DENIX