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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1							R-1 ITEM NOMENCLATURE In-House Laboratory Independent Research (ILIR) PE 0601101D8Z		
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	2.146	2.029	2.007	2.086	2.081	2.123	2.165	Continuing	Continuing
ILIR/P503	2.146	2.029	2.007	2.086	2.081	2.123	2.165	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U)This program element supports basic medical research at the Uniformed Services University of the Health Sciences (USUHS) and provides the only programmed research funds received by the University. This program facilitates the recruitment and retention of faculty, supports state-of-the-art capabilities for training military medical students and resident fellows, and allows the collection of pilot data by the University's faculty researchers. Pilot data allow the faculty to secure research funds from extramural sources (estimated \$25-\$30 million annually). Eighty to 100 intramural research projects are active each year, including 20-25 new starts. Projects are funded on a peer-reviewed, competitive basis. Results from these studies contribute to the fund of knowledge intended to enable technical approaches and investment strategies within Defense Science and Technology (S&T) programs.

(U)The ILIR program at USUHS is designed to answer fundamental questions of importance to the military medical mission of the Department of Defense in the areas of Combat Casualty Care (CCC), Infectious Diseases (ID), Military Operational Medicine (MOM), and Nuclear, Biological and Chemical (NBC) Medical Defense. The portfolio of research projects will vary annually because this research is investigator-initiated. Examples of typical research efforts are:

- Combat Casualty Care: ischemia and reperfusion injury, traumatic brain and peripheral nerve injury, neural control of pain, endotoxemic shock, malignant hyperthermia, inflammation and wound healing.
- Infectious Diseases: immunology and molecular biology of bacterial, viral and parasitic disease threats to military operations. These threats include *E. coli* and their shiga toxins, HIV, HTLV-1, strongyloides, gonorrhoea, streptococcus, hepatitis A, typhoid, influenza A, Venezuelan equine encephalitis (VEE), malaria, and bartonellosis.
- Military Operational Medicine: sustainment of individual performance, deployment and operational stressors, cognitive enhancement, military & medical training readiness.
- Nuclear, Biological and Chemical Defense: basic research questions concerning nerve agent intoxication and treatment.

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<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	2.146	2.029	2.007	2.086	2.081	2.123	2.165	Continuing	Continuing
ILIR/P503	2.146	2.029	2.007	2.086	2.081	2.132	2.165	Continuing	Continuing

(U) **Project Number and Title: P503 ILIR**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U)**Combat Casualty Care:** The objective of this program continues to provide support for a significant number of new and continuing projects in Combat Casualty Care. The program continued to investigate various aspects of wounding and wound healing and the roles that inflammatory mediators play in these processes. Projects to elucidate cellular and molecular mechanisms in endotoxic shock and its treatment are an important area of research. Other major thrust areas included peripheral nerve injury, mechanisms of repair and traumatic brain injury, based on animal models and nerve cells in culture. Included in this program is the investigation of low-power laser therapy to decrease programmed cell death when motor nerves are severed.
(\$ 0.643 Million)

(U)**Infectious Diseases:** This broad area continued to be emphasized within the USUHS; approximately 30 protocols are supported within this area. Militarily relevant bacterial threat agents such as E. coli and its toxins, gonococcus and streptococcus garnered significant available resources. Mobilization of macrophages and antibody production continued to be studied within the context of Venezuelan equine encephalitis. The initiative to study typhoid fever with the development of an animal model continues. Research continued on the study of bartonellosis by examining the vector and the animal reservoir, and by performing studies on the epidemiology of this parasitic disease. Comparison of two inactivated hepatitis A vaccines was completed with the final results impacting the decision for vaccination of military personnel.
(\$ 0.644 Million)

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(U)**Military Operational Medicine:** FY1999 funds supported research in training and military readiness as a critical area within Military Operational Medicine. Training practices and their effects on exertional heat illness of enlisted basic training recruits continued to be examined, as well as the study of the effects of exercise and exertion on the immune system. Studies to determine the effects of stress, nicotine intake and dysfunctional eating habits also continued. New work to delineate neural mechanisms underlying post-traumatic stress disorder (PTSD) was initiated. Studies in animal models of the role of neurotrophins in protecting higher brain functions and reversal of functional deficits by administration of nerve growth factor were begun.

(\$ 0.665 Million)

(U)**Nuclear, Biological and Chemical Medical Defense:** Multiple basic research projects in this threat area were supported. Analysis of the chemical breakdown of different isomers of 1,4 benzodiazepines, such as Valium, and other chiral drugs used as antidotes to central nervous system effects of nerve agent poisoning continue. Study of the pattern of sensory input to the frontal cortex was supported. The organism that exhibits extraordinary resistance to ionizing radiation, *Deinococcus radiodurans*, was examined to better understand what gives it this unique ability. A study was initiated to examine the role of mitochondrial membrane proteins in agent-induced cell death.

(\$ 0.194 Million)

(U) **FY2000 Plans:**

(U)**Combat Casualty Care:** The objective of this program is to provide support for a significant number of new and continuing projects that investigate various aspects of wounding and wound healing and the roles that inflammatory mediators play in these processes. Elucidation of cellular and molecular mechanisms in endotoxic shock and its treatment continue to be important research goals. Other major thrust areas include investigation of injury to and repair of the brain and peripheral nerves using animal models and nerve cells in culture, and identifying the cellular mechanisms behind malignant hyperthermia in order to develop new diagnosis and treatment options. (\$0.428 M)

(U) **Infectious Diseases:** As in previous years, infectious disease is one of the most active fields of research at USUHS. Militarily relevant biological threat agents such as E. coli and its toxins, influenza A, typhoid and HIV all garner significant resources. A three-pronged study of bartonellosis in Peru continues, its primary focus on identification of the disease transmission vectors. A study comparing the neutralizing antibody responses to HIV and VEE is nearing completion, as is comparison of two inactivated hepatitis A vaccines. (\$0.684 M)

(U) **Military Operational Medicine:** New projects supported by FY2000 funds include exploration of factors possibly contributing to the higher incidence stress fractures in women; the role of melanopsin in regulating circadian rhythm; and the neural and endocrine mechanisms that underlie PTSD. Ongoing projects include the investigation of endocrine & immune response to stress and exertion; the interaction between stress and nicotine intake; and the correlation of body composition, dietary options, and activity patterns with dysfunctional eating habits. (\$0.678 M)

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(U) **Nuclear, Biological and Chemical Medical Defense:** Projects initiated in FY2000 focus on health issues related to exposure to chemical warfare compounds, emphasizing development of methods for rapid diagnosis and effective treatment. In addition, work continues on identifying the function of the outer mitochondrial membrane protein in protecting against tissue injury and cell death due to radiation exposure, and on analyzing patterns of sensory input to the frontal cortex, with particular attention to the roles of the dopaminergic system and neocortical cholinergic depletion. (0.239 M)

(U) **FY2001 Plans:**

(U) Efforts will continue in all the major research areas (CCC, ID, MOM, and NBC) for FY2001. Specific projects compete for funding each year, therefore, detailed description of the research is impossible at this time.
(\$ 2.007 Million)

(U) <u>B. Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	2.167	2.033	2.021	Continuing
Appropriated Value	0.000	0.000	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	(.023)	(.004)	(.014)	
c. Other	0.000	0.000	0.000	
Current President's Budget	2.146	2.029	2.007	Continuing

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE In-House Laboratory Independent Research (ILIR) PE 0601101D8Z	

Change Summary Explanation:

- (U) **Funding:** Funding changes are due to inflation reductions and the government wide rescission.
- (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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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1				R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z					
<i>COST (In Millions)</i>	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	220.431	224.016	253.627	217.549	225.520	230.221	235.023	Continuing	Continuing
URI/P103	201.224	199.853	253.627	217.549	225.520	230.221	235.023	Continuing	Continuing
DEPSCoR/P104	19.207	24.163						Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT:**

(U) P103, University Research Initiative (URI). The URI has three primary objectives: (1) to support basic research in a wide range of scientific and engineering disciplines pertinent to maintaining the U.S. military technology superiority; (2) to contribute to the education of scientists and engineers in disciplines critical to defense needs; and (3) to help build and maintain the infrastructure needed to improve the quality of defense research performed at universities. Paralleling these objectives, this project competitively supports programs at universities nationwide in three interrelated categories:

- **Research**. The main thrust of the URI is the multidisciplinary research program of the University Research Initiative (MURI). MURI efforts involve teams of researchers investigating high-priority topics that intersect more than one traditional technical discipline; for many complex problems, this multidisciplinary approach serves to accelerate research progress and expedite transition of results to application. In FY 2001, two additional thrusts are university research for the National Nanotechnology Initiative and for critical military infrastructure protection. The URI also supports the Presidential Early Career Awards for Scientists and Engineers (PECASE), single-investigator research efforts performed by outstanding scientists and engineers early in their independent research careers.

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- Education. The URI promotes graduate education in science and engineering for U.S. citizens through the National Defense Science and Engineering Graduate Fellowship Program.
- Infrastructure. URI support for the development of research infrastructure responsive to defense needs includes two programs in the FY 2001 budget request. The Defense University Research Instrumentation Program (DURIP) allows researchers to purchase more costly items of research equipment than typically can be acquired under single-investigator awards. The URI Support Program (URISP) broadens the base of academic institutions participating in defense research by involving institutions that historically have not received much defense funding. The programs within this project P103 accomplish their infrastructure-building objectives in conjunction with the Defense Experimental Program to Stimulate Competitive Research that is in project P104 of this program element through FY 2000.

(U) P 104, Defense Experimental Program to Stimulate Competitive Research (DEPSCoR). The DEPSCoR helps to build infrastructure for research and education by involving institutions of higher education in states that historically have not received much Federal research funding. It is executed in coordination with state committees formed for the National Science Foundation's Experimental Program to Stimulate Competitive Research. Beginning in FY 2001, the DEPSCoR is moved from project 104 within this URI program element into a new program element (PE 0601114D8Z).

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(U) **PROGRAM ACCOMPLISHMENTS AND PLANS:**

(U) **FY1999 Accomplishments:**

(U) Programmatic accomplishments:

- Research. The FY 1999 MURI competition conducted by the Services resulted in 19 new awards in the following, high-priority areas of multi-Service interest: semiconductor physics; nanolithography; novel optical and infrared materials; biosensors for detection of chemical and biological agents; quantum information physics; propulsion, vacuum microwave electronics; radiation hardening; ionospheric characterization; and computational design of materials. Fundamental advances in these areas will enable the development of new technologies applicable to a broad range of future military systems. The multidisciplinary nature of these areas, and their multi-Service relevance, make them ideally suited for inclusion under the multidisciplinary element of the URI. In addition to the new MURI efforts, multidisciplinary and PECASE programs begun in prior years continued, with new competitive awards for PECASE programs. (\$137.212 Million)
- Education. Under the National Defense Science and Engineering Graduate Fellowship program, 122 new graduate fellowships were competitively awarded for study leading to advanced degrees in science and engineering fields of importance to national defense. (\$15.961 Million)
- Infrastructure. More than 230 new awards were made under the FY 1999 DURIP competition, enabling the purchase of research instrumentation needed to sustain universities' capabilities to perform cutting-edge defense research. Under the URI Support Program, efforts initiated in prior years continued in areas such as electronic and magnetic materials, image analysis, micromanufacturing, and neurodynamics. The FY 1999 competition under the DEPSCoR program resulted in 67 new awards. (\$67.258 Million)

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(U) Selected technical accomplishments:

- Researchers at Purdue University and the University of Southern California, in collaboration with Marconi Integrated Systems, Incorporated, made dramatic improvements in algorithms used to extract information about terrain and urban features from large sets of imagery data in multiple spectral regions. The new techniques that the researchers developed for constructing and managing imagery data enabled them to make full use of the information in hundreds of spectral bands from multiple sensors spanning the infrared to ultraviolet portions of the electromagnetic spectrum; previously available methods exploited only a small number of bands. The researchers also achieved five-fold improvements in registration accuracy, enabling features derived from information in multiple spectral bands to be determined with an accuracy of 1-2m (0.5-1 pixel), compared with previous results of 5-10m (2-4 pixels) for this type of imagery. New methods were developed and demonstrated for automatically extracting urban features such as buildings and, for the first time, road grids, from multiple image sources; this resulted in improved detection rates of the features with much reduced false alarm rates. The researchers derived three-dimensional information by combining the data obtained from the new techniques with terrain elevation data acquired by photogrammetric means, and they created a virtual-reality environment for viewing, analyzing, and verifying the three-dimensional information. This research accomplishment is a significant step in the development of algorithms and tools for generating terrain and urban data that are needed to support military requirements for accurate, consistent, and timely battlefield visualization.
- Researchers from the University of Southern California, University of California at Berkeley, California Institute of Technology, State University of New York at Buffalo, North Carolina State University, and University of Washington developed a new theory that predicts how molecules come together and assemble themselves into structures. The theory is the first to take into account the three-dimensional shape of molecules and the dipole moments that result from the spatial distribution of electrons and nuclei (previous theories treated the dipoles as point charges), as well as the external forces and molecular dynamics that affect molecular self-assembly. Applying the new theory to polymers, the researchers were able to explain anomalies, unique nanoscale topologies, that had been observed in certain polymerization reactions. They also were able to predict that polymers with higher electro-optical coefficients would result if the self-assembled molecules were more spherical in shape. In this way, they designed and made polymers with twice the electro-optical coefficients of previous polymers; photonic devices made from the polymers require less applied voltage to stimulate the same change in refractive index, making it possible to modulate high frequency (up to 100 Gigahertz) signals with drive voltages of less than one volt. This can improve the efficiency of radio frequency links by a factor of more than one hundred. The new polymers can be used in photonic applications such as high speed communications or advanced radar technology using direct radio frequency modulation. The ability to control the self-assembly in a broad range of materials, not just polymers, has a broad range of defense applications in areas that depend on nanoscale structures, such as molecular-scale electronic circuits, ultra-high density memories for data storage, and complex miniaturized machines.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z	

- Computer scientists at the Carnegie Mellon University and University of Pittsburgh developed the first comprehensive system of intelligent software “agents,” which can automate time-consuming tasks that otherwise would require human resources to gather information and make decisions or act on it. The agents are programs that have a certain amount of internal expertise (e.g., knowing how to carry out certain actions or how to get information from certain sources), that operate autonomously to decide when to carry out various tasks or communicate with other agents, that clone themselves when needed and move from one system to another, and that carry out standing orders or report back to a human user when there is something to report. The researchers’ analysis and modeling generated the algorithms, protocols, and languages needed to produce the first system architecture that addresses all aspects of the problem: how agents interact with human users; how they interact with information resources; and how they communicate with each other and the network as a whole, to decide how to optimally apportion among themselves the elements of a complex task. The advantages of this comprehensive approach are that it yields systems that are easy for non-experts to learn to use quickly and that are easily built up in an incremental way, while the system is being used, to larger-scale systems for increasingly complex problems. Prototypes of the system have been used in several applications, including: (1) automating support for technicians at Warner-Robbins Air Force Base, reducing delays in aircraft maintenance due to paper exchanges of information with engineers and logisticians; and (2) tracking of real and simulated forces, including both personnel and equipment, for command and communications aspects of wargames using the Modular Semiautomated Forces simulated battlefield. The long-term value to the military is in getting humans out of the loop for complex but routine tasks that can be performed as well by software agents.
- Scientists at the University of California at San Diego developed novel metallic-intermetallic, laminated composites as model materials for armor design and for possible use in tanks and other systems. The materials are lightweight (less than 4 grams/cm³), easily processed in a laboratory with a mechanical press and inductive heating, inexpensive (created from commercially available foils), and have been demonstrated to stop 7.62-millimeter, small-arms rounds at velocities as high as 870 meters/second. The researchers successfully fabricated materials using several metal combinations, including titanium-aluminum, nickel-aluminum, and stainless steel-aluminum. They also produced advanced composite materials with a thick ceramic phase between intermetallic layers, with ceramic-particulate reinforced layers, and with corrugated interfaces between layers. Each of these advanced materials exhibits unique advantages in ballistic performance, such as the tendency for corrugated, metallic-intermetallic composites to induce rotation in penetrators (thereby dramatically decreasing the depth of penetration into the composite). The scientists are using a unique Eulerian, finite-element, computer model to characterize and predict the deformation and fracture of these materials. The computational work currently is focused on optimizing the number and thicknesses of the laminate layers and the geometries of the interfaces; the goal is to understand the fundamental mechanisms that govern the material’s response to a penetrating projectile. The expected benefits to the DoD are armor materials that are lighter, easier and less expensive to fabricate, and have better ballistic performance than conventional armor designs.

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(U) **FY 2000 Plans:**

- **Research.** A FY 2000 MURI competition is being conducted for new awards in basic research underpinning high-priority areas such as data fusion in microsensor arrays; adaptive learning technology; decision making with information uncertainty; mobile, augmented battlespace visualization; real-time, fault-tolerant communication network protocols; solitonic information processing; quantum communications and quantum memory; artificial intelligence for training systems; adaptive and mobile networks for dynamic environments; phonon enhancement for electronic devices; programmed surface chemical assembly; ultra-cold atom optics; and prime reliant coatings. Multidisciplinary and PECASE programs begun in prior years are continuing, with new competitive awards under the PECASE program. (\$138.542 Million)
- **Education.** A FY 2000 competition is being conducted to award approximately 120 graduate fellowships under the National Defense Science and Engineering Graduate Fellowship Program. (\$15.407 Million)
- **Infrastructure.** FY 2000 competitions are being conducted for new awards under the DURIP and DEPSCoR programs. Efforts begun in prior years under the URI Support Program will continue. (\$70.067 Million)

(U) **FY2001 Plans:**

- **Research.** Topics for the FY 2001 MURI competition will be selected in high-priority basic research areas such as those related to: cognitive performance and training; networks of multiple sensors; compact power sources; smart materials and structures; and intelligent systems for autonomous operations. An initiative will begin to support research in nanoelectronic device physics, nanostructured materials, and nano-biodesives, as part of the National Nanotechnology Initiative. Another initiative will support research in areas related to the protection of critical military infrastructures, such as power grids and command, control, communications, and computer systems. Multidisciplinary and PECASE programs begun in prior years will continue, with new competitive awards under the PECASE program. (\$176.474 Million)
- **Education.** A FY 2001 competition will be conducted to award approximately 190 graduate fellowships under the National Defense Science and Engineering Graduate Fellowship Program. (\$25.032 Million)
- **Infrastructure.** A FY 2001 competition will be conducted for new awards under the DURIP program. Efforts begun in prior years under the URI Support Program will be completed. (\$52.121 Million)

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1		R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z

(U) **ACQUISITION STRATEGY:** Not Applicable

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	228.415	216.778	210.332	Continuing
Appropriated Value		231.378		Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed undistributed reduction	(7.984)			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment		(1.619)		
c. Other (SBIR)		(5.743)	43.295	Continuing
Current President's Budget	220.431	224.016	253.627	Continuing

Change Summary Explanation:

(U) **Funding:** FY 1999 adjustment reflects Congressional undistributed reductions. FY 2000 adjustments reflect inflation savings and the government-wide rescission. Program budget adjustments in FY 2001 include basic research initiatives related to the National Nanotechnology Initiative and critical military infrastructure protection, as well as the transfer of the Defense Experimental Program to Stimulate Competitive Research from this program element to the new PE 0601114D8Z.

(U) **Schedule:** Not applicable.

(U) **Technical:** Not applicable.

(U) **C. Other Program Funding Summary Cost** Not applicable.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z	

(U) D. Schedule Profile Not applicable.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 1							R-1 ITEM NOMENCLATURE Gulf War Illnesses Research PE 0601105D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	22.588	24.543	16.978	16.856	0.000	0.000	0.000	Continuing	Continuing
Gulf War Illnesses Research/P105	22.588	24.543	16.978	16.856	0.000	0.000	0.000	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U)This program of Gulf War Illnesses (GWI)-related research addresses topics relevant to identifying the etiology and treatment of GWI, increasing our understanding of issues pertinent to Force Health Protection, and enhancing the protection of Service members against deployment-related health threats in future deployments. This program is conducted in coordination with the Research Working Group of the Persian Gulf Veterans' Coordinating Board.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 1		R-1 ITEM NOMENCLATURE Gulf War Illnesses Research PE 0601105D8Z

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	22.588	24.543	16.978	16.856	0.000	0.000	0.000	Continuing	Continuing
Gulf War Illnesses Research/P105	22.588	24.543	16.978	16.856	0.000	0.000	0.000	Continuing	Continuing

(U) **Project Number and Title: P105 Gulf War Illnesses Research**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U)In FY 1999, the Department of Defense developed an investment strategy and execution plan to pursue a balanced program of research related to the etiology and treatment of Gulf War Illnesses and to the protection of Service members in future deployments. Specific efforts include the following:

- (U)Competed and selected for funding projects directed to multidisciplinary research to elucidate neurobiology of stress, connecting psychosocial, psychophysiological, and somatic/physiological outcomes in models of nonspecific and undiagnosed symptoms typical of ill Gulf War veterans.
(\$ 4.600 Million)
- (U)Competed and selected for funding projects which advance deployment toxicology bioassay and biosentinel-based detection and exposure assessment methods, particularly strategies to assess neurotoxic health hazards.
(\$ 0.700 Million)
- (U)Competed and selected for funding projects that explore and establish fundamentally important interactions of medical materiel and operational environments, such as stress effects on access to the brain by prophylactic drugs, radio frequency radiation-enhanced toxicity of drugs, stress effects and interactions of multiple vaccines on vaccine effectiveness.
(\$ 3.100 Million)
- (U)Competed and selected for funding epidemiological studies to develop and evaluate effectiveness of health assessment and health care delivery pre-, during, and post-deployment, thus advancing Force Health Protection surveillance strategies in future deployments.
(\$ 1.800 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 1	R-1 ITEM NOMENCLATURE Gulf War Illnesses Research PE 0601105D8Z	

(U)Initiated a 2-year Medical Follow-up Agency (Institute of Medicine) study of Aberdeen personnel previously exposed to low level chemical agents.

(\$ 1.000 Million)

(U)Initiated a new basic research program to develop a Leishmania vaccine and demonstrate feasibility of reliable serological diagnostic tests in a 4-year program conducted by Army and Navy infectious disease research laboratories.

(\$ 1.500 Million)

(U)Initiated program to study antibodies to squalene, related to concerns about vaccine health risks.

(\$ 0.600 Million)

(U)Conducted epidemiological research to complete current Gulf War Illness cohort studies and initiate new efforts at the Naval Health Research Center involving deployment health assessments.

(\$ 1.500 Million)

(U)Competed and selected for funding a congressionally-mandated study of difficult-to-diagnose conditions such as fibromyalgia, chronic fatigue syndrome, and multiple chemical sensitivities, using advanced neuroscience methods.

(\$ 3.000 Million)

(U)Plan studies of DOD and VA Gulf War registry participants in unique opportunity to address hypothesis-driven epidemiological research on deployment health risk factors.

(\$ 1.000 Million)

(U) Provided program management, contract servicing, and supplemental funding to previously funded GWI research studies.

(\$ 3.788 Million)

(U) FY2000 Plans:

(U)Continue projects in neurobiology of stress, deployment toxicology methods, operational interactions of medical materiel, and force health protection epidemiology, and competitively fund new projects to address issues raised by emerging finding from existing research and other discoveries.

(\$ 11.967 Million)

(U)Initiate a 2-year Medical Follow-up Agency (Institute of Medicine) study of prewar healthcare-seeking behaviors of Gulf War veterans and their subsequent health outcomes.

(\$ 0.500 Million)

(U)Continue development of a Leishmania vaccine and demonstrate feasibility of reliable serological diagnostic tests in a four-year program conducted by Army and Navy infectious disease research laboratories.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 1	R-1 ITEM NOMENCLATURE Gulf War Illnesses Research PE 0601105D8Z	

(\$1.500 million)

(U)Continue an expanded Tri-Service epidemiological research effort at the Naval Health Research Center involving deployment health assessments.

(\$ 1.750 Million)

(U)Initiate a program reported as a Defense Technology Objective on health behavior interventions research intended to develop and demonstrate efficacy of programs to enhance deployment readiness.

(\$ 2.000 Million)

(U)Provide program management, contract servicing, and supplemental funding to previously funded GWI research studies.

(\$ 6.826 Million)

(U) FY2001 Plans:

(U)Continue projects in neurobiology of stress, deployment toxicology methods, operational interactions of medical materiel, and force health protection epidemiology, and competitively fund new projects to address issues raised by emerging finding from existing research and other discoveries.

(\$ 10.000 Million)

(U)Continue program on Health Behaviors Interventions Research.

(\$ 2.000 Million)

(U)Continue development of a Leishmania vaccine and demonstrate feasibility of reliable serological diagnostic tests in a four-year program conducted by Army and Navy infectious disease research laboratories.

(\$ 1.500 Million)

(U)Continue an expanded Tri-Service epidemiological research effort at the Naval Health Research Center involving deployment health assessments.

(\$ 1.750 Million)

(U)Provide program management, contract servicing, and supplemental funding to previously funded GWI research studies.

(\$ 1.728 Million)

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(U) <u>B. Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	23.674	19.185	19.098	Continuing
Appropriated Value	0.000	25.185	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	(1.086)	(0.435)	(0.120)	
c. Other	0.000	(0.207)	(2.000)	
Current President's Budget	22.588	24.543	16.978	Continuing

Change Summary Explanation:

(U) **Funding:** FY 1999 establishes a separate PE for Gulf War Illness Research. Funding changes are due to programmatic reductions. FY 2000 reductions are due to inflation adjustments and government wide rescission. FY 2001 reductions are due to programmatic decisions and inflation reductions.

(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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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 1							R-1 ITEM NOMENCLATURE Government/Industry Co-sponsorship of University R PE 0601111D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	4.233	6.175	6.715	6.838	9.627	9.830	9.937	Continuing	Continuing
GICUR/P111	4.233	6.175	6.715	6.838	9.627	9.830	9.937	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U)A shared commitment between industry and Government continues to be created via the Government/Industry Co-sponsorship of University Research (GICUR) program. It will capitalize on university based research, education and training in technologies of strategic importance to national defense and also to industry. It provides an emphasis on ground-breaking research with a long-term horizon, and education and training in selected research areas which are vital to advancement of technologies. The commitment is a jointly formed pool of funding and a shared management structure for sponsoring this sort of long term basic research at universities. This will provide the military with leading-edge technologies as well as reducing vulnerabilities of industries involved, increase long-term technical growth in these areas, infuse new ideas and approaches, all of which are important for national security. Industry and government share responsibility for research focus area selection and overall direction. This program will also employ advances in information technologies and telecommunications to provide extensive connectivity among the partners and research performers from the outset. Thus, strengths of individual investigators can be effectively linked, taking advantage of geographically disbursed national resources. Mechanisms will be established for personnel exchange and interactions to provide for continuing education of highly qualified researchers already working in leading edge and emerging S&T. One program area implemented is on Complex Adaptive Networks. It meets the program criteria and is vital to DoD needs. The high priority thrust in this area is providing powerful mathematical and computer modeling methods to steer technology such that cascading effects and rapid, catastrophic failure of networks (e.g., battlefield com

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 1		R-1 ITEM NOMENCLATURE Government/Industry Co-sponsorship of University R PE 0601111D8Z

<i>COST(In Millions)</i>		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost		4.233	6.175	6.715	6.838	9.627	9.830	9.937	Continuing	Continuing
GICUR/P111		4.233	6.175	6.715	6.838	9.627	9.830	9.937	Continuing	Continuing

(U) **Project Number and Title: P111 GICUR**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) Evaluated operations of first industry-driven consortia, the research programs supported and set further directions. Continued critical research in the Semiconductor Focus Research Initiative. Ongoing research support revolutionary interconnect technology options and improvements in design productivity, quality and cycle time. Initiative was co-sponsored with Microelectronics Advanced Research Corporation (MARCO). Industry provided matching DoD funding 3:1. Selected and awarded two initial university centers (University of California, Berkley in design technology and Georgia Technology for interconnect technology). Began research in the fields of applied mathematics and computation focused on secure operation of complex and interactive networks and systems. The Complex Interactive Network/Systems was co-sponsored with EPRI, Electric Power Research Institute. Industry matched DoD funds 1:1. Performed research consortia lead universities include CAL TECH, Cornell, Carnigie Mellon, Harvard, Purdue and University of Washington, Seattle.
(\$ 4.233 Million)

(U) **FY2000 Plans:**

(U) Continue research through the Semiconductor Focus Research Initiative and the Complex Interactive Network/ Systems projects. For complex adaptive networks, mathematical and computer modeling methods developed will be tested against real world data and situations. For complex circuits, advance design concepts and interconnect schemes will be expressed in prototype devices. For smart structures and smart materials, opportunities will be identified to take concepts and methods achieved and use them in environments which could provide indicators for reliability advances.
(\$ 6.175 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 1	R-1 ITEM NOMENCLATURE Government/Industry Co-sponsorship of University R PE 0601111D8Z	

(U) FY2001 Plans:

(U) Continue research in semiconductor and complex interactive network systems. Theoretical and experimental achievements will be fully documented. Research will continue along lines both needs and opportunity driven, dependent upon success to date.
(\$ 6.838 Million)

(U) <u>B. Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	4.801	6.351	6.762	Continuing
Appropriated Value	0.000	6.351	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	(.568)	(.018)	(.047)	
c. Other	0.000	(0.158)	0.000	
Current President's Budget	4.233	6.175	6.715	Continuing

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 1	R-1 ITEM NOMENCLATURE Government/Industry Co-sponsorship of University R PE 0601111D8Z	

Change Summary Explanation:

(U) **Funding:** FY 1999 changes reflect programmatic adjustments. FY 2000 reductions are due to inflation adjustments and government wide rescission. FY 2001 adjustments are due to inflation savings.

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

(U) **Technical:**

(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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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000			
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1							R-1 ITEM NOMENCLATURE Defense Experimental Program To Stimulate Competitive Research (DEPSCoR) PE 0601114D8Z			
<i>COST (In Millions)</i>	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost	
Total Program Element (PE) Cost	0	0	9.859	9.845	9.826	9.805	9.784	Continuing	Continuing	
DEPSCoR/P104	0	0	9.859	9.845	9.826	9.805	9.784	Continuing	Continuing	

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

(U) **BRIEF DESCRIPTION OF ELEMENT:**

(U) Defense Experimental Program to Stimulate Competitive Research (DEPSCoR). The DEPSCoR is a legislated program that helps build national infrastructure for research and education by funding research activities in science and engineering fields important to national defense. Participation in this program is limited to states that meet eligibility criteria as set forth in the authorizing language. The program is intended to improve the capabilities of institutions of higher education (IHE) to develop, plan and execute science and engineering research that is competitive under the peer-review system. IHEs in eligible states are invited, through their NSF State EPSCoR Committee, to compete for research/infrastructure awards in areas identified by the department in broad agency announcements regularly published by the Services.

(U) DEPSCoR was previously funded in the University Research Initiative Program (PE 0601103D8Z).

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1							R-1 ITEM NOMENCLATURE Defense Experimental Program To Stimulate Competitive Research (DEPSCoR) PE 0601114D8Z		
	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
COST <i>(In Millions)</i>									
Total Program Element (PE) Cost			9.859	9.845	9.826	9.805	9.784	Continuing	Continuing
DEPSCoR/P104			9.859	9.845	9.826	9.805	9.784	Continuing	Continuing

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS:**

(U) **FY1999 Accomplishments:**

(U) Programmatic accomplishments:

- Reported under PE 0601103D8Z

(U) **FY2000 Plans:**

- Reported under PE 0601103D8Z

(U) **FY2001 Plans:**

-
- Research, Education, Infrastructure. FY 2001 competition will be conducted for new awards under the DEPSCoR (\$9.859 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 1	R-1 ITEM NOMENCLATURE Defense Experimental Program To Stimulate Competitive Research (DEPSCoR) PE 0601114D8Z

(U) B. Program Change Summary	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	0	0	0	Continuing
Appropriated Value				Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed undistributed reduction				
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment				
c. Other			9,859	Continuing
Current President's Budget			9,859	Continuing

Change Summary Explanation:

(U) **Funding:** DEPSCoR was previously funded in the University Research Initiative (PE 0601103D8Z). Beginning in FY 2001 DEPSCoR was established as a separate PE.

(U) **Schedule:** Not Applicable

(U) **Technical:** Not Applicable

(U) **C. Other Program Funding Summary Cost** Not Applicable

(U) **D. Acquisition Strategy:** Not Applicable

(U) **E. Schedule Profile** Not Applicable

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA2							R-1 ITEM NOMENCLATURE Medical Free Electron Laser PE 0602227D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	13.930	11.525	15.029	4.634	4.611	4.703	4.796	Continuing	Continuing
MFEL/P483	13.930	11.525	15.029	4.634	4.611	4.703	4.796	Continuing	Continuing

(U) A. Mission Description and Budget Item Justification

(U) BRIEF DESCRIPTION OF ELEMENT

(U)The MFEL program seeks to develop advanced, laser-based applications for military medicine and electronic materials research. Free electron lasers (FELs) provide unique pulse features and tunable wavelength characteristics that are unavailable in other laser devices. Thus, FELs broaden the experimental options for the development of new laser-based medical technologies.

(U) The majority of this program is focused on developing advanced procedures for rapid diagnosis and treatment of battlefield-related medical problems. Specific applications under investigation include soft tissue repair, hard tissue surgery, therapies for thermal and chemical burns, warfighter vision correction, and enhanced medical imaging. Laser applications will be clinically tested in unique program medical centers, leading to Food and Drug Administration (FDA) approval. There is high potential dual use for civilian medicine. Thus far, more than 20 clinical procedures have been developed in several medical specialties, including ophthalmology, orthopedics, thermal and chemical burn repair, and neurosurgery.

(U)A small part of this program is focused on electronic materials research. In this research, the high energy FEL beam is exploited for improved processing applications including more effective microstructure, surface cleaning and modification of transport properties of microelectronic substrates

(U) The program is executed extramurally. Performers include 5 major medical centers and approximately 10 applications groups. Awards are made competitively, following solicitation and peer review, for performance periods of up to 3 years. The program emphasizes the use of interdisciplinary teams of physicians, physicists, biologists, and engineers and collaborative interactions among the major MFEL centers.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA2		R-1 ITEM NOMENCLATURE Medical Free Electron Laser PE 0602227D8Z

<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	13.930	11.525	15.029	4.634	4.611	4.703	4.796	Continuing	Continuing
MFEL/P483	13.930	11.525	15.029	4.634	4.611	4.703	4.796	Continuing	Continuing

(U) **Project Number and Title: P483 MFEL**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U)Research on surgery of the eye and the brain, on monochromatic X -ray imaging, and on improved electronic materials continued at Vanderbilt University. FDA approval was received clearing the way for the first human surgeries to be performed with an FEL in FY2000.

(\$ 3.100 Million)

(U)Research on surgery of the eye, the brain, the skin, nerves and bone continued at Duke University. Performance of the vacuum ultraviolet (UV) laser was enhanced and the preclinical research facility was completed.

(\$ 3.155 Million)

(U)Research on surgical applications of lasers in wound repair, ophthalmic surgery, photodynamic therapy, and burn treatment continued at Mass General Hospital. Collaborations were initiated with the Army Institute of Chemical Defense and the Army Institute of Surgical Research on burn treatment.

(\$ 3.074 Million)

(U)Research on wound sterilization and bone surgery continued at the Beckman Laser Institute. Development of a new polarized light optical computed tomography imaging device for guiding laser usage by burn surgeons continued.

(\$ 1.100 Million)

(U)Research on biomolecular and tissue ablation characteristics of FEL radiation continued at Stanford University, as was research into the effects of FEL radiation on microelectronic and energetic materials.

(\$ 1.950 Million)

(U)Research to develop compact FELs, optical fibers and wave-guides for use in hospitals and battlefield settings continued.

(\$ 1.551 Million)

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA2	R-1 ITEM NOMENCLATURE Medical Free Electron Laser PE 0602227D8Z	

(U) FY2000 Plans:

(U) A competition for medical center awards was conducted during 1999 for awards beginning in FY2000. It is anticipated that the number of centers supported by the program will be reduced in number from five to four. Increased emphasis will be placed upon transition of research products for combat casualty care and military trauma centers by establishing collaborative projects between military medical sites and research centers funded under the program.
(\$ 11.525 Million)

(U) FY2001 Plans:

(U) Newly competed center awards will be in place for their first full year of funding. Emphasis will continue to be on military relevant laser medicine, with increasing focus on endoscopic imaging for rapid battlefield diagnostics and on wound diagnostics and treatment. Studies of the special problems created by laser vision correction, created by a variety of special demands of military operations, will be enhanced, as will means to alleviate such problems. Military relevant medical procedures introduced under this program will continue to be evaluated by, and transferred to military medical centers, and the special capabilities and facilities available at such centers will be used extensively.
(\$ 15.029 Million)

(U) <u>B. Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	14.496	9.719	9.698	Continuing
Appropriated Value	0.000	12.000	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	(.566)	(.177)	(.069)	
c. Other	0.000	(.298)	5.400	
Current President's Budget	13.930	11.823	15.029	Continuing

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA2	R-1 ITEM NOMENCLATURE Medical Free Electron Laser PE 0602227D8Z	

Change Summary Explanation:

(U) **Funding:** FY 1999 reflects adjustments for reprogrammings. FY 2000 adjusts the program for inflation. FY 2001 reflects adjustments for inflation and programmatic changes.

(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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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA2							R-1 ITEM NOMENCLATURE Historically Black Colleges and Universities (HBCU) PE 0602228D8Z		
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	0.000	15.747	14.236	14.402	14.830	15.141	15.457	Continuing	Continuing
HBCU/P489	0.000	15.747	14.236	14.402	14.830	15.141	15.457	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) This PE provides infrastructure support in fields of science and engineering that are important to national defense. This competitive program provides support through grants or contracts for research, collaborative research, education assistance, instrumentation purchases, and technical assistance. The research grants are to further the knowledge in the basic scientific disciplines through theoretical and empirical activities. Collaborative research allows university professors to work directly with military laboratories or other universities. Education assistance funds are used by the selected institutions to strengthen their academic programs in engineering, science and mathematics, thereby increasing the number of under-represented minorities obtaining undergraduate and graduate degrees in these fields. Funds for instrumentation allow institutions to increase their capability to perform research of interest to the Department. Technical assistance funds are used to design programs to enhance the ability of minority institutions to successfully compete for future Defense funding.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA2		R-1 ITEM NOMENCLATURE Historically Black Colleges and Universities (HBCU PE 0602228D8Z

<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	0.000	15.747	14.236	14.402	14.830	15.141	15.457	Continuing	Continuing
HBCU/P489	0.000	15.747	14.236	14.402	14.830	15.141	15.457	Continuing	Continuing

(U) **Project Number and Title: P489 HBCU**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) The FY 1999 program was divided among the Army, Navy, and Air Force to execute based on the Defense Reform Initiative.

(U) **FY2000 Plans:**

(U) Continue evaluation of the awards made with the prior year funds. In FY 2000 the HBCU/MI program will make additional awards using the program funds. These awards will be a combination of new starts, and continuations of some grants and other efforts started under previous fiscal years depending on technical progress. The Services will select the competitive awards from proposals submitted under the Infrastructure Support Program for HBCU/MIs: FY 2000 broad agency announcement distributed in September 1999.
(\$ 15.747 Million)

(U) **FY2001 Plans:**

(U) Continue evaluation of the awards made with prior year funds. In FY 2001, the HBCU/MI program will make additional awards using the program funds. These awards will be a combination of new starts, and continuations of some grants and other efforts started under previous fiscal years depending on technical progress. The Services will select the competitive awards.
(\$ 14.236 Million)

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(U) <u>B. Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	0.000	14.329	14.338	Continuing
Appropriated Value	0.000	16.329	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	0.000	(.176)	(.102)	
c. Other	0.000	(.406)	0.000	
Current President's Budget	0.000	16.153	14.236	Continuing

Change Summary Explanation:

(U) **Funding:** The Defense Reform Initiative directed that the FY 1999 program be distributed equally to the Services (Army PE 0601102A, Navy PE 0601153N, and Force PE 0601102F). FY 2000 and FY 2001 changes reflect adjustments for rescission and inflation savings.

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

(U) **Technical:**

(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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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 2							R-1 ITEM NOMENCLATURE Lincoln Laboratory PE 0602234D8Z		
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	20.219	20.189	18.602	18.845	21.089	21.569	22.345	Continuing	Continuing
Lincoln Laboratory/P534	20.219	20.189	18.602	18.845	21.089	21.569	22.345	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U)The Lincoln Laboratory (LL) program is a high technology research and development effort conducted through a cost reimbursable contract with the Massachusetts Institute of Technology (MIT). LL is operated as a FFRDC administered by the DoD, and is unique among DoD FFRDCs. It has no funding sources other than the Line for its innovative research and development efforts. This is due to the fact that LL is operated by MIT at no fee and may not charge for IR&D (under A-21). Other DoD FFRDCs do charge a fee with which they may support research efforts.

(U)The LL Line funds research activities that directly lead to the development of new system concepts, new technologies, and new components and materials. Historically, the Line funding supported many development and demonstration programs which have led to such significant DoD systems as JSTARS, MILSTAR, GEODSS, as well as to solid-state devices and processes of major importance to the military industrial base. In addition to being the foundation for many new LL programs, the Line also supports other ongoing Laboratory programs with state-of-the-art technology developments. The program has the following 4 research elements:

- Target surveillance and recognition, with emphasis on (1) revolutionary sensing techniques and algorithms for detecting and recognizing battlefield targets both in the clear and in difficult deployments, (2) supporting data collection and phenomenology, (3) fundamental target-recognition bounds and their implications for sensor and algorithm design, and (4) revolutionary new approaches for automated passive sonar target classification of submarine targets and discrimination of submarines from surface ship clutter.
- High-connectivity, low-cost military global defense network and communications systems, with emphasis on new antennas, RF technology, network protocols (including for mobile users with lightweight transceivers), high-rate fiber and free-space optical communications systems, and the interconnection of these very disparate modalities into a global defense network that can truly realize the vision of a `from sensor to shooter` communications infrastructure which will greatly enhance force effectiveness by providing the right information at the right time anywhere in the world;

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- Advanced combat support technologies for active hyperspectral sensing systems and compact biological agent detection systems. The focus in biological agent detection is in developing technology for compact, lightweight, real-time biological-agent sensors with extremely high sensitivity (<1 agent containing particle per liter of air) and with strong background clutter rejection for extremely low false-alarm rate (<1 per week). The primary objective for the active hyperspectral sensing system development is to demonstrate the feasibility and utility of combining active illumination with hyperspectral imaging for a range of military application including CID.
- Revolutionary, advanced electronic/optical technology, with specific emphasis on optical sampling for direct analog-to-digital conversion on the microwave carrier in digital receivers for radar and electronic intercept, 3-D imaging and high sensitivity IR focal-plane arrays for advanced missile seekers, mid-infrared semiconductor lasers to counter advanced heat-seeking missiles, new miniature fluorescent and microfluidic sensors for rapidly detecting and identifying low concentrations of biowarfare agents, solid state low-light imagers for improved night vision under starlight illumination, and high-speed, radiation hard, ultra-low power analog and digital circuits for ubiquitous DoD applications.

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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	20.219	20.189	18.602	18.845	21.089	21.569	22.345	Continuing	Continuing
Lincoln Laboratory/P534	20.219	20.189	18.602	18.845	21.089	21.569	22.345	Continuing	Continuing

(U) **Project Number and Title: P534 Lincoln Laboratory**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) **Target Surveillance and Recognition :**

(U) **Surface Surveillance**

(U) Developed preliminary design for new multichannel airborne data collection system emphasizing advanced, EECM-capable GMTI as well as SAR. Applied fundamental target-recognition bounds to comparative study of moving and stationary target recognition. Initiated investigation of active seismic characterization of underground facilities. Applied computational models, conducted scale model measurements and preliminary field tests, and initiated development of sparse-array processing techniques. In addition to being directly applicable to ongoing R&D efforts such as DARPA's MTE, MSTAR and underground-facilities programs, these activities will have considerable significance for organizations, such as NIMA, NRO and the Services, that are planning and/or developing next-generation sensing and exploitation systems.

(U) **Space Surveillance**

(U) Continued the advanced electro-optical technology program in support of the Air Force Space Control Mission. This included the development of an avalanche photo-diode (APD) array for 3-D laser radar imaging for applications such as terminal guidance on BMD interceptor and tactical seekers. Timing circuits, which will ultimately be bonded to the APD arrays, have been fabricated and tested. The epoxy-bonding and etching technology has been demonstrated. A 3-D laser radar brassboard system has been used to collect image data for aimpoint-selection and discrimination algorithm development. Continued the development of CMOS readout test structures for IR focal plane arrays towards the goal of developing readout multiplexers for IR focal-plane arrays that will incorporate silicon-on-insulator fabrication processes and on-chip signal processing. Tested binary-optics-grating technologies for enabling simultaneous multi-wavelength detection with a single focal plane. These focal-plane-array technologies have the common application of advanced BMD seekers.

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(U) Sonar Target Classification

Initiated the development of a sonar signal processing laboratory that provides the capability for near-real-time processing of hydrophone array data from submarine towed array systems, from beamforming through automatic classification and operator displays. Initiated development and testing of the Interactively-trainable Passive Acoustic Classifier (IPAC). Developed and demonstrated adaptive matched field processing for depth-based discrimination of surface noise from submerged targets. Developed and demonstrated approaches for mitigating a form of ownship noise called cable strum that can obscure important signatures in the forward endfire direction. (\$ 4.977 Million)

(U) Military Communications :

(U) Continue to investigate technology for global high-rate military communications and networking at rates from tens of megabits to tens of gigabits per second, including optical communications and tactical theater communications (particularly to Army forces on the move).

(U)Optical Communications: Completed free-space optical communications technology transition to the funded flight demonstration program. Continued work to enhance optical transmitter power and efficiency as well as near-quantum-limited optical receiver technology. Application to world-wide relay of high-rate surveillance data.

(U)Global Ultra-high-rate Networks: Continued development of optical technology for ultra-high-rate local and metropolitan area networks (LANs and MANs), with application to processing and fusion of surveillance data. Demonstrated 100 Gbps logic gate, clock recovery, and transmission for an ultra-fast, single-stream soliton network. Initiated test-bed demonstration of the 100 Gbps LAN and MAN utilizing soliton optical pulses and optical processing (current state-of-the-art for electronic networks is ~2 Gbps). Provided preliminary solutions to problems of transient effects in optical amplifiers and dispersion in cascaded optical filters. Developed algorithms to leverage unique advantages of optical networks and facilitate dynamic bandwidth allocation and interconnection of disparate military communication systems.

(U)Milsatcom: Completed architecture study for EHF Milsatcom beyond 2005, using agile and narrow RF beam steering, advanced low-power on-board signal processing, and new networking techniques to enable efficient computer communications over EHF Milsatcom. Continued development of electromagnetically-steered phased array antennas utilizing optical fiber and electro-optical technologies that offer light-weight, low-cost fabrication and integration on tactical platforms. Completed implementation of an 8 GHz receive array. Application to ground forces communication on the move, to aircraft, and to radars.

(U)Defensive Information Warfare: Coordinate first-ever quantitative evaluation of computer network intrusion detection (ID) software performance. Found existing GOTS systems performed worse than new development ID systems, but both are poor in detecting novel, first-seen attacks. Developed better background traffic simulations and stealthier attacks for the second annual ID evaluation. Extended unique LL Bottleneck Verification ID system and began testing on real traffic at Hanscom Air Force Base. Developed and demonstrated self-deploying ID protocols to respond dynamically to attacks.

(\$ 4.183 Million)

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(U) Combat Support Technology:

(U) Designed and developed a baseline active hyperspectral imaging (HSI) system that incorporates VIS/NIR white-light `laser` illuminator on a scanning, tripod-mountable platform with compact imaging spectrometers. The system was successfully tested in a series of laboratory experiments to demonstrate utility in detection and identification of concealed targets in a low-light, highly-cluttered environment. A series of outdoor tests designed to verify performance in concealed target detection and demonstrate range-gating ability were also conducted. Applications for the baseline system include mine detection, optical taggant discrimination and man or vehicle vision enhancement.

(U) A large number of field measurements of background clutter were made with the Biological Aerosol Warning Sensor (BAW-III), an UV fluorescence sensor. Measurements this past year concentrated on urban environments, including Atlanta, Boston, Cambridge MA, and Washington DC. These measurements are being used to calculate probability-of-detection versus false-alarm rates for the sensor. Based on the measured performance of the BAW-S-III the Joint Program Office for Biological Defense (JPO BD) has selected the BAW-S-III for insertion into the Joint Biological Point Detection System (JBPDs) beginning in late FY99. To further improve the performance of the BAW-S-III sensor, advanced laser work was initiated to reduce the power requirement, which is important for hand-held sensor applications. A new protocol was developed detecting trace amounts of biological substances in large volumes of soil; the protocol was successfully demonstrated in the laboratory using a wide variety of soil types. Based on this work a new program has been initiated in measuring contaminated soils for suspect biological particles. Microfluidics work continued with the focus on developing concepts for compact cartridges to do DNA/RNA extractions from soil samples. In the simulation area, a model of the BAW-S-III sensor was incorporated in the ModSAF simulator package.

(\$ 4.106 Million)

(U) Advanced Electronics Technology:

(U) The general objective of this program is to conceive, demonstrate, and provide advanced electronic devices, circuits and subsystems for Air Force and other DoD systems, and to transfer enabling technologies to industry. Principle efforts are in lasers, electro-optic devices, visible and infrared (IR) sensor arrays, analog and digital silicon integrated circuits, microwave and terahertz devices, biochemical sensors, and superconducting electronic devices, along with supporting development of materials and processing techniques. These efforts support DoD systems programs elsewhere within Lincoln Laboratory, as well as directly supporting AFRL (IR countermeasures (CM), adaptive optics, focal-plane readout circuits, electro-optical space surveillance, power-combined solid-state lasers). Technology from this program is exploited by the Army and Navy ballistic missile defense programs (focal-plane readout circuits), by Army SBCCOM (bioaerosol sensors), by DARPA (sub-0.25- μ m lithography, low-power/high-speed CMOS integrated circuits (IC) in silicon-on-insulator (SOI) material, high-speed optical sampling for analog-to-digital (A/D) conversion, microfluidic bio-agent identifier, multichip modules, microelectromechanical (MEM) reconfigurable microwave circuits and antennas, tunable superconductive filters for agile receivers), and by NSA (superconductive crossbar switch, high-speed cryogenic memory). Technology transfer is being accomplished through direct DoD support (IR countermeasures, CMOS/SOI circuits, imaging arrays and readout circuits, bioaerosol sensors), and through cooperative research development agreements (CRDAs) (microchip UV lasers, lithographic technology, and diamond switch technology).

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(U) Selected accomplishments: Developed and integrated high-power, high brightness lasers at 2- and 4- μ m for dual-band IRCM into demonstration subsystem with industry; Demonstrated optically sampled A/D converter at above 200 Msamples/s with 10-bit resolution and third-order intermodulation distortion below -80dB; Demonstrated first CCD imagers and CMOS/SOI logic with a unique merged CMOS/CCD technology for `smart` focal planes; Developed superconductive chirp filters with very low (-45 dB) error sidelobes and thereby enabled the demonstration of a 4-GHz-bandwidth compressive receiver with high dynamic range for electronic intelligence (ELINT); Fabricated several additional IC designs (now 92 in total) in the CMOS/SOI 0.25- μ m technology, with a direct comparison showing up to 40 times lower power at 1-GHz speed than commercial GaAs; Demonstrated new concept for wavelength-power-combining of laser sources with broad applications to high-brightness DoD systems; Performed key experiments and analysis which led to semiconductor industry decision to develop 157-nm wavelength optical lithography for sub-100-nm IC fabrication.
(\$ 6.953 Million)

(U) **FY2000 Plans:**

(U) **Target Surveillance and Recognition:**

(U) **Surface Surveillance:**

(U) Extend fundamental target-recognition bounds to multi-look, multi-frequency and polarimetric sensing. Initiate formulation and analysis of multi-sensor concepts for high-performance, resource-efficient wide-area battlefield target recognition. Continue theoretical and experimental investigation of sparse-array techniques for active seismic imaging of underground facilities. In addition to being directly applicable to ongoing R&D efforts such as DARPA`s MTE, MSTAR and underground-facilities programs, these activities will have considerable significance for organizations, such as NIMA, NRO and the Services, that are planning and developing next-generation sensing and exploitation systems.

(U) **Space Surveillance**

(U) Continue 3-D laser radar technology development with the final hybridization of 32 x 32 avalanche photo-diode (APD) arrays with arrays of CMOS timing electronics. These arrays will be incorporated into the brassboard system for the demonstration of single-photon-sensitivity 3-D imaging for advanced BMD and tactical seekers. Begin the development of APD arrays, which are sensitive at 1.5-micron wavelengths, for use with eyesafe laser transmitters. This will include the development of single-element and small arrays of diffusion-bonded structures utilizing an InGaAs absorption region and a silicon avalanche region. These APD arrays will be compatible with the co-developed CMOS timing circuitry and will enable 3-D laser radar systems for use in combat-identification and vehicle-navigation applications as well as tactical seekers in urban environments where laser eyesafety is a requirement. Begin the development of a laser-transmitter system that incorporates the multi-functional capability of 3-D laser radar and laser-vibration sensing. This system would incorporate APD arrays for the 3-D imaging along with a long-coherence-time mode-locked laser transmitter, which would allow coherent detection for vibration measurements and has applications in combat identification.

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(U) Sonar Target Classification

Continue to investigate the benefit of improved front end beamforming techniques but focus more on the impact of improved features on classifier and overall system performance. Explore and demonstrate adaptive techniques for array calibration to improve sonar performance during ownship maneuvers. Strong interfering surface ships can serve as sources of opportunity that can be used to automatically calibrate or estimate array shape. The estimated shape will then be used directly within the beamformer to improve target SNR.

(\$ 4.787 Million)

(U) Military Communications:

(U) Continue to investigate technology for global high-rate military communications and networking at rates from tens of megabits to tens of gigabits per second, including optical communications and tactical theater communications (particularly to Army forces on the move). Global ultra-high-rate networking: Initial implementation of ultra-high-rate optical network from Lincoln Laboratory to Washington, DC under funded programs; will be available for demonstrations of line-funded fiber optic communications techniques. Demonstrate 100 Gbps packet assembly, transmission and reception over optical fiber in laboratory testbed. Develop novel applications using high-speed optical backbones such as cooperative processing of radar data and other applications. Tactical Satellite Terminals: Complete transfer of technology of optically controlled phased array antennas into funded radar and communication programs.

(U)Defensive Information Warfare: Bottleneck Verification System will be further refined and evaluated, then will be extended beyond looking for illegal user-to-root transitions to other attack classes and mechanisms. This technology will be transferred to AFWIC for deployment over a wide range of Air Force base computer networks. The set of information assurance components in the yearly product evaluation will be extended to encompass protection (e.g. firewalls) and reaction (e.g. security service desks) subsystems in addition to ID subsystems. Begin development of systems that can identify and not merely detect intrusion attacks.

(\$ 3.656 Million)

(U) Combat Support Technology:

(U)Active Hyperspectral Sensing Systems: Extend the operating spectral region of both the white light `laser` and the spectral imaging systems from VIS/NIR to encompass 3 to 5 micron bands. Continue processing algorithm development in order to identify key features for target recognition and visualization using the extended sensing capability. This system will continue to be tested in both laboratory and field environments on a variety of targets and scenarios of military interest. Design of a full-spectral system, spanning the visible through infrared bands will be initiated and the factors affecting fusion with other sensing systems, such as synthetic-aperture radar and other EO sensors, will be examined.

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(U)Biological Agent Detection Systems: The work will begin to focus on a miniature, low-power sensor incorporating a UV fluorescence sensor at the front end, a B-cell-based identifying sensor at the back end, and stages of intelligent particle sampling and sample purification in the middle. For the UV sensor, work will continue on reducing the laser power requirements, and work will begin on aggressively miniaturizing the sensor. Development will begin on a fully intelligent, integrated particle sampler and on the microfluidic sample-purification sub-system. Modeling and simulation efforts will continue with emphasis on how the integrated sensor would perform in urban environments. In addition, work will continue on cartridge-based soil measurements and on background measurements. These technology efforts will flow into the Joint Biological Point Detection System (JBPDs) and into the Joint Biological Remote Early Warning System (JBREWS) ACTD.
(\$ 4.536 Million)

(U)Advanced Electronics Technology:

Extend direct RF optical sampling to bandwidths beyond 100 MHz by demonstrating scalable methods for parallelizing quantizers: Begin system demonstration of utility of optical sampling for digital receivers at radar field site. Improve materials and spectral combining techniques enabling higher-brightness and higher-operating-temperature optically pumped mid-IR semiconductor lasers for IRCM applications. Reduce dark current levels and develop CMOS-based versions of visible, UV and IR focal planes in support of AF, DARPA, and other DoD programs. Continue development of advanced silicon process technology with extensions of CMOS to sub-100-nm feature sizes, with emphasis on development of technologies for on-focal-plane processing, radiation-hard technologies, and integrated sensors. Continue development of tunable superconductive RF filters for frequency-agile receivers. Demonstrate 4-GHz bandwidth ELINT receiver incorporating superconductive chirp filters and CMOS/SOI data processor. Continue development of bio-detector technology based on integration of living biological cells with microfluids and microelectronics with emphasis on discrimination and identification methodologies. Demonstrate 3-D radar subsystem incorporating a 32x32 array of geiger-mode avalanche photodiodes (APD), integrated timing electronics, and compact laser illuminator. Demonstrate APD arrays for use at eye-safe wavelengths applications. Demonstrate microelectromechanical (MEM) RF tuning structures for electronically reconfigurable microwave receivers and antennas. Initiate development of AlGaIn UV detectors for solar-blind applications.(\$ 7.21 Million)

(U) FY2001 Plans:

(U)Target Surveillance and Recognition:

(U)Surface Surveillance:

(U)Develop and apply absolute (vs. relative, between two sensor designs) fundamental ATR performance bounds. Apply multi-sensor ATR concepts to development of practical multi-sensor ATR architectures for high-performance, resource-efficient, wide-area battlefield target recognition. Design field experiments to demonstrate such architectures. Refine techniques for sparse-array active seismic imaging and demonstrate an existing underground facility. In addition to being directly applicable to ongoing R&FD efforts such as DARPA's MTE and MSTAR programs, these activities will have considerable significance for organizations, such as NIMA, NRO and the Services, that are planning and developing next-generation sensing and exploitation systems.

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(U)Space Surveillance:

(U)Continue 3-D laser radar technology development with the scaling of the array sizes to greater than 32 x 32 pixels. These larger arrays will have applications for advanced BMD and tactical seekers and ground mapping and foliage penetration. Continue the development of 1.5-micron-sensitive APD arrays with the scaling of the single-element and small arrays to 32 x 32, or larger, array sizes. These devices will enable the single-photon-sensitive 3-D laser radar technologies to be used in the eyesafe regime for applications such as combat identification and tactical seeker homing in urban environments. Continue the development of multi-function laser transmitters, which are capable of 3-D imaging and laser-vibration sensing, for applications of combat identification and underground-structure sensing.

(U)Sonar Target Classification

Expand application of IPAC classification approach beyond submarine towed array sonars to the fixed (SOSUS) and mobile (SURTASS) surveillance problems. Develop techniques for operator in-situ training and test with field data. Develop dynamic databases to permit sonar to exploit knowledge of environment, intelligence information, external sensor data on surface ship clutter.(\$ 4.078 Million)

(U)Military Communications:

(U)Continue to develop technology for global high-rate military communications and networking, including optical communications in space and fiber. Continue demonstration and extension of networking techniques and protocols for interworking among disparate networks including Milsatcom. Complete testing of ultra-fast optical testbed with 100 Gbps transmissions between Lincoln Laboratory and Washington, DC (application to surveillance data processing). Investigate novel application areas for optical technology such as ultra-fast data encryption and processing.

(U) Defensive Information Warfare: Development and evaluation of advanced techniques for network intrusion detection will continue. Focus will shift towards detection of insider attacks (i.e. attacks from users who have authorized access to the system). Build systems that process complementary data from an ensemble of cooperating intrusion detection systems, for improved aggregate performance. Develop systems that can determine an attacker's intent.(\$ 3.449 Million)

(U) Combat Support Technology:

(U) Active Hyperspectral Sensing System: Develop a full-spectral active HSI system, using select, discrete-frequency laser wavelengths throughout the visible through mid-wave IR spectral regions, broadband illumination in discreet segments of those regions, and passive long-wave IR imaging. The system will be adaptable, where both the sensing wavebands and target-recognition algorithms will be specified by the applications. For some applications, visible APD arrays will be incorporated that permit range-resolved imaging as well as the standard spatial and spectral imaging that the active HSI system affords. Effort will also be expended in developing real-time processing and visualization schemes for either direct relay to user or transmission to a control station for fusion of multiple sensing assets.

(U)Begin to explore how to adapt B-cell-based sensor for integrated package. This technology development may feed into an integrated, miniature low-power sensor at a later date.(\$ 2.014 Million)

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(U) Advanced Electronics Technology:

(U) Investigate highly scaled CMOS/SOI digital circuits using mixed electron-beam and optical lithography at 25-nm feature sizes for ultradense circuits. Explore integration of ICs in the third dimension as a means to significantly improve functional density. Demonstrate compact and power efficient version of optically sampled A/D with multi-GHz bandwidth for radar and electronic intelligence use. Extend highly integrated CCD/CMOS imager to include noiseless jitter compensation of platform motion. Continue development of UV, visible, IR and hyperspectral imaging devices with on-focal-plane processing for `smart` multimode sensors. Transfer advanced mid-IR semiconductor laser technology to industry for dual-wavelength IRCM. Continue development of combined biochemical, micromechanical, electronic systems. Continue development of solid-state devices, materials and processing subsystems in support of DoD programs.

(\$ 5.335 Million)

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	19.271	20.774	20.739	Continuing
Appropriated Value	0.000	0.000	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	(.948)	(.070)	(.137)	
c. Other	0.000	(.515)	(2.000)	
Current President's Budget	20.219	20.189	18.602	Continuing

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Change Summary Explanation:

(U) **Funding:** FY 2000 adjustments were the result of inflation adjustments and the government wide rescission. FY 2001 reflects inflation savings.

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

(U) **Technical:**

(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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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 2							R-1 ITEM NOMENCLATURE Medical Technology PE 0602787D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	9.119	8.875	8.680	8.921	9.130	9.289	9.423	Continuing	Continuing
Radiation Injury Assessment and Therapeutic Approa/P505	9.119	8.875	8.680	8.921	9.130	9.289	9.423	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U)This program supports applied research to investigate new approaches that will lead to advancements in biomedical strategies for preventing, treating, assessing and predicting the health effects of ionizing radiation, either alone or in combination with other biological warfare (BW)/chemical warfare (CW) toxicants. The premise is that DoD must be ready to conduct tactical, humanitarian or counterterrorism missions within radiation environments. Development of protective and therapeutic strategies will enable military forces to operate, when required, in nuclear or radioactive combat environments, while minimizing both short- and long-term risks of adverse health consequences. Advancements in tools to measure radiation exposure to military personnel will be used in triage, treatment decisions and risk assessment. Accurate models to predict casualties, particularly in combined nuclear-biological-chemical NBC environments, will promote effective command decisions and force structure planning to ensure mission success.

(U)The program has three primary goals: (1) to understand the pathological consequences of radiation injury and radiological hazards in order to provide a rational basis for prophylactic and therapeutic drug development; (2) to develop novel biological markers and delivery platforms for rapid, field-based individual dose assessment; (3) to define any interactions between radiation and BW or CW agents that cause more severe injury and the drugs used to protect against them -- with the goal of developing new models to predict casualties.

(U)The Armed Forces Radiobiology Research Institute (AFRRI), because of its multidisciplinary staff and facility resources, is uniquely qualified to execute the program prescribed by its mission. AFRRI's radiation sources allow the simulation of any radiological environment that might be encountered. AFRRI is currently the sole laboratory with the combined capabilities needed to conduct this research.

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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	9.119	8.875	8.680	8.921	9.130	9.289	9.423	Continuing	Continuing
Radiation Injury Assessment and Therapeutic Approa/P505	9.119	8.875	8.680	8.921	9.130	9.289	9.423	Continuing	Continuing

(U) **Project Number and Title: P505 Radiation Injury Assessment and Therapeutic Approach**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) Identified new approaches for developing preventive treatments of both acute and chronic radiation injuries based on (a) applied knowledge of the fundamental mechanisms of cellular and molecular injury, (b) selection of novel, less toxic, but equally effective drugs, (c) pharmacologic quenching to reducing drug toxicity, and (d) new drug delivery alternatives.

(\$ 0.902 Million)

(U) Initiated studies to assess efficacy of conventional or slow-releasing radioprotectants to prevent or reduce late-arising health consequences of radiation injury, including cancer and chronic immune system suppression. (\$ 0.972 Million)

(U) Established a high-throughput, *in vitro* gene array-based drug screening system to assess potential efficacy of pharmacologics for the prevention and treatment of radiation injury.

(\$ 0.790 Million)

(U) Demonstrated in an animal model efficacy against acute radiation-induced gastrointestinal tissue injury and associated infectious complications of a novel cytokine-based treatment regimen.

(\$ 0.650 Million)

(U) Designed, synthesized, and partially characterized two new classes of long-acting radioprotectants.

(\$ 0.772 Million)

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(U) Incorporated novel enhancements to a clinical radiation bioassay system under development that provides a rapid dose assessment capability for a broad spectrum of radiation qualities (gamma rays, x rays, and neutrons): Developed interphase cell-chromosome aberration bioassay that simplifies sample preparation in a standardized protocol that can be employed in clinical and reference laboratories by generalist laboratory technicians.

(\$ 0.798 Million)

(U) Demonstrated that two new classes of biological markers have the potential to significantly improve the accuracy and precision of measuring radiation doses in exposed individuals using polymerase chain reaction (PCR) bioassay systems that are rapid and easy to perform: (a) Confirmed dose-dependent increases in incidents of cells with mitochondrial DNA deletions after irradiation using a newly developed in situ PCR assay system; (b) Demonstrated inter-individual consistency of dose-related increase in oncogene expression after irradiation using a solution-based PCR procedure.

(\$ 0.779 Million)

(U) Completed additional studies extending the database of quantitative radiation/BW agent combined effects consequences for casualty prediction models: (a) Continued collecting useful data in studies assessing the effect of ionizing radiation on the protective immune status of individuals vaccinated against anthrax; (b) Initiated and began work under a collaborative agreement with USAMRIID to study the combined effects of radiation and Venezuelan equine encephalomyelitis (VEE) virus; and (c) Quantified the increased morbidity in an animal model system under a scenario involving radiation exposure of a population suffering from endemic shigellosis.

(\$ 1.225 Million)

(U) Completed assessment of the physiologic consequences (blood flow, body temperature, and motor activity) of combined exposure to radiation and the nerve agent prophylactic pyridostigmine.

(\$ 1.218 Million)

(U) Determined that DU induces morphologic changes (transforms) in human tissue culture cells that resemble the patterns seen tumor cells and that these transformed cells form tumors in immunologically-deficient rodents. Determined that elevated levels of oncogenes are expressed in tissues from rodents implanted with DU pellets. Continued pilot studies of immunotoxic and neurotoxic potential of DU. Continued research to improve sensitivity of a potentially-fieldable method to measure uranium in urine. Determined that tungsten induces a toxic response in cultured human cells.

(\$ 1.013 Million)

(U) **FY2000 Plans:**

(U) Continue to refine and test strategies for preventive treatments based on fundamental mechanisms of cellular and molecular injury and repair of blood-forming (hematopoietic) and gastrointestinal organ systems.

(\$ 1.700 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 2	R-1 ITEM NOMENCLATURE Medical Technology PE 0602787D8Z	

(U) Extend gene-based drug screening protocol to assessing efficacy of pharmacologies under both acute low-dose radiation exposures and/or chronic exposures.

(\$ 1.386 Million)

(U) Test efficacy of long-acting (slow-release) radioprotectants against acute radiation injury.

(\$ 1.000 Million)

(U) Continue development of clinical bioassays for assessment of radiation exposures: Automate sample preparations to reduce sample preparation times for cytogenetic-based assays and identify best-candidate bioassay procedure for assessing prior radiation exposure.

(\$ 0.721 Million)

(U) Continue development of molecular-based biological markers and analytical systems that can potentially produce highly accurate and rapid radiation dose assessments under field operations. Identify and calibrate biological markers that can both indicate total absorbed dose of radiation and differentiate whole-body from partial-body exposure. Incorporate the use of automated analytical systems to more efficiently and cost-effectively evaluate new candidate molecular biomarkers

(\$ 0.757 Million)

(U) Continue assessment of the effects of combined radiation and *B. anthracis* exposures on status of protective immunity. Quantify the biological interactions of radiation and non-lethal, incapacitating bacterial agents to provide data for incorporation into casualty prediction models of combined injuries. Extend radiation/BW agent interaction studies of viral threat agents to assess changes in mortality rates after combined exposure. Collate and analyze experimental data to improve and expand the predictive value of casualty prediction models and to provide information to improve clinical management of combined injuries. Complete assessment of treatment strategies for endemic shigellosis in irradiated animals.

(\$ 1.441 Million)

(U) Assess the combined effects of radiation exposure and sleep deprivation on brain wave patterns and sleep-wake cycle alterations.

(\$ 0.918 Million)

(U) Continue work on the carcinogenic potential of DU by initiating cancer marker and tumor development (life-span) studies in laboratory rodents. Continue studies in rodents on DU's long-term effect on immune systems. Complete pilot study of tungsten toxicity.

(\$ 0.952 Million)

(U) FY2001 Plans:

(U) Continue to develop and test second-generation radioprotective treatments for sustained effectiveness efficacy. Assess efficacy of newly synthesized drug prototypes for protection against late-arising radiation injury.

(\$ 1.673 Million)

(U) Exploit gene-based drug screening protocols to assess the protective/therapeutic benefit of combining prophylactic and therapeutic regimens.

(\$ 1.324 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 2	R-1 ITEM NOMENCLATURE Medical Technology PE 0602787D8Z	

(U) Design simplified drug delivery systems for new drug prototypes: Commence initial design and testing of autoinjector systems, compounding alternatives for oral administration , and transdermal skin patches.

(\$ 1.015 Million)

(U)Continue development of clinical bioassays for assessment of radiation exposures. Automate sample preparations and reduce sample preparation times for cytogenetic biodosimetry test. Identify biological marker to differentiate prior from recent radiation exposures.(\$ 0.708 Million)

(U)Continue development of molecular biomarker systems for field use. Identify and calibrate biomarkers that can both indicate the amount of absorbed dose and differentiate whole-body from partial-body exposure. Develop automated analysis systems to efficiently evaluate promising candidate bioassays

(\$ 0.743 Million)

(U)Complete assessment of effectiveness of the anthrax vaccine to provide protection from infection following a combined radiation/*B.anthraxis* exposure. Continue studies with other vaccines (e.g. for VEE) to assess effectiveness in combined radiation/infectious agent exposures. Continue and initiate studies to assess interaction of radiation and other infections resulting from BW agents.

(\$ 1.424 Million)

(U)Complete studies on the interaction of radiation and sleep deprivation on seizure incidence, brain waves and sleep-wake cycles.

(\$ 0.893 Million)

(U)Continue studies in laboratory rodents of cancer risk of DU and of long-term effects of exposure to DU on immune and nervous systems.

(\$ 0.900 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 2	R-1 ITEM NOMENCLATURE Medical Technology PE 0602787D8Z	

(U) B. Program Change Summary	FY1999	FY2000	FY2001	Total Cost
Previous President's Budget	9.212	8.903	8.742	Continuing
Appropriated Value	0.000	0.000	0.000	Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed Undistributed Reduction	(.093)	0.000	0.000	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0.000	(.028)	(.062)	
c. Other	0.000	0.000	0.000	
Current President's Budget	9.119	8.875	8.680	Continuing

Change Summary Explanation:

- (U) **Funding:** Funding changes are due to undistributed reductions, inflation savings and the government wide rescission.
- (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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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 Medical Advanced Technology Program PE 0603002D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	2.109	1.996	2.043	2.075	2.115	2.154	2.200	Continuing	Continuing
Risk Assessment and Biomedical Applications/P506	2.109	1.996	2.043	2.075	2.115	2.154	2.200	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U)This program supports efforts in advanced technology development to provide biomedical strategies for preventing, treating, assessing and predicting casualties from ionizing radiation, either alone or in combination with biological warfare (BW)/chemical warfare (CW) agents. It is directed at the need for the Department of Defense (DoD) to be prepared to execute military missions within radiation environments, to manage radiation crises associated with terrorist activities, and for consequence management in the event of nuclear weapons detonation. The DoD is ethically committed to protection of Service members from the adverse health effects of ionizing radiation to the fullest extent consistent with operational requirements. The program incorporates findings from basic and applied research into highly integrated and focused advanced technology development studies to produce: (1) protective and therapeutic strategies, (2) tools to measure radiation exposure to military personnel, and (3) accurate models to predict casualties, particularly in combined nuclear-biological-chemical (NBC) environments. The Armed Forces Radiobiology Research Institute (AFRRI), because of its multidisciplinary staff and exceptional laboratory and radiation facilities, is uniquely qualified to execute the program prescribed by its mission. Because national laboratories operated by the Department of Energy no longer support advanced research relevant to military medical radiobiology, AFRRI is currently the sole laboratory in existence with the combined capabilities needed to conduct this research.

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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 Medical Advanced Technology Program PE 0603002D8Z

<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	2.109	1.996	2.043	2.075	2.115	2.154	2.200	Continuing	Continuing
Risk Assessment and Biomedical Applications/P506	2.109	1.996	2.043	2.075	2.115	2.154	2.200	Continuing	Continuing

(U) **Project Number and Title: P506 Risk Assessment and Biomedical Applications**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) Demonstrated broad spectrum radioprotective features of a non-toxic (non-androgenic) adrenocortical drug, 5-androstendiol (5-AED), compared to structurally similar analogs. (\$ 0.148 Million)

(U) Demonstrated therapeutic benefit of combining two recombinant hematopoietic growth factors (IL-11 and G-CSF) into a single treatment protocol for acute radiation injury of the blood forming system.(\$ 0.168 Million)

(U) Completed initial studies to reduce the toxicity (nausea) associated with aminothiols prophylaxis through pro-drug modifying techniques. (\$ 0.168 Million)

(U) Established *in vitro* radiation calibration curve for a simplified chromosome aberration measurement procedure in interphase cells. The procedure will facilitate fielding of chromosomal aberration assays to medical treatment facilities for rapid analysis of blood samples from mass casualties involving radiation exposures. (\$ 0.369 Million)

(U)Further developed protocols for measuring molecular biomarkers (oncogene expression, mitochondria DNA deletions) with a compact, portable field-deployable platform. Established fluorogenic-5'-nuclease PCR primers and probes along with plasmid calibration standards for quantitative measurement of mitochondrial DNA mutations and ras proto-oncogene mRNA from cellular samples. This effort exploits the dual-use potential of a delivery platform under development elsewhere for military use that can rapidly measure and quantify nucleic acid changes by the polymerase chain reaction (PCR). (\$ 0.304 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 Medical Advanced Technology Program PE 0603002D8Z	

(U) Developed prototype software tool to manage biodosimetric data under deployed field scenarios. Tool provides an integrated system for collecting, analyzing and tracking radiation exposures in individuals. Initiated *in vivo* validation studies under collaborative agreements and human-use protocols at clinical radiotherapy centers to validate precision and accuracy of newly developed biodosimetry systems in patients receiving radiotherapy.

(\$ 0.221 Million)

(U) Completed data reduction analysis on a segment of experimental data involving combined exposures to radiation and bacterial threat agents to enable incorporation into the Consequence Assessment Tool Set (CATS) for casualty rate predictions. The program will ultimately be capable of superimposing and analyzing radiation and BW footprints to produce a single output.

(\$ 0.321 Million)

(U) Filed patent applied for a simple method to detect uranium in bodily fluids that can be used to assess shrapnel casualties for DU fragments that may require surgical removal. Developed a method for rapid, simple identification of DU-containing metal fragments.

(\$ 0.410 Million)

(U) FY2000 Plans:

(U) Assess safety and radioprotective efficacy of the newly identified radioprotectant, 5-androstendiol, in a large, long-term pre-clinical animal study.

(\$ 0.300 Million)

(U) Assess toxicity and pharmacokinetics of second-generation slow-release prodrugs and drug capsule implants.

(\$ 0.176 Million)

(U) Continue *in vivo* studies validating chromosome aberration assay over a broad dose range and partial-body exposure situation. Test improved cytological analysis platforms using simple and easy-to-perform sample preparation protocols.

(\$ 0.347 Million)

(U) Complete initial-phase optimization of PCR-based assays for measuring multiple molecular biomarkers using field deployable platform.

Analysis of multiple biomarkers using a single analysis platform provides enhanced and efficient diagnostic capability. Continue studies to validate screening assays for measuring radiation exposure.

(\$ 0.474 Million)

(U) Coordinate assembly of appropriate experimental data from *B. anthracis*/Rad animal studies and delivery to Defense Threat Reduction Agency's Human Response Program for incorporation into the CATS program to model casualty predictions.

(\$ 0.303 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 Medical Advanced Technology Program PE 0603002D8Z	

(U) Complete development of method to measure uranium in urine of military personnel; provide protocol to application centers for assessment as a fieldable methodology. Complete development of protocols for a rapid, simple method to determine whether metal fragments contain DU. Based on results of ongoing AFRRRI DU research, continue to contribute to revisions of fragment removal policies.
(\$ 0.400 Million)

(U) **FY2001 Plans:**

(U) Assess the added protective benefit of selectively combining non-toxic radioprotectants (e.g, 5-AED, plus Vitamin E) into a single pretreatment regimen by conducting a large, long-term preclinical animal study.

(\$ 0.310 Million)

(U) Assess safety and efficacy of the newly identified therapeutic cytokine combination, IL-11 plus G-CSF, in a large, long-term preclinical animal study.

(\$ 0.177 Million)

(U) Further validate biological marker assays for radiation exposure by determining their performance characteristics in measuring (1) exposure to gamma rays at low-dose rates and (2) in situations involving prior radiation exposures. The availability of a prior-exposure assessment capability is essential to permit dose assessment when analysis is delayed or when exposures are protracted.

(\$ 0.356 Million)

(U) Validate the automated imaging platform for radiation dose assessment. Continue validation of multiple molecular biomarker approach for diagnostic biodosimetric applications.

(\$ 0.486 Million)

(U) Provide recommendations to address any aberrations in *B. anthracis* vaccine efficacy as a consequence of exposure to ionizing radiation. Initiate efforts to incorporate performance-degrading consequences from combined radiation/bacterial and radiation/pyridostigmine exposures into casualty prediction models (CATS).

(\$ 0.310 Million)

(U) Complete patent application for rapid, simple DU fragment analysis method and provide fragment analysis protocol to application centers for their assessment of the procedure as a potential fieldable methodology. Based on results of ongoing AFRRRI DU research, continue to contribute to revisions of fragment removal policies.

(\$ 0.404 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 Medical Advanced Technology Program PE 0603002D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	2.130	2.007	2.057	Continuing
Appropriated Value	0.000	0.000	0.000	Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed Undistributed Reduction	(.021)	0.000	0.000	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0.000	(.011)	(.014)	
c. Other	0.000	0.000	0.000	
Current President's Budget	2.109	1.996	2.043	Continuing

Change Summary Explanation:

(U) **Funding:** Funding changes in FY 99 are due to congressional undistributed reductions. FY 2000 adjustments reflect inflation savings and the government wide rescission. FY 2001 reflects inflation savings.

(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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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 Explosives Demilitarization Technology PE 0603104D8Z		
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	13.379	23.635	8.964	9.265	10.600	11.803	11.985	Continuing	Continuing
JDTP/P486	13.379	23.635	8.964	9.265	10.600	11.803	11.985	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) The Explosive Demilitarization Technology Program is a cooperative interservice, interagency effort focused as the sole Department of Defense (DoD) program dedicated to the development of safe, efficient and environmentally acceptable processes for the resource recovery and recycling (R3) or disposition of strategic, tactical, and conventional munitions including explosives, and rocket motors. Efforts in this program emphasize environmentally compliant technologies to enhance existing methods for munitions R3 and treatment and seeks alternatives over that of open burning/open detonation (OB/OD). There are currently over 500,000 tons of these materials requiring disposition with a forecast of over 1,450,000 tons to flow through the stockpile by 2005. This is funded under Advanced Technology Development based upon its supports to the development and exploration of new munitions concepts and technology preceding system engineering development.

(U) The effort employs the highly developed technology base in the DoD Service Laboratories and Technical Centers, the Department of Energy (DoE) National Laboratories, industry, and academia. The program is integrated through the leadership of the Joint Ordnance Commanders Demilitarization Subgroup and seeks to leverage support from the Department's Environmental Security Technology Certification Program (ESTCP), the Strategic Environmental Research and Development Program (SERDP), the Joint DoD/DOE Munitions Program, and complementary Service science and technology programs. Each project is required to include a federal laboratory sponsor and is provided peer review by the Joint Working Group. The Demilitarization Users Group is utilized to assess and review ongoing and emergent demilitarization requirements for use in planning future investments for this program. The program supports an annual Global Demilitarization Symposium, which focuses on technology transfer opportunities and the technical review and data evaluation from ongoing projects and advanced demonstrations. This program was established pursuant to Section 226 of the National Defense Authorization Act Fiscal Year 1996 (Public Law 104-106) and Section 227 of the National Defense Authorization Act for Fiscal Year 1997 (Public Law 104-201). The program provides an annual report to the Congress, which provides a detailed plan update on technology investments, accomplishments, and future planned investment areas. Recent annual reports; FY 1998-Department of Defense Joint Demilitarization Technology Program (March 1999) and the FY 1999-Department of Defense Joint Demilitarization Technology Program (February 2000).

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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 Explosives Demilitarization Technology PE 0603104D8Z8Z

<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	13.379	23.635	8.964	9.265	10.600	11.803	11.985	Continuing	Continuing
JDTP/P486	13.379	23.635	8.964	9.265	10.600	11.803	11.985	Continuing	Continuing

(U) **Project Number and Title: P486 JDTP**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) Conducted tunnel detonation demonstrations at the Nevada Test Site (NTS) to replicate and optimize depot-type field configurations. Data was collected using EPA Standard methods. Off-line analysis of bulk gases, volatile organic chemicals (VOCs), semi-volatile organic chemicals, metals and particulates were performed. Designed and constructed improved molten salt reactor. Conducted 3 successful oxidation tests on demilitarization waste materials. Began installation of the contained burn chamber at the NTS for future use in demilitarization of tactical rocket motors.
(\$ 6.589 Million)

(U) Completed validation testing on Hydrothermal Oxidation unit - test processed over 50,000 lbs. of waste material. Completed design for prototype tactical missile cryowashout system.
(\$ 2.000 Million)

(U) Flight motor energetics material from the Hellfire and Tubular launched Optically tracked Wire guided (TOW) missile systems were shown to be degraded in liquid ammonia. This process was further optimized using a state-of-the-art high flow system for increased processing rates.
(\$ 0.500 Million)

(U) Advanced cutting using high-pressure waterjet system was demonstrated and optimized for 40mm projectiles. Parameters that optimize nozzle configurations, process pressures, flow rates and cutting time were established in the cutting of Comp A-3. In addition the cutting of 1,000 5-inch 38 mm projectiles was demonstrated. Flexible workcell set-up and tooling for unpack, disassembly, and repack of munitions were developed.
(\$ 2.400 Million)

(U) Completed calibration curves and software development procedures for propellant stabilizer analyzer. Designed package and transportation case. Conducted in-house verifications of procedures.
(\$ 1.090 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 Explosives Demilitarization Technology PE 0603104D8Z8Z	

(U) Conducted bench scale conversion of 10 lbs. Explosive D to commercial products through catalytic hydrotreating and reaction with Nitric acid. Products produced were picramic acid and picric acid.
(\$ 0.800 Million)

(U) **FY2000 Plans:**

(U) The Nevada Test Site Demonstration Program will continue in FY 2000. Additional tunnel detonations will be conducted allowing benchmarking events to be compared with improved procedures that will reduce both safety and environmental concerns. Design criteria will be developed for facility fragment and noise containment as well as reduced EPA regulated emissions. Complete installation of the Contained Burn Chamber and demonstrate destruction of shillelagh Rocket Motor. Investigate system modification to accommodate a variety of tactical systems. Begin transition of improved molten salt reactor to the base to include design and integrated advanced feed system. Joint Integration will continue.
(\$ 7.313 Million)

(U) Cryogenic technologies resulting from Propellant Removal and Treatment Process will be further studied for effectiveness on conventional and tactical systems. Hydrothermal Treatment of small quantity gun propellants and high explosive fillers will be conducted.
(\$ 3.000 Million)

(U) Critical Fluid optimization for specific applications to tactical and standard missile systems will be accomplished.
(\$ 2.000 Million)

(U) Resource recovery development for waterjet and advanced cutting techniques, such as, femtosecond lasers will be pursued for conventional systems demilitarization. The flexible workcell will be enhanced for use by munition items and families.
(\$ 4.030 Million)

(U) Portable Propellant Analyzers will be demonstrated in field trials and explosive work for AEDA and recovered materials will be initiated. Demonstrate the ability to efficiently recover RDX from Comp B, characterize the recovered RDX and establish the viability of using reclaimed RDX in insensitive munition explosive formulations. Complete design and initiate construction of transportable unit for propellant conversion to fertilizer.
(\$ 3.192 Million)

(U) Conversion of Explosive D to picramic acid and picric acid through catalytic hydrotreating and nitric acid reaction will be fully characterized. Pilot scale parameters will be evaluated and economic analysis initiated.
(\$ 1.100 Million)

(U) Development, demonstration and optimization of a hot gas decontamination system will be initiated. Demonstration will focus upon the treatment of residual energetics on items recovered during demilitarization.
(\$ 3.000 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 Explosives Demilitarization Technology PE 0603104D8Z8Z	

(U) FY2001 Plans:

(U) The Nevada Test Site Demonstration Program will continue to focus on demonstrating improved field detonation operations. Detonation events will be designed and implemented based on data gathered from previous experiments. Facility fragment and noise containment designs will be tested and measured against EPA standards. Testing and modification of the Contained Burn Chamber will continue along with joint integration.

(\$ 5.764 Million)

(U) Advanced removal/conversion efforts will continue. Conventional systems treatability demonstration with cryogenic technology and optimization of hydrothermal oxidation will be completed with field demonstrations of second-generation design.

(\$ 0.750 Million)

(U) Critical fluid size reduction process application will be furthered with transportable/portable field unit demonstrations.

(\$ 0.350 Million)

(U) Advanced cutting and removal program will include flexible/agile process demonstrations for efficient processing of small quantity munitions items to prove out recovery values.

(\$ 0.650 Million)

(U) Analytical tools for explosive and propellant evaluation will continue to be optimized for recovered items.

(\$ 0.650 Million)

(U) Hydrogenation of energetic and other innovative processes to support conversion to higher value products will be accomplished.

(\$ 0.300 Million)

(U) Microwave energetic applications will move from bench scale to study of the selective decomposition of high explosives in the presence of other constituents and for anti-personnel land mine applications.

(\$ 0.500 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 Explosives Demilitarization Technology PE 0603104D8Z8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	14.442	11.183	11.029	Continuing
Appropriated Value	0.000	25.183	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	(1.063)	(.921)	(.065)	
c. Other	0.000	(.627)	(2.000)	
Current President's Budget	13.379	23.635	8.964	Continuing

Change Summary Explanation:

(U) **Funding:** FY 1999 thru FY 2001 reflect changes due to programmatic changes, the government wide 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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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 SO/LIC Advanced Development PE 0603121D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	4.505	0.000	8.622	8.750	9.816	9.963	10.241	Continuing	Continuing
Explosive Ordnance Disposal/Low Intensity Conflict/P206	0.000	0.000	7.377	8.750	9.816	9.963	10.241	Continuing	Continuing
Special Operations/Low Intensity Conflict (SO/LIC)/P205	0.000	0.000	1.245	0.000	0.000	0.000	0.000	Continuing	Continuing
Alternatives to Antipersonnel Landmines/P121	4.505	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

(U) A. Mission Description and Budget Item Justification

(U) BRIEF DESCRIPTION OF ELEMENT

(U) P121, Alternatives to Anti-personnel Landmines (APL). This project develops, tests, and evaluates area denial systems to replace anti-personnel landmines (APL). APL alternatives include surveillance systems, command and control systems, and overwatch fires which were evaluated and developed in parallel. Nonlethal technologies will also be evaluated for applicability. During the first phase, various concepts will be defined in detail and examined with emphasis placed on leveraging existing programs. A process to select viable alternatives for further development was conducted using modeling and simulation along with advanced warfighting experiments. The selected approaches will enter prototype development. Further selection of viable concepts will enter the engineering and manufacturing development phase. This project supported the non-self-destructing APL alternative program, which is being funded (PE 0604808A) and executed by the US Army. Funding for this project ended in FY 1999.

(U) P205, Special Operations/Low-Intensity Conflict (SO/LIC) Analytical Support. The SO/LIC Analytical Support project provides specialized research and analytical support for the Assistant Secretary of Defense for Special Operations and Low- Intensity Conflict (ASD (SO/LIC). Projects address a broad spectrum of technical, acquisition, and policy issues relating to special operations, counter- and anti-terrorism, peacekeeping, psychological operations, counterinsurgency, unconventional warfare, and contingency operations. The project supports and is integrated into overall DoD efforts to develop options for dealing effectively with a wide range of military responsibilities in military operations other than war. This project provides a vehicle to initiate analysis required to support acquisition documentation and conceptual policy issues regarding roles and missions of SOF in the changing world environment. Analysis may also be used to improve OASD(SO/LIC)'s congressionally mandated oversight function of special operations and low-intensity conflict.

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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 SO/LIC Advanced Development PE 0603121D8Z	

(U) P206, Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC). The EOD/LIC project is a rapid prototyping effort to provide technology and equipment to military operators who are confronted with explosive threats. Tasks focus on detection, countermeasures, and neutralization of explosive threats. Requirements submitted by the Special Operations and Joint Service EOD communities and other LIC-oriented military users are prioritized by the OSD EOD/LIC Coordination Group.

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<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	4.505	0	8.622	8.750	9.816	9.963	10.241	Continuing	Continuing
Explosive Ordnance Disposal/Low Intensity Conflict/P206	0	0	7.377	8.750	9.816	9.963	10.241	Continuing	Continuing

(U) **Project Number and Title: P206 Explosive Ordnance Disposal/Low Intensity Conflict**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY2001 Plans:**

(U) Complete development of an improved vehicle access/disruption device. Complete development of an EOD laser ordnance neutralization system. Complete development of SOF/EOD tactical decision aids. Complete development of advanced EOD explosive storage system. Complete development of an integrated explosive device training system. Complete development of a remote EOD mini-reconnaissance vehicle. Complete development of a SOF/EOD personal digital assistant. Complete development of a thermite containment system. Complete development of SOC-R ballistic protection. (\$1.106 Million)

(U)Continue development of the RAMS/AFS interface. Continue development of an autonomous search/hydrographic system upgrade. Continue development of an RF-controlled digital x-ray imaging system. Continue development of a single sided x-ray. Continue development of x-ray interpreter hardware/software. Continue development of an EOD communications headset. Continue development of a chemical/biological/ nuclear detector for EOD robots. Continue development of chemical leak seal. Continue development of a magneto-inductive firing device. Continue development of a portable blast chamber. Continue development of a high-resolution miniature color diver display system. Continue development of a hand-held explosive vapor detector. Continue development of an incident site mapping and backpack communications capability. Continue development of an integrated remotely operated underwater vehicle, with hull navigation and a limpet mine detection sonar. Continue development of an advanced remote underwater search vehicle system. Continue development of a tactical global broadcasting system receiver. (\$ 3.689 Million)

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(U)Start development of an area survey imaging sonar. Start development of an advanced diver/ROV sensor system. Start development of an EOD remote detection and access to buried ordnance system. Start development of an integrated sea ordnance training system. Start development of an EOD unmanned aerial vehicle (UAV). Start development of an advanced EOD/SOF chemical/biological weapons incident response system. Start development of an advanced SOF/EOD UXO/IED sensor detection system. Start development of a long range, miniature remote firing system. Start development of EOD/SOF ballistic protection system. (\$2.582 Million)

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<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	4.505	0	8.622	8.750	9.816	9.963	10.241	Continuing	Continuing
Special Operations/Low Intensity Conflict (SO/LIC)/P205	0.000	0	1.245	0.000	0.000	0.000	0.000	Continuing	Continuing

(U) **Project Number and Title: P205 Special Operations/Low Intensity Conflict (SO/LIC)**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY2001 Plans:**

(U) The FY 2001 program will be finalized in August 2000, ensuring that study projects are timely and responsive to the requirements of DoD policy makers.

(\$ 1.245 Million)

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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	4.505	0.000	8.622	8.750	9.816	9.963	10.241	Continuing	Continuing
Alternatives to Antipersonnel Landmines/P121	4.505	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

(U) **Project Number and Title: P121 Alternatives to Antipersonnel Landmines**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) During FY 1999 development contracts were awarded, hardware for the prototype assessment test (PAT) phase was purchased, and the PAT plan and operations order were finalized.

(\$ 4.505 Million)

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(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	4.687	0.000	0.000	Continuing
Appropriated Value	0.000	0.000	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	(.182)	0.000	0.000	
c. Other	0.000	0.000	8.622	
Current President's Budget	4.505	0.000	8.622	Continuing

Change Summary Explanation:

(U) **Funding:** Beginning in FY 2001, PE 0603121D8Z was renamed to SO/LIC Advanced Development. FY 2001-2005 funding for this PE was transferred from PE 0603122D8Z.

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

(U) **Technical:**

(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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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 Combating Terrorism Technology Support PE 0603122D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	36.349	55.449	41.307	42.004	41.737	41.805	42.749	Continuing	Continuing
Counterterror Technical Support (CTTS)/P484	31.381	46.485	41.307	42.004	41.737	41.805	42.749	Continuing	Continuing
Special Operations/Low Intensity Conflict (SO/LIC)/P205	1.215	1.309	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Explosive Ordnance Disposal/Low Intensity Conflict/P206	3.753	7.655	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) Beginning in FY2001 PE 0603122D8Z will be realigned. PE 0603122D8Z, which will be renamed Combating Terrorism Technology Support will be comprised only of P484. P205 and P206 will be moved to PE 0603121D8Z, Alternative to Land Mines, which will be renamed SO/LIC Advanced Development.

(U) P484, Counterterror Technical Support (CTTS). This program develops technology and prototype equipment that address needs and requirements that have direct operational application in the national effort to combat terrorism. It integrates Defense advanced development efforts with government-wide and international efforts to combat terrorism. Projects support antiterrorism, counterterrorism, and consequence management activities to: conduct tactical operations; protect military forces, civilian personnel, installations, infrastructure elements and the general populace from terrorist attack; detect, neutralize, and mitigate the effects of conventional and unconventional devices; conduct surveillance and tracking of terrorists; conduct threat and incident assessments; and process and disseminate information. The Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict oversees and is responsible for execution of the CTTS Program which addresses combating terrorism requirements identified by the interagency Technical Support Working Group (TSWG). The TSWG is a multi-agency R&D working group under the aegis of the Interagency Working Group on Counterterrorism. As such, the CTTS program supports, and is integrated into, the national interagency response to terrorism.

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(U) All projects are distributed among eight mission categories: Chemical, Biological, Radiological, and Nuclear Countermeasures; Explosives Detection and Defeat; Infrastructure Protection; Investigative Support and Forensics; Personnel Protection; Physical Security; Surveillance, Collection, and Operations Support; and Tactical Operations Support. This program is a non-system advanced technology development effort used to demonstrate the utility or cost reduction potential of technology when applied to different types of Defense equipment or techniques. It includes technology development and proof-of-principle demonstrations in field applications for new and improved systems. Coordination and planning efforts with the participating agencies facilitate technology transition from development to operational use. The demonstrations strive to evaluate and assess technologies in a realistic operating environment.

(U) P206, Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC). The EOD/LIC project is a rapid prototyping effort to provide technology and equipment to military operators who are confronted with explosive threats. Tasks focus on detection, countermeasures, and neutralization of explosive threats. Requirements submitted by the Joint Service EOD community and other LIC-oriented military users are prioritized by the OSD EOD/LIC Coordination Group.

(U) P205, Special Operations/Low-Intensity Conflict (SO/LIC) Analytical Support. The SO/LIC Analytical Support project provides specialized research and analytical support for the Assistant Secretary of Defense for Special Operations and Low- Intensity Conflict [ASD (SO/LIC)]. Projects address a broad spectrum of technical, acquisition, and policy issues relating to special operations, counter- and anti-terrorism, peacekeeping, psychological operations, counterinsurgency, unconventional warfare, and contingency operations. The project supports and is integrated into overall DoD efforts to develop options for dealing effectively with a wide range of military responsibilities in military operations other than war. This project provides a vehicle to initiate analysis required to support acquisition documentation and conceptual policy issues regarding roles and missions of SOF in the changing world environment. Analysis may also be used to improve OASD(SO/LIC)'s congressionally mandated oversight function of special operations and low-intensity conflict.

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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	36.349	55.449	41.307	42.004	41.737	41.805	42.749	Continuing	Continuing
Counterterror Technical Support (CTTS)/P484	31.381	46.485	41.307	42.004	41.737	41.805	42.749	Continuing	Continuing

(U) **Project Number and Title: P484 Counterterror Technical Support (CTTS)**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES. Completed a field nuclear material identification system; modification of an ion mobility spectroscopy chemical agent detector with reduced false alarm rate; formulation and testing of a non-hazardous decontamination system for chemical and biological agents; and the development of an over pack bag for devices containing chemical and biological agents. (\$ 5.017 Million)

(U) **EXPLOSIVES DETECTION & DEFEAT.** Completed technology transition of the 90-mm water canon to industry; commercialization of the Universal Training Device; the development of a safer initiating system for various explosive disruption robots; development of an interactive computer-based improvised explosive device neutralization training system; development of the ARTS robotic platform to include on-board diagnostics and access tools for Explosive Ordnance Disposal (EOD) operations; modeling of non-ideal, terrorist explosives, and the development of a database for identification of large vehicle bomb threats, disruption tools and procedures. (\$ 4.703 Million)

(U) **INFRASTRUCTURE PROTECTION.** Completed development of a common encryption standard for use by the “commodity transport” infrastructure systems (i.e., natural gas, petroleum, electricity, etc.) on their Supervisory Control and Data Acquisition (SCADA) systems and Remote Terminal Units (RTUs). (\$ 0.752 Million)

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- (U) **INVESTIGATIVE SUPPORT & FORENSICS.** Completed the development of fingerprint development systems (to detect and recover fingerprints on water soaked surfaces and to develop fingerprints from large objects using cyanoacrylate vapor); a document tagging system; an enhanced post-blast analytical tool for vehicle bombs (CarBombCAD); and a forensic expert and investigative system for aircraft mishaps in which MANPADS are the suspected cause. (\$ 1.539 Million)
- (U) **PERSONNEL PROTECTION.** Completed development of stab and slash resistant body armor and certification of an advanced personnel body armor system. (\$ 0.844 Million)
- (U) **PHYSICAL SECURITY.** Completed Personal Injury Study of the Khobar Towers bombing and identified techniques that will reduce personnel injuries from blast effects; identification and test of retrofits for specific facility upgrades to support the European Command; and standardized bomb threat evaluation cards for dissemination to military forces. (\$ 12.531 Million)
- (U) **SURVEILLANCE, COLLECTIONS, & OPERATIONS SUPPORT.** Completed development of a long-range observation system. (4.128 Million)
- (U) **TACTICAL OPERATIONS SUPPORT.** Completed advanced low-halo night vision goggles; high-speed personnel delivery boat; specialized access tool for installing anchors in steel and concrete; and development of a hand-held radiation detector. (\$ 1.867 Million)
- (U) **FY2000 Plans:**
- (U) **CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES.** Complete development of a disposable chemical and biological protective clothing system; protocols for the rapid detection of biological agents and toxins in food; testing of chemical filters for building ventilation protection; biological agent characteristics databases for human and agricultural bioterrorism pathogens; and a palmtop first responder chemical hazard planning tool. Continue development of technology and prototypes to support countermeasures against terrorist use of CBRN threats in urban environments, chemical and biological detection, identification, mitigation, and decontamination methods. Continue to develop personnel protective equipment with special emphasis on ease of use and low-cost. (\$ 2.928 Million)
- (U) **EXPLOSIVES DETECTION & DEFEAT.** Complete development of the flat-panel imager for a digital x-ray system; a canine based, remote collection explosives screening system for large vehicle bombs (LVBs); a single-sided neutron interrogation unit for the detection of vehicle bombs; an IED standard operating procedures database; an x-ray database for identification of improved improvised explosive device (IED) components; dilute explosive tile technology for LVB countermeasures; and a low cost remote-firing device. Continue development of equipment to

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assist explosive ordnance disposal (EOD) personnel in the areas of LVB countermeasures; IED detection, diagnostic, and render safe tools; and EOD training systems. Continue development of explosive detection capabilities using canines; quantum resonance and other bulk and trace explosive detection methods; and marking agents. (\$ 5.477 Million)

(U) **INFRASTRUCTURE PROTECTION.** Complete development of an automated infrastructure analysis tool for the electric power grid; a hacker publications, tools, and methodologies database; and a flash ROM (read only memory) vulnerabilities countermeasures tool. Continue development of a radio frequency weapon characterization and effects database; computer/software security and network intrusion detection tools; and water pipeline database. Start development of computer security training aides; experience-based training tools for automated information system (AIS) administrators; common viewer and data reduction tools for intrusion detection systems; infrastructure scale, vulnerability, and interdependency analysis tools; electronic watermarks and file beacons; and database for signatures and contents of known commercial-off-the-shelf programs and software. (\$ 2.625 Million)

(U) **INVESTIGATIVE SUPPORT & FORENSICS.** Continue development of DNA recovery and analysis tools; evidence source determination tools; fingerprint recovery and analysis tools; questioned document analysis validation; and tagging, tracking, and locating capabilities to support law enforcement applications. (\$ 4.036 Million)

(U) **PERSONNEL PROTECTION.** Complete evaluation of advanced transparent armor material; an advanced model for predicting of explosives effects on vehicles and occupants; evaluation of tungsten carbide armor piercing projectiles; development of an advanced transparent portable shield; and laser threat and projectile threat databases. Continue development of enhanced protective measures for fully armored vehicles; transparent armor; improved personnel body armor; counter sniper systems; and laser effects analysis. (\$ 3.437 Million)

(U) **PHYSICAL SECURITY.** Complete the development of ultra-wide band radar, short-range intrusion detection sensor. Continue development of blast mitigation techniques for use in pre and post-construction settings; entry point screening capabilities; automated vulnerability assessment tools; and advanced intruder detection sensors. (\$ 18.178 Million)

(U) **SURVEILLANCE, COLLECTIONS, & OPERATIONS SUPPORT.** Continue development of specialized equipment for intelligence collection; search and recognition systems for terrorist individuals and groups; and tagging, tracking, and locating capabilities to support the intelligence community. (\$ 6.375 Million)

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(U) **TACTICAL OPERATIONS SUPPORT.** Complete advanced chemical agent detector; miniature laser range finder; and tactical nuclear material identification system. Continue development of improved night vision systems; nuclear and chemical detectors; advanced personnel navigation systems; and tactical communication systems. (\$ 3.430 Million)

(U) **FY2001 Plans:**

(U)**TACTICAL OPERATIONS SUPPORT.** Complete development of an advanced personal navigation system; analysis to support development of advanced chemical agent detectors; transition of low halo night vision goggles; development of an advanced high data rate tactical communications system; and development of a low probability of intercept interior communications system. Continue development of improved night vision systems; nuclear and chemical detectors; and tactical communication systems.
(\$ 3.048 Million)

(U) **EXPLOSIVES DETECTION & DEFEAT.** Complete development of a single-sided NQR antenna; software codes for integrating robotic chassis and tools; a field-portable one-sided x-ray system; a hand-held IMS explosives detector; a system for screening personnel and packages; an integrated x-ray/robot; a hardened luggage container; a method for detonation cord marking; and an explosive containment system for airport security. Continue development of equipment to assist explosive ordnance disposal (EOD) personnel in the areas of large vehicle bomb countermeasures; improved improvised explosive device detection, diagnostic, and render safe tools; and EOD training systems. Continue development of explosive detection capabilities using canines; quantum resonance and other bulk and trace explosive detection methods; and marking agents.
(\$ 4.867 Million)

(U)**CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES.** Complete development of a personal chemical agent sampler; training aids for canine nerve agent detection; protocols for assessing building vulnerabilities to a chemical/biological attack; and validation of mass decontamination protocols. Continue development of technology and prototypes to support countermeasures against terrorist use of CBRN threats in urban environments; and chemical and biological detection, identification, mitigation, and decontamination methods. Continue development of personnel protective equipment with special emphasis on ease of use and low-cost.
(\$ 2.601 Million)

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(U)**PERSONNEL PROTECTION.** Complete development of a counter sniper system to intercept bullets; advanced composite vehicle armor; design and evaluation of the next generation fully armored limousine; and development of advanced personnel protection for FAVs. Continue development of enhanced protective measures for fully armored vehicles; transparent armor; improved personnel body armor; counter sniper systems; and laser effects analysis.
(\$ 3.054 Million)

(U) **SURVEILLANCE, COLLECTION & OPERATIONS SUPPORT.** Complete development of a hand-held RF detection system and a quick erect, wireless transmission system for full-motion video. Continue development of specialized equipment for intelligence collection; search and recognition systems for terrorist individuals and groups; and tagging, tracking, and locating capabilities to support the intelligence community.
(\$ 5.665 Million)

(U) **PHYSICAL SECURITY.** Complete development of security engineering manuals for baseline antiterrorism/force protection military construction standards; a modular, open architecture system to provide intelligent vulnerability assessment, consequence and risk management tools; video-based systems to provide perimeter intrusion detection with low-probability of false alarm and early warning of large vehicle bomb characteristics; a man-portable, motion-activated electronic trip flare; and an integrated high-volume air sampler and explosive trace detection system for the inspection of cargo containers. Continue developing blast mitigation techniques for use in pre and post-construction settings; entry point screening capabilities; automated vulnerability assessment tools; and advanced intruder detection sensors.
(\$ 16.153 Million)

(U)**INFRASTRUCTURE PROTECTION.** Complete development of a water pipeline database; a RF weapon characterization and effects database; electronic watermarks and file beacons; and a database of signatures and contents of known commercial-off-the-shelf programs and software. Continue development of computer/software security and network intrusion detection tools; computer security training aids; experience-based training tools for AIS administrators; common viewer and data reduction tools for intrusion detection systems; and infrastructure scale, vulnerability, and interdependency analysis tools. Start development of systems for automatic indications and warnings of cyber attacks.
(\$ 2.332 Million)

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(U)**INVESTIGATIVE SUPPORT & FORENSICS.** Complete development of a first responder tool set for emergency response and management; a personal attribute `determination through fingerprints` capability; a cockpit voice recorder analysis system; improved methodologies for trace explosives detection; techniques for the determination of the geographic source/origin of explosives and organic materials (based on stable isotopic ratios); an enhanced handwriting analysis and questioned document examination system; chemical tags for devices and documents; improved audiovisual tape enhancement methods; and latent fingerprint standard references. Continue development of DNA recovery and analysis tools; evidence source determination tools; fingerprint recovery and analysis tools; questioned document analysis validation; and tagging, tracking, and locating capabilities to support law enforcement applications.
(\$ 3.587 Million)

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<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	36.349	55.449	41.307	42.004	41.737	41.805	42.749	Continuing	Continuing
Special Operations/Low Intensity Conflict (SO/LIC)/P205	1.215	1.309	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

(U) **Project Number and Title: P205 Special Operations/Low Intensity Conflict (SO/LIC)**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U)Projects included: Non-lethal Weapons Interagency study; Optempo/Perstempo versus Deployment of NSW Forces; SOF Operations in a Sensor Rich Environment; Joint Architecture Requirements for MPARE; Compliance with DoD Information Operations Master Plan; SECDEF Report on the Military's Role in Countering Terrorism; and the Effectiveness of DoD Medical Humanitarian Projects.
(\$ 1.215 Million)

(U) **FY2000 Plans:**

(U)The FY 2000 projects include: Integrating Information Operations, Psychological Operations, and Public Diplomacy; Joint SOF Requirements and Technologies Analysis; Defense Expenditures on Low-Intensity Conflict Activities; Determine Future Roles and Missions of Special Operations Forces; Preparing for Foreign Urban Counter-Insurgency: Interagency Requirements for Future Urban Counter-Insurgency Operations; Complex Adaptive Systems Modeling for Special Operations.
(\$ 1.309 Million)

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<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	36.349	55.449	41.307	42.004	41.737	41.805	42.749	Continuing	Continuing
Explosive Ordnance Disposal/Low Intensity Conflict/P206	3.753	7.655	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

(U) **Project Number and Title: P206 Explosive Ordnance Disposal/Low Intensity Conflict**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) Completed development of a clandestine underwater transponder. Completed development of EOD ballistic/fragmentation protection. Completed development of special operations forces vehicle ballistic protection. Completed development of non-explosive cartridges. Completed development of a support craft command and control system. Completed development of an integrated mission planning and evaluation system. Completed development of an integrated diver's display mask. Completed development of a small munitions/boobytrap disrupter. Completed evaluation of long range disrupters. Completed evaluation of a miniature mine detector. Completed development of a non-magnetic dive light. (\$ 0.359 Million)

(U) Continued development of a limpet mine detection system. Continued development of a remote field disassembly system. Continued development of an improved underwater demolition charge. Continued development of a limpet mine neutralization tool. Continued development of a hull acoustic navigation system for diver's search. Continued development of an EOD incident site command, control and communications system. Continued development of an advanced EOD tactical information system. (\$ 1.717 Million)

(U) Started development of an HMMWV-based laser ordnance neutralization system. Started development of SOF/EOD tactical decision aids. Started development of an advanced EOD explosive storage system. Started development of RAMS/AFS Interface. Started development of an integrated explosive device training system. Started development of an improved vehicle access/disruption device. Started development of a remote EOD mini-reconnaissance vehicle. Started development of a SOF/EOD personal digital assistant. Started development of a thermite containment system. Started development of Special Operations Craft - Riverine (SOC-R) ballistic protection. Started development of SuperQuick fuze countermeasures. (\$ 1.677 Million)

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(U) FY2000 Plans:

(U)Complete evaluation of a remote field disassembly system. Complete development of a limpet mine detection system. Complete development of an improved underwater demolition charge. Complete development of a limpet mine neutralization tool. Complete development of a hull acoustic navigation system for diver's search. Complete development of an EOD incident site command, control and communications system. Complete development of an advanced EOD tactical information system. Complete development of SuperQuick fuze countermeasures.

(\$ 1.175 Million)

(U)Continue development of an EOD laser ordnance neutralization system. Continue development of SOF/EOD tactical decision aids. Continue development of advanced EOD explosive storage system. Continue development of the RAMS/AFS interface. Continue development of an integrated explosive device training system. Continue development of a vehicle access/disruption device. Continue development of a remote EOD mini-reconnaissance vehicle. Continue development of a SOF/EOD personal digital assistant. Continue development of a thermite containment system. Continue development of SOC-R ballistic protection.

(\$ 3.739 Million)

(U)Start development of an autonomous search/hydrographic system upgrade. Start development of an RF-controlled digital x-ray imaging system. Start development of a single sided x-ray. Start development of x-ray interpreter hardware/software. Start development of an EOD communications headset. Start development of a chemical/biological/nuclear detector for EOD robots. Start development of chemical leak seal. Start development of a magneto-inductive firing device. Start development of a portable blast chamber. Start development of a high-resolution miniature color diver display system. Start development of a hand-held explosive vapor detector. Start development of an incident site mapping and backpack communications capability. Start development of an integrated remotely operated underwater vehicle, with hull navigation and limpet mine detection sonar. Start development of an advanced remote underwater search vehicle system. Start development of a tactical global broadcasting system receiver.

(\$ 2.741 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 Combating Terrorism Technology Support PE 0603122D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	37.667	52.223	54.791	Continuing
Appropriated Value	0.000	57.223	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	(1.318)	(.666)	(.362)	
c. Other	0.000	(1.108)	(13.122)	
Current President's Budget	36.349	55.449	41.307	Continuing

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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 Combating Terrorism Technology Support PE 0603122D8Z	

Change Summary Explanation:

(U) **Funding:** In FY 2000, Congress added \$2.0M for testing of air blast and improvised explosives and \$3.0M for facial recognition. Adjustments are based on congressionally directed reductions, and a government wide rescission. Beginning in FY2001 PE 0603122D8Z will be realigned. PE 0603122D8Z, which will be renamed Combating Terrorism Technology Support will be comprised only of P484. P205 and P206 will be moved to PE 0603121D8Z, Alternative to Land Mines, which will be renamed SO/LIC Advanced Development.

(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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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 Joint DoD/DOE Munitions PE 0603225D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	12.553	14.315	16.670	16.785	17.083	17.382	17.687	Continuing	Continuing
DoD/DOE Munitiond/P225	12.553	14.315	16.670	16.785	17.083	17.382	17.687	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U)This R&D program is a cooperative, jointly funded effort between DoD and DOE to pursue new and innovative warhead, explosive, and fuze technologies in order to bring about major improvements in non-nuclear munitions. This program supports the development and exploration of new munitions concepts and technology preceding system engineering development. Through our funding arrangement with DOE, DoD resources are matched. More importantly, this relatively small DoD contribution effectively taps the annual billion-dollar DOE RDT&E investment by accessing the specialized skills, scientific equipment, facilities and computational tools not available in DoD.

(U)The effort exploits the extensive and highly developed technology base resident in the National Laboratories relevant to achieving the goal of developing capable, cost-effective conventional munitions, and leverages DoD investments with matching DOE investments. The current program supports 43 projects in warhead technology, energetic materials, advanced initiation and fuze development, munitions lifecycle technology and demilitarization, and computer simulation. A specific Service laboratory sponsors each of these active projects. The program is administered and reviewed by a Joint Technical Advisory Committee composed of members from the Army, Navy, Air Force, OSD, and DOE. Projects are peer-reviewed semi-annually by DoD Service Laboratory/Technical Center personnel in order to monitor technical excellence and insure that the technologies under development address priority DoD needs. The program is integrated with Service efforts through the Project Reliance Weapons Panel and participation in the Defense Technology Area Plan for Conventional Weapons. The program is reviewed under the Technology Area Review and Assessment process.

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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 Joint DoD/DOE Munitions PE 0603225D8Z

<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	12.553	14.315	16.670	16.785	17.083	17.382	17.687	Continuing	Continuing
DoD/DOE Munitiiond/P225	12.553	14.315	16.670	16.785	17.083	17.382	17.687	Continuing	Continuing

(U) **Project Number and Title: P225 DoD/DOE Munitiiond**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) This development effort continues to provide improved component options for use in electronic safing, arming and firing systems. The objective is to provide a set of characterized, qualified, generic components (and suppliers) and to demonstrate their use in prototype designs. A primary challenge is to extend the technology to high-velocity penetrating weapons and to artillery and mortar rounds. This requires significantly reducing system size and cost while increasing the operational capability and survivability and maintaining safety and reliability. Component advances in transformers, low-energy chip slapper detonators, capacitors and switches were achieved this year. These were demonstrated in a working prototype electronic safing and arming device (ESAD) that represents a factor of 7 reduction in size and a factor of 5 reduction in cost over currently fielded technology. New commercial vendors were successfully developed to replace component sources that have withdrawn from the defense business. A focus this year was on shock hardening to support Service initiatives in high-velocity penetrators. Critical ESAD components were shock tested to penetrating weapon environments of 35,000-G with encouraging results. Switches, capacitors and detonators as a group survived quite well. A penetrator survivable chip slapper detonator was developed using a new surface mounting technology. The assembled device, including slapper, cable and explosive column, was successfully fired after exposure to 35,000-G shocks. Tests were also performed on powered components. A switch/capacitor combination was fired under shock. Various formulations for detonator explosive pellets were developed and evaluated, and promising shock survivable candidates were identified. Multi-point detonators are the enabling technology for advanced aimable and target-adaptable warheads. Multi-point detonator arrays using 2, 4, and 40 low-energy chip slappers were successfully produced and fired. However, sensitivities of the detonator arrays to manufacturing variations in the detonators were identified. An effort to understand and accommodate the observed current oscillations and to provide more robust designs was initiated. (\$ 2.31 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 Joint DoD/DOE Munitions PE 0603225D8Z	

(U)DoD and DOE have very similar requirements for energetic materials. Both agencies desire high explosives with increased or tailored performance and decreased sensitivity. Recent accomplishments have benefited both agencies. Characterization work was begun on LLM-105, a dense, thermally stable, insensitive high explosive with 81% of the energy of HMX. A more powerful explosive first synthesized by the Russians, diaminodinitroethylene (DADE), was also synthesized in sufficient quantities to obtain preliminary performance information. DADE appears to have performance similar to RDX with reduced sensitivity and appears to be an attractive candidate for use in advanced gun propellants. A joint evaluation/development program is underway with the Navy for both of these new materials. Two additional promising energetic materials have been identified: DAAF, an insensitive material with performance similar to Composition B, and ANTZDO, which is predicted to be more energetic than HMX but much less sensitive to impact. A bench-scale effort was initiated to produce sufficient DAAG material for further evaluation. Work continued on developing an optimum synthesis route for ANTZDO. The creation of the thermochemical code CHEETAH represents a major accomplishment of the program. This code predicts the performance of energetic materials, specifically, high explosives, propellants and pyrotechnics, and reduces the number of tests necessary to develop a new material. General release of Cheetah 2.0 occurred to over 300 DoD, DOE and DoD contractor users. This version includes new chemical kinetics capability that allows for modeling of time-dependent phenomena, such as partial combustion and detonations in composite explosives. A suite of codes is under development for use in predicting the response of energetic materials in weapon systems subjected to thermal and mechanical insult. A first-ever truly predictive capability for cookoff has been developed composed of coupled thermal/mechanical/chemical codes for predicting when and where initiation occurs, along with shock physics tools for predicting the resulting violence of reaction. An experimental effort was initiated utilizing micro-impulse radar, a new diagnostic technique that measures the rate of disassembly of a test fixture, to determine the violence of cookoff response. These data will be used to evaluate and validate the simulation tools. The response of energetic materials to low strain rate deformations, where the mechanical properties of the materials control the energetic response, is also under investigation. A unique split-Hopkinson pressure bar facility was completed that allows for the measurement of the dynamic stress-strain response of soft materials such as polymers and explosives, and also permits sample temperature control from -55 to +55° C. Measurements were completed on a variety of energetic materials and binders providing input for constitutive model development. The facility design was transitioned to the Navy at Indian Head where the Navy plans to replicate it. (\$ 2.8 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 Joint DoD/DOE Munitions PE 0603225D8Z	

(U)High Energy Density Materials (HEDM) are under development that would significantly increase the effectiveness of the next generation of compact munitions. Recent calculations suggest that solid compounds derived from first and second row elements can be stabilized in configurations that would exhibit significant energy content. This year proof-of-existence and recovery to atmospheric pressure was demonstrated for a family of novel high-nitrogen molecular materials generated using high-pressure techniques. A new material synthesized at the highest pressures appears to be composed of only single bonded nitrogen, while the material created at lower pressures appears to have a mixture of single and double bonded nitrogen. Both of these materials are recoverable to ambient pressure and appear quite stable. Calculations of higher order molecules of nitrogen indicate that these materials should be very energetic, having energies several times that of any known high explosive. Another new class of energetic materials, Metastable Intermolecular Composites (MIC), uses thermite chemistry and unique processing technology which provides uniform nano-scale metal particles to make lead-free energetic materials. These materials are appropriate for use in non-toxic percussion primers for small caliber ammunition and aircraft evacuation mechanisms (CAD/PAD systems) and as reactive warhead fills and performance-enhancing additives for solid rocket propellants. MIC fabrication was scaled up to tens of grams per day in the laboratory with additional extensions and enhancements identified that are expected to support the desired production capability of 1 kg/day. Performance evaluations on the materials continued and tests by both the Army and Navy demonstrated that MIC-based materials meet the current operational requirements for both ammunition primers and for CAD/PAD applications at both high and low temperatures. Transition activities are now supported under the Green Bullet Program sponsored by the Strategic Environmental Research and Development Program (SERDP).

(\$ 0.52 Million)

(U)Lagrangian and Eulerian hydrocodes, coupled code systems, arbitrary Lagrangian-Eulerian (ALE) codes, and supporting materials models and constitutive relations developed at the nuclear weapons laboratories have been improved and adapted to DoD problems and transitioned to the DoD user community for use in warhead design and evaluation. This program provides prompt and direct access to the substantial investments in computational mechanics and materials modeling by the DOE and acts as the conduit for transition. Specific activities supporting the technology transition include distribution of computational tools to the DoD community, support of DOE codes on centralized DoD computing systems, training of the user community, and consulting as needed.

(\$ 2.117 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 Joint DoD/DOE Munitions PE 0603225D8Z	

(U)A major thrust of this program is hard target defeat. A new concept for hard target weapons, the monolithic ballasted penetrator, has been developed that significantly increases velocity limits, penetration capability into concrete, and volume for energetic materials. Manufacturing and casting development studies were completed, and two sound prototype penetrators have been produced in ultra-high-strength AeroMet 100 steel. Gun testing at velocities between 3000 and 3500 fps is scheduled for next year. Small-scale experiments to establish scale effects, velocity limits and transition behavior for oblique and yawed impacts into rock targets were initiated. Tests at high velocity against concrete targets reveal angle-of-attack sensitivities that will challenge system designs and will be the focus of further analyses and experimentation. To address the problem of designing an explosive payload that will survive high velocity impact into rock and concrete, a mid-scale projectile loaded with an explosive formulation of TATB that is thermally stable and extremely insensitive, was jointly tested with the Navy against a concrete structure at 3000 fps. Both the penetrator and explosive survived the impact. In anti-armor tasks the Global Local Optimizer (GLO) code, a non-linear optimization tool used to drive hydrodynamic design codes, was used by warhead designers to optimize and fine-tune the performance of warheads. GLO represents a new and powerful tool for the design of complex multi-parameter warhead systems. It was used to design a munition to produce a particular size and shape of hole into concrete and for generating high-speed jets in a classified project. GLO is estimated to enhance the effectiveness of the designer approximately 10-fold. Relating warhead performance to material properties requires a detailed knowledge of material properties under dynamic conditions and is considered a fundamental issue in computationally based design of future weapon systems. Significant progress has been made in showing for the first time how impurity levels and grain size combine to affect the material behavior in shaped charge liners.

(\$ 2.816 Million)

(U)DoD and DOE efforts toward munitions lifecycle technologies including stockpile aging, surveillance, demilitarization and disposal are coordinated under the auspices of this program. As the preferred method for demilitarization and disposal in DoD turns from open-burn and open-detonation to resource recycle and recovery, alternative technologies are required to turn waste materials into useful products. A successful demonstration was completed that utilized waste Explosive D available from demilitarization operations to form picramide, the starting material for synthesis of the insensitive explosive TATB, a high value product for both DoD and DOE. Scale-up efforts have been initiated and interested industrial partners have been identified for a pilot-plant demonstration. The potential for cutting explosives, both bare and encased in steel, has been demonstrated using a femtosecond laser. Unlike conventional cutting lasers that melt and vaporize material, the femtosecond laser ablates material with no evidence of heating. It offers unique capabilities for use in munitions demilitarization and manufacture. A laser testbed facility was established and cutting demonstrations completed on small components. To provide automated, remote capability for munitions demilitarization activities a robotic workcell for disassembling 155-mm projectiles was designed, prototyped, fabricated and is being assembled. When completed next year, it will provide the capability to completely disassemble M-483 rounds containing 88 bomblets. Age-related degradation of materials within high value weapon systems was studied in order to understand and predict changes in munitions safety, performance and reliability during long term storage. The current focus is on solder interconnect reliability, corrosion of electronics with an emphasis on plastic encapsulated microcircuits, and the aging of propellants. Predictive models for materials and system aging are under development to support stockpile management strategies and improve service-life estimates.

(\$ 1.99 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 Joint DoD/DOE Munitions PE 0603225D8Z	

(U) **FY2000 Plans:**

(U)Improvement of electronic safing, arming and firing systems will continue with a focus on shock survivability for hard target penetrators, multi-point detonator arrays for aimable and target-adaptable warheads, and development of a micro firing system. Shock testing of ESAD components will be expanded to encompass simultaneous axial and lateral shock environments as defined from instrumented high velocity penetration tests. The initial evaluation of shock survivability will be completed on all of the critical ESAD components. Detonator testing across the range of required environmental conditions, including cold, temperature cycling and humidity, will be performed to evaluate long-term reliability of the low-energy chip slapper assemblies. An effort will be initiated to validate electrical models of multi-point detonator arrays and to understand the electrical current oscillations observed during array firings. The objective of the work is to develop more robust multi-point system designs and to reduce the sensitivities in detonator performance to manufacturing and design variations. Recent advances in microelectronics, micro-electromechanical systems, micro-lasers and optical initiation offer opportunities for increased operational capability in electronic firing systems along with a further order of magnitude decrease in size. Initial exploration of a next generation system will begin; feasibility will be established by demonstrating new components, new architectures and enhanced integration. To preserve and transition the advanced electronic initiation technology base developed under this program, a computerized knowledge base will be established on design, manufacture, test and surveillance. This classified tool will ensure experience retention in archives and support government laboratories and contractors.

(\$ 2.35 Million)

(U)The development and characterization of new insensitive and new high-energy, high-power materials will continue with synthesis based on theoretical molecular design. The scale-up of newly synthesized materials, LLM-105, DADE, DAAF, and ANTZDO, will be completed and the predicted performance and material sensitivity properties will be confirmed. The investigation of sol-gel energetic materials will continue with a focus on their use in precision detonators and low-density gas generators. Formulations of a new family of smokeless energetics for possible exploitation in propellant applications will be explored. Release of CHEETAH 2.1 is planned which will contain an additional equation of state library with species calculated from first principles. The code is transitioning from an interpolative tool, calibrated to known explosives, to fully predictive. CHEETAH development will continue on equation of state for unreacted, partially reacted and fully reacted energetic materials, including non-ideal formulations, through modeling and carefully diagnosed experiments. Information will be input into subsequent CHEETAH updates and transitioned throughout the DoD community. Efforts to develop simulation tools for predicting munition system response to operational threat and accident environments will continue. A collaborative effort will be initiated with the Navy to experimentally assess and validate the just completed first-generation codes for predicting violence of reaction in cookoff accidents. Damage evolution and fracture behavior in energetic materials will be characterized using the new split-Hopkinson bar facility and scanning electron microscopy to support the development of energetic material constitutive models for use in the analyses of low strain rate mechanical deformation events.

(\$ 3.47 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 Joint DoD/DOE Munitions PE 0603225D8Z	

(U)The creation of new High Energy Density Materials (HEDM) will continue. Characterization of polymeric carbon monoxide and the newly synthesized nitrogen molecules will be completed in terms of their structure and energy content. Energy release mechanisms will be explored and planning for scale-up of the high-pressure and high-temperature workcell will proceed. A viable process to produce 1 kg/day quantities of MIC materials will be established to demonstrate the feasibility of medium and large-scale applications. Transition of the technology to munitions programs will be supported. A new class of materials that consists of a composite of MIC material bonded to organic molecules will be explored.

(\$ 0.98 Million)

(U)The development of Eulerian, Lagrangian, coupled and ALE codes relevant to the design and evaluation of munitions will continue. Distribution of the newest DOE codes, a parallel version of ALE3D and the ALEGRA shock physics code, to DoD sites will be completed. Efforts will continue in the development, implementation and validation of material constitutive and failure models supporting the simulation of warhead formation and warhead/target interactions. The program also provides a conduit to the improved materials models emerging from the DOE Advanced Strategic Computing Initiative providing high resolution, accurate predictions of materials behavior and failure relevant to the analyses of weapon systems. The transition and support of these tools and models along with user training will be provided as needed.

(\$ 2.435 Million)

(U)Half-scale prototypes of the monolithic ballasted penetrator will be tested at 3000-3500 fps into concrete targets to evaluate penetrator behavior and performance. Small and mid-scale experimental and computational studies will be extended with an emphasis on oblique impact and rock targets. Constitutive models of rock and soil will be evaluated and improved. The focus of these studies is on establishing system limits for high-velocity penetrators and on resolving differences in codes and models. Collaborative studies will be performed on an Air Force identified low-alloy steel that holds promise as a low-cost replacement for current ultra-high-strength steels being postulated for future high-velocity penetrators. The physical metallurgy will be evaluated to optimize chemical and processing variables. Payload survivability during high velocity impacts will be studied via microscopic analysis of the LX-17 explosive that was recovered from the joint test with Navy against a concrete target. Damage to the explosive, including gross material motion along with fracture, failure, and changes to the microstructure, will be evaluated and characterized. The use of multiple shaped charge jet impacts will be evaluated as a means for degrading concrete targets and increasing hard target penetrator performance. Application of the optimizer code GLO to complex warhead design problems, as a powerful extension of design efficiency and capability, will continue. GLO will be used to evaluate warhead designs for increased penetration capability against concrete structures and to continue the development of high-speed jet designs in support of a classified Army program. Exploration and demonstration of the highest speed shaped charge jets attainable will be pursued. The study of dynamic material properties will continue. Work will focus on understanding the role of processing on the dynamic behavior of shocked warhead liner materials, specifically addressing the importance of impurities and microstructure on liner performance. Warhead liners processed according to specifications developed from these studies will be produced and demonstrated. Liner formation and behavior will be studied using infrared thermometry and fluorescence techniques, as well as high-speed, high-resolution optical techniques. Experimental techniques to measure post-shock temperature of material samples will be explored.

(\$ 3.24 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 Joint DoD/DOE Munitions PE 0603225D8Z	

(U)The process for the direct conversion of waste Explosive D into TATB will be scaled-up from 1 kg to 10 kg in support of a planned FY2001 Navy manufacturing technology program to commercialize the process. Exploitation of femtosecond laser cutting and machining of explosives for both munitions demilitarization and manufacturing will continue. Testing in the new laser facility will begin to investigate optimum cutting rates, material limits, safety limits, and geometrical and size limits for explosives. A testbed capability for large (10-kg) explosive components will be established. A parallel modeling effort will study femtosecond time-scale kinetics of the interaction of a laser pulse with energetic material. Remote disassembly of 155-mm M-483 artillery shells to expose the submunition layers for handling and safing will be demonstrated. The program goal is to implement integrated vision capabilities with force control and compliant tooling to demonstrate completely automated disassembly of a cluster munition with safing of the individual submunitions by FY2002. Techniques will be explored for standoff monitoring of emissions from open-burn and open-detonation events. Development of materials and system aging models will continue. A predictive model for solder interconnect reliability based on mechanistic models of thermomechanical fatigue and fatigue crack propagation will be completed and validated using laboratory test samples and fielded test hardware. (\$ 1.84 Million)

(U) **FY2001 Plans:**

(U)Continue the development and demonstration of improved components and architectures for robust, low-cost, miniature safing, arming and firing systems. Continue to work with industry to establish commercial sources for qualified components and the transition of technology to developmental and fielded weapon systems. Complete the characterization of detonators, capacitors, switches, etc. in shock environments for application to hard target munitions toward the program goal of demonstrating a prototype ESAD in a high-velocity penetrator in FY2003. Continue the development of micro-firesets: develop and evaluate required components, improve integration, and demonstrate manufacturing technology. The program goal is a factor of 10 reduction in fireset size over the current low-energy designs. Resolve design issues with multi-point detonator arrays utilizing low-energy chip slappers and transition technology to DoD contractors. Continue support and development of knowledge base tool for preservation of advanced initiation technology. (\$ 3.54 Million)

(U)Continue efforts to synthesize, characterize and scale-up new energetic materials with increased or tailored performance and decreased sensitivity. Formulate and test smokeless propellants and determine performance/signature properties and scale up fabrication as needed for testing. Study experimentally the grain-scale dynamics of high explosives by observing the breakout of a detonation across the polished face of an HMX-based explosive. Explore the relationship between detonation front roughness and microstructure. Implement improved kinetics models into CHEETAH. Generalize the CHEETAH solvers to handle acid-base chemistry to improve results for explosives and propellants that contain ammonium chlorate. Exercise safety simulation tools against test data to validate codes and expand their ability to predict weapon system performance and response in accident situations. The joint experimental program with Navy will be expanded from simple to complex geometry tests. Testing and analyses of a full weapon system is scheduled for FY2002. (\$ 3.57 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 Joint DoD/DOE Munitions PE 0603225D8Z	

(U)Complete characterization of metastable polymeric molecules and continue synthesis effort of extended solid high energy density materials. Study the nature of phase transitions in solid nitrogen; pursue high hydrogen content material (BH3). Evaluate large volume press to scale up production. Complete the transition of MIC-based materials to military applications.

(\$ 0.75 Million)

(U)Continue to develop, extend and apply the hydrocodes and associated materials models for warhead design and evaluation. Ongoing code and material model development will continue to focus on greater accuracy, improved physics, and extension to a broader class of real-world problems. Continue to support the transition of these tools, the training and consulting for the DoD user community.

(\$ 3.3 Million)

(U)Continue the study of advanced hard target penetrator concepts and adapt designs to state-of-the-art materials and manufacturing methods. Complete small and mid-scale experimental and computational studies focused on scale effects, velocity limits and transition behaviors for oblique and yawed impacts into rock targets. Investigate weldability and melt processes to optimize properties and castability of the new Air Force low-cost penetrator steel. Evaluate and test the survivability of enhanced explosive payloads over the demonstrated LX-17 baseline. Continue the science-based technology projects relating warhead performance to material properties under dynamic conditions as a prelude to improved computational modeling and the transition of improved warhead designs to developmental and fielded weapon systems. Produce powder metallurgy molybdenum and tungsten liners for enhanced anti-armor warhead applications and conduct `soft-catch` tests using both prototype powder metallurgy and wrought material to permit model validation in complex, high-strain/high-strain-rate experiments.

(\$ 3.6 Million)

(U)Complete the evaluation of femtosecond laser cutting on live munitions and begin to identify specific applications of the technology for munitions manufacturing and demilitarization operations. Adapt the robotic workcell to the disassembly of Adam mine rounds. Design and simulate the disassembly process, fabricate the hardware and demonstrate the complete remote disassembly of the mine round. Continue the development of materials and system aging models. Complete the predictive model for the reliability of plastic encapsulated microcircuits in dormant storage. This is important because commercial specifications and test protocols do not accurately represent the long-term storage times and conditions relevant for DoD munitions.

(\$ 1.91 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 Joint DoD/DOE Munitions PE 0603225D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	13.007	14.786	14.790	Continuing
Appropriated Value	0.000	0.000	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	(.454)	(.104)	(.120)	
c. Other	0.000	(.367)	2.000	
Current President's Budget	12.553	14.682	16.670	Continuing

Change Summary Explanation:

(U) **Funding:** FY 1999 reflects reprogramming reductions. Funding changes in FY 2000/2001 reflect adjustments for inflation and the FY 2000 government wide recession.

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

(U) **Technical:**

(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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UNCLASSIFIED

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 Automatic Target Recognition PE 0603232D8Z			
<i>COST (In Millions)</i>	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	6.107	7.529	7.534	4.673	4.754	4.849	4.945	Continuing	Continuing
ATR/P232	6.107	7.529	7.534	4.673	4.754	4.849	4.945	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT:**

(U) Automatic Target Recognition (ATR) systems improve the capabilities of our armed forces by enabling them to make better use of the information provided by military sensor systems such as radar, laser, infrared (IR), hyperspectral, identification friend or foe (IFF), and electronic signal measurement (ESM). ATR enhances the combat capabilities of our forces by increasing the lethality and survivability of our weapon systems and decreasing the time required to acquire and identify potential targets. ATR technology reduces our risk of fratricide by augmenting combat identification systems to improve our ability to distinguish between friend, foe, or neutral forces under high stress conditions. ATR technology provides significant workload reduction for the intelligence forces by aiding the image analyst to exploit imagery rapidly and accurately. In an era of decreasing military manpower, improved ATR will enable our forces to handle an ever increasing load of sensory information in the complex situations to be encountered in the military missions of the future. ATR capabilities are becoming essential to the Warfighter, as the Services pursue "network-centric" concepts for exploiting sensor imagery and information acquired through large arrays of sensors at all echelons. An OSD initiative, Smart SensorWeb (SSW), seeks to exploit this concept even further by providing greatly enhanced situational awareness for the Warfighter at the lower echelons, such as the battlefield commander. SSW will leverage on-going Service investments and will critically depend on application of ATR technology to achieve its goals.

(U) Increasing ATR operational effectiveness requires research and development to enhance sensor performance and algorithmic image processing. Additionally, improved, more efficient procedures must be developed for measuring and demonstrating ATR effectiveness. This is very important as the utility of ATR is highly dependent on the quality of information provided by the sensor system(s) and the ability to process that information effectively to provide reliable decisions with operationally acceptable false alarm rates. Service and Agency ATR efforts have concentrated on algorithm development for conducting post-processing comparison and decision making which exploit improved digital computational capability. This program will focus on determining effectiveness of ATR, establishing benchmark metrics, and conducting and collecting single and multi-sensor data for potential reuse in Service and Agency algorithm development

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and objective evaluation. Consistent with the 1997 report of the Defense Science Board Task Force on ATR, this program will establish standard tests and procedures to provide an “honest broker” assessment of current leading candidate ATR’s, as well as emerging ATR technology for the next generation of ATR systems.

(U) The ATR program funds the integration and demonstration of advanced technology for field experimentation and assessment. The result of the ATR program efforts is the integration of the demonstrated technological capabilities and the capability to assess ATR algorithm performance. This leads to greatly improved understanding of the Joint Warfighting utility when assessed in realistic operational contexts. The Military Services provide air, land, and naval technological superiority, respectively, and ACTDs rapidly prototype and transition technological solutions to specific threat scenarios. This program provides timely resources and flexibility to horizontally integrate technology solutions across Services and Agencies and identify new and emerging “best-in-class” ATR systems with confidence so that this critical technology can be fielded more quickly.

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	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
COST (<i>In Millions</i>)									
Total Program Element (PE) Cost	6.107	7.529	7.534	4.673	4.754	4.849	4.945	Continuing	Continuing
ATR/P232	6.107	7.529	7.534	4.673	4.754	4.849	4.945	Continuing	Continuing

(U) **Project Number and Title: P232 ATR**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS:**

(U) **FY 1999 Accomplishments:**

(U) A Hyperspectral Technology Assessment Program (HTAP) was established to develop a framework for the quantitative characterization and utility of hyperspectral technology to DoD systems. During FY99, this effort reviewed various processing algorithms and applied them to canonic data sets. In addition, a system performance prediction model was developed. Another focus of the ATR Program was in the area of Synthetic Aperture Radar (SAR) for reconnaissance and surveillance. During FY99, the concept of Problem Sets was established wherein a comparative assessment of ATR algorithms for SAR data was designed and developed. This will enable the conduct of comparative testing against benchmark metrics for various mission scenarios. Techniques and metrics to quantitatively describe input image difficulty, or clutter, were formulated and are being developed. The ATR Program also initiated work in the area of optical correlators to assess their utility as an alternative to digital processing. The capabilities of the Virtual Distributed Laboratory (VDL) were improved using better query tools and encryption. FY99 also saw efforts directed towards transitioning ATR technology into existing service programs. Two efforts were initiated for ATR technology transition; the Sense and Destroy Armor (SADARM) fire-and-forget smart munition which would incorporate ATR technology for its LADAR upgrade and the Long Range Advanced Scout Surveillance System(LRAS3) which would use ATR technology for its IR sensor. Initial studies were conducted in support of advanced technology applications for Smart SensorWeb (SSW). (\$6.107 Million)

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(U) **FY 2000 Plans:**

(U) "Best Practices" for standardized ATR evaluation and assessment will be established and promulgated through the Automatic Target Recognition Working Group (ATRWG). Standard metrics to describe ATR performance and associated problem sets will be adopted which cover surveillance, weapon and attack applications of ATR's. The Problem Set generation and ATR evaluation effort to determine "best in class" will be expanded to include more complex ATR functions such as scene analysis, and new sensor types to include hyperspectral and multi-mode sensors. These data sets will be distributed and made available via the VDL. A closer technical relationship will be established between the ATR and Hyperspectral communities, with increased emphasis on technology issues dealing with the assessment of Long Wavelength Infrared (LWIR) hyperspectral imaging for ATR. Initial taxonomy will be defined for hyperspectral algorithms and a preliminary performance assessment will be established and used to refine a system level performance model. A report will be issued comparing optical and digital correlator processing. The first Problem Sets will be delivered and used to evaluate ATR algorithms for SAR imagery, The Services' synthetic image generation capabilities will be applied to multi-spectral ATR's as a means assessing ATR performance over a wider range of operating conditions. During this time period more extensive subsystem technology effectiveness demonstrations will be conducted which support the transition efforts begun in FY99. These efforts will focus on the SADARM and LRAS3 initiatives begun in FY99. Modeling and simulation tasks will be conducted to provide software and hardware in the loop effectiveness analyses refine design requirements and manufacturing approaches. These models and simulations will be used to expand the range of tests and provide greater confidence in ATR field tests, which are limited in scope and duration, to facilitate transition to production programs. An assessment of hyperspectral performance and operational utility will continue as a basis for future investment decisions. The timing of these assessments will be consistent with the current schedules for ASRP flight demos and launches of Warfighter -1 and the Navy Earth Map Observer. Additional efforts will be launched for the development of experimental testbeds by the Services to evaluate advanced "smart" sensor technology for enhancing the situational awareness of the battlefield commander – Smart SensorWeb (SSW). Initial SSW experiments will be conducted at selected test sites. (\$7.529 Million)

(U) **FY 2001 Plans:**

(U) Robustness of selected ATR's will be assessed over a wider range of challenging operating conditions using innovative applications of real, hybrid and synthetic imagery. This effort will support the validation of using multi-spectral synthetic imagery generated "on-demand" for the selected ATR in its operational scenario. The application of such multi-sensor synthetic imagery in High Level Architecture (HLA) simulations will be assessed as a technique to determine

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dynamically ATR effectiveness. In the hyperspectral area, an end-to-end performance model, incorporating sensor and processor models, will be validated. The end-to-end model will be used to conduct performance and subsystem trade off analyses between hyperspectral sensors and their ATR's. Service models developed to predict ATR performance will be refined to include evolving high fidelity multi-mode sensors. Experimentation for advanced technology assessments for Smart SensorWeb at test sites will continue. Further integration of the SSW sensorwebs will be pursued. (\$7.534 Million)

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(U) B. <u>Program Change Summary</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	5.010	7.775	7.588	Continuing
Appropriated Value				Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed undistributed reduction		0.000		
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	1.097	(.246)	(.054)	
c. Other				Continuing
Current President's Budget	6.107	7.722	7.534	Continuing

Change Summary Explanation:

(U) **Funding:** FY 1999 changes are a result of reprogrammings in support of initial studies for Smart Sensor Web advanced technology applications. FY2000 changes are due to inflation adjustments and the government wide rescission. FY 2001 reflects inflation savings

(U) **Schedule:** Not Applicable

(U) **Technical:** Not Applicable

(U) **C. OTHER PROGRAM FUNDING SUMMARY COST:** Not Applicable

(U) **D. ACQUISITION STRATEGY:** Not Applicable

(U) **E. SCHEDULE PROFILE:** Not Applicable

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY DEFENSE-WIDE RESEARCH, DEVELOPMENT TEST AND EVALUATION BA 3					R-1 ITEM NOMENCLATURE SPECIAL TECHNOLOGY SUPPORT PE 0603704D			
COST (In Millions)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete
Total Program Element (PE) Cost	11.018	15.568	10.777	10.957	11.181	11.402	11.630	Continuing
Project Name/No. and Subtotal	11.018	15.568	10.777	10.957	11.181	11.402	11.630	Continuing
Costs - Special Technology Support/P704								

A. Mission Description and Budget Item Justification

BRIEF DESCRIPTION OF ELEMENT: Special Technology Support to Intelligence and Light Forces provides quick reaction capability to satisfy CINC Intelligence and Light Forces requirements. It emphasizes the rapid prototyping of equipment and systems under initiatives which are ordinarily completed within a 12 to 24 month period, and cost less than a million dollars. By Congressional direction for FY 1990 and beyond, this program element contains two projects previously funded under other program elements: 1) the Counter Insurgency Special Technology Program (which was part of the Force Enhancements - Active Program / PE 1110011D), and 2) a portion of the Equipment Upgrade Program / PE 0203745A). Both projects are intelligence related.

The PE is under Budget Activity 3, Advanced Development, since these initiatives result in proof of technological feasibility and technical and operational evaluations.

PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1999

- Mission Support

FY 2000

- Mission Support

FY 2001

- Mission Support

FY 2002

- Mission Support

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APPROPRIATION/BUDGET ACTIVITY Research, Development, Test & Evaluation, Defense-wide/BA 3	R-1 ITEM NOMENCLATURE SPECIAL TECHNOLOGY SUPPORT PE 0603704D	

FY 1999-2004 PLANS:

B. Program Change Summary	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>To Complete</u>	<u>Total Cost</u>
Previous President's Budget (FY 1999)	11.176	10.948	10.855	Continuing	Continuing
Appropriated Value				Continuing	Continuing
Adjustments to Appropriated Value		4.792			
a. Congressionally-directed undistributed reduction					
b. Recission/Below-threshold Reprogramming, Inflation Adjustment, and government-wide rescission		(.172)			
c. Other	(.158)		(.78)	Continuing	Continuing
Current President's Budget	11.018	15.568	10.777	Continuing	Continuing

Change Summary Explanation:

(U) Funding: Funding changes are the result of below threshold reprogrammings and the government-wide rescission.

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

C. Other Program Funding Summary Cost Not Applicable.

D. Schedule Profile Not Applicable.

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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.

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) **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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(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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	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
<i>COST (In Millions)</i>									
Total Program Element (PE) Cost	34.043	7.675	7.607	7.570	7.538	7.449	7.435	Continuing	Continuing
Joint Warfighting/P727	34.043	7.675	7.607	7.570	7.538	7.449	7.435	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT:**

(U) In May 1998 the Secretary of Defense appointed Commander-in-Chief, United States Joint Forces Command, the Defense Department's Executive Agent for Joint Experimentation (JE). Subsequently, the Department realigned resources to support the Joint Forces Command's (JFCOM) new role. FY 1999 funding from this Program Element was redirected to support the initial stand-up of JFCOM's Joint Experimentation Directorate. Funding to support the Joint Advanced Warfighting Program concept development, the digital network infrastructure, and technology feeder support for joint experimentation was retained in this Program (PE). Program Element 0603727N has been established to fund JFCOM JE efforts in FY 2000 and beyond. Consequently, FY 1999 accomplishments in this exhibit include JFCOM's activities.

(U) The Joint Warfighting PE supports three related activities: the Joint Advanced Warfighting Program (JAWP), the Information Technology Backbone (ITB), and technology feeder support for joint experimentation. While these activities strongly support JFCOM's joint experimentation efforts, a separate program element has been retained since the activities support other organizations in addition to JFCOM, and require a degree of independence from JFCOM to function as envisioned.

(U) The JAWP was established by the Office of the Secretary of Defense (OSD), with the support of the Vice Chairman of the Joint Chiefs, to serve as a catalyst for innovation and change. This program's focus is on assisting in the formulation and assessment of advanced concepts and capabilities, plus identifying enabling technologies and integration options for the Department. These concepts drive changes in the doctrine,

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organization, training and education, materiel and leadership (DOTML) of the Services. The JAWP serves a key role in identifying, exploring and evaluating breakthrough warfighting capabilities. It builds on the lessons learned from earlier Service experiments that have underscored the importance of having a firm conceptual basis upon which to build experiments. The JAWP concentrates on joint instead of Service unique revolutionary concepts. In identifying and elaborating innovative joint concepts and capabilities, and associated enabling technologies, the JAWP not only takes into account Service efforts but also those of the CINCs and Defense Agencies. The JAWP promotes integration and conducts experiments and assists in their implementation. The JAWP's work complements and supports the activities of JFCOM, the Joint Staff, and the OSD. It provides an independent source for formulating advanced concept candidates for joint experimentation. The JAWP is composed of both civilian analysts and technologists, and the JAWP Analytical Project Office (JAWP-APO), a jointly manned activity established by the Deputy Secretary of Defense consisting of military operators from the four Services.

(U) The Information Technology Backplane provides an advanced network infrastructure that extends commercial capabilities to provide capabilities needed to meet *Joint Vision (JV) 2010* needs. Information Superiority is a key *JV 2010* building block and the ITB provides the means to experiment with the digital transmission capabilities that will be available in five years. The ITB is not a new physical network. It is a virtual network that capitalizes on existing physical networks such as the Defense Information Systems Network (DISN), the Defense Information Systems Agency (DISA)-Defense Advanced Research Projects Agency (DARPA) Leading Edge Services Network, the Defense Research and Engineering Network (DREN), and the experimental Advance Technology Demonstration (ATD) net. The ITB has many users from sites served by existing networks but the funding included in this PE is the incremental funding needed to support joint experimentation. For example, this PE provides the circuit costs to extend the ITB from the experimentation site to the nearest point on the backplane (where no other network exists), and only the "extra" backplane costs generated by the Joint Warfighting Experiments. Since joint experiments are very dependent on advanced distributed simulation, or on limited live command post exercises that are being driven by simulations, a robust network is needed to interconnect the various sites. Often times, these simulations press the state of the art in networking capability, including that of requiring Type-I encryption for protected communications. The ITB also supports new bandwidth intensive applications such as video teleconferencing and high definition television.

(U) The third effort supported by this PE is technology feeder support for joint experiments. There are many technology demonstrations, advanced technology demonstrations, and advanced concept and technology demonstrations that can provide advanced technologies to support joint experiments. This effort provides technology managers the resources to expand the scope of a test or demonstration to collect data for the joint staff or JFCOM, thereby leveraging the OSD and Service Advanced Concept Technology Demonstrations (ACTD) investment.

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(U) **PROGRAM ACCOMPLISHMENTS AND PLANS:**

(U) **FY1999 Accomplishments:**

(U) **Joint Experimentation:** FY 1999 funds were transferred to JFCOM is support the following efforts: (\$10.260)

(U) JFCOM's FY 1999 objectives were presented in its Joint Experimentation Campaign Plan 99 (CPLAN 99). The Campaign Plan provides a methodology for laying out a strategy and schedule for FY 1999 experiments. CPLAN 99 provided the context for the Joint Experimentation program and for developing the experimentation strategy for each identified future Joint Warfighting concept. The concept of a Joint Experiment program to address future military challenges and the concurrent necessity for Joint interoperability is unique and never before examined through a comprehensive approach. Therefore, a central theme of CPLAN 99 was "proof of process" which described the validation of the Joint Experimentation process and proof of the sufficiency of the JFCOM organization which has been established to implement this process. This "proof of process" strategy has allowed for implementation of an institutionalized approach which can support analysis and implementation of a diverse range of concepts, validation of the approach and the ability to rapidly re-focus efforts from the process to the content of the Joint Experimentation plan. CPLAN 99, the first campaign plan, has permitted benchmarking the experimentation processes which JFCOM will conduct with costing estimates established using historical Service metrics and previous experience. The concepts selected for experimentation allowed the program to establish links with other DoD wide and individual Military Service experimentation activities thereby optimizing resource allocation through integration and leveraging ongoing activities. The program of experimentation set forth by approval of CPLAN 99 structured the JFCOM Joint Experimentation organization around investigating and developing new concepts and military capabilities. Joint Experimentation differs from other RDT&E and acquisition efforts in that it is concept based instead of deficiency based. The concepts which have been selected for experimentation directly support the Chairman of the Joint Chiefs of Staff *Joint Vision 2010* Implementation Master Plan and the *Revolution in Military Affairs* for 2010 and beyond. These concepts reflect the tenets and key points articulated in the RMA and address future, emerging military challenges. These experimentation efforts will support the Joint Warfighter across the full spectrum of military operational environments. Joint Experimentation at JFCOM seeks to identify and narrow redundancies and harmonize the experimentation efforts of the Services, non-DoD agencies and industry.

(U) In FY 1999 JFCOM has sponsored a Futures Program. The Futures Program explored and will continue to examine future DOTML-P issues by reviewing emerging technologies and concepts and by bringing together warfighters, futurists, academics, and industry. Additionally,

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the Futures Program explored and continues to explore the use of wargames, modeling and simulation and virtual environments in developing future concepts for experimentation. J9901 and the Futures Program also leverages the existing Information Technology (IT) Backplane to conduct experiments. However, it is anticipated that robust experimentation will require continued development of the existing IT Backplane capabilities. The Futures Programs has focused on identifying Future Operational Capabilities (FOCs) critical to Joint Warfighting. These FOCs are the product of a series of Futures Seminars, Concepts Development Workshops and Senior Warfighter Reviews consisting of OSD, Joint Staff, Services and Component Commanders that were sponsored and executed by JFCOM starting in October 1999. Conferences and workshops have been attended by individual Service Battle Laboratory representatives, the Joint Staff, Unified CINCs and OSD who have nominated future warfighting experiments and cooperative approaches to support future experimentation partnerships. To date JFCOM has identified 10 concepts scheduled for experimentation starting in FY 1999 and continuing into FY 2000. These concepts are being evaluated in JFCOM generated experiments or will leverage ongoing services, demonstrations/experiments, ACTDs, ATDs and JT&Es. They will include experiments which evaluate the following Future Operational Concepts (FOCs): Rapid Decisive Operations (RDO), Attack Operations Against Critical Mobile Targets, Joint Interactive Planning, Focused Logistics: Enabling Early Decisive Operations, Command Relevant Operational Picture, Adaptive Joint C2, Surveillance and Fires From Space, Information Operations, Forcible Entry Operations and Strategic Deployment. These ten concepts form the basis of the experimentation process JFCOM initiated in October 1998. As a result of this activity, CINC USJFCOM has designated Rapid Decisive Operations as the key, overarching concept. The other nine currently identified concepts are supportive of RDO. This action is reflected in the SECDEF's Defense Planning Guidance. This effort has also supported the independent assessment of the Joint Advanced Warfighting Program (JAWP). The results from the OSD sponsored JAWP have been integrated into the overarching JFCOM Joint Experimentation program.

(U) **Joint Warfighting Attack Operations Experiment** - FY 1999 funds were transferred to JFCOM is support the following effort: (\$15.900 million)

(U) The JFCOM Joint Experimentation Implementation Plan (I-Plan) dated 14 July 1998 is CINC USJFCOM's concept and plan for executing the SECDEF Charter for Joint Experimentation. It establishes the experimentation process and described how JFCOM will organize to accomplish the mission. Leveraging existing resources and work accomplished by the Joint Staff and Joint Warfighting Center, JFCOM's FY 1999 experimentation focus was to test and subsequently refine the "Proof of Process" envisioned for the experimentation process by designing J9901 Attack Operations Against Critical Mobile Targets (AOACMT) to evaluate this Future Operational Concept. J9901 tested emerging concepts and joint doctrine by utilizing advanced simulations, virtual environments, and wargames. J9901 took advantage of resources developed in the Synthetic Theater of War (STOW) ACTD to support a Virtual Attack Operations situation. The success of J9901 allowed the program to

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pursue experimentation objectives focused upon the future (2015) such as Intelligence, Surveillance and Reconnaissance (ISR), Command and Control (C2), Weapons Systems, Red Teaming and Future Threats.

(U) In FY 1999, JFCOM conducted the first experimentation event for AOACMT. The initial venue for experimenting on this concept was through advanced simulation. During subsequent experimentation events, simulations of increasing complexity will be used culminating in live field events or experiments merged with simulations. This first phase focused on assessing the relationships between potential 2015 intelligence, surveillance and reconnaissance (ISR) technologies, dynamic tasking, and advanced precision engagement systems. The target set consisted of mobile theater ballistic missiles and launchers. Phase 2 will culminate in a simulation-based experiment that will add an advanced mobile air defense system to the target array and signal intelligence (SIGINT) capabilities to the ISR grid. Phase 3, in FY 2001 will expand human intelligence (HUMINT) and Information Operations (IO) to the joint force capabilities in the experiment. Each phase will also include several leveraged events, among which will be Roving Sands, Fleet Battle Experiments, Army Advanced Warfighting Experiments, Air Force Joint Expeditionary Force Experiments (JEFXs), Joint Test & Evaluations (JT&Es), advanced concept technology demonstrations (ACTDs) and work done on command, control, communications, and computers (C4)ISR by the Joint C4ISR Battle Center.

(U) Joint Advanced Warfighting Program

(U) The Joint Advanced Warfighting Program (JAWP) was established in April 1998. The JAWP-APO was established in January 1999 and fully manned with active duty military personnel in September 1999. Working for the OSD, the Joint Staff, JFCOM and their subordinate activities in support of JWE, the JAWP has: (1) identified key elements of a joint experimentation process; (2) developed candidate advanced concepts for joint experimentation including the Rapid Decisive Operations (RDO) concept which serves as the integrator for all JFCOM concepts; (3) developed, organized and conducted an attack operations experiment, JFCOM's first major FY 1999 experiment (J9901); (4) developed prototype experimentation plans; (5) conducted research and seminars to classify works on future operational concepts and future security environments that are relevant to joint experimentation; and (6) planned for and conducted seminars and workshops with other government organizations to identify complimentary and supporting technology programs and activities. (\$4.545 Million)

(U) Information Technology Backplane

(U) The Information Technology Backplane was expanded and network services and equipment provided to JFCOM. In the network security area, work continued on the authentication system for ATM switch management. In particular, efforts to provide authentication into the wide-spread Simple Network Management Protocol Version 3 (SNMP-V3) began and proposals were advanced through international standards bodies

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such as the Internet Engineering Task Force (IETF). The ITB also served as a NSA alpha and beta test site for cryptographic testing (specifically the KG-75 Release 3 FASTLANE). NRL received a small number of KG-75 Release 3 FASTLANEs as pre-certified versions and began testing the device for network functionality. The results of this initial testing were exchanged with NSA and the FASTLANE vendor, and incorporated in newer versions of the firmware. In the area of ATM applications, work in workstation voice-over-data began. This capability will allow users of a standards based workstation to conduct voice calls using the microphone and speakers attached to the computer. Work continued on tools to exercise network devices, to assist in lab bench testing, live network testing, and network monitoring. A significant part of the ITB effort provided support to JFCOM. Circuits and network management provided between JFCOM, IDA, the Joint Advanced Warfighting Program, and Naval Research Lab (NRL) were continued. Since NRL is a physical hub, network access to other Defense Research and Engineering Network sites such as Space and Naval Warfare Center, Army Research Lab, and etc., were leveraged without cost to this program. JFCOM was also provided a distributed file system node capable of accessing high-end computing resources and sharing files across the High Performance Computing Office of the Director, Defense Research and Engineering. Work began on providing JFCOM high-performance remote access to advanced image analysis tools and databases. Coordination will begin with appropriate OSD ACTD managers and service activities such as U.S.Army-Communications – Electronic Command (CECOM) and U.S. Air Force-Rome Labs to define the network architecture for JFCOM's Joint Contingency Force Experiment in FY 2000. (\$1.719 Million)

(U) Experimentation Feeder Support

(U) The Experimentation Feeder Support task directly supported JFCOM's FY 1999 experiments, a combat identification experiment, and a joint staff study. The Synthetic Theater of War (STOW) ACTD provided the virtual simulation infrastructure for JFCOM's Joint Attack of Critical Mobile Targets Experiment (J9901). Modifications were made to STOW to simulate sensors and weapons in the 2015 timeframe. By having a man-in-the-loop the experiment was able to explore the ability of humans to manage new concepts, investigate new tactics, techniques, and procedures, and to help discover "what could be" by closely linking new technology and concepts. JFCOM also supported the virtual modeling of Joint Surveillance & Target Attack Radar System (JSTARS), a Rivet Joint simulator, and Military Operations in Urban Terrain (MOUT) experimentation. Support was provided to the Combat Identification ACTD to support their participation in the All Service Combat Identification Evaluation Team's (ASCIET) FY 1999 exercise. JFCOM's interest was in the joint and coalition aspects of this experiment. The U.S. Marine Corps (USMC) is considering the Single-Channel Ground and Airborne Radio System (SINGARS) SIP+ radio as a potential combat identification solution because it will provide joint and coalition interoperability due to the large density of SINGARS and SINGARS compatible radios. In ASCIET 99 testing included an Army helicopter, USMC ground forces, and a coalition force. The Joint Staff recognized the need to integrate the processes associated with doctrine, organization, training and education, material, leadership, and people (DOTLMP).

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While the processes for changing material are well understood, the other five considerations for military capability are not well synchronized with the introduction of new technology. This analysis will define and information processing and dissemination systems to collect, coordinate, and provide information to DOD senior decision makers. (\$1.619M)

(U) FY 2000 Plans:

(U) Joint Advanced Warfighting Program

(U) The Joint Advanced Warfighting Program (JAWP) will continue its support of *JV2010* implementation and the Joint Experimentation work in the Office of the Secretary of Defense, the Joint Staff, and the JFCOM and subordinate elements. Efforts will be both on front-end identification and elaboration of concepts and capabilities, plus support for the conduct of experiments. It will mature the Attack Operations concept and expand on the experiences and lessons learned during JFCOM's J9901 experiment, which would include the addition of Joint Suppression of Enemy Air Defenses (JSEAD) operations, expanded command and control applications and a more robust sensor suite. It will continue to develop and refine candidate advanced warfighting concepts and capabilities using wargames, and modeling and simulation. It will identify promising and enabling technologies. It will collect and analyze data to support the formulation of the Department's overall Joint Experimentation efforts. The JAWP will continue to evaluate these concepts and systems through simulation, wargaming and analysis. The JAWP will help in the construct, design and conduct of joint warfighting experiments in three specific areas: command and control, logistics, and joint force employment. It will also participate in other experiments during the year that support advanced joint warfighting. The JAWP will look specifically at the *Revolution in Military Affairs* to analyze the impact of revolutionary technological concepts on doctrine and investment strategies. Workshops, seminars and conferences will be held in conjunction with JFCOM and the National Defense University to inform the discussions and shape the debate on future concepts and exercises. It will conduct vulnerability assessments using "Red Teaming" techniques to identify weaknesses and avoid surprises. It will use the transparent wargaming approach, which it developed to assist in the conduct of J9901 and other experiments. Transformation will also be a key focus. The JAWP will begin to identify programs, systems and methods to improve and expedite the process of executing and implementing the recommended changes, which result from the joint experimentation process and the development of new technological capabilities. Included in these latter activities, the JAWP will evaluate the systems and products developed in Advanced Concept Technology Demonstrations (ACTDs) for use in the Department's overall joint experimentation program. As appropriate it will use available modeling and simulation (M&S). The Defense Modeling and Simulation Office will oversee the JAWP M&S activities to insure that they are consistent with department policy and the DOD High Level Architecture for simulations. (\$4.000 Million)

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(U) Information Technology Backplane

(V) The ITB will continue to be upgraded to reflect emerging protocols that show promise from advanced research network testbeds. In the area of network management, Kerberos authentication will be extended into Simple Network Management Protocol Version 3 (SNMPv3) and interoperability with Public Key Infrastructure (PKI) protocols will be started. In the area of applications, the capability for a workstation voice user to communicate with a standard handset voice user will be started. The image analysis tool, DIEPS, will be extended across the ITB to selected sites (such as JFCOM). This will allow remote users the ability to have interaction similar to those who run DIEPS locally. Network testing of the KG-75 Release 3 FASTLANE will continue and initial pre-certification versions of the KG-175 TACLANE are expected. These units will be tested (with NSA's concurrence) to ensure network interoperability. Results will be fed back to NSA and the vendor for incorporation prior to final certification. Efforts in support of JFCOM will continue, focusing on assisting in the development of a local infrastructure to extend the ITB to multiple sites/users within JFCOM. Connectivity to key sites (JFCOM, IDA, etc.) will continue with selected circuits upgraded to 155Mbs and possibly 622Mbs (as warranted). This will enable experimentation with "killer applications" such as High Definition Television (HDTV), which produces data at gigabit per second rates. Lower bandwidth (10's of Mbps), high quality HDTV receiver systems will be tested and installed at critical sites. HDTV provides mission planners and commanders the ability to observe real-time or near-real-time temporally meaningful data. Upgrades to critical network components of the ITB (such as KG-75 Release 3 FASTLANEs) will occur. (\$1.400 Million)

(U) Experimentation Feeder Support

(U) Experimentation Feeder Support: Plans to utilize several current and planned ACTDs to support joint experimentation objectives will be completed as well as the Joint Staff DOTMLP study. The JFCOM IPT responsible for the Attack Operations Against Critical Mobile Targets (AOCMT) concept will finalize plans for the use of the Extending the Littoral Battlefield (ELB) and Joint Continuous Strike Environment (JCSE) ACTDs to support continued experimentation. JFCOM will also complete an analysis, which will be incorporated in their Campaign Plan for FY 2001, of all ACTDs including the newly selected FY 2000 ACTDs to determine how they can be used to support other experimental concepts. This specifically includes PACOM sponsored ACTDs such as Adaptive Course of Action (ACOA) and other PACOM experimentation activities coordinated with JFCOM. (\$2.275 Million)

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(U) FY2001 Plans:

(U) Joint Advanced Warfighting Program

(U) The JAWP will continue to build on its FY 2000 efforts to support the Department's Joint Experimentation efforts. The focus will be on increased involvement in additional Service/joint exercises and the JFCOMs Joint Experimentation activities, with emphasis on advancing the understanding of specific concepts and in conducting experimentation. Opportunities will be identified to leverage and integrate Service and other agency programs, as well as activities such as Advanced Technology Demonstrations and Advanced Concept Technology Demonstrations. Data collection and independent analysis will be conducted and used to produce reports and papers intended to inform the OSD, Joint Staff and JFCOM leadership of experimentation results and to make recommendations for future activities. In addition, the JAWP will identify breakthrough concepts and technologies that could produce revolutionary future warfighting capabilities. Vulnerability assessments and "Red Teaming" will be conducted to improve the validity and robustness of experimentation. A major effort during the fiscal year will be a focus on the transformation process. The JAWP will work on the identification of vehicles and opportunities that can be used in the early transition of new concepts and technologies in to actual operational military capabilities. (\$4.000 Million)

(U) Information Technology Backplane

(U) The Information Technology Backplane (ITB) ongoing task of transitioning emerging technology from advanced research network testbeds will continue. Implementation of more secure (Kerberized) network management protocols (SNMP) across the entire ITB is expected. Kerberos/Public Key Infrastructure (PKI) interoperability will begin to be tested on selected ITB sites. Work on transitioning switch-partitioning prototypes will begin at selected ITB sites. (This technology will allow physical switching elements to be partitioned into logical "subswitches" which will give virtual networks (such as the ITB) strict resource control over a shared network backbone.) Distributed applications, such as the image analysis tool, DIEPS, will be continue. Efforts in support of JFCOM will continue. Connectivity to key sites (JFCOM, IDA, etc.) will continue with selected circuits upgraded as required. High-quality compressed HDTV feeds will be generated at critical sites while allowing remote users access to a richer set of motion imagery. (\$1.400 Million)

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(U) Experimentation Feeder Support

- (U) Experimentation Feeder Support for Joint Experimentation will continue. JFCOM will analyze ACTDs started in FY 2001 for their potential to support joint experimentation. The main effort will be on executing the plan outline in Campaign Plan 2001 and providing technology and infrastructure in support of the overall experimentation program. (\$2.207)

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<u>(U)</u> <u>B. Program Change Summary</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	18.679	7.872	7.790	Continuing
Appropriated Value	19,100			Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed undistributed reduction	(.957)	0.000		
b.Reprogramming, Inflation Adjustment	15.900	(.056)	(.055)	
c. Other		(.141)		Continuing
			(.128)	
Current President's Budget	34.043	7.675	7.607	Continuing

Change Summary Explanation:

- (U) **Funding:** Reductions based on planning adjustments, inflation adjustments and the government wide rescission. FY 2000-2005 funding was transferred to the Navy's Joint Experimentation Program PE 0603727N.
- (U) **Schedule:** Not Applicable
- (U) **Technical:** Not Applicable
- (U) **C. Other Program Funding Summary Cost** Not Applicable
- (U) **D. Acquisition Strategy:** Not Applicable
- (U) **E. Schedule Profile** Not Applicable

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APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense-Wide/BA 3							R-1 ITEM NOMENCLATURE Cooperative DoD/VA Medical Research Program PE 0603738D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	5.855	7.415	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Coop DoD/VA Medical/P464	5.855	7.415	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) Congress has added funding in this program element each year since 1987. Through FY 1998, the program was managed by the Veterans Administration. In accordance with the FY 1999 Defense Authorization Bill (H.R. 3616, Sec. 244), the Department of Defense now guides investment of these funds as executive agent, acting through the U.S. Army Medical Research and Materiel Command and the Naval Operational Medicine Institute. Coordination with the VA on research topics ensures that the program benefits the health of both active military forces and veterans. Research proposals are solicited from in-house DoD and VA investigators, and projects are selected for funding based on technical merit and relevance to the solicitation. Technical merit is determined through independent peer review by experts outside the DoD and VA. Projects are selected through independent peer review by intramural VA and DoD physicians and scientists. Funds support a `core` or general research program of cooperative medical research in topics such as emerging infectious diseases, trauma, stress, and exercise physiology. Funds also support studies on emerging medical issues of importance to DoD and VA.

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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	5.855	7.415	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Coop DoD/VA Medical/P464	5.855	7.415	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

(U) **Project Number and Title: P464 Coop DoD/VA Medical**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) In FY 1999, the Department of Defense developed an investment strategy and execution plan to comply with the FY 1999 Defense Authorization Bill (H.R. 3616, Sec. 244). That bill named the Secretary of Defense as executive agent, acting through the Army Medical Research and Materiel Command (USAMRMC) and the Naval Operational Medicine Institute (NOMI). USAMRMC has solicited proposals for research in the following topics: women's health, including traumatic stress; emerging pathogens; muscle repair mechanisms and prosthesis (e.g. Post Polio Syndrome); home health monitoring (advanced technology); innovative drug delivery systems; medical records transitioning; and sleep disorders. NOMI has solicited proposals for research on the following topics: the extent and nature of physical, psychological and social problems suffered by prisoners of war and their families; factors that determine the resiliency of POWs and their families in recovering from the trauma of the experience; and physical and psychological markers that would identify potential late sequelae of captivity in former or future POWs. Awards to successful proposals began in 4Q FY 1999.
(\$ 5.855 Million)

(U) **FY2000 Plans:**

(U) In FY 2000 the Department of Defense will continue to be executive agent, acting through the U.S. Army Medical Research and Materiel Command and the Naval Operational Medicine Institute. Coordination with VA on research topics will ensure that the program benefits the health of both active military forces and veterans. As in FY 1999, research proposals will be solicited from intramural DoD and VA investigators and/or extramural investigators with significant DoD or VA collaboration. Projects will be evaluated for technical merit and program relevance. Funds will support a `core` or general research program of cooperative medical research in topics on emerging medical issues of importance to DoD and VA.
(\$ 7.415 Million)

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(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	5.915	0.000	0.000	Continuing
Appropriated Value	0.000	8.000	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	(.060)	(.485)	0.000	
c. Other	0.000	(.100)	0.000	
Current President's Budget	5.855	7.415	0.000	13.270

Change Summary Explanation:

- (U) **Funding:** Funding changes are due to 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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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/BA 3				R-1 ITEM NOMENCLATURE Advanced Concept Technology Demonstrations PE 0603750D8Z					
COST (In Millions)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	80.281	104.976	116.425	118.242	120.713	123.175	125.630	Continuing	Continuing
ACTDs/P523	80.281	104.976	116.425	118.242	120.713	123.175	125.630	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT:** The Department of Defense (DoD) recognizes the need to rapidly develop and field new technological capabilities, and to explore new and innovative operational and organizational concepts associated with those capabilities. Such advances are critical to the objective of achieving a “revolution in military affairs” to support the Chairman’s *Joint Vision 2010*. Advanced Concept Technology Demonstrations (ACTDs) are low risk vehicles for pursuing that objective. ACTDs are capability demonstration and evaluation programs in which the development and employment of technology and innovative, operational concepts by the military user are the primary focus. The demonstrations involve a materiel development organization that develops the technology, and a warfighting organization responsible for assessing the military utility. In addition to stimulating innovation, ACTDs offer three other significant opportunities. They provide experienced combat commanders with an opportunity to develop operational concepts and operational requirements to fully exploit the capabilities being evaluated. They allow the users an opportunity to assess the military utility of the proposed capability prior to a major acquisition decision. They also provide the Services with a mechanism for compressing acquisition cycle time, thus significantly improving their response to priority operational needs. As such, ACTDs are at the foundation of the DoD acquisition reform process. They do not substitute for formal DoD acquisition procedures, but do accelerate these procedures for technologies, which are deemed by the applicable combatant commands to have demonstrated military utility. In FY 1999, ACTDs also became an integral part of the Joint Warfighter Experimentation process. U.S. Joint Forces Command (JFCOM) Joint Experimentation Plan 00 identified ten ACTDs to be evaluated during Millennium Challenge, the major, all-Service joint experiment planned for FY 2000. The Deputy Under Secretary of Defense (Advance Systems and Concepts) (DUSD (AS&C)) worked closely with JFCOM to prepare Campaign Plan 01 in order to insure ACTDs integrate technology and develop new concepts of operation to fully leverage with and integrate into future joint experiments.

(U) The Military Departments and Defense Agencies provide most of the funding (80–90 percent) for ACTDs. This demonstrates significant Service/Agency commitment to the ACTD. Funding from this program element is used: 1) to support actual demonstrations and exercises, 2) to provide hardware to demonstrate military utility, and 3) to fund interim capability operations and support for up to two years after the operational demonstration phase of the ACTD. This two-year phase provides the Service, Agency, and operators with adequate time to continue to address the issues of supportability, maintainability and training identified by the ACTD.

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(U) Both the Science and Technology (S&T) and the warfighter communities submit candidate ACTDs in January of each year. The candidates proposed by the S&T community reflect technological opportunities enabled by recently demonstrated technology. The candidates proposed by the warfighter community (Joint Chiefs of Staff (JCS), Unified Commanders in Chief (CINCs) and Service operational organizations) respond to a deficiency in military capability or to an emerging military need. For each candidate, it is necessary to confirm that the proposed concept is based on technology that is sufficiently mature, and that the capability addresses a priority military need.

(U) The maturity of the technology associated with the proposed capability is assessed by the DUSD (AS&C), with assistance of senior members of the science and technology community (known as the Breakfast Club). The Joint Requirements Oversight Council (JROC) prioritizes the ACTD candidates by military need. The principal management tools for the ACTD are the Implementation Directive and Management Plan. Each approved ACTD will be described in top-level documents that provide details of the demonstration/evaluation, the main objectives, approach, critical events, measures of success, transition options, participants, schedule, and funding. Each ACTD receives considerable review and oversight at high levels within the Department.

(U) The typical timeline of two-to-four years for the operational demonstration phase of an ACTD is compressed compared to normal timelines for fielding an operational capability. These shorter schedules are made possible because ACTDs incorporate mature or nearly mature technology and, therefore, forgo time consuming technology development and technical risk reduction activities. At the end of the ACTD, the user sponsor is able to determine if the capability provided by current technology has sufficient utility to warrant procurement. If there are significant shortcomings, their options are to either pursue an advanced technology demonstration to improve performance, or not pursue the technology any further at this time. In cases where the operational user is satisfied the prototype has significant utility, the prototype can be used as an interim capability. The Department then moves quickly to enter the formal acquisition process and to acquire needed quantities.

(U) The request for FY 2001 candidate ACTDs was issued October 1999. Proposals were received from the CINCs, Services, other DoD Agencies, and industry in January 2000. Candidates are organized into the *Joint Vision 2010* operational concepts of Dominant Maneuver, Precision Engagement, Full Dimensional Protection and Focused Logistics. Plans are being finalized with the Joint Staff to begin the process of reviewing the candidates for FY 2001 ACTDs in February/March 2000. Funding for FY 2001 ACTDs is approximately \$14.0 million.

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(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1999 Accomplishments: All ACTDs initiated in FYs 1995 through 1999 have been reviewed for objectives, content and management. This includes in-depth review by some of the ACTD operational sponsors such as U. S. Joint Forces Command (JFCOM). There were several general, notable achievements for ACTDs in 1999. Approximately twenty percent of all ACTDs were deployed, or requested for deployment, to Operation Allied Force. Some remain in theater as part of Kosovo peacekeeping operations. In addition, two ACTDs received national-level recognition awards for excellence: Link-16 won the Microsoft Windows Worldwide Open Product of the Year Award and Air Base/Port Biological Detection won the David Packard Excellence for Acquisition Program Management Award. Eleven new ACTDs were started in FY 1999: Battle Damage Assessment in Joint Targeting Toolbox, Coherent Analytical Computing Environment, Common Spectral MASINT Exploitation, Compact Environmental Anomaly Sensor II, Force Medical Protection/ Dosimeter, Human Intelligence and Counterintelligence Support Tools, Joint Medical Operations - Telemedicine, Joint Theater Logistics, Personnel Recovery Mission Software, Small Unit Logistics and Theater Air and Missile Defense Interoperability. The selection process for FY 2000 ACTDs began early in FY 1999. Twelve final ACTD candidates, of the forty received from the Unified Commands, the Services and Defense agencies, were considered for final selection. Candidates cover a broad range of technologies and needs, including: intelligence, reconnaissance, surveillance, information technology and security, satellite protection, targeting enhancement, communications and crisis planning and management. These candidates were evaluated for technical maturity by the Breakfast Club and for operational need and utility by the Joint Staff Joint Warfare Capability Assessment (JWCA) process. The JROC then prioritized these 12 candidates and eleven were finally selected based upon funding availability. FY 1999 funds were transferred to the executing services/agencies in the amount of \$80.281 million.

(U) 1999 accomplishments include:

FY 1995 Starts:

- Advanced Joint Planning (AJP): Continued interim capability support and hardening of products for transition to GCCS.
- High Altitude Endurance Unmanned Aerial Vehicles (HAE-UAV): The Global Hawk unmanned air vehicle has completed air worthiness and sensor payload test flights, commenced operational field demonstrations, exercises, and possible contingency deployments, enabling early user involvement to evaluate military utility. A total of four Global Hawks are planned to take part in the operational demonstrations, along with two complete sets of the associated Common Ground Segment equipment. Global Hawk has flown 41 times for 493 flight hours, most at operational altitudes above 60,000 feet. Air Vehicle #2 crashed on 29 March 1999 due to human error. Air Vehicle #1 has successfully participated in four Operational Demo flights. Global Hawk sensors (electro-optical, infrared, and synthetic aperture radar systems) and ground control station performance is excellent. The DarkStar UAV portion of this ACTD was terminated by Under Secretary of Defense (Acquisition & Technology) after a 22 January 1999 review of the program.
- Joint Countermine (JCM): JFCOM published the military utility assessment report. Provided those technologies that demonstrated utility to JFCOM for continued operations and evaluation during the residual phase. Joint Countermine Operational Simulation (JCOS) transitioned to STOW, and the Countermine Command, Control, Communications, Computers and Intelligence (C4I) system began transition to the Global Command and Control System

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(GCCS). Further evaluated five other novel systems in conjunction with several fleet exercises. Several of the novel systems transitioned into acquisition and other ongoing programs. Transition efforts for the remaining novel systems were evaluated and coordinated with user and service agencies. Continue interim capability support.

- Precision Signals Intelligence (SIGINT) Targeting System (PSTS): Continued interim capability providing a limited operations capability and transitioned into a long-term program to upgrade all airborne and National SIGINT systems to provide precision geolocation of Electronics Intelligence (ELINT) and Communications Intelligence (COMINT) emitters.
- Rapid Force Projection Initiative (RFPI): Transitioned the following systems to interim capability status: Hunter Sensor Suite, Remote Sensory/ Integrated Acoustic System, High Mobility Artillery Rocket System (HIMARS) and the Automated 155 Howitzer and Digital Command and Control, in the form of a Light Digital Tactical Operations Center (LDTOC).
- Synthetic Theater of War (STOW): Conducted additional mission rehearsal and training exercises in support of Joint Forces Command (JFCOM) and continued technology transition to Joint Simulation System (JSIMS) and the Services simulation systems. Used as central element of JFCOM Joint Warfighting Experiment's Attack Operations thrust. JFCOM has budgeted for continued operation and sustainment of the system components beginning in Fiscal Year 2000. Concluded interim capability period and ended the ACTD.

FY 1996 Starts:

- Air Base/Port Biological Detection: Fielded residuals to four sites in two theaters (two in CENTCOM and two in PACOM). Residuals consist of detection network, C4I connectivity and downwind hazard prediction, unmasking procedures, commercial half-mask test, DoD sampling kits and decontamination equipment.
- Battlefield Awareness and Data Dissemination (BADD): Deployed BADD software to PACOM and began the operational utility assessment. Integrated the BADD software with the Defense Information Systems Agency (DISA) Information Dissemination Management (IDM) commercial-off-the-shelf (COTS)/governments-off-the-shelf (GOTS) products in preparation for fielding to selected CINCs in 3rd Quarter of FY 2000. Initiated formal segmentation of the BADD/DISA products for integration into the Defense Information Infrastructure (DII) Common Operating Environment (COE) and GCCS. Conducted four collaborative assessments with operational users at multiple agencies/distributed service sites (Army, Navy, Air Force, Special Operations Forces (SOF) and Joint). Coordinated with the SOF community to determine how these capabilities could rapidly be integrated into SOF operations.
- Combat Identification (CID): Completed military utility assessment report. Conducted Single Channel Ground and Airborne Radio System (SINCGARS) System Improvement Program (SIP)+ and SINCGARS SIP+ Forward Operating Forward Air Controller (FOFAC) operational tests. Installed Battlefield Combat Identification System (BCIS) trainers as leave-behind assets at Ft Hood's Command and Control Technical Training (CCTT) facilities. Continued interim capability assessments for SINCGARS SIP+, SINCGARS SIP+ FOFAC, and Situational Awareness Data Link (SADL) Forward Air Controller (FAC). Transitioned to fielding the Situation Awareness Data Link (SADL) for close air support F-16s and assisted the transition of the Battlefield Combat ID System (BCIS) to LRIP for vehicle to vehicle identification capabilities. Participated in the All Services Combat ID Evaluation Team (ASCIET) 99 exercise.

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- Counterproliferation I (CP I): Delivered leave-behind assets and initiated residual support phase with U.S. European Command (EUCOM.) Hard target smart fuze (HTSF), advanced unitary penetrator (AUP) and targeting tools deployed for Kosovo support with great success. EUCOM final military utility assessment was completed. HTSF began engineering/manufacturing development (EMD), AUP entered streamlined EMD/low rate initial production (LRIP) and transition activities for other CP I elements continued.
- Joint Logistics (JL): Developed data access and mediation capability to pull information from disparate data sources and to share data products between applications through a common user interface. Derived and graphically displayed planned force capability estimates for logistic units and developed the capability to track and visualize inventory status, flow, and consumption. Developed visualization framework for displaying results using mapping, charting, tables and scheduling.
- Miniature Air Launched Decoy (MALD): Completed 23 flights for a total of 211 minutes flight time. Nine flights were terminated early due to engine problems, interference with on-board guidance systems, and other sub-system failures; two others due to range safety issues. Nine flights were very successful; the longest flight was 25 minutes long. An electronic 'decoy' package, the Signature Augmentation System, was successfully flight tested, and is very effective. Four Operational Demonstration flights were conducted on 11 Sep 99. All four flights terminated early due to the wrong aircraft ejection cartridges used to 'punch' the decoys off the F-16 carriage aircraft. The excessive force caused by these cartridges cracked the fuel tanks on each vehicle causing engine fires and shortened profiles. Residual decoy vehicles will be available for follow-on testing efforts.
- Navigation Warfare (NavWar): Completed demonstration phase. Accomplishments include: prevention equipment demonstrated and evaluated; prevention CONOPS developed; need for GPS training demonstrated; need for GPS jamming in military exercises demonstrated; procedures for GPS jamming established; effectiveness of Dual Frequency/Enhanced Reacquisition demonstrated; and avionics equipment prepared for deployment.
- Semi-Automated Imagery Processing (SAIP): Conducted final military utility assessment during which SAIP successfully processed synthetic aperture radar (SAR) imagery from both the U2 and Global Hawk aircraft in an operational scenario. SAIP residuals were delivered to the Army and the Air Force. Joint Program Office established.
- Tactical Unmanned Aerial Vehicle (TUAV): Conclude interim capability period. Residual systems were utilized to support evaluation of a TUAV follow-on acquisition, as well as supporting concept of operations development at the Joint Warfighting Center.
- Theater High Energy Laser (THEL): Hardware failures set the program back approximately one year. However, all technical issues were being resolved. The four subsystems were 80-95% complete. The laser subsystem achieved 'first light' at TRW's Capistrano Test Site in California. The complete system was transported to the High Energy Systems Test Facility (HELSTF), White Sands Missile Range, New Mexico.

FY 1997 Starts:

- Chemical Add-On to Air Base/Port Bio Detection: Fielded residual assets at sites in two theaters. Residuals consist of (48 each) chemical sensors fully integrated into the airbase/port reporting, display and command and control network.
- Counterproliferation II (CP II): The ACTD Advanced Unitary Penetrator (AUP) has been selected for Conventional Air-Launched Cruise Missile. Tactical Land Attack Missile (TLAM) penetrator integration and standoff platform designs completed. Chemical point detector evaluated. Initiated new CONOPS

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development for standoff counter force operations.

- Extending the Littoral Battlespace (ELB): Conducted Major System Demonstration (MSD) I during Operation Kernel Blitz 99 using the Third Fleet and First Marine Expeditionary Force as operational forces, supported by other U.S. Pacific Command component forces. Successfully demonstrated proof-of-principle, employing off-the-shelf technologies to create an over-the-horizon, high bandwidth, tactical information and data network. Post-MSD I activities included an initial military utility assessment and determination of interim residual and/or transition opportunities.
- Information Operations Planning Tools (IOPT): Completed successful evaluation in Joint Expeditionary Force Experiment 99, which allowed Air Intelligence Agency (AIA)/Air Force Information Warfare Center (AFIWC) and Central Command (CENTCOM) to further refine operational requirements and enhance the capability of the tool. CENTCOM used IOPT to allow real time update of information operations plans by Central Air Forces (CENTAF) and the Joint Information Operations Center (JIOC). Naval Information Warfare Agency (NIWA) installed IOPT and started computer-based training and familiarization for their Navy central (NAVCENT) support elements.
- Integrated Collection Management (ICM): Completed Phase I development and began Phase II. Phase I capabilities completed include: integration and employment of main software modules; development and coordination of reengineered intelligence, reconnaissance and intelligence (ISR) collection management across tactical, theater and national sensors.
- Joint Advanced Health and Usage Monitoring System (JAHUMS): Initiated Phase II detail design, fabrication and testing of five technology modules. Baseline system acquired and installed on H-53 aircraft and flight tested. Open systems implementation process developed and presented to Defense Systems Management College and at industry symposium. ACTD designated an OSD Pilot Program for Open Systems implementation.
- Military Operations in Urban Terrain (MOUT): Completed three Army and two Marine experiments. Assessed MOUT operational concepts, tactics, techniques and procedures. Conducted down-selection for best-in-class prototype hardware and software based on operational performance, user acceptance, technical risks and affordability. Implemented systems integration, interoperability assessments, and diagnoses of advanced technology candidate products. Conducted two joint company-level integrating experiments for interoperability assessments and refinement. Developed plans for MOUT Advanced Concepts Excursion to demonstrate and evaluate more advanced science and technology-based technologies for application in an urban warfare environment. Conducted modeling and simulation (force effectiveness analyses) to quantify military utility of advanced technology candidate products.
- Rapid Terrain Visualization (RTV): Completed detailed technical and operational study and selected optimum radar and platform for collection of high-resolution digital elevation data. Acquired de Havilland DHC-7 aircraft for collection platform at no cost to the government through the Army Trade-A-Plane program. Completed iterative upgrade of terrain analysis workstations within topographic units of XVIII Airborne Corps and III Corps. Demonstrated enhanced semi-automated feature extraction capability using commercial satellite imagery. Completed collection of high-resolution digital topographic data in support of the XVIII Airborne Corps. Installed and demonstrated version 3.0 of semi-automated topographic data generation software at XVIII Airborne Corps testbed and III Corps topographic units.

FY 1998 Starts:

- Adaptive Course of Action (ACOA): Continued CINC-level software integration. Demonstrated the ACOA concept of collaborative planning operations at

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PACOM and three remote sites. This demonstration also tested the military utility of the Web Based Planner, Odyssey, and LEIF. Proliferated ACOA Version 1 to Joint Task Force Computer Network Defense (JTF CND) locations and assisted in development of their collaborative concept of operations (CONOPS).

- C4I for Coalition Warfare (C4ICW): Tested basic message gateway and the data replication mechanism. The former will be integrated into the Maneuver Control System, V12.1, as part of the initial ACTD residual. The developed international data structure will be embedded in the common database for the Army Battle Command System upgrade for the First Digitized Division.
- High Power Microwave (HPM): Conducted military utility assessment and ended the ACTD. Demonstrated the capability to neutralize specific targets in a real-world environment. Validated logistics, training and maintenance assumptions applied to the operational use of this specific system.
- Information Assurance: Automated Intrusion Detection Environment (AIDE): Continued sensor bridge development. Installed/upgraded additional AIDE Systems at 15 sites and implemented database and design changes for new sensor integration, improved visualization and increased correlation capabilities.
- Joint Biological Remote Early Warning System (JBREWS): Completed fabrication of components and the test design plan. Completed a series of military utility assessments and tests of components.
- Joint Continuous Strike Environment (JCSE): Continued concept of operations refinement. First version of functional prototype completed for all four modules (target prioritization, weapons availability monitoring, weapons-target pairing and airspace deconfliction. Defined plan for integration into Global Command and Control System. Submitted proposal for JEFX 00 Exercise with AF's Air Operations Decision Aid (AODA) program.
- Joint Modular Lighter System (JMLS): Matured concept design via an integrated multidisciplinary approach. As risk reduction measures, fabricated and tested a full-scale engineering mockup of the connector, and modeled and tested the propulsor at 1:5 scale to evaluate thrust degradation characteristics while underway. Released final designs to fabrication. Developed manufacturing plans, required jigs and fixtures, and began fabrication. Initiated engineering tests with a set of in-water assembly trials followed by unit level training. Demonstrated the connection system in open water near Fort Story, Virginia.
- Line-of-Sight Anti-Tank (LOSAT): Integrate IMU with missile guidance electronics and conduct verification tests. Complete update of weapon system, fire unit and missile hardware and software requirements. Complete fire unit electronics and missile ALR preliminary designs and initiate breadboard fabrication. Complete missile structural design. Conduct initial program design review and initiate fire unit and missile long lead time procurement. Initiate fire unit operational and test software development effort.

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- Link - 16: Completed operational demonstration and warfighter assessment activities at the Joint Integration Test Center (JITC). Per request from NATO/SHAPE, the Link 16 Rosetta system (including data link management and translation functions) was implemented in theater to support Operation Allied Force in June 1999. The system improved the multi-tactical data link network in support of sustained Balkans Operations. Implemented in the Combined Reporting Center (CRC) at Aviano Airbase, Italy (for data link system management) and the Combined Air Operations Center (CAOC) at Vincenza Airbase, Italy (for translation and real-time display functions). Now being implemented in theater to support peace-keeping operations (requirements articulated via message from 5th Allied Tactical Air Forces (5ATAF)).
- Migration Defense Intelligence Threat Data System (MDITDS): Installed in conjunction with the Joint Guard Tactical Operations Authority (TOA). Initiated integration of the threat summary capability. Held a functional requirements definition conference in theater with all users represented. European Command (EUCOM) requested acceleration of delivery schedule.
- Precision Targeting Identification (PTI): Transitioned the Advanced Target Detection System into an acquisition program. Demonstrated C-130 OSSCAR Roll-On/Roll-Off (RO/RO) C4ISR system at All Service Combat Identification Evaluation and Testing (ASCIET) 99 exercise. Demonstrated the spectral sensor for stand-off detection of camouflaged targets and go-fast boats at ASCIET 99. Following ASCIET 99, the sensor was deployed for Kosovo support. Demonstrated integrated engagement with off-board cueing and handover to on-board precision sensors for target location and identification. Completed system end-to-end validation flight test of the laser radar (LADAR) system in a dynamic environment. Completed Preliminary Design Review of the LADAR optical head for the Tornado fighter aircraft.
- Space Based Space Surveillance Operations (SBSSO): Continued contributing sensor operations for the Space Surveillance Network (SSN) and performed additional development for improving concept of operations and productivity.
- Theater Precision Strike Operations (TPSO): Commenced three-year series of annual user demonstrations. Conducted baseline assessment in concurrence with U.S. Forces Korea Ulchi Focus Lens Exercise.
- Unattended Ground Sensors (UGS): Conducted hand-emplaced and air-dropped sensor emplacement demonstrations and field tests. Deployed UGS to theater for warfighter support. Completed transition to acquisition plan and CONOPS for use of sensors operationally.

FY 1999 Starts:

- Battle Damage Assessment in Joint Targeting Toolbox (BDA in JTT): Tested basic message gateway and the data replication mechanism. The former will be integrated into the Maneuver Control System, V12, as part of the initial ACTD residual. The developed international data structure will be linked via mapping that will eventually be embedded in the common database for the Army Battle Command System upgrade.
- Coherent Analytical Computing Environment (CACE): Developed and prototyped an initial data warehouse for maintenance data from three fleet Harrier II squadrons, creating a shared data/information environment, as well as initial versions of a personal digital assistance and immersive user interface.
- Common Spectral MASINT Exploitation Capability (COSMEC): Completed demonstrations at ASCIET 99 and at the Joint Expeditionary Forces Exercise 99. Completed testing at the Joint Intelligence Test Facility. Supported CINC EUCOM field assessment.
- Compact Environment Anomaly Sensor II: Developed the system and commenced testing.

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- Force Medical Protection/ Dosimeter: Developed the field evaluation plan for Phase I prototype passive chemical sampler and the concept of employment, using simulated Phase II samplers. Acquired Phase I prototypes and planned testing to determine selectivity and sensitivity. Conducted technical evaluation of Phase II candidate technologies and select technologies for integration into Phase II sampler.
- Human Intelligence and Counterintelligence Support Tools (HICIST): Obtained test items, initiated integration and conducted a mini military utility assessment at Ft. Bragg. Objectives are to: 1) demonstrate, integrate and assess tools to enhance national-to-tactical HUMINT and counterintelligence targeting, dissemination and collection; and 2) improve strategic-to-tactical concepts of operation and architecture.
- Joint Medical Operations - Telemedicine (JMO-T): Demonstrated feasibility of a tactical communication network to provide cost-effective data transport far forward. Prototyped and demonstrated software/hardware suitable for far forward use. Demonstrated "reachback" capability from forward elements to sustaining base clinical expertise.
- Joint Theater Logistics (JTL): Developing a near-real-time capability to provide warfighters, both operators and logisticians, with a shared, web-based, focused logistics view of support capabilities during planning and execution of operational courses of action. User requirements were collected and validated and detailed planning and concept development actions leading to contract initiation were completed.
- Personnel Recovery Mission Software: Conducted user 'beta' testing. Commenced test and evaluation of core software. Completed development test and evaluation plan.
- Small Unit Logistics: Completed tactical deployment of decision support tools and a logistics information system via web-based technologies, focusing on reducing the logistics response time and footprint. Commenced a two-year software integration based on data warehousing and web-based information dissemination. Concept will be demonstrated in an incremental lead-service exercise evaluation process. First year emphasis was on supply and maintenance software systems.
- Theater Air Missile Defense Interoperability (TAMDI): Developed the plan to demonstrate the capability to interface Patriot radar measurements data with the Cooperative Engagement Capability (CEC) composite air picture. Will also demonstrate real-time target track data exchange between AEGIS and PATRIOT weapons systems.

(U) FY 2000 Plans: Transition those ACTDs that have successfully demonstrated military utility and been determined to warrant acquisition. Continue development and operational demonstration of the remaining FY 1995-1999 ACTDs, and start new FY 2000 ACTDs in accordance with planned schedules. Continue the annual process of developing and structuring new candidate ACTDs to rapidly address user needs and address issues identified in *Joint Vision 2010*. Some ACTDs will remain deployed in the Kosovo theater as part of ongoing peacekeeping operations. Funding will continue for all active previous ACTDs, including the new FY 2000 ACTDs, for a total of \$104.976 million.

(U) Other significant plans for FY 2000 are:

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FY 1995 Starts:

- Advanced Joint Planning : The Automated Joint Monthly Readiness Review (AJMRR), and the Joint Readiness Assessment Management System (JRAMS) will complete compliance certification with the Global Command and Control System (GCCS) common operating environment (COE). Final TPEdit, FMEdit, COAST and Target enhancements will be delivered to DISA D6. Conclude the interim capability period and end the ACTD.
- High Altitude Endurance UAVs: Complete operational demonstration period and military utility assessment. Conclude the interim capability period and end the ACTD. Continue normal system acquisition activities.
- Joint Countermine: Complete the full integration of the Joint Countermine Application (JCA) to run on all current service command, control, communications and intelligence architectures and to achieve DII COE certification. Conclude the interim capability period and end the ACTD.
- Precision SIGINT Targeting System: Continue interim capability period support.
- Rapid Force Projection Initiative: Conclude the interim capability period and end the ACTD.

FY 1996 Starts

- Airbase/Port Biological Detection System: Continue interim capability and residual maintenance of detector networks, provide depot repairs and spares, initiate upgrade of sampling system and maintain ongoing operator training at four sites in two theaters.
- Battlefield Awareness and Data Dissemination: Field BADD products to selected CINC's six months prior to the end of the ACTD. Continue upgrading capability, based on warfighter input/feedback, to provide a more enhanced version to the CINC's in the latter part of the fiscal year. Conclude transition period and end the ACTD. Handoff capability to DISA for operations and maintenance support.
- Combat Identification: Support interim capability assets for a last year of continued operation and obtain additional user feedback on military utility and maintainability. Continued operational support provides a mechanism from which critical features for the continued development of "combat identification" technologies emerge. Conclude interim capability period and end the ACTD.
- Counterproliferation I: Support residuals for further operational feedback to assist system engineering, integration and production activities. Continue to support exercises and concept of operations (CONOPS) development for EUCOM. Complete interim capability period and end the ACTD.
- Joint Logistics: Expand Joint Decision Support Tool (JDST) capability to compare planned and actual logistic unit support capabilities at specific nodes over time. Develop the capability to generate a below-the-line logistic force structure based upon operational courses of action. Continue joint demonstrations and military utility assessments. Transition JDSTs to GCSS through DISA.
- Miniature Air Launched Decoy: Conclude the interim capability period and end the ACTD.
- Navigation Warfare: Continue interim capability period. Residual equipment to be utilized in support of the Joint Global Positioning System Combat Effectiveness (JGPSCE) joint test and evaluation.
- Semi-Automated MINT Processing: Support the Army vehicle version and the Air Force rack version of the SAIP residuals. Revise the CONOPS and finalize transition plans. Conclude the interim capability period and end the ACTD.

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- Theater High Energy Laser: Begin laser set-up at White Sands Missile Range early in the fiscal year, followed by system integration and functional testing. System testing with single and salvo engagements of Katyusha rockets will be conducted during December 1999 - April 2000. At the conclusion of the testing in mid-year, the THEL system will be shipped to Israel for development of operational concepts, training and deployment along the northern border. ACTD is ended.

FY 1997 Starts

- Chemical Add-On to Air Base/Port Biological Detection: Conclude interim capability and residual maintenance, training and field support at four sites in two theaters. End the ACTD.
- Counterproliferation II: Continue standoff platform, penetrator and fuze tests against a surrogate soft biological facility. Continue mini-UAV and dispenser pods integration for collateral effect assessment. Demonstrate new weapon delivery tactics to achieve penetration into hard facilities containing nuclear/biological/chemical (NBC) materials. Fabricate EMD prototypes and begin test program for the Tactical Low Altitude Missile (TLAM) penetrator.
- Extending the Littoral Battlespace: Refine MSD I architecture and technology enhancements. Participate in two Limited Objective Experiments (LOEs) with operating forces in preparation for MSD II in FY 2001.
- Information Operations Planning Tool: Conclude segmentation into the Defense Information Infrastructure/Common Operating Environment (DII/COE) and complete interface to MIBD 2.0. User evaluation and training will continue during BLUE FLAG 00-1. Provide sustainment and support of IOPT to CENTCOM and CENTAF.
- Integrated Collection Management: Develop operations and intelligence, surveillance and reconnaissance synchronization matrix and automate interfaces to collection platforms and data sources. Improve reengineered integration collection management processes. Connect collection management nodes for collaboration. Continue transition planning and conduct field testing and military utility assessments.
- Joint Advanced Helicopter Usage and Monitoring System: Complete fabrication, bench and flight testing of technology modules. Install baseline system and flight test on H-60 aircraft. Begin installation of technology modules on squadron aircraft and conduct training for operational and maintenance crews. Develop health and usage monitoring system cost/benefit model and begin data collection.
- Military Operations in Urban Terrain: Conduct MOUT Advanced Concepts Excursion. Complete systems integration assessments and refinements. Acquire products and prototypes for the culminating demonstration (CD) and for interim operational capability. Complete New Equipment Training (NET) for CD. Conduct the MOUT Culminating Demonstration.
- Rapid Terrain Visualization: Acquire and process high-resolution digital elevation data set and commercial satellite imagery in direct support of XVIII Airborne Corps Warfighter Exercises (WFXs). Exploit multi-spectral and radar imagery to accelerate the terrain feature extraction process using the prototype RTV database generation system. Continue iterative upgrades of workstations and software at XVIII Airborne Corps and III Corps. Demonstrate RTV process in the Integration and Evaluation Center (IEC), including capabilities for rapid elevation data collection and semi-automated extraction of feature data. Continue migration of selected RTV capabilities from XVIII Airborne Corps to III Corps elements for further user evaluation. Complete modifications to de Havilland DHC-7 aircraft, including installation and integration of RTV Light Detection and Ranging (LIDAR) and Infrared Synthetic

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Aperture Radar (IFSAR) sensors and onboard processing capability. Develop an RTV Transition Plan to address transition of the ACTD products into the acquisition process.

FY 1998 Starts:

- Adaptive Course of Action: Continue CINC-level software integration. Participate in Tempo Brave Exercise and gather metrics on plan generation, execution monitoring, re-planning, and user evaluation. Continue integration with Campaign Object, segment applications, and deliver first complete version of ACOA system to the Global Command and Control System in the April 2000 time frame. Delivered system will include improved versions of Web Planner, Odyssey, and LEIF, as well as the Campaign Object server, Geospatial Force Planning Tool, Virtual Books, Intelligent Process Management, Facilitate.com, and MASH.
- C4I for Coalition Warfare: Conduct a demonstration, in the context of a coalition command post exercise, of the integrated message gateway. Data replication mechanism development and testing will be completed. Message formats will be fielded in the Army's Maneuver Control System (MCS).
- Joint Biological Remote Early Warning System: Continue field tests of ACTD components at Dugway Proving Grounds. Commence initial provision of residual assets (Sentry, Sample Identification, and Sensor Network Command Post Units) to EUCCOM. Continue CONOPS development and training.
- Information Assurance: Automated Intrusion Detection Environment: Selection of additional sites will be conducted based on a representative model of the DII. Surveys for the new sites will be conducted and new sensors identified will be integrated into the AIDE environment. Sensor data and data correlation will be fine tuned to reduce false alarm rates. Hardware and software upgrades for all the ACTD sites will be purchased and installed. All additional installation and training will be completed. Final reports documenting the ACTD will be written and formalized. A final demonstration of the system will be conducted.
- Joint Continuous Strike Environment: Conduct Military Utility Assessment in Fleet Battle Experiment Foxtrot and exercises in the Korean theater. Continue concept of operations refinement. Complete functional software.
- Joint Modular Lighter System: Joint Modular Lighter System: Complete fabrication of powered and non-powered modules and ancillary hardware. Conduct sea trials of powered subsystems. Contractor to execute technical testing of JMLS hardware in demonstrations supported by Government furnished equipment. Technical testing to address system performance and interface issues. Complete unit level training and conduct unit and joint demonstrations to assess military utility. Conclude the interim capability period and end the ACTD.
- Line-of-Sight Anti-Tank System: Continue fire unit and missile detail level design and analysis. Hardware tooling design and fabrication will begin. Initiate fire unit and missile piece part hardware fabrication. Complete fire unit operational and test software design; initiate code development and test. Complete update of missile operational software requirements and initiate software update. Complete hardware-in-the-loop and closed loop simulation software upgrades and initiate hardware integration.
- Link-16: Continue interim capability period. Continue transition of Rosetta technology into various tactical data link programs as the translation engine.
- Migration Defense Intelligence Threat Data System: Complete, integrate and test the threat summary, warning server and local-hire database components. Develop and test the collection interface elements. Conduct the military utility assessments of components.

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- Precision Targeting Identification: Deploy the production Advanced Target Detection system in the fleet. Transition the re-configurable optical station (part of the C-130 OSSCAR RO/RO) into an acquisition program for Naval Intelligence. Initiate prototype C-130 OSSCAR RO/RO C4ISR deployment system design. Integrate the ROSETTA Communication Gateway with the PTI track correlation processor. Complete design and fabrication of the P-3 PTI system. Complete LADAR Level II design package for the Tornado fighter aircraft. Complete evaluation of the PTI LADAR system. Initiate multi-year cooperative program with Ministry of Defense, United Kingdom on integration test and evaluation of the fighter-based LADAR for target ID.
- Space Based Space Surveillance Operations (SBSSO): Conclude formal demonstration and complete transition plan for contributing sensor operations for the SSN to Air Force Space Command.
- Theater Precision Strike Operations (TPSO): Conduct the unreinforced scenario assessment, the second of three user demonstrations in conjunction with U.S. Forces Korea Ulchi Focus Lens Exercise.
- Unattended Ground Sensors (UGS): Commence interim capability period. Initiate transition to acquisition program. Refurbish sensors for use in exercises and operations. Perform additional communications development.

FY 1999 Starts:

- Battle Damage Assessment (BDA) in Joint Targeting Toolbox (BDA in JTT): Conduct a demonstration, in the context of a coalition command post exercise, of the integrated message gateway. Data replication mechanism development and testing will continue throughout this year.
- Coherent Analytical Computing Environment (CACE): Expand the shared data environment to include operational, logistics, manpower and training data with automated data collection/entry and cross-functional reporting and analysis capability. Initiate reasoners/intelligent agents in proof-of-concept squadrons, enabling cognitive readiness within a CACE. Provide Joint Strike Fighter Program Office impact assessment.
- Common Spectral MASINT Exploitation Capability (COSMEC): Demonstrate the utility of spectral data with operational assets. COSMEC ground station will be implemented in USEUCOM, as well as the support of tactical airborne sensors. Release software version 1.3.2. Implement system at USSOUTHCOM and conduct a demonstration at USEUCOM.
- Compact Environmental Anomaly Sensor II (CEASE II): Complete system integration on critical satellite systems and conduct system launch.
- Force Medical Protection Chemical/Biological Dosimeter: Conduct Phase I field evaluations. Conduct technical evaluation of Phase II sampler. Conduct utility assessment at the CINC level.
- Human Intelligence and Counterintelligence Support Tools: Model and evaluate collection tools. Procure and evaluate additional dissemination tools. Conduct single echelon user tests.
- Joint Medical Operations - Telemedicine (JMO-T): Finalize requirements for standard tactics, techniques, and procedures for JMO-T employment forward of the theater hospital. Continue demonstrations of integrated JMO-T capability; assess utility of all JMO-T technologies; prepare for leave behind/residual period.
- Joint Theater Logistics (JTL): Develop computer-assisted capabilities to evaluate operational and logistic tasks. Develop the capability to calculate support unit requirements and sustainment and identify matching sources to meet operational missions. Track the execution of unit sourcing and sustainment through

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- unit closure and dissemination through the theater. Develop collaborative operational and logistics command and control capability.
- Personnel Recovery (PR) Mission Software: Conduct system integration and fielding: Participate in the PACOM Northern Edge exercise. Conduct CENTCOM integration.
- Small Unit Logistics (SUL): Continue system integration to include tactical distribution. Deploy the web-based system in a joint exercise showing interoperable material readiness on the tactical battlefield. Assess performance in replacing tactical footprint and inventory with speed and information. End the ACTD.
- Theater Air Missile Defense Interoperability (TAMDI): Demonstrate the ability to pass target track information to a PATRIOT weapons system to initiate an intercept (launch weapon) in advance of the PATRIOT radar detecting and tracking the target.

FY 2000 Starts:

- CINC 21: Demonstrate large screen visual presentation of situation. Identify and integrate critical decision points, processes, information requirements/relevance, and visual rendering.
- Coalition Aerial Surveillance and Reconnaissance (CAESAR): Over the next decade France, Italy, Canada, Norway, and the United Kingdom (UK) will deploy Ground Moving Target Indicator ground surveillance radar (GMTI), Synthetic Aperture Radar (SAR) platforms and/or their processing systems. The CAESAR ACTD will maximize the military utility of these scarce and expensive resources through the demonstration of interoperability among these assets. Using a combination of simulation and live-fly exercises, CAESAR will develop Concepts of Operations and tactics, techniques and procedures (TTPs) for coalition employment of MTI and SAR operations. CAESAR will correlate the products and provide interoperability among the MTI and SAR assets of the U.S. and these NATO partners.
- Communication/Navigation Outage Forecasting (CNOFS): Confirm launch opportunities for space-based package. Begin fabrication process of space-based sensor.
- Computerized Operational MASINT Weather (COMWx): Provide near-real-time cloud pictures for high-value targeting support, utilizing existing National assets. Provide a foundation to exploit future systems. Increase battlespace situation awareness to support use of precision guided munitions, strike warfare, fleet defense, air refueling and reconnaissance.
- Content-Based Information Security (CBIS): Conduct multi-level security demonstration with Canadian forces using interim software encryption.
- Ground-To-Air Passive Surveillance (GAPS): Conduct Caribbean Assessment for availability of illumination and CONOPS analysis. Complete and Validate Simulation and Modeling tools for use in other Theater Scenarios. Working as an IPT with the users, operational scenarios will be defined and modeled will be used a suite of tools available from Industry. Models and simulation will be used to ensure that the operational concepts and the resulting system specifications are well understood prior to system integration.
- Joint Intelligence, Surveillance and Reconnaissance (JISR): Refine functional user requirements. Design system architecture. Identify and evaluate candidate technologies and software.
- Multiple Link Antenna System (MLAS): Complete antenna component design and fabrication. Conduct component lab tests. Initiate systems engineering

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efforts leading to antenna configuration demonstrations and field tests.

- **Quick Bolt:** Integrate a subset of the components of the functional assessment approach. These components include data retrieval, filtering and indexing; target and target system models; and their functional aggregation. Review and validation will be done by JCS/J2-T, 497th Inspector General and the Joint Targeting Tools Users' Group Beta test.
- **Restoration of Operations (RestOps):** Complete development of site baseline exercise scenario. Conduct Joint Chemical Field Trials and CONOPS development and validation. Develop methodologies to assess technology, chemical field trials, and operational capability for use during RestOps and other fixed-site programs.
- **Tri-Band Antenna Signal Combiner:** Integrate tri-band antenna signal combiner from existing hardware and designs. Begin development of associated mission planning software to maximize data throughput while minimizing antenna weight and volume.

(U) **FY 2001 Plans:** Continue the process of transitioning and initiating ACTDs. Numerous demonstrations will be conducted for those ACTDs initiated in previous years. All FY 1995 and 1996 ACTDs should end. The demonstration phases of the FY 1997 and FY 1998 ACTDs should be completed. Funding will continue for active ACTDs initiated in FY 1996, 1997, 1998, 1999 and 2000 (\$102.660 million total for all prior year ACTDs) that have not been completed or transitioned to acquisition programs. Funding available for initiating new FY 2001 ACTDs, after subtracting for previous years ACTDs, will be approximately \$13.765 million. (\$116.425 million).

(U) Other significant plans for FY 2001 are:

FY 1995 Starts:

- **Precision SIGINT Targeting System:** Conclude the interim capability period and end the ACTD.

FY 1996 Starts:

- **Air Base/Port Biological Detection:** Continue residual maintenance of detector networks, provide depot repairs and spares, initiate upgrade of sampling system and maintain ongoing operator training at four sites in two theaters. Provide data and findings for EMD of ACTD elements. Continue the interim capability period.
- **Joint Logistics:** Continue transition of JL ACTD products to GCSS through the Advanced Information Technology Services (AITS) Joint Program Office (JPO) within the Defense Information Systems Agency (DISA). Conclude the interim capability period and end the ACTD.
- **Navigation Warfare:** Conclude the interim capability period and end the ACTD.

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FY 1997 Starts:

- Counterproliferation II: Evaluate Conventional Air-Launched Cruise Missile (CALCM) with Advanced Unitary Penetrator (AUP) against surrogate hard chemical facility. Complete integrated munitions effectiveness assessment tools and perform end-to-end validation for the CP II demonstrations. Complete weaponization and qualification.
- Extending the Littoral Battlespace: Conduct MSD II in second quarter FY 2001, followed by a rapid military utility assessment and potential transition to acquisition of accepted residual systems.
- Information Operations Planning Tool: Continue residual support and finalize transition plans. IOPT will support CENTCOM in INTERNAL LOOK 2001, CENTAF in Blue Flag 2001-1, and participate in EFX 2001. Provide IOPT capability to other IO related programs in various services. Conclude the interim capability period and end the ACTD.
- Integrated Collection Management: Develop additional interfaces to collection platforms, collection nodes and data sources. Further enhance and refine software. Develop systems integration and enhancements to processes in response to tactical feedback. Conduct final military utility assessment demonstration, deliver residual interim capability to JFCOM and begin transition of technology for acquisition.
- Joint Advanced Health and Usage Monitoring System: Complete technology module installation on squadron aircraft and crew training. Conduct the operational demonstration. Conduct maintenance re-engineering assessment and health and usage monitoring system (HUMS) technology assessment and cost/benefit analysis. Conclude interim capability support and end the ACTD.
- Military Operations in Urban Terrain: Refurbish CD equipment and commence interim capability period. Conduct extended user evaluations. Provide user evaluation information to appropriate combat and materiel development communities.
- Rapid Terrain Visualization: Complete integration and testing of high-resolution elevation data collection capability on the DHC-7 aircraft. Demonstrate integrated end-to-end RTV process. Acquire and process digital terrain data using DHC-7 collection platform and commercial satellite sources in direct support of XVIII Airborne Corps WFXs. Complete upgrade of workstations and software to objective capability in the IEC and XVIII Airborne Corps and evaluate in a WFX. Extend upgrades and capabilities to topographic units within III Corps. End the ACTD.

FY 1998 Starts

- Adaptive Course of Action: Continue multiple CINC, coalition and inter-agency level software integration. Demonstrate military utility of the complete ACOA system during a joint exercise in the December 2000. Complete integration, hardening and transition into GCCS with delivery of the final version of ACOA in the April 2001. Delivered system will include improved versions of Web Planner, Odyssey, LEIF, the Campaign Object server, Geospatial Force Planning Tool, Virtual Books, Intelligent Process Management, Facilitate.com, MASH, and applications to monitor plan execution, and interface with modeling and simulation products. Begin interim capability maintenance and sustainment phase.
- C4I for Coalition Warfare: Conduct a major demonstration, involving the United States, United Kingdom, France, Germany, Italy and Canada, of the coalition interoperability gained with ACTD message formatting and database replication. This will be in the form of a Command Post Exercise. The developed capability will be fully integrated into the Maneuver Control System (MCS) for fielding during FYs 2001/2002. A decision will be made on the

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wider integration of capability into other Army Battle Command System (ABCS) systems. An initial test of passing coalition ground force data to other Service's systems is also projected.

- Information Assurance: Automated Intrusion Detection Environment: Upgrades for new versions of existing sensors and all software licensing and hardware maintenance will be installed and maintained.
- Joint Biological Remote Early Warning System: Provide remote detection and warning of biological agents for a Brigade-size assembly area to be installed and supported in theater.
- Joint Continuous Strike Environment: Install and support residual software with Service fire support systems and GCCS. Provide capabilities to other programs, e.g., Extending the Littoral Battlespace and Theater Precision Strike Operations ACTDs. Participate in at least one joint and combined exercise, e.g., Ulchi Focused Lens.
- Line-of-Site Anti-Tank: Complete two early risk reduction missile flight tests utilizing residual IMU and guidance electronics hardware from the FY 1999 verification tests and a fire unit structurally representative of the final design. Complete fire unit and missile assembly designs and conduct final program design review. Begin integration of fire unit, including the integration of weapon system software. Missile software integration will be completed and hardware integration will be initiated.
- Link-16: Conclude interim capability period and end the ACTD.
- Migration Defense Intelligence Threat Data System: Evaluate the deployable server and threat vulnerability correlator. All ACTD elements will be integrated and the interim capability phase begun with support to EUCOM.
- Precision Target Identification: Conduct laboratory aircraft test and operational deployment of the complete PTI system. Flight test and evaluate the Tornado fighter based LADAR system. Flight test and evaluate the production re-configurable optical station. End the ACTD.
- Space Based Space Surveillance Operations (SBSSO): Conclude interim capability period and end the ACTD. Initiate post-SBSSO ACTD contributing sensor operations to Air Force Space Command.
- Theater Precision Strike Operations (TPSO): Conduct the Transition to Reinforcement assessment, the third in series of user demonstrations/evaluations.
- Unattended Ground Sensors (UGS): Complete transition to acquisition. Release request for proposal for full-scale acquisition contract. Conclude interim capability period and end the ACTD.

FY 1999 Starts

- Battle Damage Assessment (BDA) in Joint Targeting Toolbox: Integrate additional components. Include comparison of combat objectives with actual results and BDA report generation. A military utility assessment will be conducted in a CENTCOM joint exercise.
- Coherent Analytical Computing Environment: Prototype the immersive user interfaces to augment reality and increase the utility of operators basic computer skills, thereby reducing training requirements. Integrate reasoners/intelligent agents for functions such as forecasting and automated notification/broadcasting. Provide CACE architecture to USMC aviation community. Update Joint Strike Fighter Program Office impact assessment.
- Common Spectral MASINT Exploitation: Commence maintenance and sustainment of a COSMEC interim capability.

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- Compact Environmental Anomaly Sensor II: Demonstrate mission support.
- Force Medical Protection Chemical/Biological Dosimeter: Demonstrate real-time chemical sampler with biological agent collection capabilities. Complete field evaluation of Phase II sampler. Transition system to the CINC level.
- Human Intelligence (HUMINT) and Counterintelligence (CI) Support Tools: Assess CONOPS, equipment and architecture in Joint Warfighting exercise. Conduct OCONUS real-world military utility assessment and operational evaluation.
- Joint Medical Operations – Telemedicine: Complete capstone military utility assessment and transition interim capability for the CINC or designated component surgeon.
- Joint Theater Logistics: Expand capability to integrate in-theater distribution support planning and infrastructure assessment. Incorporate plan deviation detection technology and sentinels to compare planned and actual resource consumption. Forecast and assess the impact of deviations and alternative support concepts upon future operations. Conduct a military utility assessment.
- Personnel Recovery Mission Software: Complete integration and conduct CENTCOM exercise. Initiate transition activity.
- Theater Air Missile Defense Interoperability: Conduct user assessment of the AEGIS/PATRIOT integrated air picture capability. Collect THAAD/CEC integration data and prepare integration approach and concept.

FY 2000 Starts:

- CINC 21: Complete CINC-shared visualization and distributed decision making demonstration.
- Coalition Aerial Surveillance and Reconnaissance: Participate in a live-fly exercise and evaluate the interchange format, registration algorithms, and Moving Target Indicator (MTI) association, correlation and tracking algorithms. Continue development and integration of MTI-Synthetic Aperture Radar (SAR) cueing algorithms, the MTI-SAR Common Operational Picture, and mission planning and tasking tools.
- Communication/Navigation Outage Forecasting: Integrate and test space-based sensor package in space-chamber environment. Prepare package for integration onto launch platform.
- Computerized Operational MASINT Weather: Demonstrate algorithms to exploit Computerized Operational MASINT Weather products at theater level.
- Content-Based Information Security: Commence technical integration at Naval Space Warfare Systems Center's Network Technology Integration Laboratory using the hardware crypto card.
- Ground-To-Air Passive Surveillance: Complete Specifications and initiate fabrication of 2-D tracking system for Counter Drug operations. Conduct testing on controlled ranges to evaluate Passive detection, 2-D track, and low RCS performance against air platforms. GAPS will participate in at least one exercise (ASCIET or similar exercise as appropriate.) In addition, the units will be deployed to areas of interest to the CINC for initial assessment and training. The users will be trained on the system and participate in real-time inter-operation with the existing command and control functions.
- Joint Intelligence, Surveillance and Reconnaissance: Develop initial capability. Demonstrate and assess capability in Lucky Sentinel exercise.
- Multiple Link Antenna System (MLAS): Continue systems engineering. Complete antenna lab testing. Initiate antenna - platform integration. Commence field testing. Prepare for operational testing and military utility assessment.

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- Quick Bolt: Continue design reviews, system integration, and system testing of the components of the front-end guidance mechanisms.
- Restoration of Operations: Complete Joint chemical field trials and technology assessments. Conduct operational/functional testing. Develop and conduct the Preliminary Demonstration. Refine methodology for operational capability assessment and develop sensor integration software. Initiate planning for technology transition and conduct in-process reviews for the ACTD.
- Tri-Band Antenna Signal Combiner: Complete fabrication of Tri-Band Signal Combiner and perform laboratory and field tests. Complete and test associated mission planning software. Deliver to user (USSOCOM) for field evaluation.

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(U) ACQUISITION STRATEGY: Not Applicable

(U) B. Program Change Summary	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	88.598	117.969	119.298	Continuing
Appropriated Value		107.969		Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed undistributed reduction	(3.112)			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	(5.205)	(.852)	(.852)	
c. Other		(2.141)	(2.021)	Continuing
Current President's Budget	80.281	104.976	116.425	Continuing

Change Summary Explanation:

(U) Funding: Changes were based on inflation adjustments, Congressionally directed undistributed reductions, below threshold reprogrammings and the government wide rescission.

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

(U) C. Other Program Funding Summary Cost : Not Applicable

(U) D. Schedule Profile: Not Applicable

(U) A: Acquisition strategy: Not Applicable

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(U) **E. PE Funding for FY 1995 ACTDs:**

<u>ACTD</u>	<u>FY1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Advanced Joint Planning*	1.300	0	0
Cruise Missile Defense Phase I*	0	0	0
Joint Countermine**	1.400	.370	0
High Altitude Endurance Unmanned Aerial Vehicle	0	0	0
Kinetic Energy Boost Phase Intercept*	0	0	0
Medium Altitude Endurance Unmanned Aerial Vehicle*	0	0	0
Precision SIGINT Targeting System**	0	0	0
Rapid/Counter Multiple Launcher*	0	0	0
Rapid Force Projection Initiative**	0	0	0
Synthetic Theater of War*	.550	0	0

*Completed

** Completed the demonstration phase of the ACTD

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(U) **E. PE Funding for FY 1996 ACTDs**

ACTD	FY 1999	FY 2000	FY 2001
Airbase/Port Biological Detection**	1.300	1.300	1.300
Battlefield Awareness and Data Dissemination	2.400	3.500	0
Combat Identification**	2.400	1.600	0
Combat Vehicle Survivability*	0	0	0
Counterproliferation I**	4.980	6.200	0
Counter Sniper*	0	0	0
Joint Logistics	.060	0	0
Joint Readiness Extension to Advanced Joint Planning ***	0	0	0
Low Life Cycle Cost, Medium Lift Helicopter*	0	0	0
Miniature Air Launched Decoy	1.000	.600	0
Navigation Warfare**	.360	0	0
Semi-Automated IMINT Processing**	2.400	0	0
Tactical UAV*	0	0	0
Theater High Energy Laser	0	0	0

*Completed

** Completed the demonstration phase of the ACTD

*** Completed and incorporated into the Advanced Joint Planning ACTD

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(U) E. PE Funding for FY 1997 ACTDs

ACTD	FY 1999	FY 2000	FY 2001
Chemical Add-On to Biological Detection**	0	.600	0
Consequence Management*	0	0	0
Counterproliferation II	4.500	11.700	3.800
Extending the Littoral Battlespace	5.100	6.200	8.300
Information Operations Planning Tool	1.600	1.900	2.500
Integrated Collection Management	1.100	1.900	2.500
Joint Advanced Health and Usage Monitoring System	3.200	4.800	3.600
Military Operations in Urban Terrain	0	0	0
Rapid Terrain Visualization	2.550	3.700	4.800

* Completed

** Completed the demonstration phase of the ACTD

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(U) **E. PE Funding for FY 1998 ACTDs**

ACTD	FY1999	FY 2000	FY 2001
Adaptive Course of Action	4.300	5.600	2.200
C4I for Coalition Warfare	1.200	2.100	4.500
High Powered Microwave*	.700	0	0
Information Assurance: AIDE	3.000	4.300	3.200
Joint Bio Remote Early Warning System	0	2.500	3.800
Joint Continuous Strike Environment	1.560	2.500	3.200
Joint Modular Lighterage System	4.060	1.200	0
Line-of-Sight Anti-Tank	7.000	3.700	3.800
Link 16	1.250	1.200	3.800
Migration Defense Intelligence Threat Data System	.800	1.000	1.700
Precision Targeting Identification	3.226	3.200	.800
Space Based Space Surveillance Operations	.700	.900	.900
Theater Precision Strike Operations	4.000	5.600	6.400
Unattended Ground Sensors**	1.800	1.900	.700

* Completed

** Completed the demonstration phase of the ACTD

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(U) E. PE Funding for FY 1999 ACTDs

ACTD	FY 1999	FY 2000	FY 2001
Battle Damage Assessment in the Joint Targeting Toolbox	.440	.500	.300
Coherent Analytical Computing Environment	0	.600	.600
Common Spectral MASINT Exploitation Capability	1.000	1.200	1.400
Compact Environment Anomaly Sensor	0	0	.100
Force Medical Protection	.400	.600	.100
Human Intelligence and Counterintelligence Support Tools	.800	1.900	2.200
Joint Medical Operations Telemedicine	1.850	3.000	0
Joint Theater Logistics	1.700	.600	0
Personnel Recovery Mission Software	.695	.900	.600
Small Unit Logistics	1.200	.600	0
Theater Air and Missile Defense Interoperability	2.400	5.000	4.000

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(U) E. PE Funding for FY 2000 ACTDs

<u>ACTD</u>	<u>FY 2000</u>	<u>FY 2001</u>
CINC 21	1.700	4.500
Coalition Aerial Surveillance and Reconnaissance	1.106	1.460
Communication/Navigation Outage Forecasting System	.400	1.000
Computerized Operational MASINT Weather	.700	3.100
Content-Based Information Security*	1.300	1.500
Ground-To-Air Passive Surveillance	.300	2.500
Joint Intelligence, Surveillance and Reconnaissance	.800	6.200
Multiple Link Antenna System	1.200	1.900
Quick Bolt	1.000	5.400
Restoration of Operations	1.000	3.300
Tri-Band Antenna Signal Combiner	.500	.700

* Previously known as Project UMBRELLA

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide / BA 3				R-1 ITEM NOMENCLATURE High Performance Computing Modernization PE 0603755D8Z					
<i>COST (In Millions)</i>	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	151.613	164.262	164.027	137.988	143.038	145.808	148.643	Continuing	Continuing
HPCM/P476	151.613	164.262	164.027	137.988	143.038	145.808	148.643	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT:**

(U) The Department of Defense (DoD) High Performance Computing (HPC) Modernization Program (HPCMP) directly supports the needs of the warfighter for technological superiority and military dominance on the battlefield by providing the highest computational power available to U.S. weapons system scientists and engineers. By exploiting continuous advances in high performance computing technology, the defense research, development, test and evaluation (RDT&E) community is able to resolve critical scientific and engineering problems quicker and with more precision than any potential adversary threatening national security. The results of these efforts feed directly into the acquisition process by increasing our fundamental understanding of the battlefield environment as well as improving upon weapon system design, development, test, evaluation, deployment, operations and sustainment. As such, high performance computing (HPC) has been identified as a key enabling technology essential to achieving the objectives of the DoD's Science and Technology (S&T) and Test and Evaluation (T&E) programs.

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(U) The HPCMP has established and supports four major shared resource supercomputing centers as well as several smaller, special-purpose distributed supercomputing centers. These centers directly support the DoD S&T and T&E laboratories and centers and are accessible to local and remote scientists and engineers via high-speed network access. Providing for the adaptation of broadband, widely-used applications and algorithms to address S&T and T&E requirements, along with continued training of users as new system designs and concepts evolve, is an integral part of the program. The program pursues continuous interaction with the national HPC infrastructure, including academe, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise.

(U) The HPCMP user base includes approximately 5,000 computational scientists and engineers and over 60 DoD laboratories and developmental test and evaluation facilities. The integrated HPCMP program consists of a set of four large Major Shared Resources Centers (MSRCs) that are responsible for as large a fraction of DoD's S&T and DT&E computational workload as feasible. These MSRCs provide extensive capabilities to address user requirements for hardware, software, programming environments, and training. A limited set of smaller shared resource centers, Distributed Centers (DCs), augment the MSRCs to form the total HPCMP computational capability. Distributed Centers address critical HPC requirements that cannot be met at MSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC expertise located at the remote sites. The MSRCs and DCs are currently interconnected with all S&T and DT&E user sites via the Defense Research and Engineering Network (DREN). Additionally the Common HPC Software Support Initiative (CHSSI) develops a set of critical common DoD applications programs that run efficiently on advanced HPC systems at the MSRCs and Distributed Centers.

(U) True modernization of DoD's HPC capability and fulfillment of the program's vision and goals requires an on-going program strategy that addresses all aspects of HPC. While advancing the level of hardware performance is critical to success, the higher objective is to enable better scientific research and technology development for superior weapons, warfighting and related support systems. The goals of the HPCMP are to:

- Provide the best commercially available, state-of-the-art HPC capacity and capability to enable weapons development and more capable warfighting systems,
- Ensure development of software tools, supportive programming environments, and applications to exploit the capabilities of HPC,
- Expand and train the DoD HPC user base to more effectively use HPC,
- Link users and HPC centers through robust high speed networking (thus facilitating classified and unclassified access and the creation of collaborative work environments), and
- Engage, leverage, contribute to, and be a major participant in the national HPC infrastructure and exploit benefits for Defense R&D.

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(U) Four major contracts to support each of the MSRCs were competitively awarded during FY 1996. These contracts provide equipment for up to five years and comprehensive support services for the next five to eight years. The four MSRCs and their location are:

- Aeronautical Systems Center (ASC), Wright-Patterson Air Force Base, OH
- Army Corps of Engineers Waterways Experiment Station (CEWES), Vicksburg, MS
- Army Research Laboratory (ARL), Aberdeen Proving Ground, MD
- Naval Oceanographic Office (NAVO), Stennis Space Center, MS

(U) Nichols Research Corporation of Huntsville, AL was awarded contracts to support both the ASC and CEWES MSRCs. Grumman Data Systems of Herndon, VA was awarded the contract to support the NAVO MSRC. Finally, Raytheon E-Systems of Garland, TX was awarded the contract to support the ARL MSRC. Each of the MSRC contracts contains provisions, i.e. established contract options, to allow significant expansion of high performance computing systems and related support systems over the first five years of the contract. These contract options ensure that MSRC system expansions can take place in a timely fashion during each fiscal year.

(U) There are currently 17 distributed centers. In FY 1999, one distributed center was retired; four existing centers were upgraded; and two new centers were added. Also in FY 2000 multiple distributed center proposals will be evaluated resulting in awards to upgrade existing centers or establish new ones. Currently identified distributed centers and their locations are listed below:

- Air Armaments Center (ARC), Eglin AFB, FL
- Air Force Flight Test Center (AFFTC), Edwards AFB, CA
- Air Force Research Laboratory (AFRL-Rome), Rome, NY
- Air Force Research Laboratory, Sensors Directorate (AFRL/SN), Wright-Patterson AFB, OH
- Army High Performance Computing Research Center (AHPCRC), South Minneapolis, MN
- Arnold Engineering Development Center (AEDC), Arnold AFB, TN
- Arctic Region Supercomputing Center (ARSC), Fairbanks, AK
- Joint National Test Facility (JNTF), Schriever AFB, CO
- Maui High Performance Computing Center (MHPCC), Maui, HI
- Naval Air Warfare Center - Aircraft Division (NAWC-AD), Patuxent River NAS, MD

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- Naval Air Warfare Center - Weapons Division (NAWC-WD), China Lake, CA
- Naval Research Laboratory (NRL), Washington, DC
- Redstone Technical Test Center (RTTC), Huntsville, AL
- Space and Missile Defense Command (SMDC), Huntsville, AL
- Space and Naval Warfare Systems Center (SSCSD), San Diego, CA
- Tank-Automotive Research, Development and Engineering Center (TARDEC), Warren, MI
- White Sands Missile Range (WSMR), NM

(U) The Defense Research and Engineering Network (DREN) provides wide area network (WAN) connectivity among the Department's High Performance Computing resources (high performance computing systems and the HPC user base of scientist and engineers in the research, development test and evaluation community). The DREN is implemented through the DREN Intersite Services Contract (DISC) awarded to American Telephone and Telegraph (AT&T) in FY 1996. This contract allows the government to purchase high-speed network service to anywhere in the United States at bandwidths ranging from 3.0 megabits per second to 622 megabits per second (OC-12), with upgrade potential to 2.4 gigabits per second (OC-48) over the five year life of the contract.

COST (In Millions)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	151.613	164.262	164.027	137.988	143.038	145.808	148.643	Continuing	Continuing
HPCM/P476	151.613	164.262	164.027	137.988	143.038	145.808	148.643	Continuing	Continuing

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(U) **Project Number and Title: P476 HPCM**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS:**

(U) **FY 1999 Accomplishments:**

(U) **Shared Resource Centers:** The program continued the modernization and sustainment of the Shared Resource Centers. Additional HPC systems, storage, and scientific visualization capabilities were acquired to populate and upgrade the established MSRCs to fulfill a substantial portion of the projected HPC requirements of the laboratories and R&D centers. Contract options were executed to upgrade performance at four MSRCs that will minimally triple their computing capability over the current two-year performance level (PL) upgrade period (FY 1999 and FY 2000). The program assessed and prioritized HPC requirements for DCs and deployed new systems at four existing DCs and established two new DCs to accomplish S&T and DT&E mission needs which cannot be met effectively or efficiently at the MSRCs. Per congressional direction, funding was provided to two DCs and 1 MSRC for next generation internet initiatives.

(U) **Networking:** Due to researchers taking greater advantage of their connectivity to high performance computing systems and other researchers, the bandwidth demands on DREN continued to grow and more user sites took full advantage of the DREN ATM fabric. The majority of the effort in FY 1999 was to provide services to selected sites with some increases in bandwidth. Low end users continued to be connected at 3 Mbps and mid to high range users were connected at 155 Mbps (previous plans to connect high range users at 622 Mbps were postponed due to funding reductions imposed prior to FY 1999). Due to reductions in FY 1999 Research, Development Test and Evaluation funding, 6 link upgrades were postponed and 18 partial to full link improvements were postponed. Security enhancements were implemented. Collaborative work continued with the Federal networking community and standards associations to assure DREN remains compatible with future technology changes. Formal acquisition planning for the DREN follow-on contract was begun. (\$ 17.021Million)

(U) **Software Applications Support:** Development efforts in the CHSSI program continued to mature as some CHSSI projects were completed, and others begun. The CHSSI projects continued developing shared scalable applications supporting software to exploit scalable HPC assets. (\$ 23.635 Million)

(U) **MSRC Sustainment:** The program sustained and supported the integration, operation and use of HPC computational resources at the four Major Shared Resource Centers. However, this support was less than originally planned due a reduction in FY 1999 Research, Development Test and Evaluation funding. Support for scientific visualization through a high performance visualization center was increased. Support for the next generation internet initiative was also provided through 1 MSRC. .
(\$ 87.561 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 High Performance Computing Modernization PE 0603755D8Z	

(U) **Distributed Center Sustainment:** The program supported sustainment and operations at the Maui High Performance Computing Center and the Arctic Region Supercomputer Center in accordance with FY 1999 Congressional language. Due to program funding limitations recognized in 1996, a decision was made to typically only support investments in HPC systems at new or existing DCs with HPCMP procurement funding. In return for the HPCMP investment, the DC organization agrees to appropriately fund the sustainment and operations of the HPCMP equipment located at the site. Only a nominal amount of funding was allocated by the HPCMP for DC program management. Special projects supporting next generation internet initiatives were supported at two DCs. (\$ 23.396 Million)

(U) **FY 2000 Plans:**

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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 High Performance Computing Modernization PE 0603755D8Z	

(U) **Shared Resource Centers:** The program will sustain the existing capability and continue the modernization process by acquiring additional HPC systems, storage, and scientific visualization capabilities to populate and upgrade the established MSRCs to fulfill the projected HPC requirements of the laboratories and R&D centers. Contract options will continue to be executed to meet the required performance levels at the four MSRCs, minimally tripling their computing capabilities from the previous performance levels over the two year period (FY 1999 and FY 2000). The program will continue to identify evaluate and prioritize HPC requirements for DCs and will acquire and deploy new systems or upgrades to existing systems as needed to accomplish RDT&E mission needs. Formal acquisition planning efforts will begin to assure new acquisition vehicles are in place to support FY 2001 and beyond procurements.

(U) **Networking:** As researchers take greater advantage of their connectivity to high performance computing systems and other researchers, the bandwidth demands on DREN continue to grow. As local infrastructures expand, more user sites will be able to take full advantage of the DREN ATM fabric. Thus the majority of the effort in FY 2000 will be to upgrade services to selected sites and increase bandwidth. Low end users will continue to be connected at 3 Mbps, mid and high range users will be connected at 155 Mbps and high range users will be connected at 622 Mbps. Previously planned upgrades will be accomplished. Additional security enhancements will be implemented. Collaborative work will continue with the Federal networking community and standards associations to assure DREN remains compatible with future technology changes. Formal acquisition planning for the DREN follow-on contract will continue to assure new contracts are in place in FY 2001. (\$ 29.296 Million)

(U) **Software Applications Support:** Development efforts in the CHSSI program will continue to mature as some CHSSI projects are completed, and others are begun. The CHSSI projects will continue developing shared scalable applications supporting software to exploit scalable HPC assets. (\$ 21.569 Million)

(U) **MSRC Sustainment:** The program will sustain and support the integration, operation and use of HPC computational resources at the four Major Shared Resource Centers. Partial year sustainment and operations for systems purchased and deployed in FY 2000 and cost saving resulting from the retirement of older HPC systems are included in the total FY 2000 funding requested. Support for scientific visualization through a high performance visualization center is being increased. (\$ 87.166 Million)

(U) **Distributed Center Sustainment:** The program will fund sustainment and operations at the Maui High Performance Computing Center and the Arctic Region Supercomputer Center for FY 2000. Support for a multi-thread-architecture system is being implemented at the program's Distributed Center at the Naval Research Laboratory. Due to program funding limitations recognized in 1996, a decision was made to typically only support investments in HPC systems at new or existing DCs with HPCMP procurement funding. In return for the HPCMP investment, the DC organization agrees to appropriately fund the sustainment and operations of the HPCMP equipment located at the site. While funding has been added in FY 2000 to sustain the ARSC and MHPCC, only a nominal amount of funding is allocated by the HPCMP for DC program management. (\$ 26.231 Million)

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(U) **FY 2001 Plans:**

(U) **Shared Resource Centers:** The program will sustain the existing capability and continue the modernization process by acquiring additional HPC systems, storage, and scientific visualization capabilities to populate and upgrade the established MSRCs to fulfill the projected HPC requirements of the laboratories and R&D centers. The program will continue to identify evaluate and prioritize HPC requirements for DCs and will acquire and deploy new systems or upgrades to existing systems as needed to accomplish RDT&E mission needs.

(U) **Networking:** The majority of the effort in FY 2001 will be to upgrade services to all sites and increase bandwidth. Low end users will continue to be connected at 3 Mbps, mid range users will be connected at 155 Mbps and high range users will be connected at 622 Mbps. Operation of security systems and enhancements will continue. Collaborative work will continue with the Federal networking community and standards associations to assure DREN remains compatible with future technology changes. (\$ 32.691 Million)

(U) **Software Applications Support:** Development efforts in the CHSSI program will continue to mature as some CHSSI projects are completed, and others are begun. The CHSSI projects will continue developing shared scalable applications supporting software to exploit scalable HPC assets. (\$ 22.304 Million)

(U) **MSRC Sustainment:** The program will sustain and support the integration, operation and use of HPC computational resources at the four Major Shared Resource Centers. Partial year sustainment and operations for systems purchased and deployed in FY 2001 and cost saving resulting in the retirement of older HPC systems are included in the total FY 2001 funding requested. New contracts for sustainment support in FY2001 and beyond will be awarded. (\$ 88.318 Million)

(U) **Distributed Center Sustainment:** Due to program funding limitations recognized in 1996, a decision was made to typically only support investments in HPC systems at new or existing DCs with HPCMP procurement funding. In return for the HPCMP investment, the DC organization agrees to appropriately fund the sustainment and operations of the HPCMP equipment located at the site. While funding has been added in FY 2001 to sustain the ARSC and MHPCC, only a nominal amount of funding is allocated by the HPCMP for DC program management. (\$ 20.714 Million)

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(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	152.585	159.099	145.140	Continuing
Appropriated Value	153.927	168.099		Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed undistributed reduction	0	0.000	(1.113)	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	(.972)	(1.668)	20.000	
c. Other		(2.169)		Continuing
Current President's Budget	151.613	164.2662	164.027	Continuing

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide / BA 3	R-1 ITEM NOMENCLATURE High Performance Computing Modernization PE 0603755D8Z	

Change Summary Explanation:

(U) **Funding:** The funding changes in FY 1999 and FY 2000 are the result of inflation savings, below threshold reprogrammings and the government wide rescission. The adjustments in FY 2001 are the result of inflation adjustments and program revisions. The adjustments in FY 2002 are the result of inflation adjustments. Sustainment funding for the ARSC and the MHPCC is included, but only for FY 2000 and FY 2001.

(U) **Schedule:** Not Applicable

(U) **Technical:** In accordance with FY 1999 congressional language, the High Performance Computing Modernization Program used additional FY 1999 RDT&E funding for operations, sustainment and upgrades at the Maui High Performance Computing Center and the Arctic Region Supercomputing Center and provided support for scientific visualization as well as next generation internet efforts. In accordance with FY 2000 congressional language, the High Performance Computing Modernization Program will use additional FY 2000 RDT&E funding to establish a multithread architecture system and support scientific visualization.

(U) **C. Other Program Funding Summary Cost**

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Procurement Line P-1 Line, PROCUREMENT, DEFENSE-WIDE (OSD High Performance Computing - Major Equipment)

(\$ in Millions)

<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To Complete</u>	<u>Total Cost</u>
91.435	95.865	39.978	50.445	49.348	50.333	51.892	Continuing	Continuing

MILESTONE SCHEDULE:

	Fiscal Years
Milestone II Decision Review	1Q 1996
Awards for MSRC Contracts (Performance Level 1)	2Q, 3Q, 4Q 1996
Award for DREN (DISC)	4Q 1996
MSRC Performance Level 1 Capability Installed	1Q 1997-4Q 1997
In-Process Review	3Q 1997
FY 1997 HPC Modernization Plan Updated	3Q 1997
MSRC Performance Level 2 Capability Installed	2Q 1997- 3Q 1998
DREN Initial Performance Capability	3Q 1997
FY 1998 HPC Modernization Plan Updated	2Q 1998
IDREN to DREN Transition Complete	4Q 1998
MSRC Performance Level 3 Capability Installed	2Q 1999- 3Q 2000
MSRC Follow-on Contract(s) (Recompete)	2Q 2001
DREN Follow-on Contract (Recompete)	1Q 2001

(U) **D. Schedule Profile** Not Applicable

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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 Joint Wargaming Simulation Management Office PE 0603832D8Z		
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	56.861	66.967	56.971	59.286	62.027	63.353	64.541	Continuing	Continuing
JSM/P476	56.861	66.967	56.971	59.286	62.027	63.353	64.541	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

The Defense Modeling and Simulation Office has corporate-level responsibility for the cooperation and synergism of modeling and simulation (M&S) activities within the Department of Defense. M&S has demonstrated the capability to revolutionize the way in which the Department makes decisions and conducts its operations. Working as a system of systems, M&S can support a full range of applications (e.g. joint training, doctrine development, formulation and assessment of operational plans, mission rehearsal, force structuring and the acquisition of new systems). To ensure effective and efficient use of M&S, the Department has developed a strategy fostering interoperability and re-use, embodied in the Department of Defense Modeling and Simulation Master Plan, which serves as the basis for execution of this program. The major element of the strategy is development of a common technical framework (CTF) for M&S consisting of three components: the High Level Architecture (the most important); Conceptual Models of the Mission Space (CMMS); and Data Standardization. Supporting these is a broad range of shared common services which include environmental representation; human and organizational behavioral representation; verification, validation and accreditation of simulations; a modeling and simulation resource repository; a modeling and simulation operational support activity; and outreach and education initiatives to ensure standardized and timely implementation of the plan. As a result of this effort, the Department will be able to improve readiness, enhance mission rehearsal, optimize investment decisions, and achieve cost-effective acquisitions.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3		R-1 ITEM NOMENCLATURE Joint Wargaming Simulation Management Office PE 0603832D8Z

<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	56.861	66.967	56.971	59.286	62.027	63.353	64.541	Continuing	Continuing
JSM/P476	56.861	66.967	56.971	59.286	62.027	63.353	64.541	Continuing	Continuing

(U) **Project Number and Title: P476 JSM**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) Continued development of HLA technology, prototypes of enhanced capabilities and applications of advanced technology; expanded support, including high performance infrastructure for users of modeling and simulation, to enable them to exploit fully the increased capabilities that will be fielded under the HLA initiative, to include JSIMS and JWARS; designed and developed the prototype for M&S technologies required to implement technology needed to federate simulations operating at different levels of security to support applications for training, analysis and acquisition.
(\$ 24.289 Million)

(U) Developed and delivered the third operational build of the CMMS Toolset to support integration and exchange of simulation implementation-independent functional descriptions of military operations and tasks; focused on the knowledge engineering activities conducted by simulation development subject matter experts who employ conceptual models to design and implement HLA Federations and M&S applications; CMMS Toolset support for simulation developer knowledge engineering activities were demonstrated by direct collaboration with JSIMS Enterprise simulation developers and with HLA transition efforts; CMMS Toolset extended to support engineering and engagement level of detail required in acquisition and operational test and evaluation applications; experiments conducted which established the scope, priority, and compatibility of requirements to support a multitude of equipment and systems characteristics and performance specifications.
(\$ 3.200 Million)

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(U) Continued development of HLA related data standards and associated OMDD efforts; developed and delivered the first and second operational builds of the OB data access Toolset; provided OB data access Toolset support for M&S community via direct collaboration with the OSD PA&E Joint Data System, the JSIMS Enterprise, and selected HLA transition efforts; extended the registration template to support additional repository requirements and security and release policies and procedures; developed and coordinated producer Data Quality Assurance guidelines; distributed/installed Data Quality tools at additional DoD locations; began CSS, associated DIFs, and data standards development for targets/facilities information; continued to nominate and obtain final standards approval for other M&S data elements for inclusion in the DoD Data Dictionary System (DDDS); provided Functional Data Administration for M&S in accordance with DoDD 8320.1.
(\$ 2.500 Million)

(U) Completed interchange mechanism full definition by release of two software packages and expanded technology insertion efforts to further develop test capabilities; expanded software tools for SEDRIS transmittal generation and verification; initiated SEDRIS standardization through established ISO processes; evaluated sources and documented procedures for the use of alternate sources for database generation, to include commercial options; provided additional tools, reference datasets, policies and procedures for the generation of integrated databases expanding existing terrain and ocean capabilities and integrating atmospheric data and effects; initially exploited atmospheric scintillation effects in simulations using AF developed technology; expanded representational resource experiments in high-resolution Simulation Based Acquisition (SBA)-related areas in cooperation with the Joint Strike Fighter JPO; expanded development of the weather scenario generation capability, to include oceanographic data; procedures for data acquisition through littoral classification and climatological data manipulation were tested through integrated experimentation; initiated operational capability for MEL with both Internet and SIPRNet capability; completed metadata specification for access and resource site software; and generally expanded resource availability across the MEL system.
(\$ 9.527 Million)

(U) Continued extension of conceptual model of mission space technical framework to human and organizational behavior; examined limits of current Computer Generated Forces technologies; established Special Interest Area on the World Wide Web.
(\$ 1.500 Million)

(U) Updated DoDI 5000.61 and completed the initial build of an application based VV&A Recommended Practices Guide; developed V&V methodology as it applies to HLA federations, legacy simulations and new development efforts; developed prototype VV&A history templates for data and M&S; created an action plan for VV&A in support of SBA based on the SBA Roadmap; assessed V&V tool capabilities.
(\$ 3.000 Million)

(U) Modified and enhanced MSRR common, physical and software infrastructure based on network and database state-of-art and user requirements, including federation with other repositories, to form a collaborative, distributed repository system; continued documentation of MSRR; continued population of the MSRR system providing: (a) directories /catalogs; (b) data standardization resources (e.g., process and data models, data dictionary); (c) reusable data, algorithms, models and simulations; and (d) tools for browsing and accessing, linking across resources, configuration management, etc.; initiated requirements necessary for transition to the Information Analysis Center; modified software based on user requirements.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
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(\$ 3.945 Million)

(U) Continued MSOSA operations providing one-on-one assistance/education to the M&S community and transitioned to the new Modeling and Simulation Information Analysis Center (MSIAC) organization.

(\$ 4.000 Million)

(U) Continued emphasis on outreach activities to include expanded M&S conference support and web-based public affairs activities.

(\$ 1.400 Million)

(U) Instituted development of fully interactive user, staff officer, manager and executive level courses that address training, acquisition and analysis domains; conducted technical seminars, workshops and symposia; developed, fielded and populated web-based electronic libraries to make all M&S course of instruction immediately available to the M&S community; widely disseminated M&S formal instruction through production and distribution of videos and CD-ROMS; inserted M&S technology into major joint warfighter exercises; refined and enhanced the capability of the models and simulations developed to support DoD's acquisition process.

(\$ 3.500 Million)

(U) FY2000 Plans:

(U) Apply increased advanced integrated automation to federation development and operation, demonstrating additional (20%) reduced costs to create a new federation; use advanced experimentation to support domestic and international standards organizations; establish partnerships with operational organizations; continue to support joint initiatives; use enterprise-level initiatives focused on common community concerns.

(\$ 33.411 Million)

(U) Transition the CMMS Toolset to operational status; update and maintain the CSS, DIFs, and KAT Tools, CMMS Library, and supporting conversion, quality assurance, integration, and analysis tools; update and maintain the CMMS Recommended Practices Guide; support operational use of the CMMS Toolset by the M&S community; adapt components of the CMMS Toolset to support equipment and systems characteristics and performance specifications; conduct experiments to establish the scope, priority and compatibility with human behavior representations.

(\$ 2.856 Million)

(U) Transition OMDDS to operational status; update and maintain HLA related data standards and required M&S ADS data; develop and deliver the third and fourth operational builds of the OB data access Toolset; review and update Data Quality Assurance guidelines; review and update DAVIE tool; distribute/install DAVIE tool at additional DoD locations; review and update DE-RPG to ensure appropriateness; maintain existing DIFs; continue to develop CSS, associated DIFs, and data standards for additional environmental representations, units/systems, and operations /human behavior; continue to nominate and obtain final standards approval for other M&S data elements for inclusion in the DDDS; assess Data Security requirements for on-going M&S efforts; provide Functional Data Administration for M&S in accordance with DoDD 8320.1.

(\$ 1.900 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 Joint Wargaming Simulation Management Office PE 0603832D8Z	

(U) Continue SEDRIS path toward national and international standardization; complete user defined interchange experiments; initiate establishment of a consortium to manage SEDRIS products and definition in consort with target standardization organizations; develop integrated ocean database generation procedures that support transition from deep to shallow water operations and provide correlated environmental effects for SBA, training and analysis; high-resolution atmospheric effects and target scene depiction will also be studied in multi-resolution scenarios; initial work in space data use in simulation will emphasize growing interest in solar maximum events; continue to expand resource listings to include model and algorithm coverage for all environmental domains; compliance with evolving international metadata standards will be addressed; additional MEL services will be assessed from an established users and implementers consortium comprised of Military, Government, Industry and Academic members from both domestic and international organizations.

(\$ 11.200 Million)

(U) Initiate recommended practices guide for enhancing simulations with human and organizational behavior representations; continue special interest area in human behavior; examine reuse and interoperability among human behavior federates; examine and manipulate models of command decision-making.

(\$ 6.900 Million)

(U) Expand scope of VV&A guidance to address system and human behavior representations, live player interoperability, and fidelity issues; prototype VV&A tool concepts.

(\$ 2.100 Million)

(U) Maintain resource repositories to enable/encourage the reuse of models, simulations and related assets; federate with additional repositories within DoD; develop specialized structures, as necessary, to support innovative DoD programs which will increasingly depend on reuse; increase emphasis on offering incentives to M&S community to populate the repositories.

(\$ 1.400 Million)

(U) Utilize the MSIAC for core-level M&S services.

(\$ 3.000 Million)

(U) Continue emphasis on outreach activities to include expanded M&S conference support and web-based public affairs activities.

(\$ 2.000 Million)

(U) Execute transition of existing formal M&S courses of instruction to other agencies. DMSO will concentrate on effort to greatly expand the development and distribution of new courses to support the entire M&S community through electronic technologies.

(\$ 2.200 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 Joint Wargaming Simulation Management Office PE 0603832D8Z	

(U) FY2001 Plans:

(U) Demonstrate runtime infrastructure advances using next-generation software and hardware to increase (20%) performance for the same cost, using commercial software to replace 50% of customer software; continue to use advanced experimentation for enhanced standards, policies and procedures; continue partnerships with operational users; continue support of joint initiatives; continue to use enterprise-level initiatives focused on common community concerns.

(\$ 28.561 Million)

(U) Continue to support operational usage of the CMMS Toolset; continue adaptation of CMMS Toolset to support equipment and systems characteristics and performance specifications; adapt components of the CMMS Toolset to support human behavior representation as appropriate; update and maintain the CMMS RPG; continue the development of CSS and associated DIFs for CMMS subject matter descriptions; update and maintain knowledge acquisition tools and utilities to support CMMS activities.

(\$ 2.290 Million)

(U) Transition Order of Battle data access Toolset to operational status; support operational usage of OMDDS; update and maintain HLA related data standards and required M&S ADS data; develop and deliver the first and second operational builds of the Targets and Facilities data access Toolset; review and update Data Quality Assurance guidelines; review and update DAVIE tool; distribute/install DAVIE tool at additional DoD locations; review and update DE-RPG to ensure appropriateness; maintain existing DIFs; continue to develop CSS, associated DIFs, and data standards for additional environmental representations, units/systems, and operations/human behavior; continue to nominate and obtain final standards approval for other M&S data elements for inclusion in the DDS; assess Data Security requirements for on-going M&S efforts; provide Functional Data Administration for M&S in accordance with DoDD 8320.1.

(\$ 1.600 Million)

(U) Complete national and international SEDRIS standardization to include formal establishment of a management consortium; initiate investigation in the use and expansion of the SEDRIS data representation model in supporting dynamic changes in the physical environment; investigate very high resolution database designs that incorporate computer-added design files, and micro-climate environmental information for use in dynamic fly-throughs in urban terrain; continue to reduce integrated database generation timelines to meet evolving operational mission planning and mission rehearsal timeline requirements; demonstrate production and operational use of measures of database consistency to assess interoperability potential and tailor database design, generation and/or modification activities in establishing simulation federations and conducting exercise scenarios; complete initial pass at model and algorithm discovery and access in all environmental domains; fully link the MEL system with the National Spatial Data Infrastructure and appropriate international systems to ensure a robust capability to support U.S. DoD needs thus establishing a `one stop shop` capability for all environmental information needs.

(\$ 9.360 Million)

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3	R-1 ITEM NOMENCLATURE Joint Wargaming Simulation Management Office PE 0603832D8Z	

(U) Initiate the development of technologies and tools to support incorporation of authoritative representations of human and organizational behavior into DoD simulations.

(\$ 5.740 Million)

(U) Expand scope of VV&A guidance to address complex cognitive processes and dynamic environment including terrain and atmosphere; populate VV&A tool sets.

(\$ 1.730 Million)

(U) Maintain resource repositories to enable/encourage the reuse of models, simulations and related assets; increase emphasis on offering incentives to M&S community to populate the repositories.

(\$ 1.150 Million)

(U) Utilize the MSIAC for core-level M&S services.

(\$ 3.000 Million)

(U) Continue emphasis on outreach activities to include expanded M&S conference support and web-based public affairs activities.

(\$ 1.720 Million)

(U) Complete transition of existing formal M&S courses of instruction to other agencies; expand the development and distribution of new courses to support the entire M&S community through electronic technologies.

(\$ 1.820 Million)

(U) B. Program Change Summary	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	60.518	68.456	68.250	Continuing
Appropriated Value	0.000	69.206	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	(3.657)	(.522)	(.449)	
c. Other	0.000	(1.717)	(10.830)	
Current President's Budget	56.861	66.967	56.971	Continuing

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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 Joint Wargaming Simulation Management Office PE 0603832D8Z	

Change Summary Explanation:

- (U) **Funding:** Funding changes are the result of rescission, inflation and programmatic 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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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA3							R-1 ITEM NOMENCLATURE Nuclear Matters PE 0605160D8Z		
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	0.000	1.449	1.483	1.471	1.467	1.464	1.460	Continuing	Continuing
Nuclear Matters	0.000	1.449	1.483	1.471	1.467	1.464	1.460	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT:**

(U) Nuclear weapons receive special consideration within OSD because of their political and military importance, destructive power, and the potential consequences of an accident or unauthorized act. Consequently, nuclear weapons issues must receive senior level attention, action, and support. The Nuclear Matters Program provides technical policy guidance to senior OSD leadership on complex and demanding issues pertaining to nuclear stockpile sustainment. The office works closely with the Joint Staff, U.S. Strategic Command, the Military Services, OSD Policy, the Department of Energy, Congress, and foreign governments to provide guidance for – and oversight of – a wide variety of nuclear weapons activities. In support of these activities, the program provides for analysis and assessments of issues associated with the reliability, safety, security, transportation, command and control, maintenance, storage, and sustainability of the enduring stockpile.

(U) The Nuclear Matters Program was part of the Counterproliferation Support Program, which was transferred to the Defense Threat Reduction Agency (DTRA) in accordance with the Defense Reform Initiative. The Nuclear Matters Program has been transferred to PE0605160D8Z. FY 1999 funding was provided by DTRA's Counterproliferation Management Support line (0605160BR).

COST(In Millions)	FY	FY	FY	FY	FY	FY	FY	Cost to	Total Cost
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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA3						R-1 ITEM NOMENCLATURE Nuclear Matters PE 0605160D8Z			
	1999	2000	2001	2002	2003	2004	2005	Complete	
Total Program Element (PE) Cost	0.000	1.449	1.483	1.471	1.467	1.464	1.460	Continuing	Continuing
Nuclear Matters	0.000	1.449	1.483	1.471	1.467	1.464	1.460	Continuing	Continuing

(U) FY 1999 Accomplishments:

Funding and activities accomplished in PE 0605160BR. P545

(U) PLANS:

(U) FY2000 Plans:

(U) Recurring Obligations and Requirements Development: Analyses will be produced in preparation of the annual Nuclear Weapons Deployment Request to the President and support activities for senior level groups, such as the Joint Advisory Committee on Nuclear Weapons Surety. These analyses and assessments will provide guidance for preparation of the annual Nuclear Weapons Stockpile Memorandum and the Requirements and Planning Document to the President, the Nuclear Weapons Council (NWC) Chairman's Annual Report to Congress, and NWC Standing and Safety Committee actions. These products will provide the basis for technical policy recommendations to the President, Secretary of Defense, Secretary of Energy, and Chairman of the NWC. (\$560K)

(U) Nuclear Weapons Council Support: Analyses and assessments on technical issues will be produced to provide support to the NWC members and staff concerning the evolution of the nuclear weapons complex and infrastructure. These analyses will support development of agenda items for the NWC (\$300K).

(U) Maintaining the Infrastructure for the Deterrent: Analyses will be provided on topics for sustaining nuclear weapons safety, use control, survivability, certification, transportation, and reliability. These efforts will support DoD oversight of DOE stockpile stewardship activities, such as nuclear weapon sustainment and revalidation, tritium production technology issues and infrastructure requirements, nuclear weapon life extension, and stockpile stewardship and maintenance. (\$300K)

(U) Policy and Guidance for International Obligations: Oversight and guidance will be provided to activities and organizations, such as the NATO High Level Group, the Joint Theater Surety Management Group, and Congressionally approved technical exchanges with foreign nations. (\$169K)

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RD&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RD&E, Defense-Wide/BA3	R-1 ITEM NOMENCLATURE Nuclear Matters PE 0605160D8Z	

(U) **FY2001 Plans:**

- (U) Recurring Obligations and Requirements Development (\$600K)
 Nuclear Weapons Council Support (\$340K)
 Maintaining the Infrastructure for the Deterrent (\$340K)
 Policy and Guidance for International Obligations (\$203K)

(U) <u>B. Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	0	1.495	1.493	Continuing
Appropriated Value	0	0	0	Continuing
Adjustments to Appropriated Value	0	1.495		
a. Congressionally Directed Undistributed Reduction	0			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	(.009)	(.010)	
c. Other	0	(.037)0	0	
Current President's Budget	0	1.449	1.483	Continuing

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RDTE&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA3	R-1 ITEM NOMENCLATURE Nuclear Matters PE 0605160D8Z	

Change Summary Explanation: Funding changes are due to inflation savings and the government wide rescission.

- (U) **Funding:** When the Nuclear Matters funding line was created, it was placed under the Counterproliferation Program for administrative purposes. Under the Defense Reform Initiative (DRI), the Counterproliferation Program and its funding line were moved to the Defense Threat Reduction Agency, while the Office of Nuclear Matters was moved to the Director, Defense Research and Engineering. As a result, funds for Nuclear Matters were transferred from PE0605160D8Z to PE0605160BR in FY1999.
- (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:**

	FY 1999				FY2000				FY2001			
	1	2	3	4	1	2	3	4	1	2	3	4

Analysis and Support Activities

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Exhibit R-2, RDT&E Budget Item Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 4				R-1 ITEM NOMENCLATURE PHYSICAL SECURITY EQUIPMENT PE 0603228D8Z					
COST (\$ in Millions)	FY 1999	FY 2000	FY2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	24.981	25.351	35.108	35.284	35.566	36.160	36.768	CONTINUING	CONTINUING
Force Protection COTS	5.648	4.157	12.484	11.500	12.500	11.600	12.600		
Tactical Automated Security	2.230	2.560	1.875	2.000	2.000	2.000	2.000		
Weapon Storage Area	2.735	2.887	3.878	4.500	4.500	5.000	5.000		
MDARS-E	5.500	4.890	5.590	0.000	0.000	0.000	0.000		
Waterside Security System	3.330	2.650	2.000	2.500	3.000	3.000	3.000		
EDE	0.488	2.060	2.150	3.000	3.000	3.000	2.768		
Tech Base	2.800	3.000	3.000	4.384	4.000	4.000	3.500		
Dissuader	0.346	0.000	0.000	0.000	0.000	0.000	0.000		
HALT	0.093	1.097	0.921	0.000	0.000	0.000	0.000		
CROWS	0.180	0.100	0.200	0.000	0.000	0.000	0.000		
FPC2	0.246	0.000	0.000	0.000	0.000	0.000	0.000		
HVISS	0.050	0.200	0.460	2.500	2.500	3.000	2.500		
PEWD II	0.300	0.300	0.500	1.000	1.166	1.160	2.000		
ETF	0.135	0.200	0.850	1.500	1.000	1.500	1.500		
DoD Locks, Safes and Vaults	0.900	0.900	0.850	1.400	0.900	0.900	0.900		
D/D Development/Qualification	0.000	0.350	0.350	1.000	1.000	1.000	1.000		

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Exhibit R-2, RDT&E Budget Item Justification	Date: February 2000
<p>A. <u>Mission Description and Budget Item Justification.</u> This program is a budget activity level 4 based on the demonstration/validation activities ongoing within the program. The purpose of this program is to develop physical security equipment (PSE) systems and to safeguard DoD acquisition information for all DoD components, to include Force Protection. This program supports the protection of tactical and nuclear weapons systems, DoD personnel and DoD facilities. Funding for critical RDT&E security improvements within service channels has fluctuated widely over the years and prompted the FY89 Congressionally directed consolidation of the Services and former Defense Nuclear Agency (DNA)/Defense Special Weapons Agency (DSWA) PSE RDT&E funds into this single OSD controlled program element. The funds are used to provide PSE RDT&E for individual Service and Joint PSE requirements. The PSE program is organized so that an ongoing DoD-coordinated Joint Action Group, consisting of Army, Navy, Air Force, and Defense Threat Reduction Agency (DTRA) representatives monitors, directs and prioritizes potential and existing PSE programs. With few exceptions, each Service sponsors RDT&E efforts for technologies and programs, which have multi-service applications. The funds are also employed to evaluate exploratory development of Physical Security Equipment. This program element supports the Army's advanced and engineering development of Interior Detection, Exterior Detection, Security Lighting, Security Barriers and Security Display Units. In a like manner, the program element also supports the Air Force's PSE RDT&E effort in the area of Exterior Surveillance, Entry Control and Airborne Intrusion. Finally, the program supports Navy RDT&E efforts in the areas of Shipboard Security, Waterside Security, Explosive Detection, Locks and anti-compromise and emergency destruction of classified material and equipment. Beginning with FY 1997, this PE includes funding for Force Protection Commercial-Off-The-Shelf (FP COTS) evaluation and testing, which has received focus since the 1996 Khobar Towers terrorist bombing incident. The FP COTS testing applies to all available technologies, which are considered effective for DoD use.</p> <p>(U) <u>FY 1999 Accomplishments</u> DISSUADER (0.346 million)</p> <ul style="list-style-type: none">• Obtained units for Legal and Medical review and approval• Distributed units to several Government organizations to gather field data• Initiated EMD planning <p>HINDER ADVERSARIES WITH LESS THAN LETHAL TECHNOLOGY (HALT) (0.093 million)</p> <ul style="list-style-type: none">• Awarded effort to develop two Field of View (FOV) variants• Initiated EMD planning	

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Exhibit R-2, RDT&E Budget Item Justification	Date: February 2000
<p>COMMON REMOTELY OPERATED WEAPON SYSTEM (CROWS) (0.180 million)</p> <ul style="list-style-type: none">• Established Army-USAF MOA to incorporate requirements• Assisted Army with proof of concept demonstration and risk reduction activities <p>FORCE PROTECTION COMMAND & CONTROL (FPC2) (0.246 million)</p> <ul style="list-style-type: none">• Developed a new system capability through the integration of Commercial-Off-The Shelf (COTS) products• Tested/demonstrated new capability at Joint Expeditionary Force Experiment(JEFX)'99 <p>HIGH VALUE ITEM SECURITY (HVISS) PHASE II Request For Information Document (RFID) (0.050 million)</p> <ul style="list-style-type: none">• Monitored Applied Research Efforts <p>PLATOON EARLY WARNING DEVICE II (PEWD II) (0.300 million)</p> <ul style="list-style-type: none">• Completed market investigation/TASS determination• Continued evaluation of candidate Non-Developmental Items (NDI)/COTS Systems <p>ELECTRONIC TRIP FLARE (ETF) (0.135 million)</p> <ul style="list-style-type: none">• Conducted Concept Exploration <p>DoD LOCKS, SAFES, VAULTS (0.900)</p> <ul style="list-style-type: none">• Developed repairable methods of entry for approved equipment• Provided engineering and consultation• Continued support for Mobile Detection Assessment Response System (MDARS) program• Developed anchoring methods for security equipment aboard ships• Evaluated and tested attack tools and security hardware• Tested alternative attack resistant concrete for high security magazine doors• Developed security seal user training	

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Exhibit R-2, RDT&E Budget Item Justification	Date: February 2000
<p>(U) <u>FY 2000 Plans</u></p> <p>HINDER ADVERSARIES WITH LESS THAN LETHAL TECHNOLOGY (HALT) (1.097 million)</p> <ul style="list-style-type: none">• Award an EMD contract to develop an eye-safe at all ranges version, tactically rugged, and capable of operating over full military temperature ranges <p>DELAY/DENIAL (D/D) DEVELOPMENT/QUALIFICATION (0.350 million)</p> <ul style="list-style-type: none">• Manage D/D product developments• Evaluate D/D COTS products• Recommend new D/D technologies <p>COMMON REMOTELY OPERATED WEAPON SYSTEM (CROWS) (0.100 million)</p> <ul style="list-style-type: none">• Continue FY99 efforts to assist the Army with proof of concept demonstration leading up to an EMD award <p>HIGH VALUE ITEM SECURITY SYSTEM (HVISS) PHASE II (RFID) (0.200 million)</p> <ul style="list-style-type: none">• Award Broad Agency Announcement (BAA)• Conduct Technical Feasibility Testing (TFT)• Prepare Analysis Of Alternatives (AOA) <p>ELECTRONIC TRIP FLARE (ETF) (0.200 million)</p> <ul style="list-style-type: none">• Prepare/release BAA• Develop draft specification & RFP components for EMD/Production contract• Conduct Technical Feasibility Testing <p>PLATOON EARLY WARNING DEVICE II (PEWD II) (0.300 million)</p> <ul style="list-style-type: none">• Complete Concept Formulation Package• Develop Project Plan <p>DoD LOCKS, SAFES, VAULTS (0.900)</p> <ul style="list-style-type: none">• Update DoD Lock Program Hotline• Support test requirements for combination locks• Complete internal locking device User Data Package (UDP) and obtain approval of system• Continue support of Army MDARS program• Publish financial guide on destruction of National Security Information• Update technical data sheets on security hardware	

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Exhibit R-2, RDT&E Budget Item Justification	Date: February 2000
<ul style="list-style-type: none">• Finalize specification for attack resistant concrete fill material, change High Security Magazine Door (HSMD) UDP to reflect material change• Install ten Internal Locking Device (ILD) systems in Germany for the Army• Evaluate and test attack tools and security hardware <p>(U) <u>FY 2001 Plans</u></p> <p>HINDER ADVERSARIES WITH LESS THAN LETHAL TECHNOLOGY (HALT) (0.921 million)</p> <ul style="list-style-type: none">• Complete EMD Phase <p>DELAY/DENIAL (D/D) DEVELOPMENT/QUALIFICATION (0.350 million)</p> <ul style="list-style-type: none">• Manage D/D product developments• Evaluate D/D COTS products• Recommend new D/D technologies <p>COMMON REMOTELY OPERATED WEAPON SYSTEM (CROWS) (0.200 million)</p> <ul style="list-style-type: none">• Assist Army with EMD Phase by providing Engineering, Logistics, and Cost Estimating support <p>HIGH-VALUE ITEM SECURITY SYSTEM (HVISS) PHASE II (RFID) (0.460 million)</p> <ul style="list-style-type: none">• Conduct Milestone (MS) I/II In-Process Review <p>ELECTRONIC TRIP FLARE (ETF) (0.850 million)</p> <ul style="list-style-type: none">• Continue Technical Feasibility Testing• Conduct MS I/II In-Process Review <p>PLATOON EARLY WARNING DEVICE II (PEWD II) (0.500 million)</p> <ul style="list-style-type: none">• Continue Technical Feasibility Testing• Develop MS I/II IPR Package and RFP <p>DoD LOCKS, SAFES, VAULTS (0.850)</p> <ul style="list-style-type: none">• Update or publish guide specifications for security equipment (as needed)• Update existing and publish new repairable methods of entry• Conduct a Security Seals Symposium• Update National Security Information destruction methods and guidance	

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Exhibit R-2, RDT&E Budget Item Justification					Date:			
					February 2000			
B. <u>Program Change Summary</u> (\$ million)								
		<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total</u>			
Previous President's Budget		24.465	37.107	36.201	<u>Cost</u>			
Appropriated Value			26.107		Continuing			
Adjustments to Appropriated Value								
a. Congressionally Directed								
Appropriation Reduction								
b. Congressionally Directed								
Undistributed Reduction								
c. Below threshold reprogrammings,								
inflation Savings, government-wide rescission		(0.484)	(0.756)	(1.093)				
Current Budget Submit/President's Budget		24.981	25.351	35.108	Continuing			
Change Summary Explanation:								
Funding:	Adjustments reflect inflation savings, below threshold reprogrammings and the Government-wide rescission							
Schedule:	N/A							
Technical:	N/A							
C. <u>Other Program Funding Summary</u>								
		<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>FY2002</u>	<u>FY2003</u>	<u>FY2004</u>	<u>Compl</u>
	<u>Cost</u>							
Procurement Line P-1 No(s)	- USAF	1.000	1.000	1.000	1.000	1.000	TBD	TBD
Milcon Project No(s)	- N/A							
Related RDT&E:	- N/A							
D. <u>Acquisition Strategy:</u>								
E. <u>Schedule Profile</u>								
Fiscal Year actual and planned events:								
		<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>				

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Exhibit R-2, RDT&E Budget Item Justification		Date:
Acquisition Milestones		
DISSUADER	MS II	
HALT	MS II	
CROWS	MS II	
FPC2		
HVISS		MSI/II
PEWD II		
ETF		MSI/II
Engineering Milestones		
N/A		
T&E Milestones		
HALT	QT&E	
HVISS	TFT	
PEWD II		TFT
ETF		TFT
Contract Milestones		
HVISS	BAA Awd	
ETF	BAA Awd	

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PE 0603228D8Z			FORCE PROTECTION (FP) COTS EQUIPMENT EVALUATION AND INTEGRATION				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
FP COTS	5.648	4.157	12.484	11.500	12.500	11.600	12.600	Continuing	Continuing
RDT&E Articles Qty									
<p>A. <u>Mission Description and Budget Item Justification.</u> The DoD Force Protection Commercial-Off-The-Shelf (COTS) evaluation and integration project identifies and evaluates commercial systems and equipment that have potential for solving critical Force Protection problems. Equipment is tested in laboratory and operational settings to determine its suitability for a wide range of Force Protection applications. These include applications in nuclear, aircraft flight line, personnel facilities and resource protection security. Products that are identified as having military value are made available for use by incorporating them into existing or new programs. Current emphasis is on products that provide day/night all-weather detection/surveillance, sniper location, non-lethal defensive capability, barriers, large vehicle explosives detection, water-side security systems, and personal and tactical security systems. Planned testing may be accomplished at the established DoD Test Facility at Eglin AFB FL or other appropriate/necessary facility.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Procured and delivered COTS equipment, i.e., Explosive Detectors for SWA, Personnel Alerting System for EUCOM, Vehicle Barriers for Military District of Washington • Conducted Force Protection Equipment Demonstration II (3-6 May, 1999 at MCB Quantico, VA) • Performed scheduled FY 1999 evaluation and test of selected COTS equipment/systems • Published appropriate reports • Updated the methodology and published the evaluation and test schedule for FY2000 • Updated the User's Guide of Commercially available Non Developmental Items for Force Protection uses <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Procure and deliver COTS Force Protection Equipment in support of DoD urgent and compelling requirements • Perform scheduled FY 2000 evaluations and test of selected COTS equipment/systems • Publish appropriate reports • Update the User's Guide of Commercially available Non Developmental Items for Force Protection users • Update methodology and publish evaluation and test schedule for FY 2001 									

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Exhibit R-2a, RDT&E Project Justification	Date: February 2000																				
<p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none">• Procure and deliver COTS Force Protection Equipment in support of DoD urgent and compelling requirements• Perform scheduled FY 2001 test and evaluations of selected COTS equipment/systems• Conduct Force Protection Equipment Demonstration III• Publish appropriate reports• Update the User's Guide of Commercially available Non Developmental Items for Force Protection users• Update methodology and publish test and evaluation schedule for FY 2002 <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy: Identify available government contracts or commence action to competitively awarded delivery order contracts.</p> <p>D. Schedule Profile: Fiscal Year actual and planned events:</p> <table><thead><tr><th></th><th>FY 1999</th><th>FY 2000</th><th>FY2001</th></tr></thead><tbody><tr><td>Acquisition Milestones</td><td></td><td></td><td></td></tr><tr><td>Engineering Milestones</td><td></td><td></td><td></td></tr><tr><td>T&E Milestones</td><td></td><td></td><td></td></tr><tr><td>Contract Milestones</td><td></td><td></td><td></td></tr></tbody></table>			FY 1999	FY 2000	FY2001	Acquisition Milestones				Engineering Milestones				T&E Milestones				Contract Milestones			
	FY 1999	FY 2000	FY2001																		
Acquisition Milestones																					
Engineering Milestones																					
T&E Milestones																					
Contract Milestones																					

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Exhibit R-3 Cost Analysis (page 1)								Date: February 2000				
RDT&E, DEFENSE-WIDE BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z					FORCE PROTECTION COTS				
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development						1.000		2.446				
Ancillary Hardware Development						0.300		0.504				
Systems Engineering						0.200		0.400				
Licenses												
Tooling												
GFE						0.150		0.250				
Award Fees												
Subtotal Product Development						1.650		3.600		CONT	CONT	
Remarks:												
Development Support						0.150		0.250				
Software Development												
Training Development						0.150		0.250				
Integrated Logistics Support												
Configuration Management						0.050		0.050				
Technical Data						0.050		0.150				
GFE												
Subtotal Support						0.400		0.700		CONT	CONT	
Remarks:												

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Exhibit R-3 Cost Analysis (page 2)									Date: February 2000				
RDT&E, DEFENSE-WIDE BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z						FORCE PROTECTION COTS				
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract	
Developmental Test & Evaluation				1.330		1.000		1.100					
Operational Test & Evaluation				3.100		1.082		6.100					
Tooling													
GFE													
Subtotal T&E				4.430		2.082		7.200		CONT	CONT		
Remarks													
Contractor Engineering Support				0.804		0.025		0.616					
Government Engineering Support				0.348				0.318					
Program Management Support													
Program Management Personnel													
Travel				0.066				0.050					
Labor (Research Personnel)													
Miscellaneous													
Subtotal Management				1.218		0.025		0.984		CONT	CONT		
Remarks													
Total Cost				5.648	[1]	4.157	[1]	12.484	[1]				
Remarks [1] On going program to demonstrate and document availability of COTS equipment for force protection missions													

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PE 0603228D8Z			TACTICAL AUTOMATED SECURITY SYSTEM (TASS)				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
TASS	2.230	2.560	1.875	2.000	2.000	2.000	2.000	Continuing	Continuing
RDT&E Articles Qty									
<p>A. <u>Mission Description and Budget Item Justification.</u> The Tactical Automated Security System (TASS) originally an Air Force and now DoD program, is an ongoing effort to develop an integrated portable relocatable security system to provide Force Protection capability for personnel, dispersed assets, fixed base facilities and Air Base Ground Defense applications. The system includes remote sensing, alarm monitoring through fiber optic and wireless data communications and remote assessment through the use of day/night all weather Thermal Imaging systems.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Conducted Follow On Test and Evaluation (FOT&E) and corrected "critical" FOT&E deficiencies • Conducted testing of COTS products to add capabilities to the TASS suite of products • Awarded and performed technology enhancement Engineering Change Proposals (ECP) to improve/provide new capabilities. This included adding an interface to an Army chemical/biological sensor and reducing the occurrence of nuisance and false alarm messages <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Conduct testing of COTS products to add capabilities to the TASS suite of products. This will include testing a blacklight night vision illuminator and several new intrusion detection sensors • Award and perform technology enhancement ECPs to improve/provide new capabilities. This will include developing a man-portable version of TASS to meet Air Force and Army requirements; annunciator software upgrade III; and miniaturize TASS components <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Conduct testing of COTS products to add capabilities to the TASS suite of products. This will include testing short-range thermal imagers and a new class hand-held thermal imager • Award and perform technology enhancement ECPs to improve/provide new capabilities. This will include developing an entry control feature and capabilities required to protect nuclear assets • Continue the development of the man-portable version of TASS 									

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Exhibit R-2a, RDT&E Project Justification								Date:	
								February 2000	
B. Other Program Funding Summary									
	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	To Complete	Total Cost
Procurement	15.500	22.200	20.700	12.200	10.900	11.200	11.200	TBD	TBD
C. Acquisition Strategy: One (1) large, two (2) Small Business competitively awarded contracts with technology enhancement delivery order available.									
D. Schedule Profile:									
Fiscal Year actual and planned events:									
	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>						
- FOT&E									
- P3I/COTS									
- P3I/ECPS									
Acquisition Milestones									
Engineering Milestones									
T&E Milestones									
Contract Milestones									

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z							TACTICAL AUTOMATED SECURITY SYSTEM (TASS)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPFF	ESC Hanscom		0.610	2/99	0.312	11/99	0.299	11/00			
Ancillary Hardware Development	CPFF	ESC		0.079	2/99	0.062	11/99	0.090	11/00			
Systems Engineering	CPFF	ESC		0.314	[1]	0.355	11/99	0.369	11/00			
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				1.003		0.729		0.758		Cont	CONT	
Remarks: [1] Numerous delivery orders awarded throughout the fiscal year												
Development Support	CPFF	ESC		0.213	11/98	0.351	11/99	0.169	11/00			
Software Development	CPFF	ESC		0.130	12/98	0.288	11/99	0.218	11/00			
Training Development	CPFF	ESC		0.017	1/99	0.025	2/00	0.020	2/01			
Integrated Logistics Support	CPFF	ESC		0.024	11/98	0.025	2/00	0.017	2/01			
Configuration Management	CPFF	ESC		0.031	11/98	0.030	2/00	0.016	2/01			
Technical Data	CPFF	ESC		0.017	11/98	0.017	2/00	0.017	2/01			
GFE												
Subtotal Support				0.432		0.736		0.457		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z				TACTICAL AUTOMATED SECURITY SYSTEM (TASS)					
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date (2)	2001 Cost	2001 Award Date (2)	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	AFMC	Eglin AFB		0.168	12/98	0.302	11/99	0.282	11/00			
Operational Test & Evaluation	AFTEC	Eglin AFB		0.080	12/98	0.150	11/99	0.020	11/00			
Tooling												
GFE												
Subtotal T&E				0.248		0.452		0.302		CONT	CONT	
Remarks												
Contractor Engineering Support	FFP/DO	ESC		0.377	[2]	0.305	11/00	0.214	11/01			
Government Engineering Support	MIPR	DOE SNL		0.046	1/99	0.149	11/00	0.051	11/01			
Program Management Support	PO	ESC		0.094	[2]	0.166	11/00	0.069	11/01			
Program Management Personnel												
Travel		ESC		0.030	[2]	0.023	11/00	0.024	11/01			
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management				0.547		0.643		0.358		CONT	CONT	
Remarks [2] Various documents and award dates throughout the year												
Total Cost				2.230		2.560		1.875				
Remarks												

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Exhibit R-2a, RDT&E Project Justification								Date:	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PE 0603228D8Z			WEAPONS STORAGE AREA (WSA) UPGRADES				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
WSA	2.735	2.887	3.878	4.500	4.500	5.000	5.000	Continuing	Continuing
RDT&E Articles Qty									
<p>A. <u>Mission Description and Budget Item Justification.</u> Develop and deploy equipment that will provide new capability or upgrade the existing WSA Security mission. This activity will be accomplished through the testing and employment of automatic access control and command and control of WSA intrusion detection and assessment equipment. Test and deploy (as appropriate) Commercial-Off-The-Shelf (COTS) products to provide new and/or improved detection, tracking, and assessment capabilities.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Awarded contract to develop new Advanced Exterior Sensor (AES) Data Processing Module and built prototype • Installed and tested Video Motion Detection and Video Storage System at operational locations • Tested new phenomenologies to perform wide area detection and tracking • Tested new access control system <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Continue installation and testing of COTS • Develop and test new 3-D video motion detection technology • Develop a new system architecture that takes advantage of advances in technology. Includes identifying system improvements and preparing a technology roadmap • Test new COTS equipment to determine if it can meet new requirements or replace aging equipment <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Continue with the development of a new system architecture and roadmap. Conduct technology/concept demonstrations • Test new COTS equipment to determine if it can meet new requirements or replace aging equipment 									

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
B. Other Program Funding Summary									
	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>To Complete</u>	<u>Total Cost</u>
Procurement	4.900	3.500	7.300	13.581	14.137	14.047	14.743	TBD	TBD
C. Acquisition Strategy: Utilize existing DoD or DoE contract vehicles									
D. Schedule Profile:									
Fiscal Year actual and planned events:									
	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>						
- Initiate VMD Eval									
- Integrate VMD									
- COTS Evaluation									
- Develop New Sys Architecture									
- Conduct Technology/Concept Demo									
Acquisition Milestones									
Engineering Milestones									
T&E Milestones									
Contract Milestones									

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z							WEAPONS STORAGE AREA (WSA)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date (1)	2001 Cost	2001 Award Date (1)	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPFF	ESC Hanscom		0.435	2/99	0.226	12/99	0.276	1/01			
Ancillary Hardware Development	CPFF	ESC		0.120	2/99	0.068	12/99	0.062	1/01			
Systems Engineering	CPFF	ESC		0.431	[1]	0.523	12/99	0.609	1/01			
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				0.986		0.817		0.947		CONT	CONT	
Remarks: [1] Numerous delivery orders awarded throughout the fiscal year												
Development Support	CPFF	ESC		0.331	11/98	0.266	11/99	0.300	11/00			
Software Development	CPFF	ESC		0.187	12/98	0.205	12/99	0.205	11/00			
Training Development	CPFF	ESC		0.027	1/99	0.028	2/00	0.060	11/00			
Integrated Logistics Support	CPFF	ESC		0.036	11/98	0.028	11/99	0.050	11/00			
Configuration Management	CPFF	ESC		0.049	11/98	0.035	11/99	0.037	11/00			
Technical Data	CPFF	ESC		0.017	11/98	0.014	11/99	0.050	11/00			
GFE												
Subtotal Support				0.647		0.576		0.702		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z							WEAPONS STORAGE AREA (WSA)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	AFMC	Eglin AFB	0.238	12/98	0.227	12/99	0.266	12/00				
Operational Test & Evaluation	AFTEC	Eglin AFB	0.165	12/98	0.138	12/99	0.216	12/00				
Tooling												
GFE												
Subtotal T&E			0.403			0.365		0.482		CONT	CONT	
Remarks												
Contractor Engineering Support	FFP/DO	ESC	0.228	[2]	0.424	1/00	0.685	1/01				
Government Engineering Support	MIPR	DOE SNL	0.284	1/99	0.557	1/00	0.706	1/01				
Program Management Support	PO	ESC	0.165	[2]	0.103	1/00	0.280	1/01				
Program Management Personnel												
Travel		ESC	0.022	[2]	0.045	1/00	0.076	1/01				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.699		1.129		1.747			CONT	CONT	
Remarks [2] Various documents and award dates throughout the year												
Total Cost			2.735		2.887		3.878					
Remarks												

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PE 0603228D8Z			MOBILE DETECTION ASSESSMENT RESPONSE SYSTEM - EXTERIOR (MDARS-E)				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
MDARS-E	5.500	4.890	5.590	0.000	0.000	0.000	0.000	0.000	43.871
RDT&E Articles Qty									
<p>A. <u>Mission Description and Budget Item Justification.</u> The Mobile Detection Assessment Response System - Exterior (MDARS-E) will provide unmanned roving security patrols among the buildings and around the perimeter of large fixed installations, including warehouses, large storage facilities and ammunition facilities. In addition to security, the system will also support inventories and track movement or disturbance of critical inventory items.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Conducted final demonstration of Broad Area Announcement (BAA) contract MDARS-E system capabilities • Prepared Test Technical Feasibility Test (TFT) Plans/Test Procedures • Conducted Developmental Testing <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Conduct Technical Feasibility Testing (TFT) • Conduct System Functional Review • Conduct Milestone I/II In-Process Review <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Prepare/Release EMD Request for Proposal (RFP) • Conduct EMD source selection • Prepare/Award EMD contract 									

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Exhibit R-2a, RDT&E Project Justification		Date: February 2000		
B. Other Program Funding Summary				
C. Acquisition Strategy				
D. Schedule Profile:				
Fiscal Year actual and planned events:				
	FY1999	FY2000	FY2001	
Acquisition Milestones				
MDARS-E		MSI/II		
Engineering Milestones				
T&E Milestones				
MDARS-E		TFT		
Contract Milestones				
MDARS-E			EMD	

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z							MOBILE DETECTION ASSESSMENT RESPONSE SYS - EXTERIOR (MDARS-E)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development				1.509		2.600		2.661				
Ancillary Hardware Development												
Systems Engineering				0.500		0.600		0.606				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				2.009	2/3Q	3.200	2/3Q	3.267	2/3Q	CONT	CONT	
Remarks:												
Development Support				0.611		0.505		0.528				
Software Development				0.680		0.545		0.423				
Training Development								0.051				
Integrated Logistics Support				0.500		0.090		0.180				
Configuration Management				0.031		0.023		0.045				
Technical Data				0.464		0.337		0.513				
GFE												
Subtotal Support				2.286	2/3Q	1.500	2/3Q	1.740	2/3Q	CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)									Date: February 2000				
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z						MOBILE DETECTION ASSESSMENT RESPONSE SYSTEM - EXTERIOR (MDARS-E)				
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract	
Developmental Test & Evaluation				0.415		0.100		0.241					
Operational Test & Evaluation								0.161					
Tooling													
GFE													
Subtotal T&E				0.415	2/3Q	0.100		0.402	2/3Q	CONT	CONT		
Remarks													
Contractor Engineering Support				0.300									
Government Engineering Support				0.100				0.092					
Program Management Support				0.006		0.006		0.007					
Program Management Personnel				0.272		0.072		0.068					
Travel				0.112		0.012		0.014					
Labor (Research Personnel)													
Miscellaneous													
Subtotal Management				0.790	2/3Q	0.090	2/3Q	0.181	2/3Q	CONT	CONT		
Remarks													
Total Cost				5.500		4.890		5.590					
Remarks													

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Exhibit R-2a, RDT&E Project Justification								Date:	
APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z		PROJECT NAME AND NUMBER WATERSIDE SECURITY SYSTEM (WSS)				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
WSS	3.330	2.650	2.000	2.500	3.000	3.000	3.000	Continuing	Continuing
RDT&E Articles Qty									
<p>A. <u>Mission Description and Budget Item Justification.</u> The Space and Naval Warfare Center (SPAWARCEN), San Diego, is the Center of Excellence for waterfront security. Responsibilities include fixed and transportable waterside security systems, swimmer detection sonars, and Commercial-Off-The-Shelf (COTS) equipment test and evaluation, which focuses on waterfront force protection.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Supported/installed WSS hardware at field sites • Tested Intrusion Detection Distributed Array at Submarine Base (SUBASE) Kings Bay, GA • Conducted Market Surveys and Investigations of barriers and swimmer nets • Investigated Commercial-Off-The-Shelf (COTS) detection, delay and assessment technologies • Merged program management of Shipboard Physical Security (SPS) program with Waterside Security System • Established a test and integration facility at 5000 Mike Pier, SUBASE San Diego <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Manage the Waterside Security System and Shipboard Physical Security programs • Evaluate, test and integrate COTS technology, e.g. barriers, underwater cameras, digital security technology • Use "state of the art" information technology to deliver information to the user community <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Evaluate and test COTS technologies for the waterfront environment • Test and integrate WSS, which includes barriers and underwater assessment of potential targets • Complete the development of a transportable WSS • Manage the Waterside Security System and Shipboard Physical Security programs • Support installed WSS hardware at field sites • Upgrade the WQX-2 Sonar using current computer chip processing capabilities 									

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Exhibit R-2a, RDT&E Project Justification	Date: February 2000		
B. Other Program Funding Summary			
C. Acquisition Strategy			
D. Schedule Profile:			
Fiscal Year actual and planned events:			
	FY1999	FY2000	FY2001
Acquisition Milestones			
Engineering Milestones			
T&E Milestones			
Contract Milestones			

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z							WATERSIDE SECURITY SYSTEM (WSS)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development				0.550		0.400		0.353				
Ancillary Hardware Development												
Systems Engineering				0.272		0.172		0.147				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				0.822		0.572		0.500		CONT	CONT	
Remarks:												
Development Support				0.048		0.048		0.029				
Software Development				0.116		0.116		0.086				
Quality Insurance				0.020		0.020		0.014				
Integrated Logistics Support				0.084		0.060		0.046				
Configuration Management				0.094		0.094		0.070				
Technical Data				0.046		0.046		0.057				
RAM				0.052		0.052		0.046				
Subtotal Support				0.460		0.436		0.348		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z				WATERSIDE SECURITY SYSTEM (WSS)					
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation				0.936		0.730		0.477				
Operational Test & Evaluation				0.330		0.230		0.236				
Tooling												
GFE												
Subtotal T&E				1.266		0.960		0.713		CONT	CONT	
Remarks												
Contractor Engineering Support				0.501		0.401		0.353				
Government Engineering Support												
Program Management Support				0.281		0.281		0.086				
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management				0.782		0.682		0.439		CONT	CONT	
Remarks												
Total Cost				3.330		2.650		2.000				
Remarks												

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDTE&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PE 0603228D8Z			EXPLOSIVE DETECTION EQUIPMENT (EDE)				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
EDE	0.488	2.060	2.150	3.000	3.000	3.000	2.768	Continuing	Continuing
RDT&E Articles Qty									
<p>A. <u>Mission Description and Budget Item Justification.</u> Evaluate and test promising Commercial-Off-The-Shelf technologies.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Developed guidance for selecting EDE for differing operational environments • Finalized and submitted Operational Requirements Document for formal staffing • Identified promising technologies unique to EDE • Published a Commercial Off-The-Shelf (COTS) EDE catalog, established a web site and produced a newsletter "Tech News and Talk" <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Transition a highly sensitive and robust detection system for finding explosives in air and water • Conduct product evaluations, as necessary • Evaluate remote explosive detection equipment • Conduct an Explosive Detection Symposium • Demonstrate a large x-ray system, the American Science & Engineering (AS&E) MTXR-WE, at an operational naval activity in SWA <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Demonstrate the feasibility, i.e. proof of concept, of an Ultra Violet Fluorescence Explosive Detection System • Continue product evaluations • Publish technical data sheets, guides and information relating to explosive detection equipment 									

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Exhibit R-2a, RDT&E Project Justification	Date: February 2000																				
<p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile: Fiscal Year actual and planned events:</p> <table><thead><tr><th></th><th>FY1999</th><th>FY2000</th><th>FY2001</th></tr></thead><tbody><tr><td>Acquisition Milestones</td><td></td><td></td><td></td></tr><tr><td>Engineering Milestones</td><td></td><td></td><td></td></tr><tr><td>T&E Milestones</td><td></td><td></td><td></td></tr><tr><td>Contract Milestones</td><td></td><td></td><td></td></tr></tbody></table>			FY1999	FY2000	FY2001	Acquisition Milestones				Engineering Milestones				T&E Milestones				Contract Milestones			
	FY1999	FY2000	FY2001																		
Acquisition Milestones																					
Engineering Milestones																					
T&E Milestones																					
Contract Milestones																					

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z							EXPLOSIVE DETECTION EQUIPMENT (EDE)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development				0.030								
Ancillary Hardware Development												
Systems Engineering				0.010								
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				0.040						CONT	CONT	
Remarks:												
Development Support				0.020								
Software Development												
Quality Insurance				0.015								
Integrated Logistics Support				0.010		0.591		0.611				
Configuration Management				0.010								
Technical Data				0.015								
RAM				0.010								
Subtotal Support				0.080		0.591		0.611		CONT	CONT	
Remarks:												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z							EXPLOSIVE DETECTION EQUIPMENT (EDE)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation				0.050		0.354		0.354				
Operational Test & Evaluation				0.070		0.187		0.187				
Tooling												
GFE												
Subtotal T&E				0.120		0.541		0.541		CONT	CONT	
Remarks												
Contractor Engineering Support				0.118		0.622		0.692				
Government Engineering Support												
Program Management Support				0.060		0.155		0.155				
Program Management Personnel												
Travel				0.040		0.094		0.094				
Labor (Research Personnel)												
Miscellaneous				0.030		0.057		0.057				
Subtotal Management				0.248		0.928		0.998		CONT	CONT	
Remarks												
Total Cost				0.488		2.060		2.150				
Remarks												

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PE 0603228D8Z			TECHNOLOGY BASE				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
Technology Base	2.800	3.000	3.000	4.384	4.000	4.000	3.500	Continuing	Continuing
RDT&E Articles Qty									
<p>A. <u>Mission Description and Budget Item Justification.</u> The Defense Threat Reduction Agency (DTRA) is responsible for coordinating technology base efforts that feed into the advanced development projects within the Physical Security Equipment (PSE) Program. DTRA performs the exploratory development on technologies that are nominated and prioritized by the Physical Security Equipment Action Group (PSEAG). This annual process determines which technologies have potential to meet Service interests in fulfilling eventual Joint Service and Service-unique requirements.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> Completed and demonstrated prototype hardware for the Sonic Denial, Exterior Passive Millimeter Wave Sensor, and the Intrusion Detection Distributed Array Sonar projects Continued work on the improved laser diode, miniaturized radio frequency tag, security vehicle with acoustic guidance, photoneutron probe for the detection of explosives, tactical security sensor internetting system, an advanced user interface system, and an acoustic detection and classification sensor. <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> Complete and demonstrate prototype hardware for the improved laser diode, miniaturized radio frequency tags, acoustic detection and classification sensor, nuclear quadrupole resonance sensor, photoneutron probe for the detection of explosives, tactical security sensor internetting system, an advanced user interface system, and an acoustic detection and classification sensor Continue the detection on the move (exterior) project, security vehicle with acoustic detection, and the weather vulnerability assessment tool projects Initiate new projects for a target classification sensor, vulnerability of microwave and infrared sensors evaluation, a compact high performance video motion detector and a micro electromechanical sensor 									

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Exhibit R-2a, RDT&E Project Justification	Date: February 2000																				
<p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none">• Continue the detection on the move (exterior) project, the security vehicle with acoustic detection, the target classification sensor, vulnerability of microwave and infrared sensors evaluation, a compact high performance video motion detector and a micro electromechanical sensor.• Complete and demonstrate the weather vulnerability assessment tool project.• Initiate new projects as agreed upon with the Service sponsors. <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile: Fiscal Year actual and planned events:</p> <table><thead><tr><th></th><th>FY1999</th><th>FY2000</th><th>FY2001</th></tr></thead><tbody><tr><td>Acquisition Milestones</td><td></td><td></td><td></td></tr><tr><td>Engineering Milestones</td><td></td><td></td><td></td></tr><tr><td>T&E Milestones</td><td></td><td></td><td></td></tr><tr><td>Contract Milestones</td><td></td><td></td><td></td></tr></tbody></table>			FY1999	FY2000	FY2001	Acquisition Milestones				Engineering Milestones				T&E Milestones				Contract Milestones			
	FY1999	FY2000	FY2001																		
Acquisition Milestones																					
Engineering Milestones																					
T&E Milestones																					
Contract Milestones																					

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z							TECHNOLOGY BASE		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development												
Ancillary Hardware Development												
Systems Engineering				0.424		0.424		0.424				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				0.424		0.424		0.424		CONT	CONT	
Remarks:												
Development Support				0.070		0.070		0.070				
Software Development												
Quality Insurance												
Integrated Logistics Support				0.025		0.025		0.025				
Configuration Management				0.037		0.037		0.037				
Technical Data				0.050		0.050		0.050				
RAM				0.070		0.070		0.070				
Subtotal Support				0.252		0.252		0.252		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4				PROGRAM ELEMENT PE 0603228D8Z						TECHNOLOGY BASE		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation				0.600		0.700		0.700				
Operational Test & Evaluation				0.500		0.600		0.600				
Tooling												
GFE												
Subtotal T&E				1.100		1.300		1.300		CONT	CONT	
Remarks												
Contractor Engineering Support				0.300		0.300		0.300				
Government Engineering Support				0.100		0.100		0.100				
Program Management Support				0.100		0.100		0.100				
Program Management Personnel												
Travel				0.074		0.074		0.074				
Labor (Research Personnel)				0.450		0.450		0.450				
Miscellaneous												
Subtotal Management				1.024		1.024		1.024		CONT	CONT	
Remarks												
Total Cost				2.800		3.000		3.000				
Remarks												

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Exhibit R-2, RDT&E Budget Item Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 4				R-1 ITEM NOMENCLATURE JOINT ROBOTICS PROGRAM PE 0603709D8Z					
COST (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	15.646	17.516	10.294	11.238	8.876	9.047	9.220	Continuing	Continuing
MPRS	2.000	2.200	4.094	4.000	2.576	2.747	2.500	Continuing	Continuing
ROCS	3.600	3.600	4.000	4.400	3.300	3.000	3.320	Continuing	Continuing
TECHNOLOGY BASE	9.146	9.866						Continuing	Continuing
JAUGS	0.200	0.400	0.600	0.800	0.800	0.800	0.900	Continuing	Continuing
FTUV		0.750	0.900	1.138	1.000	1.000	1.500	Continuing	Continuing
BUGS	0.700	0.700	0.700	0.900	1.200	1.500	1.000	Continuing	Continuing

A. Mission Description and Budget Item Justification. This program is a budget activity level 4 based on the demonstration/validation activities ongoing within the program. This PE was established in response to Congressional guidance to consolidate DoD robotic programs on unmanned ground systems and related robotic technologies in order to increase focus of the Services' robotic programs on operational requirements. The program will demonstrate maturity of robotics technologies for their application to the formal acquisition process of land systems and subsystems. Emphasis is on the development of robotic technologies that: are amenable to multi-service applications; provide capability in high hazard environments; provide improved battlefield efficiency using supervised autonomous operational capability; reduce or enhance force manpower and support; and are affordable. This PE consolidates the DoD robotics program for unmanned ground vehicles (UGV) into two activities: (1) advancement of UGV concepts into Advanced Development (AD) acquisition programs and (2) the enhancement and exploitation of critical robotic technologies for today's and future UGV acquisition requirements. Categories under this PE are: (1) the Basic Unexploded Ordnance System (BUGS) - a Joint Service EOD effort to locate and dispose of surface UXO; (2) the Robotics Ordnance Clearing System (ROCS) - a USAF effort to develop a robotic/autonomous vehicle capability for area clearance, including active range clearance (ARC). ROCS Platforms include the following: All-purpose Remote Transport System (ARTS), Subsurface Ordnance Characterization System (SOCS), and Automated Ordnance Excavator (AOE). This technology can also be applied to formerly used defense sites for cleanup/disposal. (3) The Technology Enhancement program (DEMO III) is centered upon the enhancement and exploitation of critical robotics technologies for today's and future UGV acquisition requirements. DEMO III, in part a follow-on to the very successful DEMO II program, is a four year effort to further advance semi-autonomous technologies. (4) The Family of Tactical Unmanned Vehicles (FTUV) is a joint Army/Marine Corps effort to provide commanders a family of reconnaissance, surveillance and target acquisition UGV's that are properly sized to operate in a variety of tactical situations. Requirements are emerging for small and medium unmanned systems that improve warfighters situational awareness in scout, mechanized and infantry in urban terrain operations.

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Exhibit R-2, RDT&E Budget Item Justification	Date: February 2000
<p>Man Portable Robotic Systems (MPRS) - is an effort to develop smaller (10-40 lb. Class) UGVs as part of the FTUV program. The Joint Architecture for Unmanned Ground Systems (JAUGS) is a software-standards oriented approach to standardizing all aspects of protocols and approaches to the software aspects of all anticipated DoD unmanned systems.</p>	
<p>(U) <u>FY 1999 Accomplishments</u></p>	
<p>JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.200 million)</p>	
<ul style="list-style-type: none">• Continued to update JAUGS based on technology improvements, Joint Technical Architecture (JTA) standards established by DoD, and mission requirements• Coordinated JAUGS activities closely with 4D/RCS and Demo III development efforts• Began validation process on the JAUGS• Drafted and published documentation that described the UGV domain and set performance specifications• Incorporated JAUGS into Standardized Robotic System (SRS) contract (Previously Vehicle Teleoperation (VT))• Drafted and published the Configuration Management Plan	
<p>BASIC UXO GATHERING SYSTEM (BUGS) (0.700 million)</p>	
<ul style="list-style-type: none">• Demonstrated single vehicle subsystem, autonomous random-search, obstacle avoidance, and submunition pick-up• Demonstrated electronic and mechanical design of the random-search platforms which were improved for repeatable manufacturability, and flexibility for future experimentation• Selected one contractor to develop the BUGS directed-search system, an alternative to the random-search system	
<p>U) <u>FY 2000 Plans</u></p>	
<p>JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.400 million)</p>	
<ul style="list-style-type: none">• Evolve, refine, and update to achieve greater autonomous capability. Inputs will be received primarily from user appraisals, fielded systems feedback, and industry/Tech Base development efforts• Implement JAUGS throughout the Joint Robotics Program• Place JAUGS under configuration control	
<p>FAMILY OF TACTICAL UNMANNED VEHICLES (FTUV) (0.750 Million)</p>	
<ul style="list-style-type: none">• Conduct modeling and simulation for U.S. Army Maneuver Support Center, U.S. Army Infantry Center, and U.S. Marine Corps efforts to define/evaluate emerging technologies from the Demo III Experimental Unmanned Vehicle (XUV)• Procure two DEMO III XUV Vehicles/Support/Options for emerging technologies	

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Exhibit R-2, RDT&E Budget Item Justification				Date:
				February 2000
<ul style="list-style-type: none"> Coordinate FTUV Capstone Requirement Document for Robotic Systems 				
BASIC UXO GATHERING SYSTEM (BUGS) (0.700 million)				
<ul style="list-style-type: none"> Implement cooperative behaviors, test and demonstrate five-vehicle systems for the random-search system Complete initial design, test and demonstrate five-vehicle systems for the directed-search system 				
(U) <u>FY 2001 Plans</u>				
JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.600 million)				
<ul style="list-style-type: none"> Evolve, refine, and update to achieve greater autonomous capability. Inputs will be received primarily from user appraisals, fielded systems feedback, and industry/Tech Base development efforts Continue configuration management and control 				
FAMILY OF TACTICAL UNMANNED VEHICLES (FTUV) (0.900 million)				
<ul style="list-style-type: none"> Conduct user appraisals/field experiments and platform analysis Establish a Joint Working Group that will begin working on the Integrated Product Team (ICT) charter Prepare milestone documentation 				
BASIC UXO GATHERING SYSTEM (BUGS) (0.700 million)				
<ul style="list-style-type: none"> Continue development of ten-vehicle test systems Conduct test and experiments in user-developed scenarios Collect data for input to Analysis of Alternatives 				
B. <u>Program Change Summary</u> (\$ million)				
	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total</u>
Previous President's Budget	16.013	12.937	10.492	<u>Cost</u>
Appropriated Value		17.937		Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed				
Appropriation Reduction				
b. Congressionally Directed				
Undistributed Reduction				
c. Below threshold reprogramming,				
inflation savings, and government wide rescission	(0.367)	(0.421)	(0.198)	
Current Budget Submit/President's Budget	15.646	17.516	10.294	Continuing
Change Summary Explanation:				

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Exhibit R-2, RDT&E Budget Item Justification	Date: February 2000		
Funding: Adjustments reflect inflation savings and the government-wide rescission. Schedule: N/A Technical: N/A			
C. <u>Other Program Funding Summary</u>			
D. <u>Acquisition Strategy</u>			
E. <u>Schedule Profile</u>			
Fiscal Year actual and planned events:			
	FY1999	FY2000	FY2001
Acquisition Milestones			
Engineering Milestones			
T&E Milestones			
Contract Milestones			

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PROGRAM ELEMENT PE 0603709D8Z			PROJECT NAME AND NUMBER MAN PORTABLE ROBOTIC SYSTEMS (MPRS)				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
MPRS	2.000	2.200	4.094	4.000	2.576	2.747	2.500	Continuing	Continuing
<p>A. <u>Mission Description and Budget Item Justification.</u> The MPRS program is a research and development program to provide small, man portable unmanned vehicle systems to support the missions of light military and special operations forces. The program meets mission needs in the areas of reconnaissance during Military Operations in Urban Terrain (MOUT).</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Designed and implemented a computer data base to track all available small robots and associated technology • Assisted Army Battle Labs and users in developing realistic requirements and supported experiments conducted by the Battle Labs • Teamed with the Defense Advanced Research Projects Agency (DARPA) Tactical Mobile Robots (TMR) Program to provide small robots to the user community for evaluation and experimentation <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Conduct Concept Experimentation Program (CEP) at Ft. Leonard Wood, MO • Participate in Joint Contingency Force Advance Warfare Exercise (JCF AWE) with the US Army Maneuver Support Center (MANSCEN) • Provide the user community with MPRS prototype vehicles <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Participate in Military Police Concept Experimentation Program • Conduct baseline testing of MPRS prototype vehicles • Obtain MSO decision 									

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Exhibit R-2a, RDT&E Project Justification				Date:
B. Other Program Funding Summary				February 2000
C. Acquisition Strategy				
D. Schedule Profile				
Fiscal Year actual and planned events:				
	FY1999	FY2000	FY2001	
Acquisition Milestones				
MPRS			MS0	
Engineering Milestones				
T&E Milestones				
Contract Milestones				

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z				MAN PORTABLE ROBOTIC SYSTEMS (MPRS)					
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development				0.850		0.950		1.502				
Ancillary Hardware Development												
Systems Engineering				0.150		0.150		0.460				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				1.000		1.100		1.962		CONT	CONT	
Remarks: [1] MIPR/CPIF/FPIF/FFP activities												
Development Support												
Software Development				0.530		0.530		0.771				
Training Development												
Integrated Logistics Support				0.050		0.050		0.100				
Configuration Management												
Technical Data												
GFE												
Subtotal Support				0.580		0.580		0.871		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z							MAN PORTABLE ROBOTIC SYSTEMS (MPRS)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing				0.200		0.300		0.300				
Operational Testing								0.400				
Tooling												
GFE												
Subtotal T&E				0.200		0.300		0.700		CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support				0.150		0.170		0.500				
Program Management Personnel												
Travel				0.070		0.050		0.061				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management				0.220		0.220		0.561		CONT	CONT	
Remarks												
Total Cost				2.000		2.200		4.094		CONT	CONT	
Remarks												

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT		PROJECT NAME AND NUMBER					
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PE 0603709D8Z		ROBOTIC ORDNANCE CLEARING SYSTEM (ROCS)					
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
ROCS	3.600	3.600	4.000	4.400	3.300	3.000	3.320	CONT	CONT
<p>A. <u>Mission Description and Budget Item Justification.</u> The Robotics Ordnance Clearing System (ROCS) is a generic examination of Unexploded Ordnance (UXO) clearing applications and assessments. Prototypes are being examined for force protection in Saudi Arabia, range clearance at Nellis AFB, NV, as well as terrain assessments for probability of UXO. The US Air Force has created an Operational Requirements Document (ORD) for both force protection and active range clearance systems, utilizing the All-purpose Remote Transport System (ARTS).</p> <p>U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Responded to USAF MAJCOM "urgent and compelling" requirements for (ARTS) in support of Combat Air Force (CAF) needs <ul style="list-style-type: none"> - Delivered 5 ARTS, including mission specific modifications, to SWA, Central Air Forces (CENTAF), in support of Operation Southern Watch - Delivered 7 ARTS, including mission specific modifications, to Central Europe, United States Air Forces, Europe (USAFE), in support of Operation Allied Force • Technology transfer of ARTS baseline program to Acquisition System Program Office (ASC/WMO) for large scale procurement, delivery, and sustainment of baseline system <ul style="list-style-type: none"> - Finalized documentation package for operation and maintenance of baseline ARTS - Upgraded 2 Nellis AFB R&D prototypes to ARTS baseline configuration - Provided technical support to ASC/WMO source selection of the ARTS procurement • Developed robotic attachments and tools to defeat large vehicle bombs (LVB), clear/remove large quantities of UXO, and perform active range clearance (ARC) <ul style="list-style-type: none"> - Completed proof-of-concept integration of dual-arm manipulator system for Eglin AFB ARTS - Modified Unmanned Ground Vehicles/Systems Joint Program Office (UGV/S JPO) designed mini-flail for integration onto ARTS platform - Investigated low cost CO2 laser system developed and tested by AFRL/DE as potential component for ARTS Laser Ordnance Neutralization System (ALONS) - Conducted detailed RDT&E and characterization of anti-terrorist techniques for integration on robotic platforms including but not limited to the ARTS. 									

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Exhibit R-2a, RDT&E Project Justification	Date: February 2000
<ul style="list-style-type: none">• Conducted detailed research, development, and test on advanced robotic system technologies for integration onto existing and future robotic system platforms for ARC and Force Protection (FP) applications.<ul style="list-style-type: none">- Investigated and tested semi-autonomous point-to-point travel capability for Nellis AFB range clearance operations- Investigated lower-cost navigation system using multiple navigation sensors and Kalman filter technology- Investigated automated ordnance recognition system for identifying BLU-97 and BLU-63 submunitions- Continued evaluation of subsurface sensors to establish operating parameters and merits • Provided RDT&E support to operational forces, DoD, and other government agencies to demonstrate advanced unmanned ground vehicles and systems(UGV/S) and their mission capabilities<ul style="list-style-type: none">- Demonstrated full scale robotic ordnance clearing operations at Nellis AFB for Joint Robotics Program (JRP) General Officer Steering Committee Working Group- Performed detailed system requirements investigation in conjunction with the Headquarters Air Combat Command (HQ ACC) for ROCS at training bases throughout the United States Air Force (USAF)- Demonstrated advanced robotic systems to the United States Navy (USN) as part of Exercise DRAGON at "In From the Sea 1999"- Participated in United States Marine Corps (USMC) logistics exercise, Combat Support and Supply (CSS) Enterprise, Limited Objective Experiment (LOE) 1999, by demonstrating the use of robotic systems for force sustainment during tactical operations- Conducted counter-terrorism (CT) robotic applications demonstration during Technical Support Working Group (TSWG) Technology Conference with European Command (EUCOM)- Provided tele-operated Automated Ordnance Excavator (AOE) and training to US Army Corps of Engineers, Huntsville Center for use in ordnance investigation and clean-up of Jefferson Proving Grounds (JPG) - reducing clearance costs from \$70K per week to \$6K per week <p>U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none">• Develop robotic vehicles, attachments, and tools to defeat LVB, clear/remove large quantities of UXO, and perform ARC while providing EOD personnel the capability to quickly, accurately, and safely detect, locate, access, render safe, remove, and/or dispose of UXO/IEDs<ul style="list-style-type: none">- Complete development/integration/test of dual-arm manipulator system onto ARTS platform; coordinate technology transfer (ASC/WMO)- Complete development/integration/test of UGV/S JPO designed mini-flail onto ARTS platform; coordinate technology transfer (ASC/WMO)- Complete proof-of-concept of ALONS	

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Exhibit R-2a, RDT&E Project Justification	Date: February 2000
<ul style="list-style-type: none">- Continue RDT&E and characterization of anti-terrorist techniques for integration on robotic platforms including but not limited to the ARTS- Investigate advancements and applications of robotic systems to airbase operations and logistics support (crash rescue, vehicle turn-a-round, logistics center support)• Conduct research, development, and test on advanced robotic system technologies for integration onto existing and future robotic system platforms for ARC and FP applications<ul style="list-style-type: none">- Autonomous navigation (point-to-point, area coverage, and follow-the-leader capabilities)- Multi-vehicle control- Obstacle Recognition (Demo III technology integration, ordnance recognition, obstacle avoidance)- Database Management (stored terrain maps, multi-vehicle database sharing)- Transfer and integrate semi-autonomous control functions developed under Subsurface Ordnance Characterization System (SOCS) to field prototype Active Range Ordnance Mapping System (AROMS) <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none">• Develop robotic systems, attachments, and tools to defeat LVB, clear/remove large quantities of UXO, and perform ARC - providing EOD personnel the capability to quickly, accurately, and safely detect, locate, access, render safe, remove, and/or dispose of UXO/IEDs• Conduct research, development, and test on advanced robotic system technologies for integration onto existing and future robotic system platforms for ARC and FP applications<ul style="list-style-type: none">- Autonomous navigation- Multi-vehicle control- Obstacle Recognition- Database Management <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile</p>	

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Exhibit R-2a, RDT&E Project Justification	Date: February 2000
Fiscal Year actual and planned events:	
	FY1999 FY2000 FY2001
Acquisition Milestones	
Engineering Milestones	
T&E Milestones	
Contract Milestones	

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z							Robotic Ordnance Clearing System (ROCS)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development				0.800		0.800		1.000				
Ancillary Hardware Development				0.100		0.100		0.300				
Systems Engineering				0.100		0.100		0.200				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				1.000		1.000		1.500		CONT	CONT	
Remarks:												
Development Support				0.300		0.300		0.400				
Software Development				0.300		0.300		0.250				
Training Development				0.100		0.100		0.100				
Integrated Logistics Support				0.050		0.050		0.050				
Configuration Management				0.050		0.050		0.050				
Technical Data				0.150		0.150		0.150				
GFE												
Subtotal Support				0.950		0.950		1.000		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4				PROGRAM ELEMENT PE 0603709D8Z						Robotic Ordnance Clearing System (ROCS)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing				0.200		0.200		0.100				
Operational Testing				0.100		0.100		0.200				
Tooling												
GFE												
Subtotal T&E				0.300		0.300		0.300		CONT	CONT	
Remarks												
Contractor Engineering Support				0.600		0.600		0.400				
Government Engineering Support				0.100		0.100		0.150				
Program Management Support				0.150		0.150		0.150				
Program Management Personnel				0.100		0.100		0.100				
Travel				0.100		0.100		0.100				
Labor (Research Personnel)				0.200		0.200		0.200				
Miscellaneous				0.100		0.100		0.100				
Subtotal Management				1.350		1.350		1.200		CONT	CONT	
Remarks												
Total Cost				3.600		3.600		4.000		CONT	CONT	
Remarks												

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4		PE 0603709D8Z			TECHNOLOGY BASE				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
TECHNOLOGY BASE	9.146	9.866	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
<p>A. <u>Mission Description and Budget Item Justification.</u> The Demo III Experimental Unmanned Vehicle (XUV) Program is designed to advance and demonstrate the technology required to develop future unmanned ground combat vehicles through three major thrusts: (1) concerted technology development; (2) modeling, simulation and experimentation; and (3) technology integration and evaluation with users. Demo III focuses on demonstration of technology that will enable the development of small, highly agile, unmanned vehicles capable of off-road, semi-autonomous operation at speeds of up to 32 km/hr during daylight and 16 km/hr at night by 4Q FY 2001. Demo III supports development of two emerging requirements at the U.S. Army Armor School for a robotic scout system and a robotic leader-follower system. Technologies for these systems are applicable to a wide array of Army programs. This program will be transferred to the Army for funding, beginning in FY 2001.</p> <ul style="list-style-type: none"> • Concerted Technology Development: The technology development community, drawn primarily from government laboratories such as National Institute for Standards and Technology (NIST), the Jet Propulsion Laboratory (JPL), and the Army Research Lab (ARL), has organized itself into a series of working groups to address six technology areas deemed critical to the success of the program. The primary focus of the effort has centered on the development of perception for autonomous mobility; algorithms for local planning and autonomous behaviors; an intelligent software architecture; and a small, highly capable control interface that can be integrated into standard display units. • Modeling, Simulation and Experimentation: A modeling, simulation and experimentation effort conducted by the Mounted Battlespace Battle Lab (MBBL), with assistance from ARL, has been running in parallel with the technology development program. The program has the twin goals of utilizing simulations to estimate the operational effectiveness of differing technological solutions and hardware/software configurations, and developing Tactics, Techniques and Procedures required to employ this technology effectively. An important outcome of this effort will be the technical support package (TSP) that will be required to support the second generation Tactical Unmanned Vehicle (TUV) user appraisal currently scheduled for FY 2002. • Technology Integration and Evaluation with Users: This final component of the program will integrate 									

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Exhibit R-2a, RDT&E Project Justification	Date: February 2000
<p>technology onto a testbed vehicle and demonstrate autonomous mobility required to conduct the military scout mission under tactical conditions. Unlike the other program elements, this program element was designed to be conducted by an industrial contractor chosen through a competitive procurement process that is being managed by the U.S. Army Tank-automotive/Armament Command's Research, Development, and Engineering Center (TARDEC). In January 1998 TARDEC awarded a contract to a contractor team led by the former Robotic Systems Technology (RST) now General Dynamic Robotic Systems (GDRS), teaming with Science Applications International Corporation (SAIC) Center for Intelligent Systems (CIS) and Sarnoff Corporation.</p> <p>(U) <u>FY1999 Accomplishments:</u></p> <ul style="list-style-type: none">• Conducted Critical Design Review (CDR) in mid-November 1998 by the technology integration contractor team who presented their final design and integration plans - the result of an extensive series of trade studies and analyses conducted over the previous twelve months coupled with feedback from the government at the July Preliminary Design Review - for review, analysis and constructive criticism by the government participants, and for further refinement prior to fabrication of platforms and/or operator control units• Completed the second of four constructive simulations investigating alternative chassis configurations with differing size, weight, and mobility characteristics, together with a series of reconnaissance, surveillance and target acquisition (RSTA) mission packages of varying capability using Modular Semi-Automated Forces (ModSAF) simulations at the MBL. Here, the Demo III XUVs were employed together with manned systems to form notional battalion and brigade scout forces engaged in both offensive and defensive operations as part of a mechanized combined arms force. Measures of effectiveness, such as loss exchange ratio, were obtained for a limited number of experiments employing accepted, standard operational scenarios• Fabricated the first two (2) XUV platforms and accomplish the integration of system architecture and sensors to meet Demo III Alpha (A) performance goals in August 1999• Fabricated the first of two Operator Control Units in September 1999• Successfully conducted Demo III A in late September 1999 <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none">• Develop baseline autonomous tactical behaviors for application to the scout mission• Complete the second Virtual Simulation• Initiate the third Virtual Simulation• Initiate the third and fourth Constructive Simulations• Prepare for Demo III Bravo (B) consisting of an Engineering Evaluation Test and a Battle Lab Warfighting Experiment (BLWE)	

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Exhibit R-2a, RDT&E Project Justification		Date:	
(U) <u>FY 2001 Plans:</u>		February 2000	
• US Army will assume funding responsibility in FY 2001			
B. Other Program Funding Summary			
C. Acquisition Strategy			
D. Schedule Profile			
Fiscal Year actual and planned events:			
	FY1999	FY2000	FY2001
Acquisition Milestones			
Engineering Milestones			
T&E Milestones	DEMOIIIA		DEMOIIB
Contract Milestones			

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z							Technology Base		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPAF	RST, MD		1.915		2.275						
Ancillary Hardware Development	CPAF	RST, MD		1.425		1.425						
Systems Engineering	CPAF	RST, MD		0.900		0.900						
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				4.240		4.600						
Remarks: RST, Westminster, Maryland												
Development Support												
Software Development				1.440		1.800						
Software Development	CPAF	RST, MD		1.125		1.125						
Training Development				0.070		0.070						
Integrated Logistics Support												
Configuration Management												
Technical Data				0.271		0.271						
GFE												
Subtotal Support				2.906		3.266						
Remarks: RST, Westminster, Maryland												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z							Technology Base		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing				1.000		1.000						
Operational Testing												
Tooling												
GFE												
Subtotal T&E				1.000		1.000						
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support				0.750		0.750						
Program Management Personnel												
Travel				0.250		0.250						
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management				1.000		1.000						
Remarks												
Total Cost				9.146		9.866						
Remarks												

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E/BA 4					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. ADVANCED SENSOR APPLICATIONS PROGRAM PE 0603714D8Z				
COST (In Millions)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	17.731	27.115	15.534	15.691	16.002	16.320	16.645	Continuing	Continuing
Project Name/No. and Subtotal Cost ASAP/P714	17.731	27.115	15.534	15.691	16.002	16.320	16.645	Continuing	Continuing

A. Mission Description and Budget Item Justification

Brief Description of Element: The program focuses on continued development of domestic, and assessment of foreign, technology that has demonstrated potential for improvements in U.S. capabilities. Unique and innovative approaches are used to expand the performance envelopes of existing systems. **This program supports military requirements identified in Joint Vision 2010, the Defense Science and Technology Strategy, Full Spectrum Dominance and the Joint Warfighting Capability Objectives.**

Program Accomplishments and Plans:

FY 1999 Accomplishments:

- Mission Support (17.731 Million)

FY 2000 Plans:

- Mission Support (27.115 Million)

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/BA 4	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0603714D8Z ADVANCED SENSOR APPLICATIONS PROGRAM	

FY 2001 Plans:

- Mission Support (15.534 Million)

FY 2002 Plans:

- Mission Support (15.691 Million)

B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>FY2002</u>	Total Cost
Previous President's Budget	17.918	27.345	15.646	15.814	Continuing
Appropriated Value					
Adjustments to Appropriated Value					
a. Below threshold Reprogramming					
b. Inflation savings, rescission	(.187)	(.230)	(.112)	(.123)	
Budget Estimate Submission	17.731	27.115	15.534	15.691	Continuing

Change Summary Explanation: Adjustments reflect below threshold reprogrammings, inflation savings, and the government-wide rescission.

C. Other Program Funding Summary Cost: None

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/BA 4	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0603714D8Z ADVANCED SENSOR APPLICATIONS PROGRAM	

D. Customers and Products: Scheduled production not applicable.

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Exhibit R-2, RDT&E Budget Item Justification									Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY					R-1 ITEM NOMENCLATURE					
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4					CALs, The Strategy, PE 0603736D8Z					
COST (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	Cost to Complete	Total Cost
Total PE Cost	6.994	5.488	1.585	1.612	1.648	1.682	1.714		Continuing	Continuing
Program Specifics										
<p>A. <u>Mission Description and Budget Item Justification</u></p> <p>(U) (U) <u>BRIEF DESCRIPTION OF ELEMENT</u>: CALs is an international core strategy to share integrated digital product data through a set of standards to achieve efficiencies in business and operational mission areas. DoD's overarching goal in CALs is to develop a seamless defense enterprise in which the knowledge products of the acquisition process are immediately and rapidly accessible to all authorized users while maintaining near immediate currency and quality of information. This desired state is referred to as the "Integrated Data Environment (IDE)". The IDE (immediate access to quality information) drives many defense-wide and functional-specific reforms and business process improvements. The rapid sharing of information is an implied requisite of Integrated Product and Process Teams, a fundamental process for implementing concurrent engineering and streamlining project management. Digitized information frees logistics support and operator personnel from the burden of cumbersome document or file formats for information processing or presentation – enabling new methods for the performance of maintenance and training tasks based on interactive electronic technologies. This program element is to (1) assess and transition evolving automation technologies into the CALs strategy; (2) develop, maintain and apply to weapon system program office operations an executable business model for the application of CALs and related technologies; (3) integrate technical and functional requirements into a Shared Information Framework of the standards, protocols, procedures, and network management conventions required to achieve compatible implementation of the IDE throughout the international defense enterprise.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Completed Tri-Service IETM architecture (\$3.456 Million) • Continued to reengineer logistics processes based on CALs technologies (\$1.000 Million) • Assessed integration of CALs technologies with dynamic product models (\$.368 Million) • Completed development of CALs-based Navy "Telogistics" prototype (\$.170 Million) • Continue integration of maintenance prognostics and IETM architecture (\$2.000 Million) <p>(U) <u>FY 2000 Program</u></p> <ul style="list-style-type: none"> • Continue to reengineer logistics processes based on CALs technologies (\$1.010 Million) • Employ CALs in developing architectures to govern the modernization of integrated supply chain information systems (\$.800 Million) • Continued to reengineer logistics processes based on CALs technologies and integrate maintenance prognostics and IETM architecture (\$3.378 Million) 										

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Exhibit R-2, RDT&E Budget Item Justification		Date: February 2000		
<ul style="list-style-type: none"> Integrate CALS technologies with dynamic product models (\$.300 Million) 				
<p>(U) <u>FY 2001 Plans</u></p>				
<ul style="list-style-type: none"> Continue to reengineer logistics processes based on CALS technologies (\$.900 Million) Continue to employ CALS in developing architectures to govern the modernization of integrated supply chain information systems (\$.685 Million) 				
<p>(U) <u>FY 2002 Plans</u></p>				
<ul style="list-style-type: none"> Continue to reengineer logistics processes based on CALS technologies (\$.908 Million) Continue to employ CALS in developing architectures to govern the modernization of integrated supply chain information systems (\$.704 Million) 				
<p>B. <u>Program Change Summary</u> (\$ million)</p>				
	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	7.765	1.652	1.623	Continuing
Appropriated Value		5.652		
Adjustments to Appropriated Value				
a. Congressionally Directed				
Appropriation Reduction				
b. congressionally Directed				
Undistributed Reduction				
c. Below threshold reprogramming, inflation				
savings, rescission	(.771)	(.164)	(.038)	
Current Budget Submit/President's Budget	6.994	5.488	1.585	Continuing
Change Summary Explanation:				
Funding:	Adjustments reflect inflation savings and the Government-wide rescission.			
Schedule:	N/A			
Technical:	N/A			
C. <u>Other Program Funding Summary:</u> N/A				
D. <u>Acquisition Strategy:</u> N/A				

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Exhibit R-2, RDT&E Budget Item Justification	Date: February 2000																				
<p>E. <u>Schedule Profile</u>: N/A Fiscal Year actual and planned events:</p> <table><thead><tr><th></th><th>FY 1999</th><th>FY2000</th><th>FY2001</th></tr></thead><tbody><tr><td>Acquisition Milestones:</td><td>N/A</td><td></td><td></td></tr><tr><td>Engineering Milestones:</td><td>N/A</td><td></td><td></td></tr><tr><td>T&E Milestones:</td><td>N/A</td><td></td><td></td></tr><tr><td>Contract Milestones:</td><td>N/A</td><td></td><td></td></tr></tbody></table>			FY 1999	FY2000	FY2001	Acquisition Milestones:	N/A			Engineering Milestones:	N/A			T&E Milestones:	N/A			Contract Milestones:	N/A		
	FY 1999	FY2000	FY2001																		
Acquisition Milestones:	N/A																				
Engineering Milestones:	N/A																				
T&E Milestones:	N/A																				
Contract Milestones:	N/A																				

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Exhibit R-2, RDT&E Budget Item Justification	Date: February 2000

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									Date: (MONTH/YEAR) February 2000	
APPROPRIATION/BUDGET ACTIVITY						R-1 ITEM NOMENCLATURE				
RDT&E, Defense-wide/ Budget Activity 4						Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z				
Cost (In Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total PE 0603851D Cost	14.500	16.451	22.347	24.906	25.171	25.738	24.119	23.459	Continuing	Continuing
ESTCP/P514 Cost	14.500	16.451	22.347	24.906	25.171	25.738	24.119	23.459	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program demonstrates and validates the most promising innovative environmental technologies that target DoD's most urgent environmental needs and are projected to pay back the investment within five years through cost savings and improved efficiencies. It responds to: (1) congressional concern over the slow pace of remediation of environmentally polluted sites on military installations, (2) congressional direction to conduct demonstrations specifically focused on emerging new technologies, (3) Executive Order 12856 which requires Federal agencies to place a high priority on obtaining funding and resources needed for the development of innovative pollution prevention programs and technologies for installations and in acquisitions, and (4) the need to improve defense readiness by reducing the drain on the Department's operation and maintenance dollars caused by real world commitments such as environmental restoration and waste management. Preference for demonstrations are given to technologies that respond to Environmental Security objectives, have successfully completed all necessary research and development objectives, and address the highest priority DoD environmental requirements. Project funding supports the following categories for each year.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z	

FY 1999 Accomplishments:

- Reviewed and selected technologies for demonstration.
- Reviewed and selected sites for demonstration of remediation technologies.
- Prepared site-specific implementation plans (\$0.610 million).
- Prepared sites and secure regulatory permitting (\$2.770 million).
- Demonstration and evaluation of selected technologies (\$13.071 million).

The FY99 funds are invested in projects which address priority DoD environmental requirements. The funds are programmed in the areas of:

- Cleanup: To demonstrate and validate innovative technologies to restore DoD facilities contaminated with toxic, explosive, or hazardous waste. (\$8.620Million)
- Compliance: To demonstrate and validate innovative technologies to ensure DoD complies with our federal, state, and local environmental laws. (\$2.873 Million)
- Pollution Prevention: To demonstrate validate innovative technologies to reduce the use of hazardous materials, and curb emissions of pollutants in military operations as well as weapons systems manufacturing, operations, and maintenance. (\$4.958 Million)

FY 2000 Plans:

- Review and select technologies for demonstration.
- Review and select sites for demonstration of technologies.
- Prepare site-specific implementation plans (\$0.60 million).
- Prepare sites and secure regulatory permitting (\$2.70million).
- Award demonstration testing and evaluation for selected technologies (\$19.047 million).

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z	

FY 2001 Plans:

- Review and select technologies for demonstration.
- Review and select sites for demonstration of technologies.
- Prepare site-specific implementation plans (\$0.800 million).
- Prepare sites and secure regulatory permitting (\$2.900 million).
- Award demonstration testing and evaluation for selected technologies (\$21.206 million).

FY 2002-05 Plans: The ESTCP will continue to program and budget for the most promising innovative environmental technologies that target DoD's most urgent environmental needs and are projected to pay back the investment within five years.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z	

Justification for Budget Activity Assignment: To conform to the defined DoD acquisition milestones sequence, this program element is categorized under Budget Activity 4, Demonstration and Validation (Dem/Val).

Acquisition Strategy: When demonstration and validation of a particular technology is completed, and if the technology is found to be effective and affordable by users, regulators and other stakeholders, a user data package will be developed and distributed, e.g., specification, procurement package, etc., providing details to users on the technologies validated cost and performance and on how to acquire and implement the technology. When this step is completed, the demonstration will be considered successful.

B. Program Change Summary

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY2001</u>	<u>FY2002</u>	<u>Total Cost</u>
Previous President's Budget Appropriated Value	16.836	23.260	27.601	27.947	Continuing
Adjustments to Appropriated Value					
a. Inflation savings, rescission	(.170)	(.336)			
b. SBIR	(.215)	(.577)			
Current Budget Submit/ President's Budget	16.451	22.347	24.906	25.171	Continuing

Change Summary Explanation: FY 2000 adjustments are due to inflation savings, and the government-wide rescission.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z	

C. Other Program Funding Summary Not applicable.

D. Acquisition Strategy ESTCP projects are individually managed by the designated Service leads. Contracting is performed by the Service organization with responsibility for leading the validation effort for the technology being demonstrated.

E. Schedule Profile (Fiscal Year actual and planned events by quarter)

	<u>FY 2000</u>				<u>FY 2001</u>				<u>FY 2002</u>				<u>FY 2003</u>			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestones																
- Select technology				X												
- Select site					X											
Engineering Milestones																
- Complete site prep and regulatory permitting							X									
T&E Milestones																
- Complete T&E										X						
Contract Milestones																
Other Program Events																
- Obtain user, regulator and other stakeholder approvals														X		
- Develop and distribute user data packages															X	

This program continues from FY 2001 through FY 2005. The above milestones reflect the average life cycle of a typical, successful remediation demonstration utilizing FY 2001 funding. A similar pattern is expected for FY 2002 and outyear funding.

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RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)		DATE : (MONTH/YEAR)
		February 2000
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE PE NUMBER/PROJECT NUMBER	
RDT&E, Defense-wide/Budget Activity 4	Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z	

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>
Project Cost Categories					
Cost Categories:					
a. Demonstration & Validation	15.718	21.247	23.706	23.971	24.538
b. Program Management Support	.733	1.100	1.200	1.200	1.200
TOTAL	16.451	22.347	24.906	25.171	25.738

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RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)		DATE : (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/Budget Activity 4	R-1 ITEM NOMENCLATURE PE NUMBER/PROJECT NUMBER Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z	

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1999	Budget FY 1999	Budget FY 2000	Budget FY 2001	Budget FY2002	Budget to Complete	Total Program
DoD	C	-	-	-	103.889	16.451	22.347	24.906	25.171	Continuing	Continuing

Actual or Budget Value (\$ in millions)

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award or obligation Date	Delivery Date	Total Prior to FY1999	Budget 1999	Budget 2000	Budget 2001	Budget to Complete	Total Program
Product Development Property (list each item separately)									N/A
Support and Management Property (list each item separately)									N/A
Test and Evaluation Property (list each item separately)									N/A
Subtotal Product and Development									
Subtotal Support and Management									
Subtotal Test and Evaluation									

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)										Date: (MONTH/YEAR) February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4					R-1 ITEM NOMENCLATURE Tactical Anti-Satellite Program Development - PE 0603892D8Z							
Cost (In Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Total PE 0603892D Cost		0	7.232	0	0	0	0	0	0	0	Continuing	Continuing
Kinetic Energy anti-satellite Cost		0	0	0	0	0	0	0	0	0	Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) **BRIEF DESCRIPTION OF ELEMENT:** The U.S. military has become dependent on satellites as a primary source of information in virtually all of its operations and then looking at the world-wide proliferation of technology which is making this type capability readily available to virtually any country. Today, national defense planners and strategists have to operate with the knowledge that future adversaries will have access to satellite derived intelligence, warning, communications, navigation, weather and other information that can significantly enhance their war-fighting capability and increase the risk to U.S. and allied forces.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Tactical Anti-Satellite Program Development - PE 0603892D8Z	

(U) In 1989 the Department of Defense initiated a program to develop a ground-launched, kinetic energy (i.e., hit-to-kill) anti-satellite (KE ASAT) weapon system which would leverage off technologies developed by the U.S. Army Space and Strategic Defense Command in support of the (then) Strategic Defense Initiative Organization. Following a Milestone I Defense Acquisition Board Review in December of 1989, the Army was given responsibility for development of the weapon elements of the system (booster, kill vehicle, launch and ground support systems, and the mission and battery control centers.) The Air Force was given responsibility for development of the command and control elements that would have allowed the Commander-in-Chief, U.S. Space Command (USCINCSpace) to plan and control ASAT engagements.

(U) With the end of the cold war the perceived need for this capability, as well as support for continued funding diminished steadily and the program was restructured several times. The National Defense Authorization Act for fiscal year 1994 (FY 1994) directed that the program be converted to a Tactical ASAT Technology Program as opposed to an acquisition program with a low funding level. Under this current program, the KE ASAT was test fired in September 1994, successfully meeting all requirements. This 94-pound kill vehicle is the critical component of a KE ASAT. The following has been accomplished to date:

- KE Hover Test Completed at National Hover Test Facility, Edwards Air Force Base
- Weapon Control Subsystem (WCS) Demonstrator Software Upgraded and W5 Test Completed
- Graphical Display System (GDS) Added to WCS Screens
- KV Divert and Attitude Control System (DACS) Design Upgraded and Components Fabricated
- KV Flight Software Developed and Testing Initiated on Software Testbed
- KV Avionics Components Fabricated
- KV Digital Flyout Simulation Completed
- Seeker and GN&C Processors Upgraded

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Tactical Anti-Satellite Program Development - PE 0603892D8Z	

FY 2000 Plans

Kill mechanism technology development	.500
Digital simulations	2.500
Integration with future space control activities	3.132
Program management	1.100

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Tactical Anti-Satellite Program Development - PE 0603892D8Z	

(U) FY 2000 Plans:

- Complete KV HW/SW Integration
- KV Hardware-In-Loop testing
- Integrated Command and Control Subsystem Integration
- Kill Mechanism Technology Development
- Digital simulations
- Integration with future space control activities

**Work will not include booster procurement, laser development or space surveillance efforts.

(U) B. Program Change Summary

	<u>FY1999</u>	<u>FY2000</u>	<u>Total Cost</u>
Previous President's Budget	0	0	0
Appropriated Value	0	7.500	7.500
Adjustments for inflation savings	0	(.268)	(.268)
Current Budget Submit/President's Budget	0	7.232	7.232

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Tactical Anti-Satellite Program Development - PE 0603892D8Z	

(U) C. Other Program Funding Summary:

The original PE0603392A was established in 1989. By FY1996 Congressional action, this PE was transferred to OSD under PE0603392D. Then, later in 1996, the PE was changed to PE0603892D for more appropriate execution (Budget Activity 4). This is a continuation of the same Anti-Satellite program.

(U) D. Acquisition Strategy

The prime contract was awarded on a competitive basis in 1990 to Rockwell International. FY96 and FY97 funds were obligated on the existing contract. A technical analysis contract was awarded on a competitive basis as a SBIR to DESE Research. Other major activities will be performed in-house and by OGA. Streamline acquisition strategy has been adopted based on DOD 5000.2. Also, an integrated product team approach has been implemented. Commercial specifications have been adopted, and MIL-SPECS are used an exception basis only for acquisition.

(U) E. Schedule Profile

Project Milestones	Fiscal year actual and planned events by quarter	
	FY 2000	
	3	4
• Kill Mechanism Development	X	X
• Digital Simulations	X	X
• Integration with future space control activities	X	X

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RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)		DATE : (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE PE NUMBER/PROJECT NUMBER	
RDT&E, Defense-wide/Budget Activity 4	Tactical Anti-Satellite Program Development PE 0603892D8Z	-

A. Project Cost Breakdown (\$ in thousands)

	FY1999	FY 2000	FY 2001	FY 2002
Project Cost Categories				
Cost Categories:				
a. Demonstration & Validation		6.132		
b. Program Management Support		1.100		

TOTAL

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RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)		DATE : (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE PE NUMBER/PROJECT NUMBER	
RDT&E, Defense-wide/Budget Activity 4	Tactical Anti-Satellite Program Development PE 0603892D8Z	-

B. Budget Acquisition History and Planning Information

Performing Organizations

<u>Contractor or Government</u> <u>Performing Activity</u>	<u>Contract Method/T</u> <u>ype or Funding Vehicle</u>	<u>Award or Obligation Date</u>	<u>Performing Activity EAC</u>	<u>Project Office EAC</u>	<u>Budget FY 1999</u>	<u>Budget FY 2000</u>	<u>Budget FY2001</u>	<u>Budget to Complete</u>	<u>Total Program</u>
DoD (USASMDC) Prime Contractor Technical Analysis(SBIR) In-House effort (including OGA) Tech Sim/Support	C	Sep 90	-	-				Continuing	Continuing

Government Furnished Property

<u>Item Description</u>	<u>Contract Method/Type or Funding Vehicle</u>	<u>Award or obligation Date</u>	<u>Delivery Date</u>	<u>Budget 1999</u>	<u>Budget 2000</u>	<u>Budget to Complete</u>	<u>Total Program</u>
Product Development Property (list each item separately)			N/A				
Support and Management Property (list each item separately)			N/A				
Test and Evaluation Property (list each item separately)			N/A				

Subtotal Product and Development
 Subtotal Support and Management
 Subtotal Test and Evaluation

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 4							R-1 ITEM NOMENCLATURE Humanitarian Demining PE 0603920D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	18.172	18.197	12.728	13.733	14.494	14.789	15.089	Continuing	Continuing
Humanitarian Demining/P920t	18.172	18.197	12.728	13.733	14.494	14.789	15.089	Continuing	Continuing

(U) A. Mission Description and Budget Item Justification

(U) BRIEF DESCRIPTION OF ELEMENT

(U) This Humanitarian Demining R&D program element focuses on the testing, demonstration and validation of equipment suitable for immediate use in various international humanitarian demining missions and environments. The goal is to provide the equipment to the international demining community so that they may assess the equipment's capabilities in actual demining conditions. This program focuses on R&D technology development that reduces the time and cost associated with demining while improving the overall safety of the operator. This is accomplished through the adaptation of commercial-off-the-shelf equipment, the integration of mature technologies, and the leveraging from past and current R&D project activity in the tactical countermine and unexploded ordnance clearance mission areas. The primary objectives this program aims to achieve in technological development are to improve existing mine detection technologies, overcome the heavy vegetation problems in specific environments, and provide improved protection for deminers. These areas of emphasis have been adopted as a direct result of the feedback received at the Humanitarian Demining Workshop held in April 1999. Additional technologies identified in these workshops will also be addressed. These include technologies that: detect individual mines/minefields; detect explosives in buried mines (biosensors); confirm the presence of mines (verification); mark and map mines/minefields; improve current wide area survey equipment; clear large areas faster and more efficiently with improved mechanical clearance equipment; improve post clearance quality assurance (QA) equipment; train deminers in mine awareness, and improve deminer hand tools.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 4		R-1 ITEM NOMENCLATURE Humanitarian Demining PE 0603920D8Z

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	18.172	18.197	12.728	13.733	14.494	14.789	15.089	Continuing	Continuing
Humanitarian Demining/P920t	18.172	18.197	12.728	13.733	14.494	14.789	15.089	Continuing	Continuing

(U) **Project Number and Title: P920t Humanitarian Demining**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) Successfully developed and demonstrated 19 technologies in mine/minefield detection, mine/vegetation clearance, individual tools, and individual protection equipment. Deployed and/or demonstrated demining technologies worldwide. Including the Floating Mine Blade to Guantanamo Bay, Cuba (December 1998-present), Enhanced Tele-operated Ordnance Disposal System (ETODS), Mini Mine Detectors and visors to Jordan (April 1999-present), Air Spade, LEXFOAM, Mine Marking Foam to Ecuador (July 1999-present), Mine Marking Foam to Peru (July 1999-present), Rotar demonstration in Namibia (August 1999), Commercial Flares/Mine Marking Foam to Kosovo (August 1999), ETODS to Egypt (September 1999). Planned/coordinated for future deployments of the following technologies: Survivable Demining Tractor (SDT), Liquid Explosive Foam (LEXFOAM) to Cambodia, RHINO to Jordan and Israel. Initiated international mine detector pilot project to test and evaluate 25 COTS metal detectors against known anti-personnel (AP) land mine threats and environmental conditions existing in three countries affected by landmines. Participants are the UK, Canada, The Netherlands and the EC. Performed Demining Support System (DSS) technical assessments, user feedback evaluations and Y2K updates in CONUS (Camp Pendleton, Ft. Leonard Wood, Ft. Bragg) and OCONUS (Jordan, Laos, New Zealand, Rwanda and Germany). Initiated program to identify capabilities and limitations of commercially available individual protection equipment and to provide more effective protection clothing to deminers worldwide. Conducted Lower Extremities Assessment Program (LEAP) to determine overall performance of commercially available protective footwear against AP mines. Initiated extension of effort to remainder of the body. (\$ 18.172 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 4	R-1 ITEM NOMENCLATURE Humanitarian Demining PE 0603920D8Z	

(U) FY2000 Plans:

(U) Complete development and demonstrations on the improvements of existing mine detection technologies to include detection to a depth of 27cm and a publication containing a `Consumer Report` type approach for outlining the results of the R&D findings on currently available and near term detection technologies. Complete development and demonstration of vegetation clearing devices and improved in-situ neutralization devices. Continue to develop and demonstrate improved protective equipment for deminer protection and comfort by focusing on the human factor issues in mine protective gear. Continue to leverage existing technology from the tactical countermine area to develop and demonstrate detection technologies used for discrimination and verification. Continue to develop mechanical clearance equipment suitable for large area reduction and QA operations. Continue to develop mine/minefield marking and mapping systems and large area survey equipment. Continue to develop and demonstrate mine awareness and training technologies to help the deminers in future priority countries.
(\$ 18.197 Million)

(U) FY2001 Plans:

(U) Continue to develop and demonstrate improved protective equipment for deminer protection and comfort by focusing on the human factor issues in mine protective gear. Continue to leverage existing technology from the tactical countermine area to develop and demonstrate detection technologies used for discrimination and verification. Continue to develop mechanical clearance equipment suitable for large area reduction and QA operations. Continue to develop mine/minefield marking and mapping systems and large area survey equipment. Continue to develop and demonstrate mine awareness and training technologies to help the deminers in future priority countries.
(\$ 12.728 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 4	R-1 ITEM NOMENCLATURE Humanitarian Demining PE 0603920D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	18.498	15.847	14.819	Continuing
Appropriated Value	0.000	18.847	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	(.326)	(.229)	(.091)	
c. Other	0.000	(.421)	(2.000)	
Current President's Budget	18.172	18.197	12.728	Continuing

Change Summary Explanation:

(U) **Funding:** FY 2000 reflects inflation savings and program revisions. FY2001 changes reflect inflation savings and the government wide rescission
inflation

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

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

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

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

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 4	R-1 ITEM NOMENCLATURE Humanitarian Demining PE 0603920D8Z	

(U) E. SCHEDULE PROFILE: N/A

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RDTE&E BUDGET ELEMENT/PROJECT COST BREAKDOWN (R-3 Exhibit)		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY: RDTE&E, Defense Wide / BA 4	R-1 ITEM NOMENCLATURE: Humanitarian Demining PE 0603920D	

A. Project Cost Breakdown (\$ in thousands)

	FY 1999	FY 2000	FY 2001
Project Cost Categories:			
Cost Categories			
a. Demonstrations & Validation	17.077	17.072	11.598
b. Program Management Support	1.095	1.125	1.130
TOTAL	18.172	18.197	12.728

B. Budget Acquisition History and Planning Information:

Performing Organizations:

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity/EAC	Project Office EAC	Total Prior to FY 1999	Budget FY 1999	Budget FY 2000	Budget FY 2001	Budget to Complete	Total Program
Various	Various	Various	Various		0	18.172	18.197	12.728	Continuing	Continuing
TOTAL PROJECT					0	18.172	18.197	12.728	Continuing	Continuing

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									Date: (MONTH/YEAR) February 2000	
APPROPRIATION/BUDGET ACTIVITY					R-1 ITEM NOMENCLATURE					
RDT&E, Defense-wide/ Budget Activity 4					Coalition Warfare 0603923D8Z					
Cost (In Millions)	FY 1998	FY 1999	FY 2000	FY2001	FY2002	FY2003	FY2004	FY 2005	Cost to Complete	Total Cost
Total 0603923D Cost	0	0	0	11.839	13.020	12.544	12.775	13.087	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element funds management of U.S. efforts to achieve interoperability with allies and other friendly foreign countries across the full range of joint and combined (coalition) operations. Kosovo lessons learned revealed that the increasing complexity and difficulty of prosecuting multinational air, land, and sea campaigns is exacerbated by inadequate systems interoperability. Interoperability involves, minimally, C3I weapons and logistics in the fight, and, prior to the fight, requires working the interoperability of tactic, techniques, and procedures. Coalitions are the preferred way to address international crises of the 21st century - lend political legitimacy and provide a broad base of support; coalitions provide resources that mitigate the U.S. burden to shoulder the preponderance of forces, materiel and finance. This PE directly supports U.S. commitments to the 1999 NATO Summit's Defense Capabilities Initiative. This program funding will leverage DoD's investment strategy to ensure ongoing DoD programs and Joint Vision 2010 (JV2010) technologies operate in the coalition environment. The program will focus on: Integrating

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Coalition Warfare 0603923D8Z	

JV2010 technologies in coalition doctrine, tactics and procedures; pre-feasibility studies and technology integration to support leadership initiatives arising from international for a such as the Four Powers, the Council of National Armaments Directors and the U.S/Japan Science and Technology Forum; expanding the scope of U.S. programs to accommodate allied participation; U.S. participation in allied technology demonstrations; and achieving interoperability in a coalition environment.

FY 1998 Accomplishments:

N/A

FY 1999 Plans:

N/A

FY 2000 Plans:

N/A

FY 2001 Plans:

- Integration of JV 2010 technologies in coalition doctrine, tactics and procedures; \$2M
- Pre-feasibility studies and technology integration to support the Four Powers' agreed programs; \$2.0 million.
- Integrating allied technologies in U.S. programs; \$2.0 million.
- Expansion of U.S. technology assessments through participation in allied technology demonstrations; \$2.0 million.
- Allied interoperability for coalition warfare. \$3.8 million.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Coalition Warfare 0603923D8Z	

B. Program Change Summary

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget Appropriated Value			12.781	Continuing
Adjustments to Appropriated Value				
a. Inflation savings, below threshold reprogramming			(.942)	
b. SBIR				
Current Budget Submit/ President's Budget			11.839	Continuing

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		Date: (MONTH/YEAR) February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ Budget Activity 4	R-1 ITEM NOMENCLATURE Coalition Warfare 0603923D8Z	

C. Other Program Funding Summary : Not applicable.

D. Acquisition Strategy: This program element funds management of U.S. efforts to achieve interoperability with allies and other friendly foreign countries across the full range of joint and combined (coalition) operations.

E. Schedule Profile (Fiscal Year actual and planned events by quarter)

	<u>FY 1998</u>				<u>FY 1999</u>				<u>FY 2000</u>				<u>FY 2001</u>			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Agree on Coalition Warfare Programs																
Out reach Program to allies											X				X	
Initiate Cooperative Efforts																X

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Exhibit R-2, RDT&E Budget Item Justification									Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 4					R-1 ITEM NOMENCLATURE Joint Systems Education & Training 0604722D					
COST (\$ In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	0	0	3.419	0	0	0	0	0	3.419	3.419

(U) A. Mission Description and Budget Item Justification

(U) **BRIEF DESCRIPTION OF ELEMENT:** The program element supports the development of training and education prototypes for advanced distributed learning for all of the Services. Its broad, interservice use will establish a foundation for collaborative initiatives to jointly develop content and the learning environment for Advanced Distributed Learning (ADL). These prototypes will leverage successful research and development in training and education. Policy oversight of this program will be managed by ODUSD-R/R&T and the program will be executed by the Naval Air Warfare Center Training Systems Division through the Joint Orlando Interservice/Interagency Advanced Distributed Learning Co-laboratory to support the development of ADL prototypes.

PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 2000 Plans:

- Develop ADL prototypes using the ADL shareable courseware reference model.
- Evaluate the prototypes and disseminate lessons learned throughout DoD to support the implementation of ADL.

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Exhibit R-2, RDT&E Budget Item Justification		Date: February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 4	R-1 ITEM NOMENCLATURE Joint Systems Education and training – PE: 0604722D	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	0	0	0	0
Appropriated Value				
Adjustments to Appropriated Value		3.500		
a. Congressionally Directed Undistributed Reductions				
b. Other (Inflation savings/Rescission)		(.081)		
Current Budget Submit/President's Budget	0	3.419	0	0

(U) Funding: The change in FY-2000 is the result of below threshold reprogramming, inflation savings and a government-wide rescission.

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

(U) C. Other Program Funding Summary: Not Applicable

(U) D. Acquisition Strategy: Not Applicable

(U) E. Schedule Profile: Not Applicable

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Exhibit R-2, RDT&E Budget Item Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY			R-1 ITEM NOMENCLATURE						
ENGINEERING AND MANUFACTURING DEVELOPMENT, DEFENSE-WIDE, BUDGET ACTIVITY 5			JOINT ROBOTICS PROGRAM PE 0604709D8Z						
COST (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	14.708	14.660	11.553	13.123	13.590	13.853	14.121	Continuing	Continuing
SRS	9.700	10.000	3.000	0.000	0.000	0.000	0.000	0.000	22.700
RCSS	1.900	3.000	6.053	7.123	7.590	0.000	0.000	0.000	10.953
MDARS-I	3.108	1.660	1.500	0.000	0.000	0.000	0.000	0.000	6.268
MDARS-E	0.000	0.000	1.000	6.000	6.000	0.000	0.000	0.000	13.000
FTUV						13.853	14.121	Continuing	Continuing
<p>A. Mission Description and Budget Item Justification. This program is a budget activity level 5 based on the successful transition of robotic technologies from Program Definition and Risk Reduction (PDRR) activities to Engineering, Manufacturing and Development (EMD) as part of an Evolutionary Strategy. This PE was established in response to Office of the Secretary of Defense (OSD) and Service agreement at the April 1997 Joint Robotics Program General Officer Steering Committee (GOSC). The agreement was to have OSD retain oversight of DoD robotics programs through EMD. Individual Services are responsible for requirements generation and procurement funding. Within the JRP, emphasis is on the development of robotic technologies that: are usable in multi-service missions; provide capability in hazardous environments; provide improved battlefield efficiency using supervised autonomous operational capability; reduce or enhance force manpower and sustainability; and are affordable. Success has been achieved in four programs to justify EMD at this time. This PE establishes the consolidated DoD robotics program for unmanned ground vehicles (UGV) and advances UGV concepts into EMD for (1) the Standardized Robotic System (SRS) - a generic, modular set of kits that can be used to retrofit several different types of currently fielded vehicles to allow remote obstacle breaching operations (minefields, earthworks, bunkers, etc.), and have supported operations in Bosnia and Kosovo; (2) the Robotic Combat Support System (RCSS) - a three phase block upgrade program to the "Block 0" Product Improved Mini-Flail for anti-personnel (AP) landmine/scattermine and unexploded ordnance (UXO) proofing for the light, rapid deployment forces; (3) the Mobile Detection Assessment Response System, Interior (MDARS-I) - which will provide physical security inside warehouses of fixed installations and large storage facilities, protection of critical inventory items and track movement of items in warehouses and ammunition storage facilities; and (4) the Mobile Detection Assessment Response System, Exterior (MDARS-E)- that are intended to provide unmanned roving security patrols among the buildings and around the perimeter of large fixed installations.</p>									

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Exhibit R-2, RDT&E Budget Item Justification				Date:
				February 2000
B. <u>Program Change Summary</u> (\$ million)				
	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total</u>
Previous President's Budget	15.115	12.004	11.742	<u>Cost</u>
Appropriated Value		15.004		Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed				
Appropriation Reduction				
b. Congressionally Directed				
Undistributed Reduction				
c. Below threshold reprogramming,				
inflation savings, government-wide rescission	(0.407)	(0.344)	(0.189)	
Current Budget Submit/President's Budget	14.708	14.660	11.553	Continuing
Change Summary Explanation:				
Funding:	FY 2000-2001 inflationary savings; FY 2000 government-wide rescission			
Schedule:	N/A			
Technical:	N/A			
C. <u>Other Program Funding Summary</u>				
D. <u>Acquisition Strategy</u>				
E. <u>Schedule Profile</u>				
Fiscal Year actual and planned events:				
	FY 1999	FY2000	FY2001	
Acquisition Milestones				
SRS			MS III	
MDARS-I			MS III	
RCSS-Block 1		MS I		
MDARS-E		MS I/II		
Engineering Milestones				
T&E Milestones				
Contract Milestones				

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
EMD, DEFENSE WIDE, BUDGET ACTIVITY 5		PE 0604709D8Z			STANDARDIZED ROBOTIC SYSTEM (SRS)				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
SRS	9.700	10.000	3.000	0.000	0.000	0.000	0.000	0.000	22.700
<p>A. <u>Mission Description and Budget Item Justification</u> The Standardized Robotic System (SRS) program is a generic, modular set of kits that can be used to retrofit several different types of currently fielded engineer vehicles to allow remote obstacle breaching operations (minefields, earthworks, bunkers, etc.) Prototypes have been used in support of operations in Bosnia and Kosovo. The US Army has an approved Operational Requirements Document (ORD).</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> Executed SRS EMD contract effort for the design, manufacture and delivery of engineering prototype kits (D7G, M9 Armored Combat Excavator [ACE], T3 Dozer, DEUCE) for Developmental Testing (DT) and Operational Testing (OT) Conducted engineering and program management support for the SRS kit development Developed of an SRS kit for the Interim Vehicle Mounted Mine Detector (IVMMD) program and Interim T-3 bulldozer kits for engineering school evaluation <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> Continue SRS EMD effort for the design, manufacture and delivery of engineering prototypes Complete DT and OT of the IVMMD (Meerkat) robotic kit Engineering and program management support for the SRS kit development <p>(U) <u>FY 2001 PLANS</u></p> <ul style="list-style-type: none"> Continue SRS EMD effort for the design, manufacture, and delivery of engineering prototypes Complete DT and OT for the D7G Complete design for the M9 ACE, T3, and DUECE SRS kit application Engineering and program management support for the SRS kit development Obtain MSIII Decision for the D7G 									

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Exhibit R-2a, RDT&E Project Justification

Date:
February 2000

B. Other Program Funding Summary

C. Acquisition Strategy

The SRS kit development effort is contracted under a Small Business Innovative Research (SBIR) effort. The EMD contract was awarded 4th Quarter FY 1998 to Omnitech Robotics Incorporated. The contract is incrementally funded beginning FY 1999 through FY 2001. The SRS Milestone III production decision is scheduled for 4th Quarter FY 2001, based on the D7G kit development.

D. Schedule Profile

Fiscal Year actual and planned events:

FY1999	FY2000	FY2001
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Acquisition Milestones

SRS (D7G) (M9 ACE/DEUCE) (T3)		MSIII
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Engineering Milestones

T&E Milestones

SRS (D7G) (M9 ACE/DEUCE) (T3)		DT/OT
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Contract Milestones

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Exhibit R-3 Cost Analysis (page 1)								Date: February 2000				
EMD, DEFENSE-WIDE BUDGET ACTIVITY 5,			PROGRAM ELEMENT PE 0604709D8Z					STANDARDIZED ROBOTIC SYSTEM (SRS)				
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPIF	Omnitech		7.900		5.804		1.000			Cont.	Cont.
Ancillary Hardware Development	CPIF	Omnitech		1.000		1.000						
Systems Engineering												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				8.900		6.804		1.000			Cont.	Cont.
Remarks: Omnitech Robotics, Inc., Englewood, CO												
Development Support												
Software Development						0.496		0.444				
Training Development												
Integrated Logistics Support				0.125		0.300		0.050				
Configuration Management				0.100		0.200		0.050				
Technical Data												
GFE												
Subtotal Support				0.225		0.996		0.544			CONT	CONT
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000			
EMD, DEFENSE-WIDE, BUDGET ACTIVITY 5			PROGRAM ELEMENT PE 0604709D8Z							STANDARDIZED ROBOTIC SYSTEM (SRS)			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract	
Developmental Test D7G	MIPR	APG, MD				0.550		0.200					
IOT&E D7G	MIPR	T&E CMD				0.550							
DT M9 ACE	MIPR	APG, MD						0.306					
IOT&E M9 ACE	MIPR	T&E CMD						0.450					
DT DEUCE	MIPR	APG, MD											
IOT&E DEUCE	MIPR	T&E CMD											
DT T3	MIPR	APG, MD				0.175							
IOT&E T3	MIPR	T&E CMD				0.300							
Subtotal T&E						1.575		0.956		CONT	CONT		
Remarks DT - Developmental Test IOT&E - Initial Operational Test & Evaluation APG, MD - Aberdeen Proving Ground, Maryland T&E CMD - Test and Evaluation Command													
Contractor Engineering Support													
Government Engineering Support						0.075							
Program Management Support		US AMCOM		0.500		0.500		0.500					
Program Management Personnel													
Travel				0.075		0.050							
Labor (Research Personnel)													
Miscellaneous													
Subtotal Management				0.575		0.625		0.500		CONT	CONT		
Remarks													
Total Cost				9.700		10.000		3.000					
Remarks													

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Exhibit R-2a, RDT&E Project Justification								Date February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
EMD, DEFENSE WIDE, BUDGET ACTIVITY 5		PE 0604709D8Z			ROBOTIC COMBAT SUPPORT SYSTEM (RCSS)				
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
RCSS	1.900	3.000	6.053	0.000	0.000	0.000	0.000	0.000	10.953
<p>A. <u>Mission Description and Budget Item Justification.</u> The Robotic Combat Support System (RCSS) Program utilizes a 3 phase "Block" upgrade approach. "Block 0" is the Product Improved Mini-Flail (PIMF) which is an RCSS with the anti-personnel mine proofing and clearing payload. The PIMF has proven effective in Bosnia and Kosovo as a contingency asset. "Block 1" will be an anti-personnel obstacle clearing and neutralization system and will replace the PIMF, providing improved off-route stability, increased anti-personnel (AP) landmine neutralization speed, improved reliability, and improved human-machine interface. "Block 2" will add AP wire obstacle clearing, advanced controls, remotely deployed smoke and obscurants, and remotely delivered special munitions to support dismounted operations. "Block 3" will add the capability to carry soldier loads and provide hands-free control and dismounted soldier leader-follower technology. Mechanical devices will be added to "Block 2" that will be used to emplace demolitions and special breaching systems. A Mission Need Statement (MNS) has been developed and an Operational Requirements Document (ORD) is waiting final approval at Army Training and Doctrine Command (TRADOC).</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Designed, developed, and tested non-explosive breaching system for RCSS-Light • Produced four lightweight contingency systems for operations in Bosnia and Kosovo <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Engineering and program management support for the RCSS-Block 1 development • Start RCSS-Block 1 Program Definition and Risk Reduction (PDRR) effort for the design, manufacture and delivery of engineering prototypes <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Engineering and program management support for the RCSS-Block 1 development • Conduct initial verification testing <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p>									

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Exhibit R-2a, RDT&E Project Justification		Date February 2000		
The RCSS-Block 1 contract will be awarded under full and open competition in FY 2000.				
D. Schedule Profile				
Fiscal Year actual and planned events:				
	FY1999	FY2000	FY2001	
Acquisition Milestones				
RCSS-Block 1		MSI		
Engineering Milestones				
T&E Milestones				
RCSS-Block 1			IVT	
Contract Milestones				
			PDRR	

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
EMD, DEFENSE-WIDE, BUDGET ACTIVITY 5			PROGRAM ELEMENT PE 0604709D8Z							Robotic Combat Support System (RCSS)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPIF	OST		0.950				3.953				
Ancillary Hardware Development												
Systems Engineering				0.650		2.000		0.800				
Licenses				0.200								
Tooling								0.100				
GFE		TACOM		0.100								
Award Fees												
Subtotal Product Development				1.900		2.000		4.853		CONT	CONT	
Remarks:												
Development Support								0.100				
Software Development						0.500		0.100				
Training Development								0.100				
Integrated Logistics Support								0.100				
Configuration Management								0.100				
Technical Data												
GFE												
Subtotal Support						0.500		0.500		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000			
EMD, DEFENSE-WIDE, BUDGET ACTIVITY 5			PROGRAM ELEMENT PE 0604709D8Z							Robotic Combat Support System (RCSS)			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract	
DT								0.300					
IOT&E													
DT													
IOT&E													
Subtotal T&E								0.300		CONT	CONT		
Remarks													
Contractor Engineering Support								0.100					
Government Engineering Support						0.500		0.100					
Program Management Support								0.200					
Program Management Personnel													
Travel													
Labor (Research Personnel)													
Miscellaneous													
Subtotal Management						0.500		0.400		CONT	CONT		
Remarks													
Total Cost				1.900		3.000		6.053					
Remarks													

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT		PROJECT NAME AND NUMBER					
EMD, DEFENSE WIDE, BUDGET ACTIVITY 5		PE 0604709D8Z		MOBILE DETECTION ASSESSMENT RESPONSE SYSTEM - INTERIOR (MDARS-I)					
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
MDARS-I	3.108	1.660	1.500	0.000	0.000	0.000	0.000	0.000	6.268
<p>A. <u>Mission Description and Budget Item Justification.</u> The Mobile Detection Assessment Response System - Interior (MDARS-I) will provide unmanned physical security inside the warehouses of fixed installations and large storage facilities. In addition to security, the system will also support inventories and track movement or disturbance of critical inventory items.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> • Awarded Engineering Manufacturing Development (EMD) contract • Designed/fabricated pre-production prototype system <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Conduct Developmental and Operational Tests (DT/OT) • Prepare/Coordinate MSIII IPR package • Prepare material change package <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Initiate Pre-Planned Product Improvement effort • Obtain materials change decision • Obtain MSIII decision <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile</p>									

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Exhibit R-2a, RDT&E Project Justification		Date:		
		February 2000		
Fiscal Year actual and planned events:				
	FY1999	FY2000	FY2001	
Acquisition Milestones				
MDARS-I				MSIII
Engineering Milestones				
T&E Milestones				
MDARS-I			DT/OT	
Contract Milestones				
	EMD			

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Exhibit R-3 Cost Analysis (page 1)								Date: February 2000				
EMD, DEFENSE-WIDE, BUDGET ACTIVITY 5			PROGRAM ELEMENT PE 0604709D8Z					MOBILE DETECTION ASSESSMENT RESPONSE SYSTEM - INTERIOR (MDARS-I)				
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPIF	TBD		1.750		1.000		1.000				
Ancillary Hardware Development												
Systems Engineering				0.200		0.150		0.150				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				1.950		1.150		1.150		CONT	CONT	
Remarks:												
Development Support												
Software Development				0.500		0.150		0.150				
Training Development				0.200								
Integrated Logistics Support						0.100		0.100				
Configuration Management				0.100								
Technical Data												
GFE												
Subtotal Support				0.800		0.250		0.250		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000			
EMD, DEFENSE-WIDE, BUDGET ACTIVITY 5			PROGRAM ELEMENT PE 0604709D8Z					MOBILE DETECTION ASSESSMENT RESPONSE SYSTEM - INTERIOR (MDARS-I)					
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract	
Developmental Test				0.158		0.260							
Operational Test													
Tooling													
GFE													
Award Fees													
Subtotal T&E				0.158		0.260				CONT	CONT		
Remarks													
Contractor Engineering Support													
Government Engineering Support													
Program Management Support				0.200				0.100					
Program Management Personnel													
Travel													
Labor (Research Personnel)													
Miscellaneous													
Subtotal Management				0.200				0.100		CONT	CONT		
Remarks													
Total Cost				3.108		1.660		1.500					
Remarks													

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Exhibit R-2a, RDT&E Project Justification								Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT		PROJECT NAME AND NUMBER					
EMD, DEFENSE WIDE, BUDGET ACTIVITY 5		PE 0604709D8Z		MOBILE DETECTION ASSESSMENT RESPONSE SYSTEM - EXTERIOR (MDARS-E)					
Cost (\$ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
MDARS-E			1.000	6.000	6.000	0.000	0.000	0.000	13.000
<p>A. <u>Mission Description and Budget Item Justification.</u> The Mobile Detection Assessment Response System - Exterior (MDARS-E) will provide unmanned roving security patrols among the buildings and around the perimeter of large fixed installations including warehouses, large storage facilities and ammunition facilities. In addition to security, the system will also support inventories and track movement or disturbance of critical inventory items.</p> <p>(U) <u>FY 1999 Accomplishments</u></p> <ul style="list-style-type: none"> No EMD funding during this fiscal year <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> No EMD funding during this fiscal year <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> Prepare/release EMD Request for Proposal (RFP) Conduct EMD Source Selection Prepare/award EMD contract <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p>									

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Exhibit R-2a, RDT&E Project Justification				Date:
D. Schedule Profile:				February 2000
Fiscal Year actual and planned events:				
	FY1999	FY2000	FY2001	
Acquisition Milestones				
MDARS-E		MSI/II		
Engineering Milestones				
T&E Milestones				
Contract Milestones				

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Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0604709D8Z				MOBILE DETECTION ASSESSMENT RESPONSE SYS - EXTERIOR (MDARS-E)					
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development								0.600				
Ancillary Hardware Development												
Systems Engineering								0.200				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development								0.800		CONT	CONT	
Remarks:												
Development Support								0.200				
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support								0.200		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 2000		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0604709D8Z				MOBILE DETECTION ASSESSMENT RESPONSE SYSTEM - EXTERIOR (MDARS-E)					
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E										CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management										CONT	CONT	
Remarks												
Total Cost								1.000				
Remarks												

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P771/P773
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COST (In Thousand)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Total Cost
Total Program Element (PE) Cost	29.809	28.616	16.250	16.478	16.790	17.116	17.449	Cont.
LINK-16 - P771	2.557	4.192	4.047	7.507	10.003	17.116	17.449	Cont.
Multifunctional Information Distribution System-Low Volume Terminal (MIDS-LVT) - P773	27.252	24.424	12.203	8.971	6.787	0	0	Cont.

A. Mission Description and Budget Item Justification

The program element funds ongoing system level engineering of the existing LINK-16 system and the development of the next generation LINK-16 system, the Multifunctional Information Distribution System Low Volume Terminal (MIDS-LVT). System level engineering involves expanding the application of LINK-16 to U.S. forces, technical lead for Spectrum Management and Certification, and the analysis and development of enhancements to improve LINK-16 operational effectiveness. The MIDS-LVT is a joint international cooperative program involving the U.S., France, Italy, Germany, and Spain. The MIDS-LVT will make LINK-16 affordable for a much larger population of U.S. platforms and systems and will be interoperable with previously developed and produced LINK-16 equipment, JTIDS Class 1 and 2.

This program is funded under BA-5, Engineering and Manufacturing Development, because it encompasses engineering and manufacturing development of new end-items prior to production approval decision.

B. Program Change Summary - See individual project R-2 pages

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P771
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COST (In thousands)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Total Cost
LINK-16 - P771	2,557	4,192	4,047	8,971	10,003	17,116	17,449	Cont.

A. Mission Description and Budget Item Justification

This element funds the system level engineering effort of the existing LINK-16 to U.S. forces. The element funds the functions performed as the DOD single point of contact for all Joint Tactical Information Distribution System (JTIDS) and Multifunctional Information Distribution System (MIDS) spectrum certification activities including testing, equipment maintenance, DOD internal and external coordination, platform integration and certification. This effort analyzes and enhances the LINK-16 to expand its present operational limitations using, for example, the Joint Range Extension (JRE) which employs the satellite technology to increase the range of LINK-16 without the use of costly relays.

PROGRAM ACCOMPLISHMENTS AND PLANS

1. FY 1999 ACCOMPLISHMENTS:

- Continued LINK-16 (\$2.557 million)
- Continued the role as DOD single point of contact for all JTIDS and MIDS spectrum certification activities.
- Resolved 18 spectrum related issues that in the past have prevented DOD from achieving its spectrum management goal and published JTIDS/MIDS Spectrum Users Guide.
- Continued the initial analysis to determine methods for expanding the application of LINK-16 to U.S. forces.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P771

2. FY 2000 PLANS:

- Continue LINK-16 (\$4.192 million)
- Continue the role as DOD single point of contact for all JTIDS and MIDS spectrum certification activities.
- Continue to resolve spectrum related issues.
- Continue LINK-16 development/analysis/enhancement for increased operational requirements to U.S. forces. Requirements include Dynamic Network Management, Joint Range Extension and Joint Interface Control Officer Tool.
- Commence LINK-16 engineering technical support for U.S. users.

3. FY 2001 PLANS

- Continue LINK-16 (\$4.047 million)
- Continue the role as DOD single point of contact for all JTIDS and MIDS spectrum certification activities.
- Continue to resolve spectrum related issues.
- Continue LINK-16 development/analysis/enhancement for increased operational requirements to U.S. forces. Requirements include Dynamic Network Management, Joint Range Extension and Joint Interface Control Officer Tool.
- Continue to provide LINK-16 engineering technical support for U.S. users.

B. Program Change Summary

	FY 1999	FY 2000	FY 2001	Total Cost
FY 2000 President's Budget Submit	2.711	4.304	4.085	Cont.
Appropriated Value				
Adjustments to Appropriated Value				
a. Undistributed reductions, inflation savings, government-wide rescission	(.154)	(.112)	(.038)	
FY 2001 President's Budget Submit	2.557	4.192	4.047	Cont.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P771	

Change Summary Explanation:

Funding: Funding adjustments are due to congressional undistributed reductions in FY 1999, inflation savings in FY 2000 and FY 2001, and government-wide rescission in FY 2000.

Schedule: N/A

Technical: N/A

C. Other Program Funding Summary

Not Applicable

D. Schedule Profile

Not Applicable

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5					R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P773			
COST (In Thousands)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Total Cost
MIDS - P773	27.252	24.424	12.203	7.507	6.787	0	0	Cont.

A. Mission Description and Budget Item Justification

The Multifunctional Information Distribution System (MIDS) Low-Volume Terminal (LVT) is a U.S. joint and international (U.S., France, Germany, Italy, and Spain) cooperative program to develop and produce the next generation LINK-16 system. Designed for tactical combat applications and environments, MIDS will provide a highly jam-resistant, secure, digital (voice and data) information distribution system, enabling rapid integrated communications, navigation, and identification among tactical and command and control warfare elements. Affordability is being achieved through the implementation of open and commercial architecture standards and parts which will allow the tailoring of production configurations to the minimum needs of different U.S. platforms and missions. MIDS-LVT will be interoperable with the earlier generations of LINK-16 equipment, JTIDS Class 1 and 2. This Program Element will fund the U.S. cost share of development, fabrication and test of EMD terminals, and terminal level pre-operational support for U.S. platforms which are implementing MIDS. This element also funds preparations for competitive production. This element does not include the qualification and procurement of a MIDS variant for the F-15 which is called Fighter Data Link (FDL); the FDL is funded as an F-15 program element.

PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1999 ACCOMPLISHMENTS:

- Continued MIDS EMD (\$27.252 million)
 - Continued delivery of MIDS EMD terminals (34 MIDS LVT (1) and 7 MIDS LVT (2) terminals).
 - Continued delivery of MIDS terminals for CDT&E (28 terminals - including 10 loaned from government deliveries).
 - Supported Production Readiness Agreements and achieved Certified MIDS Manufacturer's Register

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(CMMR) for three production readiness vendors.

- Continued Supplement 3 negotiations.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P773	

- Extended MIDS EMD contract six months to June 2000 for pre-operational support during transition to production.
- Planned for Software Support capability.
- Continued management support of the International Program Office.
- Performed Award Fee Boards.
- Planned for Technical Data Support Organization.
- Supported first EMD F/A-18 flight and correction of TACAN performance deficiencies.
- Initiated government Developmental Test & Evaluation of Army MIDS Configuration.
- Provided terminal support for initiation of Initial Developmental and Operational Test & Evaluation of F/A-18.
- Continued pre-operational support.
- Continued corrective action for problems discovered in testing (contractor and government).
- Delivered MIDS Interface Simulators (MIS) Version 2.
- Initiated delivery of MIDS Interface Simulator (MIS) Version 3.
- Continued government developmental testing/operational testing of various MIDS platforms.
- Performed DT-IIA-4 initial flight testing.
- Continued development of MIDS production Requests for Proposal (RFP) and hosted industry reviews.
- Continued Electromagnetic compatibility demonstrations to support spectrum certification.

2. FY 2000 PLANS:

- Continue MIDS EMD (\$24.424 million)
 - Complete delivery of all remaining EMD terminals (42 MIDS LVT(1) and 2 MIDS LVT (2) terminals) and terminals supporting CDT&E (22 MIDS LVT (1) and 6 MIDS LVT (2) terminals).
 - Complete MIDS EMD Contract including software development, terminal deliveries, and Pre-Operational Support.
 - Continue F/A-18 Initial Developmental and Operational Test & Evaluation terminal support.
 - Continue F/A-18 flight testing support.
 - Achieve MIDS LRIP DAB decision.

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- Establish Systems Engineering and Integration (SE&I) support capabilities for EMD terminals and platform requirements.
- Establish software support capability for MIDS International Program, under SE&I providers.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P773	

- Continue management support of the International Program Office.
- Continue Electromagnetic compatibility demonstrations to support spectrum certification.
- Initiate correction of deficiencies resulting from development and operational testing (contractor and government).
- Retrofit MIDS EMD terminals to final configuration baseline.
- Finalize and release MIDS Production RFP for the production requirements.
- Award two sole source letter contracts to U.S. production contractors.
- Reach agreement on Supplement 3 negotiations.

3. FY 2001 PLANS:

- EMD Terminal and Platform Integration Support (\$12.203)
 - Achieve Milestone III Decision.
 - Continue F/A-18 Initial Developmental and Operational Test & Evaluation terminal support.
 - Continue F/A-18 flight testing support.
 - Achieve Ship Initial Operational Capability for LVT (1).
 - Initiate Army Initial Operational Test and Evaluation for LVT (2).
 - Continue correction of deficiencies resulting from operational testing.
 - Complete Initial Operational Test and Evaluation for MIDS on Ship.
 - Perform Redesign and Regression Testing of EMD terminals.
 - Continue the System Engineering and Integration support capabilities for EMD terminals and platform requirements.
 - Continue software support capability and technical data support for MIDS International Program.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P773	

B. Program Change Summary

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
FY 2000 President's Budget Submit	27.414	25.078	12.316	Cont.
Adjustments to Appropriated Value				
a. Congressional Reductions	(.162)	(.654)	(.113)	
FY 2001 President's Budget Submit	27.252	24.424	12.203	Cont.

Change Summary Explanation:

Funding: Funding adjustments reflect congressional undistributed reductions (FY 1999); inflation savings (FY 2000 and FY 2001); and government-wide rescission (FY 2000).

Schedule: Program Milestone Schedule Changes Include:

- Program review DAB for LRIP changed from April 2000 to March 2000 to recover schedule delays caused by USD(AT&L) investigation of Transatlantic Teaming initiatives.

Technical: N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5		R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P773

C. Other Program Funding Summary

	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>FY2002</u>	<u>FY2003</u>	<u>FY2004</u>	<u>FY2005</u>	<u>Total Cost</u>
Procurement:									
APN									
BLI 310525000		9.331	49.619	52.419	60.780	48.186	48.869	40.469	Cont.
OPN									
BLI 342614000						6.520	25.872	28.228	Cont.
OP, DW									
PE0207134F/PE0207130F	33.883	39.900	58.430	13.450			22.180		Cont.
PE0207133F				13.570	25.000	38.160	27.920	22.010	Cont.
OPA									
PE0208865C		15.200		.500					15,700
PE0208861C							1.500		Cont.
Related RDT&E									
PE0603713A		5.900							5.900
PE0205604N	38.129	45.421	42.225	22.069	20.529	21.154	21.645	18.886	Cont.
PE0207134F	15.000								15,000
PE0207133F			3.700						3.700

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5		R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P773

D. Acquisition Strategy

USD (AT&L) approved the MIDS Acquisition Strategy Report 2 November 1999. The approval included authorization for immediate award of two sole source letter contracts for long-lead materials and nonrecurring engineering to mitigate schedule risk of terminal deliveries in September 2001. These contracts were awarded 20 January 2000. Full contract award will be determined at the LRIP DAB in March 2000. The FY00 MIDS LRIP terminals are being equitably split between the two US-led teams and FY01 and out-year quantities will be competitively procured. The USD (AT&L) direction further states that after completion of the US-led and European-led MIDS terminal qualification efforts, the production requirements of all MIDS participants should be combined and competed among the US-led and European-led teams.

E. Schedule Profile

Fiscal Year actual and planned events by quarter

	FY 1998				FY 1999				FY 2000				FY 2001			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Supplement > _____ *

3 Negotiations

EMD Contract

MIS Deliveries _____ *V1 >V2 >V3 _____ *V3

MIDS Navy Terminals > _____ *

Army Terminals > _____ *

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Pre-Operational Support > _____ *

Systems Engineering and Integration > _____
Software Support Capability > _____

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Common Joint Tactical Information 0604771D8Z/P773	

E. Schedule Profile cont.

Fiscal Year actual and planned events by quarter

		<u>FY 1998</u>			<u>FY 1999</u>			<u>FY 2000</u>			<u>FY 2001</u>	
	1	2	3	4	1	2	3	4	1	2	3	4

Production Readiness > _____ *
Agreement

T & E Milestones

Ships > _____ *
TECHEVAL/OPEVAL

F/A-18
Technical & Operational Evaluations > _____

IOT&E

LRIP DAB *

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Production Decision

*

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EXHIBIT R-3, FY 2001/2005 RDT&E, DW PROJECT COST ANALYSIS

DATE: FEBRUARY 2000

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604771D8Z

PROJECT NUMBER: P771

PROJECT TITLE: COMMON JOINT TACTICAL INFORMATION

Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
APPROPRIATION: RDT&E,N BUDGET ACTIVITY : 5			PROGRAM ELEMENT: 0604771D8Z							COMMON JOINT TACTICAL INFORMATION		
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
LINK-16 Spectrum Support		Various	4.693	1.726	Various	3.293	Various	3.074	Various	Cont.	Cont.	Cont.
LINK-16 Engineering Support		Various	2.464	405	Dec 98	269	Various	216	Various	Cont.	Cont.	Cont.
LINK-16 Support		Various	3.413									
LINK-16 Enhancements		Various		426	Various	630	Various	757	Various	Cont.	Cont.	Cont.
Subtotal Product Development			10.570	2.557		4.192		4.047		Cont.	Cont.	Cont.
Remarks:												
Total Cost			10.570	2.557		4.192		4.047		Cont.	Cont.	Cont.

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Exhibit R-3, Project Cost Analysis

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EXHIBIT R-3, FY 2000/2001 RDT&E, DW PROJECT COST ANALYSIS

DATE: February 2000

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604771D8Z

PROJECT NUMBER: P773

PROJECT TITLE: COMMON JT TACTICAL INFO

Exhibit R-3 Cost Analysis (page 1)										Date: February 2000		
APPROPRIATION: RDT&E, DW BUDGET ACTIVITY : 5			PROGRAM ELEMENT: 0604771D8Z/P773							COMMON JT TACTICAL INFORMATION		
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Product Development												
Primary Hardware/Software Development	CPIF	MIDSCO Wayne, NJ	162.431	18.843	Various	15.600	Various			0	196.874	196.590
Pre-operation EMD Terminal Support	CPIF	MIDSCO Wayne, NJ				1.056	Various				1.056	
Software Support	TBD	TBD	0	0		2.083	Apr 00	4.681	Dec 00	0	6.764	6.764
Subtotal Product Development			162.431	18.843		18.739		4.681		0	204.694	
Remarks: The MIDS International Program Office executed a contract modification in September 1998 to extend the Engineering, Manufacturing and Development (EMD) contract to December 1999, per approval of the International SC. Subsequently, the International SC approved a second extension of the EMD contract to June 2000 for completion of EMD terminal deliveries, pre-operational support, software support, and continued program management.												
Support Costs												
Production Readiness Agreements Mfg Prototyping	FFP	Allied Signal Teterboro, NJ	3.189	0		0		0		0	3.189	3.189
Production Readiness Agreements Mfg Prototyping	FFP	Viasat Carlsbad, CA	6.346	0		0		0		0	6.346	6.346
Production Readiness Agreements Mfg Prototyping	FFP	Data Link Solutions Cedar Rapids, IA	1.000	0		0		0		0	1.000	1.000
Production Readiness Agreements	FFP	Thompson-CSF Colombes Cedex, France	1.000	0		0		0		0	1.000	1.000
Production Readiness Agreements	WX	SPAWARSYSCT San Diego, CA	550	245	Jan 99	0		0		0	795	795
Subtotal Support			12.085	245		0		0		0	12.330	12.330

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Exhibit R-3, Project Cost Analysis

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EXHIBIT R-3, FY 2000/2001 RDT&E, DW PROJECT COST ANALYSIS

DATE: February 2000

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604771D8Z

PROJECT NUMBER: P773

PROJECT TITLE: COMMON JT TACTICAL INFO

Exhibit R-3 Cost Analysis (page 2)								Date: February 2000				
APPROPRIATION: RDT&E,DW BUDGET ACTIVITY : 5			PROGRAM ELEMENT: 0604771D8Z/P773					COMMON JOINT TACTICAL INFORMATION				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation												
System Engineering	WX	SSC SD – Code 64 San Diego, CA	3.865	1.989	Jan 99	724	Jan 00	386	Jan 01	0	7.080	7.080
System Engineering	WX	SSC SD – Code 45 San Diego, CA	6.844	1.687	Jan 99	330	Jan 00	172	Jan 01	0	9.149	9.149
Software Support	MIPR	Warner Robins Robins AFB, GA	1.171	408	Jan 99	220	Jan 00	300	Jan 01	0	2.178	2.178
System Engineering	MIPR	MITRE Ft. Monmouth, NJ	1.154	311	Nov 98	0	Nov 99	0		0	465	1.465
System Engineering, and Integration	TBD	TBD	0	0		2.469	Apr 00	6.039	Dec 00	0	8.780	8.780
System Engineering	Various	Various	13.122	512	Jan 99	373	Various	186	Various	0	14.193	14.193
Subtotal T&E			26.156	4.907		4.116		7.083		0	42.845	42.845
Remarks												
Management Services												
Program Management Support	FFP	Vredenburg Carlsbad, VA	1.311	765	Various	819	Various	284	Various	0	3.179	3.179
Miscellaneous Program Support	FFP/WX/PD	Various	8.050	1.092	Various	750	Various	155	Various	0	10.047	10.047
Contract Services	MIPR	AF Pentagon Washington, DC	0	1.400	Jun 99	0		0		0	1.400	1.400

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Exhibit R-3, Project Cost Analysis

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EXHIBIT R-3, FY 2000/2001 RDT&E, DW PROJECT COST ANALYSIS

DATE: February 2000

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604771D8Z

PROJECT NUMBER: P773

PROJECT TITLE: COMMON JT TACTICAL INFO

Subtotal Management			9.361	3.257		1.569		439		0	14.626	14.626
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Exhibit R-3 Cost Analysis (page 3)								Date: February 2000				
APPROPRIATION: RDT&E,DW BUDGET ACTIVITY : 5			PROGRAM ELEMENT: 0604771D8Z/P773					COMMON JOINT TACTICAL INFORMATION				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY 99 Cost	FY 99 Award Date	FY00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Total Cost			210.033	27.252		24.424		12.203				
Remarks												
AWARD FEES												
<p>The award fee on contract has been reduced from \$15.7M to \$8.2M due to recognition that the contractor's performance does not support award fee payout at the amount originally established. After this reduction, the U.S. share of the entire Award Fee on contract is approximately \$3.4M. Contractor performance to date earned one award fee payment in June 1995, of which the US share was \$471,582 and one award fee payment for the period ending November 1995, of which the US share was \$101,120. The percentage of award fee paid to date, based on the reduced fee amount of \$8.2M is approximately 29%. The percentage of award fee paid to date based on the original fee amount of \$15.7M is 17%. An Award Fee Board is planned for FY 2000 covering the period ending December 1999.</p>												

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Exhibit R-3, Project Cost Analysis

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 7							R-1 ITEM NOMENCLATURE Commercial O&S Savings Initiative PE 0604805D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	7.221	11.582	9.629	10.744	12.829	13.188	13.551	Continuing	Continuing
Commercial O&S Savings Initiative/P805	7.221	11.582	9.629	10.744	12.829	13.188	13.551	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

Beginning in FY 2001, this Program Element has moved from Budget Activity 5 to Budget Activity 7.

The purpose of the Commercial Operations and Support Savings Initiative (COSSI) is to reduce weapon system life cycle costs, especially operating and support (O&S) costs, by inserting commercial products into military systems. COSSI is a crucial element in DoD's strategy to reduce the operations and support (O&S) costs of fielded equipment and supports the DoD goal of reducing logistics costs by 20 percent by 2005. As legacy systems age, O&S costs increase, and COSSI is an effective way to lower these costs. COSSI also allows DoD to capitalize on the commercial innovation cycle so equipment can be modernized faster. Adapting commercial technologies for use in military equipment often requires non-recurring engineering, testing and qualification. COSSI shares the costs of these efforts between the contractor and the Government. If the testing is successful and the cost savings validated, the items are purchased as retrofits. All COSSI projects must have an endorsement by a military customer and be linked to an existing military system. The benefits include: improved mean time between failure, improved logistics support by reducing parts obsolescence, reduced software reprogramming time and costs, improved performance, and the promotion of open system designs making future upgrades easier and less costly. COSSI uses Other Transactions rather than FAR procurement contracts so companies that do not normally do business with DOD are given the opportunity to provide cost saving ideas that would otherwise go unnoticed. OSD funding provides the Services an incentive to structure joint projects with pervasive impact across weapon systems, and to institutionalize the use of Other Transaction Agreements.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 7		R-1 ITEM NOMENCLATURE Commercial O&S Savings Initiative PE 0604805D8Z

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	7.221	11.582	9.629	10.744	12.829	13.188	13.551	Continuing	Continuing
Commercial O&S Savings Initiative/P805	7.221	11.582	9.629	10.744	12.829	13.188	13.551	Continuing	Continuing

(U) **Project Number and Title: P805 Commercial O&S Savings Initiative**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) In FY 1999 Program Management transferred from DARPA to OSD and the Services. FY 1999 COSSI funding supported the development, documentation, integration, and test of upgrades to the legacy Mission Computer and Stores Management Computer on the AV8B. The upgrade project used commercial components and converted assembly language software into a higher order language (C++). In addition, the project integrated the Joint Direct Attack Munition, the ALE-47 Countermeasures Dispenser, the Havequick/Singars secure communications system, and the Common Missile Warning System within the AV8B Electronic Warfare Suite. The contractor performed system development tasks and developed a System Development Plan; researched, defined and documented the system architecture to include functional requirements, performance requirements, and interface requirements; developed, provided and fully documented tested software code; developed hardware to meet system requirements; performed system and subsystem integration; delivered a System Configuration Set and provided engineering support for operational test and evaluation. The contractor supported implementation of the System Configuration Set in Fleet and production aircraft. (\$ 7.221 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 7	R-1 ITEM NOMENCLATURE Commercial O&S Savings Initiative PE 0604805D8Z	

(U) FY2000 Plans:

(U) COSSI is providing funds to develop and install an Integrated Mechanical Diagnostic/Health and Usage Management System on AH-1 helicopters. The system collects real time data on helicopter performance including continuous rotor track and balance, vibration monitoring of the gearbox, drivetrain, and engine, and structural usage monitoring. The project is expected to reduce AH-1 operation and support costs by over \$225 million by eliminating rotor track and balance flights, improving the efficiency of maintenance operations, enhancing operational readiness, and extending the period between depot maintenance. COSSI funding is also being used to develop a propeller control unit for P-3 aircraft. The project will replace the current analog/mechanical system with one that is digital/electromechanical. The benefits include higher reliability, elimination of control system adjustments requiring ground operation and flight checks, a built in test capability to improve trouble shooting, and elimination of parts obsolescence. The new propeller control unit is expected to reduce P-3 operation and maintenance costs by over 35 million during the next 12 years.

(\$ 11.582 Million)

(U) FY2001 Plans:

(U) DoD will again issue a joint solicitation for the FY2001 program. Lessons learned during previous COSSI solicitations will be used to further refine the program. DoD will use the OSD line to incentivize joint projects. Based on previous experience, most cost saving projects are expected to pertain to upgrading electronics and computers on legacy aircraft. (\$9.629 Million)

(\$ 9.629 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 7	R-1 ITEM NOMENCLATURE Commercial O&S Savings Initiative PE 0604805D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	7.901	16.976	15.129	Continuing
Appropriated Value	0.000	11.976	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	(.680)	(.098)	0.000	
c. Other	0.000	(.296)	(5.500)	
Current President's Budget	7.221	11.582	9.629	Continuing

Change Summary Explanation:

(U) **Funding:** FY 1999 changes are due to reprogramming adjustments. FY 2000 and FY 2001 reflect reductions due to programmatic decisions and inflation adjustments and the government wide rescission.

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

(U) **Technical:**

(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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Exhibit R-2, RDT&E Budget Item Justification									Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 5				R-1 ITEM NOMENCLATURE Software Development/Cost Accounting Pilots – PE: 0605013D8Z						
COST (\$ In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	0	0	0	12.000	0	0	0	0	12.000	12.000

(U) A. Mission Description and Budget Item Justification

(U) BRIEF DESCRIPTION OF ELEMENT: Most of the Department's current accounting systems and processes were designed primarily to provide budgetary accounting information and reports required by the Congress and the Office of Management and Budget. Consequently, many of these systems do not satisfy current cost accounting information requirements recently imposed on all federal government agencies nor meet the Department's management needs for cost information in support of more cost effective decisions. The program supports an initiative to improve cost accounting capabilities within the Department. The program will support cost accounting pilots to improve: (1) the accumulation and identification of cost information, (2) the analysis of cost information for making more cost effective decisions, (3) visibility of the cost of operations and programs and (4) delivery of relevant and reliable information to program managers in a way that better relates costs to outputs and activities.

PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1999 Accomplishments:

(U) FY 2000 Plans:

(U) FY 2001 Plans:

- Initiate cost accounting pilots with the United States Transportation Command, the Air Force Mobility Command, the Air Force Material Command (Information Services Activity Group) and the Office of the Under Secretary of Defense (Comptroller).
- Assess and evaluate the result of these cost accounting initiatives to determine the feasibility of potential future cost accounting initiatives.

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Exhibit R-2, RDT&E Budget Item Justification		Date: February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 5	R-1 ITEM NOMENCLATURE Software Development/Cost Accounting Pilots – PE: 0605013D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget			0	
Appropriated Value				
Congressional Directed Transfer				
Adjustments to Appropriated Value/Transferred Amount				
a. Congressional realignment				
b. Congressionally Directed Undistributed Reductions				
c. Other (DOD Program Changes)			12.000	
Current Budget Submit/President's Budget			12.000	12.000

(U) Funding: New Program in FY 2001

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

(U) C. **Other Program Funding Summary:** Not Applicable

(U) D. **Acquisition Strategy:** Not Applicable

(U) E. **Schedule Profile:** Not Applicable

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Exhibit R-2, RDT&E Budget Item Justification								Date: 02/2000	
APPROPRIATION/BUDGET ACTIVITY				R-1 ITEM NOMENCLATURE					
RDT&E, Defense Wide/Budget Activity 6				Unexploded Ordnance Detection & Clearance - PE 0603858D8Z					
COST (\$ in Millions)	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	Cost to Complete	Total Cost
Total PE Cost	1.216	1.168	1.204	1.197	.496	.991	.990	Continuing	Continuing

A. Mission Description and Budget Item Justification**Brief Description of Element**

This program element funds the Joint Unexploded Ordnance Coordination Office (JUXOCO) of the Unexploded Ordnance Center of Excellence (UXOCOE) to develop policy and provide oversight in coordinating requirements and technology in detection and clearance of unexploded ordnance (UXO) within the Department of Defense (DoD), as well as with other United States and international agencies, academia, and industry; to establish and maintain standards for testing, modeling, and the evaluation of unexploded ordnance detection and clearance technology; and to establish, gather, and maintain a database of the results of these efforts.

In response to a request from the House National Security Committee (HNSC) and concerns of the General Accounting Office (GAO), the Department of Defense submitted a plan in March 1997, "Report to Congress: Unexploded Ordnance Clearance: A Coordinated Approach to Requirements and Technology Development." This report was developed by a joint, inter-agency task force comprised of the proponents of the unexploded ordnance (UXO) clearance mission areas (active range clearance, humanitarian demining, countermine, explosive ordnance disposal, and environmental remediation). The report defined research and development priorities, program management, and cooperative activities for technology applicable to area ordnance clearance, also known as UXO clearance. The report also described a plan to maintain visibility over and leverage technology efforts within DoD, at other government agencies, and in private industry for the detection, neutralization, and disposal of UXO. In May 1997, the Under Secretary of Defense for Acquisition and Technology directed the establishment of the UXO Center of Excellence (UXOCOE) to implement this plan, and in October 1997, the Department established the operational arm of the UXOCOE, the Joint UXO Coordination Office (JUXOCO), which is collocated with the Night Vision Electronic Sensors Directorate at Ft. Belvoir, VA.

Program Accomplishments and Plans:**(U) FY 1999 Accomplishments:**

- Prepared and submitted report to Congress.
- Functioned as the focal point for UXO detection and clearance expertise.
- Promoted international cooperation and forged coordinated working research efforts in promising technologies.
- Developed and continuing to develop standards, test sites, test targets and test protocols. Selected and established common test sites, data formats, and metrics.
- Updated and maintained the UXO clearance/detection database and computer website to promote interaction and sharing of information, concepts and technology within DoD and with other US and international agencies, academia, and industry.

(U) FY 2000 Plans:

- Fully integrate industry requirements for UXO clearance equipment into UXO requirements process. (\$0.100 Million)

Exhibit R-2, RDT&E Budget Item Justification		Date: 02/2000							
<ul style="list-style-type: none"> Establish protocols for evaluation of foreign UXO detection sensor data. (\$0.100 Million) Collocate two UXO experimental areas with existing UXO testing areas. Conduct scientific experiments to gather data on the performance of detection sensors at these locations. (\$0.868 Million) Update and maintain the UXO clearance/detection database and computer website to promote interaction and sharing of information, concepts and technology within DoD and with other US and international agencies, academia, and industry. (0.100 Million) 									
(U) <u>FY2001 Plans:</u>									
<ul style="list-style-type: none"> Conduct requirements and technology workshops to update the technological thrusts for UXO RDT&E. (\$0.100 Million) Integrate international and industrial research and equipment into a computerized database of UXO RDT&E to enhance information sharing. (\$0.100 Million) Collocate one UXO experimental area with an existing UXO testing area in a geologically unique local. Conduct scientific experiments to gather data on the performance of detection sensors at this location and previously established areas. (\$1.004Million) 									
B. Program Change Summary:									
	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY2001</u>						
Previous President's Budget	1.259	1.226	1.221						
Inflation Savings, Government-wide Rescission	(0.043)	(0.058)	(0.017)						
Current Budget	1.216	1.168	1.204						
C. Other Program Funding Summary: PE 0602712A									
<u>PY</u>	<u>FY98</u>	<u>FY 99</u>	<u>FY 00</u>	<u>FY 01</u>	<u>FY 02</u>	<u>FY 03</u>	<u>FY 04</u>	To <u>Complete</u>	Total <u>Cost</u>
0	1.5	0.5	0.5	0.5	0.5	0.5	0	Continuing	Continuing
D. Acquisition Strategy: Not Applicable									
E. Schedule Profile: Not Applicable									

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Exhibit R-2a, RDT&E Project Justification							Date: 02/2000		
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT			PROJECT NAME AND NUMBER					
RDT&E, Defense Wide Budget Activity 6	PE 0603858D8Z			Unexploded Ordnance Detection and Clearance					
COST (\$ in Millions)	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	Cost to Complete	Total Cost
Total PE Cost	1.216	1.168	1.204	1.197	.496	.991	.990	Continuing	Continuing
RDT&E Articles Qty									
A. Mission Description and Budget Item Justification									
Brief Description of Element									
<p>This program element funds the Joint Unexploded Ordnance Coordination Office (JUXOCO) of the Unexploded Ordnance Center of Excellence (UXOCOE) to develop policy and provide oversight in coordinating requirements and technology in detection and clearance of unexploded ordnance (UXO) within the Department of Defense (DoD), as well as with other United States and international agencies, academia, and industry; to establish and maintain standards for testing, modeling, and the evaluation of unexploded ordnance detection and clearance technology; and to establish, gather, and maintain a database of the results of these efforts.</p> <p>In response to a request from the House National Security Committee(HNSC) and concerns of the General Accounting Office (GAO), the Department of Defense submitted a plan in March 1997, "Report to Congress: Unexploded Ordnance Clearance: A Coordinated Approach to Requirements and Technology Development." This report was developed by a joint, inter-agency task force comprised of the proponents of the unexploded ordnance (UXO) clearance mission areas (active range clearance, humanitarian demining, countermines, explosive ordnance disposal, and environmental remediation). The report defined research and development priorities, program management, and cooperative activities for technology applicable to area ordnance clearance, also known as UXO clearance. The report also described a plan to maintain visibility over and leverage technology efforts within DoD, at other government agencies, and in private industry for the detection, neutralization, and disposal of UXO. In May 1997, the Under Secretary of Defense for Acquisition and Technology directed the establishment of the UXO Center of Excellence (UXOCOE) to implement this plan, and in October 1997, the Department established the operational arm of the UXOCOE, the Joint UXO Coordination Office (JUXOCO), which is collocated with the Night Vision Electronic Sensors Directorate at Ft. Belvoir, VA.</p>									
Program Accomplishments and Plans:									
(U) <u>FY 1999 Accomplishments:</u>									
<ul style="list-style-type: none"> • Prepared and submitted report to Congress. • Functioned as the focal point for UXO detection and clearance expertise. • Promoted international cooperation and forged coordinated working research efforts in promising technologies. • Developed and continue to develop standards, test sites, test targets and test protocols. Selected and established common test sites, data formats, and metrics. • Updated and maintained the UXO clearance/detection database and computer website to promote interaction and sharing of information, concepts and technology within DoD and with other US and international agencies, academia, and industry. 									

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Exhibit R-2a, RDT&E Project Justification								Date: 02/2000		
(U) <u>FY 2000 Plans:</u>										
<ul style="list-style-type: none"> Fully integrate industry requirements for UXO clearance equipment into UXO requirements process. (\$0.100 Million) Establish protocols for evaluation of foreign UXO detection sensor data. (\$0.100 Million) Collocate two UXO experimental areas with existing UXO testing areas. Conduct scientific experiments to gather data on the performance of detection sensors at these locations. (\$0.868Million) Update and maintain the UXO clearance/detection database and computer website to promote interaction and sharing of information, concepts and technology within DoD and with other US and international agencies, academia, and industry. (0.100 Million) 										
(U) <u>FY2001 Plans:</u>										
<ul style="list-style-type: none"> Conduct requirements and technology workshops to update the technological thrusts for UXO RDT&E. (\$0.100 Million) Integrate international and industrial research and equipment into a computerized database of UXO RDT&E to enhance information sharing. (\$0.100 Million) Collocate one UXO experimental area with an existing UXO testing area in a geologically unique local. Conduct scientific experiments to gather data on the performance of detection sensors at this location and previously established areas. (\$1.004Million) 										
(U) <u>FY2002 Plans:</u>										
<ul style="list-style-type: none"> Conduct requirements and technology workshops to update the technological thrusts for UXO RDT&E. Develop business opportunity. (\$0.150 Million) Integrate international, industrial, academic, and laboratory research and equipment into a computerized database of UXO RDT&E to enhance information sharing. (\$0.100 Million) Conduct scientific experiments to gather data on the performance of detection sensors at this location and previously established areas. (\$.947Million) 										
B. Other Program Funding Summary: PE 0602712A										
	<u>PY</u>	<u>FY98</u>	<u>FY 99</u>	<u>FY 00</u>	<u>FY 01</u>	<u>FY 02</u>	<u>FY 03</u>	<u>FY 04</u>	To	Total
	0	1.5	0.5	0.5	0.5	0.5	0.5	0	Complete	Cost
									Continuing	Continuing
C. Acquisition Strategy: Not Applicable										
D. Schedule Profile: Not Applicable										

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Exhibit R-2, RDT&E Budget Item Justification									Date: February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 6				R-1 ITEM NOMENCLATURE Assessments and Evaluations – PE: 0604942D8Z						
COST (\$ In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	0	4.330	0	4.882	4.978	5.082	5.174	5.266	Continuing	Continuing
National Assessment Group Project Code: 842	0	4.330	0	4.882	4.978	5.082	5.174	5.266	Continuing	Continuing

(U) A. Mission Description and Budget Item Justification

(U) **BRIEF DESCRIPTION OF ELEMENT:** The program element supports the activities of the Director, National Assessment Group (NAG), Office of the Under Secretary of Defense for Acquisition and Technology (OUSD(A&T)) The NAG, chartered 20 Oct 97 by the DEPSECDEF, provides low cost, responsive evaluations of National Level programs belonging to Department of Defense and other US Government (USG) organizations. Additionally, the NAG places an emphasis on quick reaction to current warfighter requirements.

PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) **FY 1999 Accomplishments:**

- Provided cradle-to-grave rapid assessments, including all planning, resourcing, field operations and reporting.
- Supporting NAG clients, maintained basic infrastructure support in the following areas: civilian pay, communications; facilities; security, training, support contracts, supplies & equipment, ADP equipment, transportation, government travel, training, general administrative requirements, facilities support, communications, transportation and instrumentation.
- Limited recapitalization to upgrade its tools to state-of-the market.

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Exhibit R-2, RDT&E Budget Item Justification		Date: February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 6	R-1 ITEM NOMENCLATURE Assessments and Evaluations – PE: 0604942D8Z	

PROGRAM ACCOMPLISHMENTS AND PLANS: (Continued)

(U) FY 2000 Plans:

- Continue to provide cradle-to-grave operational assessments, including all planning, resourcing, field operations and reporting.
- In support of NAG clients, continue to sustain basic infrastructure support.
- Continue recapitalization process to upgrade its tools to state-of-the market.

(U) FY 2001 Plans:

- Continue to provide cradle-to-grave operational assessments, including all planning, resourcing, field operations and reporting.
- In support of NAG clients, continue to sustain basic infrastructure support.
- Continue recapitalization process to upgrade its tools to state-of-the market.

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Exhibit R-2, RDT&E Budget Item Justification		Date: February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 6	R-1 ITEM NOMENCLATURE Assessments and Evaluations – PE: 0604942D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	3.868	4.900	5.000	Continuing

Appropriated Value

Adjustments to Appropriated
Value/Transferred Amount

a. Congressional realignment to PE0605104D	(4.900)
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b. Congressionally Directed Undistributed Reductions	
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c. Other (Inflation savings and below threshold reprogramming)	.462	(.118)
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Current Budget Submit/President's Budget	4.330	0	4.882	Continuing
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(U) Funding: The change in FY-2000 is the result of congressional action. FY 2001 reflects inflation savings.

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

(U) C. Other Program Funding Summary: Not Applicable

(U) D. Acquisition Strategy: Not Applicable

(U) E. Schedule Profile: Not Applicable

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)						DATE February 2000		
APPROPRIATION/BUDGET ACTIVITY Research, Development, Test & Evaluation, Defense-wide				R-1 ITEM NOMENCLATURE Technical Studies, Support & Analysis PE 0605104D8Z				
COST (In Millions)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	
Total Program Element (PE) Cost	30.714	27.421	30.597	33.613	34.078	34.765	35.469	
P421 Tech Studies, Support & Analysis	30.714	27.421	30.597	33.613	34.078	34.765	35.469	

A. Mission Description and Budget Item Justification

BRIEF DESCRIPTION OF ELEMENT: This program element is classified in Budget Activity 6 (Management Support) because it is the primary source of funding for the Office of the Secretary of Defense and the Joint Staff for studies, analyses, management, and technical support efforts, to improve and support policy development, decision-making, management and administration of DoD programs and activities. Specific projects address a variety of complex issues and dynamic problems facing the Under Secretary of Defense for Acquisition, Technology & Logistics [USD(AT&L)], the Under Secretary of Defense for Policy [USD(P)], Under Secretary of Defense for Personnel and Readiness [USD(P&R)], Assistant Secretary of Defense for Command, Control, Communications and Intelligence [ASD(C3I)], Director for Program Analysis and Evaluation (DPA&E), the Joint Staff and Unified Command Commanders. Studies and analyses will examine the implications and consequences of current and alternative policies, plans, operations, strategies and budgets, and are essential for understanding and gaining insight into the complex multifaceted international, political, technological, economic, military, and acquisition environments in which defense decisions and opportunities take place. With the defense budget declining and our need to better understand and cope with the threats and uncertainties facing the Nation in the current economic environment, the need for objective analyses and forward-looking planning for the immediate through the long-range becomes greater.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
Research, Development, Test & Evaluation, Defense-wide	Technical Studies, Support & Analysis PE0605104D8Z	

PROGRAM ACCOMPLISHMENTS AND PLANS:

General Support for USD (ACQUISITION, TECHNOLOGY & LOGISTICS):

FY 1999 Accomplishments

- Developed prototype simulation/game teaching tools to advance the acquisition workforce staff understanding of PPBS
- Property, Plant and Equipment Accountability – Analyzed requirements and developed proposals for satisfying CFO compliance act for auditable financial statement of property plant and equipment
- Designed and developed a prototype model and associated algorithms for application of optimization technology for improving long range planning of defense weapons systems procurement programs.
- Analyzed weapon systems performance, cost, and schedule issues to support acquisition milestone decisions and DoD planning, programming, and budgeting activities.
- Responded to Congressional direction to evaluate weapon systems requirements and acquisition issues, and to submit master planning documents for key defense mission areas.
- Accessed cost and schedule impacts of applying varying levels of stealth technologies to tactical aircraft, tactical missiles, Uninhabited Aerial Vehicles (UAVs), and Uninhabited Combat Air Vehicles (UCAVs).
- Conducted technical analyses supporting the Reduction of Total Ownership Cost (R-TOC) initiatives.
- Conducted analysis of requirements and options for theater air and ballistic missile defense systems and architectures.
- Provided analytical support to establish U.S. positions for ammunition stockpile guidance at NATO meetings.
- Completed test of the new concepts in pilot programs that have been designated by the Services.
- Monitored the performance of the pilot tests, modified policies and procedures accordingly, and expanded successful product support concepts to other weapon systems.
- Prepared task order management plans describing the technical approach, organizational resources and management controls required to employ cost, performance and schedule requirements.
- Developed tools, utilities, and standard procedures to support logistical initiatives for material distribution management.
- Supported Defense Systems Affordability Council, a policy making forum focused on achieving better integration and balance between modernization and support, and shortening the acquisition cycle times and improving abilities to accommodate changes in budget, missions & technology.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
Research, Development, Test & Evaluation, Defense-wide	Technical Studies, Support & Analysis PE0605104D8Z	

- Sponsored, managed, and coordinated industry input to Program Executive Officer (PEO) Conference and Workshop.
- Updated the Congressionally mandated Joint Warfighting Science and Technology Plan for year 2000
- Conducted an independent analysis of functions and costs at Defense laboratories, toward possible re-engineering
- Conducted affordability activities with industry
- Developed proposed legislative initiatives to recruit, develop, and retain technology leaders
- Conducted strategic planning and implementation support for cross-Service restructuring of laboratories
- Implemented metrics for dual-use science and technology programs
- Tracked Y2K remediation of 800 mission-critical systems and managed regular forum to identify critical problems
- Continued development and implementation of systems engineering policy, best practices, and procedures in support of Acquisition Reform initiatives to reduce cycle time and total ownership costs for new and legacy systems.
- Supported the integration of the Software, Systems Engineering and Integrated Product & Process Development (IPPD) Capability Maturity Models into an integrated model.
- Identified and documented significant IPPD "best practices" in successful Post Milestone III programs for incorporation in DAU training courses and DoD policy, to include the DoD Deskbook.

FY 2000 Program

- Develop policies and procedures for DoD Property Plant and Equipment Accountability initiatives in concert with government-wide efforts of the Joint Financial Management Improvement Board.
- Continue development and implementation of systems engineering policy, best practices, and procedures in support of Acquisition Reform initiatives to reduce cycle time and total ownership costs for new and legacy systems.
- Defense Acquisition Knowledge Management System. Study of the future of electronic acquisition information, future of knowledge management and the requirements of the acquisition professional to support the DoD acquisition community.
- Analyze weapon systems performance, cost, and schedule issues to support acquisition milestone decisions and DoD planning, programming, and budgeting activities.
- Respond to Congressional direction to evaluate weapon systems requirements and acquisition issues, and to submit master planning documents for key defense mission areas.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
Research, Development, Test & Evaluation, Defense-wide	Technical Studies, Support & Analysis PE0605104D8Z	

- Review UAV programs to assess progress on areas specified in SECDEF UAV vision letter; identify program strengths and weaknesses to include technical, programmatic, and fiscal considerations; recommend policy, funding, or process changes to improve the management and execution of these programs.
- Research the components / problems of the “Tactical Air Battle Space Beneath an Overcast Sky” and postulate possible solutions.
- Assess cost and schedule impacts of applying varying levels of stealth technologies to tactical aircraft, tactical missiles, Uninhabited Aerial Vehicles (UAVs), and Uninhabited Combat Air Vehicles (UCAVs).
- Conduct technical analyses supporting the Reduction of Total Ownership Cost (R-TOC) initiatives.
- Conduct analysis of requirements and options for theater air and ballistic missile defense systems and architectures.
- Provide analytical support to establish U.S. positions for ammunition stockpile guidance at the NATO SPG meetings.
- Develop Technology Maturity Metrics to support full use of the Advanced Concept Technology Demonstration process to support cycle time reduction. These will measure the level of technology maturity and associated risk that will provide the acquisition manager the tools to do a risk assessment to support milestone decisions
- Continue design and development of full scale model and associated validated algorithms for application of optimization technology for improving long range planning of defense procurement programs.
- Development and analysis of models and databases suitable for tradeoff analysis and capability/effectiveness assessments for use in QDR 2001.
- Accomplish case analysis that analyzes depot maintenance core requirements and expand or modify the logistics programmatic efforts to meet changes in the PPBS structure.
- Develop baseline requirements and provide analysis of workforce characterization and other logistical requirements for database management and logistics cost baseline development.
- Develop data sources to use directly or indirectly to digitally transfer management information system tasks.
- Modernizing management information system tools, including, but not limited to, database applications, executive information system applications, system query language, and internet web-based tools.
- Continue refinement of prototype design, methodology, and analytical plan to validate the business necessity of academic degrees for acquisition professionals by career field clusters.
- International Cooperative R&D Programs: Provide analyses/assessments on program strengths, weaknesses, etc; recommend policy, funding and process changes. Maintain international cooperative R&D program database,

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
Research, Development, Test & Evaluation, Defense-wide	Technical Studies, Support & Analysis PE0605104D8Z	

- International Armaments Cooperation: Support international activities addressing armaments cooperation. Assess cooperative programs to meet non-Article 5 (out of area) NATO Missions.
- Assess performance requirement for Senior Acquisition Course equivalency offerings; the criteria by which programs would be evaluated for equivalency status; and the potential for using distance learning technology. Acquisition professionals need to have readily available and less costly access to a variety of advanced educational opportunities that are equivalent to senior professional military education (PME).
- Technical and analytic support for implementing the Department's goal of Civil-Military Integration.
- Technical and analytic support for defining the future acquisition workforce.
- Continue implementation, tracking, and metrics of acquisition reform initiatives-the heart of Revolution in Business Affairs needed to help pay for the Revolution in Military Affairs.
- Annual update of the Congressionally mandated Joint Warfighting Science and Technology Plan for 2001 and the companion science and technology planning documents
- Perform start-up activities within the Director, Interoperability to organize and direct office involvement in RDT&E and related management processes.
- Initiate research into international trends in information technology likely to impact defense systems interoperability.
- Review information systems architectures and related management issues in preparation for regular meetings of boards and working groups responsible for development of CIO policy.
- Initiate development of a framework for characterizing and prioritizing interoperability-related shortfalls and begin applying it within USD(AT&L) acquisition management activities (e.g., DAES reviews, DAB).
- Initiate USD(AT&L) dedicated support to U.S. program integration for system developments in fulfillment of NATO objectives embodied in the Defense Capabilities Initiative.
- Participate in review activities for development and implementation of architectures for C4ISR systems.
- Assist in defining the parameters of a joint-Service Single Integrated Air Picture in a key step toward development of a Common Relevant Operating Picture.
- Analyze current capabilities, shortfalls, and operational and technical strategies DoD-wide for achieving a Common Relevant Operating Picture.
- Propose steps to review and document processes and technologies that serve as barriers or enablers to information, logistics, and business system interoperability.

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APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
Research, Development, Test & Evaluation, Defense-wide	Technical Studies, Support & Analysis PE0605104D8Z	

- Provide technical support for Acquisition Council, Modeling and Simulation (M&S) based acquisition executive steering board.
- Provide technical support for the integration of the Software, Systems Engineering and IPPD Capability Maturity Models into an integrated model.

FY 2001 Plans

- Defense Acquisition Knowledge Management System. Study of the future of electronic acquisition information, future of knowledge management and the requirements of the acquisition professional to support the DoD acquisition community.
- Development of Technology Maturity Metrics to support full use of the Advanced Concept Tech Demo process to support cycle time reduction. Metrics developed will measure the level of technology maturity and associated risk that will provide the acquisition manager the tools to do a risk assessment to support milestone decisions.
- Analyze weapon systems performance, cost, and schedule issues in support of acquisition milestone decisions and DoD planning, programming, and budgeting activities.
- Develop implementation strategies and support requirements arising from QDR 2001 planning and analysis.
- Analyze weapon systems performance, cost, and schedule issues in support of acquisition milestone decisions and DoD planning, programming, and budgeting activities.
- Respond to Congressional direction to evaluate weapon systems requirements and acquisition issues, and to submit master planning documents for key defense mission areas.
- Finalize unexploded ordnance detection and neutralization strategies.
- Finalize UAV programs to assess progress on areas specified in SECDEF UAV vision letter; identify program strengths and weaknesses to include technical, programmatic, and fiscal considerations; recommend policy, funding, or process changes to improve the management and execution of these programs.
- Develop a system for keeping watch of the financial health and capabilities of key nodes in the defense-industrial base
- Assess the track record of divestitures used to remedy anti-competitive structures resulting from mergers between defense suppliers
- Generate economic analysis to support acquisition policies and practices governing industrial competition and capabilities
- Update and expand knowledge of foreign defense companies' industrial capabilities
- Deepen understanding of lower-tier and component suppliers of both critical infrastructure and weapon systems
- Analyze structure and capabilities of the industry selling information systems and secure telecommunications services to DoD
- Create profiles of the competitive sources available in industrial sectors of special importance to DoD's acquisition program

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Research, Development, Test & Evaluation, Defense-wide	Technical Studies, Support & Analysis PE0605104D8Z	

- Assess the industrial capabilities of key sectors supporting DoD's acquisition program
- Forecast vulnerabilities in the supply chains on which DoD relies for weapon systems
- Determine the best practices that should govern expectations of industrial restructuring and production-line transfers
- Finalize technical analyses supporting the Reduction of Total Ownership Cost (R-TOC) initiative(s).
- Finalize analysis of requirements and options for theater air and ballistic missile defense systems and architectures.
- Continue analytical support to establish U.S. positions for ammunition stockpile guidance at the NATO SPG meetings.
- Analyze weapon systems performance, cost, and schedule issues in support of acquisition milestone decisions and DoD planning, programming, and budgeting activities.
- Respond to Congressional direction to evaluate weapon systems requirements and acquisition issues, and to submit master planning documents for key defense mission areas.
- Continue analytical support to establish U.S. positions for ammunition stockpile guidance at the NATO SPG meetings.
- Consolidation of Defense Trade: Support bilateral discussions (US DoD/UK MoD Declaration of Principles), establish cooperative framework in light of globalization of the industrial base in facilitating transatlantic cooperation.
- European Defense Identity-Balancing Armaments Cooperation: Provide analyses on European defense initiatives to better understand dynamics of European environment.
- Rationalization of European Aerospace: Provide analyses to increase awareness of European efforts toward consolidation and its effects on market and security issues.
- Defense Industry Transatlantic Armaments Cooperation: Establish international policy forum (US/European defense industry CEOs) to facilitate greater and more efficient armaments cooperation.
- Provide US Forces Korea/ROK Systems Architecture to identify C4I systems integration shortfalls.
- Develop deliverables for logistical policies and procedures for supporting research and development of logistical system supply chain operations.
- Issue-specific analysis and studies to review product support pilot maintenance and transportation concepts.
- Initiate case studies supporting recommended approached to maintenance, transportation and logistics transformation policies.
- Develop a study that recommends plans and policies to begin the implementation of functional portfolio approach to logistical acquisition oversight.
- Integrate study recommendations into supply chain integration and logistics systems modernization policies and product support.

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- Accomplish a comparative analysis of DoD and commercial practices that identify and assess potential data exchange technologies for logistics applications and improvement.
- Initiate an analysis that recommend approaches for technical solutions to improve implementation and integration of EDI procedures and data sharing including ways to interface multiple EDI translators in DoD logistics systems.
- Accomplish a case study that proposes policies to enable the separation of infrastructure requirements from acquisition of functional applications of commercial off-the-self policies and awareness.
- Explore processes and policies for exporting Service/Agency Logistics best practices across the Department and procedures for logistics enterprise action planning and information management.
- Continue refinement of prototype design, methodology, and analytical plan to validate the business necessity of academic degrees for acquisition professionals by career field clusters.
- Continue implementation, tracking, and metrics of acquisition reform initiatives-the heart of Revolution in Business Affairs needed to help pay for the Revolution in Military Affairs.
- Annual update of the Congressionally mandated Joint Warfighting Science and Technology Plan for 2002 and the companion science and technology planning documents
- Provide technical and engineering assistance to the S&T Affordability Task Force
- Technical support in exploring initiatives to increase the effectiveness and efficiency of the DoD laboratories
- Research on planning manufacturing activities with industry in cooperation with the National Center for Advanced Technologies
- Continue technical and engineering support on the DoD Dual Use program
- Conduct research to characterize the crisis, combat, and operations-other-than-war environments in which interoperability objectives with allies and coalition partners must be defined and accomplished.
- Continue applying the framework for interoperability shortfalls to develop priorities for interoperability objectives and employ them within USD(AT&L) acquisition management activities (e.g., DAES reviews, DAB).
- Plan and initiate reviews of DoD-wide systems engineering, integration, and testing activities related to system-of-system acquisitions, to evaluate and compare the success of alternative technical and management approaches for accomplishing interoperability objectives.
- Based on international trends in information technologies, characterize alternative acquisition policies within U.S. and allied/coalition countries as they might affect success in acquiring and integrating systems for joint and coalition interoperability.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
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- Review joint architecture development activities in support of USD(AT&L) participation the Architecture Steering Group, Architecture Control Council, and other CIO interfaces with Services and DoD agencies.
- Initiate support activities for analyzing the interoperability dimensions of military requirements presented in new Operational Requirements Documents and assessing whether the requirements as stated are adequate for producing a system that will achieve the needed interoperability.
- Identify selected allied/coalition partner system developments and acquisition programs for review to assess interoperability potential and impacts.
- Continue AT&L dedicated support to U.S. program integration for system developments in fulfillment of NATO objectives embodied in the Defense Capabilities Initiative.
- Review plans for Joint Warfighting Experiments (JWEs) and Joint Warfighting Capability Assessments (JWCAs) for implementation of relevant C4ISR system architectures and demonstrations of interoperability.
- Based on processes applied in analysis of the common operating picture, review selected system-of-system concepts including Global Information Grid (GIG) to assess application of the Joint Technical Architecture and the extent of resulting interoperability.
- Implement steps to review and document processes and technologies DoD-wide that serve as barriers or enablers to information, logistics, and business system interoperability.
- Provide technical support for Acquisition Council, M&S based acquisition executive steering board.
- Provide technical support for Acquisition Reform initiatives in Systems Engineering functional areas to reduce cycle time and total ownership cost for new and legacy systems.
- Provide technical support for the integration of the Software, Systems Engineering and IPPD Capability Maturity Models into an integrated model.
- Identify and document significant “best practices” in successful Post Milestone III IPPD programs for incorporation in DAU training courses and DoD policy to include the DoD Deskbook.

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APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
Research, Development, Test & Evaluation, Defense-wide	Technical Studies, Support & Analysis PE0605104D8Z	

General Support for USD (POLICY)

FY 1999 Accomplishments:

- Conducted a feasibility study for the establishment of a Near East South Asia Center for Security Studies
- Conducted assessments and analyses of NATO allies' progress toward implementing the Defense Capabilities (DCI) objectives established at the Washington Summit (ongoing effort)
- Initiated a study to evaluate the conduct of peace operations and make recommendations for improvement.
- Conducted a series of assessments of the possible impact of the use of weapons of mass destruction on CENTCOM's ability to conduct operations in southwest Asia.
- Conducted a comprehensive, cross-service examination of the issue of the joint suppression of enemy air defense (JSEAD) with a view toward improving effectiveness in this area and our transforming the force.
- Initiated a study of weapons of mass destruction (WMD) to evaluate existing analytical tools, review the quality of data regarding the effects of WMD on military operations, and make recommendations on near-term improvements for analyzing WMD requirements through modeling.
- Initiated a study to assess the ability of U.S. forces to divert, disrupt, delay or destroy an enemy's surface military potential. Assisted in shaping follow-on concept development and experimentation activities to improve the Department joint interdiction capabilities.
- Assessed DoD nuclear planning efforts to determine how well the employment guidance has been fulfilled; provided analysis and support for the most recent version for the Policy Guidance for the Employment of Nuclear Weapons; and reviewed nuclear weapons allocation planning and assessed the results of each plan.
- Assessed implications for U.S. strategy and force posture regarding the challenge of compelling, rather than deterring, both state and non-state adversaries.
- Analyzed and assessed strategies that potential adversaries could use to attack U.S. vulnerabilities across a wide range of scenarios from major theater wars to smaller-scale contingencies.

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- Assessed the risks to the U.S. associated with our worldwide program of sharing missile early warning information with allies as well as Russia.
- Conducted analyses and wargaming to help CENTCOM better understand the possible impact of the use of weapons of mass destruction on its ability to conduct operations. (Follow-on analysis is planned for FY 2000).
- Initiated an effort to develop tools for rigorously measuring the differential effect of shaping and crisis-response activities on the international environment.
- Analyzed “homeland defense” requirements which, when complete, should form part of the foundation of a larger effort to integrate “homeland defense” requirements into the broader assessments of our national defense strategy.
- Initiated a study to analyze current combat models in an effort to improve the assessments and ability to predict battlefield outcomes.
- Initiated a review of WMD preparedness with the objective of improving the analysis of warfighting requirements in a WMD environment.
- Assessed future U.S. strategy and military posture in the Asia-Pacific region

FY 2000 Program:

- Analyze use of force options in preparation for the 2001 Quadrennial Defense review
- Develop and explore multiple alternative frameworks for U.S. defense strategy, including the articulation of distinct regional shaping/engagement strategies and preparation for future peer, asymmetric, or ambiguous threats
- Assess the feasibility of a variety of options with regard to future infrastructure and access in the Asia-Pacific region
- Provide detailed computer modeling support for independent assessments of national missile defense, theater missile defense, and shared early warning
- Conduct assessments of U.S. non- and counterproliferation policies and programs as well as doctrine and training
- Assist in the development of smallpox research priorities with a view toward precluding the use of smallpox as a biological weapon
- Develop strategies to respond to emerging issues in missile proliferation
- Assess the implications of likely defense missions through 2020 for force structure and defense strategy.
- Analyze the potential impact of small scale contingencies on U.S. force structure planning

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Research, Development, Test & Evaluation, Defense-wide	Technical Studies, Support & Analysis PE0605104D8Z	

- Conduct, in conjunction with PA&E, assessments and analyses of NATO allies' progress toward implementing the Defense Capabilities (DCI) objectives established at the Washington Summit. Evaluate NATO enlargement, including assessments of military implications and costs, allocation of costs among members, and program/budget impacts on DoD
- Increase effectiveness of various programs which seek to provide C4 capabilities and information support to partner nations
- Continue the development of a Near East -South Asia Center for Security Studies
- Assist in shaping defense reform in NATO aspirants by conducting initial defense assessments in Slovakia, Slovenia (continuing) and Albania and Macedonia
- Evaluate assumptions and shortfalls in the USG analysis of terrorist groups' infrastructure as well as the architecture, centers of gravity, and the vulnerabilities of the groups themselves.
- Conduct a baseline review of U.S. hemispheric security policy in the Americas
- Conduct a review of the effectiveness of current "rapid assessments" which are used to plan and execute effective relief operations and make recommendations for improvements
- Identify DoD bilateral engagement activities that have maximum effect in enhancing foreign militaries' abilities to participate and contribute effectively to peacekeeping operations
- Continue to assess the possible impact of the use of weapons of mass destruction on CENTCOM's ability to conduct operations in southwest Asia with a view toward developing a set of recommendations that the CINC can use to revise war plans, training and exercise programs, and materiel requirements (continuing).

FY 2001 Plans

- Continue analysis on a wide range of studies, analyses and research that will support the Department's efforts on the Quadrennial Defense Review (QDR), including alternate force structures, budget and strategy
- Continue to develop and revise existing plans to take into account the chemical-biological threat, in particular in CENTCOM and EUCOM
- Continue to conduct regionally-focused studies on critical issues of concern to the department.
- Continue to collect, analyze, and update statistics on a wide range of macroeconomic and defense indicators used for responsibility-sharing comparisons among NATO nations, Japan and the Republic of Korea
- Analyze the threat posed by the proliferation of weapons of mass destruction and the impact on U.S. force structure, acquisition, logistics, training, and doctrine

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- Continue assessments of the implications of the Revolution in Military Affairs and how new and emerging technologies might best be exploited to enhance combat effectiveness.
- Assess implementation of nuclear employment policy guidance and examine critical policy issues involved with national and theater ballistic missile defense
- Continue efforts in the area of modeling and simulation of future warfare in support of the QDR
- Continue the assessment of asymmetric threats to U.S. security interests and help develop alternative U.S. strategies in accordance with the requirements of the QDR.
- Make substantive classification guidance available in classification guides available to DoD activities with the authority to disclose classified military information to foreign governments and international organizations.
- Use knowledge management techniques to make DoD policies readily available to decision makers in DoD. Determine the source and management techniques necessary to keep data up-to-date and easily accessible.
- Continue analyses on “homeland defense” issues (possible follow-on to existing study)

General Support for the USD (Personnel & Readiness)

FY 1999 Accomplishments:

- In support of the recruiting function, performed a major review of the most cost-effective mix of national and local advertising, and the best means of conveying the Department’s message to high quality youth.
- Began a major, congressionally-mandated, test of the privatization of selected aspects of recruiting.
- Evaluated the effectiveness of civilian-contracted telemarketing as a “tool” to enhance recruiting.
- Developed innovative strategies to explore new markets to enhance recruiting, such as attracting college-bound youth into the military.
- Analyzed potential new approaches for DoD’s Hispanic Officer recruitment efforts.
- Evaluated the effect on recruiting and retention of alternate proposals for expanding and extending the Montgomery GI Bill program for post-service educational benefits.
- Continued work on a model of recruiting for the Selected Reserves.
- Began background research for the FY 2000 Quadrennial Review of Military Compensation.

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- Continued to assess the impact of MWR and other quality of life programs on military families, with special emphasis on the effects of major QoL programs on retention, satisfaction with military life, and spouse employment.
- Continued to develop and evaluate alternative policies to foster more effective Active/Reserve Force integration.
- Developed a methodology to determine the value of the medical health benefit.

FY 2000 Program:

- Continue the test and evaluation of privatizing selected aspects of recruiting, as mandated in the National Defense Authorization Act for Fiscal Year 1999.
- Develop models and analytic tools concerning compensation and career management, to support reporting requirements and evaluation of the major new compensation structure and retirement benefits enacted as part of the National Defense Authorization Act for Fiscal Year 2000.
- Evaluate the continued viability and cost-effectiveness of the grade tables for officers in the Defense Officer Personnel Management Act.
- Continue contractor support on compensation issues being examined by the FY 2000 Quadrennial Review of Military Compensation.
- Continue modeling and analytic support for the Department's recruiting and retention programs for both active duty and Reserve Component personnel.
- Analyze retention and quality of life issues, based on the results from the 1999 surveys of active duty personnel and spouses.
- Provide analytic support for a review of the central management structure, and the roles of parents, in the Department of Defense Education Act Schools.
- Continue modeling the effects of existing and proposed Quality of Life programs on recruiting, retention, and satisfaction, especially in view of new technologies.
- Develop modeling and analytic capability to support policy decisionmaking concerning the size, composition, and compensation structure of the DoD civilian workforce.

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- Use innovative modeling efforts to compare the costs, benefits, and patient satisfaction under the Military Health System, including Tricare, with those of civilian health care insurance.
- Develop methods to improve the determination of total force requirements for manpower, especially joint manpower.

FY 2001 Plans:

- Conclude the rigorous modeling and evaluation of the cost-effectiveness of recently-enacted pay and allowance and retirement compensation systems, including the new choices open to retiring service members, and the new high-deployment per diem allowance that will be implemented in FY 2001.
- Improve the technological capability of personnel systems to acquire, distribute, train, and utilize qualified personnel for Active and Reserve forces.
- Conclude the Congressionally-mandated test and evaluation of the privatization of selected aspects of recruiting.
- Evaluate alternatives for managing total force manpower.
- Monitor quality of life, equal opportunity and diversity of the force, and model their effects on recruitment and retention, especially on high-demand or expensive-to-train skills and specialties.
- Conclude and synthesize analyses of the cost-effectiveness of the Military Health System, including Tricare, and its effect on recruiting, retention, and the quality of life of service members.
- Address congressional mandates and directives.

General Support to Director, Program Analysis & Evaluation

FY 1999 Accomplishments:

Part I. Current Agenda Issues:

Implementing QDR Strategy

- Systematic study across most Army munitions of requirements, approved acquisition and procurement objectives, wartime expenditures, training requirements, inventories, and budgets since the Cold War.
- Updated and extended past efforts to increase understanding and ability to program medical program resources.

Supporting QDR Modernization Approach

- Further development of development of an existing fast running model of the Army Internet.

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- Reviewed radar technologies to meet future shipboard air defense needs. Developed transition plan for implementing acquisition for next generation radars. Analyzed radar configurations of ship classes, alternatives to shipboard radars, and adequacy of the Navy's acquisition plans for next-generation shipboard air defense radars.
 - Developed a methodology for combining different means of enhancing aircraft survivability through common measures of performance and effectiveness.
 - Provided analytical foundation for a cost-effective allocation of resources among space, missile defense, and reconnaissance systems.
- Congressional Mandates
- Provided senior leaders with key analyses to aid in resource allocation decisions and enhance defense planners' ability to make most effective use of scarce collective defense resources.
- Part II. Development of Analytic Capabilities
Cost Analysis Research & Tools
- Developed DoD "Best Practices" for estimating costs of new development programs in key product sectors.
 - Provided necessary data to address policy issues related to the magnitude, sources, and characteristics of cost growth and schedule growth.
 - Improved cost models and estimating methodologies by exploring new ways of constructing learning curves (or cost improvement curves) to forecast expected cost of new systems.
 - Provided ready access to expert up-to-date research and consultative services in the areas of information technology and information assurance.
- Effectiveness Analysis Tools
- Analyzed Army's non-TBMD ground-based air defense structure in light of actual threats faced in post Cold War environment; developed and evaluated possible changes in force structure, force component, and acquisition strategies.
 - Examined and developed selected critical air defense factors including sensor resource management, sensor data quality, data fusion, and information latency. Derived proper translation of impact of these factors into the existing SSADM model. Examined contribution/added-value of new systems and concepts (AADC and JCTN) to the outcome of ship AAW defense engagements.
 - Analyzed the DWCF programming process for ordering goods and services and the accounting system for those expenditures.
- Planning, Programming, and Budgeting System (PPBS)
- Support for defense analysis professional forum.

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- Improved the FYDP to enhance its value to DoD decision-makers.
Other Analytic Support Activities
- Re-estimated translator vectors to improve accuracy of Defense Employment and Purchases Projection System (DEPPS) projections of DoD spending.
- Sponsored symposium for DoD cost research activities among OSD, the military services, and defense agencies.
Anticipating Future Analytic Requirements
- Provided basic handbook for use by DoD cost analysis and acquisition communities for consideration of cost reduction initiatives undertaken by defense contractors.
- Collected, analyzed, exploited latest available information to develop databases and methods for estimating development/production costs of next generation tactical aircraft.
- Provided a detailed assessment of defense aircraft industry in accordance with "lean" manufacturing concepts and processes.
- Developed a methodology for identifying military forces needed for a variety of smaller scale contingencies (SSCs) and alternatives to the use of U.S. military units in SSCs.
Part III. Anticipating Future Analytic Issues
- Continued preparations for the next QDR.

FY 2000 Program:1. Current Defense Issues:Analytical ChallengesStrategy

- Continued development of critical management indicators, tools, and techniques for incorporation into DPP materials used to provide DoD senior leadership with an overview of long-term trends, "health", and affordability of the defense program.
- Provide analytical foundation for a cost-effective allocation of resources among space, missile defense, and reconnaissance systems.

Adaptive Force Structure

- Analysis of digitization's operational effectiveness expanded to address how program delay can remain executable with delayed resourcing; analysis will inform Program Reviews for FY 02-07 and the QDR, and provide alternative, executable courses of action for the Army as digitization evolves in the near term.

Smaller Scale Contingencies

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- Analysis of U.S. involvement in smaller-scale contingencies and issues related to U.S. military involved in these operations -- assessment of impact of projected level of global engagement on U.S. force structure, PERSTEMPO and OPTEMPO, and ability to fight and win MTWs.
- Build an analytic foundation for examining opportunities and challenges arising from operations with non-U.S. military organization in future smaller scale contingencies (SSCs).
- Develop insight into how foreign military, international organizations (IOs), and other non-governmental civilian organizations (NGOs) might approach and respond to SSCs that will inform critical assumptions in PA&E's analysis of longer-term Defense requirements.

Investment Strategy

- Detailed assessment of defense aircraft industry in accordance with "lean" manufacturing concepts and processes.

Modernization

- Review radar technologies to meet future shipboard air defense needs. Develop transition plan for implementing acquisition for next generation radars. Analyze radar configurations of ship classes, alternatives to shipboard radars, and adequacy of the Navy's acquisition plans for next-generation shipboard air defense radars.
- Examine survivability, lethality, and range of individual platforms identified as potential LRI aircraft in context of future threat scenarios to show how platform alternatives influence the effectiveness of the entire force.

Infrastructure

- Develop a "should cost" model to establish an estimate of requirements for the defense health program and to illuminate decisions on a program that commands an increasing proportion and amount of the DoD topline.
- Develop statistical methods that will model the relationship between customer funding (as contained in the FYDP), and the resulting purchases from working capital funds over the program period.
- Provide senior leaders with key analyses to aid in resource allocation decisions and enhance defense planners' ability to make most effective use of scarce collective defense resources.

Congressional Mandates

- Estimate cost of F-22, JSF, and other military aircraft, the results of which are required for the MSII independent cost estimate for the JSF program scheduled for early FY 2001.
- Analysis of aerial refueling tanker requirements in support of air mobility operations.
- Fully analyze the Kosovo conflict in order to apply lessons learned to future deployments.

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- 2. Development of Analytic Tools
- Cost Analysis Research and Tools
- Develop metrics that can be used to gauge the sufficiency of military service and major defense agency funding for O&M.
- Develop methods by which OSD can better evaluate the depot maintenance areas in the Defense Working Capital Fund (DWCF).
- Provide a research project for an Air Force institute of Technology (AFIT) Master's Thesis that supports DoD cost estimating efforts.
- Improve cost estimating relationships for Ballistic Missile Defense systems in preparation for major milestone reviews.
- Modernize and improve efficiency of the Department's cost estimating process to support PPBS and acquisition process for major defense acquisition programs.
- Provide research on new tools for estimating costs of new development programs in key product sectors.
- Analyze the "outcomes to date" relative to estimates at engineering manufacturing development (EMD) of programs employing innovative development, manufacturing, and management strategies.
- Support in conducting symposium for DoD cost research activities among OSD, the military services, and defense agencies.
- Provide necessary data to address policy issues related to the magnitude, sources, and characteristics of weapon systems cost growth and schedule growth.
- Improve quality, timeliness, and cost effectiveness of DoD software cost estimating with development of a parsimonious set of historical resources and cost-driver data, and data collection consistent with principles of acquisition streamlining.
- Collect, analyze, and exploit latest available information to develop databases and methods for estimating development and production costs of next generation tactical aircraft.
- Provide a parametric estimate based on historical aircraft propulsion components and the limited experience from current technology to help in developing reasonable and defensible cost estimates.
- Improve PA&E's ability to evaluate program assumptions in areas related to software. Improve ability to evaluate costs and benefits of software development programs and strategies.
- Provide ready access to expert up-to-date research and consultative services in the areas of information technology and information assurance.

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Effectiveness Analysis Tools

- Assessment of Army's update to the analysis of alternatives for the Comanche helicopter addressing issues in the areas of low observability and the achievement of weight goals; review potential cost tradeoffs between component materials alternatives.
- Provide expert analytical critique and assistance for developing mathematical/engineering tools needed to examine selected TACAIR analyses and studies to include aircraft end-game maneuver, aircraft attrition, stealth utility, laser performance, weapons effects, and aircraft CER development.
- Reestimate translator vectors to improve accuracy of Defense Employment and Purchases Projection System (DEPPS) projections of DoD spending.
- Improve the Department's suite of joint mobility and campaign models and simulations. Detailed comparison of the mobility functionality of JWARS with the model it is supposed to replace, MIDAS.

Planning, Programming, and Budgeting Systems (PPBS)

- Support defense analysis professional forum.
- Support in conducting symposium in support of sound integration and planning of DoD economic research activities among OSD, the military services, and defense agencies.
- Provide for various initiatives to improve the analytic structure of the FYDP necessary to facilitate credible FYDP-based analyses of force and infrastructure resources and to enhance value to DoD decision makers.

Other Analytic Support Activities

- Share an analytical methodology with selected foreign governments that will produce a resource-constrained, multi-year defense program that supports the national security strategy and can be converted into a defense budget that can be justified to Parliament.
- #### Anticipating Future Analytic Requirements -- Preparing for the Next QDR
- Review of Army force and manpower issues that arise as part of the PPBS FY 02-07 Program Reviews and QDR.
 - Review of readiness and availability issues relating to Low Density/High Density Units (LDHDs) arising as part of PPBS Program Reviews and the next QDR.
 - Provide an innovative view of how the DoD cost community estimates aircraft production support labor costs.
 - Analyze repair process problems that contribute to degradation of aircraft readiness.
 - Research to provide insight into acquisition-reform as experienced in the procurement of weapon systems.
 - Analysis of the Department's installation infrastructure when studying how force structure alternatives contribute to accomplishing our military objectives.

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- Continued development of FSC to allow a smoother, quicker and more disciplined evaluation of the likely budget and steady-state effects of major force or infrastructure proposals.
- Collect, analyze, and exploit latest available information to develop databases and methods for estimating development and production costs of next generation tactical aircraft.
- Develop an initial humanitarian lessons learned from the Kosovo operation.
- Develop PA&E's Weapons of Mass Destruction (WMD) modeling capability for the next QDR.
- Develop a Measure of Effectiveness framework in support of long term programmatic analysis to better understand the conduct of SSC operations and its impact on U.S. DoD capability requirements and operational timings.
- Assess key features of contemporary defense logistics management framework and environment; identify associated potential major defense logistics challenges; develop 21st Century logistics support concepts that meet projected needs.
- Obtain environmental data for scenario development for use in simulations that will allow the Department to assess the robustness and requirements of U.S. forces in a variety of scenarios, from MTWs to SSCs in selected regions of the world.

FY 2001/2002 Plans: The Quadrennial Defense Review (QDR) 2001 is the premier analytical challenge for FY 2001. Early planning conferences have identified 13 key analysis areas for the QDR. These include a more explicit examination of the risks and implications of defense strategies that support national objectives. This examination will include an assessment of threat environment that focuses on the impacts of asymmetric threats; DoD's roles, responsibilities, and requirements for homeland defense; alternate postures of engagement; and the unique demands of smaller scale contingencies. The examination will explore transformation strategies and implementation plans for new operational concepts and new organizational arrangements that exploit new technologies. This transformation will look towards more adaptive force structures that will address the emerging threat while simultaneously addressing the long standing issues of tempo, readiness, and infrastructure. The analyses will examine investment strategies that account for the interrelationship between recapitalization, transformation, and force structure spending. The investment strategy will include analyses of the modernization program and will strike a balance between modernizing platforms and modernizing weapons. Finally, the analyses will explore strategies that maintain nuclear deterrence and stability in the changing security environment. In addition to QDR analyses, PA&E will continue to build and refine analytical tools that can better address current and emerging issues facing the department. These tools include cost analysis and research tools, effectiveness analysis tools, and the Planning, Programming, and Budgeting System (PPBS). Cost analysis and research tools will address the costs of the military medical delivery

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system and will improve our ability to understand and project DoD infrastructure and requirements. Effectiveness analysis tools and studies will provide independent estimates of the cost and operational effectiveness of planned weapon systems. Finally, initiatives will continue that support the FYDP Improvement initiative, the Automated Program Planning System, and the PPBS automated tool kit.

General Support for ASD (C3I)

FY 1999 Accomplishments:

- Analyzed DoD space and technology programs' implementation of DoD space policy with regard to systems acquisition and technology issues.
- Provided analytical support to the development and creation of an Information Superiority Investment Strategy (ISIS).
- Analyzed the interplay between the nature of society and the nature of security in the information age to identify optimal information strategies.
- Conducted a study of the spectrum of netwar from terrorism to transnational crime to better understand its impact on the information revolution.
- Updated previous estimates of security resources consistent with Defense programming and budgeting structures and OMB Circular A-11.
- Analyzed emerging National Security policy revisions/recommendations on the DoD Special Access Policy community and developed appropriate policy.
- Provided engineering support and technical analyses to assess and evaluation positioning and navigation systems.

FY 2000 Program:

- Continue support to the Information superiority Investment Strategy (ISIS).
- Develop an Information Superiority Advanced Technology Plan which identifies DoD's future information technology needs.
- Evaluate adequacy of the military's access to electromagnetic spectrum.
- Update Security/CI resource estimates used to validate component inputs.
- Analyze all facets of information operations strategy and policy to promulgate effective guidance.

FY 2001 Plans:

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- Continue support to the Information Superiority Investment Strategy (ISIS).
- Update Security/CI resource estimates used to validate component inputs.
- Support Space and GPS (Global Positioning Systems) Systems Acquisition and Review
- Review conceptual framework for security and counterintelligence to structure management decisions in the areas of force protection, and critical infrastructure protection
- Support Space Launch Infrastructure assessments
- Review information operations/information warfare policies and implement improved strategies.

General Support for the Joint Staff

FY 1999 Accomplishments:

- Determined the number of attack submarines required to successfully prosecute a military campaign in 2015 and 2025 using illustrative long-range planning scenarios.
- Optimized a model used for analyzing attack submarine operations. Used the model to simulate attack submarine operations. Primary missions included clandestine intelligence, integrated battle group support, strike, rapid mobility, special warfare, mining, sea denial, and protection of sea lines of communication (SLOCs).
- Examined all phases of a major theater of war to assist the DOD leadership in gaining a better understanding of the capabilities (programmed and potential) of U.S. forces to divert, disrupt, delay or destroy an enemy's surface military potential before it can be used effectively against friendly forces in the context of possible future major theater conflicts.
- Analyzed logistics representation in warfare modeling and simulation tools. Specifically, identified critical joint logistics requirements, and then translated those requirements into Joint Simulation System (JSIMS) capabilities to support existing and future training, mission rehearsals, and other areas.
- Pursued a focused modernization effort that maintains U.S. qualitative superiority in key warfighting capabilities, exploits the Revolution in Military Affairs, and supports the joint operational concepts delineated in Joint Vision 2010.
- Determined impact of changes in force arrival and sustainment upon end-to-end mobility assets support and infrastructure campaign objectives. Established force delivery requirements and assessed the performance of POM FY 00-05 and alternative mobility programs.

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- Identified and prioritized combat support/combat service support functional information requirements in support of the Global Command Support System functional requirement analysis and strategic planning.
- Pursued a focused modernization effort that maintains US qualitative superiority in key warfighting capabilities, exploits the Revolution in Military Affairs, and supports the joint operational concepts delineated in Joint Vision 2010.
- Developed independent, unbiased recommendations for potential changes in the assignment of functions (or roles and missions) to the armed forces, as the Chairman considers necessary to achieve maximum effectiveness of the armed forces.
- Monitored events that would drive changes to the Master Navigation Plan (MNP) from the previously issued version of the MNP.
- Provided technical support to ensure quick-turn analysis tools for evaluation of high value Strike precision platforms.

FY 2000 Program:

- Implement Joint Vision 2010 Focused Logistics requirements as defined in the Chairman, Joint Chief of Staff Instruction 3010.02 Joint Vision Implementation Master Plan.
- Provide analytic and policy support using information technology equipment software and services in support of the CFE Treaty and Vienna Document implementation.
- Assess the Joint Tactical Radio System (JTRS) integration within the Joint Network Management System.
- Assess the JTRS impact on networks and network management.
- Prepare a game study plan and pre-game support document for Focused Logistics (FLOW) War Game 2001 preparations. These documents will form the basis for the FLOW 2001 war game.
- Design and develop the operational architecture for the Global Information Grid (GIG).

FY 2001 Plans:

- During this timeframe, the Joint Staff will select studies with the highest payoff decision-making supporting the Chairman, JCS.
- Provide wargaming, analysis and assessment capabilities to support future Chairman of the Joint Chiefs of Staff requirements.
- Assess Joint Warfighting Capabilities.
- Use the collaborative analysis process to exploit existing analytic expertise in the Services to aid in assessment of joint issues.
- Quadrennial Defense Review – develop total force employment database for peacetime requirements/tempo analysis.
- Quadrennial Defense Review – assess warfighting impact changes spawned from MRS 05.

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B. Program Change Summary

	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>
Previous President's Budget	29.641	29.506	30.016
Appropriated Value		0*	
Adjust to Appropriated Value/President's Budget		30.021*	
Congressional Undistributed Reductions, Inflation Savings, Gov't-Wide Rescission, and Below Threshold Reprogramming	1.073	(2.600)	(.581)
Current Budget Submit/President's Budget	30.714	27.421	30.597

Funding:

* The House and subsequent Conference Report appropriated no funding for 6 budget lines related to technical studies and assessments, which totaled \$40.861 M. Instead, it created a new budget line to cover these requirements, and provided \$30.021 M for this purpose. The net impact on this program was a significant reduction in resources available for its requirements.

The Y2K supplemental added \$ 1.55 Million to this program.

Schedule: N/A

Technical: N/A

C. Other Program Funding Summary Cost N/A

D. Schedule Profile N/A

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APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 6				R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. SUPPORT TO C3I PE 0605116D8Z					
COST (In Millions)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	*	7.749	3.769	3.794	3.820	3.876	3.912	Continuing	Continuing

*This PE has been reactivated IAW PBD 172 which transferred the funding to ASD(C3I) effective FY 2000.

A. Mission Description and Budget Item Justification

Brief Description of Element: Funding is provided for technical and analytical support to evaluate and improve the management oversight of DoD space and information superiority programs. Support is focused on reviewing the resources and acquisition issues for existing and planning National Security Space Programs and analysis of evolving technologies to better prepare DoD to meet future challenges of the Information Age. Analytical studies will also evaluate information operations and counterintelligence capabilities.

Program Accomplishments and Plans:

FY 2000 Plans: (\$7,749 million)

- Support development of Integrated Capstone Strategic Plan (ICSP)
- Support management, coordination, review, and promulgation of DoD space policy
- Support the Pacific Disaster Center test bed development of policy, management, technology, and operations for environment security.

FY 2001 Plans: (\$3.769 million)

- Continue support of space policy issues.
- Support modernization of space-related capabilities.

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- Support development of DoD policy on information operations and counterintelligence issues.

B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	-	2.000	2.000	Continuing
Appropriated Value		8.000	-	
Adjustments for inflation, the Government-wide rescission, and program revisions		(.051)	1.769	
Budget Estimate Submission	-	7.949	3.769	Continuing

Change Summary Explanation:

During 1998 the Deputy Secretary of Defense reorganized space and C3 functions within OSD. DUSD(Space) ceased to exist as a separate organization and most functions were integrated into ASD(C3I). Resources to support these functions were transferred to ASD(C3I) effective FY 2000. FY 2000 Defense Appropriations Act provided a \$6M Congressional Add to support the Pacific Disaster Center (PDC) partially offset by inflation savings and government-wide rescissions. FY 2001 reflects program revisions and inflation savings.

C. Other Program Funding Summary Cost: N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 6	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0605116D8Z SUPPORT TO C3I	

D. Schedule Profile: N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E/BA 6					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. FOREIGN MATERIAL ACQUISITION & EXPLOITATION PE 0605117D8Z				
<i>COST (In Millions)</i>	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	34.229	64.042	32.173	31.770	31.413	32.133	32.871	Continuing	Continuing
Project Name/No. and Subtotal Cost FMA&E/P411	34.229	64.042	32.173	31.770	31.413	32.133	32.871	Continuing	Continuing

A. Mission Description and Budget Item Justification

Brief Description of Element: This program is involved in the acquisition and exploitation of foreign military equipment and military technology.

Program Accomplishments and Plans: The DoD Foreign Material Program acquires and exploits foreign materiel systems, subsystems, components, commercial items with military applications, and technologies as well as related technical and operational documents. The FY 1999 and outyear program is a classified activity about which information is available to properly cleared and authorized personnel.

Provide an acquisition strategy: The Foreign Material Program Review Board (FMPRB) approves annual Foreign Material Acquisition (FMA) lists that target high-priority foreign military materiel that is potentially acquirable. As targets of opportunity become available, materiel acquisition actions are handled with real-time responsiveness and obligation of funds.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/BA 6	R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. FOREIGN MATERIAL ACQUISITION & EXPLOITATION PE 0605117D8Z	

B. Program Change Summary	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	Total Cost
Previous President's Budget	34.591	34.937	35.458	Continuing
Appropriated Value				
Adjustments to Appropriated Value		30.000		
a. Congressionally directed rescission		(.946)		
b. Inflation savings, undistributed reductions, program revisions, below threshold reprogramming	(.362)	(.051)	(3.285)	
Current Budget Submit/President's Budget	34.229	64.042	32.173	Continuing

Change Summary Explanation:

Funding: FY00: \$30M Congressional Add; congressional rescission, below threshold adjustments
FY01: PBD 604 (.285); PBD (3.000) program reductions.

Schedule: NA
Technical: NA

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/BA 6	R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. FOREIGN MATERIAL ACQUISITION & EXPLOITATION PE 0605117D8Z	

C. Other Program Funding Summary Cost

	<u>FY1997</u>	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>FY2002</u>	<u>FY2003</u>	<u>FY2004</u>	<u>FY2005</u>	<u>Compl</u>	<u>Total</u>
Procurement Line P-1 No(s), Name(s)											
Milcon Project No(s), Name(s)											
Related RDT&E:											

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E/BA 6	R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. FOREIGN MATERIAL ACQUISITION & EXPLOITATION PE 0605117D8Z	

D. Schedule Profile

Fiscal Year actual and planned events by quarter

	<u>FY1997</u>				<u>FY1998</u>				<u>FY1999</u>				<u>FY2000</u>			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestones																
Engineering Milestones																
T&E Milestones																
Contract Milestones																
Other Program Events																

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Exhibit R-2, RDT&E Budget Item Justification								Date: February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 6				R-1 ITEM NOMENCLATURE Export License Control – PE: 0605123D8Z						
COST (\$ In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	0	0	1.5	6.0	10.5	3.5			21.5	21.5

(U) A. Mission Description and Budget Item Justification

(U) BRIEF DESCRIPTION OF ELEMENT: The program element supports the research, design and acquisition of an automated system by the Director, Policy Automation Directorate (PAD), Office of the Under Secretary of Defense for Policy (OUSD(P)), for export license processing and analysis. The system will be integrated among all export license regulatory and reviewing agencies (Departments of Defense, Commerce, State, and other agencies) and incorporate connectivity to industry license applicants. The system will improve the quality of the reviews that protect critical military capabilities and support defense cooperation with allies and friends, and reduce review times to meet global marketplace demands. This program is a new start effort.

(U) FY 2000 Plans:

- Establish a contract for a system integrator for program management and systems integration services.
- Establish an Interagency Project Team.
- Develop a Management Plan.
- Initiate definition of requirements and security analysis.

(U) FY 2001 Plans:

- Complete System Development Plan.
- Complete Functional Requirements Document.
- Begin prototype development.
- Develop System Test Procedures.
- Develop System Implementation Plan.

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Exhibit R-2, RDT&E Budget Item Justification		Date: February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 6	R-1 ITEM NOMENCLATURE Export License Control – PE: 0605123D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	0	0	0	0
Current Budget Submit/President's Budget	0	1.5	6.0	Continuing

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

(U) C. Other Program Funding Summary: Procurement funds: FY2002 \$2.5 million; FY2003 \$6 million.

(U) D. Acquisition Strategy: Award ASAP a delivery order from an existing Government contract for program management and system integration services.

(U) E. Schedule Profile: A milestone chart will be a contract deliverable from the contract referred to in the Acquisition Strategy above.

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Exhibit R-2, RDT&E Budget Item Justification					Date: February 2000				
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity : 6				R-1 ITEM NOMENCLATURE Defense Travel System – PE: 0605124D8Z					
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	0	0	9.122	4.854	2.470	0	0	0	16.446
Defense Travel System	0	0	9.122	4.854	2.470	0	0	0	16.446

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION

(U) BRIEF DESCRIPTION OF ELEMENT: The PMO for the Defense Travel System was established to provide procurement management and system fielding support worldwide. The DTS is the standard DoD business travel services system that combines reengineered travel policies and procedures with the best industry practices and technology. The DTS provides full travel management support from arranging for travel and approving travel authorizations, to processing reimbursement vouchers following travel and maintaining appropriate government records. The Defense Travel System is a fully electronic process that leverages technology to speed the coordination of travel, incorporates a digital signature capability, and embraces standard industry Electronic Commerce procedures. Funding for the R&D elements of this program has been realigned from the O&M appropriation, in accordance with OSD memo dated Oct 26, 1999, Subject: Budgeting for Information technology and Automated Information Systems..

PROGRAM ACCOMPLISHMENTS AND PLANS: (\$ in Thousands)

1. (U) FY 2001 PLAN:

- Testing of the mappings between the Defense Travel System’s Common User Interface (CUI) and the Defense Accounting & Disbursing Systems (DADS). There are currently 47 different accounting and disbursing systems that DTS must interface with.
- Complete development of electronic maps between the CUI and the DADS.
- Complete development of the MIS/Archive for electronic storage of travel records and initial upload of personnel profiles from DMDC files during testing.

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Exhibit R-2, RDT&E Budget Item Justification		Date: February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity : 6	R-1 ITEM NOMENCLATURE Defense Travel System – PE: 0605124D8Z	

PROGRAM ACCOMPLISHMENTS AND PLANS: (Continued)

- Start development and test of P3I items. These include Charge Card Vendor Interface, Global Transportation Network Interface, and the Defense Information Infrastructure Compliance.

(U) B. PROGRAM CHANGE SUMMARY:	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
(U) FY 2000 President's Budget:	0	0	0	Continuing
(U) Adjustments from FY2000 PRESBUDG:	0	+9,122	+4,854	
(U) FY 2001 President's Budget Submit:	0	9,122	4,854	Continuing

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Reflects a realignment of program funding from the O&M appropriation to RDT&E. The realignment is the result of increased development and testing requirements for the program.

(U) Schedule: None.

(U) Technical: None.

(U) C. OTHER PROGRAM FUNDING SUMMARY: (Dollars in Thousands)

Project Number & Title	<u>FY2000</u> <u>Actual</u>	<u>FY2001</u> <u>Estimate</u>	<u>FY2002</u> <u>Estimate</u>	<u>FY2003</u> <u>Estimate</u>	<u>FY2004</u> <u>Estimate</u>	<u>FY2005</u> <u>Estimate</u>	<u>FY2006</u> <u>Estimate</u>	<u>To Complete</u>	<u>Total Cost</u>
(U) O&M Line Defense Travel System	30,276	37,179	51,851	41,050	12,425	12,390			185,171

(U) D. ACQUISITION STRATEGY: Not Applicable

(U) E. SCHEDULE PROFILE: Not Applicable

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BUDGET JUSTIFICATION
FOR PROGRAM ELEMENTS OF THE
OSD RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, DEFENSE-WIDE PROGRAM
FY 2001 BUDGET EXTIMATES SUBMISSION

PE 0605128D8Z, Classified Program USD(POLICY), is justified in the classified annex.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2)							February 2000		
DEFENSEWIDE RDT&E (0400) BUDGET ACTIVITY SIX			FOREIGN COMPARATIVE TEST (FCT) PE 0605130D8Z						
\$'s in Thousands	FY 1999*	FY 2000*	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	COST TO COMPLETE	TOTAL COST
PE 0605130D	32,684	31,876	31,697	31,837	32,835	33,542	34,241	Cont'g	Cont'g

A. (U) **MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:**

This is not a new start. FYs 1999 and 2000* were funded in the Director Test and Evaluation, Defense (0450) appropriation in the same Program Element.

On June 7, 1999, Secretary Cohen approved the disestablishment of the office of the Director, Test, Systems Engineering and Evaluation. The Under Secretary of Defense for Acquisition, Technology and Logistics, Strategic and Tactical Systems (USD (AT&L/S&TS)) will retain the management and oversight of the Foreign Comparative Test (FCT) program.

As a result, funds for these activities have been realigned with other funds appropriated for the USD (A&T/S&TS). Beginning with FY 2001, funds have been transferred to the Defensewide RDT&E appropriation (0400), PE 0605130D.

The mission of the FCT program is to test and evaluate foreign non-developmental items (NDI) identified by the CINCs and Services in order to avoid costly and time-consuming U.S. new start acquisition programs. The FCT program funds test and evaluation of allied and friendly nation's weapons and equipment to provide procurement alternatives to satisfy U.S. Armed Forces requirements or correct mission area shortcomings. The FCT program is congressionally mandated in Title 10, USC, Section 2350a. FCT projects are nominated by the Services and U.S. Special Operations Command (SOCOM) each year and submitted to Congress for approval prior to expenditure of funds. Approved projects are normally funded for one or two years.

This Research Category 6.5 is assigned and identified in this descriptive summary in accordance with existing DoD policy.

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(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1999 Accomplishments:

- Completed 7.62mm Short Range Training Ammunition.
- Completed 120mm APERS Round for M1A1/A2 Tank.
- Completed LVOS Anti-Riot Grenade.
- Completed Castings for Affordable Fighter Structures (CAFS).
- Completed Emergency Evacuation Hyperbaric Stretcher.
- Completed Insensitive Munitions Hellfire Missile Motor.
- Completed M-72 Light Anti-Tank (LAW) Insensitive Rocket Motor Propellant.
- Completed Maritime Craft Air Deployment System II.
- Completed MILSTAR Rubidium Standard.
- Completed Next Generation Small Loader.
- Completed RDX/HMX Explosives Qualification.
- Completed Remote Operating Vehicle Hot & Pump System.
- Completed Solid State DC Reference Standard.
- Completed Titanium Nitride Coatings for Compressor Blades.
- Completed Uncooled Thermal Imager.
- Completed Weather Forecasting System.
- Continued 40mm Practice Grenade.
- Continued Afocal Assembly.
- Continued Countersniper Gunfire Detection System.
- Continued Electronic Module.
- Continued F-15 Countermeasures Dispenser.
- Continued Joint JRAAWS Ammunition Upgrades, Phase II.
- Continued Laser/Primer Compatible Igniter.
- Continued Lightweight Aluminum Track for AAV.
- Continued Patrol Coastal Decoy System.
- Continued Scanner Assembly, NV80 B-Kit.
- Continued Submarine Escape and Immersion System.
- Initiated and completed Automatic Detection IR System.
- Initiated and completed Joint Service Combat Shotgun.
- Initiated and completed Songbird.
- Initiated 21mm Trainer for M72 LAW.

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- Initiated 30mm APFSDS Tracer Round.
- Initiated AAV Aluminum Roadwheels.
- Initiated Advanced Lightweight Grenade Launcher Ammunition.
- Initiated Combat Vehicle Crew Fire Extinguisher.
- Initiated Crusader Automatic Transmission.
- Initiated Emergency Aircraft Arresting System.
- Initiated FCTMS – Paperless FCT process.
- Initiated High Pressure Pure Air Generator.
- Initiated Improved Battery Cells.
- Initiated Lightweight Hand Grenade.
- Initiated MC-130H Air Refueling System Pod.
- Initiated Molecular Sieve Oxygen Generating System.
- Initiated Parachute Leaflet Delivery System.
- Initiated Plastic Practice Bombs.
- Initiated Stealth Screen System.

FY 2000 Accomplishments:

- Complete 21mm Trainer for M72 LAW.
- Complete 30mm APFSDS Tracer Round.
- Complete 40mm Practice Grenade.
- Complete Afocal Assembly.
- Complete Combat Vehicle Extinguisher.
- Complete Counter Sniper/Gunfire Detection System.
- Complete Electronic Module.
- Complete Emergency Aircraft Arresting System.
- Complete F-15 Countermeasures Dispenser.
- Complete High Pressure Pure Air Generator.
- Complete Improved Battery Cell.
- Complete Joint JRAAWS Ammunition Upgrades, Phase II.
- Complete Laser/Primer Compatible Igniter.
- Complete Lightweight Hand Grenade.
- Complete Molecular Sieve Oxygen Generating System.
- Complete Parachute Leaflet Delivery System.
- Complete Patrol Coastal Decoy System.

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- Complete Plastic Practice Bombs.
- Complete Scanner Assembly, NV80 B-Kit.
- Complete Submarine Escape & Immersion Equipment.
- Continue Advanced Lightweight Grenade Launcher Ammunition.
- Continue Crusader Automatic Transmission.
- Continue Lightweight Aluminum Track for AAV.
- Continue MC-130H Air Refueling System Pod.
- Continue Stealth Screen System.
- Initiate and complete 5.56mm Lightweight Machine Gun.
- Initiate and complete Large Aircraft Interior Decontamination.
- Initiate and complete Passenger Anti-Exposure Survival System.
- Initiate 155mm Sensor Fuzed Ammunition.
- Initiate Anti-Jam GPS Antenna.
- Initiate Combat Vehicle Troop Seat.
- Initiate Joint Protective Aircrew Ensemble.
- Initiate Lightweight Diesel Driven Auxiliary Power Unit for AAV.
- Initiate Mine Protected Clearance Vehicle.
- Initiate Space Qualified Digital Signal Processor.
- Initiate Wide-band Klystron for E-3 AWACS.
- Initiate Wind Tunnel-Internal Force Balance.

FY 2001 Plans:

Fund approximately 35 new or continuing foreign system tests and evaluations and/or technology assessments to include:

- Complete Anti-jam GPS Antenna.
- Complete Combat Vehicle Troop Seat.
- Complete Crusader Automatic Transmission.
- Complete Lightweight Aluminum Track for AAV.
- Complete Lightweight Diesel Driven Auxiliary Power Unit.
- Complete Mine Protected Clearance Vehicle.
- Complete Space Qualified Digital Signal Processor.
- Complete Stealth Screen System.
- Complete Wide-band Klystron for E-3 AWACS.
- Complete Wind Tunnel Internal Force Balance.

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- Continue Advanced Lightweight Grenade Launcher Ammunition.
- Continue Joint Protective Aircrew Ensemble.
- Continue MC-130H Aerial Refueling System Pod.

B. (U) Program Change Summary:

	<u>FY 1999*</u>	<u>FY 2000*</u>	<u>FY 2001</u>
FY 2000 President's Budget	32,684	31,876	31,947
Appropriated Value	32,684		
Adjustments to Appropriated Value			
Robotics Technology Development Program			(250)
Current Budget Submit	32,684	31,876	31,697

C. (U) Other Program Funding Summary: NA

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6				R-1 ITEM NOMENCLATURE SBIR PE 0605502D8Z				
COST (In Millions)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	Cost to Complete	Total Cost
Total Program Element (PE) Cost	16.626	25.755	*	*	*	*	continuing	cont.
SBIR Administration No. P-518	16.626	25.755	*	*	*	*	continuing	cont.

*2.5 percent of extramural RDT&E funds appropriated to the Office of the Secretary of Defense (OSD)

A. Mission Description and Budget Item Justification

BRIEF DESCRIPTION OF ELEMENT: US Code Title 15, originally passed in 1983, requires the DoD to establish a Small Business Innovation Research (SBIR) program, funded by allocating 2.5 percent of their extramural RDT&E budgets, for mission-oriented R&D projects at small technology companies. The program has broad bipartisan backing in Congress, based on DoD's recent finding that "SBIR-developed technologies have resulted in significant improvements in U.S. military capabilities and major savings to the taxpayer," as well as highly favorable reviews of the program by the GAO (1989, 1992, 1996, 1997, 1999) and the National Academy of Sciences (1999).

This program element funds OSD's portion of the DoD SBIR program. It represents 2.5 percent of the extramural RDT&E funds appropriated to OSD, and it funds R&D projects recommended and executed by the Service laboratories, with overall management oversight by OSD.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6	R-1 ITEM NOMENCLATURE SBIR PE 0605502D8Z	

PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1999-2004: This program element funds early-stage R&D projects at small technology companies, in accord with the requirements of Public Law 102-564. The FY99 technology focus areas are: Army Research Laboratory Sensors/ Electronic Devices (including intersensor networks); Army Research Institute Human Systems (Cognitive Readiness); Naval Sea Systems Command Modeling and Simulation (Condition Based Maintenance Technology); and Air Force Research Laboratory Electronics. The technology focus areas planned for FY00 are: Cognitive Readiness and Smart Sensor Web technology.

B. Program Change Summary

FY 1999 funding for this program element was \$ 16.626 million, which represents 2.5 percent of extramural RDT&E funds appropriated to OSD in FY 1999. Funding for FY 2000 through FY 2004 will be 2.5 percent of extramural RDT&E, in accord with Public Law 102-564. In FY 2000, \$5 million was added to the \$20.755 million which is derived from 2.5 percent of extramural RDT&E. This addition is a congressional special interest program "only for a technology insertion program, to be carried out by a federally funded research and development center and other units it affiliates with, to demonstrate the cost saving and efficiency benefits of applying commercially available software and information technology to the manufacturing lines of small defense firms." This is planned as a one-time addition, without continuing funds beyond FY 2000.

C. Other Program Funding Summary: N/A

D. Schedule Profile N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Budget Activity 6					R-1 ITEM NOMENCLATURE CLASSIFIED PROGRAMS C3I PE 0605710D8Z				
COST (<i>In Millions</i>)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	61.733	.598	.641	.650	.662	.675	.688	Continuing	Continuing

A. Mission Description and Budget Item Justification

Brief Description and Budget Item Justification: Funding provides for accomplishment of studies, assessments and technical evaluations of C3I programs and activities. Resources are used to support efforts including the integration of C3 and Intelligence programs and activities, the identification and resolution of national and tactical interoperability issues and fostering Defense-wide and joint support to military forces.

Program Accomplishments and Plans:

FY 1999 Accomplishments: (61.733 Million)

- Provided support to Y2K mission and functional readiness assessment of US Intelligence Community mission critical systems to ensure overall interoperability across the community.
- Ensured Y2K compliance of the Battlefield Intelligence Collection and Exploitation Systems and its interface with US and Allied nations.
- Supported the accomplishment of Y2K integration and interoperability testing of the Services' non-compliant mission critical automated systems.
- Conducted analyses in support of the Defense Information Assurance Program to examine information organizations, operations, technologies, and policies to improve IA readiness posture of the Department.
- Developed information operations/information warfare tools to monitor, document, and mitigate attempts at computer espionage and/or disruption of critical defense database.

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FY 2000 Plans:

- Mission Support (0.598 Million)

FY 2001 Plans:

- Mission Support (0.641 Million)

Classified Programs C3I is in Budget Activity 6, Management Support because it is consistent with established DoD definitions for BA 6. Provide an acquisition strategy. N/A

<u>B. Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	Total Cost
Previous President's Budget	6.359	.627	.645	Continuing
Appropriated Value				
Adjustments to Appropriated Value	55.424			
a. Internal Reprogramming.				
b. Undistributed reductions, below threshold	(.050)	(.029)	(.004)	
reprogramming, inflation savings, and government-wide rescission				
Budget Estimate Submission	61.733	.598	.641	Continuing

Change Summary Explanation:

FY1999: Y2K Emergency Supplemental funding for C3I initiatives was included in this Program Element.
Reductions (.050)
FY2000: Reduction (.029)
FY2001: PBD 604 (.005)

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6						R-1 ITEM NOMENCLATURE SBIR Administration PE 0605790D8Z				
COST (In Millions)		FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost		1.737	1.630	1.728	1.757	1.795	1.832	1.868	Continue	Continue
SBIR Administration No. P-518		1.737	1.630	1.728	1.757	1.795	1.832	1.868	Continue	Continue

A. Mission Description and Budget Item Justification

BRIEF DESCRIPTION OF ELEMENT: Under the Small Business Innovation Research (SBIR) program, DoD funds approximately \$550 million annually in mission-oriented R&D projects at small technology companies. The program has broad bipartisan backing in Congress, based on DoD’s recent finding that “SBIR-developed technologies have resulted in significant improvements in U.S. military capabilities and major savings to the taxpayer,” as well as consistently favorable evaluations of the program by the National Academy of Sciences (1999), National Bureau of Economic Research at Harvard (1996), and General Accounting Office (1989, 1992, 1996, 1997, 1999).

PE 0605790D8Z is the only source of funds for the coordination and evaluation of the component SBIR programs within DoD, because the 1992 SBIR Act provided that “a Federal agency shall not use any of its SBIR budget...for the purpose of funding administrative costs of the program.” PE 0605790D8Z funds central elements of SBIR program coordination and evaluation that are required by law, including:

- **Implementation of quantifiable, performance-based metrics for DoD’s SBIR program**, based on the degree to which SBIR technologies are commercialized in military and private sector markets (in response to Section 818 of P.L. 105-261);
- **Development of processes to facilitate the transition of SBIR-developed technologies into DoD acquisition programs** (in response to Section 818 of P.L. 105-261);
- **Development of processes to facilitate participation in the program by small technology companies that have never before done business with DoD** (in response to P.L. 102-564); and
- **Monitoring of DoD-wide SBIR program expenditures, to meet Congressionally mandated reporting requirements** (P.L. 102-564 and 97-219).

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6	R-1 ITEM NOMENCLATURE SBIR Administration PE 0605790D8Z

PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1999 Accomplishments: This budget item funded implementation of USD(A&T) and/or Congressionally-directed initiatives including the following: (1) Development and implementation of quantifiable, performance-based metrics for the DoD SBIR program and the small companies that participate in the program, based on the degree to which SBIR technologies are commercialized in military and private sector markets; (2) Development and implementation of a process for using a company's track record in commercializing its prior SBIR awards as a critical factor in the evaluation of the company's SBIR proposals; (3) Systematic evaluation of DoD's new "Fast Track" policy, under which small businesses that attract matching funds from outside investors receive a significantly higher probability of SBIR award; (4) Monitoring of DoD-wide SBIR program expenditures, as well as DoD's annual reporting to Congress and the Small Business Administration on the operation of DoD's SBIR program; (5) Development and implementation of processes to streamline the SBIR process and facilitate participation in the program by companies not used to doing business with the government. (1.737 Million)

FY 2000 Plans: This budget item is funding continuing implementation of the USD(A&T) and/or Congressionally-directed initiatives, including the following activities: (1) tracking the metrics of commercialization of SBIR R&D in military and/or private sector markets; (2) analysis of these metrics for purposes of program evaluation and improvement; (3) use of the metrics in the process for evaluating the SBIR proposals from small companies; (4) continuing evaluation of the Fast Track and other recent USD(A&T)-directed initiatives; and (5) Monitoring of DoD-wide SBIR program expenditures and implementation of processes to facilitate participation in the program by companies not used to doing business with the government. In addition, this budget item is funding the initial analysis and implementation of a new Congressionally-directed initiative to facilitate the transition of SBIR-developed technologies into DoD acquisition programs, through such vehicles as web-based networking. This program element includes funding for travel, including invitational travel, in support of the above activities. (\$1.630 Million)

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6		R-1 ITEM NOMENCLATURE SBIR Administration PE 0605790D8Z

FY 2001 Plans: This budget item will continue to fund the USD(A&T) and/or Congressionally-directed initiatives to track and analyze metrics of the SBIR program's effectiveness; evaluate the success of recent program improvements; monitor DoD-wide program expenditures; facilitate participation by new companies; and facilitate the transition of SBIR-developed technologies into DoD acquisition programs. It will also fund the initial study, analysis, and implementation of the new "Challenge" program that has been approved by the House-Senate conference on the FY 2000 Defense Authorization Act. This program will enable small technology companies to submit proposals to DoD for innovative technologies to improve the capabilities and/or reduce the costs of ongoing DoD acquisition programs. (\$1.728 Million)

B. Program Change Summary

	FY1999	FY2000	Total Cost
Previous President's Budget	1.799	1.713	Continuing
Appropriated Value	1.799	1.713	
Adj. to Approp. Value/President's Budget	(.062)	(.083)	
Current Budget Submit	1.737	1.630	Continuing

Change Summary Explanation:

Funding: The change in funding in FY 1999 and FY 2000 is the result of undistributed Congressional reductions and inflation savings.
 Schedule: N/A
 Technical: N/A

C. Other Program Funding Summary: N/A

D. Acquisition Strategy: N/A

E. Schedule Profile N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6					R-1 ITEM NOMENCLATURE SBIR Administration PE 0605790D8Z					
COST (In Millions)		FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost		1.737	1.630	1.728	1.757	1.795	1.832	1.868	Continue	Continue
SBIR Administration No. P-518		1.737	1.630	1.728	1.757	1.795	1.832	1.868	Continue	Continue

A. Mission Description and Budget Item Justification

BRIEF DESCRIPTION OF ELEMENT: Under the Small Business Innovation Research (SBIR) program, DoD funds approximately \$550 million annually in mission-oriented R&D projects at small technology companies. The program has broad bipartisan backing in Congress, based on DoD’s recent finding that “SBIR-developed technologies have resulted in significant improvements in U.S. military capabilities and major savings to the taxpayer,” as well as consistently favorable evaluations of the program by the National Academy of Sciences (1999), National Bureau of Economic Research at Harvard (1996), and General Accounting Office (1989, 1992, 1996, 1997, 1999).

PE 0605790D8Z is the only source of funds for the coordination and evaluation of the component SBIR programs within DoD, because the 1992 SBIR Act provided that “a Federal agency shall not use any of its SBIR budget...for the purpose of funding administrative costs of the program.” PE 0605790D8Z funds central elements of SBIR program coordination and evaluation that are required by law, including:

- **Implementation of quantifiable, performance-based metrics for DoD’s SBIR program**, based on the degree to which SBIR technologies are commercialized in military and private sector markets (in response to Section 818 of P.L. 105-261);
- **Development of processes to facilitate the transition of SBIR-developed technologies into DoD acquisition programs** (in response to Section 818 of P.L. 105-261);
- **Development of processes to facilitate participation in the program by small technology companies that have never before done business with DoD** (in response to P.L. 102-564); and
- **Monitoring of DoD-wide SBIR program expenditures, to meet Congressionally mandated reporting requirements** (P.L. 102-564 and 97-219).

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6	R-1 ITEM NOMENCLATURE SBIR Administration PE 0605790D8Z

PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1999 Accomplishments: This budget item funded implementation of USD(A&T) and/or Congressionally-directed initiatives including the following: (1) Development and implementation of quantifiable, performance-based metrics for the DoD SBIR program and the small companies that participate in the program, based on the degree to which SBIR technologies are commercialized in military and private sector markets; (2) Development and implementation of a process for using a company's track record in commercializing its prior SBIR awards as a critical factor in the evaluation of the company's SBIR proposals; (3) Systematic evaluation of DoD's new "Fast Track" policy, under which small businesses that attract matching funds from outside investors receive a significantly higher probability of SBIR award; (4) Monitoring of DoD-wide SBIR program expenditures, as well as DoD's annual reporting to Congress and the Small Business Administration on the operation of DoD's SBIR program; (5) Development and implementation of processes to streamline the SBIR process and facilitate participation in the program by companies not used to doing business with the government. (1.737 Million)

FY 2000 Plans: This budget item is funding continuing implementation of the USD(A&T) and/or Congressionally-directed initiatives, including the following activities: (1) tracking the metrics of commercialization of SBIR R&D in military and/or private sector markets; (2) analysis of these metrics for purposes of program evaluation and improvement; (3) use of the metrics in the process for evaluating the SBIR proposals from small companies; (4) continuing evaluation of the Fast Track and other recent USD(A&T)-directed initiatives; and (5) Monitoring of DoD-wide SBIR program expenditures and implementation of processes to facilitate participation in the program by companies not used to doing business with the government. In addition, this budget item is funding the initial analysis and implementation of a new Congressionally-directed initiative to facilitate the transition of SBIR-developed technologies into DoD acquisition programs, through such vehicles as web-based networking. This program element includes funding for travel, including invitational travel, in support of the above activities. (\$1.630 Million)

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6		R-1 ITEM NOMENCLATURE SBIR Administration PE 0605790D8Z

FY 2001 Plans: This budget item will continue to fund the USD(A&T) and/or Congressionally-directed initiatives to track and analyze metrics of the SBIR program's effectiveness; evaluate the success of recent program improvements; monitor DoD-wide program expenditures; facilitate participation by new companies; and facilitate the transition of SBIR-developed technologies into DoD acquisition programs. It will also fund the initial study, analysis, and implementation of the new "Challenge" program that has been approved by the House-Senate conference on the FY 2000 Defense Authorization Act. This program will enable small technology companies to submit proposals to DoD for innovative technologies to improve the capabilities and/or reduce the costs of ongoing DoD acquisition programs. (\$1.728 Million)

B. Program Change Summary

	FY1999	FY2000	Total Cost
Previous President's Budget	1.799	1.713	Continuing
Appropriated Value	1.799	1.713	
Adj. to Approp. Value/President's Budget	(.062)	(.083)	
Current Budget Submit	1.737	1.630	Continuing

Change Summary Explanation:

Funding: The change in funding in FY 1999 and FY 2000 is the result of undistributed Congressional reductions and inflation savings.
 Schedule: N/A
 Technical: N/A

C. Other Program Funding Summary: N/A

D. Acquisition Strategy: N/A

E. Schedule Profile N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2)						February 2000			
DEFENSEWIDE RDT&E (0400) BUDGET ACTIVITY SIX			TEST AND EVALUATION PE 0605804D8Z						
\$'s in Thousands	FY 1999*	FY 2000*	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	COST TO COMPLETE	TOTAL COST
PE 0605804D8Z			43,915	44,218	46,224	47,121	47,989	Cont'g	Cont'g

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION

This is not a new start. The Joint Test and Evaluation Program (JT&E) and support for Developmental Test and Evaluation (DT&E) assessments for FYs 1999 and 2000* were funded in the Director Test and Evaluation, Defense (0450) appropriation in PE 0605804D.

On June 7, 1999, Secretary Cohen approved the disestablishment of the office of the Director, Test, Systems Engineering and Evaluation. The Under Secretary of Defense for Acquisition, Technology and Logistics, Strategic and Tactical Systems (USD (AT&L/S&TS)) will retain the management and oversight of the JT&E program and perform DT&E assessments of the Department's weapons systems.

As a result, funds for these activities have been realigned with other funds appropriated for the USD(A&T/S&TS). Beginning with FY 2001, funds have been transferred to the Defensewide RDT&E appropriation (0400), PE 0605804D.

JT&E programs are process, rather than product, focused T&E activities conducted in a joint military environment. These multi-Service programs, chartered by OSD and coordinated with the Joint Staff and Services, provide improvements in interoperability of Service systems, improvements in technical and operational concepts, improved performance of systems, validate testing methodologies, and provide data for validating models, simulations and test beds. JT&E programs solve relevant warfighter issues in a joint T&E environment.

This Research Category 6.5 PE supports joint military testing of the Department's weapons systems to determine if they meet their detailed performance requirements for the Joint Staff and the Services and management of the DoD test and evaluation process.

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(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1999 Accomplishments:

The following activities were funded in the PE 0605804D, DTE, D (0450) appropriation for FY 1999.

JT&E Programs:

- Completed Joint Advanced Distributed Simulation (JADS), Joint Theater Missile Defense (JTMD), Joint Combat Search And Rescue (JCSAR); conducted outbriefings, distributed final reports and transitioned legacy products.
- Continued JADS-EW, Joint Electronic Combat testing using SIMulation (JECSIM), Joint Close Air Support (JCAS), Joint WarFighter (JWF), Joint Theater Distribution (JTD), and Joint Shipboard Helicopter Integration Process (JSHIP) testing, and extended Joint Suppression of Enemy Air Defense (JSEAD) through FY01.
- Conducted JT&E annual nomination review, and directed Joint Battle Damage Assessment (JBDA) and Joint C2 Intelligence, Surveillance and Reconnaissance (JC2ISR) as Feasibility Studies.
 - Determined if the FY 1998 Feasibility Studies, Joint Global Positioning System Combat Effectiveness (JGPSCE formerly GPS-JOBE), Joint Cruise Missile Defense (JCMD) and Joint Missile Alert Broadcast System (JMABS), were necessary and feasible for chartering as JT&Es. Charters pending for JGPSCE and JCMD.
- Completed JMABS closeout final report.

T&E Independent Activities:

- Review, coordination, and approval of 696 Test and Evaluation Master Plans (TEMPs) (Draft and Service Approved).
- Review and coordination on all significant program documentation to include: 444 Defense Acquisition Executive Summaries (DAES); 36 Acquisition Decision Memoranda (ADM); and, 1,452 Other Documents Reviewed.
- Analyses of programs for compliance with DT&E policies identified in the DoD 5000 acquisition policy and monitoring of on-going developmental test program activities through participation in 1,440 local and 468 out-of-town developmental test program fora.

FY 2000 Accomplishments:

The following activities were funded in the DTE, D (0450) appropriation for FY 2000 and were executed by USD(A&T)/S&TS

JT&E Programs:

- Complete JADS-EW and JECSIM, conduct outbriefings, distribute final reports and transition legacy products.
- Continue JSEAD, JCAS, JWF, JTD, JSHIP, JGPSCE and JCMD testing.

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- Determine if the FY1999 Feasibility Studies, JBDA and JC2ISR, are necessary and feasible for chartering as JT&Es.
- - Conduct JT&E annual review of nominations for potential feasibility studies.

T&E Independent Activities: Includes funding for assessments of the developmental testing of the more than 220 major weapon acquisition programs; oversight of the JT&E programs, and travel for D, S&TS. Specifically, the DT&E organization, within D, S&TS, is the USD(A&T) focal point for all activities related to developmental test and evaluation as outlined in Section 133, Title 10, United States Code. T&E Independent Activities include funding for:

- Analyses of programs for compliance with DT policies identified in the DoD 5000 acquisition policy.
- Review, coordination, and approval of Test and Evaluation Master Plans (TEMPs).
- Monitoring of on-going developmental test program activities.
- Review and coordination on all significant program documentation.

FY 2001 Plans:

JT&E Programs:

- Complete JSEAD and JWF, conduct outbriefings, distribute final reports and transition legacy products.
- Continue JCAS, JTD, JSHIP and JGPSCE and JCMD testing.
- Conduct directed feasibility studies.
- Charter ongoing JBDA and JC2ISR JFS' into JT&Es as directed by the SAC.
- Conduct JT&E annual nomination review for potential new feasibility studies.
- Determine if the FY 2000 Feasibility Studies are necessary and feasible for chartering as JT&Es.

T&E Independent Activities: Includes funding for assessments of the developmental testing of the more than 220 major weapon acquisition programs; oversight of the JT&E programs, and travel for D, S&TS. Specifically, the DT&E organization, within D, S&TS, is the USD(A&T) focal point for all activities related to developmental test and evaluation as outlined in Section 133, Title 10, United States Code. T&E Independent Activities include funding for:

- Analyses of programs for compliance with DT policies identified in the DoD 5000 acquisition policy.
- Review, coordination, and approval of Test and Evaluation Master Plans (TEMPs).
- Monitoring of on-going developmental test program activities.
- Review and coordination on all significant program documentation.

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B. (U) PROGRAM CHANGE SUMMARY

	<u>FY 1999*</u>	<u>FY 2000*</u>	<u>FY 2001</u>
Previous President's Budget			46,120
Appropriated Value			
Adjustments to Appropriated Value			
Robotics Technology Development Program			(2,205)
Current Budget Submit			43,915

* FYs 1999 and 2000 is included in PE 0605804D in FY 1999

C. (U) OTHER PROGRAM FUNDING SUMMARY NA

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 7							R-1 ITEM NOMENCLATURE Commercial O&S Savings Initiative PE 0604805D8Z		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	7.221	11.582	9.629	10.744	12.829	13.188	13.551	Continuing	Continuing
Commercial O&S Savings Initiative/P805	7.221	11.582	9.629	10.744	12.829	13.188	13.551	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

Beginning in FY 2001, this Program Element has moved from Budget Activity 5 to Budget Activity 7.

The purpose of the Commercial Operations and Support Savings Initiative (COSSI) is to reduce weapon system life cycle costs, especially operating and support (O&S) costs, by inserting commercial products into military systems. COSSI is a crucial element in DoD's strategy to reduce the operations and support (O&S) costs of fielded equipment and supports the DoD goal of reducing logistics costs by 20 percent by 2005. As legacy systems age, O&S costs increase, and COSSI is an effective way to lower these costs. COSSI also allows DoD to capitalize on the commercial innovation cycle so equipment can be modernized faster. Adapting commercial technologies for use in military equipment often requires non-recurring engineering, testing and qualification. COSSI shares the costs of these efforts between the contractor and the Government. If the testing is successful and the cost savings validated, the items are purchased as retrofits. All COSSI projects must have an endorsement by a military customer and be linked to an existing military system. The benefits include: improved mean time between failure, improved logistics support by reducing parts obsolescence, reduced software reprogramming time and costs, improved performance, and the promotion of open system designs making future upgrades easier and less costly. COSSI uses Other Transactions rather than FAR procurement contracts so companies that do not normally do business with DOD are given the opportunity to provide cost saving ideas that would otherwise go unnoticed. OSD funding provides the Services an incentive to structure joint projects with pervasive impact across weapon systems, and to institutionalize the use of Other Transaction Agreements.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 7								R-1 ITEM NOMENCLATURE Commercial O&S Savings Initiative PE 0604805D8Z	

<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	7.221	11.582	9.629	10.744	12.829	13.188	13.551	Continuing	Continuing
Commercial O&S Savings Initiative/P805	7.221	11.582	9.629	10.744	12.829	13.188	13.551	Continuing	Continuing

(U) **Project Number and Title: P805 Commercial O&S Savings Initiative**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U) In FY 1999 Program Management transferred from DARPA to OSD and the Services. FY 1999 COSSI funding supported the development, documentation, integration, and test of upgrades to the legacy Mission Computer and Stores Management Computer on the AV8B. The upgrade project used commercial components and converted assembly language software into a higher order language (C++). In addition, the project integrated the Joint Direct Attack Munition, the ALE-47 Countermeasures Dispenser, the Havequick/Singars secure communications system, and the Common Missile Warning System within the AV8B Electronic Warfare Suite. The contractor performed system development tasks and developed a System Development Plan; researched, defined and documented the system architecture to include functional requirements, performance requirements, and interface requirements; developed, provided and fully documented tested software code; developed hardware to meet system requirements; performed system and subsystem integration; delivered a System Configuration Set and provided engineering support for operational test and evaluation. The contractor supported implementation of the System Configuration Set in Fleet and production aircraft. (\$ 7.221 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 7	R-1 ITEM NOMENCLATURE Commercial O&S Savings Initiative PE 0604805D8Z	

(U) FY2000 Plans:

(U) COSSI is providing funds to develop and install an Integrated Mechanical Diagnostic/Health and Usage Management System on AH-1 helicopters. The system collects real time data on helicopter performance including continuous rotor track and balance, vibration monitoring of the gearbox, drivetrain, and engine, and structural usage monitoring. The project is expected to reduce AH-1 operation and support costs by over \$225 million by eliminating rotor track and balance flights, improving the efficiency of maintenance operations, enhancing operational readiness, and extending the period between depot maintenance. COSSI funding is also being used to develop a propeller control unit for P-3 aircraft. The project will replace the current analog/mechanical system with one that is digital/electromechanical. The benefits include higher reliability, elimination of control system adjustments requiring ground operation and flight checks, a built in test capability to improve trouble shooting, and elimination of parts obsolescence. The new propeller control unit is expected to reduce P-3 operation and maintenance costs by over 35 million during the next 12 years.

(\$ 11.582 Million)

(U) FY2001 Plans:

(U) DoD will again issue a joint solicitation for the FY2001 program. Lessons learned during previous COSSI solicitations will be used to further refine the program. DoD will use the OSD line to incentivize joint projects. Based on previous experience, most cost saving projects are expected to pertain to upgrading electronics and computers on legacy aircraft. (\$9.629 Million)

(\$ 9.629 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 7	R-1 ITEM NOMENCLATURE Commercial O&S Savings Initiative PE 0604805D8Z	

(U) B. <u>Program Change Summary</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	7.901	16.976	15.129	Continuing
Appropriated Value	0.000	11.976	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	(.680)	(.098)	0.000	
c. Other	0.000	(.296)	(5.500)	
Current President's Budget	7.221	11.582	9.629	Continuing

Change Summary Explanation:

(U) **Funding:** FY 1999 changes are due to reprogramming adjustments. FY 2000 and FY 2001 reflect reductions due to programmatic decisions and inflation adjustments and the government wide rescission.

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

(U) **Technical:**

(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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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000	
APPROPRIATION/BUDGET ACTIVITY 07					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. C3I INTELLIGENCE PROGRAMS PE 0305190D8Z				
<i>COST (In Millions)</i>	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	10.589	15.403	25.182	26.022	25.337	26.203	27.367	Continuing	Continuing
Project Name/No. and Subtotal Cost C3I Intelligence Programs/P481	10.589	15.403	25.182	26.022	25.337	26.203	27.367	Continuing	Continuing

A. Mission Description and Budget Item Justification

Brief Description and Budget Item Justification: PE includes all resources and manpower in support of projects managed by the Intelligence Systems Support Office (ISSO) as directed by the ASD(C3I). ISSO oversight and technical support to DoD activities and initiatives requiring assistance in technology areas ranging from concept development through demonstration of full operational capability. The primary focus is on development, integration and assessment of systems or applications in support of non-traditional and contingency warfare.

Program Accomplishments and Plans:

FY 1999 Accomplishments:

- Mission Support (10.589 Million)

FY 2000 Plans:

- Mission Support (15.403 Million)

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FY 2001 Plans:

- Mission Support (25.182 Million)

FY 2002 Plans:

- Mission Support (26.022 Million)

C3I Intelligence Programs is in Budget Activity 7, Operational Systems Development because it is consistent with established DoD definitions for BA 7. Provide an acquisition strategy. Not Applicable

B. Program Change Summary	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>FY2002</u>	Total Cost
Previous President's Budget	9.551	9.480	8.536	9.561	Continuing
Appropriated Value					
Adjustments to Appropriated Value	1.038	5.923	16.646	16.461	
a. Internal Reprogramming.					
b. Below threshold program adjustments					
c. Inflation Adjustment					
Current Budget Submit/President's Budget	10.589	15.403	25.182	26.022	Continuing

Change Summary Explanation:

Funding: FY00: Congressional Add: \$6.0 Million; Reductions (.077 Million)
FY01: PBD 604 = (.074); PBD 70C = +1.0; PBD 707 = +15.720
FY02: PBD 604 = (.074); PBD 70C = +1.0; PBD 707 = +15.535
Schedule: NA
Technical: NA

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