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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense-Wide/BA 3							R-1 ITEM NOMENCLATURE Strategic Environmental Research and Development Program PE 0603716D8Z		
COST(In Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	56.513	57.207	51.357	53.346	52.958	53.937	55.055	Continuing	Continuing
SERDP/P470	56.513	57.207	51.357	53.346	52.958	53.937	55.055	Continuing	Continuing

(U) **A. Mission Description and Budget Item Justification**

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U)The Strategic Environmental Research and Development Program (SERDP) was established by Congress in 1990 (10 U.S.C. Section 2901-2904) to address Department of Defense (DoD) and Department of Energy (DOE) environmental concerns. It is conducted as a DoD program, jointly planned and executed by the DoD, DOE, and the Environmental Protection Agency (EPA), with strong participation by other Federal agencies, industry, and academia. SERDP's objective is to improve DoD mission readiness by providing new knowledge, cost-effective technologies, and demonstrations in the areas of environmental cleanup, compliance, conservation, and pollution prevention. SERDP does this by (1) addressing high priority, mission- relevant, defense environmental technology needs necessary to enhance military operations, improve military systems' effectiveness, enhance military training/readiness, and help ensure the safety and welfare of military personnel and their dependents; and (2) enhancing pollution prevention capabilities to reduce operational and life-cycle costs, as well as reducing the cost of necessary cleanup actions and compliance with laws and regulations. As a secondary benefit, SERDP helps solve significant national and international environmental problems. The keys to a growing list of SERDP technological successes are the ability to respond aggressively to these priority defense needs; the pursuit of universal, world-class technical excellence; emphasis on constant technology transfer to field use; and sound fiscal management.

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SERDP/P470	56.513	57.207	51.357	53.346	52.958	53.937	55.055	Continuing	Continuing

(U) **Project Number and Title: P470 SERDP**

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(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) **Pollution Prevention: There are five major focus areas within pollution prevention**

(U) **(1) Next Generation Fire Suppression Technology Program:** This umbrella project seeks to replace Halon 1301 in DoD weapon systems. In FY 1999, this project finalized data on in-flight ullage conditions and completed the development of test methodologies on the toxicity, environmental impact, materials compatibility, and principal degradation products.

(\$ 4.220 Million)

(U) **(2) Elimination and Reduction of Air Emissions:** Ten projects focus on reducing or eliminating hazardous air emissions in the form of Volatile Organic Compounds (VOC), oxides of nitrogen (NO_x) and particulates. These projects range from reformulations of sealants, primers, adhesives and coatings to improved, non-hazardous solvents. A baseline evaluation of Room Temperature Vulcanizing (RTV) silicone formation was developed to assess physical adhesion properties and surface analysis for a replacement of a currently high VOC silane primer. A trapped vortex combustor is showing promise to reduce emissions and conserve fuel. Reduction of VOCs and elimination of hazardous air pollutants and toxic solvents has been demonstrated by a low VOC chemical agent resistant coating system.

(\$ 6.414 Million)

(U) **(3) `Green Energetics`:** Four projects are designed to reduce the environmental impact of explosives and propellants. They span from the reformulation of small caliber ammunition to eliminate the lead, to the elimination of hazardous material from propellants and explosives. Successes include: 1) a cylindrical Magnetron Sputtering Process that replaces the aqueous electrodeposition process using hexavalent chrome, a known carcinogen; 2) a non-lead propellant that was successfully tested in a rocket motor case; and 3) over 800 thousand `green` bullets passed Lot Acceptance Test at Lake City Army Ammunition plant.

(\$ 3.714 Million)

(U) **(4) Elimination of Chromium:** Chromium is used extensively in both coatings and sealants due to its corrosion protection and durability. However, hexavalent chromium is a carcinogen and creates an environmental hazard. Three projects, dedicated to the elimination of chromium in a variety of applications from hard chrome plating to sealants, adhesives, and coatings were started in FY99. Research spans from elucidating basic mechanisms to reformulations of products to eliminate the chromium. The most promising Sol-Gel chemistry for Aluminum, Titanium, and steel alloys were identified.

(\$ 2.134 Million)

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(U)(5) **Elimination or Reduction of Hazardous Materials:** The handling and disposal of hazardous materials is a costly and time-consuming process. Six projects are designed to eliminate or reduce the production of hazardous materials in the operation and maintenance of weapons systems. Technologies, such as new depainting and stripping processes, extraction and recycling, can radically reduce the volume of hazardous materials. Development of non-hazardous substitute materials, which perform equal to or better than the original, is another focus of these projects. Two projects were completed in FY99 in this subthrust. An inert supercritical fluid solvent allows for the extraction and recycling of propellant. A precision targeting process provides a standardized procedure for comparative risk reduction associated with pesticides.

(\$ 2.717 Million)

(U) **Cleanup:** There are 5 high priority areas within cleanup thrust area. This includes four National Environmental Technology Test Sites (NETTS) which facilitate the demonstration and validation of technologies prior to commercialization.

(U)(1) **Unexploded Ordnance (UXO) Detection:** Eight projects aim to improve UXO detection capability, which is the highest priority within the SERDP Cleanup Technology Thrust Area. Efforts focused on development and integration of multi-sensors and data fusion software for the location, identification, discrimination, and delineation of UXOs. In FY 1999, three new efforts were initiated to address innovative UXO discrimination techniques. Phenomenological modeling and development of single-sensor signal processing algorithms to identify which type of detection sensors were successfully developed to identify buried UXO. These models are capable of modeling EMI, radar, and seismic responses from objects with arbitrary shape and orientation in arbitrary, multi-layered environments. The results of the modeling will be used in developing optimal detectors to identify UXO at DoD sites. Harmonic radar was shown capable to remotely detect and locate surface and shallow-buried UXO. A new data analysis system (i.e. data fusion), completed this year, reduces target analysis time by up to 50 percent.

(\$ 4.139 Million)

(U)(2) **Dense Non-Aqueous Phase Liquid (DNAPL) Detection and Remediation (non-bio):** DNAPLs are among the most difficult materials to detect in the subsurface and remediate. They are a common contaminant at almost every DoD site due to their widespread use as cleaning solvents. Seven projects are focused on physico-chemical remediation techniques. All biological remediation projects are covered under the bioremediation subthrust. Source removal, real-time detection using negative ion sensors, geophysical sensors, barriers, and tracer tests are the foci of the non-bio DNAPL detection and remediation projects subthrust.

(\$ 4.308 Million)

(U)(3) **Risk Assessment and Standards:** One of the most pressing issues in cleanup is `how clean is clean`. To determine this, four projects are focusing on the risks to humans, animals, plants and ecosystems associated with military compound. During FY 99 dose-response information was generated using genosensors and conducting whole-organism bioassays for such military-relevant compounds such as explosives (TNT, RDX, HMX), other organics (PCB/PAH), and metals (Pb). Preliminary results indicate relatively low whole organism toxicity for RDX and HMX in comparison to the TNT degradation products TNB and DANT.

(\$ 3.059 Million)

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(U)(4) **Bioremediation:** Six projects focus on bioremediation. The largest effort is a continuing umbrella project that represents a collective research initiative by several key government and academic organizations supporting the development of bioremediation treatment technologies. The research objective for this umbrella project is to develop field implementable, cost effective biotreatment processes for remediation of predominant DoD contaminants. Other bioremediation projects include foci such as: bioenhanced in-well vapor stripping, monitoring and maintenance of in-situ bioremediation, barrier systems, and aerobic cometabolic systems.

(\$ 4.577 Million)

(U) (5) **DoD National Environmental Technology Test Sites (NETTS) Program:** This continuing project facilitates transfer to field use of new, innovative, cost savings cleanup technologies. Four operational test sites (Dover AFB, McClellan AFB, NCB Port Hueneme, and former Wurtsmith AFB) hosted fifteen field tests and demonstrations of innovative remedial and site characterization technologies.

(\$ 2.654 Million)

(U) **Compliance:** The Compliance Thrust Area supports waste treatment and disposal, environmental monitoring and environmental management that is not directly related to site restoration but is meeting current and future environmental compliance requirements of DoD and DOE. There are 3 major foci within the Compliance thrust area in FY99. Reduction of Air emissions is the primary focus of this thrust area.

(U) (1) **Reduction of Air Emissions:** Nine projects deal with the control of the emission of Volatile Organic Compounds (VOC), the oxides of nitrogen (NOx) and particulate matter. Applications to detect contaminants and control them in jet engine test cells and tactical vehicle paint booths are emphasized. Four projects were completed in FY99. Successes include: 1) a portable apparatus capable of detecting major and minor air pollutants with a greater than trillion-to-one dynamic range and part-per-quadrillion sensitivity, 2) a non-thermal plasma reactor for air emission control, 3) laser-based sensors for VOC/NOx and metal emission monitoring, and 4) membrane-mediated extraction and biotreatment of VOCs.

(\$ 5.542 Million)

(U)(2) **Demilitarization and Deconstruction of Conventional Weapons:** Two continuing projects develop environmentally benign processes for the destruction of explosives in conventional weapons. One involves the use of enzymes to degrade energetic materials and the other uses hypergolic chemical which neutralizes the energetic materials and precludes a detonation. Results indicate that organic amines react with TNT, RDX and Composition B at low temperatures leading to the safe breakdown of the explosive material without detonation. Two patents, one for `Combined Enzymatic and Microbial Method for Destruction of Explosives,` and another for `Method for Transformation of Nitroaromatics by Redox Enzyme` were submitted.

(\$ 0.921 Million)

(U)(3) **Characterization and Treatment of Waters and Sludges:** Five projects address the characterization and treatment of waters and sludges. One project was completed in FY99 and resulted in reaction models based on newly developed oxidation rates for common organic compounds in supercritical water. Technologies being developed include: electrochemical advanced oxidation, nanofiltration membranes, thermal controls, and biodegradation. These technologies are being applied to shipboard wastes, oil/water separators, combustors, bioreactors, SCWO reactor skids, and other prototype water and sludge treatment units.

(\$ 2.361 Million)

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(U) **Conservation:** There are 4 focus areas in the Conservation thrust area in FY99. The majority of the efforts in conservation address the assessment and mitigation of military impacts on DoD lands.

(U) **(1)Assessment and Mitigation of Military Impacts:** Ten projects, two completed this year, provide tools and methodologies for assessing and mitigating the adverse impact of military training and testing on DoD's natural and cultural resources. These projects require a knowledge of military operations and natural/cultural resource management issue such as species migration, biodiversity, noise impacts, fragmentation, plant resiliency, reclamation techniques. Especially pertinent to DoD's requirements are impacts effecting threatened and endangered species and marine mammals. Successes include: 1) the development of satellite telemetry technology to provide previously unattainable natural history information on wildlife, and 2) the development of an environment risk assessment and improved operational model that helps to minimize the effects from releasing military training smoke on the threatened and endangered Red-cockaded Woodpecker.

(\$ 5.492 Million)

(U)**(2) Ecological Modeling and Simulation:** Modeling and simulation play a key role in the development of natural resources management plans. Three efforts in ecological modeling and simulation and an analysis of the errors inherent in the models are included in this segment. Imagery data were acquired and preprocessed at Fort Bliss, TX, and Camp Williams, UT, and initiated development of a biophysical model/site water balance to support military training and testing carrying capacity modeling and simulation was initiated. The development of habitat fragmentation effective area model for vertebrate and invertebrate was initiated also.

(\$ 1.329 Million)

(U)**(3) Ecosystem Management:** This represents a major new initiative beginning in FY 1999. The objective is to develop the scientific understanding of ecosystem processes on military lands that will permit the sustainable use of these lands. Centered at Ft. Benning, GA, this initiative in FY99 focused first on the development of indicators of ecosystem health and thresholds of ecosystem damage. An ecosystem characterization and monitoring design document was developed and 3 research projects have been initiated to determine ecosystem indicators of ecological change at the military installation and surrounding community.

(\$ 2.932 Million)

(U) **FY2000 Plans:**

(U) **Pollution Prevention:** There are five major focus areas within pollution prevention. Elimination and reduction of hazardous air emissions is the primary emphasis of the pollution prevention thrust area in FY00.

(U)**(1) Next Generation Fire Suppression Technology Program:** This umbrella project seeks to replace Halon 1301 in DoD weapon systems. In FY 2000, this project will finalize data on the toxicity, environmental impact, materials compatibility, and principal degradation products of candidate replacements.

(\$ 4.199 Million)

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(U)(2) **Elimination and Reduction of Air Emissions:** Nine continuing projects focus on reducing or eliminating hazardous air emissions in the form of Volatile Organic Compounds (VOC), oxides of nitrogen (NOx) and particulates. These projects include reformulations of sealants and coatings to improved, non-hazardous solvents. The initial development of the improved combustor for turbine engines will be completed. A new family of polymer-matrix, composite, manufacturing and repair technologies are being developed in the hopes of reducing emissions from adhesive bonding operations. Through the identification of various mechanisms of military coating degradation, performance criteria are being defined to help eliminate unnecessary repair or replacement of coatings, a significant source of hazardous air emissions.

(\$ 6.237 Million)

(U)(3) **Green Energetics`:** Three continuing projects are designed to render the manufacture of explosives and propellants environmentally benign. They address elimination of solvents from the manufacturing process for solid propellants and elimination of toxic materials from small caliber ammunition. Two of these projects will be completed in FY00. Work on a solventless binder for energetic materials and recycling of propellants will be completed.

(\$ 2.879 Million)

(U)(4) **Elimination of Chromium:** Three continuing projects are dedicated to the elimination of chromium in a variety of applications. Research spans from elucidating basic mechanisms of chromium protection to development of new application processes. Three new start projects will begin to develop advanced alternative coatings and processes to replace chromium.

(\$ 4.078 Million)

(U)(5) **Elimination and Reduction of Hazardous Materials:** Four continuing projects are designed to eliminate or reduce the production of hazardous materials. Development of technologies, which permit inspection of aircraft structures without removing the coating, will significantly reduce the volume of waste material generated. One project will be completed in FY00. This will result in a method to successfully recycle hazardous cleaning rags using a liquid carbon dioxide fabric cleaning technology. Two new starts are anticipated to focus on corrosion protection to reduce the hazardous materials associated with the use of cadmium in the manufacturing of structural steels (i.e., coatings).

(\$ 2.121 Million)

(U)**Cleanup:** There are 5 high priority areas within cleanup thrust area. This includes four National Environmental Technology Test Sites (NETTS) which facilitate the demonstration and validation of technologies prior to commercialization.

(U)(1) **Unexploded Ordnance (UXO) Detection:** Five continuing efforts are focused on improvement of UXO detection capability. Two new start efforts will begin to look at a variety of innovative methods to detect and identify UXO. One involves an acoustic technique, and the other a ground penetrating radar technology.

(\$ 2.872 Million)

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(U)(2)**DNAPL Detection and Remediation (non-bio):** DNAPLs are among the most difficult materials to detect in the subsurface and remediate. They are a common contaminant at almost every DoD site due to their widespread use as cleaning solvents. Seven projects are focused on primarily a physio-chemical remediation technique. All biological remediation projects are covered under the bioremediation subthrust. Source removal, real-time detection using negative ion sensors, geophysical sensors, barriers, and tracer tests are the foci of the non-bio DNAPL detection and remediation projects subthrust. Two projects will be completed in FY00. Anticipated successes include: 1) development of high-resolution 3-D images of geological structures and DNAPL in the subsurface, and 2) development of a radiochemical technique for making tagged tracers.

(\$ 2.936 Million)

(U)(3) **Risk Assessment and Standards:** One of the most pressing issues in cleanup is `how clean is clean`. To determine this, four continuing projects are focusing on the risks to humans, animals, plants and ecosystems associated with military compounds. Three of these projects will be completed in FY00. Anticipated successes include: 1) development of simulators for insitu remediation evaluations, 2) data bases to access the risks from mixed exposure to DCA and TCA, and 3) assessments of soil microbes to exposure of genotoxic agents. Two new projects address bioavailability of metals in soils to support new soil toxicity standards.

(\$ 3.474 Million)

(U)(4)**Bioremediation:**Five continuing projects are addressing bioremediation. The largest continuing effort is a umbrella project that represents a collective research initiative by several key government and academic organizations supporting the development of bioremediation treatment technologies. The research objective is to develop field implementable, cost effective biotreatment processes for remediation of predominant DoD contaminants. The demonstration of a bioreactor to treat PAHs and the in situ biotreatment of PCE/TCE will be completed. Additionally, new start projects will be address in-situ bioremediation of perchlorate, transformation of Cis-DCE and VC and Fe(O)-based bioremediation of RDX-contaminated aquifers.

(\$ 6.641 Million)

(U)(5)**DoD National Environmental Technology Test Sites (NETTS) Program:** Continuing project facilitates transfer to field use of new, innovative, cost savings cleanup technologies. 4 operational test sites (Dover AFB, McClellan AFB, NCB Port Hueneme, and former Wurtsmith AFB) plan to host over 20 field tests and demonstrations of innovative remedial and site characterization technologies.

(\$ 2.370 Million)

(U)**Compliance:** The Compliance Thrust Area supports waste treatment and disposal, environmental monitoring and environmental management that is not directly related to site restoration but is meeting current and future environmental compliance requirements of DoD and DOE. There are 4 major foci within the Compliance thrust area in FY00. FY00 brings the close of demilitization efforts and the beginning of a new focus, the support of developing regulations, rules and standards through scientific study.

(U)(1) **Reduction of Air Emissions:** Six continuing projects are developing detection and control technologies for the emission of contaminants. Plasma assisted catalyst control work will be completed along with a ultra broadband radiation technique to remotely sense hazardous air pollutants.

(\$ 3.315 Million)

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(U)(2) **Demilitarization and Deconstruction of Conventional Weapons:** There are 2 completing projects to develop environmentally benign processes for the destruction of explosives in conventional weapons. These are the last projects dealing with demilitarization that will be funded by SERDP.
(\$ 0.927 Million)

(U)(3) **Characterization and Treatment of Waters and Sludges:** Four continuing projects address characterization and treatment of waters and sludges. Technologies being developed include: electrochemical advanced oxidation, nanofiltration membranes, thermal controls, and biodegradation. These technologies are being applied to shipboard wastes, oil/water separators, combustors, bioreactors, SCWO reactor skids, and other prototype water and sludge treatment units. An electrochemical advanced oxidation process and a composite nanofilter membrane are the anticipated results of this subthrust for FY00.

(\$ 2.406 Million)

(U)(4) **Scientific Support for Proposed Regs/Rules/Standards:** This subthrust initiated in FY00 provides scientific support of regulations, rules and standards that are in the process of being developed. Six new starts in FY00 are planned in the areas of fate and impact of energetics on training and testing ranges, and fate and impact of copper and zinc in harbors and estuaries. These projects support the proposed Range Rule and the Uniform National Discharge Standards.

(\$ 2.089 Million)

(U) **Conservation:** There are 4 central themes to the Conservation thrust area. In FY00, two new research category will emerge to address the pressing issues of cultural resource management and invasive species.

(U) **(1) Assessment and Mitigations of Military Impacts:** Seven continuing projects are developing tools and methodologies for assessing and mitigating the adverse impact of military training and testing on DoD's natural and cultural resources. These projects require a knowledge of military operations and natural/cultural resource management issues such as species migration, biodiversity, noise impacts, fragmentation, plant resiliency, reclamation techniques. Especially pertinent to DoD's requirements are impacts effecting threatened and endangered species and marine mammals. Three of the seven projects will be completed in FY00. Anticipated successes include: 1) a risk assessment framework for natural and cultural resources, 2) an analysis of impacts on biodiversity for the Mojave Region, and 3) data and tools for assessing the impact of noise on marine mammals.

(\$ 4.813 Million)

(U)(2) **Invasive Species:** This is a new subthrust that is being initiated by four new start projects. These projects are developing techniques to enhance monitoring, prediction and control of invasive species on DoD lands. Noxious weeds, western rangeland grasses, knapweed, cheatgrass, and garlic mustard are being addressed.

(\$ 1.518 Million)

(U)(3) **Ecological Modeling and Simulation:** Modeling and simulation play a key role in the development of natural resources management plans. Two continuing efforts that are addressing the error and uncertainty in ecological modeling and simulation are included in this subthrust.

(\$ 0.679 Million)

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(U)(4) **Ecosystem Management:** The largest effort in this subthrust is the major initiative which began in FY98. This umbrella project continues to develop the scientific understanding of ecosystem processes on military lands that will permit the sustainable use of these lands. Centered at Ft. Benning, GA, this initiative is focusing on the development of indicators of ecosystem health. In FY00, two new starts will address thresholds of ecosystem damage. Another ecosystem management project, which is being included in this subthrust starting in FY00, addresses ecosystem fragmentation and restoration. Additionally, three one-year efforts, which are directed towards the identification of indicators of ecological health, will start in FY00.
(\$ 3.653 Million)

(U) **FY2001 Plans:**

(U)**Pollution Prevention:** There are five major focus areas within pollution prevention

(U)(1) **Next Generation Fire Suppression Technology Program:** This continuing umbrella project seeks to develop a replacement for Halon 1301 through development of 1) alternative technologies, 2) new mechanisms of flame extinguishment, and 3) suppression optimization for candidate technologies.
(\$ 3.953 Million)

(U)(2) **Elimination and Reduction of Air Emissions :** Eight continuing project focus on reducing or eliminating hazardous air emissions in the form of Volatile Organic Compounds (VOC), oxides of nitrogen (NOx) and particulates. One project is expected to be completed in FY01, resulting in an innovative non-polluting composites remanufacturing and repair for military applications. At least two new projects will focus on reducing particulate matter emission from military gas turbine engine applications.
(\$ 7.391 Million)

(U)(3) **Green Energetics`:** Research will continue to develop and assess new, less toxic and volatile propellants, explosives, and associated weaponry materials. The `Green Barrel` program will be completed in FY01, resulting in a PVD technology for the application of environmentally safe coatings for gun barrel bore protection.
(\$ 0.847 Million)

(U)(4) **Elimination of Chromium:** Six continuing projects are dedicated to the elimination of chromium in FY 2001. The development of Sol-Gel technology to replace chromated sealant and primers will be completed. Additionally, the process parameters for selected material coating control sensors and algorithms will be developed for depositing coatings. This process will replace chrome electroplating.
(\$ 4.276 Million)

(U)(5) **Elimination or Reduction of Hazardous Materials:** Five continuing projects are designed to eliminate or reduce the production of hazardous materials. Technologies to replace current toxic aircraft deicing fluids will be completed. Additionally, new indicators for cleaning verification will be developed. Three potential new starts will address composite structures, ceramic materials and primer/igniter systems.
(\$ 1.063 Million)

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(U)Cleanup: There are 5 high priority areas within the cleanup thrust area. This includes four National Environmental Technology Test Sites (NETTS) which facilitate the demonstration and validation of technologies prior to commercialization.

(U)(1) Unexploded Ordnance (UXO) Detection: There are 5 continuing efforts to improve UXO detection capability, all of which will be completed. Anticipated successes include: 1) the development of a low frequency ultra-wideband boom synthetic aperture radar for remote detection, 2) a seismic detection system, 3) a process for using multisensor array data for UXO discrimination, 4) a mid-frequency electromagnetic induction process, and 5) a statistical signal process using physic-based models. At least four new start projects will focus on statistical sampling methods and data processing. (\$ 2.945 Million)

(U)(2) Site Characterization: This is a new subthrust focusing initially on optimization of long-term groundwater monitoring systems. It will be initiated with a one-year scoping project. (\$ 0.115 Million)

(U)(3) Risk Assessment and Standards: Three continuing projects address the risk of DoD related environmental contaminants to individuals and populations, and bioavailability of metals in soils to support new soil toxicity standards. Two projects should be completed in FY01 resulting in the development of a mode of action to assess health risk from chemical/physical agents, and a biological assessment for characterizing contaminant risk. Four new projects are anticipated in FY01 that consider characterization of contaminated marine sediments for in-situ remediation and development of ecological soil screening levels. (\$ 3.937 Million)

(U)(4)Bioremediation : Nine continuing projects address bioremediation. The continuing umbrella project, `From Flash to Field`, will be completed this year. Two other projects also will be completed. Anticipated successes include: 1) biotreatment `toolbox`, 2) effective aerobic cometabolic systems for chlorinated solvent mixtures, and 3) microbial consortia and individual bacterial isolates capable of perchlorate degradation. At least, four new projects are anticipated under this research category to address microbial processes for the degradation of nitroaromatic contaminants. (\$ 4.267 Million)

(U)(5) Physio-chemical Remediation: Five continuing projects, originally listed under the DNAPL subthrust area, will be completed in FY01. These projects address DNAPL detection and remediation through source removal, real-time monitoring, and barriers. Two new start projects are anticipated. They will address physio-chemical, in-situ remediation of contaminated sediments and enhanced in-situ mixing of contaminants and chemical/biological additives. (\$ 2.454 Million)

(U)(6)DoD National Environmental Technology Test Sites (NETTS) Program: Continuing project facilitates transfer to field use of new, innovative, cost savings cleanup technologies. Over 20 field tests and demonstrations are anticipated in FY01. (\$ 2.040 Million)

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(U)Compliance: The Compliance Thrust Area supports waste treatment and disposal, environmental monitoring and environmental management that is not directly related to site restoration but is meeting current and future environmental compliance requirements of DoD and DOE. There are 3 major foci within the Compliance thrust area. The work in Demilitarization has ended, and work on fate and impact of contaminants started in FY 00 is continuing.

(U)(1) Reduction of Air Emissions: There are 4 continuing projects dealing with the control of the emission of Volatile Organic Compounds (VOC) and particulate matter, all of which will be completed. At least, two new start projects are anticipated in this year to address toxic release inventory air emission from DoD munitions.
(\$ 3.107 Million)

(U)(2)Scientific Support of Proposed Regs/Rules/Standards: Two continuing projects support the proposed Range Rule and the Uniform National Discharge Standards. This work involves defining the source term for energetics on military ranges and examining the fate and transport of zinc and copper in harbors and estuaries. Over four new starts are expected in this subthrust to support proposed regulations addressing regional haze as well as continued support for the proposed Range Rule.
(\$ 3.436 Million)

(U)(3) Characterization and Treatment of Waters and Sludges: Two completing projects address Oil/Water separator sludges and wastewater. Anticipated successes include: 1) a highly compact and high performance combustion system, and 2) a microbial consortia for the treatment of bilge water. At least, one new start effort is anticipated to address non-point source runoff at military installations.
(\$ 1.730 Million)

(U)Conservation: There are 4 central themes to the Conservation thrust area. Assessment and mitigation of military impacts on DoD lands continues to be emphasized. There are 6 new starts planned in FY 01.

(U)(1) Assessment and Mitigation of Military Impacts: Five continuing projects, four to be completed in FY01, provide tools and methodologies for assessing and mitigating the adverse impact of military training and testing on DoD's natural and cultural resources. These projects require a knowledge of military operations and natural/cultural resource management issues such as species migration, noise impacts, plant resiliency, reclamation techniques. Anticipated successes include: 1) identification of impact of noise on Red-Cockaded Woodpecker, 2) new and novel remote sensing technologies to detect change on military installations, 3) improved units of measure to estimate carrying capacity, and 4) plant resiliency data and information. Three new start projects are anticipated to address the inventory and monitoring of the threatened and endangered species in inaccessible areas, and indicators of stress on threatened and endangered species.
(\$ 4.296 Million)

(U)(2) Ecological Modeling and Simulation: Two efforts addressing error and uncertainty in ecological modeling and simulation will be completed in FY01. These projects will provide the necessary quality control/assurance mechanisms to support DoD's decision support systems regarding natural and cultural resources.
(\$ 0.654 Million)

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense-Wide/BA 3	R-1 ITEM NOMENCLATURE Strategic Environmental Research and Development Program PE 0603716D8Z	

(U)(3) **Ecosystem Management:** The largest effort in this subthrust is the SERDP Ecosystem Management Program which began in FY98. This umbrella project continues to develop the scientific understanding of ecosystem processes on military lands that will permit the sustainable use of these lands. Centered at Ft. Benning, GA, this initiative is focusing on the development of indicators of ecosystem health and thresholds of ecosystem damage. In FY01, this umbrella project will be focusing on the implementation of its long-term monitoring effort, the development of an integrated framework, refinement of the data repository, and continued management of the individual research projects. No new start projects are anticipated under this umbrella project in FY01.

Another ecosystem management project addresses ecosystem fragmentation and restoration will be completed in FY01 and will result in a management model for predicting the effects of ecosystem fragmentation. At least one new start is anticipated to address riparian ecosystem management and restoration.

(\$ 3.447 Million)

(U) (4) **Invasive Species:** Four continuing projects are developing techniques to enhance monitoring, prediction and control of invasive species on DoD lands. Noxious weeds, western rangeland grasses, knapweed, cheatgrass, and garlic mustard are being addressed.

(\$ 1.399 Million)

(U) B. Program Change Summary	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	58.771	53.506	51.729	Continuing
Appropriated Value	0.000	58.506	0.000	Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed Undistributed Reduction	0.000	0.000	0.000	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	(2.258)	(.674)	(.372)	
c. Other	0.000	(.625)	0.000	
Current President's Budget	56.513	57.217	51.357	Continuing

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Change Summary Explanation:

(U) **Funding:** FY 99 funding reductions are the result of reprogramming actions. FY 00 and 01 changes are the result of rescission and inflation adjustments.

(U) **Schedule:** N/A

(U) **Technical:** N/A

(U) **C. OTHER PROGRAM FUNDING SUMMARY COST:** N/A

(U) **D. ACQUISITION STRATEGY:** N/A

(U) **E. SCHEDULE PROFILE:** N/A

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