

Office Of Secretary Of Defense  
FY 2000/2001 RDT&E PROGRAM

EXHIBIT R-1

APPROPRIATION: 0400D Research Development Test &amp; Eval, Defwide

Date: FEB 1999

Line No	Program Element Number	Item	Act	Thousands of Dollars				S E C
				FY 1998	FY 1999	FY 2000	FY 2001	
1	0601101D8Z	In-House Laboratory Independent Research	1	1,495	2,167	2,033	2,021	U
3	0601103D8Z	University Research Initiatives	1	214,600	228,415	216,778	210,332	U
4	0601105D8Z	Gulf War Illness	1		23,674	19,185	19,098	U
5	0601111D8Z	Government/Industry Cosponsorship of University Research	1	6,942	4,801	6,351	6,762	U
	<b>Basic Research</b>			<b>223,037</b>	<b>259,057</b>	<b>244,347</b>	<b>238,213</b>	
9	0602227D8Z	Medical Free Electron Laser	2	19,137	14,496	9,719	9,698	U
10	0602228D8Z	Historically Black Colleges and Universities (HBCU) Science	2	10,724		14,329	14,338	U
11	0602234D8Z	Lincoln Laboratory Research Program	2	17,197	19,271	20,774	20,739	U
20	0602787D8Z	Medical Technology	2	8,559	9,212	8,903	8,742	U
	<b>Applied Research</b>			<b>55,617</b>	<b>42,979</b>	<b>53,725</b>	<b>53,517</b>	
22	0603002D8Z	Medical Advanced Technology	3	2,848	2,130	2,007	2,057	U
23	0603104D8Z	Explosives Demilitarization Technology	3	11,285	14,442	11,183	11,029	U
24	0603120D8Z	Demining	3	15,112				U
25	0603121D8Z	Alternative to Landmines	3	2,760	4,687			U
26	0603122D8Z	Counterterror Technical Support	3	40,826	37,667	52,223	54,791	U
28	0603160D8Z	Counterproliferation Support - Adv Dev	3	74,196				U
30	0603225D8Z	Joint DoD-DoE Munitions Technology Development	3	16,242	13,007	14,786	14,790	U
31	0603232D8Z	Automatic Target Recognition	3	5,904	5,010	7,775	7,588	U
34	0603704D8Z	Special Technical Support	3	11,147	11,176	10,948	10,855	U
37	0603716D8Z	Strategic Environmental Research Program	3	56,716	58,771	53,506	51,729	U

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38	0603727D8Z	Joint Warfighting Program	3	8,255	18,679	7,872	7,790	U
39	0603728D8Z	Agile Port Demonstration	3	4,617				U
40	0603738D8Z	Cooperative DoD/VA Medical Research	3	18,437	5,915			U
44	0603750D8Z	Advanced Concept Technology Demonstrations	3	74,756	88,598	117,969	119,298	U
45	0603752D8Z	Commercial Technology Insertion Program	3	18,000				U
47	0603755D8Z	High Performance Computing Modernization Program	3	139,023	152,585	159,099	145,140	U
57	0603832D8Z	Joint Wargaming Simulation Management Office	3	60,059	60,518	68,456	68,250	U
58	0605160D8Z	Counterproliferation Support	3			1,495	1,493	U
	<b>Advanced Technology Development</b>			<b>560,183</b>	<b>473,185</b>	<b>507,319</b>	<b>494,810</b>	
62	0603228D8Z	Physical Security Equipment	4	17,801	25,465	37,107	36,201	U
63	0603708D8Z	Integrated Diagnostics	4	2,742	3,394			U
64	0603709D8Z	Joint Robotics Program	4	26,806	16,013	12,937	10,492	U
65	0603714D8Z	Advanced Sensor Applications Program	4	14,279	17,918	15,345	15,646	U
66	0603736D8Z	CALS Initiative	4	6,172	7,765	1,652	1,623	U
67	0603790D8Z	NATO Research and Development	4	7,939				U
69	0603851D8Z	Environmental Security Technical Certification Program	4	14,500	16,836	23,260	27,601	U
82	0603892D8Z	ASAT	4	37,500				U
83	0603920D8Z	Humanitarian Demining	4		18,498	15,847	14,819	U
84	0603923D8Z	Coalition Warfare	4			12,781	12,124	U
	<b>Demonstration and Validation</b>			<b>127,739</b>	<b>105,889</b>	<b>118,929</b>	<b>118,506</b>	

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88	0604709D8Z	Joint Robotics Program - EMD	5		15,115	12,004	11,742	U
90	0604771D8Z	Joint Tactical Information Distribution System (JTIDS)	5	50,312	30,125	29,382	16,401	U
91	0604805D8Z	Commercial Operations and Support Savings Initiative	5		7,901	16,976	15,129	U
		<b>Engineering and Manufacturing Development</b>		<b>50,312</b>	<b>53,141</b>	<b>58,362</b>	<b>43,272</b>	
95	0305889D8Z	Counterdrug Intelligence Support	5	1,835				U
		<b>Engineering and Manufacturing Development</b>		<b>1,835</b>				
96	0603858D8Z	Unexploded Ordnance Detection and Clearance	6		1,259	1,226	1,221	U
97	0604942D8Z	Assessments and Evaluations	6		3,868	4,900	5,000	U
98	0605104D8Z	Technical Studies, Support and Analysis	6	30,592	29,641	29,506	30,016	U
101	0605110D8Z	USD(A&T)--Critical Technology Support	6	2,487				U
103	0605116D8Z	General Support to C3I	6			2,000	2,000	U
104	0605117D8Z	Foreign Material Acquisition and Exploitation	6	34,782	34,591	34,937	35,458	U
105	0605122D8Z	Industrial Capabilities Assessments	6			3,299	3,373	U
108	0605128D8Z	Classified Program USD(P)	6	8,397	3,346			U
110	0605160D8Z	Counterproliferation Support	6	6,310				U
113	0605502D8Z	Small Business Innovative Research	6	31,858				U
115	0605710D8Z	Classified Programs - C3I	6	929	6,359	627	645	U
116	0605790D8Z	Small Business Innovation Research Administration	6	1,609	1,799	1,713	1,757	U
		<b>RDT&amp;E Management Support</b>		<b>116,964</b>	<b>80,863</b>	<b>78,208</b>	<b>79,470</b>	
142	0305190D8Z	C3I Intelligence Programs	7	8,827	9,551	9,480	10,332	U

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143	0305204D8Z	Tactical Unmanned Aerial Vehicles	7	53,871				U
144	0305205D8Z	Endurance Unmanned Aerial Vehicles	7	181,165				U
145	0305206D8Z	Airborne Reconnaissance Systems	7	186,090				U
147	0305207D8Z	Manned Reconnaissance Systems	7	26,402				U
150	0305208D8Z	Distributed Common Ground Systems	7	34,879				U
153	0305209D8Z	DARP Integration and Support	7	7,101				U
	<b>Operational Systems Development</b>			<b>498,335</b>	<b>9,551</b>	<b>9,480</b>	<b>10,332</b>	
162	1001017D8Z	Partnership for Peace Activities	7		4,896			U
	<b>Operational Systems Development</b>				<b>4,896</b>			
<b>Total Office Of Secretary Of Defense</b>				<b>1,634,022</b>	<b>1,029,561</b>	<b>1,070,370</b>	<b>1,038,120</b>	

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 1							<b>R-1 ITEM NOMENCLATURE</b> In-House Laboratory Independent Research (ILIR) PE 0601101D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	1.495	2.167	2.033	2.021	2.102	2.099	2.143	2.188	Continuing	Continuing
ILIR/P503	1.495	2.167	2.033	2.021	2.102	2.099	2.143	2.188	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 allows the collection of pilot data by the University's faculty researchers. Pilot data allow the faculty to secure research funds from non-DoD sources (est. \$20-\$25 million annually). Approximately 80 to 100 intramural research projects (20-25 new starts) are awarded each year, 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 port folio 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, cryopreservation and substitution of blood components, endotoxic shock, 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, gonorrhea, streptococcus, hepatitis A, Venezuelan equine encephalitis (VEE), malaria, and bartonellosis.
- Military Operational Medicine: military and medical training and 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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	1.495	2.167	2.033	2.021	2.102	2.099	2.143	2.188	Continuing	Continuing
ILIR/P503	1.495	2.167	2.033	2.021	2.102	2.099	2.143	2.188	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) **Combat Casualty Care:** This program supported 24 projects in Combat Casualty Care. The following are examples of the objectives of a few highlighted protocols: a) Investigate the vascular effects of biochemicals that cause inflammation related to wounding and wound healing; b) Continue the investigation of the role of endotoxin, the lipopolysaccharide outer membrane component of gram negative bacteria leading to multiorgan failure, shock, and death; c) Study the molecular events underlying muopioid receptor activation to develop better pain relief strategies; d) Examine the effects of neurocytokines, biochemicals that are released upon nerve damage, in peripheral nerve and brain injury; e) Investigate healing mechanisms following ischemia-reperfusion injury; f) develop a blood test for diagnosing malignant hyperthermia susceptibility for use on the battlefield. (\$ 0.519 Million)

(U) **Infectious Diseases:** Twenty-six projects addressing basic research questions in Infectious Diseases were funded for FY1998. Highlights from the plans of these projects include: a) Continue the investigation of Venezuelan equine encephalitis (VEE) by examining the role of macrophages and cytokines in the early immune response and development of inflammation of the central nervous system; b) Continue to investigate how environmental regulation of gonococcal gene expression plays a critical role in the pathogenesis of the sexually transmitted disease *N. gonorrhoeae*; c) Develop a small animal model to determine the molecular mechanisms and regulation of *Salmonella typhi* invasion of epithelial cells; d) Determine the chronic infection rate, disease burden, risk factors within a population endemic for *B. Bacilliformis* (Batonellosis); e) Study the gene regulation of the shiga-like toxins coming from enterohemorrhagic *Escherichia coli*; f) Continue data collection for the comparison of two inactivated hepatitis A vaccines for their cross-immunogenicity and efficacy. (\$ 0.572 Million)

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(U) **Military Operational Medicine:** FY1998 funds supported 23 projects in Military Operational Medicine. Goals of a few representative proposals are as follows: a) Investigate psychobiological dysfunction (PTSD symptomology) resulting from exposure to combat-like trauma; b) Understand how stress-induced changes in glucocorticoid hormones suppress the immune response; c) Continue to investigate the training practices impacting exertional heat illness in Marine Corps basic training, as well as to study how immune function is affected by exercise; d) Attempt to determine the relationship of health outcomes and job performance to substance use in the military; e) Delineate the gene transcription mechanisms underlying neural enhancement of cognitive function and soldier performance; f) Continue work to understand chronobiotic role of extra-retinal light reception in the control of the physiologic circadian rhythm. (\$ 0.264 Million)

(U) **Nuclear, Biological and Chemical Medical Defense:** There were six projects in progress in FY1998 in the NBC area. Representative research efforts in this area are: a) Characterize the breakdown of 1,4-benzodiazepines, such as valium, used as an antidote to central nervous system effects of nerve agent poisoning; b) Study the pattern of sensory input to the frontal cortex for treatment of head injury; c) Study the DNA structure and repair mechanisms of the organism *Deinococcus radiodurans* to understand the mechanism of its extraordinary resistance to radiation; d) Study the functional deficits induced by neocortical cholinergic depletion and the potential restoration of function by administration of nerve growth factor. (\$ 0.14 Million)

(U) **FY1999 Plans:**

(U) **Combat Casualty Care:** The objective of this program is to provide support for a significant number of new and continuing projects in Combat Casualty Care from FY1998. The program is continuing 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 continue to be an important area of research. Another major thrust area is peripheral nerve injury and traumatic brain injury with the use of 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. (\$ 0.82 Million)

(U) **Infectious Diseases:** This broad area continues to be one of emphasis within the USUHS; approximately 30 protocols are supported in this area. Militarily relevant bacterial threat agents such as *E. coli* and its toxins, gonococcus, and streptococcus garner significant available resources. Mobilization of macrophages and antibody production continues 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 continues the study of bartonellosis in Peru by examining the vector and the animal reservoir, and by performing studies of the epidemiology of this parasitic disease. The study of the comparison of two inactivated hepatitis A vaccines should be brought to completion with the final results influencing the decision for vaccination of military personnel. (\$ 0.739 Million)

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(U) **Military Operational Medicine:** FY1999 funds are supporting research in training and military readiness as a critical area within Military Operational Medicine. Training practices and their effects on exertional heat illness of Marine Corps basic training recruits continue 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 and nicotine intake and dysfunctional eating habits also continue. New work to delineate neural mechanisms underlying post-traumatic stress disorder (PTSD) is being initiated. Other studies addressing different aspects of military training and readiness are anticipated. (\$ 0.391 Million)

(U) **Nuclear, Biological and Chemical Medical Defense:** Multiple basic research projects in this threat area are being supported. Analysis of the chemical breakdown of different isomers of 1,4 benzodiazepines, such as Valium, and other chiral drugs used as antidote to central nervous system effects of nerve agent poisoning, continue. Study of the pattern of sensory input to the frontal cortex is being supported. The organism that exhibits extraordinary resistance to ionizing radiation, *Deinococcus radiodurans*, is being examined to better understand what gives it this unique ability. A study is being initiated to study the role of mitochondrial membrane proteins in agent-induced cell death.(\$ 0.217 Million)

(U) **FY2000 Plans:**

(U) Efforts will continue in all the major research areas (CCC, ID, MOM, and NBC) for FY2000. Specific projects compete for funding each year, therefore, detailed description of the research is impossible at this time. (\$ 2.033 Million)

(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. (\$ 2.021 Million)

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(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	1.513	2.173	2.068	2.057	Continuing
Appropriated Value	1.569	0	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-0.074	-0.006			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	-0.035	-0.036	
c. Other	0	0			
Current Presidents Budget	1.495	2.167	2.033	2.021	Continuing

**Change Summary Explanation:**      Funding changes are due to congressional undistributed reductions and inflation adjustments.

- (U)    **Funding:**      N/A
- (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 1				R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z						
COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	214.600	228.415	216.778	210.332	214.436	237.414	242.391	247.490	Continuing	Continuing
URI/P103	196.601	209.201	206.778	200.332	204.436	227.414	232.391	237.490	Continuing	Continuing
DEPSCoR/P104	17.999	19.214	10.000	10.000	10.000	10.000	10.000	10.000	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 our 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, in conjunction with the other project within this program element, competitively supports programs at universities nationwide in three interrelated categories:

- **Research.** The main thrust of the URI is 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 addition, the URI 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. Through FY 1998, the URI also supported the Augmentation Awards for Science and Engineering Research Training (AASERT) program, which awarded research traineeships for graduate students and also supported laboratory experiences for undergraduate students on defense research projects.
- Infrastructure. URI support for the development of research infrastructure responsive to defense needs includes three programs. 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 third program is the Defense Experimental Program to Stimulate Competitive Research in project P104.

(U) P 104, Defense Experimental Program to Stimulate Competitive Research (DEPSCoR). The DEPSCoR further helps to build national infrastructure for research and education in defense-critical fields 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.

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

(U) **FY1998 Accomplishments:**

(U) Programmatic accomplishments:

- Research. A MURI competition conducted by the Services resulted in 17 new starts in high-priority areas of multi-Service interest related to four Strategic Research Objectives identified in the DoD's corporate Basic Research Plan: nanoscience, biomimetics, compact power sources, and mobile wireless communications. 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. (\$ 117.660 Million)
- Education. Under the National Defense Science and Engineering Graduate Fellowship program, 96 new graduate fellowships were competitively awarded for study leading to advanced degrees in science and engineering fields of importance to national defense. The FY 1998 competition for the AASERT program led to the award of research traineeships for more than 125 graduate students and support for the involvement of more than 50 undergraduate students in defense research. (\$ 29.003 Million)
- Infrastructure. More than 230 new awards were made under the FY 1998 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 1998 competition under the DEPSCoR program resulted in 72 new awards. (\$67.937 Million)

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(U) Selected technical accomplishments:

- Researchers at the Georgia Institute of Technology, Northwestern University, and University of Minnesota at Minneapolis used a new method to demonstrate the feasibility of using ultrasonic guided waves to detect the initiation of flaws and other potential failure sites in annular structures, such as those in helicopter rotor hubs. The method includes a theoretical model for the propagation of ultrasonic waves of multiple frequencies traveling at different velocities through a complex structure, and a transfer function to interpret the effects of cracks or other flaws on the acoustic waveform when a structure is subjected to such waves. The new method has multiple advantages over existing x-ray, destructive-testing, and pulse-echo methods for detecting cracks in annular structures: it is less expensive and faster than any of the them; it does not require removing and replacing suspected parts, as do x-ray and destructive-testing methods; and it probes the entire path through the structure, unlike the pulse-echo methods that rely on reflection of transmitted pulses from cracks or other flaws. The use of the new method will increase understanding of deterioration mechanisms in materials and structures, and should enable development of technologies for detecting and predicting microcracks and fractures in real-time. These advances underpin early detection of structural flaws to prevent catastrophic failures in ships, aircraft, and other defense systems (e.g., due to metal fatigue and wearout in rotating machineries, such as high-cycle fatigue in jet aircraft).
- Scientists at Tufts University, Pennsylvania State University, and Columbia developed a biomimetic "nose" to detect volatile organic chemical compounds at vapor-phase concentrations of tens of parts per billion, more than ten times as sensitive as previous man-made "noses" and approaching the sensitivity of canine noses. It also has dramatically improved signal-to-noise ratios of man-made devices. The "nose" is biologically inspired in that it mimics olfactory systems of dogs and other vertebrates in two new and important ways. First, it detects the organic compounds using ensembles of different receptors distributed randomly on a surface, mimicking the olfactory epithelium in an animal's nose. The receptors are polymer microspheres impregnated with various fluorophors that fluoresce in the presence of different, specific compounds. A fiber-optic bundle images the detecting surface on a charged-coupled device; the spatial pattern of the fluorescence and its temporal duration vary with the compound being detected, due to the different spatial distribution and temporal response of the receptors for that compound. The second way in which this "nose" mimics animal olfactory functions is in the data processing for detecting, classifying, and quantifying the compounds; it uses computational neural networks that "learn" the spatial and temporal pattern of the response for each chemical using algorithms that are based on those that animal brains use to process olfactory data. The new "nose" can detect single compounds or mixtures of various compounds. It is a major advance in detection and identification of minute traces of biochemical compounds and has great potential for application in unexploded ordnance detection, chemical and biological warfare defense, and other areas important to protecting warfighters on land and sea.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z	

- A team at the University of Illinois and the University of Texas at Austin made three significant advances in the area of predicting radar scattering from complex surfaces. First, they extended the new Fast Multipole method to numerically solve equations of electromagnetic wave propagation and compute in a day the scattering of 3-gigahertz radar from the Northrup/McDonnell-Douglas YF-23 (using a computer-assisted design file for the plane); this is a major advance over earlier methods, when solving a complex problem like this one, with two million unknowns, would have taken months and been plagued with errors. Second, they found a quicker way to compute scattering from nearly planar surfaces, which includes important cases such as optical gratings, scattering from very corrugated surfaces with high spatial frequencies (such as vegetation and other ground clutter), and microstrips on ground planes; for this class of scatterers, the researchers discovered a clever way to represent the problem using an integral that can be evaluated by an even faster algorithm than the standard Fast Multipole method. Third, the team devised a new Plane-Wave/Time-Domain (PWTD) algorithm that can quickly compute scattering involving wider frequency ranges, such as scattering of wideband radars. The PWTD calculation in the time and space domains can handle those problems, complementing the Fast Multipole method's Fourier transforms into the frequency domain that cannot do so. Like the Fast Multipole method, the PWTD method uses surface integrals that have major advantages over earlier methods that use volume integrals; it is faster and does not introduce the grid induced dispersion and numerical artifacts produced by the other methods. The team has extensive contacts with industry and government offices that will use the greater power and fidelity of the new methods to design low-observable platforms and target recognition systems for the DoD.
- Researchers at Carnegie Mellon University developed a process to make nanocrystalline phases of iron-cobalt (FeCo) and demonstrated that the materials have excellent soft magnetic properties that persist at higher temperatures needed for military platform applications. Soft magnetic materials are used in alternating-current devices, such as rotors of electric generators, because they can be easily magnetized and demagnetized in the presence of oscillating, applied magnetic fields and have correspondingly lower power losses due to hysteresis effects in those oscillating fields. The military services need soft magnetic materials as they move toward air, land, and sea platforms with more electric systems to replace fluid-cooling and hydraulic systems that require a great deal of maintenance and are a major cause of breakdowns. The new iron-cobalt materials are nanocrystalline, so they have soft magnetic properties that are superior to those of a single crystal or amorphous material; most importantly low power losses. The new materials exhibit those superior properties at higher temperatures than previous nanocrystalline soft magnets; they do so up to a Curie temperature of 970 degrees Celsius, 200 degrees higher than the Curie temperature for previous materials and high enough for applications in aircraft engines operating at 600 degrees Celsius with the needed safety margin. They also exhibit the properties at much higher magnetic fields, up to 2.1 Tesla, than earlier nanocrystalline magnetic materials; with the higher fields, generators made from the materials have higher efficiency. Thus, the new materials have good potential for application in electric systems to help increase efficiency and reduce weight, cost, and need for maintenance in aircraft engines and other subsystems for military platforms. The university researchers' collaborations with industry and national and DoD laboratories will promote transition of the research findings to potential applications.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z	

- Scientists at Clemson University, North Carolina State University, and the University of Michigan developed unique measuring and modeling capabilities and used them to begin to understand the physical mechanisms affecting quasi-optical power generation by arrays of discrete solid-state sources at frequencies of 10-100 Gigahertz. Vacuum tubes traditionally have been used to get the multiwatt powers at higher frequencies that are required for missile seekers and military communications applications, but there is interest in using solid-state devices because they are cheaper, smaller, and more reliable. The problem is that a single solid-state source produces only 0.1-0.2 watts at the higher frequencies of interest. Using networks with transmission lines to combine outputs of single sources in a brute force way works for 10 sources, but begins to drop off in efficiency for greater numbers of sources due to the complexity of the combining networks. Attempts to get the higher powers by quasi-optically combining the electromagnetic outputs of arrays of 36-100 sources, rather than using metal connections, have yielded total power much lower than the sum of the powers of the single devices. To try to understand the problem with these quasi-optical methods, the researchers developed the first instrument that measures the electromagnetic field amplitude and phase in three dimensions near these solid-state arrays with minimal disturbance of the field. They also developed a unique model to simulate the electromagnetic field inside and outside the array, as well as temperature and nonlinear device effects inside the solid-state material. What they found, which is entirely new and unexpected, is that fields emitted by some sources within an array can be out of phase with those emitted by other sources, causing destructive interference in the electromagnetic field; essentially, power emitted by the former sources is being dissipated by the latter sources due to the phase mismatch. The understanding that the researchers are gaining of the fundamental physics should enable the control and elimination of the interference effects, which will improve output powers of high-frequency, solid-state arrays by factors of ten or more to the multiwatt levels needed for military applications.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z	

(U) **FY1999 Plans:**

- Research. Topics for new MURI starts were selected in high-priority research areas such as solid-state electronics (radiation hardening, vacuum electronics, and nanolithography), detection of chemical and biological agents (high selectivity and stochastic sensing mechanisms), computational neuroscience for learning and human/machine interactions, novel materials (tunable electronic polymers, adaptive infrared response materials, computational design), propulsion (pulsed detonation phenomena), ionospheric characterization (global specification and forecasting), and information processing (nonclassical representation and manipulation). The results of that MURI competition should be announced in early 1999. Multidisciplinary and PECASE programs begun in prior years are continuing, with new competitive awards under the PECASE program. (\$137.183 Million)
- Education. A FY 1999 competition is being conducted to award approximately 200 graduate fellowships under the National Defense Science and Engineering Graduate Fellowship Program, as the separate AASERT program of graduate research traineeships is discontinued. (\$23.412 Million)
- Infrastructure. The FY 1999 competition under the DURIP program resulted in 233 awards for research equipment needed to perform cutting-edge defense research. Sixty-seven new awards were made under the DEPSCoR program. Efforts begun in prior years under the URI Support Program will continue. (\$67.820 Million)

(U) **FY2000 Plans:**

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z	

- Research. Topics for new MURI starts will be selected in high-priority research areas such as novel materials; devices and structures concepts; information science, including data fusion, distributed computing, quantum computing and quantum memory; biomolecular science and engineering; advanced, ultrawide-bandwidth communications; electronic/electro-optical devices; and compact power systems. Multidisciplinary and PECASE programs begun in prior years will continue, with new competitive awards under the PECASE program. (\$133.486 Million)
- Education. A FY 2000 competition will be conducted to award approximately 200 graduate fellowships under the National Defense Science and Engineering Graduate Fellowship Program. (\$23.117 Million)
- Infrastructure. FY 2000 competitions will be conducted for new awards under the DEPSCoR and DURIP programs. Efforts begun in prior years under the URI Support Program will continue. (\$60.175 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z	

(U) **FY2001 Plans:**

- Research. Topics for new MURI starts will be selected in high-priority research areas such as fields underlying the understanding of harsh battlespace environments for military personnel and systems, life extension and life assurance for materials and structures, the physical and mathematical bases of information science, modeling and simulation, and education and training to improve human performance under extreme stress. Multidisciplinary and PECASE programs begun in prior years will continue, with new competitive awards under the PECASE program. (\$130.094 Million)
- Education. A FY 2001 competition will be conducted to award approximately 200 graduate fellowships under the National Defense Science and Engineering Graduate Fellowship Program. (\$21.449 Million)
- Infrastructure. FY 2001 competitions will be conducted for new awards under the DEPSCoR and DURIP programs. Efforts begun in prior years under the URI Support Program will be completed. (\$58.789 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 1	R-1 ITEM NOMENCLATURE UNIVERSITY RESEARCH INITIATIVE PE 0601103D8Z	

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	222.628	216.320	220.522	214.219	Continuing
Appropriated Value	230.788	229.420			Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	(13.714)	(1.005)			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	(2.474)		(3.744)	(3.887)	
c. Other					Continuing
Current President's Budget	214.600	228.415	216.778	210.332	Continuing

**Change Summary Explanation:**

(U)    **Funding:**      Funding changes due to inflation program adjustments.

(U)    **Schedule:**      Not Applicable

(U)    **Technical:**      Not Applicable

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

**D. Acquisition Strategy:** Not Applicable

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

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 1							<b>R-1 ITEM NOMENCLATURE</b> Gulf War Illnesses Research PE 0601105D8Z			
<i>COST(In Millions)</i>	FY 1998	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	23.674	19.185	19.098	18.988	0	0	0	Continuing	Continuing
Gulf War Illnesses Research/P105	0	23.674	19.185	19.098	18.988	0	0	0	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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>										<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 1								<b>R-1 ITEM NOMENCLATURE</b> Gulf War Illnesses Research PE 0601105D8Z			

<i>COST(In Millions)</i>	FY 1998	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	23.674	19.185	19.098	18.988	0	0	0	Continuing	Continuing
Gulf War Illnesses Research/P105	0	23.674	19.185	19.098	18.988	0	0	0	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) None reported under this program element. This was a new program element beginning in FY1999. (\$ 0 Million)

(U) **FY1999 Plans:**

(U) Competitively fund 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.(\$ 3 Million)

(U) Competitively fund projects which advance deployment toxicology bioassay and biosentinel-based detection and exposure assessment methods, particularly strategies to assess neurotoxic health hazards (\$ 3 Million)

(U) Competitively fund 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, radiofrequency radiation-enhanced toxicity of drugs, stress effects and interactions of multiple vaccines on vaccine effectiveness (\$ 3 Million)

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(U) Competitively fund epidemiological studies to develop and evaluate effectiveness of health assessment and health care delivery pre-, during, and post-deployment, advancing Force Health Protection surveillance strategies in future deployments. (\$ 3 Million)

(U) Conduct 2-year Medical Follow-up Agency (Institute of Medicine) study of prewar healthcare-seeking behaviors of Gulf War veterans and their subsequent health outcomes.  
(\$ 0.5 Million)

(U) Conduct 2-year Medical Follow-up Agency (Institute of Medicine) study of Aberdeen personnel previously exposed to low level chemical agents. (\$ 0.5 Million)

(U) Develop Leishmania vaccine and demonstrate feasibility of reliable serological diagnostic tests in a four year program conducted by Army and Navy infectious disease research laboratories Develop Leishmania vaccine and demonstrate feasibility of reliable serological diagnostic tests in a four year program conducted by Army and Navy infectious disease research laboratories.(\$ 1.5 Million)

(U) Conduct an expanded epidemiological research effort at the Naval Health Research Center involving deployment health assessments. (\$ 1.5 Million)

(U) Conduct Congressionally-mandated study of difficult to diagnose conditions such as fibromyalgia, chronic fatigue syndrome, and multiple chemical sensitivities, using advanced neuroscience methods,  
(\$ 3.15 Million)

(U) Study DOD and VA Gulf War registry participants in unique opportunity to address hypothesis-driven epidemiological research on deployment health risk factors. (\$ 1 Million)

(U) Program management, contract servicing costs, and supplemental funding to previously funded GWI research studies.  
(\$ 3.524 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 1	<b>R-1 ITEM NOMENCLATURE</b> Gulf War Illnesses Research PE 0601105D8Z	

(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. (\$ 12 Million)

(U) Conduct 2-year Medical Follow-up Agency (Institute of Medicine) study of prewar healthcare-seeking behaviors of Gulf War veterans and their subsequent health outcomes. (\$ 0.5 Million)

(U) Conduct 2-year Medical Follow-up Agency (Institute of Medicine) study of Aberdeen personnel previously exposed to low level chemical agents. (\$ 0.5 Million)

(U) Develop Leishmania vaccine and demonstrate feasibility of reliable serological diagnostic tests in a four year program conducted by Army and Navy infectious disease research laboratories. (\$ 1.5 Million)

(U) Conduct an expanded epidemiological research effort at the Naval Health Research Center involving deployment health assessments (\$ 1.5 Million)

(U) Program management, contract servicing costs, and supplemental funding to previously funded GWI research studies.(\$ 3.185 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. (\$ 12 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 1	<b>R-1 ITEM NOMENCLATURE</b> Gulf War Illnesses Research PE 0601105D8Z	

- (U) Conduct 2-year Medical Follow-up Agency (Institute of Medicine) study of prewar healthcare-seeking behaviors of Gulf War veterans and their subsequent health outcomes. (\$ 0.5 Million)
  
- (U) Conduct 2-year Medical Follow-up Agency (Institute of Medicine) study of Aberdeen personnel previously exposed to low level chemical agents. (\$ 0.5 Million)
  
- (U) Develop Leishmania vaccine and demonstrate feasibility of reliable serological diagnostic tests in a four year program conducted by Army and Navy infectious disease research laboratories. (\$ 1.5 Million)
  
- (U) Conduct an expanded epidemiological research effort at the Naval Health Research Center involving deployment health assessments.(\$ 1.5 Million)
  
- (U) Program management, contract servicing costs, and supplemental funding to previously funded GWI research studies. (\$ 3.098 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 1	R-1 ITEM NOMENCLATURE Gulf War Illnesses Research PE 0601105D8Z	

<b>(U) B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	0	19.646	19.515	19.443	Continuing
Appropriated Value	0	23.796	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	0	-0.122			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	-0.330	-0.345	
c. Other	0	0	0	0	
Current Presidents Budget	0	23.674	19.185	19.098	Continuing

**Change Summary Explanation:**      Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U)    **Funding:**      FY 1999 establishes a separate PE for Gulf War Illness Research.

(U)    **Schedule:**      N/A

(U)    **Technical:**      FY 1999 establishes a separate PE for Gulf War Illness Research.

(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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 1							<b>R-1 ITEM NOMENCLATURE</b> Government/Industry Co-sponsorship of University R PE 0601111D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	6.942	4.801	6.351	6.762	6.891	7.011	7.226	7.345	Continuing	Continuing
GICUR/P111	6.942	4.801	6.351	6.762	6.891	7.011	7.226	7.345	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 dispersed 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 communications, electrically powered ships, multisensor surveillance/ integration) are avoided. The results are of extreme importance for the Critical Infrastructures Protection national need. The second area implemented emphasizes basic concepts for DoD needs in high frequency applications such as radars, millimeter/microwave communications and radiometry, with special attention to devices fabricated from compound semiconductors, such as gallium arsenide. This thrust is unique to DoD. The thrust is by no means limited to silicon-based CMOS (complementary metal oxide silicon) digital topics. Research here is aimed at breakthroughs to enable rapid, correct, verifiable, implementable designs of complex circuits. Interconnect research will include causes of delays and performance limits as features become smaller (for higher speed). Higher conductivity metals and very low dielectric constant materials will be investigated, as will non-conventional, innovative fabrication processes beyond present vision. These areas require truly innovative research.

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(U) Within government, DoD has taken the lead in establishing GICUR efforts on these topics. An additional effort will now be directed at another area: Structures and Smart Materials for Reliability Advances This will be co-sponsored by industry in GICUR programs.

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 1							<b>R-1 ITEM NOMENCLATURE</b> Government/Industry Co-sponsorship of University R PE 0601111D8Z			

<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	6.942	4.801	6.351	6.762	6.891	7.011	7.226	7.345	Continuing	Continuing
GICUR/P111	6.942	4.801	6.351	6.762	6.891	7.011	7.226	7.345	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Implemented complex adaptive networks program covered under new MOA between electric power industry and DoD, and design/interconnect research program for complex circuits covered under another MOA between industry and DoD. Finalized goals and management structure for both GICUR program, with emphasis on interactions between DoD and industrial consortia sponsors. Jointly chose the first subareas for research and determined selection criteria for proposals. Establish multi-university, multi-investigator programs for the focus topics. (\$ 6.942 Million)

(U) **FY1999 Plans:**

(U) Evaluate operations of first industry-driven consortia, the research programs supported and set further directions. Plan for a new thrust in smart structures and smart materials for reliability advances suitable for university-performed consortium-teamed research. Identify organizations, industry groups, existing consortia, other government agencies, etc. interested in the GICUR concept for further program development. The program in this field will be implemented. Management structure is to be finalized with emphasis on multiservice needs and opportunities being addressed. (\$ 4.801 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 1	<b>R-1 ITEM NOMENCLATURE</b> Government/Industry Co-sponsorship of University R PE 0601111D8Z	

**(U)      FY2000 Plans:**

(U)      Research in long range aspects of the three areas included in GICUR will continue. 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. (\$ 6.351 Million)

**(U)      FY2001 Plans:**

(U)      Theoretical and experimental achievements will be fully documented to-date. Research will continue along lines both needs and opportunity driven, dependent upon success to date. (\$ 6.762 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 1		R-1 ITEM NOMENCLATURE Government/Industry Co-sponsorship of University R PE 0601111D8Z

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	7.393	9.870	9.667	9.691	Continuing
Appropriated Value	7.713	5.674	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	0.32	-0.873	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	0	0	
c. Other	0	0	-3.316	-2.929	
Current Presidents Budget	6.942	4.801	6.351	6.762	Continuing

**Change Summary Explanation:**      Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U)      **Funding:**      FY 1988 and FY 1999 changes are due to Congressional directed reductions. Outyear adjustments are due to programmatic changes.

(U)      **Schedule:**      N/A

(U)      **Technical:**      FY 1988 and FY 1999 changes are due to Congressional directed reductions. Outyear adjustments are due to programmatic changes.

(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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>							<b>DATE</b> February 1999			
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/BA2							<b>R-1 ITEM NOMENCLATURE</b> Medical Free Electron Laser PE 0602227D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	19.137	14.496	9.719	9.698	4.670	4.651	4.749	4.848	Continuing	Continuing
MFEL/P483	19.137	14.496	9.719	9.698	4.670	4.651	4.749	4.848	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 applications.

(U) The majority of this program (80%) is focused on developing advanced procedures for the rapid diagnosis and treatment of battlefield - related casualties. Specific applications under investigation include soft tissue repair, hard tissue surgery, therapies for thermal burns and chemical burns, and enhanced medical imaging. Laser applications will be clinically tested in unique MFEL 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 much smaller part of this program (20%) is focused on electronic materials research. In these studies, the high energy FEL beam is being exploited for improved processing applications including more effective dopants, surface cleaning and modification of transport properties of microelectronic substrates

(U) The program is executed extramurally. Performers include 5 major medical centers and approximately 20 applications groups. Awards are made competitively, following solicitation and peer review, for performance periods of 2 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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>									<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/BA2							<b>R-1 ITEM NOMENCLATURE</b> Medical Free Electron Laser PE 0602227D8Z			

<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	19.137	14.496	9.719	9.698	4.670	4.651	4.749	4.848	Continuing	Continuing
MFEL/P483	19.137	14.496	9.719	9.698	4.670	4.651	4.749	4.848	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 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. The mid-infrared FEL was compared with a new prototype optical parametric mid-infrared laser for incision quality. (\$ 2.221 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 facilities was completed. (\$ 2.882 Million)

(U) Research on surgical applications of lasers in wound repair, neurosurgery and burn treatment continued at Mass General Hospital. Collaborations were conducted with the Army Institute of Chemical Defense on chemical burn treatment. (\$ 3.751 Million)

(U) Research on wound sterilization and bone surgery continued at the Beckman Laser Institute. Development of a new Doppler-imaging device for guiding laser usage by burn surgeons continued. (\$ 0.993 Million)

(U) Research on biomolecular and tissue absorption characteristics of FEL radiation continued at Stanford University, as was research into the effects of FEL radiation on microelectronic and energetic materials. (\$ 2.155 Million)

(U) Research to develop compact FELs, optical fibers and wave-guides for use in hospitals and battlefield settings continued. (\$ 3.283 Million)

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(U) Studies on the interactions of photons with biomolecules, cells, tissues, and materials continued.(\$ 3.852 Million)

(U) **FY1999 Plans:**

(U) A competition for medical center awards will be 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 three. 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. (\$ 14.496 Million)

(U) **FY2000 Plans:**

(U) Reduce number of centers funded in the Program from five to three and provide interim funding for close out and transition of promising technologies to industry. Phase out all electronics research and refocus continuing research efforts to address identifiable transition targets relevant to treatment and diagnosis of medical conditions of specific interest in military medicine. Selection of centers and specific projects will depend upon competition held during FY1999. (\$ 9.719 Million)

(U) **FY2001 Plans:**

(U) Begin phase-out of two of the three academic research centers by transition of research efforts to either military medical institutions or industry. Continue development of new procedures for treatment and diagnosis of medical conditions of particular pertinence to military medicine. (\$ 9.698 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/BA2		<b>R-1 ITEM NOMENCLATURE</b> Medical Free Electron Laser PE 0602227D8Z

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	20.103	9.706	4.800	4.782	Continuing
Appropriated Value	20.841	14.706	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-1.704	-0.210			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	-0.081	-0.084	
c. Other	0	0	5.000	5.000	
Current Presidents Budget	19.137	14.496	9.719	9.698	Continuing

**Change Summary Explanation:** Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U) **Funding:** The budget reflects an increase of \$5M in FY00 and FY01 to maintain three medical centers.

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

(U) **Technical:** Changes are due to Congressional adjustments in FY 1998 and FY 1999. Outyear programs continue support for three medical centers.

(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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>							<b>DATE</b> February 1999			
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA2							<b>R-1 ITEM NOMENCLATURE</b> Historically Black Colleges and Universities (HBCU) PE 0602228D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	10.724	0	14.329	14.338	14.515	14.960	15.291	15.626	Continuing	Continuing
HBCU/P489	10.724	0	14.329	14.338	14.515	14.960	15.291	15.626	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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA2		<b>R-1 ITEM NOMENCLATURE</b> Historically Black Colleges and Universities (HBCU) PE 0602228D8Z

<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	10.724	0	14.329	14.338	14.515	14.960	15.291	15.626	Continuing	Continuing
HBCU/P489	10.724	0	14.329	14.338	14.515	14.960	15.291	15.626	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Awards were made under the DoD Infrastructure Support Program for HBCU/MIs. In one solicitation the Army, Navy and Air Force as a group made a total of forty-three grants to forty-two HBCU/MIs. There were thirty-five Instrumentation awards and eight Education awards. The Instrumentation Program awards made by the Army and Air Force provides for the acquisition of research and educational-use technology equipment and instrumentation. Emphasis is on instrumentation which will enhance the ability of HBCU/MIs to perform research which is of interest to DoD and to increase the number of underrepresented minority graduates in the fields of science, engineering, and mathematics. The Navy continued funding for eight education centers. The Education Centers Program is designed to (a) enhance programs and capabilities at HBCU/MIs in scientific disciplines critical to the national security function of DoD and (b) to increase the number of underrepresented minority in the fields of science, mathematics and engineering. (\$ 10.724 Million)

(U) **FY1999 Plans:**

(U) The FY 1999 program was divided among the Army, Navy, and Air Force to execute based on the Defense Reform Initiative. (\$ 0.0 Million)

(U) **FY2000 Plans:**

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA2		<b>R-1 ITEM NOMENCLATURE</b> Historically Black Colleges and Universities (HBCU) PE 0602228D8Z

(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. The: FY 2000 broad agency announcement is scheduled to be distributed in August 1999. (\$ 14.329 Million)

(U) **FY2001 Plans:**

(U) Continue evaluation of the awards made with prior year funds. In FY2001, 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. (\$ 14.338 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA2		<b>R-1 ITEM NOMENCLATURE</b> Historically Black Colleges and Universities (HBCU) PE 0602228D8Z

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	11.080	0	0	0	Continuing
Appropriated Value	0	0	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-0.356	0	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	0	0	
c. Other	0	0	14.329	14.338	
Current Presidents Budget	10.724	0	14.329	14.338	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). However, for FY2000 and beyond the Defense Reform Initiative PBD 711R directed that program be reverted to OSD.

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

(U) **Technical:** 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). However, the Defense Reform Initiative reversed that direction FY 2000 and out year funds.

(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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>									DATE February 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 2					R-1 ITEM NOMENCLATURE Lincoln Laboratory PE 0602234D8Z					
COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	17.197	19.271	20.774	20.739	20.994	21.275	21.781	22.590	Continuing	Continuing
Lincoln Laboratory/P534	17.197	19.271	20.774	20.739	20.994	21.275	21.781	22.590	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 Federally Funded Research and Development Center (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 funds research activities that directly lead to the development of new system concepts, new technologies, and new components and materials. Historically, funding supports 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 funding 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, and (3) fundamental target-recognition bounds and their implications for sensor and algorithm design.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 2	R-1 ITEM NOMENCLATURE Lincoln Laboratory PE 0602234D8Z	

- 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;
- Advanced combat support technologies for hyperspectral sensing systems, Micro Air Vehicles for battlefield surveillance 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 applications 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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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 2					R-1 ITEM NOMENCLATURE Lincoln Laboratory PE 0602234D8Z					
	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
COST ( <i>In Millions</i> )										
Total Program Element (PE) Cost	17.197	19.271	20.774	20.739	20.994	21.275	21.781	22.590	Continuing	Continuing
Lincoln Laboratory/P534	17.197	19.271	20.774	20.739	20.994	21.275	21.781	22.590	Continuing	Continuing

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

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

(U) **FY1998 Accomplishments:**

(U) **Target Surveillance and Recognition:** (\$4.574 Million)

(U) **Surface Surveillance**

(U) Used the airborne data collection system to image large portions of Ft. Drum, NY over several seasons, creating a unique database of synthetic-aperture-radar (SAR) change phenomenology. Applied fundamental target-recognition bounds to design study of height-sensing SAR. Initiated investigation of “inverse scattering” theory for application to target-recognition in foliage penetrating SAR imagery. These activities have had direct impact on ongoing R&D activities such as Dynamic Data Base (DDB) and Radar Complex Data Exploitation (RCDE) (both DARPA); and have considerable significance for agencies such as NIMA and NRO that must plan next-generation exploitation and sensing systems.

(U) **Space Surveillance**

(U) Continued the advanced electro-optical technology program in support of the Air Force Space Control Mission. Expanded the technology development effort to include advanced electro-optical seekers for Ballistic Missile Defense. Continued the development of advanced CMOS readout multiplexers for IR focal plane arrays that will enable the improvement of FPA pixel to pixel spatial uniformity for high quantum efficiency detector materials such as InSb and HgCdTe. An FPA CMOS readout multiplexer design has been implemented; fabrication of CMOS integrated circuits for full function FPA readouts have begun. Continued the development of avalanche photo-diode (APD) array for 3-D laser radar imaging to support advanced BMD interceptor seeker concept. Four by four APD sub-arrays have been fabricated and wire bonded to 16-channel CMOS timing electronics. A 3D laser radar brassboard system has been demonstrated. The FPA technology developments will become the basis for improved seekers for the BMD community including the Navy Lower and Upper Tier Theater Ballistic Missile Defense Programs.

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(U) **Military Communications:** (\$3.484 Million)

(U) Continued to investigate globally networked military communications systems that will enable the free flow of information among disparate users and systems at rates from tens of kilobits per second to tens of gigabits per second. The targeted user community for these systems includes DoD (Air Force, Navy & Army) and the intelligence community. Technology is under development for both free-space optical communications and terrestrial fiber communications, as well as for tactical theater communications, particularly to forces on the move, and for the interconnection of satellite communications (SATCOM), terrestrial and wireless systems into a global defense network.

(U) Optical communications: Free-space optical communications technology successfully transitioned to a 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 and demonstration of optical technology for ultra-high rate local and metropolitan area networks (LANs and MANs). Demonstration of optical processing functions for high-speed cryptography and for packet routing in a 100 Gbps LAN/MAN. Application to processing and fusion of surveillance data.

(U) Tactical Satellite Terminals: 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 development of architecture and plans for integration of transmit and receive arrays. Continue implementation of an 8 GHz receive array. Application to ground forces communication on the move and to aircraft.

(U) Defensive Information Warfare: Developed and demonstrated a prototype protocol for dynamic reconfiguration in a network conferencing application, to confuse potential network attackers. Developed a network for realistic simulation of actual attacks and anomalous usage, mixed with normal network background traffic, in order to evaluate objectively the performance of existing and developmental intrusion detection systems.

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(U) **Combat Support Technology:** (\$2.903 Million)

(U) Designed and developed a baseline active hyperspectral imaging (HSI) system that incorporates a VIS/NIR white-light “laser” illuminator on a scanning, tripod-mountable platform with a compact imaging spectrometer. 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 are planned. Applications for the baseline system include man or vehicle vision enhancement, mine detection, and optical taggant discrimination.

(U) To improve the performance of UV fluorescence-based biological-agent sensors a large number of agent stimulants and background substances (pollens, mold spores, etc.) were measured in an aerosol chamber. In addition, field measurements of background clutter continued. These lab and field measurements have led to the development of a three-channel sensor for the Army, with considerably enhanced discrimination capability as compared to the previous two-channel sensor. Work was initiated in networking sensors together, both in simulations and for real-time sensing and discrimination. Also, development of a biological identifier accelerated with the addition of DARPA support. Immunological B-cells are being tailored and introduced into microfluidic chambers, which will analyze samples selected by the alarm device. Each cell fluoresces in response to a specific antibody and thereby will provide rapid identification of agents.

(U) Several fixed-wing Micro Air Vehicle (MAV) airframe configurations were tested in a wind tunnel to evaluate electric propulsion performance and the effectiveness of different wing and tail arrangements. Several airframe configurations were also outfitted with radio control for flight testing. A vehicle with 10-in. wingspan flew successfully. Development of more efficient, miniature internal combustion engines continued throughout the year. Optical designs were completed for two high-resolution, visible imaging cameras. The transfer of Lincoln technology will be completed by the end of FY98.

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(U) **Advanced Electronics Technology:** (\$6.236 Million)

(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 mm-wave devices, 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). Technology from this program is exploited by the Army and Navy ballistic missile defense programs (focal plane readout circuits), by Army EdgeWood Research Development and Engineering Center (ERDEC) (bioaerosol sensors), by DARPA (sub 0.25- $\mu\text{m}$  lithography, low-power/higher-speed CMOS circuits in silicon-on-insulator (SOI) material, high speed optical sampling for analog-to-digital (A/D) conversion, microfluidic bio-agent identifier, multichip modules) by BMDO (avalanche photodiodes for 3-D radar, GaN layers for electronics, superconductive spread spectrum modem) and 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, superconductive filters), and through cooperative research development agreements (CRDAs) microchip UV lasers, lithographic technology, and diamond switch technology.

(U) Selected accomplishments: (1) Demonstrated high-power, high brightness lasers at 2- and 4- $\mu\text{m}$  for dual-band IR counter measure subsystem; (2) Demonstrated resonant-tunnel-diode injection-locked oscillator for stable laser driver in optically sampled A/D converter; (3) Fabricated demultiplexers for optical A/D converter; (4) Demonstrated high-accuracy, low-power charge-coupled device (CCD) as A/D converter; (5) Evaluated SOI material and initiated fabrication of merged CMOS/CCD circuit for "smart" focal planes; (6) Demonstrated 1.3- $\mu\text{m}$ -wavelength tapered laser/amplifier with low noise for compact, wide-dynamic- range, analog fiber-optic link; (7) Demonstrated multi-GHz-bandwidth superconductive compressive receiver for electronic intelligence (ELINT); (8) Fabricated > 1-GHz clock-rate SOI/CMOS data-processing circuits for ELINT receiver; (9) Demonstrated geiger-mode avalanche photodiode (APD) array with CMOS per-pixel timing circuits for 3-D radar; (10) Demonstrated antiblooming feature for extended intrascene dynamic range in CCD imager for improved night vision; (11) Continued development of miniature IR, visible and UV lasers for ranging and biodetection; (12) Designed tunable microwave filters using superconductive resonators; (13) First demonstration of avalanche photo gain in GaN.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 2	R-1 ITEM NOMENCLATURE Lincoln Laboratory PE 0602234D8Z	

(U) **FY1999 Plans:**

(U) **Target Surveillance and Recognition:** (\$4.977 Million)

(U) **Surface Surveillance:**

(U) Initiate development of multichannel airborne data collection capability. Extend fundamental target-recognition bounds to high-range-resolution radar profiling for application to moving-ground-target recognition. Use synthetic foliage-penetrating radar imagery to validate target representation for inverse-scattering-based recognition techniques. Initiative investigation of active seismic characterization of underground facilities – develop computational model and validate with subscale experimentation. In addition to being directly applicable to ongoing R&D efforts such as DARPA’s DDB, MTE, FOPEN and Small Unit Operations programs, these activities will have considerable significance for organizations, such as NIMA, NRO and the Services, that are planning and developing next-generation exploitation and sensing systems.

(U) **Space Surveillance:**

(U) Continue advanced focal plane technology work with emphasis on submicron and SOI CMOS device processing technologies applied to silicon monolithic read-out multiplexers for high quantum efficiency FPAs. Continue 3-D laser radar technology development with epoxy bonding of 32 x 32 APD arrays to SOI-CMOS timing electronics arrays for high sensitivity receivers. These advanced focal plane array technologies for both passive and active IR sensors will lead to new BMD interceptors with much-needed improvements in detection, acquisition and discrimination to counter increasingly challenging ballistic missile threats. Both the Army and Navy Theater Ballistic Missile Defense Programs will gain advanced interceptor capabilities from these technologies.

(U) **Military Communications:** (\$4.183 Million)

(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: Initiate test-bed demonstration of 100 Gps LAN and MAN for processing surveillance data, utilizing soliton optical pulses and optical processing (current state-of-the-art for electronic networks is ~2Gbps); demonstrate networking techniques and protocols for interconnection of disparate military communications systems. Milsatcom: Complete architecture for EHF Milsatcom beyond 2005, including sophisticated, 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; identify required technology developments. Tactical Satellite Terminals: Continue development of optically-controlled phased array antennas. Evaluate 4-element receive array at 8 GHz; continue development of integrated transmit and receive array (application to communications on-the-move to ground forces and to aircraft).

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(U) **Defensive Information Warfare:** Techniques for dynamic network reconfiguration will be refined, extended and demonstrated in the context of a large scale network, as a step towards developing technology for improved robustness in military C4I systems. The attack/anomalous usage simulation system will be extended beyond the Unix environment to embrace popular commercial operating systems, such as Windows NT, frequently used by the military. The development and refinement of algorithms for improved real time intrusion detection will continue, with preliminary evaluation in military base-protect operating environments.

(U) **Combat Support Technology:** (\$3.158 Million)

(U) **Hyperspectral Sensing Systems:** Extend the operating spectral region of both the white light “laser” and the spectral imaging systems to encompass the 1 to 2 micron and 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 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, will be examined.

(U) **Biological Agent Detection Systems:** Field measurements and aerosol-chamber measurements will continue. Lab measurements will concentrate on growth media. Field measurements will broaden applications by measuring in and around buildings for counter-terrorism applications. Microfluidics technology work will focus on expanding the capability to design and fabricate complex structures for tissue-based sensors. Advanced laser and optical technology will be pursued to adapt the UV fluorescence sensor to other missions, e.g., release assessment after an attack on an underground structure. Modeling and simulation efforts will be expanded to integrate battlefield communications and biodetection sensor models in a detailed ModSAF simulation. These technology efforts will be flowed into the Army ATD on biological sensing, the Joint Biological Remote Early Warning System (JBREWS) ACTD, and into an expected follow-on Army ATD on a combined chemical, biological, nuclear sensor.

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(U)     **Advanced Electronics Technology:** (\$6.836 Million)

(U)     In support of digital receivers for advanced DoD sensors, demonstrate direct RF optical sampling (no down conversion) with A/D conversion at greater than 100 MHz bandwidth and 80 dB dynamic range. Transition baseline mid-IR semiconductor laser technology to industry for dual-wavelength IRCM systems. Continue development of tunable superconductive RF filters for frequency-agile receivers. Demonstrate 4-GHz bandwidth ELINT receiver incorporating superconductive chip filters and CMOS/SOI data processor. Explore micromechanical RF tuning structures for electronically reconfigurable microwave communications circuits. Commence development of AlGaN materials for avalanche photodiodes. Demonstrate controlled-impedance multi-chip module (MCM) with high-speed digital circuits. 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 digital and analog integrated circuits to support emerging DoD systems, with an emphasis on low-power/high-speed subsystems in MCMs. Extend SOI/CMOS to sub-200-nm feature size radiation hard process. Demonstrate tunable low-noise tapered lasers in the 1.3- $\mu$ m region for wavelength division multiplexed RF links. Continue development of bio-detector technology with emphasis on discrimination and identification methodologies. Demonstrate APD arrays for use at eye-safe wavelengths in 3-D ranging/imaging applications. Demonstrate 3-D radar subsystems incorporating a geiger-mode photodiode array, integrated timing electronics, and compact laser illuminator.

(U)     **FY2000 Plans:**

(U)     **Target Surveillance and Recognition:** (\$5.621 Million)

(U)     **Surface Surveillance:**

(U)     Complete development of multichannel airborne data collection capability. Formulate new sensor designs incorporating insights gained from development of fundamental ATR performance bounds and high-definition vector imaging (HDVI). Use synthetic foliage-penetrating radar imagery for initial validation of inverse-scattering-based target recognition. Develop algorithms for exploiting active seismic signatures of underground facilities and validate with subscale experimentation. In addition to being directly applicable to ongoing R&D efforts such as DARPA's DDB, MTE, FOPEN and Small Unit Operations programs, these activities will have considerable significance for organizations, such as NIMA, NRO and the Services, that are planning and developing next-generation exploitation and sensing systems.

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(U) **Space Surveillance:**

(U) Continue the development of advanced focal plane arrays in both visible and IR wavebands and in-pixel focal plane signal processing. Continue the development of 3-D laser radar for advanced seeker applications with the capability to scale the array size to greater than 32X32 pixels. The on-FPA processing technologies for both passive and active (LADAR) sensors promise significant improvements in performance and reductions in development and life cycles costs for future BMD interceptor systems for Navy Theater Area Defense and Theater Wide Defense.

(U) **Military Communications:** (\$4.724 Million)

(U) Continue to develop technology for global high-rate military communications and networking, including optical communications in space and fiber, future EHF Milsatcom architecture and technology, and tactical theater communications (particularly to Army forces on the move). Continue extension and demonstration of networking techniques and protocols for interworking among disparate networks including Milsatcom. Complete 100 Gbps optical LAN/MAN testbed (application to surveillance data processing). Continue demonstration of integrated transmit/receive phased array antenna system, and begin design of prototype system for future Milsatcom applications. Continue development of Milsatcom signal processing technology; continue laboratory demonstration of integrated on-board demodulation, switching, and routing techniques for next-generation EHF Milsatcom.

(U) Defensive Information Warfare: Prototype protocols for improved security and robustness to network attack in Internet environments will be developed and demonstrated in the context of a distributed collaborative planning application, as a further step towards more network attack-resilient military C4I systems. The development and evaluation of advanced techniques for network intrusion detection will be continued, with emphasis on the fusion of complementary data from an ensemble of cooperating intrusion detection systems, for improved aggregate performance.

(U) **Combat Support Technology:** (\$3.566 Million)

(U) Hyperspectral Sensing: 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.

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(U) Biological Agent Detection Systems: Perform lab tests to explore integrating a UV fluorescence trigger sensor with a microfluidic biofilter and with a B-cell identifying sensor. Extend the modeling and simulation to develop advanced sensor-fusion algorithms and to look at simulation of combined Nuclear Biological Chemical (NBC) sensor. Explore how to adapt biological sensing processes (e.g., B-cell sensing) to non-living systems. This work will feed into the Army ATD and also into the Joint Biological Universal Detection (JBUD) system to be developed by the Joint Program Office for Biological Defense.

(U) **Advanced Electronics Technology:** (\$7.863 Million)

(U) Extend direct RF optical sampling to higher bandwidths by demonstrating scalable methods for parallelizing quantizers. Improve materials and spectral combining techniques enabling higher-brightness and higher- operating-temperature optically pumped mid-IR semiconductor lasers for IRCM applications. 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 processing, radiation hard technologies, and integrated sensors. Explore applications of visible and IR "expendable" imagers for unmanned observation post. Demonstrate micromechanically reconfigurable microwave ICs for frequency-agile receivers. Continue development of bio-detector technology with emphasis on compact, long duration sensors capable of rapid agent identification. Develop AlGaIn UV detectors for solar blind applications

(U) **FY 2001:**

(U) **Target Surveillance and Recognition:** (\$5.355 Million)

(U) **Surface Surveillance:**

(U) Use multichannel airborne data collection system to demonstrate wide-area, high-resolution, rapid-revisit GMTI with ECCM. Develop and apply absolute (vs. relative, between two sensor designs) fundamental ATR performance bounds. Use real foliage-penetrating radar imagery to validate inverse-scattering-based target recognition. Test exploitation of active-seismic underground-facility signatures with full-scale experimentation. In addition to being directly applicable to ongoing R&D efforts such as DARPA's DDB, MTE, FOPEN and Small Unit Operations programs, and to planning and development activities of NIMA, NRO and the Services, this activity will help develop and prove concepts crucial to creation of a true joint integrated air/ground picture

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(U) **Space Surveillance**

(U) Continue the development of 3-D laser radar technologies for advanced seeker applications. These include compact, high efficiency lasers, receiver FPA's and high sensitivity passive sensor FPA's for acquisition and handover to the LADAR. These advanced technology sensors will allow future ballistic missile defense interceptors to address very advanced missile threats which will include intentional countermeasures applied to both defense tracking radars as well as the IR interceptor seekers. The evolving Ballistic Missile Defense Organization (BMDO) Technology Readiness Roadmap specifically identifies these technology developments as high priority for future BMD systems by both Air Force, Army and Navy BMD Programs.

(U) **Military Communications: (\$4.500 Million)**

(U) Continue to develop technology for global high-rate military communications and networking, including optical communications in space and fiber, future Milsatcom architecture and technology, and tactical theater communications (particularly to Army forces on the move). Continue Laboratory demonstrations of technology for DoD-specific applications (particularly in EHF Milsatcom signal and antenna processing), refine networking architecture and protocols, complete integrated transmit/receive phased array antenna, and aid DoD in defining its development and procurement strategy for the future global defense network that will provide C3 and ISR product transport. Application is to the emerging integration of DoD command elements, information centers, and execution forces into a unified Global Information Grid.

(U) Defensive Information Warfare: Dynamic reconfiguration and improved security protocols will be integrated with state-of-the-art intrusion detection technology for adaptive real time reaction to network attacks. Intrusion detection strategies will be extended to focus on anomalous user behavior, with the objective of countering computer/network attacks mounted from inside the protected bastion perimeter. Transition of proven technology to military operating environments will be initiated.

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(U) **Combat Support Technology: (\$3.398 Million)**

(U) Hyperspectral Sensing Systems: Operational concepts will be developed during this phase of the 4-D hyperspectral sensor program for surface surveillance and reconnaissance to be operated on various platforms such as ground vehicles (including unattended ground sensors), UAVs and aircraft. The effort will focus on selected specific applications which will lead to the design and development of compact and/or miniaturized sensing systems, adaptive and automated real-time (or near real-time) processing algorithms, as well as protocols for communication and product dissemination.

(U) Biological Agent Detection Systems: Develop and test a fully integrated detection/identification system, including the required communications and data-fusion architectures. Explore how to integrate biological sensors with chemical and nuclear sensors. Begin to test sensors based on non-living systems.

(U) **Advanced Electronics Technology: (\$7.486 Million)**

(U) Investigate highly scaled CMOS/SOI digital circuits using mixed electron-beam and optical lithography at 25-nm feature sizes for ultradense circuits. Demonstrate compact and power efficient version of optically sampled A/D with multi-GHz bandwidth for radar and electronic intelligence use. Demonstrate highly integrated imager with digital output in optimized low-power-consumption configuration suitable for tactical image web and/or micro-air vehicle use. Continue development of UV, visible, IR and hyperspectral imaging devices with on-focal-plane processing for "smart" multimode sensors. Explore analog optical processing techniques to extend performance of compressive receivers to 10-GHz bandwidth for signal intercept. Extend micromechanically reconfigurable microwave circuits to high power for transmitter applications. Transfer advanced mid-IR semiconductor laser technology to industry for dual-wavelength IRCM. Continue development of solid-state devices, materials and processing subsystems in support of DoD programs.

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(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	17.708	19.641	19.574	19.252	Continuing
Appropriated Value	18.474				Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	(0.766)				
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment					
c. Other			1.500	1.800	Continuing
Current President's Budget	17.708	19.641	21.074	21.052	Continuing

**Change Summary Explanation:**

(U)    **Funding:**    Changes in 1998 are based on Congressionally directed reduction. FY2000 and FY2001 was increased to extend the technology developed for chemical agent detection to include biological agent detection technology.

(U)    **Schedule:**    Not Applicable

(U)    **Technical:**    Not Applicable

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

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

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(U) E. SCHEDULE PROFILE: Not Applicable

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 2							<b>R-1 ITEM NOMENCLATURE</b> Medical Technology PE 0602787D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	8.559	9.212	8.903	8.742	8.990	9.210	9.380	9.526	Continuing	Continuing
Radiation Injury Assessment and Therapeutic Approa/P505	8.559	9.212	8.903	8.742	8.990	9.210	9.380	9.526	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) This program is executed by the Armed Forces Radiobiology Research Institute (AFRRI) which, because of its multidisciplinary staff and facility resources, is uniquely qualified to carry out this mission. AFRRI's radiation sources allow the simulation of any radiological environment that might be encountered. Because national laboratories operated by the Department of Energy no longer support research efforts relevant to military medical radiobiology, the AFRRI is currently the sole laboratory with the combined capabilities needed to conduct this research.

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<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	8.559	9.212	8.903	8.742	8.990	9.210	9.380	9.526	Continuing	Continuing
Radiation Injury Assessment and Therapeutic Approa/P505	8.559	9.212	8.903	8.742	8.990	9.210	9.380	9.526	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Developed new strategies for preventive treatments of both acute and chronic radiation injuries based on (a) fundamental mechanisms of cellular and molecular injury, (b) selecting less toxic drug alternatives, (c) pharmacologic quenching to reduce drug toxicity, and (d) new drug delivery alternatives. (\$ 2.114 Million)

(U) Developed enhanced treatments for radiation-associated infections using immune system stimulators. (\$ 2.045 Million)

(U) Evaluated newly developed delivery platform for cytogenetic-based radiation dose assessments in individuals. The system will provide standardized operational simplicity needed to carry out dose assessments in clinical and reference laboratories, enabling better medical management of large numbers of casualties. (\$ 0.664 Million)

(U) Identified and initiated development of two classes of novel molecular markers potentially useful as diagnostic determinants of radiation doses received by individuals. Observed that ionizing radiation induces a specific deletion in the genomes of mitochondrial DNA and alterations in oncogene expression, both of which are quantifiable in a dose-dependent fashion. Both classes of markers can be easily and quickly measured using newly developed polymerase chain reaction (PCR) methods for nucleic acid sequence analysis. (\$ 0.658 Million)

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(U) Quantified the increased mortality rates seen in irradiated mice infected via the pulmonary route with *Bacillus anthracis* (Sterne) spores. Initiated studies to assess effects of radiation on the immune status of individuals vaccinated with the anthrax vaccine. Established *in vitro* model systems to assess radiation/viral interactions. Data will be used to build casualty prediction models and develop treatment protocols for combined injuries. (\$ 1.054 Million)

(U) Identified a synergistic consequence that causes redistribution of blood flow within the body resulting from the interaction of sub-lethal radiation and therapeutic levels of the nerve agent prophylactic pyridostigmine. These data will be used to assess treatment of combined injuries. (\$ 0.961 Million)

(U) Initiated studies to assess the cancer-causing potential of depleted uranium (DU) in laboratory animals. Initiated a pilot study to assess the effects on the immune system of tissue-embedded DU fragments. Initiated development of a potentially fieldable method to measure uranium in the urine of military personnel. (\$ 0.792 Million)

(U) Planned study and initiated pilot experiments to determine the toxicity associated with tungsten, which is a proposed replacement metal for DU in munitions manufacturing. (\$ 0.271 Million)

(U) **FY1999 Plans:**

(U) Initiate studies to assess efficacy of conventional or slow-released radioprotectants to prevent or reduce late-arising health consequences of radiation, including cancer and chronic immune system suppression. (\$ 2.222 Million)

(U) Develop and test second-generation radioprotective modalities that improve efficacy through sustained effectiveness. Assess newly available drug prototypes for protective efficacy against acute radiation injury. (\$ 2.009 Million)

(U) Continue development of clinical bioassays that provide a rapid dose assessment capability for radiation exposures involving a broad spectrum of radiation qualities (gamma, neutron, etc.). Develop an automated analytical capability that allows high sample-number throughput and operability by generalist laboratory technicians. (\$ 0.748 Million)

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- (U) Continue identification and development of new biological markers and compact, portable instrumentation for radiation dose assessments that provide a simple and easy-to-use forward-fielded screening system. Measure effects of incremental doses and time-course of exposures to evaluate the practical utility of candidate assays. (\$ 0.779 Million)
- (U) Extend radiation/BW agent interaction studies to assess incapacitation resulting from combined exposures to a variety of doses, and add this endpoint to casualty prediction models. Continue studies to determine the effect of radiation on the immune status of individuals vaccinated against anthrax. Extend *in vitro* models for viral/radiation interactions to *in vivo* model systems. (\$ 1.222 Million)
- (U) Initiate studies to determine how radiation and nerve agents interact to adversely affect military personnel upon combined exposure. Continue assessments of the physiologic consequences of combined exposure to radiation and the nerve agent prophylactic pyridostigmine. (\$ 1.219 Million)
- (U) Continue laboratory animal studies on the cancer risk of DU to refine recommendations for treatment of military personnel wounded by DU. Initiate full study on the toxicity of tungsten. Initiate pilot studies to determine the long-term effects on the immune, nervous, and male reproductive systems from exposure to DU. (\$ 1.013 Million)
- (U) **FY2000 Plans:**
- (U) Continue to develop and test second generation of radioprotective treatments with sustained effectiveness. Assess efficacy of newly synthesized drug prototypes for protection from acute radiation injury. (\$ 2.043 Million)
- (U) Design, synthesize, and provide initial testing of drug prototypes to treat immune system deficiencies after radiation exposure. (\$ 2.043 Million)
- (U) Continue development of clinical bioassays for assessment of radiation exposures. Optimize protocol to permit assessment of prior radiation exposure. Develop a rapid sample processing procedure involving the use of a portable incubator to minimize cell culture delays for the analysis of samples using the clinical bioassays. (\$ 0.721 Million)

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- (U) Continue evaluation of new assays to detect radiation exposure to provide simple and easy-to-use forward-field screening exposure-assessment tools. Develop automated analysis systems to efficiently evaluate promising candidate bioassays. (\$ 0.757 Million)
- (U) Continue assessment of immunization strategies for B. anthracis in combination with radiation. Quantify the interactions of radiation with incapacitating bacterial agents for non-lethal endpoints to provide prediction models of casualties from combined injuries. Extend radiation/BW agent interaction studies to the viral threat agent Venezuelan Equine Encephalitis (VEE) virus, assessing increased mortality of the combined exposure in order to expand the capability of casualty prediction models and to provide appropriate care for casualties. (\$ 1.441 Million)
- (U) Assess the changes in sensitivity to nerve agent induced seizures with prior exposure to ionizing radiation. Initiate studies on effectiveness of therapeutic regimens to mitigate these seizures. Quantify the interactions of nerve agent and radiation in order to expand the capability of casualty prediction models. (\$ 0.918 Million)
- (U) Continue studies on the cancer risk of DU in laboratory animals, tungsten toxicity, and the long-term effects of exposure to DU on immune, nervous, and male reproductive systems. (\$ 0.980 Million)
- (U) **FY2001 Plans:**
- (U) Continue development of simple, self-administered drug delivery systems for radiation protection and treatment. Evaluate transdermal skin patches, oral administration, and autoinjector systems. (\$ 4.012 Million)
- (U) Continue development of clinical bioassays to provide rapid assessment of radiation exposure from a low dose and low dose-rate exposures. Establish protocols to process high number of samples simulating a mass-casualty incident. (\$ 0.708 Million)
- (U) Continue identification and development of new assays to detect radiation exposure. Complete in vitro evaluation studies to permit identification of suitable cytological and molecular biomarker to transition to in vivo validation studies. (\$ 0.743 Million)

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- (U) Complete assessment of effectiveness of the vaccine for anthrax to provide protection from infection with a combined radiation/B. anthracis exposure. Continue studies with other vaccines (e.g. for VEE). Assess therapeutic strategies for combined exposures to radiation and B. anthracis in order to evaluate current therapeutic strategies and to recommend the best treatments for combined injuries. (\$ 1.424 Million)
  
- (U) Continue assessment of interactions of radiation with nerve agent and nerve agent therapeutics in order to provide recommendations for appropriate treatment protocols for combined injuries. Interactions will be determined for various nerve agents, various time intervals between radiation /agent exposures and various doses of radiation and of nerve agent to fully characterize the interactions for both therapeutic strategies and casualty prediction models. (\$ 0.893 Million)
  
- (U) Continue studies on the cancer risk of DU in laboratory animals. Complete tungsten toxicity study. Complete pilot studies on long-term effects of exposure to DU on immune and nervous systems. Continue male reproductive study. (\$ 0.962 Million)

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(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	8.669	9.239	9.056	8.900	Continuing
Appropriated Value	8.407	9.239	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	0	-0.027			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0			
c. Other	0.152	0	-0.153	-0.158	
Current Presidents Budget	8.559	9.212	8.903	8.742	Continuing

**Change Summary Explanation:**      Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U)    **Funding:**      Changes in FY99 are a result of undistributed reductions. FY2000 and FY 2001 are a result of budget adjustments.

(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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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Medical Advanced Technology Program PE 0603002D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	2.848	2.130	2.007	2.057	2.091	2.133	2.175	2.224	Continuing	Continuing
Risk Assessment and Biomedical Applications/P506	2.848	2.130	2.007	2.057	2.091	2.133	2.175	2.224	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. This program is executed by the Armed Forces Radiobiology Research Institute (AFRRI) which, due to its multidisciplinary staff and exceptional laboratory and radiation facilities, is uniquely qualified to carry out this 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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>									<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Medical Advanced Technology Program PE 0603002D8Z			

<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	2.848	2.130	2.007	2.057	2.091	2.133	2.175	2.224	Continuing	Continuing
Risk Assessment and Biomedical Applications/P506	2.848	2.130	2.007	2.057	2.091	2.133	2.175	2.224	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Completed a pilot demonstration of an improved clinical support protocol for acute, potentially fatal radiation injury. Continued assessment and optimization of a combined (prophylaxis/therapeutic) treatment modality for enhancing survival following acute, lethal irradiation. (\$ 0.718 Million)

(U) Demonstrated the feasibility of using implanted capsules to provide sustained and effective delivery of radioprotective drugs. Improved efficacy of implanted ‘slow-release’ drug capsules by instituting use of therapeutic drug assays for monitoring blood levels of radioprotective drugs during protocol optimization studies. (\$ 0.402 Million)

(U) Developed simplified sample preparation procedure used with chromosome aberration assays for radiation dose assessment. The procedure will facilitate fielding of chromosomal aberration assays to advanced medical treatment facilities. Completed initial studies extending the application of radiation dose measuring protocols to incremental doses of gamma and fission neutrons. (\$ 0.524 Million)

(U) Developed protocols to enable measurement molecular markers (oncogene expression, mitochondria DNA deletions) by means of a compact, portable field-deployable platform. This effort exploits a dual-use potential for a delivery platform under development elsewhere for military use that can rapidly measure nucleic acid changes by the polymerase chain reaction (PCR). (\$ 0.619 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Medical Advanced Technology Program PE 0603002D8Z	

(U) Established the capability to integrate the health consequences of radiation/ BW agent interactions into the Consequence Assessment Tool Set (CATS). Initiated computer-modeling efforts to incorporate combined injury data into CATS. (\$ 0.293 Million)

(U) Continued development of simple method to measure uranium in urine of military personnel to provide a rapid, field-based clinical assay for depleted uranium (DU) exposure, and submitted the procedure for patent application. (\$ 0.292 Million)

**(U) FY1999 Plans:**

(U) Assess efficacy of a modified, nontoxic radioprotective drug combination together with an improved clinical regimen for maximizing the prevention of acute and potentially fatal radiation injury. (\$ 0.168 Million)

(U) Initiate development of preventive treatments for the long-term health consequences associated with radiation exposure. Design and assess implanted, slow-release drug capsules. (\$ 0.169 Million)

(U) Initiate combined treatment protocol studies aimed at combating radiation-associated nausea and tissue injury following acute exposures. (\$ 0.168 Million)

(U) Complete development of initial *in vitro* radiation calibration curves for a simplified chromosome aberration measurement procedure. Further optimize sample preparation protocols for automated analysis in deployed medical treatment facilities. Develop automated cytological platforms for rapid analysis of blood samples from mass casualties. (\$ 0.369 Million)

(U) Develop software tools to manage biodosimetric data for field use and provide an integrated system for measurement of radiation exposures. Test rapid, forward-fieldable screening assays for estimating radiation exposure. Validate newly developed biodosimetry methods under collaborative agreements and human-use protocols at clinical radiotherapy centers for testing radiation therapy patients. (\$ 0.504 Million)

(U) Develop initial computer program for CATS to predict casualty rates in operational forces using experimental data from animal studies that reveal enhanced mortality from combined exposures to radiation and bacteria. The program will have the capability to superimpose and analyze the two footprints in a single output. (\$ 0.321 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Medical Advanced Technology Program PE 0603002D8Z	

(U) Provide recommendations to physicians for treatment of exposure to DU based on continuing studies of DU toxicity and tissue distribution. Continue development of simple method to measure uranium in urine of military personnel. (\$ 0.431 Million)

(U) **FY2000 Plans:**

(U) Assess safety and efficacy of implanted, slow-release, radioprotective treatment devices. Perform standard toxicology assessments on treatments relative to specific blood or tissue levels of radioprotectants. (\$ 0.476 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 protocols. (\$ 0.347 Million)

(U) Complete initial-phase optimization of PCR-based assays for measuring multiple molecular biomarkers using field deployable platform. Continue studies to validate screening assays for measuring radiation exposure. (\$ 0.474 Million)

(U) Provide recommendations for addressing any changes in efficacy of *B. anthracis* vaccine upon exposure to ionizing radiation. Initiate efforts to incorporate performance-degrading consequences from combined radiation/bacterial and radiation/pyridostigmine exposures into casualty prediction models. (\$ 0.303 Million)

(U) Complete development of method to measure uranium in urine of military personnel; provide protocol to application centers for assessment as a fieldable methodology. (\$ 0.407 Million)

(U) **FY2001 Plans:**

(U) Design and test easy-to-use autoinjector devices for delivery and implantation of the slow-release drug capsules for treatment of injuries associated with radiation exposure. (\$ 0.487 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) 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)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Medical Advanced Technology Program PE 0603002D8Z	

(U) Conducted validation analysis of the automated imaging platform for radiation dose assessment. Continue to develop and validate multiple molecular biomarker approach for diagnostic biodosimetric applications. (\$ 0.486 Million)

(U) Provide computer module for Consequence Assessment Tool Set (CATS) to predict mortality from interactions of radiation and *B. anthracis*. Initiate efforts to incorporate interactions of radiation with viral agents into casualty prediction models. (\$ 0.310 Million)

(U) Provide recommendations to physicians for treatment of exposure to Depleted Uranium (DU) based on findings from AFRI immunotoxicity and neurotoxicity studies. (\$ 0.418 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3		R-1 ITEM NOMENCLATURE Medical Advanced Technology Program PE 0603002D8Z

<b>(U) B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	2.672	2.136	2.041	2.094	Continuing
Appropriated Value	2.778	2.136	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-0.106	-0.006	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	-0.034	-0.037	
c. Other	0	0			
Current Presidents Budget	2.848	2.130	2.007	2.057	Continuing

**Change Summary Explanation:**      Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U)    **Funding:**      Changes are due to congressional undistributed reductions and inflation adjustments.

(U)    **Schedule:**      N/A

(U)    **Technical:**      Changes are due to congressional undistributed reductions and inflation adjustments.

(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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Explosives Demilitarization Technology PE 0603104D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	11.285	14.442	11.183	11.029	11.337	11.693	11.919	12.116	Continuing	Continuing
JDTP/P486	11.285	14.442	11.183	11.029	11.337	11.693	11.919	12.116	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, such as, 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 2004. 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.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Explosives Demilitarization Technology PE 0603104D8Z	

(U) The effort employs the highly developed technology base in the DoD Service Laboratories/Technical Centers, DOE National Laboratories, industry, and academia. The joint program is integrated through the Joint Ordnance Commanders Demilitarization Subgroup and leverages support from the Environmental Security Technology Certification Program (ESTCP), the Strategic Environmental Research and Development Program (SERDP), the Joint DoD/DOE Munitions Program, and the Services. A specific federal laboratory sponsors each of the projects with peer review by the Joint Working Group. The Demilitarization Users Group provide assessment and review of demilitarization requirements for use in planning new investments for this program. Supporting an annual Global Demilitarization Symposium, which focuses on technical review and data evaluation from current projects enhances technology transfer opportunities, and ongoing 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 1997-Department of Defense Joint Demilitarization Technology Program (February 1998) and the FY 1998-Department of Defense Joint Demilitarization Technology Program (February 1999).

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>									<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 3									<b>R-1 ITEM NOMENCLATURE</b> Explosives Demilitarization Technology PE 0603104D8Z	

<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	11.285	14.442	11.183	11.029	11.337	11.693	11.919	12.116	Continuing	Continuing
JDTP/P486	11.285	14.442	11.183	11.029	11.337	11.693	11.919	12.116	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Analysis of seven initial demonstrations continues. X-Tunnel complex at the Nevada Test Site has been repaired and improved to accommodate more efficient future demonstrations. Data was gathered from EPA Standard Methods, off-line analysis of bulk gases, volatile organic chemicals, semi-volatile organic chemicals, metals and particulates as well as the demonstrations of a tunable diode laser for measuring bulk gases and a real time particle analysis instrument. The Contained Burn Chamber for tactical rocket motors was developed and placed at NTS. Tri-Service Molten Salt Technology effort explored improved feed systems and optimized equipment design. (\$ 7.285 Million)

(U) Four Hydrothermal Oxidation propellant treatability demonstrations accomplished. Hazard Class 1.1 propellant behavior studies furthered thermal cycling criteria for removal completion. (\$ 2.000 Million)

(U) Completed ingredient recovery demonstration for 1.1 propellant. Improved design of washout fixture for the removal system to accommodate Multiple Launch Rocket System (MLRS). Feasibility study of dry removal completed. (\$ 0.500 Million)

(U) The waterjet and resource recovery and recycling (R3) system completed the static testing of the abrasive slurry jet system on 40-mm projectiles. In addition, a demonstration of the washout of PBXN-106 loaded projectiles was conducted. Hydrogenation of high explosive material feasibility study indicated acceptable risk for further development. (\$ 0.500 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Explosives Demilitarization Technology PE 0603104D8Z	

(U) The Portable Propellant/Explosive Analyzer Program completed design and fabrication of ruggedized miniature field near infrared (IR), thin layer chromatography (TLC) and gas chromatography/mass spectrometry (GC/MS) units for field screening stability tests of recovered propellants. This program is developing uncomplicated analytical procedures for field stability testing. The propellant to fertilizer program successfully completed conversion validation tests consisting of 2 phases totaling 21 batch reactions. The first phase processed up to 100 pounds of propellant per batch, and the second phase scaled up to 1,800 pounds per batch. Independent analysis of the conversion results verified complete conversion of propellant to fertilizer. Design criteria for a mobile conversion unit was initiated. (\$ 1.000 Million)

(U) **FY1999 Plans:**

(U) The Tunnel Demonstration Program will continue to optimize detonations and burns that replicate depot-type field operations. The data collected from these events will be used to develop less intrusive methods for munition demilitarization, such as improved loading configurations, containment chamber, and noise limitations. Capability at Dugway Proving Ground (DPG) will be used to develop emissions profiles. Testing of the Contained Burn Chamber will be initiated and proved out of the complete destruction of Shillelagh and TOW missile rocket motors accomplished. Molten Salt Technology will test effectiveness of the improved unit with transition to the base for destruction of demilitarization waste streams. Joint integration will continue. (\$ 7.792 Million)

(U) The Propellant Removal and Treatment Process will be modified to examine effectiveness on tactical and conventional systems. Further feasibility studies on hydrolytic reactions in treatment vessels will be accomplished. Hydrothermal Oxidation optimization for specific formulations will be supported. (\$ 2.75 Million)

(U) Multiple Launch Rocket System will be processed at advanced rates to optimize efficiency and to improve recovered material reformulation processes. (\$ 1.6 Million)

(U) The waterjet and resource recovery and recycling program will continue with applying the high-pressure water washout system to Composition A3 and transitioning the system to Crane Army Ammunition Activity. In addition, improvements will be incorporated into the abrasive slurry jet system to include cutting at 20,000 psi. Flexible workcell applications will be enhanced. (\$ 1 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Explosives Demilitarization Technology PE 0603104D8Z	

(U) The Portable Propellant/Explosive Analyzer program will accomplish field-testing of the developed unit. In addition, a complete technical data package will be developed. Initial explosive feasibility studies and planning will be completed. (\$ 1 Million)

(U) Catalytic Hydrotreating uses a liquid stream containing the energetic material, which is combined with hydrogen, heated, and contacted with a catalyst. This catalytic reduction with hydrogen provides the flexibility of recovering valuable chemical or fuel resources. Primary focus will be on the reaction chemistry and product separation operations. This work will build on the Explosive D work performed for the Navy to determine viability of the process for energetics. (\$ 0.3 Million)

**(U) FY2000 Plans:**

(U) The Tunnel Demonstration Program will continue in FY 2000. Additional tunnel detonations and burns will be conducted to allow 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. Additionally, the Contained Burn Chamber will be modified to accommodate a variety of tactical systems, and joint integration will continue. (\$ 7.283 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. (\$ 0.700 Million)

(U) Critical Fluid optimization for system specific application will be accomplished for Multiple Launch Rocket System variants and standard missiles. (\$ 0.700 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 items and families. (\$ 1.350 Million)

(U) Portable Propellant Analyzers will be transitioned to field trials and explosive work for AEDA and recovered materials will be initiated. (\$ 0.900 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Explosives Demilitarization Technology PE 0603104D8Z	

(U) Hydrotreating of high explosive fill will be fully characterized and process shifts to higher value products will be supported.  
(\$ 0.250 Million)

(U) **FY2001 Plans:**

(U) The Focus on the Tunnel Demonstration Program will continue to be proving out of improved field detonation and burn operations. Detonation and Burn 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 EP?A standards. Testing and modification of the Contained Burn Chamber will continue along with joint integration. (\$ 6.879 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.  
(\$ 1.000 Million)

(U) Critical fluid size reduction process application will be furthered with transportable/portable field unit demonstrations.  
(\$ 0.500 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. (\$ 0.800 Million)

(U) Analytical tools for explosive and propellant evaluation will continue to be optimized for recovered items. (\$ 0.800 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. (\$ 0.750 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3		R-1 ITEM NOMENCLATURE Explosives Demilitarization Technology PE 0603104D8Z

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	11.711	11.65	11.375	11.228	Continuing
Appropriated Value	12.259	14.650	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-0.974	-.208	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	-0.192	-0.199	
c. Other	0	0	0	0	
Current Presidents Budget	11.285	14.442	11.183	11.029	Continuing

**Change Summary Explanation:** Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U) **Funding:** FY 1999 funding changes are due to congressional increases.

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

(U) **Technical:** FY 1999 funding changes are due to congressional increases.

(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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Demining PE 0603120D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	15.112	0	0	0	0	0	0	0	0.000	15.112
Demining/P547	15.112	0	0	0	0	0	0	0	0.000	15.112

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) This humanitarian demining R&D program focuses on development, testing, and evaluation of equipment to reduce the time and costs associated with demining while improving operational safety of deminers. This program adapts commercial-off-the-shelf equipment and mature technologies to rapidly demonstrate and transition equipment for landmine detection, landmine clearance, protection of deminers, and mine awareness training to the international demining community. The program seeks to leverage past and current R&D project activity in related areas including tactical countermine, unexploded ordnance clearance, and foreign development programs. There are four areas of emphasis currently being addressed by this technology development program: equipment to locate mined and mine-free terrain; clearers specialized for demining agricultural areas and neutralization devices to destroy individual mines without moving them; tools for the deminer to enhance safety; and various media to facilitate mine awareness and deminer training. Humanitarian demining needs and sustainment issues originate with the regional Commanders-In-Chief during the annual demining action officers' workshop. These needs and issues are refined with data from the United Nations, international groups, Non-Government Organizations (NGOs), and contractors experienced in demining operations.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
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<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	15.112	0	0	0	0	0	0	0	0.000	15.112
Demining/P547	15.108	0	0	0	0	0	0	0	0.000	15.112

(U) **Project Number and Title: P547 Demining**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Developed and successfully demonstrated mechanical clearers specialized for demining agricultural areas and QA of areas previously cleared. Developed and successfully demonstrated small remote controlled clearance devices that use commercial mowers for vegetation removal and flails for mine clearance. Initiated development of an improved mechanical flail to correct deficiencies identified from prior deployments. Developed and demonstrated various alternative technologies used for in-situ neutralization of landmines, some of which do not permit high order detonation. Initiated improvements for a hand held liquid explosive foam (LEXFOAM) application. Developed and successfully demonstrated improved Blast & Fragment Containers that contain fragments during mine detonation and a simple alternative power source used with various detection equipment to reduce the logistics burden caused by the constant requirement of batteries in the field. Developed and successfully demonstrated a wide area detection system capable of mine detection, mine/minefield mapping and recording and various mission planning operations. Continued the development of a hand held detection device that capitalizes on commercial mining equipment and is capable of mine detection and discrimination. Initiated improvements to the hand held detection devices and integrated mine marking devices. Initiated development and demonstration of commercially available explosive detection equipment for mine detection applications. Continued the development of individual tools used to enhance deminer safety and improve efficiency of the operation. Continued the development of various media to facilitate mine awareness and deminer training.(\$ 15.112 Million)

(U) **FY1999 Plans:**

(U) FY1998 concluded advanced technology development.  
(\$ 0 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3	R-1 ITEM NOMENCLATURE Demining PE 0603120D8Z	

(U) <b>B. Program Change Summary</b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	15.918	0	0	0	0.000
Appropriated Value	15.918	0	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-.0806	0	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	0	0	
c. Other	0	0	0	0	
Current Presidents Budget	15.112	0	0	0	15.112

**Change Summary Explanation:** Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U) **Funding:** : Funding for FY 1999 through FY 2005 was realigned to PE 0603920D8Z because the program is more properly classified as Demonstration and Validation.

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

(U) **Technical:** : Funding for FY 1999 through FY 2005 was realigned to PE 0603920D8Z because the program is more properly classified as Demonstration and Validation.

(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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Alternatives to Antipersonnel Landmines PE 0603121D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	2.760	4.687	0	0	0	0	0	0	0.000	7.609
Alternatives to Antipersonnel Landmines/P121	2.760	4.687	0	0	0	0	0	0	0.000	7.609

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) P121, Alternatives to Anti-personnel Landmines (APL). This program element 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 will be 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 will be conducted using modeling and simulation along with advanced warfighting experiments. The selected approaches will then enter prototype development, further selection of viable concepts will then enter the engineering and manufacturing development phase. This program currently supports the non-self-destructing APL alternative program, which is being funded (PE 0604808A) and executed by the US Army. Funding for this program ends in 1999.

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<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	2.760	4.687	0	0	0	0	0	0	0.000	7.609
Alternatives to Antipersonnel Landmines/P121	2.760	4.687	0	0	0	0	0	0	0.000	7.609

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) During FY 1998 the Department conducted a study to quantify the military utility of APL and assess potential alternatives. The APL alternatives considered included: force structure; tactical techniques, and procedures; and technology options. Industry was given the results of the study and solicited for proposals. The top industry candidates were awarded purchase orders in order to develop formal proposals of their alternatives. The Department then completed the evaluation of 52 white papers, 12 of which were chosen for proposal development and submission. Proposal evaluation for contract award has been completed. (\$ 2.760 Million)

(U) **FY1999 Plans:**

(U) During FY 1999 development contracts will be awarded, hardware for the prototype assessment test (PAT) phase will be purchased and the PAT plan and operations order will be finalized. (\$ 4.687 Million)

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(U) <b>B. Program Change Summary</b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	2.856	4.753	0	0	7.609
Appropriated Value	2.990	4.753	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-0.230	-0.066	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	0	0	
c. Other	0	0	0	0	
Current Presidents Budget	2.760	4.687	0	0	7.447

**Change Summary Explanation:**      Funding changes are due to congressional undistributed reductions and inflation adjustments.

- (U)    **Funding:**      N/A
- (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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<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	40.826	37.667	52.223	54.791	56.510	52.758	54.021	55.306	Continuing	Continuing
Counterterror Technical Support (CTTS)/P484	35.675	32.349	43.054	45.330	46.768	42.713	43.626	44.595	Continuing	Continuing
Explosive Ordinance Disposal/Low Intensity Conflict/P206	3.717	3.983	7.831	8.095	8.350	8.626	8.847	9.131	Continuing	Continuing
Special Operations/Low Intensity Conflict (SO/LIC)/P205	1.434	1.335	1.338	1.366	1.392	1.419	1.548	1.580	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(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 and counterterrorism 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 (chemical, biological, nuclear, and radiological) devices; conduct surveillance and tracking of terrorist; conduct threat and event assessments; and process and disseminate information. The Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict directs the CTTS Program which addresses combating terrorism requirements identified by the interagency Technical Support Working Group ( TSWG).

(U) The TSWG is a multi-agency R&D working group under the aegis of the National Security Council's Interagency Working Group on Counterterrorism. As such, the CTTS program supports, and is integrated into, the national interagency response to terrorism. Also, it conducts a cooperative international R&D program, and is executing projects with three countries.

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(U) The CTTS program develops technologies and state-of-the-art prototype equipment that have direct operational application in the national effort to combat terrorism. Projects address the highest priority needs as dictated by current threat assessments. Documented activities and capabilities show that terrorists continue to be technologically and tactically sophisticated, which poses new challenges to our capability to respond. The CTTS program supports measures against chemical and biological terrorism and is fully coordinated with the Chemical/Biological Defense Program and the Counterproliferation Support Program. Current priorities are the detection and neutralization of terrorist-built explosive devices, countermeasures for chemical and biological terrorism, and the detection and surveillance of terrorists.

(U) Projects are structured to address numerous technical focus areas. Capabilities to be pursued include: equipment used to prevent and respond effectively to a chemical/biological agent release in an urban area; building a national capability to detect and disable large-vehicle bombs; methods and systems used to detect improvised terrorist devices from stand-off distances; a national infrastructure assurance and protection; systems for improved audio and video surveillance of terrorists; effective detection of ammonium nitrate-based explosives; more effective post-blast forensic analysis; and equipment and systems assisting DoD units and other response agencies in dealing with consequence management following a terrorist attack. These areas address deficiencies cited in response to questions about the adequacy of counterterrorism R&D posed in Presidential Decision Directive 39 (PDD-39).

(U) All national and international projects are distributed among eight counterterrorism mission categories: Tactical Operations Support; Explosives Detection and Disposal; Weapons of Mass Destruction Countermeasures; Personnel Protection; Surveillance, Collection, and Operations Support; Physical Security; Infrastructure Protection; and Investigative Support and Forensics. This program is a non-system advanced technology development project 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 integrated technologies in a realistic operating environment to assess the performance in actual mission scenarios and the cost reduction potential of advanced technology.

(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.

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(U) P205, Special Operations/Low-Intensity Conflict (SO/LIC) Analytical Support. The S O/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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<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	40.826	37.667	52.223	54.791	56.510	52.758	54.021	55.306	Continuing	Continuing
Counterterror Technical Support (CTTS)/P484	35.675	32.349	43.054	45.330	46.768	42.713	43.626	44.595	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) **TACTICAL OPERATIONS SUPPORT.** Completed development of specialized access tools that provides for installing anchors for supporting assault forces. Continued development of a high-speed, personnel delivery boat. Continued development of a rifle-fired 40mm grenade with a controlled fragmentation pattern for use in close quarters battle scenarios. Continued development of night vision goggles that substantially reduces the effects of halo and blooming when bright lights are encountered, greatly improving the effectiveness of the devices. Started development of the design for a miniature laser range finder for use by snipers and other tactical forces. (\$ 1.635 Million)

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(U)      **EXPLOSIVES DETECTION & DEFEAT.** Completed development of the High Energy Access and Disablement system (HEAD) for the disruption of large vehicle bombs; procedures and hardware delivered to US Air Force EOD teams. Completed development of the 90-mm water cannon disrupter for mid-sized improvised explosives devices (IEDs); procedures written and 6 systems deployed over seas to EOD teams. Completed test and evaluation of a COTS water disrupter, the “Boot Banger”, for disruption of improvised explosive devices contained within the truck of a passenger car; procedures written for EOD. Completed development of a base-line, prototype of the All-purpose Remotely controlled Teleoperated System (ARTS) for use against large vehicle bombs. Completed development of the Universal Training Device for training against IEDs; 20 systems delivered for DOD testing. Continued development of a system for the detection of terrorist bombs from standoff distances under a variety of conditions. Continued to develop the full spectrum of response requirements for large vehicle bombs, including detection, analysis, access, and disablement. Continued to develop an interactive, computer-based improvised explosive device neutralization training system. Continued to develop a safer initiating system for various explosive disruption robots. Continued development of a single-sided antenna for use with nuclear quadrupole resonance explosive detection methods. Continued researching factors that affect the capabilities of improvised explosive device detection through biological schemes. Continued development of a field-portable x-ray system for imaging the contents of suspect baggage/containers when access to only one side is possible. Started development of a flat-panel imager for a digital x-ray system. Started development of a Canine based, remote collection, screening system for large vehicle bombs. Started the development of a single-sided neutron interrogation unit for the detection of vehicle bombs. Started modeling of non-ideal, terrorist explosives. Started development of a database for identification of large vehicle threats, disruption tools and procedures. Started development of the ARTS platform to include on-board diagnostics and access tools for EOD. (\$ 7.06 Million)

(U)      Continued development of the Pulsed Fast Neutron Analysis (PFNA) Container Inspection System (CIS) to non-intrusively determine materials present in large shipping containers. (\$ 2.707 Million)

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(U) **CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES.** Completed the development of a low-cost, throw-away protective mask to provide sufficient levels of protection from a chemical/biological threat while egressing a contaminated area. Completed development of a handheld reader for immunochromatographic assays for the detection of biological agents. Completed the development of a ruggedized, downsized capability for operators to determine the contents of closed containers. Completed development of chemical/biological masks for first responders. Completed the development of an improved, in-field capability to identify nuclear materials. Continued development of a standoff system for detection and characterization of chemical and biological agents using a non-nuclear source. Continued development of a non-hazardous, non-corrosive, environmentally-safe decontamination systems for chemical and biological agents. Started the modification of a ion mobility spectroscopy chemical agent detector to perform separation of chemical agents in contaminated environments with a reduction in false alarms. Started the development of a real-time, highly selective and sensitive, portable chemical and biological warfare agent detection systems. Started the development of a rapid detection system for pathogenic chemical and biological agents in food. Started development of a personal chemical and biological agent dosimeter. Started development of a inexpensive disposable chemical and biological protective system. (\$ 6.398 Million)

(U) Started development of an Anti-Biological Device (ABD) to non-intrusively destroy biological agents in situ. (\$ 3.539 Million)

(U) **PERSONNEL PROTECTION.** Completed the design enhancements to allow fully armoring of a unibody vehicle. Continued development of a design for flexible body armor that resists penetration and slashes from knives and other sharp edged instruments. Started development of lightweight body armor using advanced materials to make the armor lighter and more flexible. Started modeling explosive effects on fully armored vehicles, including effects on occupants. Started a study to evaluate technologies to support the detection and interception/deflection of sniper bullets directed at speakers. Started evaluation of alternative, lightweight, transparent armor for use in vehicles. (\$ 2.845 Million)

(U) **SURVEILLANCE, COLLECTIONS, & OPERATIONS SUPPORT.** Started development of advanced tagging systems. Started development of hostage barricade surveillance systems. (\$ 1.500 Million)

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(U) **PHYSICAL SECURITY.** Completed and distributed guides to DoD field activities for Security Glazing Applications and Protection Against Terrorist Vehicle Bombs. Developed and distributed Terrorist Bomb Threat Stand-Off reference to security forces and EOD activities. Completed development of prototype non-intrusive, multi-sensor, inspection system for the detection of bulk explosives in large vehicles. Conducted demonstration of inspection technologies in SWA, success of demonstration has resulted in request to conduct additional OCONUS follow-on technology demonstrations. Completed Personal Injury Study of the Oklahoma City Bombing detailing location of injuries and fatalities from the bombing. Continued the development of an interagency Structural Blast Mitigation Program. Started field tests of specialized structures that address pre and post construction technologies to mitigate blast effects. Started follow-on study at Air Force request to address the Khobar Tower bombing. Started data computation effort to verify various interagency computer blast models. Started development of a modular, open architecture computer based system able to address vulnerability assessments and consequence or risk management to assist security personnel, facility engineers, installation managers and Commanders in making effective and cost-sensitive force protection and facility security decisions. (\$ 8.126 Million)

(U) **INFRASTRUCTURE PROTECTION.** Continued development of an automated infrastructure analysis tool for the electric power grid. Started development of a means of modeling the effects of economic and information warfare terrorism. Started development of an radio frequency weapon characterization and effects database. Started 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 (RTU). (\$ 0.695 Million)

(U) **INVESTIGATIVE SUPPORT & FORENSICS.** Continued development of an enhanced version of the CarBomb CAD analysis tool, which is a system that aides post-blast analysis of vehicle bombs. Started development of an enhanced handwriting analysis system. Started development of a personal attribute determination by fingerprints capability. Started the development of a system to detect and recover fingerprints on water soaked surfaces. Started development of a document copier tagging system. Started development of chemicals to tag devices and documents with micro-tracer particles. (\$ 1.170 Million)

(U) **FY1999 Plans:**

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(U) **TACTICAL OPERATIONS SUPPORT.** Complete development and field evaluation of night vision goggles that mitigate the effects of halo effects and blooming when bright lights are encountered, and which is rugged enough to withstand the physical shock from tactical operations. Complete development of a robust, miniature laser range finder. Transition the advanced high speed personnel delivery boat. Continue development of a rifle-fired 40mm grenade that provides a controlled pattern for use by tactical forces in close combat situations. Start evaluation and development of technologies that provide through-wall-imaging capability for use by tactical forces. Start identification and development of non-explosive breaching capabilities. Start evaluation and development of improved non-pyrotechnic diversionary device. (\$ 1.470 Million)

(U) **EXPLOSIVES DETECTION & DEFEAT.** Complete technology transition of the 90-mm water canon to industry. Complete technology transition of the Universal Training Device to industry. Complete development of a safer initiating system for various explosive disruption robots. Continue development of a system for the detection of terrorist bombs from standoff distances under a variety of conditions. Continue to develop the full spectrum of response requirements for large vehicle bombs, including detection, analysis, access, and disablement. Continue to develop an interactive, computer-based improvised explosive device neutralization training system. Continue development of a single-sided antenna for use with nuclear quadrupole resonance explosive detection methods. Continue researching factors that affect the capabilities of improvised explosive device detection through biological schemes. Continue development of a field-portable x-ray system for imaging the contents of suspect baggage/containers when access to only one side is possible. Continue development of the ARTS platform to include on-board diagnostics and access tools for EOD. Continue development of the flat-panel imager for a digital x-ray system. Continue development of a Canine based, remote collection explosives screening system for Large Vehicle Bombs. Continue development of a single-sided neutron interrogation unit for identification of vehicle bombs. Continue modeling of non-ideal, terrorist explosives. Continue development of a database for identification of large vehicle threats, disruption tools and procedures. Start development of an x-ray database on components used in IEDs. Start development of software codes for integrating robotic chassis and various tools used (arms/disrupters/sensors) for modular PC based control architecture. Start development of small, capable, low cost robots for EOD use. Start development of new high speed shape charge technology. Start development of new, portable, light-weight explosive total containment systems. (\$ 5.179 Million)

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(U) **CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES.** Complete the development of an improved, in-field capability to identify nuclear materials. Complete the modification of a ion mobility spectroscopy chemical agent detector to perform separation of chemical agents in contaminated environments with a reduction in false alarms. Complete the development of a rapid detection system for pathogenic chemical and biological agents in food. Complete development of a inexpensive disposable chemical and biological protective system. Continue development of a standoff system for detection and characterization of chemical and biological agents using a non-nuclear source. Continue development of a non-hazardous, non-corrosive, environmentally-safe decontamination systems for chemical and biological agents. Continue the development of a real-time, highly selective and sensitive, portable chemical and biological warfare agent detection systems. Continue development of a personal chemical and biological agent dosimeter. Start the development of enhanced non-intrusive screening and diagnostic capabilities for operators to determine the contents of closed containers. Start expert review of existing urban modeling capabilities to include domestic and foreign.(\$ 7.294 Million)

(U) **PERSONNEL PROTECTION.** Complete design for flexible body armor that resists penetration and slashes from knives and other sharp edged instruments. Complete development and characterization of advanced lightweight body armor. Continue modeling explosive effects on fully armored vehicles, including effects on occupants. Continue development of a design for a system that will provide protection to VIP speakers from snipers. Continue evaluation and characterization of advanced transparent armor for use in fully armored vehicles. Start evaluation and development of multilayered, lightweight, energy-absorbing, composite armor for vehicles. (\$ 1.515 Million)

(U) **SURVEILLANCE, COLLECTIONS, & OPERATIONS SUPPORT.** Continue development of advanced tagging systems. Continue development of hostage barricade surveillance systems. Start development of CT analyst support tool. Start development of long-range, LPI/D communications system. Start development of special cellular communications protocol intercept and geolocation system. Start development of GPS cellular tracking device. Start development of portable, remote antenna array. (\$ 1.988 Million)

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(U) **PHYSICAL SECURITY.** Complete Personal Injury Study of the Khobar Towers Bombing and identify techniques that will reduce personnel injuries from blast effects. Continue development of a non-intrusive, multi-sensor, inspection system for the detection of bulk explosives in large vehicles. Continue the development of the modular, open architecture computer based system able to address the full range of vulnerability assessments and consequence or risk management tools to assist security personnel, facility engineers, installation managers and commanders in making effective and cost-sensitive force protection and facility security decisions. Continue the development of interagency Structural Blast Mitigation Program. Pace of large scale blast test against specialized structures increases; focus will be to evaluate new and existing seismic construction techniques for protection against blast loads. Start development of a multi-sensor, non-intrusive Undervehicle Inspection System for detection of bulk explosives and contraband. Start development of non-intrusive, rapid personnel screening system to detect explosive residue on individual passing through an inspection point. Start development of a advanced technology, rapid, mobile cargo inspection system. Start development of technology to stop internal combustion engine powered vehicles from exiting a vehicle inspection point. Start development of a self contained, easily deployable, immediately operable, access control point for deployed security forces. (\$ 9.008 Million)

(U) **INFRASTRUCTURE PROTECTION.** Complete development of an automated infrastructure analysis tool for the electric power grid. Complete 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 (RTU). Continue development of a means of modeling the effects of economic and information warfare terrorism. Continue the development of an radio frequency weapon characterization and effects database. Start development of computer/ software security and network intrusion detection tools. Start development of computer security training aides. Start development of water pipeline database. Start development of a hacker publication, tools, and methodology database. (\$ 1.440 Million)

(U) **INVESTIGATIVE SUPPORT & FORENSICS.** Complete the development of a system to detect and recover fingerprints on water soaked surfaces. Complete development of a document copier tagging system. Complete development of an enhanced version of the CarBomb CAD design tool, which is a system that aides post-blast analysis of vehicle bombs. Complete development of a first responder’s tool set for emergency response and management. Continue development of an enhanced handwriting analysis system. Continue development of a personal attribute determination by fingerprints capability. Continue development of chemicals to tag devices and documents with micro-tracer particles. Start development of novel optical tagging systems for law enforcement. Start development of compendium of explosive properties. Start development of characterization of materials that are transparent to x-rays. Start development of computer forensics tools. (\$ 1.955 Million)

(U) Start development of a real-time facial recognition system.(\$ 2.500 Million)

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(U) **FY2000 Plans:**

(U) **TACTICAL OPERATIONS SUPPORT.** Complete development of non-pyrotechnic diversionary devices. Complete safety certification and transition rifle-fired 40mm grenade that provides a controlled pattern for use by tactical forces in close combat situations. Continue development of through wall imaging systems that provide capability to image wall construction as well as to identify presence of personnel in adjacent spaces. Continue development of portable non-explosive breaching devices. Start development of small, covert optical tags for tactical forces. Start development of advanced tactical sensors to identify and locate anti-personnel surveillance systems. (\$ 1.660 Million)

(U) **EXPLOSIVES DETECTION & DEFEAT.** Complete development of the flat-panel imager for a digital x-ray system. Complete development of a Canine based, remote collection explosives screening system for Large Vehicle Bombs. Complete to develop an interactive, computer-based improvised explosive device neutralization training system. Complete development of the ARTS platform for diagnostic and access for EOD; transition to US Air Force for procurement. Complete development of a single-sided neutron interrogation unit for the detection of vehicle bombs. Complete development of the x-ray database for identification of IED components. Complete development of a database for identification of large vehicle threats, tools and procedures. Complete modeling of non-ideal, terrorist explosives. Complete development of new, portable, light-weight explosive total containment systems. Continue development of a system for the detection of terrorist bombs from standoff distances under a variety of conditions. Continue development of a single-sided antenna for use with nuclear quadrupole resonance explosive detection methods. Continue researching factors that affect the capabilities of improvised explosive device detection through biological schemes. Continue to develop the full spectrum of response requirements for large vehicle bombs, including detection, analysis, access, and disablement. Continue development of software codes for integrating robotic chassis and various tools used (arms/disrupters/sensors) for modular PC based control architecture. Continue development of a field-portable x-ray system for imaging the contents of suspect baggage/containers when access to only one side is possible. Continue development of small, capable, low cost robots for EOD use. Continue development of high speed shape charge technology. Start development of detection technology to be used against advanced sensor based threats; thermal, acoustics, etc. Start development of technologies to image and identify components of IEDs for precision disruption. Start development of EOD tools (arms/disrupters) and sensors for small robotic platforms. Start development of enhanced Canine substance detection. Start development of detection technology for use against non-nitrogen based explosives. Start development for non-intrusive analysis. Start development of background contaminant profiling. (\$ 12.188 Million)

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(U) **CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES.** Complete development of a non-hazardous, non-corrosive, environmentally-safe decontamination systems for chemical and biological agents. Complete the development of a rapid detection system for pathogenic chemical and biological agents in food. Continue development of a standoff system for detection and characterization of chemical and biological agents using a non-nuclear source. Continue development of a real-time, highly selective and sensitive, portable chemical and biological warfare agent detection systems. Continue development of a personal chemical and biological agent dosimeter. Continue review of urban modeling capability, perform verification studies. Start the development of enhanced non-intrusive screening and diagnostic capabilities for operators to determine the contents of closed containers. Start the development of testing procedures for next generation NBC responder equipment. (\$ 10.291 Million)

(U) **PERSONNEL PROTECTION.** Complete evaluation of advanced transparent armor for potential use in fully armored vehicles. Complete development of multilayered, lightweight, energy-absorbing, composite armor for vehicles. Complete modeling explosive effects on fully armored vehicles, including effects on occupants. Continue development of a design for a system that will provide protection to VIP speakers from snipers. Start development of system(s) capable of locating and identifying sniper optics. Start development a personnel tag system that provides identification of friendly personnel in an environment of multiple agency participation. (\$ 1.687 Million)

(U) **SURVEILLANCE, COLLECTION & OPERATIONS SUPPORT.** Complete development of hostage barricade surveillance systems. Complete development of CT analyst support tool. Complete development of long-range, LPI/D communications system. Complete development of GPS cellular tracking device. Continue development of advanced tagging systems. Continue development of special cellular communications protocol intercept and geolocation system. Continue development of portable, remote antenna array. Start development of long-range, clandestine microphone system. Start development of an automated profiling capability program to define the type and source of information indicative of terrorist activity. (\$ 3.179 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Counterterror Technical Support PE 0603122D8Z	

(U) **PHYSICAL SECURITY.** Complete development of system that can stop internal combustion engine powered vehicles from exiting a inspection point. Complete development of advanced multi-sensor, non-intrusive Undervehicle Inspection System for the detection of bulk explosives and contraband. Complete development of a non-intrusive, rapid personnel screening system to detect explosive residue on individual passing through an inspection point. Continue the development of a rapid, multi-sensor inspection system for the detection of bulk explosives at a entry point. Continue the interagency blast mitigation program; evaluation of the effectiveness of new blast wall designs for reducing over pressure and debris impacts on personnel and structures. Demonstrate new methods and establish criteria for reducing injuries and casualties due to progressive structural collapse. Continued development of a modular, open architecture system to provide intelligent vulnerability assessment, consequence and risk management tools to assist security personnel, facility engineers, installation managers and commanders in making effective and cost-sensitive force protection decisions. Conduct demonstration of enhanced capability mobile cargo inspection system. Start development of a virtual reality training system for inspection and entry points where security force personnel will participate in real time consequence management and interaction with virtual indigenous population. (\$ 10.218 Million)

(U) **INFRASTRUCTURE PROTECTION.** Complete development of an radio frequency weapon characterization and effects database. Complete development of computer security training aides. Complete development of a hacker publication, tools, and methodology database. Continue development of a means of modeling the effects of economic and information warfare terrorism. Continue development of computer/software security and network intrusion detection tools. Continue development of water pipe line database. (\$ 1.660 Million)

(U) **INVESTIGATIVE SUPPORT & FORENSICS.** Complete development of chemicals to tag devices and documents with micro-tracer particles. Complete development of a first responder's tool set for emergency response and management. Complete development of compendium of explosive properties. Complete development of characterization of materials that are transparent to x-rays. Continue development of an enhanced handwriting analysis system. Continue development of a personal attribute determination by fingerprints capability. Continue development of novel optical tagging systems for law enforcement. Continue development of computer forensics tools. (\$ 2.171 Million)

(U) **FY2001 Plans:**

(U) **TACTICAL OPERATIONS SUPPORT.** Complete development of through wall imaging systems that provide capability to image wall construction as well as to identify presence of personnel in adjacent spaces. Complete development of non-explosive breaching devices. Complete development of small, covert optical tags for tactical forces. Continue development of advanced tactical sensors to identify and locate anti-personnel surveillance systems. (\$ 1.792 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Counterterror Technical Support PE 0603122D8Z	

(U) **EXPLOSIVES DETECTION & DEFEAT.** Complete development of a single-sided antenna for use with nuclear quadrupole resonance explosive detection methods. Complete development of software codes for integrating robotic chassis and various tools used (arms/disrupters/sensors ) for modular PC based control architecture. Complete development of small, capable, low cost robots for EOD use. Complete researching factors that affect the capabilities of improvised explosive device detection through biological schemes. Complete development of high speed shape charge technology. Complete development of a field-portable x-ray system for imaging the contents of suspect baggage/containers when access to only one side is possible. Continue development of a system for the detection of terrorist bombs from standoff distances under a variety of conditions. Continue development of detection technology to be used against advanced sensor based threats; thermal, acoustics, etc. Continue development of technologies to image and identify components of IEDs for precision disruption. Continue development of EOD tools (arms/disrupters) and sensors for small robotic platforms. Continue development of enhanced Canine substance detection. Continue development of detection technology for use against non-nitrogen based explosives. Continue development for non-intrusive analysis. Continue to develop the full spectrum of response requirements for large vehicle bombs, including detection, analysis, access, and disablement. Continue development of background contaminant profiling. Start development of system to provide moving vehicle screening for explosives. Start development of materials for enhanced suppression/mitigation. (\$ 11.785 Million)

(U) **PERSONNEL PROTECTION.** Complete and demonstrate a system that will provide protection to VIP speakers from snipers. Complete development of system(s) capable of locating and identifying sniper optics. Complete the development of a personnel tag system that provides identification of friendly personnel in an environment of multiple agency participation. (\$ 1.795 Million)

(U) **PHYSICAL SECURITY.** Complete technology survey and field test phase of the interagency blast mitigation program. Complete recommended architectural guidelines for facility site planning and pre- and post-construction technologies that will mitigate damage and personal injury effects large blasts. Complete development of a modular, open architecture system to provide intelligent vulnerability, consequence management, risk, and assessment tool to assist security personnel, facilities engineers, installation managers and commanders in making effective and cost-sensitive force protection and facility security decisions. Continue development of a virtual reality training system for inspection and entry points where security force personnel will participate in real time consequence management and interaction with a virtual indigenous population. Continue the development of a rapid, multi-sensor inspection system for the detection of bulk explosives at a entry point. Start development of a integrated multi-sensor, non- intrusive, stand-off vehicle and operator inspection system able to address all facets of vehicle inspection and rapidly integrate the results to the security force. Start development of a easily deployable, quick erect protective barrier system capable of mitigating the effects of a large vehicle bomb. Start development of non-intrusive vehicle tagging and tracking system able to monitor unlimited number of vehicles located within a installation. (\$ 11.112 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Counterterror Technical Support PE 0603122D8Z	

(U)     **INFRASTRUCTURE PROTECTION.** Complete development of water pipeline database. Continue development of a means of modeling the effects of economic and information warfare terrorism. Continue development of computer/software security and network intrusion detection tools. (\$ 1.791 Million)

(U)     **INVESTIGATIVE SUPPORT & FORENSICS.** Complete development of an enhanced handwriting analysis system. Complete development of a personal attribute determination by fingerprints capability. Complete development of novel optical tagging systems for law enforcement. Continue development of computer forensics tools. (\$ 1.793 Million)

(U)     **SURVEILLANCE, COLLECTION & OPERATIONS SUPPORT.** Complete development of special cellular communications protocol intercept and geolocation system. Continue development of portable, remote antenna array. Complete development of advanced tagging systems. Continue development of long range, clandestine microphone system. Continue development of an automated profiling capability program to define the type of information indicative of terrorist activity. (\$ 3.509 Million)

(U)     **CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES.** Complete the development of a rapid detection system for pathogenic chemical and biological agents in food. Complete development of an inexpensive disposable chemical and biological protective system. Continue development of a standoff system for detection and characterization of chemical and biological agents using a non-nuclear source. Continue development of a non-hazardous, non-corrosive, environmentally-safe decontamination systems for chemical and biological agents. Continue the development of a real-time, highly selective and sensitive, portable chemical and biological warfare agent detection systems. Continue development of a personal chemical and biological agent sampler. Continue review of urban modeling capability, perform validation studies. Continue the development of enhanced non-intrusive screening and diagnostic capabilities for operators to determine the contents of closed containers. Start the development of testing procedures for next generation NBC responder equipment. (\$ 11.753 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Counterterror Technical Support PE 0603122D8Z			

<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	40.826	37.667	52.223	54.791	56.510	52.758	54.021	55.306	Continuing	Continuing
Explosive Ordnance Disposal/Low Intensity Conflict/P206	3.717	3.983	7.831	8.095	8.350	8.626	8.847	9.131	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Completed development of an autonomous search vehicle. Completed development of an imaging ordnance locator. Completed development of a high resolution diver sonar. Completed development of a standoff dearmmer with laser sight. Completed development of a clandestine underwater transponder. Completed development of an improvised explosive device visualization capability. Completed development of EOD ballistic/fragmentation protection. (\$ 0.403 Million)

(U) Continued development of special operations forces vehicle ballistic protection. Continued development of non-explosive cartridges. Continued development of a remote field disassembly system. Continued development of a limpet mine detection system. (\$ 0.69 Million)

(U) Started development of a support craft command and control system. Started development of an integrated mission planning and evaluation system. Started development of an integrated diver's display mask. Started development of an improved underwater demolition charge. Started development of a limpet mine neutralization tool. Started development of a hull acoustic navigation system for diver's search. Started development of an EOD incident site command, control and communications system. Started development of an advanced EOD tactical information system. Started development of a small munitions/boobytrap disrupter. Started evaluation of long range disrupters. Started evaluation of a miniature mine detector. Started development of a non-magnetic dive light. (\$ 2.624 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Counterterror Technical Support PE 0603122D8Z	

**(U) FY1999 Plans:**

(U) Complete development of special operations forces vehicle ballistic protection. Complete development of non-explosive cartridges. Complete development of a remote field disassembly system. Complete development of a limpet mine detection system. (\$ 1.000 Million)

(U) Continue development of a support craft command and control system. Continue development of an integrated mission planning and evaluation system. Continue development of an integrated diver's display mask. Continue development of an improved underwater demolition charge. Continue development of a limpet mine neutralization tool. Continue development of a hull acoustic navigation system for diver's search. Continue development of an EOD incident site command, control and communications system. Continue development of an advanced EOD tactical information system. Continue development of a small munitions/boobytrap disrupter. Continue evaluation of long range disrupters. Continue evaluation of a miniature mine detector. Continue development of a non-magnetic dive light. (\$ 1.575 Million)

(U) Start development of an HMMWV-based laser ordnance neutralization system. Start development of special operations target information system with a multifunction equation/calculator system. Start development of an EOD explosive transport and storage kit container. Start development of a portable/hand held thermal imaging device. Start development of a ground penetrating object detector. Start development of remote activation munitions systems (underwater adapter kit). Start development of electronic countermeasures for electronic fuses. Start development of an improved vehicle access/disruption device. (\$ 1.408 Million)

**(U) FY2000 Plans:**

(U) Complete development of a support craft command and control system. Complete development of an integrated mission planning and evaluation system. Complete development of an integrated diver's display mask. 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 a small munitions/boobytrap disrupter. Complete evaluation of long range disrupters. Complete evaluation of a miniature mine detector. Complete development of a non-magnetic dive light. (\$ 0.300 Million)

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(U) Continue development of an HMMWV-based laser ordnance neutralization system. Continue development of special operations target information system with a multifunction equation/calculator system. Continue development of an EOD explosive transport and storage kit container. Continue development of a portable/hand held thermal imaging device. Continue development of a ground penetrating object detector. Continue development of remote activation munitions systems (underwater adapter kit). Continue development of electronic countermeasures for electronic fuses. Continue development of an improved vehicle access/disruption device. (\$ 1.605 Million)

(U) Start development of an integrated improvised explosive devices training system. Start development of a rapid underwater ordnance neutralizer. Start development of an advanced remotely controlled, EOD mini-reconnaissance vehicle. Start development of a special operations global remote initiator device. Start development of a miniature CD-ROM reader for EOD applications. Start development of a remote controlled transporter x-ray. Start development of a portable thermite grenade thermal insulator. Start development of a polarized ground disturbance lens. Start development of focused acoustic waves for special operations landmine detection. Start development of an ultrahigh pressure waterjet mine neutralization system. Start development of a SOF special energetic material (SOFSEM). Start development of an underwater breathing apparatus advanced CO2 scrubber. Start development of an advanced tactical personnel protection system. Start development of an integrated C4I low intensity conflict digital reconnaissance system. Start development of an under water digital reconnaissance system. Start development of an EOD low cost remote underwater search system. Start development of a long range remote control system. Start development of an advanced device for standoff identification of explosive hazards. Start development of a tactical lightweight filmless x-ray receiver/imager. Start development of an advanced demolition timer. Start development of a portable underwater laser line scanner. Start development of a miniaturized, multi-sensor surface reconnaissance system. (\$ 5.926 Million)

(U) **FY2001 Plans:**

(U) Complete development of an HMMWV-based laser ordnance neutralization system. Complete development of special operations target information system with a multifunction equation/calculator system. Complete development of an EOD explosive transport and storage kit container. Complete development of a portable/hand held thermal imaging device. Complete development of a ground penetrating object detector. Complete development of remote activation munitions systems (underwater adapter kit). Complete development of electronic countermeasures for electronic fuses. Complete development of an improved vehicle access/disruption device. (\$ 0.550 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Counterterror Technical Support PE 0603122D8Z	

(U) Continue development of an integrated improvised explosive devices training system. Continue development of a rapid underwater ordnance neutralizer. Continue development of an advanced remotely controlled, EOD mini-reconnaissance vehicle. Continue development of a special operations global remote initiator device. Continue development of a miniature CD-ROM reader for EOD applications. Continue development of a remote controlled transporter x-ray. Continue development of a portable thermite grenade thermal insulator. Continue development of a polarized ground disturbance lens. Continue development of focused acoustic waves for special operations landmine detection. Continue development of an ultrahigh pressure waterjet mine neutralization system. Continue development of a SOF special energetic material (SOFSEM). Continue development of an underwater breathing apparatus advanced CO2 scrubber. Continue development of an advanced tactical personnel protection system. Continue development of an integrated C4I-low intensity conflict digital reconnaissance system. Continue development of an underwater digital reconnaissance system. Continue development of an EOD low cost remote underwater search vehicle. Continue development of a long range remote control system. Continue development of an advanced standoff system for identification of explosive hazards. Continue development of a tactical lightweight filmless x-ray receiver/imager. Continue development of an advanced demolition timer. Continue development of a portable underwater laser line scanner. Continue development of a miniaturized, multi-sensor surface reconnaissance system. (\$ 6.363 Million)

(U) Start development of an active infrared (AIR) detection system. Start development of an advanced limpet mine neutralization tool. Start development of an underwater excavation system. Start development of an area survey imaging sonar (ASIS). (\$ 1.182 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Counterterror Technical Support PE 0603122D8Z			

<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	40.826	37.667	52.223	54.791	56.510	52.758	54.021	55.306	Continuing	Continuing
Special Operations/Low Intensity Conflict (SO/LIC)/P205	1.434	1.335	1.338	1.366	1.392	1.419	1.548	1.580	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Projects included: Analysis of SOF Information Warfare Requirements and Capabilities, The Future of Intra-State Conflict, Development of Analytical Tools for Operations Other Than War, Enhanced PYSOP, Readiness of Joint Service Explosive Ordnance Disposal Units for the 21st Century, Effectiveness of PYSOP in Bosnia and Potential for Increased Utility of PYSOP on Support of Future Peace-Type Operations, and AC-130 Force Structure. (\$ 1.434 Million)

(U) **FY1999 Plans:**

The FY 1999 program was approved in August 1998. Approved projects/study include: 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. (\$ 1.335 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Counterterror Technical Support PE 0603122D8Z	

(U) **FY2000 Plans:**

(U) The FY 2000 program will be finalized in August 1999, ensuring that study projects are timely and responsive to the requirements of DoD policy makers. (\$ 1.338 Million)

(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. (\$ 1.366 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
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(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	39.036	35.813	39.223	41.381	Continuing
Appropriated Value	0	38.3130	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	0	-.646	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	1.7900	0	-0.900	-0.900	
c. Other	0		13.0000	013.410	
Current Presidents Budget	40.826	37.667	52.223	54.791	Continuing

**Change Summary Explanation:**

- (U) **Funding:** FY 1999 funding changes are due to congressional undistributed reductions. Congress added \$2.5 million in FY 1999 for the Facial Recognition Technology (FRT) project. Increase in FY 2000 and FY 2001 focus on Anti-Terrorism and Force Protection development.
  
- (U) **Schedule:** N/A
  
- (U) **Technical:** N/A
  
- (U) **C. OTHER PROGRAM FUNDING SUMMARY COST:** Other Appropriation Funds: Department of State
  
- (U) **D. ACQUISITION STRATEGY:** N/A
  
- (U) **E. SCHEDULE PROFILE:** N/A

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								DATE <b>February 1999</b>		
<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>				<b>PE NUMBER AND TITLE</b> <b>0603160D8Z Counterproliferation Advanced Technology Development</b>						
<i>COST (In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	74196	0	0	0	0	0	0	0	0	74196
P535 SOF Counterproliferation Support	16189	0	0	0	0	0	0	0	0	16189
P539 Counterforce	58007	0	0	0	0	0	0	0	0	58007
<b><u>Mission Description and Budget Item Justification:</u></b>										
<p>In August 1994, DoD established the Counterproliferation Support Program specifically to address the DoD shortfalls in counterproliferation operational capabilities documented in the May 1994 Report to Congress titled <i>Report on Nonproliferation and Counterproliferation Activities and Programs</i>. Counterproliferation Support Program funds are used to leverage DoD acquisition programs to meet the counterproliferation priorities of the Commanders-in-Chief (CINCs) of the Combatant Commands and accelerate the deployment of enhanced capabilities to the field. Specifically, the goal of the Counterproliferation Support Program is to improve specific military counterproliferation capabilities by (1) building on ongoing programs in the Services, DoD agencies, Department of Energy and US Intelligence; (2) focusing on the most critical counterproliferation shortfalls to address major gaps in deployed capabilities (as reflected in the CINCs' priorities and the Counterproliferation Review Committee's (CPRC) prioritized list of counterproliferation Areas for Capability Enhancements); (3) leveraging existing program funding to more rapidly field capabilities by accelerating the deliverables of DoD programs; (4) identifying and enhancing the development of high payoff technologies to accelerate capabilities to the warfighter; (5) identifying and promoting key non-materiel initiatives that complement technological advances; and (6) transitioning Counterproliferation Support Program projects to the Services as soon as practicable.</p> <p>The FY 1998 Defense Reform Initiative (DRI) directed the establishment of the Defense Threat Reduction Agency (DTRA) effective 1 October 1998. The DTRA will be formed through the consolidation of three existing agencies: the Defense Special Weapons Agency (DSWA), the On-Site Inspection Agency (OSIA), and the Defense Technology Security Administration (DTSA). In addition, several functions from the Office of the Secretary of Defense (OSD) and Washington Headquarters Services (WHS) currently involved in the management of associated programs will transfer to DTRA as well. The DTRA will also carry out programs to counter proliferation and reduce threats posed by weapons of mass destruction and provide nuclear weapon stockpile and related support.</p> <p>As part of this budget submission, Counterproliferation Support Program funding and manpower resources programmed for FY 1999 and out are transferred to the DTRA. A five-percent military and civilian personnel savings associated with the DTRA consolidation has already been applied and is reflected in the funding and personnel transfers to DTRA.</p>										
Exhibit R-2 (PE 0603160D8Z)										

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								DATE <b>February 1999</b>		
<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>				<b>PE NUMBER AND TITLE</b> <b>0603160D8Z Counterproliferation Advanced Technology Development</b>					<b>PROJECT</b> <b>P535</b>	
<i>COST (In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
P535 SOF Counterproliferation Support	16189	0	0	0	0	0	0	0	0	16189
<p><b><u>A. Mission Description and Budget Item Justification</u></b></p> <p><b><u>Project P535 - SOF Counterproliferation Support:</u></b> In 1995, the Secretary of Defense (SECDEF) assigned the core task of countering the proliferation of weapons of mass destruction (WMD) to Special Operations Forces (SOF). The SOF Projects will develop and demonstrate SOF unique devices that enable SOF and special mission units to detect, disable and neutralize WMD and their associated facilities under the direction of a geographic combatant commander-in-chief (CINC) in support of Concept Plan (CONPLAN) 0400. These projects are to be employed by SOF units with direct application to the nation's effort to counter the spread of WMD (CP-WMD). These include efforts to defeat hard and deeply buried targets (HDBT), explosive ordinance disposal (EOD) and maritime efforts to prevent the spread of WMD technology or systems using the sea-lanes. HDBT is focused on breaching tools, improved communications, life support equipment, detection and defeat sensors, underground navigation systems, and target defeat. The EOD focus is on detection, characterization, extraction, and emergency destruction of nuclear, biological and chemical (NBC) agents and devices. Efforts to seek to improve these capabilities by providing greater standoff and utilizing non-intrusive technologies. Maritime counterproliferation (CP) operations concentrate on defeating and neutralizing WMD or WMD material being transported or concealed on maritime platforms. Also included are efforts to enhance our existing capability in support of the domestic response to the WMD threat on U.S. soil. The CP-WMD effort also includes support requirements that apply to all three efforts.</p> <p>Under Project 535, First Responder Projects quickly leverage DoD biological and chemical response, detection and mitigation technologies to crisis and consequence management response teams such as the US Army Technical Escort Unit (USA TEU), the Navy Defense Technical Response Group (DTRG), the Federal Emergency Management Agency (FEMA), the US Secret Service (USSS) and the Department of Public Health and Safety (PHS). These projects are executed in conjunction with the Joint Chiefs of Staff CONPLAN 0300, the Office of the Assistant Secretary of Defense (Special Operations and Low Intensity Conflicts) and the Technical Support Working Group of the National Security Council's Interagency Working Group on Counterterrorism to ensure full interagency coordination of requirements.</p> <p><b><u>Acquisition Strategy:</u></b></p> <p><b><u>FY 1998 Accomplishments:</u></b></p> <ul style="list-style-type: none"> <li>• 1828 FIRST RESPONDER PROJECTS</li> <li>• Chemical/ Biological Sentry System (CBSS)--Finalized field testing; delivered prototype unit to user (600)</li> <li>• Biological Detection Kit--Field tested system; delivered prototype units to user (329)</li> <li>• Chemical Agent Recognition Training Aid—Developed a training aid that reproduces the visual and auditory signatures associated with chemical agent alarm functioning, thereby increasing individual and user confidence in detector operability (150))</li> </ul>										
Project P535						Exhibit R-2 (PE 0603160D8Z)				

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE <b>February 1999</b>																																																				
<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>	<b>PE NUMBER AND TITLE</b> <b>0603160D8Z Counterproliferation Advanced Technology Development</b>	<b>PROJECT</b> <b>P535</b>																																																				
<ul style="list-style-type: none"> <li>• Detection/ Electronic Diagnostics—Initiated development of modified x-ray system to minimize risk of explosive device functioning during x-ray operations (400)</li> <li>• Access -- Conducted development of Sloth Technology equipment designed to operate/move at speeds below sensing threshold of volumetric sensors (275)</li> <li>• Neutralize -- Assessed capability of explosively driven magneto-hydrodynamic generators as a means of defeating very fast firing circuits on explosive devices (50)</li> <li>• SBIR/STTR (24)</li> <li>• 14361 SOF PROJECTS</li> <li>• Efforts in support of SOF. Specific details are classified (14232)</li> <li>• SBIR/STTR (129)</li> </ul> <p>Total            16189</p> <p><b>FY 1999 Planned Program:</b> Total            0    Funds and activities transferred to PE 0603160BR. P535</p> <p><b>FY 2000 Planned Program:</b> Total            0    Funds and activities transferred to PE 0603160BR. P535</p> <p><b>FY 2001 Planned Program:</b> Total            0    Funds and activities transferred to PE 0603160BR. P535</p> <p><b>B. <u>Project Change Summary</u></b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;"><u>FY 1998</u></th> <th style="text-align: center;"><u>FY 1999</u></th> <th style="text-align: center;"><u>FY 2000</u></th> <th style="text-align: center;"><u>FY2001</u></th> <th style="text-align: center;"><u>Total Cost</u></th> </tr> </thead> <tbody> <tr> <td>Previous President's Budget</td> <td style="text-align: right;">11885</td> <td style="text-align: right;">0</td> <td style="text-align: right;">0</td> <td style="text-align: right;">0</td> <td style="text-align: right;">Continuing</td> </tr> <tr> <td>Appropriated Value</td> <td style="text-align: right;">11885</td> <td style="text-align: right;">N/A</td> <td style="text-align: right;">N/A</td> <td style="text-align: right;">N/A</td> <td style="text-align: right;">N/A</td> </tr> <tr> <td>Adjustments to Appropriated Value</td> <td style="text-align: right;">4304</td> <td style="text-align: right;">N/A</td> <td style="text-align: right;">N/A</td> <td style="text-align: right;">N/A</td> <td style="text-align: right;">N/A</td> </tr> <tr> <td>Current Budget Submit/President's Budget</td> <td style="text-align: right;">16189</td> <td style="text-align: right;">0</td> <td style="text-align: right;">0</td> <td style="text-align: right;">0</td> <td style="text-align: right;">Continuing</td> </tr> </tbody> </table> <p><b>C. <u>Other Program Funding Summary</u></b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;"><u>FY 1998</u></th> <th style="text-align: center;"><u>FY 1999</u></th> <th style="text-align: center;"><u>FY 2000</u></th> <th style="text-align: center;"><u>FY 2001</u></th> <th style="text-align: center;"><u>FY 2002</u></th> <th style="text-align: center;"><u>FY 2003</u></th> <th style="text-align: center;"><u>FY 2004</u></th> <th style="text-align: center;"><u>FY 2005</u></th> <th style="text-align: center;"><u>To</u></th> <th style="text-align: center;"><u>Total</u></th> </tr> </thead> <tbody> <tr> <td>Not Applicable</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;"><u>Compl</u></td> <td style="text-align: center;"><u>Cost</u></td> </tr> </tbody> </table> <p>Project P535 <span style="float: right;">Exhibit R-2 (PE 0603160D8Z)</span></p>				<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY2001</u>	<u>Total Cost</u>	Previous President's Budget	11885	0	0	0	Continuing	Appropriated Value	11885	N/A	N/A	N/A	N/A	Adjustments to Appropriated Value	4304	N/A	N/A	N/A	N/A	Current Budget Submit/President's Budget	16189	0	0	0	Continuing		<u>FY 1998</u>	<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</u>	<u>Total</u>	Not Applicable									<u>Compl</u>	<u>Cost</u>
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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								DATE <b>February 1999</b>		
<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>				<b>PE NUMBER AND TITLE</b> <b>0603160D8Z Counterproliferation Advanced Technology Development</b>				<b>PROJECT</b> <b>P539</b>		
<i>COST (In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
P539 Counterforce	58007	0	0	0	0	0	0	0	0	58007
<p><b>A. <u>Mission Description and Budget Item Justification</u></b></p> <p><b>Project P539 - Counterforce:</b> The purpose of this project is to develop technologies, demonstrate prototype systems in an operationally realistic environment and provide the warfighter with enhanced capabilities in response to current threat projections for potential adversaries who have the capability to develop and/or employ nuclear, biological and chemical (NBC) weapons in future regional conflicts involving the U.S. or its allies. The U.S. requires the capability to identify and characterize NBC research, production, storage and operational support facilities and be prepared to attack and neutralize them while mitigating collateral effects resulting from expulsion and release of NBC agents. The potential target set includes fixed, aboveground and underground hardened and unhardened facilities. The project started in FY95 and was structured to exploit ongoing technology programs wherever possible. Early project emphasis was applied to efforts to predict and measure target response and dispersion of agents associated with attacks against NBC facilities using existing conventional weapons. Current emphasis is to mitigate collateral effects through advanced weapon development and greatly enhanced deliberate target planning leading to optimized weapon employment. The near-term focus is the demonstration of target planning tools, weapons and sensors supporting direct attacks on an expanded set of NBC targets. In the longer-term, the project emphasis will change to standoff penetrating weapons, collateral effects assessment and the supporting planning tools. Prototype or modified systems integrating these technologies will then be evaluated in an Advanced Concept Technology Demonstration (ACTD), and a residual operational capability provided to the warfighters.</p> <p>A second counterforce CP ACTD is approved by DUSD(AT) and is awaiting signature of the management plan. The original CP ACTD has been retitled CP1 ACTD for the first CP ACTD. The second CP ACTD is called the Second Counterproliferation Counterforce Advanced Concept Technology Demonstration (CP2 ACTD). FY98 is the transition year with CP1 ACTD concluding and CP2 ACTD starting.</p> <p>This project builds on previous Defense Special Weapons Agency (DSWA) projects to develop and mature sensor systems to provide additional capabilities for pre-, trans- and post-attack target characterization, and damage and collateral effects assessments. The project further develops and accelerates capabilities in collateral effects prediction, target/weapon interaction prediction, and funds the integration of these capabilities into Service/CINC target planning systems. The project also builds on Service programs in advanced weapon guidance, penetration and fuze enhancements. Service weapon development expertise will be used to integrate complementary, demonstrated technologies into prototype weapons that can improve prompt response, enhance lethality and control collateral effects. The project milestones are broken into four major product areas or subprojects, sensors, collateral effects, target planning and weapons, plus the operational demonstrations.</p> <p><b>1. <u>Sensors.</u></b> This effort will provide improved warfighting residual capabilities for facility characterization, battle damage assessment (BDA) and collateral effects assessment against the spectrum of NBC facilities. Research and development is currently in progress at DSWA to characterize signatures from shallow underground facilities for exploitation by tactical unattended ground sensors (TUGS). Objectives of the current program include development of techniques for source identification,</p>										
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<p>localization, and performing change detection in trans-attack signatures for weapon effectiveness analysis. Current intelligence community (IC) and Department of Energy (DOE) programs involve research and development to assess sensor performance and approaches for optimum sensor application for surface target detection and underground facility detection and characterization. Other project activities include enhancing the performance of existing forward looking infrared (FLIR) sensors and a weapon based sensor to provide high confidence BDA. This sub-project will leverage existing programs to (1) define concept of operations and sensor system (ground, air, and weapon based) architectures for BDA, collateral effects assessment and facility characterization; (2) develop and demonstrate sensor technologies and prototype sensor systems for BDA and facility characterization; (3) produce a data fusion and processing module for BDA and facility characterization to meet user requirements on existing platforms; (4) produce an integrated BDA module to support airborne sensors; (5) develop and demonstrate a man-emplaced TUGS system that includes multi-sensor arrays; (6) integrate stand-off and point chemical sensors onto an unmanned air vehicle (UAV) and an expendable mini-UAV, respectively, and demonstrate the ability to confirm, identify, and assess the release of chemical agents in support of attacks on NBC facilities. CP2 ACTD sensors and data fusion will address confirming the presence of chemical agents post attack and assist in predicting transport patterns by updating pre-strike predictions of the potentially hazardous plume with real-time data. The CP2 ACTD sensor program will leverage on-going chemical sensor efforts within the chemical and biological defense community to minimize program risk in developing chemical sensors for counterforce missions. This program will also monitor the progress of remote biological agent detectors for potential incorporation into the collateral effects assessment system.</p> <p><b>2. Collateral Effects.</b> The Collateral Effects program provides predictive tools for NBC expulsion and dispersion resulting from attacks on WMD facilities as well as acts of terrorism and hostile use of WMD for a variety of applications supporting NBC target attack planning. Requirements include high resolution weather models, weather measurement systems, and population databases. A key element in developing these collateral effects codes is chemical/biological expulsion tests and modeling. Modeling of chemical/biological expulsion sources will be based on theoretical model and empirical data. Codes will be validated from existing data, other predictive models and special collateral effects experiments. The collateral effects tools will provide pre-attack prediction and post-attack assessment. The Hazard Prediction and Assessment Capability (HPAC) is a major product that predicts the release and transport of NBC materials and the subsequent collateral effects. The high resolution weather prediction capability, another area of emphasis in the subproject, will provide timely wind, cloud, and precipitation data necessary for NBC collateral effects predictions. Weather data currently does not have the resolution or quality necessary. This weather data will also be available to other users in the theater such as Joint Warning Network (JWARN). These tools will also be integrated into the target attack planning tools to assess the consequences of attacks on WMD facilities.</p> <p><b>3. Target Planning.</b> This effort will provide a new deliberate planning combat assessment capability and a major upgrade for existing theater level planning capabilities for defeating or denying NBC facilities and capabilities. This effort builds upon the Integrated Mission Effects Assessment (IMEA) planning tool developed for CP1. IMEA provides a forward deployable target planning capability for NBC targets. IMEA is an integration of the Munitions Effects Assessment (MEA) tool providing targeting solutions using conventional weapons for a variety of structures and equipment and the HPAC developed under the Collateral Effects subproject. The current effort will produce the Integrated Target Planning Tool Set (ITPTS) that will provide a spectrum of planning capabilities from deliberate to crisis. ITPTS includes IMEA II and high resolution weather prediction. IMEA II will import target data and import attack assessment data from prior planned strikes. ITPTS will also predict weapons performance and associated NBC collateral effects, develop targeting solutions that minimize collateral effects, and provide the results through the appropriate interfaces for a variety of targets including functionally and structurally complex facilities. The major differences between IMEA and IMEA II is a greatly enhanced interface to the</p>		
Project P539		Exhibit R-2 (PE 0603160D8Z)

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<p>Intelligence community and upgrades to handle additional target types including complex facilities, to handle additional weapons and platforms, to provide more operator friendly displays, to import attack assessment data, and to efficiently interface with Service planning systems. The ITPTS interfaces include but are not limited to Global Command and Control System, the Service targeting and strike execution control systems, strategic and tactical intelligence and sensor systems, the weather community, and the NBC warning system. A key interface for CP applications is with the Tactical Multi-Sensor Fusion (TMSF), providing critical pre- and post-strike target characterization information. The “plug and play” architecture is required to accommodate differing CONOPS, theaters, and performers in several geographic locations. The deliberate planning capability requires significant input from the intelligence community including data regarding NBC facilities, processes, and surrounding populations. This effort will support the intelligence community in developing the necessary interfaces to provide for the efficient transfer of intelligence data. ITPTS will include IMEA II, IMEA II Prime, an advanced wind and weather prediction capability, and a “plug and play” architecture. This effort will execute a full verification and validation program for all delivered capabilities including extensive field testing at all functional levels.</p> <p><b>4. Weapons.</b> Conventional explosive-filled weapons are often relatively ineffective in destroying large underground reinforced concrete facilities. Even if the weapon detonates inside the facility, substantial interior walls and/or floors often confine the blast and fragmentation thus causing significant overpressure and venting through the penetration hole. Likewise conventional explosive-filled weapons often result in complete and uncontrolled destruction of soft buried and aboveground facilities. When these facilities protect NBC, the random use of conventional weapons greatly increases the risk of agent dispersal that may result in extensive civilian or force casualties. This sub-project will develop, integrate and demonstrate advanced conventional weapons technologies to improve mission effectiveness against NBC facilities while mitigating collateral effects. For CP1 ACTD, these technologies include improvements in adverse-weather/precision guidance, enhanced penetrating capabilities, and advanced fuzing options. Technologies that have been successfully demonstrated will be weaponized into prototype systems. Advanced fuzes will enable weapons employment options to maximize lethality and/or control collateral effects. The focus for CP2 ACTD is to provide the warfighter with a demonstrated option to attack NBC facilities in a standoff mode. CP2 ACTD will improve on existing stand-off weapon platforms to provide enhanced penetration, advanced fuzing, and enhanced payloads that can reduce collateral effects by neutralizing agents before they are released or reducing the amount released. Standoff weapons to be enhanced include the conventional Tomahawk Land Attack Missile (TLAM-C) and the Conventional Air Launched Cruise Missile (CALCM). Enhanced payloads will explore alternate warhead options to conventional blast/fragmentation with the objectives of mitigating collateral effects associated with dispersal of NBC materials while also minimizing the number of weapons required to functionally defeat WMD facilities.</p> <p><b>5. Operational Demonstrations.</b> The Counterproliferation ACTD will improve the operational capability for holding NBC targets at risk with minimum collateral effects. The objective is to integrate available or near-term technologies for sensors, weapons, collateral effects prediction and target planning tools, evaluate the technologies in an operational context, and transition improved capabilities rapidly to warfighters. Specifically, this project will enhance and accelerate existing programs to provide integrated target planning to include collateral effects prediction codes and sensors for facility characterization and BDA, and advanced weapons development programs to meet NBC target defeat requirements. This project will also support demonstration operations to include system operational concept, demonstration planning, scenario development, execution of the ACTD and post-demonstration analysis. Planning and execution of the ACTDs uses a time phased approach to screen candidate technologies for maturity, develop prototype systems and demonstrate enhancements in military capability against a warfighter prioritized subset of all potential NBC target types. This approach results in a cycle of prototype development and testing followed by periods of operational demonstration.</p>		
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<p>Two operational demonstration series were defined for the CP1 ACTD. The first demonstration, named Dipole Orbit (DO), was successfully completed in February 1997. This first demonstration used new target planning tools to determine the “best” employment of current weapons with a smart fuze against simulated biological agents housed in soft above-ground bermed structures. The second and final demonstration series, named Dipole Jewel (DJ), is scheduled for completion in July 1998. This demonstration will assess improved capabilities in weapons, sensors, and enhanced planning tools against a simulated, hardened chemical weapons production facility in a shallow-buried, cut-and-cover structure. After the start of CP1 ACTD, the sponsoring command identified a need to understand their ability to conduct counterforce operations against soft above-ground simulated chemical production facilities using the TLAM-C. The Dipole Tiger (DT) demonstration series was added as a quick response to the users’ request. DT started in April 1997 and will end in FY98.</p> <p>Four operational demonstration series are planned during CP2 ACTD over the period of FY1999-2002 to provide the sponsor and participating commands with the opportunity to assess the utility of the selected technologies. The objective of the first demonstration series in CP2 ACTD, called Dipole Xeric (DX), is to employ current technology products in weapons and improved target planning tools, using new weapon delivery tactics, and operationally demonstrate their enhanced penetration capabilities against a simulated chemical agent production and storage facility considerably harder than the structure used during CP1 ACTD Dipole Jewel series. The objective of the second demonstration series, called Dipole Yukon (DY), is to exploit near-term technology by demonstrating the baseline capabilities of the Joint Air-to-Surface Stand-off Missile (JASSM) to conduct chemical/biological (C/B) counterforce missions through operationally realistic attacks against a simulated biological weapons storage facility. The objective of the third demonstration, called Dipole Zodiac (DZ), is to assess the suitability of the CALCM with a penetrating warhead and a Predator UAV-based standoff sensor providing collateral effects assessment. The objective of the fourth demonstration series, called Divine Canberra (DC), is to evaluate the end-to-end set of products of the CP2 ACTD including the target planning tool, in its final operational context, a TLAM stand-off attack penetrating weapon capability, and remote combat assessment using a small expendable mini - UAV with a chemical point sensor on-board (and deployed from the Predator UAV demonstrated in DZ) against a relatively hard chemical production and storage facility. DC also includes demonstration of a weaponized enhanced payload.</p> <p>The High Frequency Active Auroral Research Program (HAARP) is to develop an ionospheric research facility to study and exploit emerging ionospheric technology for DoD surveillance and communications applications. The specific application of this project is imaging of underground counterproliferation related facilities.</p> <p><b><u>Acquisition Strategy:</u></b>  <b>FY 1998 Accomplishments:</b></p> <ul style="list-style-type: none"> <li>• 11440 SENSORS</li> <li>• Delivered TMSF for validation, support ACTD fielding and provide operational user manuals. (600)</li> <li>• Provided test support and fielding for TFPM. (1400)</li> <li>• Delivered TUGS demonstration units, supply communications and interfaces, support validation tests and supply operational user manuals. (2700)</li> <li>• Baselined performance of existing remote or standoff chemical agent detectors for the counterforce role and down-select to an appropriate candidate. (200)</li> </ul>		
Project P539	Exhibit R-2 (PE 0603160D8Z)	

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BUDGET ACTIVITY		February 1999
<b>3 - Advanced Technology Development</b>	PE NUMBER AND TITLE	PROJECT
	<b>0603160D8Z Counterproliferation Advanced Technology Development</b>	<b>P539</b>
<ul style="list-style-type: none"> <li>• Initiated testing of existing chemical point sensors for counterforce role. (1400)</li> <li>• Initiated design modifications of a mini-UAV chemical point sensor. (900)</li> <li>• Initiated design modifications of the Predator UAV platform for remote sensing and delivery of a mini-UAV. (540)</li> <li>• Initiated Predator UAV sensor system integration and subsystem test and evaluation. (1000)</li> <li>• Upgraded HAARP transmitter. Evaluate "Blind" test data. Validation analysis of ground global tomography (2700)</li>   <li>• 6900 COLLATERAL EFFECTS               <ul style="list-style-type: none"> <li>• Developed high resolution weather prediction capability and weather data server. (2500)</li> <li>• Collected weather data for tools validation. (1800)</li> <li>• Developed a chemical precursor source term model. (800)</li> <li>• Enhanced population effects model. (600)</li> <li>• Initiated development of HPAC 4.0 software. (1200)</li> </ul> </li>   <li>• 10600 TARGET PLANNING               <ul style="list-style-type: none"> <li>• Delivered IMEA 3.1 to reflect lessons learned from the CP I ACTD. (500)</li> <li>• Generated component level weapon-target validation data. (800)</li> <li>• Initiated design and development of IMEA 4.0 for Dipole Xeric. (1800)</li> <li>• Defined interface standards and initiate software development for the Integrated Target Planning Tool Set (ITPTS). (1200)</li> <li>• CP Analysis and Planning System (CAPS) - advanced planning initiative (6300)</li> </ul> </li>   <li>• 18004 WEAPONS               <ul style="list-style-type: none"> <li>• Completed ITAG flight test and fabrication of ACTD demonstration units. (2880)</li> <li>• Completed Ground Setting Unit (GSU) design and certification for HTSF. (2650)</li> <li>• Procured AUPs and conduct flight tests for DX demonstration readiness. (1092)</li> <li>• Designed and ground tested a CALCM unitary penetrator. (2500)</li> <li>• Conducted TLAM penetrator systems integration. (982)</li> <li>• Initiated TLAM penetrator warhead design, fabrication, and test. (3850)</li> <li>• Initiated smart fuze design to meet Navy certification requirements. (1800)</li> <li>• Conducted initial down-selection and lab tests of payloads to mitigate collateral effects. (950)</li> <li>• Began scale tests of selected high temperature incendiaries (HTI) and chemical neutralization agents against simulated chemical and biological agents. (550)</li> </ul> </li> </ul>		
Project P539	Exhibit R-2 (PE 0603160D8Z)	

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<ul style="list-style-type: none"> <li>• Conducted modeling and simulation to support concept screening and down-select. (600)</li> <li>• Developed enhanced weapon lethality models to support predictions of agent response. (150)</li>   <li>• 10205 OPERATIONAL DEMONSTRATIONS</li> <li>• Executed the CP ACTD Phase II (Dipole Jewel). (5098)</li> <li>• Completed Dipole Jewel post demonstration analysis. (1100)</li> <li>• Initiate target construction for Dipole Xeric demonstration. (807)</li> <li>• Conducted Dipole Xeric demonstration planning. (1200)</li> <li>• CP Capabilities Working Group - advanced planning initiative (2000)</li>   <li>• 858 SBIR/STTR</li> <li>Total 58007</li> </ul>										
<b>FY 1999 Planned Program:</b>										
Total 0 Funds and activities transferred to PE 0603160BR. P539										
<b>FY 2000 Planned Program:</b>										
Total 0 Funds and activities transferred to PE 0603160BR. P539										
<b>FY 2001 Planned Program:</b>										
Total 0 Funds and activities transferred to PE 0603160BR. P539										
<b>B. Project Change Summary</b>										
	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>					
Previous President's Budget	46376	0	0	0	Continuing					
Appropriated Value	56376	N/A	N/A	N/A	N/A					
Adjustments to Appropriated Value	1631	N/A	N/A	N/A	N/A					
Current Budget Submit/President's Budget	58007	0	0	0	Continuing					
<b>C. Other Program Funding Summary</b>										
	<u>FY 1998</u>	<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>	To	Total
Not applicable									Compl	Cost
Project P539									Exhibit R-2 (PE 0603160D8Z)	

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY					R-1 ITEM NOMENCLATURE					
RDT&E, Defense Wide/BA 3					JOINT DoD/DOE MUNITIONS PE 0603225D8Z					
COST ( <i>In Millions</i> )	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	16.242	13.007	14.786	14.790	14.916	15.233	15.553	15.880	Continuing	Continuing
DoD/DOE Munitions/P225	16.242	13.007	14.786	14.790	14.916	15.233	15.553	15.880	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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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3					R-1 ITEM NOMENCLATURE JOINT DoD/DOE MUNITIONS PE 0603225D8Z					

	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
<i>COST (In Millions)</i>										
Total Program Element (PE) Cost	16.242	13.007	14.786	14.790	14.916	15.233	15.553	15.880	Continuing	Continuing
DoD/DOE Munitions/P225	16.242	13.007	14.786	14.790	14.916	15.233	15.553	15.880	Continuing	Continuing

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

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

(U) **FY1998 Accomplishments:**

(U) This development effort continues to provide improved component options for use in robust, low-cost, miniature 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. The primary challenge is to significantly reduce system size and cost while increasing the operational capability and survivability and maintaining safety and reliability. A further challenge is to extend the technology to high velocity penetrating weapons and to artillery and mortar rounds. The functionality and reliability of a new semiconductor switch was demonstrated that is a factor of 5 lower in cost and a factor of 10 smaller than the vacuum switch used in current systems. The firing voltage for chip-slapper detonators was decreased 30% by using composite flyers and aluminum bridges. Lower detonator voltage allows the use of smaller, lower-cost energy storage devices and other components. The functionality of redesigned 1 kV ceramic capacitors was demonstrated for fire set application to replace custom mylar units. Capacitor costs decreased from \$100 to \$2-\$10; size decreased by a factor of 10. These new components have been demonstrated in a working prototype electronic safing and arming device (ESAD) that is 1.25 cubic inches in size with parts cost of \$120. This represents a factor of 5 reduction in size and a factor of 4 reduction in cost over current state-of-the-art technology. Multi-point detonators are the enabling technology for advanced aimable and multi-mode warheads. A 20-point design utilizing new lower energy and lower voltage Safe, Low-Input, Microslappers (SLIM) is being transferred to the Air Force contractor working on the multi-mode warhead for LOCAAS. Fast charge coupled devices (CCD) are being used to build a high-speed imaging (4000 frames/s) camera with a 512x512 pixel array for use in range-gated sensors and experiment diagnostics. Fabrication and testing of the imager at full pixel clock rate was completed. (\$3.380 Million)

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(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. LLM-105, a new energetic molecule that combines moderate energy with excellent insensitivity properties, was scaled up using a batch process to a 0.4-kg quantity. Instrumented shock loading tests showed a prototype formulation to be extremely insensitive, thereby increasing the likelihood of it becoming a practical material for munitions. A R&D 100 Award, given to the top 100 inventions in the US each year thought to have the greatest impact, was won for a new explosive compound that produces no smoke yet generates large quantities of gas. It is an excellent candidate material for low-signature rocket propellants. A hard target penetrator explosive, RX-35-EK, which combines nearly 50% increase in energetic performance with improved survivability, was transferred to Eglin AFB for testing. The CHEETAH 2.0 thermochemical code, used by over 250 DoD organization and contractors for prediction of the performance of high explosives (HE) as well as gun and rocket propellants, was released to users. This update tripled the database of HEs and enables CHEETAH to be used over a very comprehensive range of energetic materials problems. An initial code suite for use in multidimensional cookoff studies was completed and transitioned to the NAVY. This first-ever truly predictive capability for cookoff is 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. (\$3.480 Million)

(U) Polymeric carbon monoxide, the first of a new and potentially very interesting class of metastable High Energy Density Materials (HEDM) was synthesized under very high pressure and temperature in the laboratory and recovered for characterization at ambient conditions. Energy content of this class of materials is predicted to exceed that of known high explosives by a factor of 2 to 4. Scale-up activities and performance evaluations continued on another new class of energetic materials, Metastable Intermolecular Composites (MIC), where 500 prototype MIC-based, green (lead-free) percussion primers for small-arms ammunition were produced and evaluated by the Army; all performance specs were met. Work on a carbon/hydrogen HEDM continued. The energy storage mechanism was established and preliminary experiments showing feasibility of production scale-up were completed. (\$1.060 Million)

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(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. The smooth particle hydrocode SPHINX, used for detailed endgame analyses of high-speed missile intercepts, was improved and adapted to parallel computer architectures. New materials and failure models required for this application were implemented. Material constitutive models for composites and explosives were developed using experimental data from a new Hopkinson bar made of magnesium, which allows dynamic strain rates of low-density materials to be determined. (\$2.822 Million)

(U) A new concept for hard target weapons, the monolithic ballasted penetrator, has been developed that significantly increases velocity limits, penetration depth into concrete, and volume for energetic materials. The first prototype penetrator was fabricated demonstrating casting of ultra high strength alloy steel, net-shape processing and cost-effective manufacture. Preparations for testing are underway. Completed successful instrumented test of mid-scale conventional penetrator at high velocity (3500 fps) into concrete providing first detailed environmental data for components and payload at these conditions. These tests directly support the challenging problem of designing a fuze and payload that will survive high velocity impact into rock and concrete. A new level of shaped charge performance (classified), resulting from hydrocode design tools, was demonstrated. Two separate designs were developed; one of which originated from using the Global Local Optimizer (GLO) code coupled with the hydrocode CALE. GLO enhances the effectiveness of the designer approximately 10-fold. This was the first attempted use of GLO to accomplish a completely new warhead design. Both of the designs were successfully tested and achieved the predicted levels of performance. A new understanding of the influence of material properties on warhead liner performance provided the first correlation and explanation of the combined influence of material grain size and impurity concentration of liner ductility. (\$3.250 Million)

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(U) DoD and DOE efforts toward munitions lifecycle technologies including stockpile aging, surveillance, demilitarization and disposal are coordinated under the auspices of this program. Work was completed on molten salt and base-hydrolysis, two competing technologies for the destruction of explosives and other organic materials. Prototype units have been constructed and delivered for pilot plant use and evaluation. The molten salt destruction of energetic materials project was completed with transition of pilot plant reactors to the Bluegrass Ammunition Depot and to Air Force Research Laboratory at Eglin AFB. A portable base-hydrolysis unit and hydrothermal unit was designed, fabricated, tested and delivered to a DOE facility for evaluation. Initial tests were performed using a femtosecond laser, demonstrating the capability to cut through HE samples, both bare and inside of a case, without any evidence of chemical reaction in the HE. These test results served to initiate a major effort to exploit the technology for demilitarization and precision machining of HE. In collaboration with a DoD contractor a process was developed for cofiring rocket motor propellant washout waste streams contaminated with asbestos fibers. The presence of asbestos is a result of the washout process. Combustion conditions and control strategies were demonstrated that burns the residual propellant and transform the asbestos fibers into amorphous, harmless magnesium silicates. A prototype robotic workcell for disassembling 40-mm projectiles was developed and delivered to McAlester Army Ammunition Plant for testing and evaluation. 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. Development of predictive models for materials and system aging was begun based on evaluation of stockpile materials and components. The focus is on solder interconnect reliability, corrosion of electronics with an emphasis on plastic encapsulated microcircuits, and the aging of propellants. (\$2.250 Million)

(U) **FY1999 Plans:**

(U) Continue the improvement of electronic safing, arming and firing systems with a focus on reducing size and cost for application to artillery and mortar rounds and increasing shock survivability for application to high-velocity hard target penetrators. Continue to work with industry to establish commercial sources for qualified components and continue the transition of technology to developmental and fielded weapon systems. Complete the characterization of low-energy semiconductor bridge (SCB) slapper detonators and continue work on the producibility, packaging and long-term reliability of chip and SCB slapper detonators. Complete development and testing of HNS-IV explosive formulations with binders for use in detonator pellets in high shock environments. Establish an alternate commercial source for the new semiconductor switch; the current supplier has decided to quit the defense business. Evaluate electron-bombarded CCD intensifier to improve sensitivity and resolution of high-speed imaging camera. Evaluate non-linear optical materials as imaging detector in near IR and initiate field tests. (\$2.310 Million)

(U) Continue the development of HE with increased or tailored performance and decreased sensitivity. Initiate work on a more energetic hard target explosive with significantly improved survivability to meet the HE needs of the Navy and Air Force for a hypervelocity munition. Complete characterization

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work on promising new energetic, insensitive molecule, LLM-105. Produce increased quantities and evaluate new high-nitrogen tetrazine-based explosives that promise decreased sensitivity while maintaining performance. Evaluate energetic elastomers based on dinitropropylacrylate for use as explosive binders having tailored glass transition temperature to reduce the embrittlement of explosives at low operational temperatures. Continue characterization of new, smokeless compounds for application in explosives and propellants. Continue work to predict the response of energetic materials in weapon systems subjected to thermal and mechanical insult. Fully characterize bulk and constituent properties of explosives PBX-9502 and PBXN-9, build constitutive models, and implement in 3D hydrocodes. Use these tools to predict HE response to hard target penetration environments. Experimentally assess and validate tools for predicting the violence of reaction in cookoff accidents. Continue the equation of state measurements on unreacted and off-Hugoniot states of HEs as a physical basis for developing the CHEETAH kinetics modeling capability. (\$2.800 Million)

(U) Complete the characterization of polymeric carbon monoxide, the first metastable HEDM sample, in terms of its structure and energy content. Explore energy release mechanisms, continue the creation of new HEDM materials, and proceed with plans to scale up the high pressure and high temperature workcell. Scale up MIC fabrication capability to 1 kg/day operation and assist Army and Navy in evaluating alternatives for establishing fabrication capability at DoD facilities. Establish parameters for production of carbon/hydrogen in powder form and generate adequate powder to characterize its nature and properties. (\$0.720 Million)

(U) 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. Release new version of ALE3D in parallel architecture. Experimentally validate SPHINX simulations of high-speed missile intercept endgames. Implement improved and validated reactive and dynamic burn models into hydrocodes. Continue the development, implementation, and validation of material constitutive and failure models for incorporation into simulation tools. (\$2.317 Million)

(U) Build four additional monolithic ballasted penetrator prototypes and test at mid-scale. Work supports Navy development of penetrating warhead for Standard Missile. Establish velocity limits and transition behavior for oblique and yawed impacts into limestone and weathered rock. Support the development of advanced reactive warhead concepts by evaluating how thin-film composition and structure affect the performance, deformation and failure of brittle films on ductile metal substrates. Continue the application of the optimizer code GLO to complex warhead design problems, as a powerful extension of design efficiency and capability. Use GLO to design warheads for increased penetration capability against concrete structures, for the integration of LX-19 into a tantalum explosively formed projectile (EFP) warhead, and for continuation of the high speed jet design. Continue the study of impurity effects on

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the dynamic behavior of warhead liner materials. Continue the exploration and demonstration of the highest speed shaped charge jets attainable. Continue the dynamic study and analysis of liner formation and behavior, using infrared thermometry and fluorescence techniques, as well as high-speed, high-resolution optical techniques. Perform EFP tests to evaluate powder metallurgy tantalum vs. wrought material and determine the effects of specific textures and powder processes on warhead formation and performance. (\$2.870 Million)

(U) Establish a testbed facility for the evaluation and exploitation of femtosecond laser cutting and machining of HE for use in munitions manufacturing and demilitarization processes. Initiate a parallel modeling effort to fully understand the femtosecond time-scale kinetics of the interaction of a laser pulse with energetic material. Improve vision and force control algorithms for the robotic workcell to increase operation rate of the disassembly of 40-mm Navy projectiles. Begin design and fabrication of tools and fixtures for automated disassembly of Improved Conventional Munitions (ICM) and safing of individual submunitions. In the study of materials aging characterize age-related physiochemical changes taking place in propellants to identify the cause of observed bulk property changes in composite rocket motors. The objective is to develop a constitutive propellant failure model to improve service-life predictive codes. (\$1.990 Million)

(U) **FY2000 Plans:**

(U) Continue the development and demonstration of improved component options for use in robust, low-cost, miniature safing, arming and firing systems. Complete the characterization of detonators, capacitors, switches, etc. in shock environments for application to hard target munitions. Continue work on prototype ESAD sized for artillery and mortar rounds. Initiate work on an ESAD for hard target penetrators. The goal is to complete the design, fabrication and testing of a working prototype in FY2003. Complete high-speed imaging camera with electron-bombarded CCD and high-resolution frame grabber technology. (\$2.430 Million)

(U) Continue the development of a low-sensitivity HE for application to hypervelocity hard target penetrators. The goal is to provide the Air Force and Navy with a high performance explosive formulation that will survive the impact of a hypervelocity penetrator into concrete. Complete characterization of new tetrazine-based explosives and select most promising candidate material for explosive and propellant formulations. Initiate formulation studies to optimize their performance in munitions systems. Evaluate the potential of sol-gel energetic materials for possible applications in high energy and high power explosives, precision detonator materials and detonation wave shapers, and pyrotechnics. Transition TATB-based technology developed for the nuclear weapons community to the DoD to meet IHE material requirements in a cost-effective manner. Continue pursuit and evaluation of highly energetic molecules with improved thermal stability. Continue development of equation of state for unreacted, partially reacted and fully reacted HEs, including non-ideal HEs,

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through modeling and carefully diagnosed experiments. Information generated will be input into CHEETAH and transitioned throughout the DoD community. (\$3.570 Million)

(U) Continue ongoing pursuit of new HEDM candidate materials having energy capacities 2-4 times that of HMX. Scale up production capabilities to provide gram-size material samples for characterization and study of energy release mechanisms. Transition fabrication technology for MIC materials to Army and Navy and complete economic assessments for establishing DoD production facilities. Complete study of carbon/hydrogen HEDM in terms of sensitivity, energy release potential, shelf-life stability and suitability for exploitation. (\$1.010 Million)

(U) Continue development of Eulerian, Lagrangian, coupled and ALE codes relevant to the design and evaluation of munitions. Continue to incorporate improved materials models emerging from the DOE Advanced Strategic Computing Initiative to provide high resolution, accurate predictions of materials behavior and failure during warhead formation and warhead/target interactions. Support the transition of these tools to the DoD community. (\$2.536 Million)

(U) Complete testing of ballasted penetrator concept for use against hard target. Develop and improve constitutive modeling of rock and soil and continue extensive benchmarking of codes and design tools against mid-scale and lab-scale tests. Provide fuze and payload developers with accurate predictions and measurements of penetration environments to support survivability testing. Produce and demonstrate prototype explosive projectile warheads using liners processed according to specifications developed from ongoing impurity and microstructural studies. Pursue hybrid EFP/jet and tandem concepts of defeat of specified hard targets. Evaluate utility of GLO-designed warhead concept for defeat of concrete targets. Transition high-speed jet designs to DoD to meet performance requirements well beyond the current state-of-the-art. (\$3.340 Million)

(U) Begin tests in the femtosecond laser facility of cutting potential against large-scale HE samples and live munitions. Continue study of HE/ultra-short-pulse laser beam interactions through integration of modeling and well-diagnosed experiments. Delimit regions of utility for demilitarization and machining operations. Transition the process for synthesis of TATB, a high value explosive, by the direct conversion of waste Explosive D available from demilitarization operations. Demonstrate progress toward remote disassembly of 155-mm ICM artillery shells by remotely exposing submunition layers for handling and safing. The program goal is to implement integrated vision capabilities with force control and compliant tooling to demonstrate completely automated disassembly of ICMs with safing of individual submunitions by FY2002. Complete the predictive model for solder interconnect reliability based on mechanistic models of thermomechanical fatigue and fatigue crack propagation. Validate model using laboratory test samples and fielded test hardware. Continue the development of other materials and system aging models. (\$1.900 Million)

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(U) **FY2001 Plans:**

(U) Continue the development of advanced electronic safing, arming, and firing systems with a focus on small size, low cost and improved survivability. Demonstrate a working prototype of a generic ESAD sized for artillery and mortar rounds (less than 0.75 cubic inches) and with a further factor of two reduction in cost (\$50 in parts). Continue work on the prototype hard target ESAD toward the planned demonstration in FY2003. (\$2.430 Million)

(U) Transition HE and propellant formulations based on new tetrazine explosives to Services for safety qualification and application to munitions systems. Exercise the new hazards codes to evaluate the risk to munitions systems from a broad range of accident scenarios. Develop materials models that can predict new explosives molecules and their properties. Formulate explosives and propellants with enhanced properties such as lower sensitivity and smoke-free burning. (\$3.600 Million)

(U) Complete characterization of metastable polymeric carbon monoxide and continue synthesis effort of other extended solid HEDM. Study the nature of phase transitions in solid nitrogen; pursue high hydrogen content material (BH3). Evaluate large volume press to scale up production. (\$0.590 Million)

(U) Continue to develop, extend and apply the hydrocodes and associated materials models for warhead design and evaluation. Continue to support the transition of these tools, the training and consulting for the DoD user community. (\$3.170 Million)

(U) Continue study of advanced hard target penetrator concepts and adapt designs to state-of-the-art materials and manufacturing methods. Continue development and validation of computational design tools and material models to extend penetrating weapon reliability and capability. Produce power metallurgy molybdenum and tungsten liners for enhanced warhead applications. Apply advanced modeling and simulation based design techniques to new warhead materials with energetic properties which couple to targets in order to increase efficiency and lethality. (\$3.180 Million)

(U) Complete testing of the femtosecond laser cutting on live munitions and transition the technology to Services and DoD contractors for application to munitions manufacturing and demilitarization operations. Conduct full-scale demonstration of the direct chemical oxidation process for destruction of organic waste. This technique addresses the need for low-cost processing of empty shell cases to certify removal of trace quantities of explosives or toxic materials. Demonstrate integrated disassembly hardware and software algorithms in the robotic workcell for automated, remote disassembly of ADAM mine projectiles. Complete the predictive model for the reliability of plastic encapsulated microcircuits in dormant storage. This is important because commercial

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specifications and test protocols do not accurately represent storage times and conditions for DoD munitions. Continue the development of other materials and system aging models. (\$1.820 Million)

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(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	16.141	16.354	15.290	15.306	Continuing
Appropriated Value	17.700				Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	(0.733)	(.440)			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	(0.058)				
c. Other		(2.907)	(.504)	(.516)	Continuing
Current President's Budget	16.242	13.007	14.786	14.790	Continuing

**Change Summary Explanation:**

(U)    **Funding:**      Funding changes in 1999, 2000, and 2001 are due to congressionally directed undistributed reductions and below threshold program adjustments.

(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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COST ( <i>In Millions</i> )	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	5.904	5.010	7.775	7.588	4.709	4.795	4.896	4.999	Continuing	Continuing
ATR/P232	5.904	5.010	7.775	7.588	4.709	4.795	4.896	4.999	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 such military sensor systems 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 adversaries. 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. When coupled to appropriate sensor suites, ATR allows rapid detection of individual surface and buried mines and unexploded ordnance (UXO). 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.

(U) Increasing ATR operational effectiveness requires research and development to enhance sensors and algorithm processing. Additionally, improved, standardized procedures and metrics for measuring and demonstrating ATR effectiveness must be developed. The utility of ATR is highly dependent on the quality of the 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 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.

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(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 algorithms and various technologies. 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 sooner.

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COST <i>(In Millions)</i>	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	5.904	5.010	7.775	7.588	4.709	4.795	4.896	4.999	Continuing	Continuing
ATR/P232	5.904	5.010	7.775	7.588	4.709	4.795	4.896	4.999	Continuing	Continuing

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

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

(U) **FY 1998 Accomplishments:**

(U) Work continued to assess key ATR metrics to find the “best in class” and spur fielding for critical needs identified by the Defense Science Board (DSB) and Joint Requirements Oversight Council. An ATR Transition Conference was held to address a DSB recommendation to bring developers and operators together to better understand each other’s perspectives and expectations for ATR. The Virtual Distributed Laboratory (VDL) was brought on-line with the central site at Air Force Research Laboratory, Wright Patterson AFB, OH. The VDL is a high-speed network to Service sites to host test procedures, data sets, and ATR results to reduce the cycle time for ATR development and evaluation. A cooperative multi-sensor data collection, referred to as the Mother-of-All Data Collections-1 (MAD-1), was conducted at Eglin AFB, FL in conjunction with the Air Force, Army, and DARPA. The imagery of operationally deployed target sets was used to assess Laser Radar ATR performance and is being hosted on the VDL to mature surveillance and attack ATR algorithms. The longer-term approach to provide imagery to ATR’s for evaluation is to use multi-sensor synthetic imagery. For the first time, synthetic infrared imagery was input to an ATR for evaluation and its results were compared to those obtained with the corresponding real imagery as an initial step for validation. The recommendation of the OSD Hyperspectral Imaging (HSI) Integrated Product Team (IPT) to establish a Hyperspectral Technology Assessment Program was implemented. The Hyperspectral Technology Assessment Program (HTAP) will lay out the framework needed to characterize the potential value of HSI systems to DoD operations, and will apply this framework to identify opportunities for near-term technology development and demonstration. (\$5.904 Million)

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(U) **FY 1999 Plans:**

(U) The focus of the ATR assessment technology program will be directed toward Synthetic Aperture Radar (SAR) ATR for the reconnaissance and surveillance scenario. A comparative assessment of ATR's for SAR will be conducted and the results used to both establish the state-of-the-art performance and to assess concepts for performance benchmark metrics. Techniques and metrics to quantitatively describe input image difficulty, or clutter, will be developed. The program will cooperate with a service Program Manager to facilitate transition of an ATR application through enhanced evaluation techniques directed toward mission specific problem sets. "Best Practices" for standardized ATR evaluation and assessment will be established and promulgated through the Automatic Target Recognition Working Group (ATRWG). ATR evaluation techniques will be applied to hyperspectral imaging systems. The use of synthetic imagery for forward-looking infrared (FLIR) ATR evaluation will be validated. Humanitarian Demining Operations will be addressed through evaluation of ATR technologies developed to detect mines and UXO. More extensive multi-sensor algorithms will be evaluated. For HTAP, the two most promising application domains to pursue are 1.) tactical target detection and classification; and 2.) battlespace environment characterization, from both airborne and spaceborne sensors. Hyperspectral algorithm assessment and performance modeling will be undertaken for these two domains. (\$5.010Million)

(U) **FY 2000 Plans:**

(U) Standard metrics to describe ATR performance and associated problem sets will be adopted which cover surveillance, weapon, and attack applications of ATR's. The 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. Quantitative performance for hyperspectral algorithms will be established and used to refine a system level performance model. The Services' synthetic image generation capabilities will be applied to multi-spectral ATR's as a means to assess ATR performance over a wider range of operating conditions. During this time period more extensive subsystem technology effectiveness demonstrations will be conducted which support a broader range of system/platform applications. 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. A quantitative understanding of HSI performance and operational utility will be established as a basis for future investment decisions. This timing is consistent with the current schedules for ASRP flight demos and launches of Warfighter -1 and the Navy Earth Map Observer. (\$7.775 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA 3	R-1 ITEM NOMENCLATURE Automatic Target Recognition PE 0603232D8Z	

(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 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. (\$7.588 Million)

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA 3	R-1 ITEM NOMENCLATURE Automatic Target Recognition PE 0603232D8Z	

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY 1998</u></b>	<b><u>FY 1999</u></b>	<b><u>FY 2000</u></b>	<b><u>FY 2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	6.487	5.081	4.909	4.725	Continuing
Appropriated Value	6.789				Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	(0.302)	(.071)			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment					
c. Other			3.000	3.000	Continuing
Current President's Budget	5.904	5.010	7.775	7.588	Continuing

**Change Summary Explanation:**

(U)    **Funding:**    FY 1999 changes are due to congressionally directed undistributed reductions. FY2000 and FY2001 changes are due to addition of Hyperspectral Imaging and systems applications to the ATR Program.

(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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Exhibit R-2, RDT&E Budget Item Justification									DATE: FEBRUARY 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 3					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. <b>Special Technical Support</b> <b>PE 0603704D8Z</b>					
COST(\$In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total PE Cost	11.147	11.176	10.948	10.855	11.043	11.279	11.514	11.757	Continuing	Continuing
Project Name/No. and Subtotal Cost STS/P704	11.147	11.176	10.948	10.855	11.043	11.279	11.514	11.757	Continuing	Continuing

**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 that 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/PE1110011D), and 2) a portion of the Equipment Upgrade Program/PE0203745A). Both projects are intelligence related.

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

**Program Accomplishments and Plans:**

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<b>Exhibit R2, RDT&amp;E Budget Item Justification</b>		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 3	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0603704D8Z SPECIAL TECHNICAL SUPPORT	

**FY 1998 Accomplishments**

- Rapid fielding of specialized surveillance systems
- Continued support to the Demand Driven Direct Digital Dissemination (5D) system
- Special Access Program for HUMINT mission support
- Development and fielding of unique secure data reporting systems
- Developed and fielded network reporting and visualization systems
- Developed and demonstrated Tactical and Strategic events visualization system
- Fielded Technical Intelligence systems and components

**FY 1999 Plans**

- Mission Support

**FY 2000 Plans**

- Mission Support

**FY 2001 Plans**

- Mission Support

<b>B. <u>Program Change Summary</u></b>	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
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<b>Exhibit R2, RDT&amp;E Budget Item Justification</b>		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 3	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0603704D8Z SPECIAL TECHNICAL SUPPORT	

Previous President's Budget	11.224	11.337	11.320	11.234	Continuing
Appropriated Value					
Adjustments to Appropriated Value					
a. Below threshold program adjustments	-.077		-.184	-.183	
b. Inflation Adjustment		-.161	-.188	-.196	
Amended Budget Estimate Submission	11.147	11.176	10.948	10.855	Continuing

**Change Summary Explanation:** N/A

**C. Other Program Funding Summary:** None

**D. Acquisition Strategy:** N/A

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>							DATE February 1999			
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA 3				R-1 ITEM NOMENCLATURE Strategic Environmental Research and Development program PE 0603716D8Z						
COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	56.716	58.771	53.506	51.729	53.764	53.423	54.468	55.569	Continuing	Continuing
SERDP/P470	56.716	58.771	53.506	51.729	53.764	53.423	54.468	55.569	Continuing	Continuing

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

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

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

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA 3	R-1 ITEM NOMENCLATURE Strategic Environmental Research and Development Program PE 0603716D8Z	

COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	56.716	58.771	53.506	51.729	53.764	53.423	54.468	55.569	Continuing	Continuing
SERDP	56.716	58.771	53.506	51.729	53.764	53.423	54.468	55.569	Continuing	Continuing

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

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

(U) **FY1998 Accomplishments:**

(U) **Pollution Prevention:**

(U) **Next Generation Fire Suppression Technology Program (NGFSTP):** This umbrella project which began in FY 1997 is part of the NGFSTP for the replacement of Halon 1301 in DoD weapon systems, the production of which was banned by the Montreal Protocol. It is divided into the following six fully integrated technical focus areas each with sequential and synergistic research elements (a total of 32 research elements). Research and development activities began in the following sub-thrust areas: Mechanisms of Ultra-High Efficiency Chemical Suppressants, Suppression Dynamics of Fine Droplets and Particles, Stabilization of Flames, Suppression System Effectiveness Screening, and Advanced Propellants/Additive Development for Gas Generators. In FY 1998, data on fires in military platforms and the outcome of these fires were received from military safety centers and a draft report summarizing these was completed. A number of compounds containing such atoms as phosphorus, iron, nitrogen, and bromine have been demonstrated to be at least as effective as Halon 1301 with little potential environmental impact. Additionally, characterization of the particle behavior in flames as a function of the individual size groupings and position in the flames of various strain is underway and fabrication of wind tunnel for flame spread experiments is completed. A successful workshop on screening methods for agent compatibility with people, materials, and the environment was held. A detailed summary of the discussions and conclusions from the workshop is available online at <http://flame.cfr.nist.gov/ngp/>. Also, sixteen new research elements were initiated. (\$ 3.407 Million)

(U) **Elimination of Toxic Materials and Solvents from Solid Propellant Components:** Continuing project, to eliminate (minimize) the use of lead compounds as ballistic catalysts in reduced-smoke propellants, and eliminate HCl as a combustion product of tactical and strategic boosters. In FY 1998 lead-free formulations were developed and formulation downselection was completed. (\$ 1.420 Million)

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(U) **Elimination of Toxic Heavy Metals from Small Caliber Ammunitions:** Continuing project to eliminate hazardous materials in the bullet core and primer of small caliber ammunition while meeting U.S. and NATO performance requirements. The project evaluates tungsten as a possible replacement for lead-antimony. A draft report on environmental safety and health aspects of tungsten is being prepared. Preliminary recycle and bio-uptake studies for tungsten as replacement material for lead antimony are completed. A sensitivity study of Metastable Interstitial Composites primer to water was completed. Primers have been assembled into cartridges and tested. Long term storage tests and primer/propellant ignition interface tests are ongoing. (\$ 0.900 Million)

(U) **Eliminate Volatile Organic Compounds (VOCs) in CARC Paint Formulation, Applications, and Removal:** Continuing project to reduce the regulated VOC content of chemical agent resistant coating (CARC) system for use on military equipment by all services. Established basic low VOC formulation. Army Research Laboratory awarded patent (#5,691,410) for the water reducible low VOC CARC formulation. Validated all properties of Army Green camouflage color. (\$ 0.900 Million)

(U) **Trapped Vortex Combustor for Jet Engines:** Continuing project will develop design rules for and demonstrate the feasibility of a trapped vortex combustor for reducing the NOx (oxides of nitrogen) VOC, and CO (carbon oxide) emissions from aircraft, land and marine gas turbine engines by 60%. This combustor has been chosen for inclusion in the Integrated High Performance Turbine Engine Technology (IHPTET) engine. Fabrication of high pressure facility for testing trapped vortex combustor at up to 45 atm has been completed. (\$ 0.640 Million)

(U) Additional efforts in 17 other projects were undertaken in Pollution Prevention. (\$ 11.363 Million)

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA 3	R-1 ITEM NOMENCLATURE Strategic Environmental Research and Development Program PE 0603716D8Z	

**(U) Cleanup:**

**(U) Unexploded Ordnance (UXO) Detection:** Continuing umbrella effort to integrate and automate UXO detection, identification, and discrimination sensor technologies to include wide-area, rapid coverage over a variety of terrain of UXO-contaminated areas. In FY1998, completed in-depth analysis of UXO sensor data from Phase II studies. Developed GIS for incorporating sensor, ground truth, and environmental/geophysical data. Assembled database of magnetic and acoustic resonance signatures of UXO. Developed prototype multisensor fusion algorithm. Also, in a related parallel approach using enhanced harmonic radar for UXO detection, levels of UXO harmonic responses were measured and included narrowband (CW) and impulse waveforms. Also, system integration and field demonstration of the multi-sensor MUDSS (Mobile Underwater Debris Survey System) system for underwater UXO detection was completed. Use of MUDSS as compared to manual survey can reduce survey time by a factor of five and reduce costs by 50-70%, a savings of up to \$400K per square nautical mile. MUDSS was also successfully demonstrated in the search for the SWISSAIR plane off Nova Scotia in September 1998. (\$ 2.695 Million)

**(U) Integrated Biotreatment Research Program:** From Flask to Field: Continuing umbrella project to be completed in FY 2001. Project 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 and field several biotreatment processes for remediation of predominant DoD contaminants. Project is evaluating: (1) biocell reactor and cascading bioslurry reactors for PAHs (polycyclic aromatic hydrocarbons); (2) aerobic degradation of PCBs (polychlorinated biphenyls) with new strains; (3) engineering of reductive dechlorination of PCBs; and (4) combining solvent extraction with residual in situ biotreatment for PCE (perchloroethylene) and TCE (trichloroethylene). The fluidized-bed reactor study at Volunteer Army Ammunition Plant and the engineering and installation of an electrolytic degradation system for PCE were completed successfully. (\$ 2.600 Million)

**(U) Aquifer Restoration by Enhanced Source Removal:** Continuing project to demonstrate processes for enhancing removal of light and dense non-aqueous phase liquids (LNAPLs and DNAPLs) in a variety of geologic settings. In FY 1998 with leveraged funding from other DoD and EPA sources, completed 9 side by side tests at Hill Air Force Base for LNAPL removal using surfactants and co-solvents. Field tests for DNAPL removal from contaminated ground water using co-solvents, sparging, and surfactants began at Dover Air Force Base test cells. The results from these tests will be used to develop guidelines that will address the entire remediation effort, including site characterization and support to achieve maximum benefit. (\$ 2.180 Million)

**(U)** Additional efforts in 13 other projects were undertaken in Cleanup. (\$ 10.040 Million)

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(U) **Conservation:**

(U) **Marine Mammal Monitoring for DoD Compliance:** Two projects completed in FY 1998. These projects demonstrated a near real-time communication link for data distribution to automate detection and classification processes for marine mammals. Completed at-sea tests to assess the impacts of low-frequency sound sources on mammals and determined long-term monitoring capability. Monitoring databases have been developed for NAVFAC and will be transitioned to the Navy and the National Oceanic and Atmospheric Agency (NOAA) in FY 1999. Results will provide DoD with first order effects of the impact of Naval operations on marine mammals and the tools and analytical capability to comply with the Marine Mammals Act. (\$2.065 Million)

(U) **Emerging and Contemporary Technologies in Remote Sensing for Ecosystem Assessment and Change Detection on Military Reservations:** Continuing project will develop remotely sensed change detection protocols necessary to stimulate natural dynamics (temporal and spatial) of the military installation ecosystems. The project will also develop models and/or techniques for military trainers and land managers to assess training impact on land use. Initiated the retrospective analysis and developed classifications of ecological sites. Survey points for ecotone identification / analysis were established. (\$1.000 Million)

(U) Additional efforts in 13 other projects were undertaken in Conservation. (\$6.046 Million)

(U) **Compliance:**

(U) **Compact Shipboard Incinerator:** Project completed in FY 1998. Developed new concept for waste incinerator based on pulsed combustor actuator. Successfully developed and demonstrated pilot-scale actively controlled vortex combustion (afterburner) and transitioned to simplified design and realistic operational conditions. Evaluations are underway for full, real-time testing of this afterburner. (\$1.240 Million)

(U) **Lead-Based Paint Hazard Mitigation:** Project completed in FY 1998. Project has transitioned to demonstration/validation field tests of vitrification technologies for immobilizing heavy metals during lead removal activities are underway at DoD installations (Rock Island Arsenal, IL, Marine Corps Base Hawaii, and Puget Sound Naval Shipyard, WA). Other removal technologies including microwave assisted removal of paint from wood, were evaluated to minimize worker and public exposure. (\$ 0.750 Million)

(U) Additional efforts in 16 other projects in were undertaken Compliance. (\$ 9.470 Million)

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(U)     **FY1999 Plans:**

(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 will finalize data on in-flight ullage conditions and complete the development of test methodologies on the toxicity, environmental impact, materials compatibility, and principal degradation products. (\$ 4.146 Million)

(U)     **(2) Reduction of Air Emissions:** There are eight projects focused on reducing or eliminating hazardous air emissions in the form of Volatile Organic Compounds (VOC), oxides of nitrogen (NOx) and particulates. These projects range from reformulations of sealants, primers and coatings to improved, non-hazardous solvents to improved turbine engine design. (\$ 5.251 Million)

(U)     **(3) “Green Energetics”:** Five projects are designed to reduce the environmental impact of explosives and propellants. They span from the reformulation of bullets in small caliber ammunition to eliminate the lead in them, to elimination of hazardous material from propellants, to the “Green Gun Barrel” program. (\$ 3.953 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. There are four projects dedicated to the elimination of chromium in a variety of applications from hard chrome plating to sealants, adhesives and coatings. Research spans from elucidating basic mechanisms to reformulations of products to eliminate the chromium. (\$ 2.891 Million)

(U)     **(5) Elimination or Reduction of Hazardous Materials:** The handling and disposal of hazardous materials is a costly and time consuming process. These 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 repainting and stripping processes 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. (\$ 2.699 Million)

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(U) **Cleanup:** There are four high priority areas within cleanup that comprise the bulk of the cleanup effort. In addition, there are four National Environmental Technology Test Sites (NETTS) which are maintained in order to facilitate the demonstration and validation of technologies for more rapid transfer to the field.

(U) **(1) Unexploded Ordnance (UXO) Detection:** A total of 8 projects including 5 continuing efforts to improve UXO detection capability, which is the highest priority within the SERDP Cleanup Technology Thrust Area. Represents a collective research initiative for the 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 will be initiated to address innovative UXO discrimination techniques (\$ 4.024 Million)

(U) **(2) Dense Non-Aqueous Phase Liquid (DNAPL) Detection and Remediation:** 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. Twelve projects, including five new starts, are focused on all phases of the problem starting with detection of the contamination in the subsurface. Included within these projects are several technologies for remediating DNAPLs with an emphasis on in-situ technologies. (\$ 6.135 Million)

(U) **(3) Risk Assessment:** One of the most pressing issues in cleanup is “how clean is clean”. To determine this, five projects are focusing on the risks to humans, animals, plants and ecosystems associated with military compounds. Included in this is a \$2.7M earmark for environmental toxicological risk assessment. (\$ 5.921Million)

(U) **(4) Integrated Biotreatment Research Program: From Flask to Field:** 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 is to develop field implementable, cost effective biotreatment processes for remediation of predominant DoD contaminants. (\$ 2.635 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. Four operational test sites (Dover AFB, McClellan AFB, NCB Port Hueneme, and former Wurtsmith AFB) plan to host 15-20 field tests and demonstrations of innovative remedial and site characterization technologies. (\$ 2.575 Million)

(U) **Compliance:** The Compliance Thrust Area develops “end-of-pipe” control technologies which treat waste streams to prevent the introduction of contaminants into the environment. There are three major foci within the Compliance thrust area. This thrust area includes an earmark for the National Environmental Education and Training Center (NEETC).

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Strategic Environmental Research and Development Program PE 0603716D8Z	

(U)      **(1) Air Emissions:** This is the largest of the foci of the thrust area. There are eleven projects dealing with the control of the emission of Volatile Organic Compounds (VOC), the oxides of nitrogen (NOx) and particulate matter with an emphasis on applications to detect contaminants and control them in jet engine test cells and tactical vehicle paint booths. (\$ 6.345 Million)

(U)      **(2) Demilitarization of Conventional Weapons:** There are two continuing projects to develop environmentally benign processes for the destruction of explosives in conventional weapons. With the establishment of the DoD Demilitarization Program, these are the last projects for demilitarization that will be funded by SERDP. (\$ 0.926 Million)

(U)      **(3) Oil/Water Separator Sludge:** There are two new start projects to deal with the difficult problem of Oil/Water separator sludges. The goal is a small, compact unit for on-site or shipboard processing that can render these sludges environmentally benign. (\$ 1.417 Million)

(U)      **Conservation:** There are four central themes to the Conservation thrust area.

(U)      **(1) Impacts of Military Operations:** The seven projects in this sub-thrust examine the impacts of military operations on military lands, threatened and endangered species and marine mammals. Through sound scientific knowledge, we can sustain military training and testing operations while simultaneously protecting the environment. (\$ 4.427 Million)

(U)      **(2) Restoration:** These two projects develop techniques and technologies which are designed to restore degraded military lands. This is necessary not only to ensure the long term sustainability of the land, but also to provide a realistic training environment. These projects include new planting techniques as well as the development of new cultivars that can withstand a significant level of use and abuse. (\$ 1.071 Million)

(U)      **(3) 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. (\$ 1.254 Million)

(U)      **(4) Ecosystem Management:** This represents a major new initiative beginning in FY 1999 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 will first focus on the development of indicators of ecosystem health and thresholds of ecosystem damage. (\$ 3.101 Million)

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(U)     **FY2000 Plans:**

(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 2000, this project will finalize data on the toxicity, environmental impact, materials compatibility, and principal degradation products of candidate replacements. (\$ 3.888 Million)

(U)     **(2) Reduction of Air Emissions:** There are six continuing projects focused 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. (\$ 3.954 Million)

(U)     **(3) “Green Energetics”:** Three continuing projects are designed to render the manufacture of explosives and propellants environmentally benign. They span from the reformulation of propellants to elimination of solvents from the manufacturing process. Work on a solventless binder for energetic materials and recycling of propellants will be completed. (\$ 3.570 Million)

(U)     **(4) Elimination of Chromium:** There are four continuing projects 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. A new start for developing a replacement for the non-line-of-sight hard chrome plating process is projected. (\$ 3.592 Million)

(U)     **(5) Elimination or Reduction of Hazardous Materials:** Five 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. One new start is anticipated in reducing the hazardous materials associated with the application and stripping of specialty coatings. (\$ 3.064 Million)

(U)     **Cleanup:** There are four high priority areas within cleanup that comprise the bulk of the cleanup effort. In addition, there are four National Environmental Technology Test Sites (NETTS) which are maintained in order to facilitate the demonstration and validation of cleanup technologies for more rapid transfer the to field.

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(U) **(1) Unexploded Ordnance (UXO) Detection:** There are 6 continuing efforts to improve UXO detection capability. Efforts in exploiting third harmonic radars and data fusion will be completed. (\$ 2.431 Million)

(U) **(2) Dense Non-Aqueous Phase Liquid (DNAPL) Detection and Remediation:** DNAPLs are among the most difficult materials to detect in the subsurface and remediate. Ten continuing projects are focused on all phases of the problem starting with detection of the contamination in the subsurface. Included within these projects are several technologies for remediating DNAPLs with an emphasis on in-situ technologies. Work on In-well vapor stripping of TCE will be completed and one new start in anticipated. (\$ 5.363 Million)

(U) **(3) Risk Assessment:** 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. (\$ 3.516 Million).

(U) **(4) Integrated Bio-treatment Research Program: From Flask to Field:** 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 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. (\$ 4.143 Million)

(U) **DoD National Environmental Technology Test Sites (NETTS) Program:** 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) plan to host 15-20 field tests and demonstrations of innovative remedial and site characterization technologies. (\$ 1.683 Million)

(U) **Compliance:** The Compliance Thrust Area develops “end-of-pipe” control technologies which treat waste streams to prevent the introduction of contaminants into the environment. There are three major foci within the Compliance thrust area. Two 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. (\$ 1.000 Milion)

(U) **(1) Air Emissions:** There are eight continuing projects develop detection and control technologies for the emission of contaminants. Work on non-thermal plasma destruction and membrane mediated extraction of VOCs will be completed. (\$ 4.244 Million)

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- (U)      **(2) Demilitarization of Conventional Weapons:** There are two 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. (\$ 1.421 Million)
  
- (U)      **(3) Oil/Water Separator Sludge:** There are two continuing projects to deal with the difficult problem of Oil/Water separator sludges and rendering them environmentally benign. Work continues towards developing a small, compact unit for on-site or shipboard processing. (\$ 2.187 Million)
  
- (U)      **Conservation:** There are four central themes to the Conservation thrust area.
  
- (U)      **(1) Impacts of Military Operations:** The six continuing projects in this sub-thrust examine the impacts of military operations on military lands, and threatened and endangered species. One new start in the impact of riparian zones is anticipated. (\$ 3.864 Million)
  
- (U)      **(2) Restoration:** The two continuing projects develop techniques and technologies which are designed to ensure the long term sustainability of the land, and to provide a realistic training environment. A new start in the control of invasive species is planned. (\$ 1.661 Million)
  
- (U)      **(3) Modeling and Simulation:** Modeling and simulation play a key role in the development of natural resources management plans. Three continuing efforts in ecological modeling and simulation and an analysis of the errors inherent in the models are included in this segment. (\$ 1.106 Million)
  
- (U)      **(4) Ecosystem Management:** This major initiative 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 will first focus on the development of indicators of ecosystem health and thresholds of ecosystem damage. One new start to examine the role of disturbance is planned. (\$ 2.818 Million)
  
  
- (U)      **FY2001 Plans:**
  
- (U)      **Pollution Prevention:** There are five major focus areas within pollution prevention. Five new starts to address high priority DoD needs are planned.

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(\$ 3.001 Million)

(U) **(1) Next Generation Fire Suppression Technology Program:** This continuing umbrella project seeks to develop a replacement for Halon 1301.  
(\$ 4.182 Million)

(U) **(2) Reduction of Air Emissions:** There are six continuing projects, five of which will complete in FY 2001, focused on reducing or eliminating hazardous air emissions in the form of Volatile Organic Compounds (VOC), oxides of nitrogen (NOx) and particulates. (\$ 3.873 Million)

(U) **(3) "Green Energetics":** One continuing project, the "Green Gun Barrel" program will be completed in FY 2001. (\$ 1.092 Million)

(U) **(4) Elimination of Chromium:** There are four continuing projects dedicated to the elimination of chromium in FY 2001. The development of Sol-Gel technology to replace chromated sealant and primers will be completed. (\$ 3.716 Million)

(U) **(5) Elimination or Reduction of Hazardous Materials:** Three continuing projects are designed to eliminate or reduce the production of hazardous materials. Technologies to replace current toxic aircraft deicing fluids will be completed. (\$ 1.130 Million)

(U) **Cleanup:** There are four high priority areas within cleanup that comprise the bulk of the cleanup effort. Eight new starts, including an increased emphasis on UXO, are planned. (\$5.773 Million)

(U) **(1) Unexploded Ordnance (UXO) Detection:** There are 5 continuing efforts to improve UXO detection capability, all of which will be completed. A large portion of the new start funds cited above will be dedicated to UXO detection. (\$ 3.185 Million)

(U) **(2) Dense Non-Aqueous Phase Liquid (DNAPL) Detection and Remediation:** Six continuing projects are focused on all phases of the problem. Five of the six continuing projects will be completed. (\$ 3.185 Million)

(U) **(3) Risk Assessment:** One continuing project, which will be completed this year addresses the risk of DoD related environmental contaminants to individuals and populations. (\$ 1.131 Million)

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- (U)      **(4) Integrated Bio-treatment Research Program: From Flask to Field:** This continuing umbrella project will be completed this year. (\$ 0.331 Million)
  
- (U)      **DoD National Environmental Technology Test Sites (NETTS) Program:** Continuing project facilitates transfer to field use of new, innovative, cost savings cleanup technologies. (\$ 1.668 Million)
  
- (U)      **Compliance:** The work in Demilitarization has ended and work on fate and impact of contaminants started in FY 00 is continuing. Three new starts are planned for FY 01. (\$ 2.302 Million)
  
- (U)      **(1) Air Emissions:** There are four continuing projects dealing with the control of the emission of Volatile Organic Compounds (VOC) and particulate matter, all of which will be completed. (\$ 2.528 Million)
  
- (U)      **(2) Fate and Impact of Contaminants:** Continuing work on energetics on military ranges and zinc and copper in harbors and estuaries. (\$ 2.714 Million)
  
- (U)      **(3) Oil/Water Separator Sludge:** There are two completing projects to deal with the difficult problem of Oil/Water separator sludges. (\$ 2.166 Million)
  
  
- (U)      **Conservation:** There are four central themes to the Conservation thrust area. There are 5 new starts planned in FY 01. (\$2.606 Million)
  
- (U)      **(1) Impacts of Military Operations:** The three completing projects in this sub-thrust examine the impacts of military operations on military lands, and threatened and endangered species. (\$ 1.695 Million)
  
- (U)      **(2) Restoration:** The two continuing projects develop techniques and technologies which are designed to restore degraded military lands. (\$ 1.782 Million)
  
- (U)      **(3) Modeling and Simulation:** Three completing efforts in ecological modeling and simulation and an analysis of the errors inherent in the models are included in this segment. (\$ 1.172 Million)

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(U) **(4) Ecosystem Management:** This major long-term initiative 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 will first focus on the development of indicators of ecosystem health and thresholds of ecosystem damage. (\$ 2.498 Million)

(U) <b>B. <u>Program Change Summary</u></b>	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	57.115	0	54.429	52.664	Continuing
Appropriated Value	61.874	58.771			Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	(5.158)				
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment					
c. Other					Continuing
Current President's Budget	56.716	58.771	53.506	51.729	Continuing

**Change Summary Explanation:**

- (U) **Funding:** Funding changes in outyears reflect below threshold program adjustments and revisions to inflation adjustments.
- (U) **Schedule:** Not Applicable
- (U) **Technical:** Not Applicable

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

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

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

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<i>COST (In Millions)</i>	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	8.255	18.679	7.872	7.790	7.751	7.706	7.624	7.615	Continuing	Continuing
Joint Warfighting/P727	8.255	18.679	7.872	7.790	7.751	7.706	7.624	7.615	Continuing	Continuing

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

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

In May 1998 the Secretary of Defense appointed Commander-in-Chief, United States Atlantic Command (CINCUSACOM) as the Defense Department's Executive Agent for Joint Experimentation. Subsequently, the Department realigned resources to support ACOM's new role. FY 99 funding from this Program Element was redirected to support the initial stand-up of ACOM's Joint Experimentation Directorate. Funding for joint experiments was transferred to ACOM. 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 PE. Program Element 0603727N has been established to provide ACOM with their own funding source in FY 00. Consequently, the FY 98 accomplishments and FY 99 plans in this exhibit include ACOM's activities. Detailed funding changes are in section B.

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 ACOM's joint experimentation efforts, a separate program element has been retained since the activities support other organizations in addition to ACOM, and they require a degree of independence from ACOM to function as envisioned.

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The JAWP was established by 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, 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 vice Service unique revolutionary concepts. In identifying and elaborating innovative Joint concepts and capabilities, and associated enabling technologies, the JAWP will not only take into account Service efforts but those of CINCs and Defense Agencies as well. The JAWP promotes integration and assists implementation. The JAWP's work complements and supports the activities of the Atlantic Command (ACOM), the Joint Staff, and the Office of the Secretary of Defense. It provides an independent source for formulating advanced concept candidates for joint experimentation. The JAWP is composed of both civilian analysts and technologists, and military operators. The civilians provide a level and quality of expertise not generally available in the Department of Defense. The active duty military provide current operational perspective to concepts under investigation and serve as a vital link to ongoing relevant activities in the Services.

(U)

The Information Technology Backplane provides an advanced network infrastructure that extends commercial capabilities to provide capabilities needed to meet JV2010 needs. Information Superiority is a key JV2010 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.

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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. For example, the Joint Staff has prepared 72 desired operational capabilities based on JV2010 concepts and 21st Century Challenges. For each Challenge, the Joint Staff has prepared roadmaps that provide opportunities to assess each Challenge. The roadmap for the battlefield awareness challenge shows 42 Advanced Concept Technology Demonstrations (ACTDs) that have the potential to demonstrate some aspect of a desired operational capability supporting battlefield awareness. This effort provides technology managers the resources to expand the scope of a test or demonstration to collect data for the joint staff or ACOM, thereby leveraging the OSD and Service ACTD investment.

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

**(U) FY1998 Accomplishments:**

(V) USACOM was officially designated Executive Agent for Joint Experimentation on October 1, 1998. However in FY 98 an extensive effort was focused on four objectives: the stand-up of USACOM J-9 organization, the development of the Joint Experimentation process, concept development and selection, and development of the experimentation program for FY 99-01. Additionally, USACOM sponsored the live fly portion of Information Superiority Experiment 1.1 in 4th quarter FY 1998. Leveraging the United States Air Force's Expeditionary Forces Experiment (EFX) 98, USACOM investigated and tested new concepts and organizations to enhance Joint Suppression of Enemy Air Defenses (JSEAD) against mobile targets. Data assessment is ongoing and is included in ACOM's FY 1999 Joint Experimentation program. (\$4.055 Million)

(U) The Joint Advanced Warfighting Program (JAWP) was established in April 1998. Working for the Office of the Secretary of Defense, the Joint Staff, the Atlantic Command (ACOM) and their subordinate activities in support of Joint Warfighting Experimentation, it has: (1) identified key elements of a joint experimentation process; (2) began development of candidate advanced concepts for joint experimentation; (3) began development of an exemplar joint experiment; (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 (5) planned for seminars and workshops with other government organizations to identify complimentary and supporting technology programs and activities. (\$1.500 million)

(U) An Information Technology Backplane (ITB) compliant with the Joint Technical Architecture, and Advanced Battlespace Information System (ABIS) was integrated and put in place, thereby providing an environment of existing information technology components into which prototype

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and other emerging products can be inserted, exercised and evaluated with respect to interoperability and joint warfighting potential. The ITB builds upon existing networks and complements, not duplicates, other networking efforts by Defense Information Systems Agency (DISA), Defense Advanced Research Projects Agency (DARPA), Director Defense Research and Engineering/ High Performance Computing Management Office (DDR&E/HPCMO) and Naval Research Lab (NRL). The ITB was extended into ACOM (Joint Training, Analysis and Simulation Center) and Institute for Defense Analyses.

(U) In the commercial environment, Asynchronous Transfer Mode (ATM) is the protocol of choice for simultaneously processing multiple applications that have huge amounts of data with low latency. ATM provides an economical method to dynamically combine large, low latency data streams like video and voice over a single transmission resource. The 98 accomplishments all relate to our efforts to evolve ATM services to meet JV2010 requirements, while still using commercial of the shelf equipment. In the network management area we provided the means to separate hundreds of switches into logical groups that can be administered by different organizations/services. Work also began on a Java-based network management tool that automatically discovers these logical groups of switches and simplifies their interconnection. In the network security area work began to strengthen the authentication needed to access ATM switch management features using Kerberos security. In the area of Quality of Service (QoS), drivers were implemented to map the Internet Protocol flows to ATM Quality of Service. We also deployed Multiple Protocol Over ATM (MPOA), which eliminates traditional router bottlenecks by creating ATM virtual circuit shortcuts. In the area of ATM applications we implemented Voice-Telephone-Over-ATM, which enables a site to carry both voice from standard handsets and data over a single network connection. In the area of test tools work began on tools that will exercise network devices to assist in lab bench testing, live network testing and network monitoring. Finally, network equipment will be acquired to support ACOM's end node, field two deployable network suites, and upgrade test beds. (\$2.700 Million)

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**(U) FY1999 Plans:**

(U) USACOM's experimentation activities are broken into three categories: (1) USACOM Generated Events - Events developed 'in-house' by USACOM J-9 specifically to support assessment of one or more concepts; (2) Major Leveraged Events - Events that are planned, developed and executed by CINC, Service, or Agency in which USACOM plays a major role in modifying the event to support assessment of one or more concepts; and (3) Minor Leveraged Events - Events intended to provide relatively small amounts of information in a more narrowly focused area for further development. Capitalizing on existing resources and work accomplished by the Joint Staff and Services, USACOM's FY 99 experimentation focus is to provide "Proof of Concept" of the Experimentation Process by conducting Joint Experiment Number I (JE-1). In addition, USACOM will leverage ongoing Service sponsored Experiments to test various warfighting concepts. In total USACOM will be involved in the execution and assessment of one USACOM Generated Event (JE-1), two Major Leveraged Events, and ten Minor Leveraged Events. USACOM will sponsor other concept development studies and Red Team vulnerability assessments. Experiment support technologies including prototypes, advanced technologies, surrogates, and integration materials will be used to support experimentation efforts. Concurrently, USACOM will host a series of Futures Seminars and Warfighter Reviews as a part of the baseline analysis on mid-term and future concepts. Analysis, modeling and simulation and wargames are an integral part of the FY 99 plan. Advanced planning for FY 00 and 01 experiments will be conducted in parallel of ongoing FY 99 experiments. (\$ 10.562 M)

The Joint Advanced Warfighting Program (JAWP) will support JV2010 implementation and the Joint Experimentation work in the Office of the Secretary of Defense, the Joint Staff, and the Atlantic Command (ACOM) 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 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 begin 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. The JAWP will have a major role in executing the simulation portion of ACOM's Joint Experiment-1. 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 to inform the discussions and shape the debate on future concepts and exercises. It will begin to conduct vulnerability assessments using "Red Teaming" techniques to identify weaknesses and avoid surprises. 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

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experimentation process and the development of new technological capabilities. Included in these latter activities, the JAWP will evaluate the systems and products developed during the Synthetic Theater of War (STOW) Advanced Concept Technology Demonstration (ACTD) for use in support a robust modeling and simulation capability which can provide near and mid term support to ACOM's experimentation activities. 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. \$4.3 Million)

The Information Technology Backplane will be expanded and network services and equipment will be provided to ACOM. In the network security area work will continue on the authentication system for web servers and ATM switch management. The ITB will also serve as a NSA alpha and beta test site for cryptographic testing (specifically the KG-75 Release 3 FASTLANE and the KG-175 TACLANE). In the area of ATM applications workstation voice-over-data capability will be converted to a standards based system which will allow users at workstations to conduct voice calls using the microphone and speakers attached to the computer. Work will also be 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 will provide direct support to ACOM. Circuits will be upgraded to 155Mbs and network management provided between ACOM, IDA, the Joint Advanced Warfighting Program, and Naval Research Lab (NRL). 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, etc, will be leveraged without cost to this program. ACOM will also be provided a distributed file system node capable of accessing high-end computing resources and sharing files across the High Performance Computing Office of the DDR&E. Coordination will begin with appropriate OSD ACTD managers and service activities such as USA-CECOM and USAF-Rome Labs to define the network architecture for ACOM's Joint Contingency Force experiment in FY 00. (\$1.817 Million)

(U) Experimentation Feeder Support: ACOM's Campaign Plan, dated 1 December 1998, provides the list of ACOM generated events, major leveraged events and minor leveraged events for FY 99-01. The next step is to develop detailed concept papers for each of the eight concept areas that ACOM is pursuing. The Deputy Under Secretary of Defense (Advanced Systems and Concepts) in coordination with ACOM and the Joint Staff will assist in determining which ACTDs, ATDs, and/or Technology Demonstrations best support ACOM's experimentation events. This funding will be provided to the selected technology managers to support a joint experiment. Funding will be provided for efforts such as system integration, and logistics and test support. (\$2.00 Million)

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### (U) **FY2000 Plans:**

(U) The JAWP will continue to build on its FY99 efforts to support the Department's Joint Experimentation efforts. The focus will be on increased involvement in additional Service/joint exercises and the Atlantic Command's (ACOM) 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 ACOM 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 FY 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. (\$4.300 Million)

(U) 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). In the area of applications, the capability for a workstation voice user to communicate with a standard handset voice user will be provided. Efforts in support of ACOM will continue. Selected circuits will be upgraded from 155Mbps to 622Mbps. This will enable experimentation with "killer applications" such as High Definition Television (HDTV), which produces data at gigabit per second rates. Lower bandwidth, high quality HDTV will be purchased and installed at key sites. HDTV provides mission planners and commanders the ability to observe real-time or near-real-time temporally meaningful data. ACOM will be provided with the network infrastructure that supports their Joint Contingency Force experiment. (\$1.572 Million)

(U) Experimentation Feeder Support for Joint Experimentation will continue. ACOM's Campaign Plan 00, which will be published in April 99, will provide additional experimentation detail and refinements to the current plan. Integrated concept teams will have had the opportunity to prepare more detailed experimentation and assessment plans. Once the concepts and experimentation plans are more clearly articulated, technologies supporting the experiments will be identified. It is anticipated that plans for the Joint Olympic event in the FY 04 timeframe will become clearer and work will begin to align the technologies supporting this major integrating exercise. Once again, this funding is only intended to leverage ongoing developments to support joint experiments, and not to fund the development itself.(\$2.000 Million)

### (U) **FY 2001 Plans:**

(U) The Joint Advanced Warfighting Program (JAWP) will continue support of the Department's Joint Experimentation activities. It will mature those promising concepts developed and demonstrated during the previous two years. It will exploit successes and continue to serve as a catalyst for change and transformation. (\$4.300 Million) The IT Backplane will be upgraded to reflect emerging protocols that show promise from

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advanced research network testbeds. Support will continue for ACOM and other joint experimentation sites. ATM enabled applications and experiments will permit ACOM to conduct experiments using emerging technologies that will be commercially available in the 2000-2003 timeframe. (\$1.490 Million)

(U) Experimentation Feeder Support will continue to support Joint Experimentation and the FY 04 Olympic event. (\$2.000 Million)

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3	R-1 ITEM NOMENCLATURE Joint Warfighting PE 0603727D8Z	

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	8.761	23.700	27.332	30.212	Continuing
Appropriated Value		18.700			Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	-0.506	-0.021			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment					
c. Other			-19.460	-22.422	Continuing
Current President's Budget	8.255	18.679	7.872	7.790	Continuing

**Change Summary Explanation:**

- (U)    **Funding:** Reductions based on planning adjustments. FY00-05 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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Agile Port Demonstration PE 0603728D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	4.617	0	0	0	0	0	0	0	Continuing	Continuing
ADP/P728	4.617	0	0	0	0	0	0	0	Continuing	Continuing

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

(U)     **BRIEF DESCRIPTION OF ELEMENT**

The goal of the program is to support the development and deployment of advanced concepts and technologies leading to an automated, fully-integrated, multi-modal Defense Transportation System (DTS) able to meet the needs of the 21st century. The Center for Commercial Development of Transportation Technologies (CCDoTT) is a DoD funded consortium of public, private, and academic activities brought together to identify and deploy advanced technologies that can be systematically integrated into ports and other transportation systems supporting both commercial and DoD transportation requirements. The purpose of the program is to compare traditional transportation methodologies with next generation technologies, identify the potential for these new technologies to support DoD mobility requirements, and determine the scenarios and criteria for their economic use.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3		R-1 ITEM NOMENCLATURE Agile Port Demonstration PE 0603728D8Z

COST(In Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	4.617	0	0	0	0	0	0	0	Continuing	Continuing
ADP/P728	4.617	0	0	0	0	0	0	0	Continuing	Continuing

(U) **Project Number and Title: P728 ADP**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) **Advanced Sealift Technologies.** Planned to conduct a military Sealift Emergency Deployment Readinesss Exercise (SEDRE) using a commercial high speed sealift vessel to transport troops and materiel from a military deployment port to a selected destination. Perform detailed design, analysis and evaluation of features identified in FY97 as necessary to make commercial vessels compatible with DoD Strategic & Tactical requirements and current DoD cargo handling systems. Focus included research and development, testing, evaluation and commercialization on top candidate enabling technologies for high speed marine applications as identified in FY97 assessments. Evaluated additional commercial ship designs and planned initiatives that can be effectively used for military support or adapted for use by the DoD. Performed more in-depth research on high speed sealift propulsion systems, cargo transfer equipment, and related systems. (\$ 1.250 Million)

(U) **Agile Port Technologies.** Conducted R&D scale demonstrations of selected state-of-the-art cargo handling technologies and port systems to quantitatively assess the improvements in deployment efficiency, reduced times, decrease in port congestion and increase in port-mobilization capabilities. Planned to demonstrate selected terminal management and information technologies to interface Agile Ports with the DTS. Increased sophistication of models & simulations and conducted optimization, design and cost analysis assessments of Agile Ports. Continued to develop, evaluate, and optimize Agile Port concepts and associated Intermodal Transfer (IT) in order to provide flexibility to future DoD mobility operations while serving both commercial and military needs. (\$ 2.170 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Agile Port Demonstration PE 0603728D8Z	

(U) **Rapid Deployment Technologies.** Demonstrated R&D scale models of technologies which leveraged advanced commercial Marine-Rail Interfaces in support of DoD intermodal deployments. Expanded modeling and simulation to include the hinterland region between the seaport and the Inland Port; integrated advanced Weigh In Motion (WIM) technology into an improved TrAMS; and expanded analysis and evaluations of advanced technologies offering maximum benefits to DoD mobility activities. (\$ 1.197 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3	R-1 ITEM NOMENCLATURE Agile Port Demonstration PE 0603728D8Z	

<b>(U) B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	4.778	0	0	0	Continuing
Appropriated Value		0	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-.161	0	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment		0	0	0	
c. Other	0	0	0	0	
Current Presidents Budget	4.617	0	0	0	Continuing

**Change Summary Explanation:**

- (U) **Funding:** FY 1998 reductions are based on inflation adjustments and other minor below threshold reprogramming.
- (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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense-Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Cooperative DoD/VA Medical Research Program PE 0603738D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	18.437	5.915	0	0	0	0	0	0	24.349	24.349
Coop DoD/VA Medical/P464	18.437	5.915	0	0	0	0	0	0	24.349	24.349

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) Congress has added funding in this program element to the Department of Defense (DoD) budget request each year since 1987. Funds support a “core (general research)” program of cooperative medical research funded by DoD and managed by the Department of Veterans Affairs (VA). Core projects address medical research topics potentially of benefit to both Departments, such as emerging infectious diseases, trauma, stress, and exercise physiology. The DoD and VA jointly identify focus areas. Projects are selected through a independent peer review process, and are conducted by intramural VA and DoD physicians and scientists. Funds also support studies on emerging medical issues of importance to DoD and VA, for example, Gulf War veterans illnesses (GWVI) and hepatitis C research.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense-Wide/BA 3		R-1 ITEM NOMENCLATURE Cooperative DoD/VA Medical Research Program PE 0603738D8Z

COST(In Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	18.437	5.915	0	0	0	0	0	0	24.349	24.349
Coop DoD/VA Medical/P464	18.437	5.915	0	0	0	0	0	0	24.349	24.349

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Established a focus areas for core projects in exercise physiology; a solicitation was prepared jointly by DoD and VA technical advisors and the process of independent merit review and project selection is in process. Additional focus areas in nervous system injury and host defenses to emerging pathogens are being planned. For all focus areas, 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 peer review by non-DoD, non-VA experts. (\$ 9.992 Million)

(U) Continued intramural, core research efforts on the health effects of combat stress and post-traumatic stress disorder, and GWVI-related conditions such fibromyalgia. (\$ 0.846 Million)

(U) Initiated intramural research to determine the prevalence of hepatitis C virus infection among U.S. military populations. This research, conducted by the Naval Medical Research Institute, was established in response to Congressional concern that the number of VA patients with hepatitis C antibodies has apparently increased during recent years, indicating an elevated risk of service-connected infections. (\$ 0.445 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense-Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Cooperative DoD/VA Medical Research Program PE 0603738D8Z	

(U) Continued intramural, epidemiological studies efforts concerning Gulf War Illnesses. These seven large studies, conducted by the Naval Health Research Center, are comparing symptoms, hospitalizations and reproductive outcomes between Gulf War veterans and non-deployed veterans of the same era. Efforts included a study to determine the feasibility of establishing an active-surveillance birth defects registry for DoD. Epidemiological studies demonstrated that Gulf War veterans who remained on active duty were not at increased postwar risk of unusual hospitalizations or of having children with birth defects. These studies are inter-Agency collaborations among DoD, Centers for Disease Control and Prevention, Environmental Protection Agency, Department of Veterans Affairs, and University of California at San Diego. Studies have been endorsed by the Institute of Medicine, presented to the Presidential Advisory Committee for Gulf War Veterans' Illnesses, presented to the GAO, and published in the leading peer-reviewed medical journals. (\$ 2.654 Million)

(U) Initiated the establishment of a program of multi-site, cooperative clinical trials to assess the effectiveness of protocols for treating veterans of the Persian Gulf War who suffer from ill-defined or undiagnosed conditions, such as chronic fatigue syndrome and fibromyalgia. Treatment protocols will include, but not be limited to, a multi-disciplinary treatment model, or which cognitive behavioral therapy is a component. (\$ 4.5 Million)

(U) **FY1999 Plans:**

(U) In accordance with the FY99 Defense Authorization Bill (H.R. 3616, Sec. 244), management of this program will be revised for FY99. The Department of Defense will guide the investment of these funds as executive agent for the program, acting through the U.S. Army Medical Research and Materiel Command and the Naval Operational Medicine Institute. Details of the FY99 management and investment strategies currently are being developed. (\$ 5.915 Million)

(U) **FY2000 Plans:**

(\$ 0 Million)

(U) **FY2001 Plans:**

(\$ 0 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense-Wide/BA 3		R-1 ITEM NOMENCLATURE Cooperative DoD/VA Medical Research Program PE 0603738D8Z

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	14.421	0	0	0	14.421
Appropriated Value	19.500	6.000	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-1.063	-0.085	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	0	0	
c. Other	0	0	0	0	
Current Presidents Budget	18.437	5.915	0	0	24.352

**Change Summary Explanation:** Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U) **Funding:** Funding changes are due to program budget and congressional adjustments. The FY1998 program of \$15 Millions was a congressional plus up.

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

(U) **Technical:** Funding changes are due to program budget and congressional adjustments. The FY1998 program of \$15 Millions was a congressional plus up.

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

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

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

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 1999			
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/BA 3					R-1 ITEM NOMENCLATURE Advanced Concept Technology Demonstrations PE 0603750D8Z					
COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	74.756	88.598	117.969	119.298	121.149	123.497	126.080	128.725	Continuing	Continuing
ACTDs/P523	74.756	88.598	117.969	119.298	121.149	123.497	126.080	128.725	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT:** The Department of Defense 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 material 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. In FY 1999, ACTDs also became an integral part of the Joint Warfighter Experimentation process. U.S. Atlantic Command’s (ACOM) Joint Experimentation Plan 99 identified twelve ACTDs in its near-term experimentation matrix. The Deputy Under Secretary of Defense (Advance Systems and Concepts) (DUSD/ASC) is working closely with ACOM in preparing Campaign

Plan 00 to insure ACTD work to integrate technology and develop new concepts of operation is fully leveraged and integrated into future joint experiments.

(U) Other sources provide most of the funding for ACTDs. Funding from this program element, typically 10 to 20%, 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 two years after the “operational demonstration phase” of the ACTD. This two-year phase provides the operators with adequate time to continue to address the issues of supportability, maintainability and training identified by the ACTD.

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/BA 3	R-1 ITEM NOMENCLATURE ADVANCED CONCEPT TECHNOLOGY DEMONSTRATIONS PE 0603750D	

(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 that have been enabled by recently demonstrated technology. The candidates proposed by the warfighter community (Joint Chiefs of Staff (JCS), Unified Commanders in Chief (CINCs), 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 Deputy Under Secretary of Defense (Advanced Systems and Concepts (DUSD (ASC))), with assistance of senior members of the science and technology community (known as the Breakfast Club). The Joint Requirements Oversight Council (JROC) determines the military need by prioritizing the ACTD candidates. The principal management tool for the ACTD is the ACTD Management Plan. Each approved ACTD will be described in a top-level document that provides details of the demonstration/evaluation, the main objectives, approach, critical events, measures of success, transition options, participants, schedule, and funding.

(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 by the fact that the 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, either to pursue an advanced technology demonstration to improve performance, or not to 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 and then move quickly to enter the formal acquisition process and to acquire quantities to fully satisfy the need.

(U) The request for Fiscal Year 2000 candidate ACTDs was issued October 1998. Proposals were received from the CINCs, Services, other Department of Defense Agencies, and industry in January 1999. Candidates are organized into the *Joint Vision 2010* focus areas of Dominant Maneuver, Precision Engagement, Full Dimensional Protection and Focused Logistics. Plans are being finalized with the Joint Staff to begin the process of identifying and reviewing the candidates for FY 2000 ACTDs in February/March 1999. Funding for FY 2000 ACTDs is approximately \$10 million.

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

(U) **FY 1998 Accomplishments:** All ACTDs initiated in FYs 1995, 1996 and 1997 have been reviewed for objectives, content and management. This includes in-depth review by some of the ACTD operational sponsors such as United States Atlantic Command (ACOM). Fourteen new ACTDs were started in FY 1998: Adaptive Course of Action, Command, Control, Communications and Intelligence (C4I) for Coalition Warfare, High Power

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Microwave, Information Assurance: Automated Intrusion Detection Environment, Joint Biological Remote Early Warning System, Joint Continuous Strike Environment, Joint Modular Lighter System, Line of Sight Anti-Tank System, Link-16, Migration Defense Intelligence Threat Data System, Precision Target Identification, Space Based Space Surveillance Operations, Theater Precision Strike Operations and Unattended Ground Sensors. The selection process for FY 1999 ACTDs began in October 1997. Thirteen final ACTD candidates, of the 37 received from the Unified Commands, the Services and Defense agencies, were considered for final selection. Candidates covered a broad range of technologies and needs, including logistics, intelligence, medical protection and telemedicine, information technology, mission planning, battle damage assessment, automated maintenance, personnel recovery and air defense. 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 thirteen candidates and eleven were finally selected based upon funding availability. In order to validate technical maturity, program planning and program management, each final candidate underwent a one-day comprehensive review (termed a 'final scrub') prior to final selection and ACTD start in early FY 1999. FY 1998 funds were transferred to the executing services/agencies in the amount of \$74.756 million.

(U) 1998 accomplishments include:

FY 1995 Starts:

- Advanced Joint Planning (AJP): Developed software tools that provide the insight into readiness of component forces and the ability to manage Time Phased Force Deployment Data (TPFDD) demonstration on a daily basis at U.S. Atlantic Command (ACOM). Utility of these tools (Time-Phase Force Deployment Data Editor (TPEdit), Force Modular Editor (FMEdit), Force Module Editor (FMEdit), Course of Action Selection Tool (COAST), Target, Automated Joint Monthly Readiness Review (AJMRR), and the Joint Readiness Assessment Management System (JRAMS)) has been successfully completed. TPEdit, FMEdit, COAST, and Target have been delivered to Defense Information Systems Agency (DISA) D6 for final testing and fielding. JRAMS has been distributed to several CINCs for demonstration of improved responsiveness and accuracy of the CINC readiness assessment. Both JRAMS and AJMRR were delivered to DISA D6 in November 1998.
- High Altitude Endurance Unmanned Aerial Vehicles (HAE-UAV): Successful first flights for both Global Hawk and DarkStar air vehicles were conducted. Global Hawk Air Vehicles #1 and #2 have flown a total of ten air worthiness and payload test flights at Edwards AFB CA for a total of 50.4 hours. Eight of the ten flights have reached altitudes in excess of 50,000 feet. The latest flight was the first payload mission on 22 Jan 99; the Global Hawk Integrated Sensor Suite (which includes three different types of sensors) successfully used these sensors to gather 'spot' and 'swath' imagery, and also transmitted the imagery via satellite communications to a ground station in San Diego CA. DarkStar has completed five successful airworthiness test flights to date totalling 6.1 hours. Four of the flights went to 5000 feet in altitude; the latest flight on 9 Jan 99 flew for 2.7 hours and 25,000 feet in altitude
- Joint Countermine (JCM): Completed Phase II and the second demonstration during MARCOT/Unified Spirit 98 on 6-26 June 1998 in Stephenville, Newfoundland, Canada. Demonstrated ten novel systems, C4I integration, and legacy systems during the operational exercise. A

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"quick look" analysis report and operational assessment has been prepared. In addition in August 1998, ACOM sponsored Warfighter Analysis Laboratory Experiment to allow warfighters to apply lessons learned during a simulated exercise. Several land based countermeasure systems were also demonstrated in JTFEX 98-1 at Fort Bragg, North Carolina in February 1998. ACOM published its military utility assessment in October 1998.

- Precision Signals Intelligence (SIGINT) Targeting System (PSTS): Completed a final demonstration phase in Korea in September 1998. The PSTS integrated airborne and National SIGINT to achieve accurate geolocation of emitters. The demonstration included upgraded capabilities for the U.S. Army GUARDRAIL system, processing software and communications links. The ACTD leaves a limited operator capability and transitions 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): Completed the full scale demonstration phase in August 1998. This demonstration incorporated new sensor, shooter and command and control technologies into the nation's light, first-to-fight forces. The demonstration concluded with a large free-play engagement between a brigade of the 101st Air Assault Division and a combination of real and virtual opposing forces. The new capabilities that were demonstrated included the Hunter Sensor Suite, Remote Sensory, Integrated Acoustic System, High Mobility Artillery Rocket System (HIMARS), Automated 155 Howitzer and digital command and control in the form of a Light Digital Tactical Operations Center (LDTOC). These components will be entering an interim capability and transition phase.
- Synthetic Theater of War (STOW): Participated in a major operational exercise in support of ACOM and began transition of STOW technologies to the Joint Simulation System (JSIMS) and the Services. In all supported events to date, STOW has been distributed among many sites that interface to it via operational command, control, communications, computers and intelligence (C4I) systems. This integration allows realistic interaction between real-world planning and simulated combat implementation. STOW has achieved new milestones in the number and fidelity of entity-level simulations.

**FY 1996 Starts:**

- Air Base/Port Biological Detection: Conducted Aerosol Background Environmental Sampling at four U.S. installations in Central Command (CENTCOM)/Pacific Command (PACOM) areas of responsibility. At CENTCOM request, the ACTD prototype network was deployed for Operation Desert Thunder. It was operational for 24 hours a day, ran for over 3000 hours with zero network false alarms, and less than one half of a percent of false positives. In addition, the Mark-III sensors have been reduced 25% in size and 35% in weight.
- Battlefield Awareness and Data Dissemination (BADD): Installed a software package at multiple sites providing an integrated environment of broadcast management, information dissemination management, and battlefield awareness service that provide near-real-time imagery, geographic and video products at transfer rates ranging from hundreds-to-thousands of times faster than current capability. Secured user involvement via a series of jointly designed, operationally realistic assessments. Continued efforts to transition BADD products to selected national, joint and service infrastructure programs.

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- **Combat Identification (CID):** Conducted Virtual Integration Exercise (VIE) using the distributed interactive simulation systems at Fort Knox (ground components and forward air controllers), Fort Rucker (helicopters), and Armstrong Laboratories (fixed wing aircraft) all executing operations at the same time over a National Training Center (NTC) terrain data base. Conducted Combat ID Exercise (CIDEX) at Fort Hood with the Digitized Brigade for the military utility assessment of Battlefield Combat Identification System (BCIS) Ground and BCIS Helicopter. Conducted Combat ID Interoperability Demonstration (CIDID) at Fort Huachuca to assess interoperability of combat ID architecture. De-installed BCIS from the 4th Infantry Division at Fort Hood. Provided data in support of the decision to transition BCIS and Situational Awareness Data Link (SADL) to production.
- **Combat Vehicle Survivability (CVS):** Completed technical and operational field tests. Analyzed field test data, which indicated that the technology has significant military utility. Performed CASTFORM modeling to extrapolate technology's utility to larger engagements. Designed and tested improved critical technology subsystem. Conducted extended user tests of subsystem on an operational platform. Redesigned critical technology subsystem to allow for 'use as needed' capability, instead of being permanently installed.
- **Counterproliferation I (CP I):** Conducted several demonstrations and tests against a hardened surrogate chemical weapons production facility. These included successful demonstrations of the Hard Target Smart Fuze (HTSF) and Advanced Unitary Penetrator (AUP), sensors, targeting and hazard prediction tools, with live ordinance dropped from F-15Es and F/A-18s. The Inertial Terrain Aided Guidance (ITAG), which provides a launch and leave, adverse weather precision guidance system, had its first successful test. The Integrated Munitions Effectiveness Assessment (IMEA) is being used to support European Command (EUCOM) targeting activities. Standoff capability is an integral component of CP II (see FY97 starts) which is focusing on Tactical Land Attack Missile and Conventional Air Launched Cruise Missile. The Tactical Unattended Ground Sensor (TUGS) system and the Tactical Forward Looking Infrared (FLIR) Pod Modification (TFPM) capabilities were successfully included in the demonstrations and showed enhanced capabilities for target characterization and battle damage assessments (BDA).
- **Joint Logistics (JL):** Phase II constructed web-based Joint Logistics decision support tools. Focus was placed on connectivity into emerging data bases, operations planning systems and communications networks. These advanced logistics planning capabilities were demonstrated in exercises, then transitioned to the CINCs for true field use.
- **Miniature Air Launched Decoy (MALD):** Completed tooling development for air vehicle fabrication, assembly, ground integration and testing.
- **Navigation Warfare (NavWar):** Exercises used prevention and protection equipment developed by the Navigation Warfare ACTD. Squad-sized exercises were carried out at White Sands Missile Range, New Mexico, Fallon Naval Air Station, Nevada and Camp Lejeune, North Carolina. Large-scale exercises were carried out at Fort Bragg, North Carolina (Purple Dragon) and Fallon Naval Air Station, Nevada. These large-scale exercises have begun the process of training and CONOPs development necessary to deal with Advanced Navigation Systems on a stressed battlefield in the fog of war.
- **Semi-Automated Imagery Processing (SAIP):** Deployed the enhanced SAIP system, which added several new capabilities. The first formal military utility assessment was held in June 1998. This two-week field exercise included Army and Air Force participation, with SAIP processing live real-time imagery from the U-2 aircraft. This exercise clearly demonstrated the advantages of SAIP-aided imagery analysis over unaided

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analysts. Results showed SAIP is critical to handling ever-increasing volumes of imagery products.

- Tactical Unmanned Aerial Vehicle (TUAV): Military utility assessment for joint land force components, which included the Army and Marine Corps, concluded in July 1998. Conducted 184 flights without a Class A or B mishap. Conducted 31 flights with autolandings. Conducted seven flights with an endurance of greater than three hours. Maximum range demonstrated was 205 kilometers. Commenced the interim capability period.
- Theater High Energy Laser (THEL): Currently undergoing testing of the laser system at the Capistrano Test Site in California. End-to-end testing of the pointer/tracker system alignment was completed. Initial command, control, communications and intelligence (C3I) and radar testing was completed at White Sands Missile Range. THEL site construction at the site was initiated. This is a joint ACTD with Israel.

FY 1997 Starts:

- Chemical Add-On to Air Base/Port Bio Detection: The chemical sensor hardware interface was successfully demonstrated and evaluated at Dugway Proving Grounds and was deployed with the prototype Airbase/Port Biological Detection ACTD to Kuwait at CENTCOM request to support Operation Desert Thunder.
- Consequence Management (CM): In December 1997, the Army Technical Escort Unit (TEU) and USMC Chemical Biological Incident Response Force (CBIRF) responded to a simulated domestic terrorist scenario involving release of various biological simulants in a large U.S. city. This was the final and very successful demonstration for this ACTD. The TEU and CBIRF were equipped with existing and emerging bio-detection technologies. These technologies were evaluated for their usefulness and ability to be operated by both units. The final technical review and report were completed this year.
- Counterproliferation II (CP II): The design was completed with elements including: stand-off penetrators (enhanced warhead penetration performance and fuzing options); enhanced payloads (reduce collateral effects by either neutralizing the agent or mitigating release and dispersion); combat assessment (assess collateral effects generated by attack on a chemical related facility); and enhanced planning tools (institutionalize end-to-end nuclear, chemical or biological related target planning support for warfighting commands).
- Extending the Littoral Battlespace (ELB): A Systems Integration Lab (SIL) at the Space Warfare (SPAWAR) Systems Center, was established, along with a hardware and systems integration testbed aboard USS Coronado. These two testbeds will support integration, testing and demonstration for the command and control elements, as well as rapid transition/acquisition support. An industry team was awarded a competitive contract to be the Systems Engineer and Integrator. Detailed analysis and evaluation of candidate-enabling technologies was conducted. The first Major Systems Demonstration (MSD I) was definitized and detailed planning and coordination were executed. Initial integration tests were successfully conducted with a commercial off-the-shelf wireless network, sensors, fires and targeting, and command and control applications.

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- Information Operations Planning Tools (IOPT): Due to cancellation of CENTCOM's Internal Look exercise in FY 1998, a series of mini evaluations were held. The first exercise, AVENGING SURF 98, was held in July 1998 for CENTCOM, and its components, to evaluate in-garrison and initial crisis planning. It provided a positive feedback environment for CENTCOM, Central Air Forces (CENTAF), Navy and Army participants. This first demonstration in an operational oriented scenario allowed the ACTD to obtain critical data on how the tool would be used by geographically separated units. The second assessment was the USAF's EFX in September 1998. Transition discussions for the ACTD are on going with Air Combat Command (ACC) and Air Force Materiel Command (AFMC), as well as representatives from the other service information warfare (IW) centers of excellence. In August 1998, the initial operational capability of the IOPT was installed at CENTCOM, Central Air Forces (CENTAF), Joint Command and Control Warfighting Center (JC2WC), and the Air Force Information Warfare Center (AFIWC).
- Integrated Collection Management (ICM): The first system demonstration was completed. Completed Phase I prototype design and development.
- Joint Advanced Health and Usage Monitoring System (JAHUMS): Awarded and completed nine contracts for Phase I concept definition studies for twelve technology modules. Conducted critical design review of baseline system.
- Military Operations in Urban Terrain (MOUT): Completed technology assessment process that enables the rapid identification of technology candidates and evaluates them against the user-developed criteria to enable a rank ordering of each candidate's ability to meet the requirements. Conducted product and user qualification testing and experimentation for three Army and two U.S. Marine Corps experiments. Conducted a complete technology risk assessment for all 32 user requirements and developed courses of action to mitigate or eliminate the risks. Conducted an excursion of MOUT technology products with RFPI. Instrumented MOUT sites at Fort Benning (Army) and Camp Lejeune (USMC) to facilitate non-intrusive data collection and to assist in generating data for modeling and simulation assessments of military utility.
- Rapid Terrain Visualization (RTV): Conducted detailed technical and operational study to select optimum radar and platform for collection of high-resolution digital elevation data. Merged linear and spatial feature data into a fully integrated data set using prototype battlefield visualization database generation software and generated tailored databases for terrain analysis workstations. Demonstrated baseline semi-automated feature extraction capability using commercial satellite imagery. Demonstrated prototype RTV systems in the Joint Precision Strike Demonstration (JPSD) Integration and Evaluation Center (IEC) and obtained data to evaluate measures of effectiveness. Participated in Division XXI advanced warfighting experiments (AWE) in support of III Corps and 101st warfighting experiments (WFX) in support of the XVIII Airborne Corps. Installed and demonstrated version 2.0 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): Completed knowledge acquisition and initial base lining of PACOM planning operations. Started CINC-level software integration. Produced a World Wide Web-based Visual Demonstration of the ACOA vision and concept of operations to include descriptions of technologies and applications to be used to achieve the goals set forth in the ACOA Management Plan.

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- C4I for Coalition Warfare (C4ICW): The objective is enhanced interoperability of US Army command and control (C2) systems with the United Kingdom, France, Germany, Italy and Canada. This is being accomplished through two multilateral formats with the listed countries. The process uses both NATO standardized message formats and database replications. A series of coalition demonstrations/AWEs are in the early planning stage. This ACTD has developed the process for passing coalition ground force data to other Service's systems. The capability will be integrated into and supported in the Army Battle Command System (initially Maneuver Control System (MCS)) as part of the planned fielding of Army Command Battle System (ABCS) software upgrades. DISA accepted the ACTD data elements and definitions for the next GCCS build to enhance both the land element of the common operational picture and potential for interoperability with coalition partners.
- High Power Microwave (HPM): Demonstrated an operational information warfare attack capability, packaged for tactical operations. Contract for construction of demonstration modules was awarded in September 1998.
- Information Assurance: Automated Intrusion Detection Environment (IA:AIDE): Conducted first demonstration in September at seven sites, with two-level reporting to DISA's Global Operations System Center.
- Joint Biological Remote Early Warning System (JBREWS): Completed system and critical design reviews. Commenced fabrication of systems.
- Joint Continuous Strike Environment (JCSE): Completed design and integration of technology models. Commenced design integration into the Global Command and Control System (GCCS) and relevant service systems. Conducted first in a series of user demonstrations. Began refinement of CONOPS.
- Joint Modular Lighter System (JMLS): Provides operational capability to move warfighting materiel from ship-to-shore in Sea State 3. Will significantly increase system life and reduce required maintenance. Proposals for design of a lightweight, affordable, Sea State 3-capable system were evaluated and multiple contracts for most promising designs were awarded in March 1998.
- Line-of-Sight Anti-Tank (LOSAT): Contract was awarded in April 1998. Completed missile guidance electronics design updated in preparation for incorporation of the inertial measurement unit (IMU). Fabricated hardware and updated operational and test software for missile guidance electronics verification tests. Initiated update of weapon system, fire unit and missile hardware and software requirements. Initiated design concepts for fire unit electronics and missile aft-looking receiver (ALR).
- Link - 16: Demonstrated a joint, integrated capability to pass tactical information seamlessly among Link-16 and variable message format-based tactical data link networks, which are currently separated both in message format and physical wavelength. Software has been developed to exchange tactical information between the networks and their physical devices, as well as the specific message sets required for this exchange. Capability was demonstrated in a controlled environment.
- Migration Defense Intelligence Threat Data System (MDITDS): Operational planning with EUCOM, Defense Special Weapons Agency (DSWA), J34, and the Defense Intelligence Agency (DIA) is ongoing. Cross-network data transitioning to support warning, threat, and vulnerability assessment is underway. Threat assessment/summary software was delivered in September 1998. The operational management team is currently planning a fall 1998 force protection exercise to help determine functional requirements of future MDITDS modules. The

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EUCOM Special Assistant for Security Matters recently put a theater-specific vulnerabilities database on-line. The ACTD will incorporate this as the core to the 'blue' information/decision support interface and proliferate it globally.

- Precision Targeting Identification (PTI): Conducted preliminary demonstration of the potential of laser radar (LADAR) and 3rd generation forward-looking infrared (FLIR) technologies to increase search area and obtain low-probability of intercept, precise target location and identification. Prepared for demonstrations of capability in the counter-drug mission area aboard a modified U.S. Navy P-3 Orion. Capability is applicable to other platforms and missions requiring precise target identification.
- Space Based Space Surveillance Operations (SBSSO): Integration of the MSX sensor into the Space Surveillance System was achieved with dramatic improvement in system performance for high altitude surveillance.
- Theater Precision Strike Operations (TPSO): Commenced system integration and evaluation. Began United States Forces - Korea exercise support.
- Unattended Ground Sensors (UGS): A series of demonstrations were conducted using hand-employed sensors.

(U) **FY 1999 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 95/96/97/98 ACTDs, and start new FY 1999 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*. DUSD(ASC) is coordinating with the Joint Staff's Joint Warfighting Center to identify candidate ACTDs that will become an integral part of the Joint Warfighter Experimentation process and help implementation of the Chairman's *Joint Vision 2010*. Support the respective services and agencies to complete the Year 2000 assessment and necessary remediation of each ACTD to insure that the ACTD products are Year 2000 compliant. Funding will continue for all active previous ACTDs, including the new FY 1999 ACTDs, for a total of \$88.598 million.

(U) Other significant plans for FY 1999 are:

FY 1995 Starts:

- Advanced Joint Planning : The Automated Joint Monthly Readiness Review (AJMRR), and the Joint Readiness Assessment Management System (JRAMS) will complete transition into 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 interim capability period.
- High Altitude Endurance UAVs: Global Hawk and DarkStar unmanned air vehicles will complete their air worthiness and sensor payload test flights, and then commence operational field demonstrations, exercises, and possible contingency deployments, enabling early user involvement to evaluate military utility. A total of four Global Hawks and three DarkStars are planned to take part in the operational demonstrations, along with two complete sets of the associated Common Ground Segment equipment.
- Joint Countermine: Provide those technologies that demonstrated utility to ACOM for continued operations and evaluation during the residual

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phase. Joint Countermine Operational Simulation (JCOS) will transition to STOW, and the Countermine C4I will begin transition to GCCS. Several of the novel systems will transition into acquisition and other ongoing PM programs. Transition efforts for the remaining novel systems will be evaluated and coordinated with user and service agencies.

- Precision SIGINT Targeting System: Commence interim capability period.
- Rapid Force Projection Initiative: Conclude simulation activities and testing. Continue follow-on training and commence interim capability period.
- Synthetic Theater of War: Conduct additional mission rehearsal and training exercises in support of ACOM and continue technology transition to Joint Simulation System (JSIMS) and the Services simulation system. Conclude interim capability period.

FY 1996 Starts

- Airbase/Port Biological Detection System: Residuals will be incrementally fielded to sites in two theaters in this year and FY2000. Residuals consist of : detection network, C4I connectivity and downwind hazard prediction, unmasking procedures, commercial half-mask test, decontamination equipment, and contamination detection kit.
- Battlefield Awareness and Data Dissemination: Complete the assessment of operational utility. Transition of BADD products to operational users as part of the collaborative assessments carried out using distributed service (Army, Navy, Air Force and Joint) sites. Effort will continue to allow products to be integrated into the Defense Information Infrastructure (DII) Common Operating Environment (COE) and GCCS. Service interaction to refine and extend BADD capabilities will also continue.
- Combat Identification: Complete military utility assessment report. Conduct Single Channel Ground and Airborne Radio System (SINCGARS) System Improvement Program (SIP)+ and SINCGARS SIP+ Forward Operating Forward Air Controller (FOFAC) operational tests. Install Battlefield Combat Identification System (BCIS) trainers as leave-behind assets at Ft Hood's Command and Control Technical Training (CCTT) facilities. Continue leave-behind assessments for BCIS, SINCGARS SIP+, SINCGARS SIP+ FOFAC, Situational Awareness Data Link (SADL) and SADL Forward Air Controller (FAC). Conclude interim capability period and end the ACTD.
- Counterproliferation I: With the delivery of the residuals (HTSF, AUP, IMEA, TUGS, and TFPM), CP I moves into residual support mode to EUCOM. HTSF will begin EMD, and transition activities for other CP I elements will continue. This ACTD will continue to support exercises and CONOPS development for EUCOM.
- Joint Logistics: Phase II will continue building additional capability into the web-based Joint Logistics decision support tools. The focus will be on force capability assessment, logistics course of action planning analysis, connectivity into emerging data bases, operations planning systems and execution monitoring. These advanced logistics capabilities will be demonstrated in exercises and then transitioned to the CINCs for field use.
- Miniature Air Launched Decoy: First flight is scheduled for late 1998. Completion of flight demonstrations will follow, where operational users will evaluate military utility in preparation for the user assessment and recommendation. Complete operational demonstration of the decoy with a

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user assessment of military utility. Interim capability period will commence.

- Navigation Warfare: Revise CONOPS. Commence interim capability period.
- Semi-Automated IMINT Processing: Integration and field testing will continue to achieve transition system objectives and to support the U-2 Advanced Synthetic Aperture Radar System (ASARS-2), and the ASARS-2 Improvement Program. The second SAIP military utility assessment will be held in January 1999. SAIP will process SAR imagery from both the U2 and Global Hawk aircraft in an operational scenario. Transition planning with the Air Force and Army will continue, and residual capabilities will be delivered to both services.
- Tactical UAV: Continue interim capability period.
- Theater High Energy Laser: System will begin laser set-up and assembly, followed by system integration and functional testing at the HELSTAF facility at White Sands Missile Range in October 1998. System testing with single and salvo engagements of Katyusha rockets will be conducted during January-March 1999. At the conclusion of the testing at HELSTAF in mid-FY 1999, the THEL system will be shipped to Israel for development of operational concepts, training and deployment along the northern border.

FY 1997 Starts

- Chemical Add-On to Air Base/Port Biological Detection: Residuals will be incrementally fielded to sites in two theaters in this year and FY2000. Residuals consist of the chemical sensors fully integrated into the Airbase/Port reporting, display and command and control network.
- Consequence Management: Integration into operations of user selected technologies will continue, as will CONOPS refinement. This is the concluding year for the ACTD's demonstration and residual period and ends the ACTD.
- Counterproliferation II: Selection will occur between the United Kingdom (UK) Broach and the ACTD Advanced Unitary Penetrator (AUP) for Conventional Air-Launched Cruise Missile. Continue Tactical Land Attack Missile (TLAM) penetrator integration and standoff platform designs. Test and evaluate a dual-drop tactic with AUP from an F-117. Evaluate chemical point detector. New CONOPS development will start for standoff counter force operations.
- Extending the Littoral Battlespace: Conduct MSD I in the third quarter FY 1999. MSD I will stress the ability to operate after deeply penetrating the littoral while leaving all heavy support and infrastructure afloat, literally expanding the littoral battlespace by tens of thousands of square miles. MSD I will be conducted 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. Post-MSD I activities will include initial military utility assessment and determination of interim residual and/or transition opportunities.
- High Power Microwave: Conduct user assessment of the HPM capability.
- Information Operations Planning Tool: Participate in EFX 99 and another joint exercise so that Air Intelligence Agency (AIA)/AFIWC and CENTCOM can further refine operational requirements and enhance the capability of the tool. CENTCOM will use the IOPT to allow real time update of Information Operations Plans by CENTAF and JC2WC. Naval Information Warfare Agency (NIWA) plans to install an IOPT and start computer-based training and familiarization for their Navy Central (NAVCENT) support elements. Based on inputs from M, space information

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operations (IO) concepts and requirements for IO planning will be rolled into the tool. Work to provide segmentation into DII/COE will take place. Further investigation and implementation of a new mapping tool, collaboration capability and interface to MIDB 2.0 will take place.

- Integrated Collection Management: Complete Phase II process re-engineering and prototype design. Commence first military utility assessment.
- Joint Advanced Helicopter Usage and Monitoring System: Phase II design, fabrication and testing of technology module board level designs. Acquire, install and test baseline system on the aircraft.
- Military Operations in Urban Terrain: Complete four-to-six Army and three-to-four Marine experiments. Assess MOUT operational concepts, tactics, techniques and procedures. Conduct down-selection for best-in-class prototype hardware and software based on operational performance, user acceptance, technical risks and affordability. Implement systems integration, interoperability assessments, and diagnoses of advanced technology candidate products. Conduct joint company-level integrating experiments for interoperability assessments and refinement. Develop plans for MOUT Advanced Concepts Excursion to demonstrate and evaluate more advanced science and technology (S&T)-based technologies for application in a MOUT environment. Conduct modeling and simulation to quantify military utility of advanced technology candidate products.
- Rapid Terrain Visualization: Acquire and process high-resolution digital elevation data set and commercial satellite imagery in direct support of XVIII Airborne Corps WFXs. Exploit multi-spectral and radar imagery to accelerate the terrain feature extraction process using the prototype RTV database generation system. Continue iterative upgrade 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 demonstration of selected RTV capabilities from XVIII Airborne Corps to III Corps elements for further user evaluation. Complete modifications to DeHavilland DHC-7 aircraft, including installation and integration of RTV Infrared Synthetic Aperture Radar (IFSAR) sensor 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. Demonstrate the ACOA concept of collaborative planning operations at PACOM and three remote sites in December 1998. This demonstration will also test the military utility of the Web Based Planner, ODYSSEY, and LEIF. If military utility is proven, these applications will progress toward acquisition and delivery to the Global Command and Control System in the April 1999 time frame.
- C4I for Coalition Warfare: The basic message gateway and the data replication mechanism will be tested. The basic message gateway 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.
- Joint Biological Remote Early Warning System: Fabrication of ACTD systems and test design plan will be completed. A series of military utility assessments and tests will be held at Dugway Proving Grounds in the 3<sup>rd</sup> and 4<sup>th</sup> quarters.

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- Information Assurance: Automated Intrusion Detection Environment: Continue sensor bridge development. Install additional sensors at 15 sites and implement database and design changes for new sensors. Instrument nine additional sites for an end-of-year demonstration.
- Joint Continuous Strike Environment: Participate in joint theater exercise and continue concept of operations refinement. Incrementally develop four modules (target prioritization, weapons availability monitoring, weapons-target pairing and airspace deconfliction), test, and begin integration into Global Command and Control System and Service fire support systems.
- Joint Modular Lighter System: Conduct system critical design review and begin hardware fabrication. Conduct unit-level training and demonstrations in the Norfolk/Virginia Beach area.
- Line-of-Sight Anti-Tank System: 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 testing. 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.
- Link-16: Conduct system tests at the Joint Battle Center and a demonstration test and warfighter assessment/operational demonstration. Begin interim capability period.
- Migration Defense Intelligence Threat Data System: The vulnerability assessment module will be completed, MDITDS will be installed with the Joint Guard Tactical Operations Authority (TOA), and the threat summary capability will be incrementally integrated into the system for evaluation. EUCOM will conduct an exercise to gather user functional requirements for future software deliveries and modifications to existing modules. Delivery and testing of the cross-network and deployable information transitioning will occur.
- Precision Targeting Identification: Conduct crew training and user utility operations.
- Space Based Space Surveillance Operations (SBSSO): Conduct additional user demonstration.
- Theater Precision Strike Operations (TPSO): Commence three-year series of annual user demonstrations. Conduct Continental United States (CONUS)/ Outside Continental United States (OCONUS) baseline demonstration.
- Unattended Ground Sensors (UGS): Conduct air-dropped sensor emplacement demonstrations and tests are planned.

FY 1999 Starts:

- Battle Damage Assessment (BDA) in Joint Targeting Toolbox (BDA in JTT): Integrate and demonstrate an advanced technology-based BDA capability to provide functional damage assessments measured against stated objectives, related objectives and the desired end state. The ACTD will address current problems in the BDA process: labor intensive/mainly manual; lacks timeliness and accuracy; focus on physical damage limits depth of analysis; BDA collection outstrips analysis capability.
- Coherent Analytical Computing Environment (CACE): The objective is to significantly reduce Joint Strike Force Program total cost of ownership (TOC) by: developing and evaluating a proof of concept analytical computing environment for decision support purposes and providing a marked improvement in the quantity, quality, timeliness, and utility of mission-critical logistics information available to the chain of

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command and supporting agencies and authorities. This fiscal year, the CACE system will be developed and integrated in two Fleet Harrier II squadrons, creating a shared data/information environment.

- Common Spectral MASINT Exploitation Capability (COSMEC): Use COSMEC to test data from a sensor, e.g., LASH or SYERS, in conjunction with a domestic exercise, such as ASCIET or RED FLAG, to determine the utility of spectral capabilities and products for the warfighter.
- Compact Environmental Anomaly Sensor II (CEASE II): The objective is to develop a three pound, four-inch cube of miniaturized environmental sensors and integrate it with a critical satellite for launch into a geosynchronous orbit prior to Solar Max. Provide the capability of warnings of dangerous space environment conditions to allow for spacecraft safing. Provide environmental data to speed anomaly resolution and to reduce downtime. The system will be built and tested during this fiscal year.
- Force Medical Protection Chemical/Biological Dosimeter: Conduct field evaluation of Phase I prototype passive chemical sampler and develop concept of employment, using simulated Phase II samplers. Conduct technical evaluation of Phase II candidate technologies and select technologies for integration into Phase II sampler.
- HUMINT and Counterintelligence Support Tools: The objectives are to: 1) demonstrate, integrate and assess tools to enhance national-to-tactical HUMINT and CI targeting, dissemination and collection; and 2) improve strategic-to-tactical concepts of operation and architecture.
- Joint Medical Operations - Telemedicine (JMO-T): Demonstrate interoperability of joint telemedicine teams. Determine requirements for standard tactics, techniques and procedures for JMO-T employment forward of the theater hospital using modeling and simulation. Demonstrate feasibility of a tactical communication network (TCN) to provide cost effective data transport far forward.
- Joint Theater Logistics (JTL): The objective is to initiate the migration from Federated Combat Support Joint Decision Support Tools, and CINC, Service and agency applications, to integrated information displays in support of the joint warfighter.; to enhance command and control of combat support at the joint task force level; and, to develop and support a transition strategy for ongoing operations and maintenance. Complete initial integration and migration planning this fiscal year.
- Personnel Recovery (PR) Mission Software System Integration and Fielding: The objective is to transition from a paper-based PR response to an integrated GCCS software suite with point-and-click mission interface. Provide Joint Search and Rescue Centers with PR mission software and hardware. Participate this year in the PACOM Cobra Gold exercise.
- Small Unit Logistics (SUL): Small Unit Logistics: Tactical deployment of decision support tools and a logistics information system via web-based technologies, reducing the logistics response time. Commence a two-year software integration and an incremental lead-service exercise evaluation. First year emphasis on supply and maintenance software systems.
- Theater Air Missile Defense Interoperability (TAMDI): Demonstrate the capability to interface Patriot radar measurements data with the Cooperative Engagement Capability (CEC) composite air picture. Demonstrate real-time target track data exchange between AEGIS and PATRIOT weapons systems.

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(U) **FY 2000 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 ACTD demonstrations should be completed during this period, along with most of the FY 1997 and some FY 1998 ACTD demonstrations. Funding will continue for active ACTDs initiated in FY 1995, 1996, 1997, 1998 and 1999 (\$107.740 million total for all prior year ACTDs) that have not been completed or transitioned to acquisition programs. Funding available for initiating new FY 2000 ACTDs, after subtracting for previous years ACTDs, will be approximately \$10.229 million. (\$117.969 million).

(U) Other significant plans for FY 2000 are:

FY 1995 Starts:

- High Altitude Endurance UAVs: Commence interim capability period.
- Joint Countermine: Continue to support user assessments to obtain additional feedback on military utility and maintainability and continue to coordinate transition plans. Conclude the interim capability period and end the ACTD.
- Rapid Force Projection Initiative: Conclude interim capability period and end the ACTD.
- Precision SIGINT Targeting System: Conclude interim capability period and end the ACTD.
- Synthetic Theater of War: Conclude interim capability period and end the ACTD.

FY 1996 Starts:

- Air Base/Port Biological Detection: Continue residual maintenance, training and field support at sites in two theaters.
- Battlefield Awareness and Data Dissemination: Continue enhancements as high payoff capabilities emerge from the technology base. Refine development based on operational warfighter input. Prepare capability for final transition.
- Combat Identification: Interim capability assets will be supported for a last year of continued operation and to obtain additional user feedback on military utility and maintainability. Continued operational support provides a mechanism which critical features for the continued development of Combat Identification identify technologies.
- 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.
- Information Operations Planning Tool: Continue to integrate tools and conduct an operational demonstration. Refinement of the CONOPs based on the field demonstration in FY98 will occur, and an assessment of the INTERNAL LOOK 98 demonstration will be made.
- Joint Logistics: Continue joint demonstrations and military utility assessments. Commence interim capability period.
- Miniature Air-Launched Decoy: Continue interim capability period.
- Navigation Warfare: Continue interim capability period.

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- Semi-Automated Imagery Processing: The Army vehicle version and the Air Force rack version of the SAIP residuals will be supported, CONOPS revised and transition plans finalized. This is the final year of SAIP demonstration and interim capability period and ends the ACTD.
- Tactical UAV: Conclude interim capability period.
- Theater High Energy Laser: Maintain operational use in Israel.

**FY 1997 Starts**

- Chemical Add-On: Residual maintenance, training and field support will continue at sites in two theaters.
- Counterproliferation II: Continue stand-off 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 NBC materials. Fabricate EMD prototypes and begin test program for the TLAM penetrator.
- Extending the Littoral Battlespace: Assessment of MSD I, lessons learned, continued technology search and evaluation and preparation for MSD II will be conducted.
- Information Operations Planning Tool: User evaluation will continue, in part via demonstration, during BLUE FLAG 00-1. AFIWC will consider integration of other IO tools developed under their concept exploration/development initiative. Sustainment and support of the IOPT will be provided to CENTCOM and CENTAF.
- Integrated Collection Management: Complete Phase II prototype development, operational development tests and the second military utility assessment.
- Joint Advanced Health and Usage Monitoring System: Complete system installations, conduct training for operational and maintenance crews and begin operational demonstration.
- 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 Advanced Concept Excursion. Conduct the MOUT Culminating Demonstration.
- Rapid Terrain Visualization: Complete integration and testing of high-resolution elevation data collection capability on DeHavilland 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.

**FY 1998 Starts**

- Adaptive Course of Action: Continue CINC-level software integration. Conduct a multi-CINC user demonstration. Continue to evaluate applications within ACOA for early transition to the Global Command and Control System on a 12-to-18 month cycle.

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- 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 maneuver control system (MCS).
- Information Assurance: Automated Intrusion Detection Environment: Integrate an additional 15 sensors into the G-2 environment and an additional nine sites. Sensors 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 entire ACTD will be written and formalized. A final demonstration of the entire system will be conducted.
- Joint Biological Remote Early Warning System: Residual assets (Sentry Units (SU), Sample Identification Units (SIU), and Sensor Network Command Post (SNCP) Units) will provide remote detection and warning of biological agents for a Brigade-size assembly area and will be installed and supported in theater. CONOPS development will continue.
- Joint Continuous Strike Environment: Participate in joint and combined theater exercises and continue concept of operations refinement. Complete four modules (target prioritization, weapons availability monitoring, weapons-target pairing and airspace deconfliction), testing, and integration into Global Command and Control System and Service fire support systems. Hold final military utility assessment.
- Joint Modular Lighter System: Conduct joint and unit demonstrations. Commence interim capability period.
- Line-of-Site Anti-Tank: Complete fire unit and missile detail level design and analysis. Hardware tooling and fabrication will begin. 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 update of existing Virtual Prototype Simulator (VPS) and initiate fabrication of second unit. Complete hardware-in-the-loop and closed loop simulation software upgrades and initiate hardware integration.
- Link-16: Continue interim capability period.
- Migration Defense Intelligence Threat Data System: The threat summary and debriefer's associate components will be completed, integrated and tested. The collection interface elements will be developed and tested. Military utility assessment will be conducted.
- Precision Target Identification: Upgrades are planned to the baseline Over-the-Horizon Airborne Sensor Information System (OASIS), which will have been flown operationally in FY99. This C4I upgrade will provide Fleet connectivity to permit processing of external target track information to generate pointing directions for the AVX-1(x) PTI subsystem in addition to providing the compatible data link formats such as OTH-T Gold and TRAP. Delivery and integration support with the United Kingdom's Tornado testbed is also planned for completion.
- Space Based Space Surveillance Operations (SBSSO): Conduct final user demonstration and commence interim capability period.
- Theater Precision Strike Operations (TPSO): Complete second of three user demonstrations in conjunction with Ulchi Focus Lens Exercise.
- Unattended Ground Sensor (UGS): Commence interim capability period.

FY 1999 Starts

- Battle Damage Assessment (BDA) in Joint Targeting Toolbox: A subset of the components of the functional assessment approach will be integrated. These components include: data retrieval, filtering and indexing; target and target system models; and their functional aggregation.

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- Review and validation will be done by J2-T, 497IG, and the Joint Targeting Tools Users' Group Beta test.
- Coherent Analytical Computing Environment: Incorporation of reasoners/intelligent agents in proof-of-concept squadrons, creating a CACE. Provide residual, shared data/information environment architecture/software to entire USMC Harrier community. Provide JSF Program Office impact assessment.
  - Common Spectral MASINT Exploitation: Demonstrate the utility of spectral data with operational assets, such as SYERS/CARS or LANDSAT/EAGLE VISION, during a theater-level exercise, such as FOAL EAGLE, UNION FLASH or TRAIL BLAZER.
  - Compact Environmental Anomaly Sensor II: Complete system integration on critical satellite systems and conduct system launch.
  - Force Medical Protection Chemical/Biological Dosimeter: Technical evaluation of Phase II sampler. Demonstrate real-time chemical sampler with biological agent collection capabilities. Conduct utility assessment at the CINC level.
  - Human Intelligence (HUMINT) and Counterintelligence (CI) Support Tools: Model and evaluate collection tools. Procure and evaluate dissemination tools. Conduct single echelon user tests.
  - Joint Medical Operations – Telemedicine: Demonstrate effectiveness of integrated JMO-T capability to satisfy user measures of effectiveness in a joint, capstone utility assessment.
  - Joint Theater Logistics: Migrate federated applications to integrated information software capability.
  - Personnel Recovery Mission Software: Conduct CENTCOM integration.
  - Small Unit Logistics: Continue system integration to include tactical distribution and health services. Deploy the web-based system in a joint exercise showing the inter-operable material readiness information system, maintenance application, and the tactical intermediary logistics operations center. Assess performance for replacing tactical footprint and inventory with speed and information.
  - Theater Air Missile Defense Interoperability: 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.

(U) **FY 2001 Plans:** Continue the process of transitioning and initiating ACTDs. Numerous demonstrations will be conducted for those ACTDs initiated in previous years. Most FY 1995 and 1996 ACTDs will be fully completed (end of interim capability period) during this year. All FY 1997 ACTD demonstrations should be completed, along with most of the FY 1998 and some FY 1999 ACTDs. Funding will continue for active ACTDs initiated from FY 1996 through FY 2000 (\$89.170 million total for all 96-99 ACTDs and an estimated \$20 million for FY 00) that have not been completed or transitioned to acquisition programs. Funding available for initiating new FY 2001 ACTDs, after subtracting for previous year ACTDs, will be approximately \$10.128 million. (\$119.298 million).

(U) Other significant plans for FY 2001 are:

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FY 1995 Starts

- High Altitude Endurance UAVs: Conclude the interim capability period and end the ACTD.

FY 1996 Starts

- Airbase/Port Bio Detection: Continue residual maintenance, training and field support at four sites in two theaters. Conclude the demonstration and interim capability period and end the ACTD.
- Battlefield Awareness Data Dissemination: Conclude interim capability period and end the ACTD. Handoff capability to DISA for potential fielding to operational users.
- Joint Logistics: Continue joint demonstrations and interim capability period.
- Miniature Air-Launched Decoy: Conclude the interim capability period and end the ACTD.
- Navigation Warfare: Conclude interim capability period and end the ACTD.

FY 1997 Starts

- Chemical Add-On to Airbase/Port Bio Detection: The ACTD demonstration and interim capability period conclude this year and end the ACTD.
- Counterproliferation II: Evaluate Conventional Air-Launched Cruise Missile (CALCM) with 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 Tools: Residual support will continue and transition plans finalized. The IOPT will support CENTCOM in INTERNAL LOOK 01, CENTAF in Blue Flag 01-1, and EFX 01. Provide IOPT capability to other IO related programs in various services. This is the last year for the ACTDs demonstration and interim capability period and ends the ACTD.
- Integrated Collection Management: Complete Phase III prototype design and development. Conclude third military utility assessment.
- Joint Advanced Helicopter Usage and Monitoring System: Complete operational demonstration. Conduct health and usage monitoring system (HUMS) technology assessment and cost/benefit analysis.
- Military Operations in Urban Terrain: Commence interim capability period.
- Rapid Terrain Visualization: Conclude interim capability support period and end the ACTD.

FY 1998 Starts

- Adaptive Course of Action: Complete integration, hardening and transition into the GCCS/Leading Edge Services (LES). Begin interim capability maintenance and sustainment phase.

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- C4I for Coalition Warfare: A major United States, United Kingdom, France, Germany, Italy and Canada demonstration of the coalition interoperability gained with ACTD message formatting and database replication will be held. 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 wider integration of capability into other 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: Commence interim capability period.
- Joint Biological Remote Early Warning System: In this final year of the residual phase, support will continue for the brigade-size capability.
- 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.
- Joint Modular Lighter System: Continue interim capability period.
- Line-of-Site Anti-Tank: 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. Complete update of digital and hardware-in-the-loop simulations. Operational procedures and training guides will be completed. Training device development and preparations for first Battle Lab Warfighting Experiment will also be completed.
- Link-16: Conclude interim capability period and end the ACTD.
- Migration Defense Intelligence Threat Data Systems: The vulnerability assessment, threat summary and auto data tagging will be installed for the residual period. The collection interface will have a field demonstration and evaluation.
- Precision Target Identification: The full PTI system will be deployed in the Fleet after final modifications to the laser radar (LADAR) in this budget year. Specifically, final repackaging of the LADAR and integration on the AVX-1(x) optical station are planned. The full sensor system will be tested initially at contractor facilities to ensure successful LADAR operation prior to installation on a brass board optical station at the Naval Air Warfare Center – Annapolis Division (NAWCAD) facility. Next, the system will be integrated on a testbed aircraft. Following a successful triumvirate, PTI will be integrated as an AVX-1(x) configuration co-aligned with the mid-wavelength infrared (MWIR) camera in the acquisition turret for operational deployment.
- Space Based Space Surveillance Operations: Conclude interim capability period and end the ACTD
- Theater Precision Strike Operations: Complete third in series of user demonstrations/evaluations.
- Unattended Ground Sensors: Conclude interim capability period and end the ACTD.

**FY 1999 Starts**

- Battle Damage Assessment in Joint Targeting Toolbox: Additional components will be integrated. These include: comparison of combat objectives with actual results and BDA report generation. A military utility assessment will be conducted in a CENTCOM joint exercise.

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- Coherent Analytical Computing Environment: Extend reasoners/intelligent agents to group, wing and Headquarters USMC. Provide CACE architecture to USMC aviation community. Update JSF Program Office impact assessment.
- Common Spectral MASINT Exploitation: Commence maintenance and sustainment of a COSMEC interim capability
- Compact Environmental Anomaly Sensor II: Demonstrate mission support.
- Force Medical Protection Biological/Chemical Dosimeter: Transition system to the CINC level.
- Human Intelligence (HUMINT) and Counterintelligence (CI) Support Tools (HCIST): Assess CONOPS, equipment and architecture in Joint Warfighting exercise. Conduct OCONUS real-world military utility assessment and operational evaluation.
- Joint Medical Operations – Telemedicine: Transition an interim capability for the CINC or designated component surgeon.
- Joint Theater Logistics: Complete integrated operations and combat service support operations center capability.
- Theater Air Missile Defense Interoperability: Conduct user assessment of the AEGIS/PATRIOT integrated air picture capability.

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

<b>(U) B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	77.455	116.330	133.768	122.209	Continuing
Appropriated Value		89.830			Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	(2.699)	(1.232)			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment					
c. Other			(15.799)	(2.911)	Continuing
Current President's Budget	74.756	88.598	117.969	119.298	Continuing

**Change Summary Explanation:**

**(U) Funding:** Changes in FY 1999 were due to congressionally directed undistributed reductions. FY2000 and FY20001 adjustments were based on programmatic revisions.

**(U) Schedule:**

**(U) Technical:**

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

<u>ACTD</u>	<u>FY 1998</u>	<u>FY1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Advanced Joint Planning**	1.390	1.200	.300	0
Cruise Missile Defense Phase I*	0	0	0	0
Joint Countermine**	6.530	1.440	.390	0
High Altitude Endurance Unmanned Aerial Vehicle	0	0	0	0
Kinetic Energy Boost Phase Intercept*	0	0	0	0
Medium Altitude Endurance Unmanned Aerial Vehicle*	0	0	0	0
Precision SIGINT Targeting System**	.960		0	0
Rapid/Counter Multiple Launcher*	0	0	0	0
Rapid Force Projection Initiative**	0	0		0
Synthetic Theater of War**	2.140	.600	0	0

\*Completed

\*\* Completed the demonstration phase of the ACTD

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

<u>ACTD</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Airbase/Port Biological Detection	1.070	1.200	1.300	2.800
Battlefield Awareness and Data Dissemination	4.280	2.400	2.600	0
Combat Identification**	4.280	2.400	1.280	0
Combat Vehicle Survivability**	1.200	0	0	0
Counterproliferation I	1.080	5.280	6.500	2.000
Counter Sniper*	0	0	0	0
Joint Logistics	1.600	.0	0	0
Joint Readiness Extension to Advanced Joint Planning ***	0.320	.0	0	0
Low Life Cycle Cost, Medium Lift Helicopter*	0	0	0	0
Miniature Air Launched Decoy	0.750	.600	1.600	2.450
Navigation Warfare	4.170	.360	0	0
Semi-Automated IMINT Processing	2.140	2.400	0	0
Tactical UAV**	0	0	0	0
Theater High Energy Laser	0	0	0	0

\*Completed

\*\* Completed the demonstration phase of the ACTD

\*\*\* Completed the demonstration phase of the ACTD and incorporated into the Advanced Joint Planning ACTD

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**(U) E. PE Funding for FY 1997 ACTDs**

<b>ACTD</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>
Chemical Add-On to Biological Detection	1.070	0	.700	1.000
Consequence Management*	0	0	0	0
Counterproliferation II	0	5.400	10.300	7.400
Extending the Littoral Battlespace	2.200	6.000	6.400	9.000
Information Operations Planning Tool	2.140	2.728	1.300	1.800
Integrated Collection Management	1.070	1.200	1.300	1.800
Joint Advanced Health and Usage Monitoring System	4.280	4.800	5.300	1.800
Military Operations in Urban Terrain	5.400	0	0	0
Rapid Terrain Visualization	1.600	2.400	3.900	5.400

\* Completed

\*\*Completed the demonstration phase of the ACTD

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

<b>ACTD</b>	<b>FY 1998</b>	<b>FY1999</b>	<b>FY 2000</b>	<b>FY 2001</b>
Adaptive Course of Action	2.900	4.800	5.200	2.200
C4I for Coalition Warfare	.430	1.920	3.000	2.600
High Powered Microwave	.750	.600	1.500	.500
Information Assurance: AIDE	3.210	3.600	5.200	3.600
Joint Bio Remote Early Warning System	0	0	2.600	5.400
Joint Continuous Strike Environment	.960	1.560	2.600	2.000
Joint Modular Lighterage System	3.800	4.260	.070	0
Line-of-Sight Anti-Tank	5.276	8.400	6.400	1.800
Link 16	1.230	.600	1.300	2.000
Migration Defense Intelligence Threat Data System	.430	.960	1.100	.540
Precision Targeting Identification	2.300	2.700	3.500	1.080
Space Based Space Surveillance Operations	.750	.840	.900	0
Theater Precision Strike Operations	1.070	4.900	7.050	9.000
Unattended Ground Sensors	1.980	2.160	3.200	4.600

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**(U) E. PE Funding for FY 1999 ACTDs**

<b>ACTD</b>	<b>FY1999</b>	<b>FY 2000</b>	<b>FY 2001</b>
Battle Damage Assessment in the Joint Targeting Toolbox	.480	.600	.400
Coherent Analytical Computing Environment	0	.640	.900
Common Spectral MASINT Exploitation Capability	1.200	2.300	1.200
Compact Environment Anomaly Sensor	0	0	.100
Force Medical Protection	.420	1.500	2.200
Human Intelligence and Counterintelligence Support Tools	.600	2.000	1.600
Joint Medical Operations Telemedicine	2.040	3.070	1.000
Joint Theater Logistics	1.800	2.000	1.000
Personnel Recovery Mission Software	.750	1.800	2.100
Small Unit Logistics	1.200	1.640	1.000
Theater Air and Missile Defense Interoperability	2.400	5.400	6.900

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Commercial Technology Insertion Program PE 0603752D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	18.000	0	0	0	0	0	0	0	Continuing	Continuing
Commercial technology Insertion for First Use Mili/P795	8.905	0	0	0	0	0	0	0	Continuing	Continuing
Open Systems Demonstrations to Expand Commercial I/P796	9.095	0	0	0	0	0	0	0	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) The purpose of the Commercial Technology Insertion Program (CTIP) is to reduce risks and increase opportunities for the insertion of commercial technologies into defense systems. By supporting the required nonrecurring engineering, test and qualification, CTIP enables commercial components to be used confidently in weapon system applications. By demonstrating open system architectures that take advantage of the latest commercial technologies, CTIP increases the ability of defense systems to avoid parts obsolescence and keep pace with commercial technology advancement. Commercial technologies selected for insertion through this Program apply to more than one weapon system and will reduce life cycle costs and improve performance, reliability and maintainability. This Program implements the Department's strategy for using more commercial technologies in military equipment.

(U) The Program is managed by the Office of the Secretary of Defense and executed by Service program offices. Proposed projects for the insertion of commercial technologies and demonstration of open architectures in defense systems are selected by the Services and approved for funding by the OSD. The systems selected as initial applications are planned/ongoing development and modification programs. CTIP has defined two major thrust areas for the FY 97-99 program: P795 - Commercial Technology Insertion for First Use Military Applications and P796 - Open Systems Demonstrations to Expand Commercial Insertion Opportunities.

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(U) P795. The first thrust eliminates barriers to the insertion of a commercial components in a military system. DoD program managers are often reluctant to take the risk of using parts whose characteristics in a military operating environment have not been tested and validated. The business case often does not exist for a single program to make the required investment in adapting and testing commercial items. As a result, military unique items continue to be selected by designers of defense systems, leading to higher costs, lower reliability, increased parts obsolescence, and often lower performance than commercial alternatives. CTIP addresses this problem by providing the engineering and qualification testing needed for the “first user” program, thereby reducing the risk and expense to an acceptable level for follow-on programs. CTIP also provides information to users on test and operational experience with commercial parts in military applications. Two projects were initiated in the first year of the program: (1) commercial microelectromechanical sensors for fuze, safe, and arm devices, with initial applications for undersea weaponry and missiles, and (2) commercial analog to digital signal processing architecture for the F-15 radar.

(U) P796. The second thrust focuses on the system engineering of open system architectures (OSA). OSA are based on commercial market developments and standards. This thrust demonstrates the effectiveness and suitability of these open architectures for use in weapon systems. The purpose is to increase the opportunity for insertion of commercial subsystems and components from sources other than the original equipment manufacturer, and to facilitate upgrades over the life cycle to keep pace with commercial technology advancement. Defense system architectures are often proprietary system solutions that make parts substitution and future upgrades difficult. By contrast, the best practice in the commercial sector is to rely on open system standard interfaces that make upgrading faster, easier and less expensive. Commercial interfaces apply to computer hardware and software and to other electronic, electrical and mechanical attributes.

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<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	18.000	0	0	0	0	0	0	0	Continuing	Continuing
Commercial technology Insertion for First Use Mili/P795	8.905	0	0	0	0	0	0	0	Continuing	Continuing

(U) **Project Number and Title: P795 Commercial technology Insertion for First Use Mili**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Expanded testing and qualification of commercial MEMS sensors for application to Extended Range Guided Munition (ERGM) and Low Cost Competent Munitions. (\$ 4 Million)

(U) Completed system engineering to integrate a commercially based analog to digital signal processing architecture into the F15 radar. Design, prototype, and test the video processor board, integrate it with the digital signal processor board, and conduct bench testing to verify performance. (\$ 4.905 Million)

(U) **FY1999 Plans:**

(U) Beginning with FY 1999, CTIP funding will transfer to PE 604805D. (\$ 0 Million)

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<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	18.000	0	0	0	0	0	0	0	Continuing	Continuing
Open Systems Demonstrations to Expand Commercial I/P796	9.095	0	0	0	0	0	0	0	Continuing	Continuing

(U) **Project Number and Title: P796 Open Systems Demonstrations to Expand Commercial I**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Demonstrated the feasibility of using commercial software and standard commercial interfaces in the avionics suite, mission computer, and warfare management computer of the AV-8B. (\$ 9.095 Million)

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3		<b>R-1 ITEM NOMENCLATURE</b> Commercial Technology Insertion Program PE 0603752D8Z

(U) <b>B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	19.105	0	0	0	Continuing
Appropriated Value	20.000	0	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-0.895	0	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	0	0	
c. Other	1.105	0	0	0	
Current Presidents Budget	18	0	0	0	Continuing

**Change Summary Explanation:** Funding changes are due to congressional undistributed reductions and inflation adjustments.

(U)    **Funding:**        Reductions are due to Congressional adjustments. The President's Budget submit for FY 1999 transfers the funding to PE 064805D and to the Services.

(U)    **Schedule:**        N/A

(U)    **Technical:**        Reductions are due to Congressional adjustments. The President's Budget submit for FY 1999 transfers the funding to PE 064805D and to the Services.

(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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								DATE January 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide / BA 3				R-1 ITEM NOMENCLATURE HIGH PERFORMANCE COMPUTING MODERNIZATION PE 0603755D8Z						
	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
<i>COST (In Millions)</i>										
Total Program Element (PE) Cost	139.023	152.585	159.099	145.140	139.109	144.297	147.248	150.275	Continuing	Continuing
HPCM/P476	139.023	152.585	159.099	145.140	139.109	144.297	147.248	150.275	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 Developmental Test and Evaluation (DT&E) programs.

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide / BA 3	<b>R-1 ITEM NOMENCLATURE</b> HIGH PERFORMANCE COMPUTING MODERNIZATION PE 0603755D8Z	

(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 DT&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 DT&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 4,300 computational scientists and engineers and over 60 DoD laboratories and developmental test and evaluation facilities. The integrated HPCM 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 12 distributed centers. In FY 1998 five existing centers were upgraded. In FY 1999, one distributed center was retired. Also in FY 1999 multiple distributed center proposals will be evaluated resulting in three to five awards. The distributed centers and their locations are listed below:

- Arnold Engineering Development Center (AEDC), Arnold AFB, TN
- Air Armaments Center (ARC), Eglin AFB, FL
- Army High Performance Computing Research Center (AHPCRC), Minneapolis, MN
- Maui High Performance Computing Center (MHPCC), Maui, HI
- Naval Air Warfare Center (NAWC), Patuxent River NAS, MD
- Space and Naval Warfare Systems Center (SSCSD), San Diego, CA
- Naval Research Laboratory (NRL), Washington, DC
- Air Force Research Laboratory (AFRL-Rome), Rome, NY
- Space and Missile Defense Command (SMDC), Huntsville, AL
- Tank-Automotive Research, Development and Engineering Center (TARDEC), Warren, MI
- White Sands Missile Range (WSMR), NM

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- Redstone Technical Test Center (RTTC), Huntsville, AL

(U) In addition to the distributed centers listed above, the Arctic Region Supercomputer Center (ARSC) has been funded by Congress in FY 1996, FY 1997, 1998 and FY 1999 and is providing computational resources to the HPCMP user community.

(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.

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	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
<i>COST (In Millions)</i>										
Total Program Element (PE) Cost	139.023	152.585	159.099	145.140	139.109	144.297	147.248	150.275	Continuing	Continuing
HPCM/P476	139.023	152.585	159.099	145.140	139.109	144.297	147.248	150.275	Continuing	Continuing

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

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

(U) **FY1998 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, minimally tripling their computing capability over the two year period (FY 1997 and FY 1998). The program assessed and prioritized HPC requirements for DCs and deployed new systems at five existing DCs to accomplish S&T and DT&E mission needs which cannot be met effectively or efficiently at the MSRCs.

(U) **Networking:** The DREN fully replaced the Interim DREN in FY1998. The DREN started operation with 10 service delivery points on 1 July 1997. By the end of FY 1998, a total of 60 government facilities and 4 Internet network access points (NAPs) will be connected via DREN. Full Internet Protocol (IP) service is extended to all sites and more robust Asynchronous Transfer Mode (ATM) ATM services are provided to sites with local infrastructures capable of supporting these services (21 sites). Current communications bandwidths provided to sites range from 3 megabits per second to 155 megabits per second. Collaborative work continued with the Federal networking community to assure DREN remains compatible with future technology changes. (\$21.742 Million)

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(U) **Software Applications Support:** 34 individual Common High Performance Computing Software Support Initiative (CHSSI) projects completed alpha and in some cases beta testing in FY 1998. These testing efforts confirmed that sound engineering practices and principles are being employed. Comprehensive reviews were conducted across all 10 computational technology areas (CTAs). (\$20.907 Million)

(U) **MSRC Sustainment:** The program sustained and supported the integration, operation, and use of existing HPC resources at the four MSRCs. (\$72.073 Million)

(U) **Distributed Center Sustainment:** . The program funded sustainment and operations at the Maui High Performance Computing Center and the Arctic Region Supercomputer Center in accordance with FY 1998 Congressional language. Although not formally a HPCMP DC because it lacks a DoD sponsor, Arctic Region Supercomputer Center funding is included in the DC totals. The DC organization funds the sustainment and operations of the HPCMP equipment located at the site. Only a nominal amount of funding is allocated for DC program management. (\$24.301 Million)

(U) **FY1999 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. 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.

(U) **Networking:** As researchers take greater advantage of their connectivity to high performance computing systems and other researchers, the bandwidth demands on DREN will 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 1999 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 (previous plans to connect high range users at 622 Mbps have been postponed due to funding reductions). 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 begin to assure new contracts are in place in FY 2001. (\$22.691 Million)

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(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 to their fullest. (\$22.846 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. The additional funds requested will provide for a full year of sustainment and operations for those systems purchased and deployed in FY 1998. Partial year sustainment and operations for systems purchased and deployed in FY 1999 is included in the total FY 1999 funding requested. Funding is provided for a high performance visualization center. (\$86.202 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 in accordance with FY 1999 Congressional language. Although not formally a HPCMP DC because it lacks a DoD sponsor, Arctic Region Supercomputer Center funding is included in the DC totals. The DC organization funds the sustainment and operations of the HPCMP equipment located at the site. Only a nominal amount of funding is allocated for DC program management. Only a nominal amount of funding is allocated for DC program management. (\$20. 846Million)

(U) **FY2000 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. 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 contracts are in place to support FY 2001 and beyond procurements.

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(U)     **Networking:** As researchers take greater advantage of their connectivity to high performance computing systems and other researchers, the bandwidth demands on DREN will 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 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. Formal acquisition efforts will assure follow-on contracts are in place to support DREN services in FY2001 and beyond. (\$29.517 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 to their fullest. (\$22.535 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 in the retirement of older HPC systems are included in the total FY 2000 funding requested. Formal acquisition planning efforts will begin to evaluate options for sustainment support in FY2001 and beyond. (\$86.201 Million)

(U)     **Distributed Center Sustainment:** A one year budget adjustment provides sustainment and operations for the Maui High Performance Computing Center and the Arctic Region Supercomputer Center. The DC organization funds the sustainment and operations of the HPCMP equipment located at the site. Only a nominal amount of funding is allocated for DC program management. (\$20.846 Million)

(U)     **FY2001 Plans:**

(U)     **Shared Resource Centers:** The program will sustain the existing capability and continue modernizing HPC systems, storage, and scientific visualization capabilities to fulfill a significant portion of the projected the R&D & laboratory and center HPC requirements. New contracts will be awarded to provide the next generation of HPC capability.

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(U) **Networking:** As researchers take greater advantage of their connectivity to high performance computing systems and other researchers, the bandwidth demands on DREN will continue to grow. Network services provided under DISC will transition to the follow-on service provider. 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 change. (\$32.900 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 to their fullest. (\$22.446 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. (\$88.948 Million)

(U) **Distributed Center Sustainment:** . The DC organization funds the sustainment and operations of the HPCMP equipment located at the site. Only a nominal amount of funding is allocated for DC program management. (\$0.846 Million)

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

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<b>(U) B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	126.211	140.927	139.548	146.206	Continuing
Appropriated Value	149.880	153.927			Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	(9.613)	(1.342)			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	(1.244)		(.449)	(1.066)	
c. Other			20.000		Continuing
Current President's Budget	139.023	152.585	159.099	145.140	Continuing

**Change Summary Explanation:**

**(U) Funding:** The funding adjustment in FY 1998 is based on congressional adjustments in the Defense Appropriations Act and program budget reductions. The funding adjustments in FY 2000 are a result of revised inflation factors and program budget increases (including a FY 2000 specific program budget increase). The reduction in FY 2001 is a result of revised inflation factors and program budget decisions.

**(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.

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

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

(\$ in Millions)									
FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
87.100	91.435	62.705	40.422	50.796	49.748	50.782	52.392	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

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

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<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Joint Wargaming Simulation Management Office PE 0603832D8Z			
<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	60.059	60.518	68.456	68.250	70.552	71.954	73.456	74.899	Continuing	Continuing
JSM/P476	60.059	60.518	68.456	68.250	70.552	71.954	73.456	74.899	Continuing	Continuing

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

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) 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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<i>COST(In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	60.059	60.518	68.456	68.250	70.552	71.954	73.456	74.899	Continuing	Continuing
JSM/P476	60.059	60.518	68.456	68.250	70.552	71.954	73.456	74.899	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1998 Accomplishments:**

(U) Continued development of support software for testing and Federation Object Model (FOM) development; incorporated modification to legacy systems to interoperate through the HLA; completed competitive procurement process for Runtime Infrastructure (RTI) software; continued development, integration, test and standardization; began HLA compliance testing and simulation certification. (\$ 27.428 Million)

(U) Integrated operational Conceptual Models of the Mission Space (CMMS) into M&S Resource Repository (MSRR); continued to integrate Component knowledge acquisition projects into CMMS; provided CMMS Toolset products to support campaign-level analysis and training related knowledge acquisition by integrating the Joint Simulation System (JSIMS), Joint Warfare System (JWARS), National Air and Space (Warfare) Model (NASM), Warfighters' Simulation 2000 (WARSIM 2000), and JSIMS Maritime knowledge acquisition products into the CMMS Library; conducted CMMS evaluation experiments to establish scope, priority, and compatibility of acquisition and operational test and evaluation related CMMS requirements for subsequent inclusion in the CMMS Toolset; continued to develop security policies for the CMMS Library. (\$ 2.890 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Joint Wargaming Simulation Management Office PE 0603832D8Z	

(U) Completed initial build of HLA related data standards and the associated Object Model Data Dictionary System (OMDDS) and made them available through the internet; completed the identification and designation of an additional 500 Authoritative Data Sources (ADS) and structured the ADS database for formal life-cycle maintenance; began development of a registration template as a specification for identifying, registering, and assessing data products; demonstrated distributed data quality guidelines, tools, and utilities; established CSS and associated DIFs for HLA OMDD, Order of Battle (OB), and Synthetic Environments (through the Synthetic Environment Data Representations Interchange Specification (SEDRIS)); began integration of end-user data verification and validation (V&V) guidelines into the Model and Simulation Verification, Validation, and Accreditation (VV&A) RPG; began development of data producer Data Quality Assurance Guidelines; completed development and initial deployment of the Data Verification Interactive Editor (DAVIE) data quality tool; continued development of data standards for the authoritative representation of the natural environment, units and systems with a focus on the SEDRIS for the natural environment; obtained IEEE approval of the IDEF1X97 modeling language; conducted a formal comparison of IDEF1X97, UML, and STEP to specify complex data; executed the mission of Functional Data Administration for M&S in accordance with DoD 8320.1. (\$ 4.200 Million)

(U) Completed initial development of a weather scenario generation capability for use by simulation developers and exercise planners in specifying consistent and correlated scenarios to achieve analysis, testing, and training simulation evaluation objectives; established the initial operational criteria for the MEL and rehosted its access site from research laboratory to the M&S Operational Support Activity; developed the software capability for access to resources over the SIPRNet; keywords redefined and metadata descriptions reworked for improved system performance and interface with other MSRR Libraries. (\$ 12.500 Million)

(U) Completed National Research Council report on modeling human and organizational behavior which outlined future investments in this critical area. (\$ 1 Million)

(U) Initiated Phase 1 of the VV&A Recommended Practices Guide revision; produced draft guide for the program manager and developed foundation for a guide for the VV&A practitioner; integrated the concepts of M&S and end-user data V&V (referred to as VV&A and VV&C); developed first-order VV&A history templates as well as templates which capture information related to producer quality assurance activities. (\$ 1.300 Million)

(U) Completed development of and developmental testing on the initial MSRR prototype, including necessary research and engineering to operate the same software on both the unclassified Internet and classified SIPRNet in conformance with current security guidance; software released three times, which included independent developmental and operational testing associated with each release; completed system engineering associated with installation of the initial prototype at the Modeling and Simulation Operational Support Activity (MSOSA); trained the registrar and established help desk functions. (\$ 4.740 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
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(U) Assessed Modeling and Simulation Operational Support Activity (MSOSA) performance and adjusted structure and procedures to meet evolving user needs, including access to planning tools and other modeling and simulation assets; upgraded MSOSA operational support system to incorporate current developments in electronic information research and network technologies. (\$ 3.500 Million)

(U) Expanded awareness of DoD's M&S initiatives worldwide through full participation in major M&S conferences, and support for 12 related technical conferences and seminars; developed greater visibility throughout DoD and the M&S industry via an aggressive web-based public affairs/outreach program; assisted NATO partners established US-like M&S standards, procedures, and policies. (\$ 1.200 Million)

(U) Finalized DoD-wide M&S education and training plan; conducted first formal DoD-level M&S education courses with the execution of 10 iterations of the M&S Staff Officers Course; expanded M&S formal courses of instruction with the development of the Executive-level Course, the Program Managers Course, and an M&S primer course; conducted technical seminars, workshops and symposia on M&S; inserted M&S technology into major joint warfighter exercises. (\$ 1.300 Million)

(U) **FY1999 Plans:**

(U) Continue development of HLA technology, prototypes of enhanced capabilities and applications of advanced technology; expand 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; design, develop and prototype the 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. (\$ 26.200 Million)

(U) Develop and deliver the third and fourth operational builds of the CMMS Toolset to support integration and exchange of simulation implementation-independent functional descriptions of military operations and tasks; focus 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 will be demonstrated by direct collaboration with JWARS and JSIMS Enterprise simulation developers and with HLA transition efforts; CMMS Toolset will be extended to support engineering and engagement level of detail required in acquisition and operational test and evaluation applications; experiments will be conducted to establish 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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Joint Wargaming Simulation Management Office PE 0603832D8Z	

(U) Continue development of HLA related data standards and associated OMDD efforts; develop and deliver the first and second operational builds of the OB data access Toolset; provide 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; extend the registration template to support additional repository requirements and security and release policies and procedures; develop and coordinate producer Data Quality Assurance guidelines; distribute/install Data Quality tools at additional DoD locations; begin CSS, associated DIFs, and data standards development for targets/facilities information; continue to nominate and obtain final standards approval for other M&S data elements for inclusion in the DoD Data Dictionary System (DDDS); provide Functional Data Administration for M&S in accordance with DoDD 8320.1. (\$ 2.500 Million)

(U) Complete interchange mechanism full definition and expand technology insertion efforts to further develop test capabilities; expand software tools for SEDRIS transmittal generation and verification; initiate SEDRIS standardization through established standards organizations both nationally and internationally; evaluate sources and document procedures for the use of alternate sources for database generation, to include commercial options; provide 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; initial exploitation of atmospheric scintillation effects in simulations; expand representational resource experiments in high-resolution Simulation Based Acquisition (SB A)-related areas; complete development of a weather scenario generation capability; provide initial procedures for data acquisition through littoral classification and climatological data manipulation; initiate operational capability for MEL with both Internet and SIPRNet capability; complete metadata specification and implementation in access and resource site software; incorporate atmosphere and space models and algorithms catalog, and expand resource availability across the MEL system. (\$ 10.518 Million)

(U) Continue extension of conceptual model of mission space technical framework to human and organizational behavior; examine limits of SEDRIS data model for human behavior; establish Special Interest Area on the World Wide Web. (\$ 1.500 Million)

(U) Transition VV&A guidance from the theoretical to the application level; develop V&V methodology as it applies to federations, SBA, Analysis of Alternatives, and new development efforts (e.g., JWARS and JSIMS); support VV&A advancement through information exchange (VV&A history templates) and curriculum development; define VV&A tool concepts. (\$ 3.000 Million)

(U) Modify and enhance MSRR common, physical and software infra structure based on network and database state-of-art and user requirements, including federation with other repositories, to form a collaborative, distributed repository system; continue documentation of MSRR; continue 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.; initiate transition to appropriate agency; modify software based on user requirements.(\$ 4.200 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
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(U) Continue MSOSA operations providing one-on-one assistance/education to the M&S community while transitioning to the new Modeling and Simulation Information Analysis Center (MSIAC) organization.(\$ 4.500 Million)

(U) Continue emphasis on outreach activities to include expanded M&S conference support and web-based public affairs activities. (\$ 1.400 Million)

(U) Institute development of fully interactive user, staff officer, manager and executive level courses that address training, acquisition and analysis domains; conduct technical seminars, workshops and symposia; develop, field and populate web-based electronic libraries to make all M&S course of instruction immediately available to the M&S community; widely disseminate M&S formal instruction through production and distribution of videos and CD-ROMS; insert M&S technology into major joint warfighter exercises; refine and enhance 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. (\$ 26.897 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. (\$ 3.360 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Joint Wargaming Simulation Management Office PE 0603832D8Z	

(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. (\$ 6.900 Million)

(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. (\$ 12.900 Million)

(U) Initiate recommended practices guide for enhancing simulations with human and organizational behavior representations; continue special interest area in human behavior. (\$ 1.400 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. (\$ 2.900 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. (\$ 4.400 Million)

(U) Initiate transition from MSOSA to MSIAC. MSIAC will operate under yearly core-level of funding. (\$ 4.700 Million)

(U) Continue emphasis on outreach activities to include expanded M&S conference support and web-based public affairs activities. (\$ 1.500 Million)

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(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. (\$ 3.500 Million)

(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. (\$ 26.167 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. (\$ 3.200 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 DDDS; assess Data Security requirements for on-going M&S efforts; provide Functional Data Administration for M&S in accordance with DoDD 8320.1. (\$ 6.700 Million)

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(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. (\$ 1300 Million)

(U) Initiate the development of technologies and tools to support incorporation of authoritative representations of human and organizational behavior into DoD simulations. (\$ 1.300 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. (\$ 2.841 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.(\$ 4.600 Million)

(U) Complete transition from MSOSA to MSIAC; MSIAC will operate under yearly core-level of funding.(\$ 4.843 Million)

(U) Continue emphasis on outreach activities to include expanded M&S conference support and web-based public affairs activities. (\$ 1.600 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.(\$ 4.00 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3		<b>R-1 ITEM NOMENCLATURE</b> Joint Wargaming Simulation Management Office PE 0603832D8Z

<b>(U) B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	61.46	70.696	69.636	69.484	Continuing
Appropriated Value	64.338	61.496	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	-4.069	-0.977			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	-0.32	-0.266	
c. Other	-0.21	0	-1.5	-1.5	
Current Presidents Budget	60.059	60.518	68.456	68.25	Continuing

**Change Summary Explanation:** Funding changes are due to congressional undistributed reductions and inflation adjustments.

- (U) Funding:** Funding changes are the result of below threshold program adjustments and revisions in inflation projections.
- (U) Schedule:** N/A
- (U) Technical:** Funding changes are the result of below threshold program adjustments and revisions in inflation projections.
- (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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>							<b>DATE</b> February 1999			
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3							<b>R-1 ITEM NOMENCLATURE</b> Nuclear Matters PE 0605160D8Z			
<i>COST(In Millions)</i>	FY 1998	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	1.495	1.493	1.492	1.490	1.489	1.487	Continuing	Continuing
Nuclear Matters/P476	0	0	1.495	1.493	1.492	1.490	1.489	1.487	Continuing	Continuing

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

(U)     **BRIEF DESCRIPTION OF ELEMENT**

(U)     The Nuclear Matters (NM) program has been established in PE0605160D8Z. 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. NM provides technical policy guidance to senior OSD leadership on complex and demanding issues pertaining to nuclear stockpile sustainment. The office works closely with 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.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3								<b>R-1 ITEM NOMENCLATURE</b> Nuclear Matters PE 0605160D8Z		

<i>COST(In Millions)</i>	FY 1998	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	1.495	1.493	1.492	1.490	1.489	1.487	Continuing	Continuing
Nuclear Matters/P476	0	0	1.495	1.493	1.492	1.490	1.489	1.487	Continuing	Continuing

(U) **Project Number and Title: P476 Nuclear Matters**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY2000 Plans:**

(U) Analyses are 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. Analyses and assessments providing guidance for preparation of the annual Nuclear Weapons Stockpile Memorandum, Long Range Planning Assessment to the President, NWC Chairman's Annual Report to Congress, and NWC Standing and Safety Committee actions. Products provide basis for technical policy recommendations to the President, Secretary of Defense, and Chairman of the Nuclear Weapons Council. (\$ 0.575 Million)

(U) **Nuclear Weapons Council (NWC) Support:**

(U) Provide support to the NWC staff and members via products on technical issues concerning the evolution of the nuclear weapons complex and infrastructure. Analyses support development of agenda items for the NWC. (\$ 0.350 Million)

(U) **Maintaining the Deterrent Infrastructure:**

(U) Provide analyses on sustaining nuclear weapons safety, use control, survivability, certification, transportation, and reliability. These efforts support DoD oversight of such DOE stockpile stewardship activities as: nuclear weapon sustainment and revalidation, development of an assured tritium supply, life extension programs, and stockpile stewardship and maintenance.(\$ 0.350 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Nuclear Matters PE 0605160D8Z	

**(U) Policy Support and Guidance for International Obligations:**

(U) Provide oversight and guidance to activities and organizations such as the NATO Senior Level Weapons Protection Group, the Joint Theater Surety Management Group, and Congressionally approved technical exchanges with foreign nations. (\$ 0.22 Million)

**(U) FY2001 Plans:**

**(U) Recurring Obligations and Requirements Development**

(U) Analyses are 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. Analyses and assessments providing guidance for preparation of the annual Nuclear Weapons Stockpile Memorandum, Long Range Planning Assessment to the President, NWC Chairman's Annual Report to Congress, and NWC Standing and Safety Committee actions. Products provide basis for technical policy recommendations to the President, Secretary of Defense, and Chairman of the Nuclear Weapons Council. (\$ 0.573 Million)

**(U) Nuclear Weapons Council (NWC) Support:**

(U) Provide support to the NWC staff and members via products on technical issues concerning the evolution of the nuclear weapons complex and infrastructure. Analyses support development of agenda items for the NWC. (\$ 0.35 Million)

**(U) Maintaining the Deterrent Infrastructure:**

(U) Provide analyses on sustaining nuclear weapons safety, use control, survivability, certification, transportation, and reliability. These efforts support DoD oversight of such DOE stockpile stewardship activities as: nuclear weapon sustainment and revalidation, development of an assured tritium supply, life extension programs, and stockpile stewardship and maintenance. (\$ 0.350 Million)

**(U) Policy Support and Guidance for Internati onal Obligations:**

(U) Provide oversight and guidance to activities and orga nizations such as the NATO Senior Level Weapons Protection Group, the Joint Theater Surety Management Group, and Congressionally approved technical exchanges with foreign nations. (\$ 0.220 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3	<b>R-1 ITEM NOMENCLATURE</b> Nuclear Matters PE 0605160D8Z	

<b>(U) B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	0	0	0	0	Continuing
Appropriated Value	0	0	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	0	0	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	0	0	
c. Other	0	0	1.495	1.493	
Current Presidents Budget	0	0	1.495	1.493	Continuing

**Change Summary Explanation:** Funding changes are due to budget decisions.

**(U) Funding:** When it was first created, the Nuclear Matters funding line was placed under the Counterproliferation Program for administrative purposes. Under the Defense Reform Initiative (DRI), the Counterproliferation program and its funding line is being moved to the Defense Threat Reduction Agency while the office of Nuclear Matters will report to the Director, Defense Research and Engineering. Therefore, funds for Nuclear Matters will be transferred from PE0605160D8Z to PE0605160BR in FY99. Beginning in FY00, the Nuclear Matters Program will be funded in PE0605160D8Z.

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

**(U) Technical:** When it was first created, the Nuclear Matters funding line was placed under the Counterproliferation Program for administrative purposes. Under the Defense Reform Initiative (DRI), the Counterproliferation program and its funding line is being moved to the Defense Threat Reduction Agency while the office of Nuclear Matters will report to the Director, Defense Research and Engineering. Therefore, funds for Nuclear Matters will be transferred from PE0605160D8Z to PE0605160BR in FY99. Beginning in FY00, the Nuclear Matters Program will be funded in PE0605160D8Z.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 3		<b>R-1 ITEM NOMENCLATURE</b> Nuclear Matters PE 0605160D8Z

- (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 1999	
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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	17.801	25.465	37.107	36.201	36.383	36.729	37.370	38.029	CONTINUING	CONTINUING
Force Protection COTS	1.624	6.065	15.607	14.201						
Tactical Automated Security	1.320	2.300	2.560	1.875						
Weapon Storage Area	2.068	2.400	2.665	3.525						
MDARS-I	2.201									
MDARS-E	1.903	5.500	4.890	5.590						
WSS	1.800	1.800	1.950	1.650						
EDE	0.300	0.900	1.250	1.750						
SPS	0.900	1.200	1.350	1.150						
Locks, Safes, Vaults	1.300	1.100	1.450	1.450						

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. 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 nuclear weapons, tactical and nuclear weapons systems, DoD personnel and DoD weapon systems. Funding for critical RDT&E security improvements within service channels has fluctuated widely over the years and prompted the consolidation of the Services and former Defense Special Weapons Agency (DSWA) PSE RDT&E funds into this single OSD controlled program element. This program was originally formed by the Congressional consolidation of the three Services and the former DSWA RDT&E PSE budget submissions for FY 1989. 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 monitor, direct, and prioritize potential and existing PSE programs. With few exceptions, each Service sponsors RDT&E efforts for technologies and programs, which have multi-service applications. In several cases, applications are unique to only one service. 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 equipment. Concerns regarding the protection of DoD weapon systems acquisition information at DoD

**Exhibit R-2, RDT&E Budget Item Justification**

Date:

February 1999

RDT&E facilities has led to an expanded role for this Program Element since FY 1995. 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 bombing incident. The FP COTS testing applies to all available technologies, which are considered effective for DoD use.

## OTHER PROGRAMS

(U) FY 1998 Accomplishments

DELAY-DENIAL (SABER 203) (1.100 million)

- Conduct Saber 203 Initial Operational Test & Evaluation
- Continue Hindering Adversaries with Less-than lethal Technology (HALT) Technological demonstration project
- Conduct detailed design review and demonstration for potential Military/Civilian users

HIGH VALUE ITEM SECURITY (HVISS) PHASE II (RFID) (0.050 million)

- Prepared/released RFID Broad Area Announcement (BAA) for FY99 award
- Continued Concept Exploration

PLATOON EARLY WARNING DEVICE II (PEWD II) (0.435 million)

- Initiated market investigation
- Evaluated candidate NDI/COTS Systems including Air Force TASS to determine requirement shortfalls

TECHNOLOGY BASE (2.800 million)

- Completed and demonstrated prototype hardware for the Advanced Exterior Sensor project, the Millimeter Wave Data Link (Exterior), and the Wireless and Self-Powering Sensor. In addition, continued work on the improved laser diode, miniaturized radio frequency tag, underwater security vehicle with acoustic guidance, sonic denial systems, and an acoustic detection and classification sensor.

(U) FY 1999 Plans

DELAY-DENIAL (SABER 203) (0.500 million)

- Transition SABER 203 to Hinder Adversaries with less than Lethal Technology (HALT) Eye Safe at the Aperture (ESATA)
- Transition Laser Diode Improvements Program from DTRA to USAF

**Exhibit R-2, RDT&E Budget Item Justification**

Date:

February 1999

HIGH VALUE ITEM SECURITY SYSTEM (HVISS) PHASE II (RFID) (0.200 million)

- Prepare/release RFID BAA proposal
- Prepare BTA
- Award BAA

ELECTRONIC TRIP FLARE (0.200 million)

- Conduct MS/MI
- Conduct Concept Exploration
- Prepare/release BAA proposal

PLATOON EARLY WARNING DEVICE II (PEWD II) (0.300 million)

- Complete Market Investigation/TASS determination
- Conduct Technical Feasibility Testing
- Develop Program Management Plan

TECHNOLOGY BASE (3.000 million)

- Complete and demonstrate prototype hardware for the improved laser diode, miniaturized radio frequency tags, the underwater security vehicle with acoustic guidance and the acoustic detection and classification sensor systems. In addition, continue the detection on the move project, the millimeter wave data link (interior), the sonic denial project, and the photoneutron probe for the detection of explosives and nuclear material. If funding is available, initiate a project for the fluorescence detection of explosives, a targeting classifying sensor, and develop a force protection sensor selector.

(U) FY 2000 Plans

DELAY-DENIAL (HINDER ADVERSARIES WITH LESS THAN LETHAL TECHNOLOGY [HALT]) (0.775 million)

- Initiate Laser Diode Improvements qualification, demonstration and test program

HIGH-VALUE ITEM SECURITY SYSTEM (HVISS) PHASE II (RFID) (0.260 million)

- Prepare COEA
- Conduct Technical Feasibility Testing

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification</b>	Date: February 1999
<p>ELECTRONIC TRIP FLARE (0.850 million)</p> <ul style="list-style-type: none"><li>• Prepare/release BAA</li><li>• Develop draft Specification and RFP components for EMD/Production Contract</li><li>• Conduct Technical Feasibility Testing</li></ul> <p>PLATOON EARLY WARNING DEVICE II (PEWD II) (0.500 million)</p> <ul style="list-style-type: none"><li>• Complete Concept Formulation Package</li><li>• Develop logistics concept</li><li>• Develop RFP</li><li>• Develop Milestone I/II IPR Package</li></ul> <p>TECHNOLOGY BASE (3.000 million)</p> <ul style="list-style-type: none"><li>• Continue the fluorescence detection of explosives project, the Intruder Detection System from an external robotics platform and complete the development of a force protection sensor selector. In addition, initiate projects to evaluate the capability to improve the situational awareness of security personnel through coordinated task execution with robotic sensor systems, improve video motion detection for tactical surveillance sensors, a portable vehicle explosion detection system, as well as a remote explosive detection system.</li></ul> <p>(U) <u>FY 2001 Plans</u></p> <p>DELAY-DENIAL (HINDER ADVERSARIES WITH LESS THAN LETHAL TECHNOLOGY [HALT]) (0.600 million)</p> <ul style="list-style-type: none"><li>• Transition Laser Countermeasures Study from DTRA and establish EMD program</li></ul> <p>HIGH-VALUE ITEM SECURITY SYSTEM (HVISS) PHASE II (RFID) (0.160 million)</p> <ul style="list-style-type: none"><li>• Conduct Milestone I/II In-Process Review</li><li>• Release EMD RFP, conduct EMD Source Selection</li></ul> <p>ELECTRONIC TRIP FLARE (0.750 million)</p> <ul style="list-style-type: none"><li>• Conduct MS I/II In-Process Review</li><li>• Release EMD RFP, conduct EMD Source Selection</li><li>• Conduct Technical Feasibility Testing</li></ul> <p>PLATOON EARLY WARNING DEVICE II (PEWD II) (0.500 million)</p> <ul style="list-style-type: none"><li>• Conduct MS I/II In-Process Review</li><li>• Release EMD RFP, conduct EMD Source Selection</li></ul>	

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Exhibit R-2, RDT&E Budget Item Justification					Date:			
<ul style="list-style-type: none"> <li>Conduct Technical Feasibility Testing</li> </ul>					February 1999			
TECHNOLOGY BASE (3.000 million)								
<ul style="list-style-type: none"> <li>Continue to manage projects under the Security Concepts Development, Advanced Sensors, Mobile Platforms, Advanced Storage and Transportation and Waterside Security programs as defined by the Services. Evaluate Commercial-off-the-shelf (COTS) equipment, to determine the potential to meet the needs of the Services.</li> </ul>								
B. <u>Program Change Summary</u> (\$ million)								
	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>			
Previous President's Budget	17.939	31.792	31.727	30.814	Continuing			
Appropriated Value								
Adjustments to Appropriated Value								
a. Congressionally Directed Appropriation Reduction								
b. Congressionally Directed Undistributed Reduction								
c. OSD Directed Undistributed Reduction	(0.138)	(6.327)	(0.620)	(0.613)				
Current Budget Submit/President's Budget	17.801	25.465	37.107	36.201	Continuing			
Change Summary Explanation:								
Funding:	N/A							
Schedule:	N/A							
Technical:	N/A							
C. <u>Other Program Funding Summary</u>								
	<u>FY1998</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	0.300	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> Delay-Denial (SABER 203) and Hinder Adversaries with less than Lethal Technology (HALT) will utilize existing DoD or DOE contract vehicles								

Exhibit R-2, RDT&E Budget Item Justification		Date: February 1999			
E. <u>Schedule Profile</u>					
Fiscal Year actual and planned events:					
	FY1998	FY1999	FY2000	FY2001	
<b>Acquisition Milestones</b>					
SABER 203		MS III			
HALT		MS II	MSIII		
HVISS				MSI/II	
PEWD II				MSI/II	
ETF				MSI/II	
<b>Engineering Milestones</b>					
N/A					
<b>T&amp;E Milestones</b>					
SABER 203	IOT&E				
HALT		QT&E			
HVISS			TFT		
PEWD II				TFT	
ETF				TFT	
<b>Contract Milestones</b>					
HVISS		BAA Awd			
ETF			BAA Awd		

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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			FORCE PROTECTION (FP) COTS EQUIPMENT EVALUATION AND INTEGRATION					
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost	
FP COTS	1.624	6.065	15.607	14.201					CONT	CONT	
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 security, aircraft flight lines, personnel facilities and resource protection. 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 and non-lethal defensive capability. Planned testing will be accomplished at the established DoD Test Facility at Eglin AFB FL.</p> <p>(U) <u>FY 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• Published User's Guide of Commercially available Non Developmental Items for Force Protection uses</li> <li>• Updated methodology and published evaluation and test schedule for FY 1999</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• Perform scheduled FY 1999 test and evaluations of selected COTS equipment/systems</li> <li>• Conduct Force Protection Equipment Demonstration (3-6 May, 1999 at MCB Quantico, VA)</li> <li>• Publish appropriate reports</li> <li>• Update a User's Guide of Commercially available Non Developmental Items for Force Protection uses</li> <li>• Update methodology and publish test and evaluation schedule for FY 2000</li> </ul> <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> <li>• Perform scheduled FY 2000 test and evaluations of selected COTS equipment/systems</li> <li>• Publish appropriate reports.</li> </ul>											

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	Date: February 1999					
<ul style="list-style-type: none"><li>• Update the User's Guide of Commercially available Non Developmental Items for Force Protection uses</li><li>• Update methodology and publish test and evaluation schedule for FY 2001</li></ul> <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"><li>• Perform scheduled FY 2001 test and evaluations of selected COTS equipment/systems</li><li>• Conduct Force Protection Equipment Demonstration</li><li>• Publish appropriate reports</li><li>• Update the User's Guide of Commercially available Non Developmental Items for Force Protection uses</li><li>• Update methodology and publish test and evaluation schedule for FY 2002</li></ul> <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 border="0"><tr><td></td><td>FY 1998</td><td>FY 1999</td><td>FY 2000</td><td>FY2001</td></tr></table> <p><b>Acquisition Milestones</b></p> <p><b>Engineering Milestones</b></p> <p><b>T&amp;E Milestones</b></p> <p><b>Contract Milestones</b></p>			FY 1998	FY 1999	FY 2000	FY2001
	FY 1998	FY 1999	FY 2000	FY2001		

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Exhibit R-3 Cost Analysis (page 1)										Date: February 1999		
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						2.900		2.900				
Ancillary Hardware Development						0.500		0.500				
Systems Engineering						0.400		0.400				
Licenses												
Tooling												
GFE						0.250		0.250				
Award Fees												
Subtotal Product Development						4.050		4.050		CONT	CONT	
Remarks:												
Development Support						0.250		0.250				
Software Development												
Training Development						0.250		0.250				
Integrated Logistics Support												
Configuration Management						0.050		0.050				
Technical Data						0.150		0.150				
GFE												
Subtotal Support						0.700		0.700		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)									Date: February 1999			
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				1.353		1.250		1.250				
Operational Test & Evaluation			1.366	3.500		8.532		7.217				
Tooling												
GFE												
Subtotal T&E			1.366	4.853		9.782		8.467		CONT	CONT	
Remarks												
Contractor Engineering Support			0.158	0.804		0.685		0.616				
Government Engineering Support			0.080	0.348		0.340		0.318				
Program Management Support												
Program Management Personnel												
Travel			0.020	0.060		0.050		0.050				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.258	1.212		1.075		0.984		CONT	CONT	
Remarks												
Total Cost			1.624	6.065	[1]	15.607	[1]	14.201	[1]			
Remarks [1] On going program to demonstrate and document availability of COTS equipment for force protection missions												

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			TACTICAL AUTOMATED SECURITY SYSTEM (TASS)					
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost	
TASS	1.320	2.300	2.560	1.875					CONT	CONT	
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 day/night all weather Thermal Imaging systems. A Common Operational Picture/Common Tactical Picture (COP/CTP) system to support commanders at all levels from a local site or base through to the regional Area Of Responsibility will be developed to provide an expanded command and control capability.</p> <p>(U) <u>FY 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• Prepared System for FOT&amp;E</li> <li>• Completed site surveys for Korean Deployments</li> <li>• Evaluated four new sensors for TASS applications</li> <li>• Developed concept for TASS application for Force Protector/Force Provider Exercise</li> <li>• Briefed TASS program to the Army - issued delivery orders Army (ARCENT Kuwait) equipment</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• Perform Technology Enhancement ECP's, investigate and integrate potential Army/Industry chemical biological detectors for TASS</li> <li>• Develop and demonstrate a Common Operation, Common Tactical Picture (COP/CTP) basic capability system integrating mapping and TASS input</li> </ul> <p>(U) <u>FY 2000 Plans</u></p>											

Exhibit R-2a, RDT&E Project Justification									Date:		
									February 1999		
<ul style="list-style-type: none"> <li>• Commence DII/COE compliance evaluation for future TASS equipment.</li> <li>• Continue integration of new detection and surveillance equipment.</li> <li>• COP/CTP - Integrate and demonstrate multi-level security investigation and Sensor Guard Intel work station.</li> <li>• Investigate JWARN and Portal Shield interoperability.</li> <li>• Begin Redundant Annunciate Priority A (Nuclear) capability implementation</li> <li>• Investigate Micro-Sensor Technology integration studies</li> <li>• Transition from DTRA and initiate Passive Millimeter Wave Sensor EMD effort</li> </ul>											
(U) <u>FY 2001 Plans</u>											
<ul style="list-style-type: none"> <li>• Begin Micro-Sensor EMD project</li> <li>• COP/CTP - Develop interface with JWARN system. Incorporate analyst support and vulnerability assessment tools and base status cell capability.</li> <li>• Complete Passive Millimeter Wave Sensor (PMWS) EMD effort</li> </ul>											
B. Other Program Funding Summary											
		<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	To <u>Complete</u>	Total <u>Cost</u>
Procurement		11.650	15.500	21.300	20.600	11.700	10.000	8.500	8.500	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:											
		FY1998	FY1999	FY2000	FY2001						
- FOT&E		■									
- P3I			■								
- COP/CTP (Basic)			■								
- DII/COE Certification				■							
- COP/CTP (Upgrade I)				■							
- Redundant Annunciator Integration				■							
- Micro-Sensor Integration					■						
- COP/CTP (Upgrade II)						■					
- PMWS EMD							■				

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	Date: February 1999
<p>Acquisition Milestones</p> <p>Engineering Milestones</p> <p>T&amp;E Milestones</p> <p>Contract Milestones</p>	

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
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	HQ/ESC Hanscom	0.231	0.625	2/99	0.278	12/99	0.268	1/01			
Ancillary Hardware Development	CPFF	HQ/ESC	0.020	0.080	2/99	0.082	12/99	0.027	1/01			
Systems Engineering	CPFF	HQ/ESC	0.254	0.327	[1]	0.408	[1]	0.363	[1]			
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.505	1.032		0.768		0.658		CONT	CONT	
Remarks: [1] Numerous delivery orders awarded throughout the fiscal year												
Development Support	CPFF	HQ/ESC	0.211	0.235	11/98	0.330	11/99	0.228	11/00			
Software Development	CPFF	HQ/ESC	0.013	0.142	12/98	0.246	12/99	0.159	11/00			
Training Development	CPFF	HQ/ESC	0.026	0.017	1/99	0.033	2/00	0.027	11/00			
Integrated Logistics Support	CPFF	HQ/ESC	0.028	0.024	11/98	0.033	11/99	0.023	11/00			
Configuration Management	CPFF	HQ/ESC	0.022	0.031	11/98	0.040	11/99	0.021	11/00			
Technical Data	CPFF	HQ/ESC	0.013	0.017	11/98	0.022	11/99	0.023	11/00			
GFE												
Subtotal Support			0.313	0.466		0.704		0.481		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 1999		
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
Developmental Test & Evaluation	AFMC	Eglin AFB	0.087	0.169	12/98	0.265	12/99	0.245	12/00			
Operational Test & Evaluation	AFTEC	Eglin AFB	0.073	0.081	12/98	0.066	12/99	0.028	12/00			
Tooling												
GFE												
Subtotal T&E			0.160	0.250		0.331		0.273		CONT	CONT	
Remarks												
Contractor Engineering Support	FFP/DO	HQ/ESC	0.185	0.380	[2]	0.536	[2]	0.277	[2]			
Government Engineering Support	MIPR	DOE SNL	0.048	0.046	1/99	0.057	1/00	0.066	1/01			
Program Management Support	PO	HQ/ESC	0.066	0.095	[2]	0.124	[2]	0.089	[2]			
Program Management Personnel												
Travel		HQ/ESC	0.043	0.031	[2]	0.040	[2]	0.031	[2]			
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.342	0.552		0.757		0.463		CONT	CONT	
Remarks [2] Various documents and award dates throughout the year												
Total Cost			1.320	2.300		2.560		1.875				
Remarks												

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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
WSA	2.068	2.400	2.665	3.525					CONT	CONT
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 employment of Advanced Entry Control Systems (AECS) for automatic access control and command and control of WSA intrusion detection and surveillance equipment. Develop the all weather Advanced Exterior Sensor (AES) for a wide area detection and surveillance capability. Integrate and deploy suitable commercial exterior Video Motion Detection (VMD) systems for WSA applications.</p> <p>(U) <u>FY 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• Initiate project to incorporate Video Storage capability into the IDS mission of AECS</li> <li>• Conduct AES proof-of concept demonstration (May 98)</li> <li>• Commence AES Risk Reduction phase planning</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• Initiate requirements analysis and market survey for the Base Gate Access Control System (BGACS)</li> <li>• AES - Initiate Risk Reduction Phase</li> <li>• Evaluate commercial systems for wide area detection and surveillance (WADS)</li> <li>• Initiate VMD integration program</li> </ul> <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> <li>• Develop BGACS Architecture, purchase, integrate Demo System</li> <li>• Continue AES Risk Reduction Phase and demonstrate prototype</li> </ul> <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> <li>• BGACS Demonstration and start field trial</li> <li>• Initiate AES EMD Phase</li> </ul>										

Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
(U) <u>FY 2001 Plans</u>										
<ul style="list-style-type: none"> <li>• BGACS Demonstration and start field trial</li> <li>• Initiate AES EMD Phase</li> </ul>										
B. Other Program Funding Summary										
	<u>1998</u>	<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	1.361	4.900	3.500	4.000	5.100	7.000	6.000	6.000	TBD	TBD
C. Acquisition Strategy: Utilize existing DoD or DoE contract vehicles										
D. Schedule Profile:										
Fiscal Year actual and planned events:										
	FY1998	FY1999	FY2000	FY2001						
- Initiate VMD Eval	■									
- Integrate VMD		■								
- AES Risk Reduction Phase		■	■							
- AES EMD Phase				■	■					
- WADS COTS Evaluation				■	■					
- Design BGACS		■								
- Build and Demo BGACS			■							
- BGACS Field Trial				■	■					
Acquisition Milestones										
Engineering Milestones										
T&E Milestones										
Contract Milestones										

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Exhibit R-3 Cost Analysis (page 1)										Date: February 1999		
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
Primary Hardware Development	CPFF	HQ/ESC Hanscom	0.363	0.382	2/99	0.209	12/99	0.366	1/01			
Ancillary Hardware Development	CPFF	HQ/ESC	0.029	0.105	2/99	0.063	12/99	0.043	1/01			
Systems Engineering	CPFF	HQ/ESC	0.400	0.378	[1]	0.482	[1]	0.493	[1]			
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.792	0.865		0.754		0.902		CONT	CONT	
Remarks: [1] Numerous delivery orders awarded throughout the fiscal year												
Development Support	CPFF	HQ/ESC	0.330	0.290	11/98	0.246	11/99	0.318	11/00			
Software Development	CPFF	HQ/ESC	0.115	0.164	12/98	0.189	12/99	0.199	11/00			
Training Development	CPFF	HQ/ESC	0.046	0.021	1/99	0.026	2/00	0.043	11/00			
Integrated Logistics Support	CPFF	HQ/ESC	0.039	0.032	11/98	0.026	11/99	0.035	11/00			
Configuration Management	CPFF	HQ/ESC	0.037	0.042	11/98	0.032	11/99	0.026	11/00			
Technical Data	CPFF	HQ/ESC	0.023	0.015	11/98	0.013	11/99	0.035	11/00			
GFE												
Subtotal Support			0.590	0.564		0.532		0.656		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)									Date: February 1999			
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	0.138	0.209	12/98	0.210	12/99	0.324	12/00			
Operational Test & Evaluation	AFTEC	Eglin AFB	0.114	0.145	12/98	0.127	12/99	0.220	12/00			
Tooling												
GFE												
Subtotal T&E			0.252	0.354		0.337		0.544		CONT	CONT	
Remarks												
Contractor Engineering Support	FFP/DO	HQ/ESC	0.295	0.200	[2]	0.391	[2]	0.545	[2]			
Government Engineering Support	MIPR	DOE SNL	0.076	0.250	1/99	0.514	1/00	0.630	1/01			
Program Management Support	PO	HQ/ESC	0.021	0.146	[2]	0.095	[2]	0.195	[2]			
Program Management Personnel												
Travel		HQ/ESC	0.042	0.021	[2]	0.042	[2]	0.053	[2]			
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.434	0.617		1.042		1.423		CONT	CONT	
Remarks [2] Various documents and award dates throughout the year												
Total Cost			2.068	2.400		2.665		3.525				
Remarks												

Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
MDARS-E	1.903	5.500	4.890	5.590					CONT	CONT
RDT&E Articles Qty										
<p>A. <u>Mission Description and Budget Item Justification.</u> The Mobile Detection Assessment Response System - Exterior (MDARS-E) is intended to support the physical security of 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 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• Initiated development of Command and Control Capabilities for MDARS-E Vehicle into the MDARS Console (MRHA)</li> <li>• Completed second design iteration and prototype the Integrated Lock Device (ILD)</li> <li>• Install ILD at MDARS-E Final Demonstration</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• Prepare Test TFT Plans/Test Procedures</li> <li>• Conduct Developmental Testing</li> <li>• Update MS I/II IPR Documentation</li> <li>• Conduct final demonstration of Broad Area Announcement (BAA) contract MDARS-E system capabilities</li> </ul> <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> <li>• Conduct Technical Feasibility Testing (TFT)</li> <li>• Conduct System Functional Review</li> <li>• Conduct Milestone I/II In-Process Review</li> <li>• Prepare/release EMD RFP</li> <li>• Conduct EMD Source Selection</li> <li>• Prepare/award EMD contract</li> </ul>										

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 1999			
(U) <u>FY 2001 Plans</u>					
• Conduct Engineering Development					
• Conduct MS III					
B. Other Program Funding Summary					
C. Acquisition Strategy					
D. Schedule Profile:					
Fiscal Year actual and planned events:					
	FY1998	FY1999	FY2000	FY2001	
<b>Acquisition Milestones</b>					
MDARS-E			MSI/II	MSIII	
<b>Engineering Milestones</b>					
<b>T&amp;E Milestones</b>					
MDARS-E			TFT		
<b>Contract Milestones</b>					

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
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			0.650	1.509		2.600		2.661				
Ancillary Hardware Development												
Systems Engineering			0.650	0.500		0.600		0.606				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			1.300	2.009	2/3Q	3.200	2/3Q	3.267	2/3Q	CONT	CONT	
Remarks:												
Development Support			0.106	0.611		0.505		0.528				
Software Development			0.263	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			0.140	0.464		0.337		0.513				
GFE												
Subtotal Support			0.509	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 1999			
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			0.004	0.006		0.006		0.007				
Program Management Personnel			0.080	0.272		0.072		0.068				
Travel			0.010	0.112		0.012		0.014				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.094	0.790	2/3Q	0.090	2/3Q	0.181	2/3Q	CONT	CONT	
Remarks												
Total Cost			1.903	5.500		4.890		5.590				
Remarks												

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Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4			PE 0603228D8Z			WATERSIDE SECURITY SYSTEM (WSS)				
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
WSS	1.800	1.800	1.950	1.650					CONT	CONT
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 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• Supported three Waterside Security System (WSS) sites: SUBASE Bangor, SUBASE Kings Bay and ASU Bahrain</li> <li>• Upgraded WSS systems to PC based architecture (Kings Bay/Bangor)</li> <li>• Coordinated with US Coast Guard on security technology applications for San Diego Bay</li> <li>• Completed development of new Radar Track Processor</li> <li>• Conducted site survey for the installation of a WSS at Portsmouth Naval Ship Yard</li> <li>• Validated transportable system configuration</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• Manage the Waterside Security System and Shipboard Physical Security programs</li> <li>• Support installed WSS hardware at field sites</li> <li>• Transfer the Intrusion Detection Distributed Array (IDDA) from advanced research to the WSS program</li> <li>• Integrate IDDA into the WSS</li> <li>• Establish a website to provide technical information to potential users</li> <li>• Investigate barriers and swimmer nets</li> </ul> <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> <li>• Manage the Waterside Security System and Shipboard Physical Security programs</li> <li>• Test, evaluate and integrate COTS technology, e.g. barriers, underwater cameras</li> </ul>										

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	Date: February 1999																									
<p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"><li>• Test, evaluate COTS technologies for the Waterfront environment</li><li>• Test an integrated WSS, which includes barriers and underwater assessment of potential targets</li><li>• Complete the development of a transportable WSS</li><li>• Manage the Waterside Security System and Shipboard Physical Security programs</li><li>• Support installed WSS hardware at field sites</li></ul> <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile:</p> <p>Fiscal Year actual and planned events:</p> <table><thead><tr><th></th><th>FY1998</th><th>FY1999</th><th>FY2000</th><th>FY2001</th></tr></thead><tbody><tr><td><b>Acquisition Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>Engineering Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>T&amp;E Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>Contract Milestones</b></td><td></td><td></td><td></td><td></td></tr></tbody></table>			FY1998	FY1999	FY2000	FY2001	<b>Acquisition Milestones</b>					<b>Engineering Milestones</b>					<b>T&amp;E Milestones</b>					<b>Contract Milestones</b>				
	FY1998	FY1999	FY2000	FY2001																						
<b>Acquisition Milestones</b>																										
<b>Engineering Milestones</b>																										
<b>T&amp;E Milestones</b>																										
<b>Contract Milestones</b>																										

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Exhibit R-3 Cost Analysis (page 1)								Date: February 1999				
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			0.400	0.400		0.400		0.353				
Ancillary Hardware Development												
Systems Engineering			0.160	0.160		0.172		0.147				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.560	0.560		0.572		0.500		CONT	CONT	
Remarks:												
Development Support			0.060	0.060		0.046		0.029				
Software Development			0.100	0.100		0.114		0.086				
Quality Insurance			0.020	0.020		0.020		0.014				
Integrated Logistics Support			0.050	0.050		0.057		0.046				
Configuration Management			0.085	0.085		0.091		0.070				
Technical Data			0.045	0.045		0.057		0.057				
RAM			0.060	0.060		0.051		0.046				
Subtotal Support			0.420	0.420		0.436		0.348		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 1999		
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			0.190	0.190		0.230		0.177				
Operational Test & Evaluation			0.200	0.200		0.230		0.236				
Tooling												
GFE												
Subtotal T&E			0.390	0.390		0.460		0.413		CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support			0.360	0.360		0.401		0.353				
Program Management Personnel												
Travel			0.070	0.070		0.081		0.036				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.430	0.430		0.482		0.389		CONT	CONT	
Remarks												
Total Cost			1.800	1.800		1.950		1.650				
Remarks												

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Exhibit R-2a, RDT&E Project Justification									Date:		
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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost	
EDE	0.300	0.900	1.250	1.750					CONT	CONT	
RDT&E Articles Qty											

A. Mission Description and Budget Item Justification. Test and evaluate promising commercial-off-the-shelf technologies.

(U) FY 1998 Accomplishments

- Submitted draft Joint Services Operational Requirement (JSOR)
- Developed recommendations for detecting explosives in concrete trucks
- Conducted evaluation of CDS 2002 Mobile Search, remote-sensing device
- Conducted market survey
- Completed long range plans for explosive detection equipment (EDE)
- Wrote EDE health and safety guidance document

(U) FY 1999 Plans

- Develop guidance for selecting EDE for differing operational environments
- Finalize JSOR
- Complete evaluation of equipment Mobile Search vehicle
- Identify promising technologies unique to EDE
- Set up and maintain an information source for explosive detection equipment

(U) FY 2000 Plans

- Transition a highly sensitive and robust detection system for finding explosives in air and water by biochemical signal amplifications
- Conduct product evaluations, as necessary
- Evaluate remote explosive detection equipment
- Conduct an Explosive Detection Symposium

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<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	Date: February 1999																									
<p>(U) FY 2001 Plans</p> <ul style="list-style-type: none"><li>• Provide an Ultra Violet Fluorescence Explosive Detection System</li><li>• Continue product evaluations</li><li>• Publish technical data sheets, guides and information relating to explosive detection equipment</li></ul> <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile:</p> <p>Fiscal Year actual and planned events:</p> <table><thead><tr><th></th><th>FY1998</th><th>FY1999</th><th>FY2000</th><th>FY2001</th></tr></thead><tbody><tr><td><b>Acquisition Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>Engineering Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>T&amp;E Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>Contract Milestones</b></td><td></td><td></td><td></td><td></td></tr></tbody></table>			FY1998	FY1999	FY2000	FY2001	<b>Acquisition Milestones</b>					<b>Engineering Milestones</b>					<b>T&amp;E Milestones</b>					<b>Contract Milestones</b>				
	FY1998	FY1999	FY2000	FY2001																						
<b>Acquisition Milestones</b>																										
<b>Engineering Milestones</b>																										
<b>T&amp;E Milestones</b>																										
<b>Contract Milestones</b>																										

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
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				0.130		0.187		0.465				
Ancillary Hardware Development												
Systems Engineering				0.010		0.037		0.037				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				0.140		0.224		0.502		CONT	CONT	
Remarks:												
Development Support				0.020		0.031		0.030				
Software Development												
Quality Insurance				0.015		0.025		0.058				
Integrated Logistics Support				0.040		0.050		0.053				
Configuration Management				0.010		0.025		0.058				
Technical Data				0.050		0.125		0.350				
RAM				0.010		0.019		0.058				
Subtotal Support				0.145		0.275		0.607		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)									Date: February 1999			
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				0.200		0.376		0.233				
Operational Test & Evaluation				0.150		0.187		0.175				
Tooling												
GFE												
Subtotal T&E				0.350		0.563		0.408		CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support			0.100	0.125		0.063		0.059				
Program Management Personnel												
Travel			0.025	0.100		0.094		0.087				
Labor (Research Personnel)												
Miscellaneous			0.175	0.040		0.031		0.087				
Subtotal Management			0.300	0.265		0.188		0.233		CONT	CONT	
Remarks												
Total Cost			0.300	0.900		1.250		1.750				
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			SHIPBOARD PHYSICAL SECURITY (SPS)					
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost	
SPS	0.900	1.200	1.350	1.150					CONT	CONT	
RDT&E Articles Qty											

A. Mission Description and Budget Item Justification. The Shipboard Physical Security (SPS) program consists of integrated detection sensors, alarms, information displays, security force equipment, and procedures to provide defense in-depth against a wide range of external and internal shipboard threats.

(U) FY 1998 Accomplishments

- Completed phase I and II of the Smart Ship integrated security system project installation
- Completed all Smart Ship installation drawings
- Upgraded the Smart Ship security installation to Windows NT
- Continued the upgrade of the Shipboard mock-up facility at Crane, IN
- Defined minimum security system configuration for each class of ship
- Defined the requirements and identified equipment for an Emergency Security Response Force Team
- Tested and evaluated emerging security related technologies and where applicable, such technologies were integrated into the SPS baseline configuration

(U) FY 1999 Plans

- Merge program management of SPS with Waterside Security System (WSS)
- Continue evaluation of COTS technologies for shipboard applications
- Support plans to install an operational test bed at SUBASE San Diego

(U) FY 2000 Plans

- Continue the evaluation of COTS technologies for shipboard applications
- Support the installation of an operational test bed at SUBASE San Diego
- Support plans to install waterfront physical security hardware at NAVSTA Norfolk and/or SUBASE Norfolk

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	Date: February 1999																									
<p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"><li>• Continue evaluation of COTS technologies for shipboard applications</li><li>• Support operational test bed at SUBASE San Diego</li><li>• Support installation at Norfolk</li></ul> <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile:</p> <p>Fiscal Year actual and planned events:</p> <table><thead><tr><th></th><th>FY1998</th><th>FY1999</th><th>FY2000</th><th>FY2001</th></tr></thead><tbody><tr><td><b>Acquisition Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>Engineering Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>T&amp;E Milestones</b></td><td></td><td></td><td></td><td></td></tr><tr><td><b>Contract Milestones</b></td><td></td><td></td><td></td><td></td></tr></tbody></table>			FY1998	FY1999	FY2000	FY2001	<b>Acquisition Milestones</b>					<b>Engineering Milestones</b>					<b>T&amp;E Milestones</b>					<b>Contract Milestones</b>				
	FY1998	FY1999	FY2000	FY2001																						
<b>Acquisition Milestones</b>																										
<b>Engineering Milestones</b>																										
<b>T&amp;E Milestones</b>																										
<b>Contract Milestones</b>																										

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z						SHIPBOARD PHYSICAL SECURITY (SPS)			
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			0.165	0.230		0.245		0.211				
Ancillary Hardware Development												
Systems Engineering			0.120	0.150		0.160		0.153				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.285	0.380		0.405		0.364		CONT	CONT	
Remarks:												
Development Support			0.040	0.060		0.061		0.051				
Software Development			0.050	0.070		0.092		0.064				
Quality Insurance			0.010	0.015		0.013		0.014				
Integrated Logistics Support			0.030	0.050		0.049		0.038				
Configuration Management			0.030	0.040		0.049		0.038				
Technical Data			0.025	0.030		0.037		0.032				
RAM			0.040	0.060		0.061		0.051				
Subtotal Support			0.225	0.325		0.362		0.288		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)									Date: February 1999			
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z						SHIPBOARD PHYSICAL SECURITY (SPS)			
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			0.130	0.150		0.172		0.165				
Operational Test & Evaluation			0.140	0.160		0.190		0.180				
Tooling												
GFE												
Subtotal T&E			0.270	0.310		0.362		0.345		CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support			0.120	0.185		0.184		0.153				
Program Management Personnel												
Travel						0.025						
Labor (Research Personnel)												
Miscellaneous						0.012						
Subtotal Management			0.120	0.185		0.221		0.153		CONT	CONT	
Remarks												
Total Cost			0.900	1.200		1.350		1.150				
Remarks												

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Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4			PE 0603228D8Z			DoD LOCKS, SAFES, VAULTS				
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
LOCKS	1.300	1.100	1.450	1.450					CONT	CONT
RDT&E Articles Qty										
<p>A. <u>Mission Description and Budget Item Justification.</u> The DoD Lock Program identifies, tests and evaluates commercial hardware for suitability and compliance with security requirements and tools and technology that may reduce the delay time afforded by present day security systems mandated by current regulations. Develop CD-ROM based security technology information program; test program for security seals; alternative high security locking system for AA&amp;E applications; and entry system for "locked out" high security magazine doors.</p> <p>(U) <u>FY 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• Conducted lightweight concrete forced entry and explosive test</li> <li>• Completed testing of X-ray equipment</li> <li>• Conducted operational and mechanical testing of the Internal Locking Device</li> <li>• Completed the Tamper Resistant Seals Guide</li> <li>• Completed the Federal Specification, FF-S-2738, for Tamper Resistant Seals</li> <li>• Published Beta version of CD-ROM for destruction of National Security Information</li> <li>• Published "Security Facts Newsletter"</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• Develop repairable methods of entry for approved equipment</li> <li>• Write guide for storage of controlled substances</li> <li>• Provide engineering and consultation</li> <li>• Continue support for MDARS program</li> <li>• Publish final guidance on destruction of National Security Information</li> <li>• Develop anchoring methods for security equipment aboard ships</li> </ul>										

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	Date: February 1999										
<p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"><li>• Update DoD Lock Program Hotline</li><li>• Develop AA&amp;E shipping container lock</li><li>• Publish specification for GS approved key storage container</li><li>• Update technical data sheets on security hardware</li></ul> <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"><li>• Update or publish guide specifications for security equipment (as needed)</li><li>• Update existing and publish new repairable methods of entry</li><li>• Conduct a Security Seals Symposium</li><li>• Update National Security Information destruction methods and guidance</li></ul> <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile:</p> <p>Fiscal Year actual and planned events:</p> <table><thead><tr><th></th><th>FY1998</th><th>FY1999</th><th>FY2000</th><th>FY2001</th></tr></thead><tbody><tr><td></td><td></td><td></td><td></td><td></td></tr></tbody></table> <p><b>Acquisition Milestones</b></p> <p><b>Engineering Milestones</b></p> <p><b>T&amp;E Milestones</b></p> <p><b>Contract Milestones</b></p>			FY1998	FY1999	FY2000	FY2001					
	FY1998	FY1999	FY2000	FY2001							

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603228D8Z						DoD LOCKS, SAFES, VAULTS			
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			0.400	0.393		0.556		0.614				
Ancillary Hardware Development												
Systems Engineering			0.175	0.137		0.217		0.211				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.575	0.530		0.773		0.815		CONT	CONT	
Remarks:												
Development Support			0.025	0.025		0.030		0.040				
Software Development			0.060	0.042		0.080		0.082				
Quality Insurance			0.025	0.025		0.030		0.040				
Integrated Logistics Support			0.040	0.034		0.047		0.060				
Configuration Management			0.060	0.042		0.047		0.060				
Technical Data			0.200	0.150		0.118		0.113				
RAM			0.050	0.043		0.059		0.071				
Subtotal Support			0.460	0.361		0.411		0.466		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 1999		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4				PROGRAM ELEMENT PE 0603228D8Z						DoD LOCKS, SAFES, VAULTS		
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			0.150	0.116		0.121		0.084				
Operational Test & Evaluation			0.075	0.061		0.121		0.025				
Tooling												
GFE												
Subtotal T&E			0.225	0.177		0.242		0.109		CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support			0.040	0.032		0.024		0.060				
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.040	0.032		0.024		0.060		CONT	CONT	
Remarks												
Total Cost			1.300	1.100		1.450		1.450				
Remarks												

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Exhibit R-2, RDT&E Budget Item Justification								Date: 02/1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide / BA-4					R-1 ITEM NOMENCLATURE <b>Integrated Diagnostics 0603708D8Z</b>					
COST (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	2,742	3,394	0.0	0.0	0.0	0.0	0.0	0.0	0	
<p><b>A. Mission Description and Budget Item Justification</b>                      The program element provided funding for large scale, high leverage demonstrations of the integrated application of existing commercial and DoD technologies, practices, standards and products for order of magnitude weapon system affordability and support improvements. Demonstrations were selected to 1) measure the risks and show the feasibility of payoff from selected technology applications and 2) show novel or unorthodox alternatives to conventional weapon system acquisition and support. Demonstrations showed technology applications which provide a highly integrated and automated set of weapon system support capabilities (built in test, factory, depot, and test equipment, technical information, etc.). The demonstrations were intended to lead to reduced maintenance man-hours, "per weapon system" deployment tails, and weapon system acquisition and ownership costs. The demonstrations examined leveraging industry manufacturing processes and integrated acquisition processes/technology approaches to address systemic weapon system production and support affordability drivers.</p> <p>The projects have demonstrated the value of incorporating integrated diagnostics approaches for weapon systems support and the methodologies used to acquire and manage diagnostics. After recognizing the value and the low risk of this approach, Service weapon program managers have begun or are planning to incorporate integrated diagnostics in new platforms such as the JSF, F/A-18E/F, surface combatant ships, and missile defense. The program was also instrumental in establishing DoD Automatic Test System policy. This program has achieved its original goal to "seed" these approaches in the acquisition community, therefore the Department concluded this program.</p> <p><b>B. Program Change Summary:</b> The Department has concluded this program.</p> <p><b>C. Other Program Funding Summary:</b> Not Applicable</p> <p><b>D. Acquisition Strategy:</b>                      As preconditions to initiating a demonstration, Service managers committed to provide the R&amp;D or procurement investment to transition the products to the selected demonstration field weapon system fleet and to incorporate products and concepts into new weapon systems designs for long-term payoffs.</p> <p><b>E. Schedule Profile:</b></p>										

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Exhibit R-2, RDT&E Budget Item Justification												Date: 02/1999				
Fiscal Year events by quarter:	FY1998				FY1999				FY2000				FY2001			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Joint Factory-to-Field Demonstration</b>																
Modify test hardware/software	x															
Complete instrument interface demonstration		x														
Complete test program interface demonstration				x												
Coordinate architecture standards					x											
<b>Trident Launcher Demonstration</b>																
Conduct land-based integration tests			x													
Conduct in-field tests							x									
Complete tests and final report											x					
<b>Diagnostics for Acquisition Demonstration</b>																
Modify test hardware/software				x												
Translate test strategy and rehost on legacy ATS							x									
Complete field demonstration											x					

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Exhibit R-2, RDT&E Budget Item Justification									Date: February 1999	
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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	26.806	16.013	12.937	10.492	11.470	9.112	9.304	9.498	CONTINUING	CONTINUING
MPRS	0.500	2.200	2.200	2.200						
ROCS	3.200	3.600	3.600	3.600						
TECHNOLOGY BASE	6.721	9.813	6.737	4.292						

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 projects and (2) the enhancement and exploitation of critical robotic technologies for today's and future UGV acquisition requirements. Categories under this PE are: (1) Man Portable Robotic Systems (MPRS) - consolidated efforts to develop smaller (10-40 lb. Class) UGVs in response to emerging user requirements. Two MPRS programs are underway: the Basic Unexploded Ordnance System (BUGS), which is a joint service effort to locate and dispose of surface UXO; and the Outdoor Miniature Robotic Ground Vehicle (OMRGV), which is a small robotic vehicle for reconnaissance and other hazardous tasks in special operations or light infantry missions; (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). Platforms include the following: All-purpose Robotics Transport System (ARTS), Subsurface Ordnance Characterization System (SOCS), Automated Ordnance Excavator (AOE), and Joint Amphibious Mine Countermine (JAMC). 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; and (4) the Joint Architecture for Unmanned Ground Systems (JAUGS) which is a software-standards oriented approach to standardizing all aspects of protocols and approaches to the software aspects of all anticipated DoD unmanned systems.

## Exhibit R-2, RDT&amp;E Budget Item Justification

Date:

February 1999

(U) FY 1998 Accomplishments

## VEHICLE TELEOPERATION (VT) (11.500 million)

- Obtained favorable MS I/II for entry into combined Program Definition/Risk Reduction (PDRR) /Engineering and Manufacturing Development (EMD) phase
- Awarded Small Business Innovative Research (SBIR) Phase III contract to enter combined PDRR/EMD phase in support of VT acquisition program
- Developed final Performance Specification for MK4 (EMD) VT kits, and initiated configuration control
- Developed, built, and demonstrated Standardized Teleoperation System (STS) kits for M9 Armored Combat Excavator (ACE), D5, and T3 bulldozers
- Completed initial development testing for the STS
- Completed Limited User Testing for STS on the M-1 tank, and the D7G, D5, T3, and M9 ACE bulldozers
- Increased involvement with USMC and USAF
- Started design/development of Robotic Combat Support System (RCSS) for US Army Engineer School (USAES)
- Defined VT requirements for the USAF, USMC, and USN

## TACTICAL UNMANNED VEHICLE (TUV) (4.685 million)

- Finalized System Specification for TUV and developed a Draft Request For Proposal (RFP) for EMD
- Continued long-term User Appraisals in support of Evolutionary Acquisition Strategy
- Improved reliability performance in SARGE prototype for participation in Military Operations on Urban Terrain (MOUT) Advanced Concepts Technology Demonstration (ACTD)
- Trained USMC Chemical, Biological Incident Response Force (CBIRF) and integrated robotics into contingency exercise training

## JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.200 million)

- 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
- Incorporated JAUGS as a requirement in the TUV contract requirements package
- Incorporated JAUGS into the VT contract
- Commenced planning and coordination for the configuration management of JAUGS

Exhibit R-2, RDT&E Budget Item Justification					Date: February 1999
<p>U) <u>FY 1999 Plans</u>            JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.400 million)</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• Implement JAUGS throughout the Joint Robotics Program</li> <li>• Place JAUGS under configuration control</li> </ul>					
<p>(U) <u>FY 2000 Plans</u>            JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.400 million)</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• Continue configuration management and control</li> </ul>					
<p>(U) <u>FY 2001 Plans</u>            JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.400 million)</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• Continue configuration management and control</li> </ul>					
<p>B. <u>Program Change Summary</u> (\$ million)</p>					
	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	27.085	16.217	13.156	10.681	Continuing
Appropriated Value					
Adjustments to Appropriated Value					
a. Congressionally Directed Appropriation Reduction					
b. Congressionally Directed Undistributed Reduction					
c. Below Threshold Program Reduction	(0.279)	(0.204)	(0.219)	(0.189)	
Current Budget Submit/President's Budget	26.806	16.013	12.937	10.492	Continuing
<p>Change Summary Explanation:            Funding: N/A</p>					

Exhibit R-2, RDT&E Budget Item Justification		Date: February 1999			
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:					
	FY1998	FY1999	FY2000	FY2001	
<b>Acquisition Milestones</b>					
Standardized Teleoperation System ( now known as Standardized Robotic System (SRS)	MSI/II				
<b>Engineering Milestones</b>					
<b>T&amp;E Milestones</b>					
<b>Contract Milestones</b>	EMD				

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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 0603709D8Z			MAN PORTABLE ROBOTIC SYSTEMS (MPRS)					
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost	
MPRS	0.500	2.200	2.200	2.200					CONT	CONT	
RDT&E Articles Qty											
<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 platforms to support the missions of light and special operations forces. The program meets mission needs in the areas of reconnaissance during Military Operations in Urban Terrain (MOUT), as well as locating and disposing of very sensitive unexploded ordnance. This program has been renamed MPRS to assume a broader application of small, man portable systems. Previously it was only the Basic Unexploded Ordnance Gathering System (BUGS).</p> <p>(U) <u>FY 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• Demonstrated prototype multiple BUG systems</li> <li>• Demonstrated vehicular operation for RECORM autonomous sensor platform</li> <li>• Obtained approval of Operational Requirements Document (ORD) for the Outdoor Miniature Robotic Ground Vehicle (OMRGV)</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• Initiate testing of autonomous sensing of UXO in conjunction with reactive, autonomous vehicle control</li> <li>• Initiate sensor platform/small expendable MPRS integration</li> <li>• Initiate OMRGV development efforts</li> </ul> <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> <li>• Continue development of MPRS system prototypes</li> <li>• Conduct developmental testing of MPRS prototypes</li> <li>• Complete OMRGV prototype integration and check-out</li> </ul> <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> <li>• Complete developmental testing of BUGS prototypes</li> <li>• Conduct Analysis of Alternatives (AOA) and obtain Milestone 0 decision</li> </ul>											

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<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 1999			
B.	Other Program Funding Summary				
C.	Acquisition Strategy				
D.	Schedule Profile				
	Fiscal Year actual and planned events:				
		FY1998	FY1999	FY2000	FY2001
<b>Acquisition</b>					
<b>Milestones</b>					
OMRGV		ORD			
BUGS				MS0	
<b>Engineering Milestones</b>					
<b>T&amp;E Milestones</b>					
<b>Contract Milestones</b>					

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999				
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			0.355	0.950		0.600		0.400					
Ancillary Hardware Development													
Systems Engineering			0.100	0.150		0.200		0.300					
Licenses													
Tooling													
GFE													
Award Fees													
Subtotal Product Development			0.455	1.100		0.800		0.700		CONT	CONT		
Remarks: [1] MIPR/CPIF/FPIF/FFP activities													
Development Support													
Software Development				0.530		0.500		0.300					
Training Development													
Integrated Logistics Support				0.050		0.200		0.100					
Configuration Management													
Technical Data													
GFE													
Subtotal Support				0.580		0.700		0.400		CONT	CONT		
Remarks													

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Exhibit R-3 Cost Analysis (page 2)									Date: February 1999			
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				0.300		0.500		0.800				
Operational Testing												
Tooling												
GFE												
Subtotal T&E				0.300		0.500		0.800		CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support			0.025	0.150		0.150		0.250				
Program Management Personnel												
Travel			0.020	0.070		0.050		0.050				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.045	0.220		0.200		0.300		CONT	CONT	
Remarks												
Total Cost			0.500	2.200		2.200		2.200				
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 0603709D8Z			ROBOTIC ORDNANCE CLEARING SYSTEM (ROCS)					
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost	
ROCS	3.200	3.600	3.600	3.600					CONT	CONT	
RDT&E Articles Qty											
<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 a 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 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• Built and fielded the 2<sup>nd</sup> All-purpose Remote Transport System (ARTS) for Active Range Clearance at Nellis Air Force Base (AFB), NV</li> <li>• Secured ARTS Program Objective Memorandum (POM) Funding for FY99-FY02 procurement for 21 systems</li> <li>• Built in-house ARTS for test and evaluation at various demonstrations</li> <li>• Integrated controls for brush-cutting attachment for rapid vegetation removal</li> <li>• Performed vegetation removal on ordnance ranges on Howard AFB, Panama</li> <li>• Demonstrated multi-sensor platform (magnetometers, ground penetrating radar and EM-61) at Yuma Proving Grounds</li> <li>• Built and fielded ARTS for Eglin AFB Explosive Ordnance Disposal (EOD) unit to recover test munitions</li> <li>• Completed and delivered backhoe remote control package with technical transfer documentation to Eglin AFB EOD</li> <li>• Participated with HQ Air Combat Command (ACC) in drafting the ARTS operational requirements document (ORD)</li> <li>• Designed and built a stainless steel version of ARTS platform as tow vehicle for a subsurface detection platform</li> <li>• Develop controller area network interface for autonomous control modules</li> <li>• Completed ARTS technology transfer documentation package (baseline version)</li> <li>• Demonstrated ARTS at the U.S. Marine Corps Commandant's War Fighting Experiment at Camp Lejeune, NC</li> </ul>											

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<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	Date: February 1999
<ul style="list-style-type: none"><li>• Designed and integrated an ARTS surface scrap removal system to remove debris and process for disposal</li><li>• Integrated UGV/S JPO's fiber optic control capability into the ARTS control system for both RF and fiber control</li><li>• Provided 2 commercial versions of ARTS for urgent and compelling need for Southwest Asia and validated tech transfer package</li><li>• Developed and integrated 2 Standardized Teleoperation System onto D-8 Caterpillar bulldozers</li><li>• Provided and modified 2 protective armor kits for D-8 bulldozer</li><li>• Designed and modified 9 Israeli mine plows for quick attachment to D-8 bulldozer</li></ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"><li>• Finalize documentation for the operation and maintenance of the ARTS</li><li>• Have USAF Chief of Staff sign ORD</li><li>• Integrate a dual-arm manipulator system for the Eglin AFB EOD ARTS</li><li>• Develop a semi-autonomous point-to-point travel capability for Nellis range clearance operations</li><li>• Integrate and demonstrate a lower-cost navigation system using multiple navigation sensors and Kalman filter technology</li><li>• Deliver remaining 7 ARTS identified for urgent and compelling need for Southwest Asia</li><li>• Upgrade the 2 Nellis prototypes to ARTS baseline configuration</li><li>• Transfer and integrate semi-autonomous control functions developed under the subsurface ordnance characterization system (SOCS) to the field prototype Active Range Ordnance Mapping System (AROMS)</li><li>• Integrate CO2 laser system to the ARTS tele-remote operation</li><li>• Develop an automated ordnance recognition system for identifying BLU-97 and BLU-63 submunitions</li><li>• Modify the UGV/S JPO designed mini-flail and integrate into the ARTS platform</li><li>• Continue evaluation of new subsurface sensors to establish operating parameters and merits</li><li>• Investigate the utilization of the ARTS for forest fire fighting applications</li><li>• Conduct explosive testing of the high energy access and disablement device on ARTS</li><li>• Modify ARTS software to be JAUGS compliant</li></ul> <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"><li>• Complete integration and testing of CO2 laser system</li><li>• Develop a vision based ordnance recognition system for BLU-97 and BLU-63 submunitions</li></ul>	

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	Date: February 1999				
<ul style="list-style-type: none"> <li>• Continue development of semi-autonomous control for automating the entire range clearance process including             <ul style="list-style-type: none"> <li>Multi-vehicle operations for windrowing of submunitions                 <ul style="list-style-type: none"> <li>- Ordnance removal/disposal</li> <li>- Scrap and debris removal</li> </ul> </li> </ul> </li> <li>• Develop vision-based thermal recognition system for forest fire fighting</li> <li>• Develop vision-based color recognition system for defoliant applications</li> <li>• Incorporate technology advancements such as obstacle detection and avoidance from Demo III program</li> <li>• Investigate semi-autonomous excavation control utilizing in-bucket sensing capability</li> <li>• Address the integration of ARTS command and control with the UAV "Tactical Control System"</li> </ul> <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> <li>• Develop multi-vehicle control scheme for active range clearance</li> <li>• Investigate advanced navigation technologies including             <ul style="list-style-type: none"> <li>- Real-time obstacle avoidance/detection</li> <li>- Generic graphical user interface for robotic vehicle control</li> <li>- Improved command and control for ground based vehicle systems</li> </ul> </li> <li>• Explore applications for ground-based robotic systems</li> <li>• Investigate control schemes for advanced navigation using artificial intelligence/neural networks</li> </ul> <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile</p> <p style="margin-left: 40px;">Fiscal Year actual and planned events:</p> <table style="margin-left: 100px; border: none;"> <tr> <td style="text-align: center;">FY1998</td> <td style="text-align: center;">FY1999</td> <td style="text-align: center;">FY2000</td> <td style="text-align: center;">FY2001</td> </tr> </table> <p><b>Acquisition Milestones</b></p> <p><b>Engineering Milestones</b></p> <p><b>T&amp;E Milestones</b></p> <p><b>Contract Milestones</b></p>		FY1998	FY1999	FY2000	FY2001
FY1998	FY1999	FY2000	FY2001		

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
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			0.700	0.800		0.800		0.800				
Ancillary Hardware Development			0.100	0.100		0.100		0.100				
Systems Engineering			0.100	0.100		0.100		0.100				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.900	1.000		1.000		1.000		CONT	CONT	
Remarks:												
Development Support			0.350	0.300		0.300		0.300				
Software Development			0.350	0.300		0.300		0.300				
Training Development			0.100	0.100		0.100		0.100				
Integrated Logistics Support			0.050	0.050		0.050		0.050				
Configuration Management			0.050	0.050		0.050		0.050				
Technical Data			0.150	0.150		0.150		0.150				
GFE												
Subtotal Support			1.050	0.950		0.950		0.950		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 1999		
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			0.100	0.200		0.200		0.200				
Operational Testing			0.050	0.100		0.100		0.100				
Tooling												
GFE												
Subtotal T&E			0.150	0.300		0.300		0.300		CONT	CONT	
Remarks												
Contractor Engineering Support			0.450	0.600		0.600		0.600				
Government Engineering Support			0.100	0.100		0.100		0.100				
Program Management Support			0.150	0.150		0.150		0.150				
Program Management Personnel			0.100	0.100		0.100		0.100				
Travel			0.100	0.100		0.100		0.100				
Labor (Research Personnel)			0.100	0.200		0.200		0.200				
Miscellaneous			0.100	0.100		0.100		0.100				
Subtotal Management			1.100	1.350		1.350		1.350		CONT	CONT	
Remarks												
Total Cost			3.200	3.600		3.600		3.600				
Remarks												

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Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4			PE 0603709D8Z			TECHNOLOGY BASE				
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
TECHNOLOGY BASE	6.721	9.813	6.737	4.292					CONT	CONT
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification. The Demo III Unmanned Ground Vehicle (UGV) 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 ORDs 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.

(U) FY1998 Accomplishments:

- Concerted Technology Development: The technology development community, drawn primarily from government laboratories such as NIST, the Jet Propulsion Laboratory (JPL), and 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. A development plan that will provide the critical elements of technology required to advance technology and meet performance goals specified for Demo III has been charted, initial steps towards implementing the plan have been executed and first demonstrations of incremental advancement have been completed. The working groups have also completed detailed trade studies of required technologies.
- Modeling, Simulation and Experimentation: A modeling, simulation and experimentation effort conducted by the MMBL, 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 TTPs required to employ this technology effectively. An important outcome of this

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Exhibit R-2a, RDT&E Project Justification	Date: February 1999
<ul style="list-style-type: none"> <li>• 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. The second of four constructive simulations and the first virtual simulation 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 MMBL has been completed. 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.</li> <li>• The technology integration effort represents the third thrust of the Demo III effort. This final component of the program will integrate technology on-board 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 Research, Development, and Engineering Center (TARDEC). In January 1998, TARDEC awarded a contract to a contractor team lead by Robotic Systems Technology (RST), teaming with Science Applications International Corporation (SAIC) Center for Intelligent Systems (CIS) and Sarnoff Corporation. A Preliminary Design Review (PDR) was conducted in late July by the technology integration contractor team who presented their initial design and integration plans - the result of an extensive series of trade studies and analyses conducted over the past five months - for review, analysis and constructive criticism by the government participants, and for further refinement prior to the Critical Design Review (CDR).</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• Conduct Critical Design Review (CDR) of Demo III XUV with contractor team</li> <li>• Complete the second Constructive Simulation</li> <li>• Fabricate first two (2) XUV platforms and integrate system architecture and sensors to meet Demo III Alpha (A) performance goals</li> <li>• Fabricate the first of two Operator Control Units to be available by Demo III A</li> <li>• Conduct Demo III A consisting of an Engineering Evaluation Test and a Battle Lab Warfighting Experiment (BLWE)</li> </ul> <p>(U) <u>FY 2000 Plans:</u></p> <ul style="list-style-type: none"> <li>• Fabricate the second two (2) XUV platforms with integrated architecture and sensors to meet Demo III</li> </ul>	

Exhibit R-2a, RDT&E Project Justification				Date:					
<p>Bravo performance goals</p> <ul style="list-style-type: none"> <li>• Fabricate the second Operator Control Unit</li> <li>• Complete the second Virtual Simulation</li> <li>• Initiate the third Virtual Simulation</li> <li>• Initiate the third and fourth Constructive Simulations</li> <li>• Complete Demo III Bravo (B) consisting of an Engineering Evaluation Test and a Battle Lab Warfighting Experiment (BLWE)</li> </ul> <p>(U) <u>FY 2001 Plans:</u></p> <ul style="list-style-type: none"> <li>• Conduct Demo III consisting of an Engineering Evaluation Test and a Battle Lab Warfighting Experiment (BLWE) with troops demonstrating four XUV platforms performing autonomous operation over rugged terrain as part of a mixed military force containing both manned and unmanned vehicles</li> </ul> <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile</p> <p>Fiscal Year actual and planned events:</p> <table border="0"> <tr> <td></td> <td>FY1998</td> <td>FY1999</td> <td>FY2000</td> <td>FY2001</td> </tr> </table>						FY1998	FY1999	FY2000	FY2001
	FY1998	FY1999	FY2000	FY2001					
<b>Acquisition Milestones</b>									
<b>Engineering Milestones</b>									
<b>T&amp;E Milestones</b>		DEMOIIIA	DEMOIIIB	DEMOIII					
<b>Contract Milestones</b>		Integration							
		Contract							

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
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	1.983	2.250		1.250		1.000				
Ancillary Hardware Development	CPAF	RST, MD		1.425		0.725						
Systems Engineering	CPAF	RST, MD	0.708	0.900		0.400						
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			2.691	4.575		2.375		1.000		CONT	CONT	
Remarks: RST, Westminster, Maryland												
Development Support												
Software Development			1.445	0.775		0.750		0.650				
Software Development	CPAF	RST, MD	1.430	1.125		0.900		0.350				
Training Development				0.067				0.542				
Integrated Logistics Support								0.250				
Configuration Management												
Technical Data				1.271		0.712						
GFE												
Subtotal Support			2.875	3.238		2.362		1.792		CONT	CONT	
Remarks: RST, Westminster, Maryland												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 1999		
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		1.000				
Operational Testing												
Tooling												
GFE												
Subtotal T&E				1.000		1.000		1.000		CONT	CONT	
Remarks												
Contractor Engineering Support			0.400									
Government Engineering Support			0.368									
Program Management Support			0.200	0.750		0.750		0.250				
Program Management Personnel												
Travel			0.187	0.250		0.250		0.250				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			1.155	1.000		1.000		0.500		CONT	CONT	
Remarks												
Total Cost			6.721	9.813		6.737		4.292				
Remarks												

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Exhibit R-2, RDT&E Budget Item Justification									DATE FEBRUARY 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 4					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. <b>ADVANCED SENSOR APPLICATIONS PROGRAM</b> <b>PE 0603714D8Z</b>					
COST(\$In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total PE Cost	14.279	17.918	15.345	15.646	15.814	16.143	16.481	16.828	Continuing	Continuing
Project Name/No. and Subtotal Cost ASAP/P714	14.279	17.918	15.345	15.646	15.814	16.143	16.481	16.828	Continuing	Continuing
Quantity of RDT&E Articles	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The program focuses on continued development of domestic and foreign non-acoustic technology that has demonstrated potential for improvements in U.S. capabilities. Through joint international programs, unique and innovative approaches and technologies to expanding the performance envelopes of existing systems are examined for potential enhancements to U.S. abilities to detect and locate potential threats to U.S. National Security. **This program supports military and intelligence requirements identified in Joint Vision 2010, the Defense Science and Technology Strategy, Full Spectrum Dominance and the Joint Warfighting Capability Objectives.**

In FY 1998, Congress added funding for the High Frequency Active Auroral Research Program (HAARP). This program examines the utility of the ionospheric modification facility developed under HAARP for military, intelligence, counterproliferation, counterterrorism and counternarcotics missions. This program supports military and

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<b>Exhibit R2, RDT&amp;E Budget Item Justification</b>		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 4	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0603714D8Z ADVANCED SENSOR APPLICATIONS PROGRAM	

intelligence requirements identified in the Joint Vision 2010, Defense Science and Technology Strategy, Full Spectrum Dominance and the Joint Warfighting Capability Objectives.

**Program Accomplishments and Plans:**

**FY 1998 Accomplishments:**

- Defined specific environmental parameters relevant to littoral and open ocean defense priorities (5.500 Million)
- Completed procurement of testbed hardware to be tested first quarter FY 2000 (3.400 Million)
- Completed joint evaluation of technology and moved understanding of radar scattering into phase II (4.119 Million)
- Completed refurbishment of on-board strategic array and computer programming upgrade (1.000 Million)
- Assisted in defining conventional signal generation and system propagation (0.260 Million)

**FY 1999 Plans:**

- Continue data collections for environmental applications relevant to military/intelligence applications (5.500 Million)
- Begin data collections with new system to evaluate mechanisms at low angles(4.618 Million)
- Complete testbed and bench testing in preparation for full scale evaluation(3.400 Million)

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Exhibit R2, RDT&E Budget Item Justification		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 4	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0603714D8Z ADVANCED SENSOR APPLICATIONS PROGRAM	

- Transition the sensor project to acquisition (1.000 Million)
- Collect and evaluate data (0.400 Million)
- Initiate exploration and demonstrate potential for high priority military applications for HAARP (2.000 Million)
- Assess initial capabilities of Stochastic Resonance Technology (1.000 Million)

**FY 2000 Plans:**

- Define specific sensor parameters relevant to environmental technologies(5.700 Million)
- Continue data collections with system to evaluate false alarm statistics(4.745 Million)
- Establish requirements for foreign cooperative technology evaluation projects(2.000 Million)
- Complete performance evaluation for military and intelligence applications(1.900 Million)
- Define performance characteristics(1.000 Million)

**FY 2001 Plans:**

- Complete systems evaluation of environmental technologies for Defense applications (4.500 Million)
- Continue data collections and evaluation for modeling validation for sensor systems, expand applications(4.846 Million)
- Define priorities for foreign technology evaluations and establish test program(3.200 Million)
- Establish false alarm rates for final systems and define detailed performance envelopes (1.400 Million)

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<b>Exhibit R2, RDT&amp;E Budget Item Justification</b>		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 4	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0603714D8Z ADVANCED SENSOR APPLICATIONS PROGRAM	

- Continue definition of space-based system requirements and capabilities for systems (1.700 Million)

<b>B. <u>Program Change Summary</u></b>	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	Total Cost
Previous President's Budget	17.655	15.147	15.602	15.928	Continuing
a. Congressional Add		+3.000			
Appropriated Value	17.655	18.147	15.602	15.928	
Adjustments to Appropriated Value					
a. DoD Internal Reprogramming	-3.000				
b. Undistributed Congressional Reduction	-.069				
c. OSD Adjustments	-.307				
d. Inflation Adjustment		-.229	-.257	-.282	
Amended Budget Estimate	14.279	17.918	15.345	15.646	Continuing

**Change Summary Explanation: N/A**

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Exhibit R2, RDT&E Budget Item Justification		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 4	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0603714D8Z ADVANCED SENSOR APPLICATIONS PROGRAM	

C. Other Program Funding Summary: None

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<b>Exhibit R2a RDT&amp;E Project Justification</b>									DATE FEBRUARY 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 4					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. <b>ADVANCED SENSOR APPLICATIONS PROGRAM</b> <b>PE 0603714D8Z</b>					
COST (\$ In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Project Cost	14.279	17.918	15.345	15.646	15.814	16.143	16.481	16.828	Continuing	Continuing
RDT&E Articles Qty										

**A. Mission Description and Budget Item Justification:**

The program focuses on continued development of domestic and foreign non-acoustic technology that has demonstrated potential for improvements in U.S. capabilities. Through joint international programs, unique and innovative approaches and technologies to expanding the performance envelopes of existing systems are examined for potential enhancements to U.S. abilities to detect and locate potential threats to U.S. National Security. **This program supports military and intelligence requirements identified in Joint Vision 2010, the Defense Science and Technology Strategy, Full Spectrum Dominance and the Joint Warfighting Capability Objectives.**

In FY 1998, Congress added funding for the High Frequency Active Auroral Research Program (HAARP). The program examines the utility of the ionospheric modification facility developed under HAARP for military, intelligence, counterproliferation, counterterrorism and counternarcotics missions. This program supports military and intelligence requirements identified in the Joint Vision 2010, Defense Science and Technology Strategy, Full Spectrum Dominance and the Joint Warfighting Capability Objectives.

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**B. Other Program Funding Summary: N/A**

**C. Acquisition Strategy:**

The program plans to continue the support of major contractors through ISSO contracting office. As activities transfer to the Office of Special Technology, contracts supporting those efforts will transfer with them. As required by the DFAR and DoD acquisition reform policies, all initiatives will meet appropriate regulations and requirements. The acquisition strategy is reviewed bi-annually to identify possible improvements in customer support and enhancements to program efficiency.

**D. Schedule Profile:**

Fiscal Year actual and planned events by quarter:

- Define parameters 2QFY98
- Define priority military/intelligence activities for HAARP 4QFY98
- Complete procurement of hardware 4QFY98
- Define priority military/intelligence activities for HAARP 4QFY98
- Initiate U.S. activities 1QFY99
- Transition joint activities 1QFY99
- Complete refurbished array 2QFY99
- Begin exploration and demonstration of HAARP Capabilities 1QFY99
- Assess initial capabilities of Stochastic Resonance for Defense/intelligence applications 1QFY99
- Continue data collections for environmental activities 3QFY99
- Data collection with new system 3QFY99
- Complete testbed 4QFY99
- Transition array activities 4QFY99
- Define parameters 1QFY00
- Continue joint data collections 2QFY00

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- Define requirements for foreign cooperative evaluations 2QFY00
- Complete evaluation 3QFY00
- Define system parameters 4QFY00
- Complete sensor system evaluation technology 4QFY00
- Define environmental parameters 1QFY01
- Continue data collections for applications 2QFY01
- Continue evaluations for foreign cooperative technology tests 3QFY01
- Establish false alarm statistics for operational concepts 3QFY01
- Evaluate space-based benefits for applications 4QFY01
- Continue data collections for model validation 1QFY02
- Continue evaluation of foreign technology for military/intelligence Applications 1QFY02
- Establish baseline technology capabilities for critical military Requirements 2QFY02
- Define vulnerabilities 3QFY02
- Evaluate system enhancements for upgrades to foreign technologies 4QFY02
- Evaluate foreign technology capability 4QFY02
- Continue data collections to verify technology capabilities 1QFY03
- Collect data for model validation and verification 2QFY03
- Define vulnerabilities 3QFY03
- Evaluate mechanisms for detection under all environmental conditions 4QFY03
- Establish system performance parameters 1QFY04
- Collect data on sensors for false alarm and enhanced performance evaluations for foreign technologies 2QFY04
- Verify models for enhanced system performance 3QFY04
- Validate models and theory for technology capabilities 4QFY04
- Define new processing techniques for enhanced system capability 4QFY04

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Exhibit R-3, Project Cost Analysis

Exhibit R-3 Cost Analysis (page 2)								Date: February 1999				
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 4			PROGRAM ELEMENT PE0603714D8Z				PROJECT NAME AND NUMBER ASAP/P714					
Cost Categories (Tailor to WBS, or System /Item Requirements)	Contract Method & Type	Performing Activity Location	Total PYS Cost	CY Cost	CY Award Date	BY1 Cost	BY1 Award Date	BY2 Cost	BY2 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Development Test & Evaluation	Multiple	Various	49.098	5.177	4/99	5.578	4/00	5.686	4/01	Con't	Con't	
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			49.098	5.177		5.578		5.686				
Remarks												
Contractor Engineering Support	multiple	Various	28.398	6.179	4/99	3.411	4/00	3.481	4/01	Con't	Con't	
Government Engineering Support	Multiple	Various	53.495	5.457	4/99	5.882	4/00	5.374	4/01	Con't	Con't	
Program Management Support												
Program Management Personnel												
Travel			1.304	.005	4/99	.005	4/00	.005	4/01	Con't.	Con't	
Labor (Research Personnel)												
Overhead	multiple	Various	11.491	1.100	4/99	.469	4/00	1.100	4/01	Con't	Con't	
Subtotal Management			94.688	12.741		9.767		9.960				
Remarks												

Exhibit R-2, RDT&E Budget Item Justification								Date: February 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/Budget Activity 4					R-1 ITEM NOMENCLATURE CALs, The Strategy, PE 0603736D8Z					
COST (\$ in Millions)	1998	1999	2000	2001	2002	2003	2004	2005	Cost to Complete	Total Cost
Total PE Cost	6,172	7,765	1,652	1,623	1,650	1,685	1,720	1,756	Continuing	Continuin
Project A Name/No. & subtotal cost										
Project B Name/No. & subtotal cost										
Project C Name/No. & subtotal cost										
Quantity of RDT&E Articles										

**A. Mission Description and Budget Item Justification**

(U) **Brief description of element:** 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.

(U) **Program Accomplishments and Plans:**

(U) **FY 1998 Accomplishments:**

- Supported Joint Service initiatives for Business Process Improvements (BPI) using CALS technology. Areas of focus were on identifying opportunities for and implementing BPI concepts to establish the Integrated Data Environment (\$1.000 Million)
- Supported a Weapon System Program’s development of an IDE (\$1.147 Million)
- Continued development and update of analytic tools and methods to support the IDE implementations (\$.025 Million)
- Completed Integrated Weapon System Database (IWSDB) technology (\$4.000 Million)

(U) **FY 1999 Plans:**

- Complete Tri-Service IETM architecture (\$4.125 Million)
- Reengineer logistics processes based on CALS technologies (\$1.000 Million)
- Assess integration of CALS technologies with dynamic product models (\$.368 Million)
- Complete development of CALS-based Navy “Telogistics” prototype (\$.120 Million)
- Complete integration of maintenance prognostics and IETM architecture (\$2.152 Million)

(U) FY 2000 Plans:

- Continue to reengineer logistics processes based on CALS technologies (\$.895 Million)
- Employ CALS in developing architectures to govern the modernization of integrated supply chain information systems (\$.757 Million)

(U) FY 2001 Plans:

- Continue to reengineer logistics processes based on CALS technologies (\$.925 Million)
- Continue to employ CALS in developing architectures to govern the modernization of integrated supply chain information systems (\$.698 Million)

(U) <b>B. Program Change Summary:</b>	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	1.916	1.899	1.652	1.623	Continuing
Appropriated Value	9.916	5.866			
Adjustments to Appropriated Value:					
Other (DoD Program Changes)	(3.744)	1.899			
Current Budget Submit/President's Budget	6.172	7.765	1.652	1.623	Continuing

(U) Change Summary Explanation:

(U) Funding: The changes in FYs 1998 and 1999 are due to below threshold program adjustments.

(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-3 Cost Analysis (page 1)									Date: February 1999			
APPROPRIATION/BUDGET ACTIVITY 4			PROGRAM ELEMENT 0603736D8Z						CALs, The Strategy			
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												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development												
Remarks:												
Development Support			4.725	6.645		1.652		1,623		Continuing		
Software Development												
Training Development			.515									
Integrated Logistics Support			.465									
Configuration Management			.467									
Technical Data				.120								
Business Process Improvements				1.000								
Subtotal Support			6.172	7.765		1.652		1,623		Continuing		
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 1999		
APPROPRIATION/BUDGET ACTIVITY 4				PROGRAM ELEMENT 0603736D8Z						CALs, The Strategy		
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												
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			6.172	7.765		1.652		1.623		Continuing		
Remarks												

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>									Date: (MONTH/YEAR) February 1999	
APPROPRIATION/BUDGET ACTIVITY					R-1 ITEM NOMENCLATURE					
<b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>					<b>Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z</b>					
<i>Cost (In Millions)</i>	FY 1998	FY 1999	FY 2000	FY 2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total PE 0603851D Cost	14.500	16.836	23.260	27.601	27.726	27.947	26.316	25.676	Continuing	Continuing
ESTCP/P514 Cost	14.500	16.836	23.260	27.601	27.726	27.947	26.316	25.676	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.

**Exhibit R-2, RDT&E Budget Item Justification**  
(Exhibit R-2, page 1 of 5)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR) February 1999
APPROPRIATION/BUDGET ACTIVITY <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE <b>Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z</b>	

**FY 1998 Accomplishments:**

- Reviewed and selected technologies for demonstration.
- Reviewed and selected sites for demonstration of remediation technologies.
- Prepared site-specific implementation plans (\$0.500 million).
- Prepared sites and secure regulatory permitting (\$2.700 million).
- Demonstration and evaluation of selected technologies (\$11.300 million).

**FY 1999 Plans:**

- Review and select technologies for demonstration.
- Review and select sites for demonstration of technologies.
- Prepare site-specific implementation plans (\$0.610 million).
- Prepare sites and secure regulatory permitting (\$2.770million).
- Award demonstration testing and evaluation for selected technologies (\$13.456 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. (\$8.848 Million)
- Compliance: To demonstrate and validate innovative technologies to ensure DoD complies with our federal, state, and local environmental laws. (\$2.953 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. (\$5.035 Million)

**Exhibit R-2, RDT&E Budget Item Justification**  
(Exhibit R-2, page 2 of 5)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR) February 1999
APPROPRIATION/BUDGET ACTIVITY <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE <b>Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z</b>	

**FY 2000 Plans:**

- Review and select technologies for demonstration.
- Review and select sites for demonstration of technologies.
- Prepare site-specific implementation plans (\$0.700 million).
- Prepare sites and secure regulatory permitting (\$2.800 million).
- Award demonstration testing and evaluation for selected technologies (\$19.760 million).

**FY 2001-05 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.

**Exhibit R-2, RDT&E Budget Item Justification**  
(Exhibit R-2, page 3 of 5)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR) February 1999
APPROPRIATION/BUDGET ACTIVITY  <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE  <b>Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z</b>	

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 1998</u>	<u>FY 1999</u>	<u>FY2000</u>	<u>Total Cost</u>
Previous President's Budget	15.164	17.051	16.650	Continuing
Appropriated Value	15.164	17.051		
Adjustments to Appropriated Value				
a. Undistributed reduction	(.301)			
b. SBIR	(.363)	(.215)		
Current Budget Submit/ President's Budget	14.500	16.836	23.260	Continuing

**Change Summary Explanation:** FY 1998 changes are due to congressional undistributed reductions. FY 1999 changes are below threshold program adjustments. FY00 -05 reflect changes due to increased requirements.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR) February 1999
APPROPRIATION/BUDGET ACTIVITY <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE <b>Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z</b>	

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 1999</u>				<u>FY 2000</u>				<u>FY 2001</u>				<u>FY 2001</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 1999 funding. A similar pattern is expected for FY 2001 and year funding.

**Exhibit R-2, RDT&E Budget Item Justification**  
(Exhibit R-2, page 5 of 5)

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<b>RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)</b>		DATE : (MONTH/YEAR) February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE PE NUMBER/PROJECT NUMBER</b>	
RDT&E, Defense-wide/Budget Activity 4	Environmental Security Technology Certification Program (ESTCP) PE 0603851D8Z	

	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002
Project Cost Categories					
Cost Categories:					
a. Demonstration & Validation	13,750	16,103	22,410	26,651	26,776
b. Program Management Support	750	733	850	950	950
<b>TOTAL</b>	14,500	16,836	23,260	27,601	27,726

(Exhibit R-3, page 1 of 2)

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<b>RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)</b>		DATE : (MONTH/YEAR) February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>  RDT&E, Defense-wide/Budget Activity 4	<b>R-1 ITEM NOMENCLATURE PE NUMBER/PROJECT NUMBER</b>  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 1998	Budget FY 1998	Budget FY 1999	Budget FY 2000	Budget FY2001	Budget to Complete	Total Program
DoD	C	-	-	-	89.389	14.500	16.836	23.260	27.601	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 FY1997	Budget 1997	Budget 1998	Budget 1999	Budget to Complete	Total Program
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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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>										Date: (MONTH/YEAR) <b>FEB 99</b>		
APPROPRIATION/BUDGET ACTIVITY  <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>						R-1 ITEM NOMENCLATURE  Tactical Anti-Satellite Program Development - PE <b>0603892D</b>						
<i>Cost (In Millions)</i>	FY 1998	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	37.5	0	0	0	0	0	0	0	0	0	Continuing	Continuing
Kinetic Energy anti-satellite Cost	37.5	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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR)  FEB 99
APPROPRIATION/BUDGET ACTIVITY  <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE  Tactical Anti-Satellite Program Development - PE 0603892D	

(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 was accomplished in FY 1998:

- 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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR)  FEB 99
APPROPRIATION/BUDGET ACTIVITY  <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE  Tactical Anti-Satellite Program Development - PE 0603892D	

FY98/99 Plans

INTERCEPTOR COMPONENT	
DEVELOPMENT, INTEGRATION AND TESTING	\$6,750K
INTEGRATED COMMAND AND CONTROL SUBSYSTEM	\$5,500K
KV SYSTEM INTEGRATION AND TESTING	\$6,750K
KILL MECHANISM TECHNOLOGY DEVELOPMENT	\$8,250K
HWIL FACILITY PREPARATION AND TESTING	\$4,000K
PROGRAM MANAGEMENT	\$2,250K
TECHNICAL SIMULATION & SUPPORT (SBIR)	\$4,000K

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR)  FEB 99
APPROPRIATION/BUDGET ACTIVITY  <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE  Tactical Anti-Satellite Program Development - PE 0603892D	

**(U) FY 1998 Plans:**

- The Senate Armed Services Committee has authorized \$37.5 million for KE ASAT in the FY 1998 Authorization Bill. The Senate Appropriation bill also included \$37.5 million for KE ASAT. The Joint Authorization (Senate & House) has agreed on \$37.5 million for KE ASAT. The following will be accomplished with FY 1998 funds:
- Complete KV HW/SW Integration
- KV Hardware-In-Loop testing
- Integrated Command and Control Subsystem Integration
- Kill Mechanism Technology Development
- Digital simulations

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

**(U) B. Program Change Summary**

	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>Total Cost</u>
Previous President's Budget	0	0	0	0
Appropriated Value	37500K	0	0	
Adjustments to Appropriated Value *	0	0	0	0
Current Budget Submit/President's Budget	37500K	0	0	0

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR)
<b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>		<b>FEB 99</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	Tactical Anti-Satellite Program Development - PE 0603892D	

(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

Fiscal year actual and planned events by quarter

<u>Project Milestones</u>	<u>FY 1998</u>				<u>FY 1999</u>			
	1	2	3	4	1	2	3	4
• Kill Mechanism Development					X	X	X	X
• KV Integration							X	X
• Hardware-in-Loop Facility prep						X	X	X
• Digital Simulations					X	X		
• Command & Control integration & Upgrades					X	X	X	X

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<b>RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)</b>		DATE : (MONTH/YEAR) <b>FEB 99</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE PE NUMBER/PROJECT NUMBER	
RDT&E, Defense-wide/Budget Activity 4	Tactical Anti-Satellite Program Development PE 0603892D -	

**A. Project Cost Breakdown ( \$ in thousands )**

	FY 1998	FY 1999	FY 2000	FY 2001
Project Cost Categories				
Cost Categories:				
a. Demonstration & Validation	35,250			
b. Program Management Support	2,250			
<b>TOTAL</b>	<b>37,500</b>			

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<b>RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)</b>		DATE : (MONTH/YEAR) <b>FEB 99</b>
APPROPRIATION/BUDGET ACTIVITY  RDT&E, Defense-wide/Budget Activity 4	R-1 ITEM NOMENCLATURE PE NUMBER/PROJECT NUMBER  Tactical Anti-Satellite Program Development - PE <b>0603892D</b>	

**B. Budget Acquisition History and Planning Information**

Performing Organizations

<u>Contractor or Government Performing Activity</u>	<u>Contract Method/Type or Funding Vehicle</u>	<u>Award or Obligation Date</u>	<u>Performing Activity EAC</u>	<u>Project Office EAC</u>	<u>Total Prior to FY 1998</u>	<u>Budget FY 1998</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	-	-	325000	37500 23250 4000 8250 2000				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>Total Prior to FY1998</u>	<u>Budget 1998</u>	<u>Budget 1999</u>	<u>Budget 2000</u>	<u>Budget to Complete</u>	<u>Total Program</u>
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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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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 4							<b>R-1 ITEM NOMENCLATURE</b> Humanitarian Demining PE 0603920D8Z			
<i>COST(In Millions)</i>	FY 1998	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	18.498	15.847	14.819	18.480	14.921	15.234	15.554	Continuing	Continuing
Humanitarian Demining/P920t	0	18.498	15.847	14.819	18.480	14.921	15.234	15.554	Continuing	Continuing

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

**(U)     BRIEF DESCRIPTION OF ELEMENT**

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

**(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 U.S. and foreign countermine, as well as civilian 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 January 20-22, 1998 and the Washington Conference on Global Demining held May 20-22, 1998. A corollary benefit from this program is that many of the technologies pursued have very high potential for satisfying requirements in other DoD mission areas, such as military area clearance. 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 QA equipment; train deminers in mine awareness, and improve deminer hand tools.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>									<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 4							<b>R-1 ITEM NOMENCLATURE</b> Humanitarian Demining PE 0603920D8Z			

<i>COST(In Millions)</i>	FY 1998	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	18.498	15.847	14.819	18.480	14.921	15.234	15.554	Continuing	Continuing
Humanitarian Demining/P920t	0	18.498	15.847	14.819	18.480	14.921	15.234	15.554	Continuing	Continuing

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

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Plans:**

(U) This program aims to initiate and/or continue development and demonstration of demining technologies while maintaining focus on the three primary areas of emphasis that include: improving current mine detection technologies, overcoming heavy vegetation problems in specific environments and providing improved protection for deminers. These primary areas of focus were defined by the various non-governmental organizations (NGOs) present at the Humanitarian Demining Workshop held in January 1998 and the various donor governments, international organizations and NGOs that participated in the May 1998 Washington Conference on Global Demining. This program will also continue development of: large mechanical clearing devices for agricultural areas and QA operations ; new alternatives for in-situ neutralization devices that are simple to use, affordable and expendable; simple, safe, robust and affordable technologies for detecting, discriminating and identifying landmines; and mine/minfield marking and mapping systems. A new area of development will be in improved large area survey equipment used for demining mission planning. Finally, the program will continue to concentrate on operational fielding of mature technologies suitable for demining.(\$ 18.498 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense Wide/BA 4	<b>R-1 ITEM NOMENCLATURE</b> 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.(\$ 15.847 Million)

**(U)**      **FY2001 Plans:**

(U)      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.(\$ 14.819 Million)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 4		R-1 ITEM NOMENCLATURE Humanitarian Demining PE 0603920D8Z

<b>(U) B. <u>Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous Presidents Budget	0	17.234	16.113	15.086	Continuing
Appropriated Value	0	0	0	0	Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed Undistributed Reduction	0	0	0	0	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0	0	0-.266	-.267	
c. Other	0	1.264	0	0	
Current Presidents Budget	0	18.498	15.847	14.819	Continuing

**Change Summary Explanation:**      Funding changes are due to congressional undistributed reductions and inflation adjustments.

**(U)      Funding:**      No funds were appropriated for this line in FY 1998. FY 1999 through FY 2003 program reflects a realignment of funding from PE 0603120D.

**(U)      Schedule:**      N/A

**(U)      Technical:**      No funds were appropriated for this line in FY 1998. FY 1999 through FY 2003 program reflects a realignment of funding from PE 0603120D.

**(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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<b>RDT&amp;E BUDGET ELEMENT/PROJECT COST BREAKDOWN (R-3 Exhibit)</b>		DATE: February 1999
APPROPRIATION/BUDGET ACTIVITY:  RDT&E, Defense Wide / BA 4	R-1 ITEM NOMENCLATURE:  Humanitarian Demining PE 0603920D	

**A. Project Cost Breakdown (\$ in thousands)**

	FY 1998	FY 1999	FY 2000	FY 2001
Project Cost Categories:				
Cost Categories				
a. Demonstrations & Validation	0	17.523	14.813	13.691
b. Program Management Support	0	.975	1.034	1.128
<b>TOTAL</b>	<b>0</b>	<b>18.498</b>	<b>15.847</b>	<b>14.819</b>

**B. Budget Acquisition History and Planning Information:**

Funding Revisions

FY 1998 President's Budget	0	0	9.944	9.935
FY 1999 President's Budget	0	17.234	16.113	15.086

No Funds were appropriated for this line in FY 1998. FY 1999 through FY 2001 reflect a realignment of funding from PE 0603120D. The current FY 1999 reflects a Congressional adjustment of \$1.5 million. The FY 2000 and FY 2001 amounts reflect inflation adjustments.

Performing Organizations:

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or <u>Obligation Date</u>	Performing <u>Activity/EAC</u>	Project Office <u>EAC</u>	Total Prior to <u>FY 1998</u>	Budget <u>FY 1998</u>	Budget <u>FY 1999</u>	Budget <u>FY 2000</u>	Budget <u>FY 2001</u>	Budget to <u>Complete</u>	Total <u>Program</u>
Miscellaneous					0	0	18.498	15.847	14.819	Continuing	Continuing
<b>TOTAL PROJECT</b>					<b>0</b>	<b>0</b>	<b>18.498</b>	<b>15.847</b>	<b>14.819</b>	Continuing	Continuing

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>									Date: (MONTH/YEAR) February 1999	
APPROPRIATION/BUDGET ACTIVITY						R-1 ITEM NOMENCLATURE				
<b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>						<b>Coalition Warfare 0603923D8Z</b>				
Cost (In Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total 0603923D Cost	0	0	12.781	12.124	13.334	12.827	13.075	13.409	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

This program element funds management and execution of international cooperative programs designed to maximize DoD's capability to engage in coalition warfare. Global geopolitical milieu mandates coalition operations to confront conventional and asymmetrical threats. Coalitions are preferred way to address international crises of the 21<sup>st</sup> century; coalitions lend political legitimacy to an effort and provide a broad base of support; and coalitions provide resources that mitigate the need for the U.S. to shoulder the total financial and military force burden. Furthermore, coalition doctrine, tactics and procedures must accommodate Joint Vision 2010 (JV 2010) technologies relating to information dominance, precision strike, C3I interoperability and focused logistics.

The scope of the cooperative program includes the full spectrum of coalition operations, ranging from peace keeping, through tension and crisis to theater war. This program funding will leverage DoD's investment strategy to ensure DoD programs and JV2010 technologies operate in the coalition environment. The program will focus on: Integrating

**Exhibit R-2, RDT&E Budget Item Justification**  
(Exhibit R-2, page 1 of 4)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR) February 1999
APPROPRIATION/BUDGET ACTIVITY <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE <b>Coalition Warfare 0603923D8Z</b>	

JV2010 technologies in coalition doctrine, tactics and procedures; pre-feasibility studies and technology integration to support leadership initiatives arising from international fora such as the Four Powers, the Conference of National Armaments Directors and the U.S./Japan Science and Technology Forum; expanding the scope of U.S. sponsored Advanced Concept Technology Demonstrations (ACTDs) to accommodate allied participation; U.S. participation in allied technology demonstrations; and enhancing interoperability in a coalition environment.

FY 1998 Accomplishments:  
N/A

FY 1999 Plans:  
N/A

FY 2000 Plans:

- Integration of JV 2010 technologies in coalition doctrine, tactics and procedures; \$2M
- Pre-feasibility studies and technology integration to support the Four Power's agreed programs; \$3M
- Integrating allied technologies in U.S. sponsored Advanced Concept Technology Demonstrations (ACTDs); \$2M
- Expansion of U.S. technology assessments through participation in allied technology demonstrations; \$2M
- Allied interoperability for coalition warfare. \$3.8 M

**Exhibit R-2, RDT&E Budget Item Justification**  
(Exhibit R-2, page 2 of 4)

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR) <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE <b>Coalition Warfare 0603923D8Z</b>	

**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 Power's agreed programs; \$3M
- Integrating allied technologies in U.S. sponsored Advanced Concept Technology Demonstrations (ACTDs); \$2M
- Expansion of U.S. technology assessments through participation in allied technology demonstrations; \$2M
- Allied interoperability for coalition warfare. \$3.1 M

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY2000</u>	<u>Total Cost</u>
Previous President's Budget Appropriated Value			12.781	Continuing
Adjustments to Appropriated Value				
a. Undistributed reduction				
b. SBIR				
Current Budget Submit/ President's Budget			12.781	Continuing

**Change Summary Explanation: N/A** This program is a new start for FY 2000.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: (MONTH/YEAR) February 1999
APPROPRIATION/BUDGET ACTIVITY <b>RDT&amp;E, Defense-wide/ Budget Activity 4</b>	R-1 ITEM NOMENCLATURE <b>Coalition Warfare 0603923D8Z</b>	

C. Other Program Funding Summary: Not applicable.

D. Acquisition Strategy: This program will fund armaments cooperation with friendly nations and will be conducted in accordance with 10 U.S.C 2350a.

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					X				X					X		
Out reach Program to allies							X				X				X	
Negotiate Memoranda of Understanding								X				X				X

**Exhibit R-2, RDT&E Budget Item Justification**  
(Exhibit R-2, page 4 of 4)

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Exhibit R-2, RDT&E Budget Item Justification									Date: February 1999	
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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	N/A	15.115	12.004	11.742	13.357	13.860	14.150	14.448	CONTINUING	CONTINUING
SRS		10.000	8.504	2.000						
RCSS		2.000	2.000	6.200						
TUV				2.042						
MDARS-I		3.115	1.500	1.500						

A. Mission Description and Budget Item Justification

(U) BRIEF DESCRIPTION OF ELEMENT: This program is a budget activity level 5 based on the successful transition of robotic technologies from demonstration/validation activities to Engineering, Manufacturing and Development (EMD) as part of an Evolutionary Strategy. This PE was established by FY 1998 PBD 202, in response to OSD and Service agreement at the April 1997 Joint Robotics Program General Officer Steering Committee (GOSC) to have OSD retain consolidation of DoD robotics programs on unmanned ground systems through EMD. Individual Services are responsible for requirements generation and procurement funding. The JRP demonstration/validation efforts have demonstrated maturity of robotics technologies for their application to the formal acquisition process of land systems and subsystems. Emphasis is on the development of robotics 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. Success has been achieved in three programs to justify EMD at this time. This PE establishes the consolidated DoD robotics program for unmanned ground vehicles (UGV) which advances the UGV concepts into EMD acquisition projects 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 teleoperation capabilities, like obstacle breaching operations (minefields, earthworks, bunkers, etc.), that have supported Operations Joint Endeavor and Joint Guard in Bosnia; and (2) the Robotic Combat Support System (RCSS) - a light version, RCSS-L will be developed for limited anti-personnel (AP) landmine/scattermine and unexploded ordnance (UXO) proofing for the light, rapid deployment forces, while a medium version, RCSS-M will be designed for AP landmine/scattermine, UXO and wire obstacle clearing, and bucket and fork capabilities to support operations by heavy force divisions and corps engineers in all terrain conditions; and (3) the Tactical Unmanned Vehicle (TUV) - a joint Army/USMC effort to develop a robotic UGV for the Reconnaissance, Surveillance and Target Acquisition (RSTA) mission; and (4) the Mobile Detection Assessment Response System, Interior (MDARS-I) - is intended to support the physical security of fixed installations, protection of critical inventory items, and tracking movement of items in warehouses.

Exhibit R-2, RDT&E Budget Item Justification					Date: February 1999
<p>(U) <u>FY 1998 Accomplishments</u>                      TACTICAL UNMANNED VEHICLE (TUV)</p> <ul style="list-style-type: none"> <li>• No EMD Funding during this fiscal year</li> </ul>					
<p>(U) <u>FY 1999 Plans</u>                      TACTICAL UNMANNED VEHICLE (TUV)</p> <ul style="list-style-type: none"> <li>• No EMD Funding during this fiscal year</li> </ul>					
<p>(U) <u>FY 2000 Plans</u>                      TACTICAL UNMANNED VEHICLE (TUV)</p> <ul style="list-style-type: none"> <li>• No EMD Funding during this fiscal year</li> </ul>					
<p>(U) <u>FY 2001 Plans</u>                      TACTICAL UNMANNED VEHICLE (TUV) (2.042 million)</p> <ul style="list-style-type: none"> <li>• TUV EMD effort for the design, manufacture and delivery of engineering prototypes</li> <li>• Engineering and program management support for the TUV development</li> </ul>					
<p>B. <u>Program Change Summary</u> (\$ million)</p>					
	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	N/A	11.307	12.190	11.954	Continuing
Appropriated Value		15.307			
Adjustments to Appropriated Value					
a. Congressionally Directed Appropriation Reduction					
b. Congressionally Directed Undistributed Reduction					
c. OSD Directed Undistributed Reduction		(0.192)	(0.186)	(0.212)	
Current Budget Submit/President's Budget	N/A	15.115	12.004	11.742	Continuing
<p>Change Summary Explanation:</p> <p style="padding-left: 20px;">Funding: N/A</p> <p style="padding-left: 20px;">Schedule: N/A</p>					

Exhibit R-2, RDT&E Budget Item Justification				Date:
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 1998	FY 1999	FY2000	FY2001
Acquisition Milestones				MSII
Engineering Milestones				
T&E Milestones				
Contract Milestones				

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Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
SRS	N/A	10.000	8.504	2.000					20.504	20.504
RDT&E Articles Qty										

  

A. Mission Description and Budget Item Justification. 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 teleoperation capabilities to accomplish obstacle breaching operations (minefields, earthworks, bunkers, etc.) Prototypes have been used in support of Operation Joint Endeavor and Joint Guard in Bosnia. The US Army has an approved Operational Requirements Document (ORD).

(U) FY 1998 Accomplishments

- No EMD funding during this fiscal year

(U) FY 1999 Plans

- SRS EMD contract effort for the design, manufacture and delivery of engineering prototypes (D7G, M9 Armored Combat Excavator [ACE], T3 Dozer, Deuce) for Developmental Testing (DT) and Operational Testing (OT)
- DT and OT for the D7G and M9 SRS kit applications
- Engineering management for the SRS kit development
- Program management support for SRS kit development

(U) FY 2000 Plans

- Continue SRS EMD effort for the design, manufacture and delivery of engineering prototypes
- DT and OT completion for the M9 ACE and performance of the T3 and Deuce SRS kit applications
- Engineering and program management support for the SRS kit development

(U) FY 2001 PLANS

- Continue SRS EMD effort for the design, manufacture, and delivery of engineering prototypes
- Complete DT and OT for the T3 and OT for the M9 and Deuce
- Engineering and program management support for the SRS kit development

B. Other Program Funding Summary

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Exhibit R-2a, RDT&E Project Justification		Date: February 1999			
<p>C. Acquisition Strategy                      The SRS kit development effort is contracted under a Small Business Innovative Research (SBIR) effort. The EMD contract was awarded 4<sup>th</sup> Quarter FY 1998 to Omnitech Robotics Incorporated. The contract will be incrementally funded in FY 1999 and FY 2000. The SRS Milestone III production decision is scheduled for 3d Quarter FY 2000, based on the D7G kit development.</p>					
<p>D. Schedule Profile</p> <p>Fiscal Year actual and planned events:</p>					
	FY1998	FY1999	FY2000	FY2001	
<b>Acquisition Milestones</b>					
SRS (D7G)			MSIII		
(M9 ACE/Deuce)					IPR
(T3)					IPR
<b>Engineering Milestones</b>					
<b>T&amp;E Milestones</b>					
SRS (D7G)		DT	OT		
(M9 ACE/Deuce)			DT	OT	
(T3)				DT/OT	
<b>Contract Milestones</b>		EMD			

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Exhibit R-3 Cost Analysis (page 1)										Date: February 1999		
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		8.000		4.744		1.500			12.744	15.250
Ancillary Hardware Development												
Systems Engineering												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				8.000		4.744		1.500			12.744	15.250
Remarks: Omnitech Robotics, Inc., Englewood, CO												
Development Support												
Software Development								0.200				
Training Development												
Integrated Logistics Support								0.100				
Configuration Management												
Technical Data												
GFE												
Subtotal Support								0.300			CONT	CONT
Remarks												

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Exhibit R-3 Cost Analysis (page 2)									Date: February 1999			
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		0.650		0.300		0.100				
IOT&E D7G	MIPR	T&E CMD		0.650		0.170		0.100				
DT M9 ACE	MIPR	APG, MD				0.350						
IOT&E M9 ACE	MIPR	T&E CMD				0.650						
DT DEUCE	MIPR	APG, MD				0.400						
IOT&E DEUCE	MIPR	T&E CMD				0.550						
DT T3	MIPR	APG, MD				0.175						
IOT&E T3	MIPR	T&E CMD				0.305						
Subtotal T&E				1.300		2.900		0.200		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												
Program Management Support		US AMCOM		0.700		0.860						
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management				0.700		0.860				CONT	CONT	
Remarks												
Total Cost				10.000		8.504		2.000				
Remarks												

Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
RCSS	N/A	2.000	2.000	6.200					CONT	CONT
RDT&E Articles Qty										
<p>A. <u>Mission Description and Budget Item Justification.</u> The Robotic Combat Support System (RCSS) will consist of light and medium weight versions. A lightweight prototype has been supporting Operation Joint Endeavor and Joint Guard in Bosnia. The lightweight system will be developed for limited anti-personnel (AP) landmine/scattermine and unexploded ordnance (UXO) proofing for light, rapid deployment forces. A medium version will be designed for AP landmine/scattermine proofing, UXO and wire obstacle clearing, and bucket and fork capabilities to support operations by heavy force divisions and corps engineers in all terrain conditions. A Mission Need Statement has been developed and a draft Operational Requirements Document (ORD) is being staffed.</p> <p>(U) <u>FY 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>• No EMD Funding available during this fiscal year</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>• RCSS-L Program Definition and Risk Reduction (PDRR) effort for the design, manufacture and delivery of engineering prototypes</li> </ul> <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> <li>• RCSS-L EMD effort for the design, manufacture and delivery of engineering prototypes</li> <li>• DT for the RCSS-L development</li> <li>• Engineering and program management support for the RCSS-L development</li> </ul> <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> <li>• Continue RCSS-L EMD effort for the design, manufacture and delivery of engineering prototypes</li> <li>• OT for the RCSS-L development</li> </ul>										

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>					Date:
• Engineering and program management support for the RCSS-L/M development					
B. Other Program Funding Summary					
C. Acquisition Strategy The RCSS-L contract will be awarded under full and open competition in FY 2000.					
D. Schedule Profile					
Fiscal Year actual and planned events:					
	FY1998	FY1999	FY2000	FY2001	
<b>Acquisition</b>					
<b>Milestones</b>					
RCSS-L		MSI	MSII		
<b>Engineering Milestones</b>					
<b>T&amp;E Milestones</b>					
RCSS-L			DT		
<b>Contract Milestones</b>			EMD		

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Exhibit R-3 Cost Analysis (page 1)								Date: February 1999				
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	TBD		1.000		1.500		4.375				
Ancillary Hardware Development												
Systems Engineering				0.750				1.000				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development				1.750		1.500		5.375		CONT	CONT	
Remarks:												
Development Support						0.250						
Software Development				0.250		0.250		0.500				
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support				0.250		0.500		0.500		CONT	CONT	
Remarks												

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Exhibit R-3 Cost Analysis (page 2)									Date: February 1999			
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								0.200				
IOT&E												
DT												
IOT&E												
Subtotal T&E								0.200		CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support								0.125				
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management								0.125		CONT	CONT	
Remarks												
Total Cost				2.000		2.000		6.200				
Remarks												

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Exhibit R-2a, RDT&E Project Justification								Date:		
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 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
MDARS-I	N/A	3.115	1.500	1.500					CONT	CONT
RDT&E Articles Qty										
<p>A. <u>Mission Description and Budget Item Justification.</u> The Mobile Detection Assessment Response System - Interior (MDARS-I) is intended to support the physical security of fixed installations including warehouses 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 1998 Accomplishments</u></p> <ul style="list-style-type: none"> <li>No EMD Funding during this fiscal year</li> </ul> <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> <li>Award Engineering Manufacturing Development (EMD) contract</li> <li>Design/fabricate pre-production prototype system</li> </ul> <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> <li>Conduct Developmental and Operational Tests (DT/OT)</li> </ul> <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> <li>Initiate Pre-Planned Product Improvement effort</li> <li>Engineering and program management support for the MDARS-E program</li> <li>Obtain MSIII decision</li> </ul> <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile</p>										

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 1999			
Fiscal Year actual and planned events:					
	FY1998	FY1999	FY2000	FY2001	
<b>Acquisition Milestones</b>					
MDARS-I		MSI/II		MSIII	
<b>Engineering Milestones</b>					
<b>T&amp;E Milestones</b>					
MDARS-I		TFT		DT/OT	
<b>Contract Milestones</b>			EMD		

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Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
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 1999			
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				0.165		0.100						
Operational Test												
Tooling												
GFE												
Award Fees												
Subtotal T&E				0.165		0.100				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				3.115		1.500		1.500				
Remarks												

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P771/P773

COST (In Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Total Cost
Total Program Element (PE) Cost	50,312	30,125	29,382	16,401	16,654	17,000	17,356	17,722	Cont.
LINK-16 - P771	5,146	2,711	4,304	4,085	9,067	10,128	17,356	17,722	Cont.
Multifunctional Information Distribution System-Low Volume Terminal (MIDS-LVT) - P773	45,166	27,414	25,078	12,316	7,587	6,872	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 (MIDS) which is a joint and international cooperative program involving 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 element also supports the expanded application of LINK 16 to U.S. forces, including LINK 16, spectrum certification and investigation of operational enhancements.

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 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P771

COST (In Millions)		FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Total Cost
LINK-16 - P771		5,146	2,711	4,304	4,085	9,067	10,128	17,356	17,722	Cont.

A. Mission Description and Budget Item Justification

This element funds the expanded application of LINK-16 to U.S. forces, including LINK 16, spectrum certification and investigation of operational enhancements.

PROGRAM ACCOMPLISHMENTS AND PLANS

1. FY 1998 ACCOMPLISHMENTS:

- Continued LINK-16 (\$5,146 Million)
- Provided technical support and Link-16 support for international users
- Continued efforts, including testing, associated with receiving and maintaining frequency certification
- Continued development/analysis for increased operational requirements

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P771	

## 2. FY 1999 PLANS:

- Continue LINK-16 (\$2,711 Million)
- Provide technical support and Link-16 support for international users
- Continue efforts, including testing, associated with receiving and maintaining frequency certification
- Continue development/analysis for increased operational requirements

## 3. FY 2000 PLANS:

- Continue LINK-16 (\$4,304 Million)
- Provide technical support and Link-16 support for international users
- Continue efforts, including testing, associated with receiving and maintaining frequency certification
- Continue development/analysis for increased operational requirements

## 4. FY 2001 PLANS

- Continue LINK-16 (\$4,085 Million)
- Provide technical support and Link-16 support for international users
- Continue efforts, including testing, associated with receiving and maintaining frequency certification
- Continue development/analysis for increased operational requirements

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P771

B. Program Change Summary

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Previous Budget Submit FY 00/01 BES Appropriated Value	5,412	2,793	4,327	4,153
Adjustments to Appropriated Value				
a. Below threshold program adjustments	(.266)	(.082)	(.023)	(.068)
Current President's Budget FY 00/01	5,146	2,711	4,304	4,085

Change Summary Explanation:

Funding:

Schedule: N/A

Technical: 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/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P771	

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 1999
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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P773
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COST (In Millions)		FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Total Cost
MIDS - P773		45,166	27,414	25,078	12,316	7,587	6,872	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 1998 ACCOMPLISHMENTS:

- Continued MIDS EMD (\$45,166 Million)
  - Continued Supplement 3 negotiations
  - Initiated delivery of MIDS terminals
  - Continued delivery of MIDS Interface Simulators (MIS) Version 1
  - Continued MIDS-LVT CDT&E testing (including Army Variant)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE
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		February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P773	

## FY 1998 ACCOMPLISHMENTS (continued):

- Continued studies related to proliferation of MIDS in U.S platforms
- Initiated government laboratory testing
- Initiated pre-operational support of MIDS On Ship, F/A-18, F/A-16, and Army integration and testing
- Initiated government developmental testing/operation and testing of various MIDS platforms
- Continued corrective action for problems discovered in testing (contractor and government)
- Continued Production Readiness Other Transaction Agreements (OTA's) efforts
- Initiated production decision preparation and process
- Extended MIDS EMD Contract by nine months, to December 1999
- Continued management support in the International Program Office

## 2. FY 1999 PLANS:

- Continue MIDS EMD (\$27,414 Million)
  - Extend Production Readiness Agreements
  - Conclude Supplement 3 negotiations
  - Extend MIDS EMD contract six months to June 00 for interim support
  - Plan for Software Support Activity capability
  - Continue management support in the International Program Office
  - Perform Award Fees Boards
  - Establish Technical Data Support Organization
  - First EMD F/A-18 flight
  - Initiate Developmental Test & Evaluation of Army MIDS Configuration
  - Provide terminal support for initiation of Independent Operational Test & Evaluation of F/A-18
  - Continue delivery of MIDS terminals
  - Continue pre-operational support
  - Continue corrective action for problems discovered in testing (contractor and government)
  - Deliver MIDS Interface Simulators (MIS) Version 2
  - Initiate delivery of MIDS Interface Simulator (MIS) Version 3
  - Continue government developmental testing/operational testing of various MIDS platforms

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE
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		February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P773	

### 3. FY 2000 PLANS:

- Continue MIDS EMD (\$25.078 Million)
  - Complete MIDS EMD Contract
  - Continue F/A-18 Independent Operational Test & Evaluation terminal support
  - Achieve MIDS Milestone III Decision
  - Establish software support activity capability
  - Continue F/A-18 flight testing
  - Continue management support in the International Program Office
  - Complete Pre-Operational Support under MIDSCO Contract
  - Initiate correction of deficiencies resulting from operational testing

### 4. FY 2001 PLANS:

- Continue EMD MIDS (\$12,316 Million)
  - Initiate F/A-18 MIDS Technical Evaluation and Operational Evaluation
  - Achieve Ship Initial Operational Capability for LVT
  - Achieve Army Initial Operational Capability for LVT-2
  - Continue correction of deficiencies resulting from operational testing
  - First article qualification testing for new contractors
  - Interchangeability testing of various configurations
  - Initiate Developmental testing-II for A-4 and A-6
  - Initiate submarine Technical Evaluation and Operational Evaluation

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P773

B. Program Change Summary

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Previous Budget Submit FY 00/01 BES Appropriated Value	47,854	27,719	12,314	12,521
Adjustments to Appropriated Value				
a. Revisions to program requirements and inflation estimates	(2,688)	(.305)	12,764	.205
Current President Budget Submit FY 00/01	45,166	27,414	25,078	12,316

Change Summary Explanation:

Funding:

Schedule: N/A

Technical: N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1999
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APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P773
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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									
ICN 310525000	.000	47,100	.000	34,100	37,600	43,200	39,300	36,500	
OPN									
ICN 343130000	.000	.000	.000	1,898	3,952	3,953	4,340	5,918	
ICN 342614000	.000	.000	2,400	2,000	4,300	10,900	24,700	22,900	
AP,AF									
PE0207134F/PE0207130F	31,800	40,760	31,980	13,453	.000	.000	15,900	.000	
PE0207133F	.000	.000	.000	26,910	49,592	53,558	29,373	29,994	
OPA									
PE02008864C	.000	15,100	.000	.000	.000	.000	.000	.000	
Related RDT&E									
PE0603713A	1,000	6,300	0.000	.100	.100	.100	.100	.100	
PE0205604N	37,415	44,730	42,452	18,407	13,346	17,003	.000	.000	
PE0604503N	1,399	2,882	1,423	.000	.000	.000	.000	.000	
PE0207134F	7,600	.000	.000	.000	.000	.000	.000	.000	
PE0207133F	0.000	2,240	1,090	.000	.000	.000	.000	.000	

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution System (JTIDS) 0604771D8Z/P773

D. Acquisition Strategy

A Defense Acquisition Board for a Milestone III decision is planned in April 00 to support production contract award in June 00. A competitive acquisition strategy will be executed with potential for award to more than one qualified bidder. Initial contract award will include first article qualification test units and production units for Navy, Air Force and Army requirements.

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	
<b>Supplement</b>	> _____ *															
<b>3 Negotiations</b>																
<b>EMD Contract</b>																
MIS Deliveries	_____ *V1				>V2				____>V3 *V3							
MIDS Navy Terminals	> _____ *															
Army Terminals	> _____ *															
Pre-Operational Support	> _____ *															

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE
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		February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA-5	R-1 ITEM NOMENCLATURE Joint Tactical Information Distribution Systems (JTIDS) 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	1	2	3	4			

**Production Readiness**

> \_\_\_\_\_ \*

Agreement Competition

**T & E Milestones**

Ships

> \_\_\_\_\_  
TECHEVAL/OPEVAL

Support F/A-18

Technical & Operational Evaluations

> \_\_\_\_\_  
IOT&E TECHEVAL/OPEVAL

**LRIP**

\*

**Production Decision**

\*

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

DATE: FEBRUARY 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604771D8Z

PROJECT NUMBER: P771

PROJECT TITLE: COMMON JOINT TACTICAL INFORMATION

Exhibit R-3 Cost Analysis (page 1)								Date: February 1999				
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 Engineering Support		Various	2.464									
LINK-16 Spectrum Support		Various	4.693	2.343	Dec 99	2.488	Dec 00	2.562	Dec 01	Cont.	Cont.	Cont.
Misc Contracts		Various	2.778	.368		1.816		1.523		Cont.	Cont.	Cont.
Misc Labs		Various	.635									
Subtotal Product Development			10.570	2.711		4.304		4.085		Cont.	Cont.	Cont.
Remarks:												
<b>Total Cost</b>			10.570	2.711		4.304		4.085		Cont.	Cont.	Cont.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>									<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-wide/BA 5						<b>R-1 ITEM NOMENCLATURE</b> COMMERCIAL O & S SAVINGS INITIATIVE PE 0604805D8Z				
<i>COST (In Millions)</i>	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Commercial O&S Savings Initiative	0	7.901	16.976	15.129	16.102	16.519	16.867	17.221	Continuing	Continuing

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

**(U) BRIEF DESCRIPTION OF ELEMENT:** 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 and processes into military systems. COSSI is a crucial element in DoD's strategy to reduce the operations and support (O&S) costs of fielded equipment. As legacy systems age, O&S costs increase, and COSSI is an effective way to lower these costs. Reducing O&S costs can make more funds available for procurement. In addition, COSSI 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 incentivizes the Services to structure joint projects with pervasive impact across weapon systems, and to institutionalize the use of Other Transaction Agreements. This program was previously been managed by DARPA. In FY1999, funding and management responsibility were transferred to the Services and OSD.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA 3	R-1 ITEM NOMENCLATURE COMMERCIAL O & S SAVINGS INITIATIVE PE 0604805D8Z	

COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Commercial O&S Savings Initiative	0	7.901	16.976	15.129	16.102	16.519	16.867	17.221	Continuing	Continuing

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

**(U) FY 1998 Accomplishments:**

In FY 1998, COSSI was managed and funded by DARPA (PE 603805E). COSSI funds were used to complete 30 projects started in FY 1997. These projects are: composite rotor and blades for the Apache helicopter (\$11,500,000), Composite 12-ton semitrailer van (\$900,000), eyesafe laser rangefinder for the OH58 helicopter (\$2,947,000), computer replacement for the Guardrail Sensor System (\$4,026,000), night vision heads-up displays (\$764,000), polymeric serving container for operational rations (\$515,000), satellite tracking system for materiel (\$1,635,000), Advanced flight control computer for the UH-60 helicopter (\$3,123,000), composite main rotor blade for the UH-60 helicopter (\$4,486,000), low cost computer encryption card (\$414,000), ultrasonic testing of pressure vessels aboard ships (\$294,000), lithium ion batteries for underwater vehicles (\$3,450,000), portable engine test cell for the H-53 helicopter (\$359,000), communications gateway for intelligence systems interoperability (\$1,865,000), integrated usage and monitoring system for the H-53 helicopter (\$9,021,000), integrated system management tools for software (\$2,058,000), reconfigurable electronic modules for the AN/SPS-67 radar (\$1,128,000), light weight aircraft battery (\$262,000), laser cladding process for corrosion resistance (\$323,000), COTS hardware and open system software for the AN/BQR-22 system (\$3,105,000), information transfer using "push" software (\$180,000), inspection kit for composite propeller blades (\$200,000), commercially based processing for F/A18 C/D avionics (\$13,957,000), data capture and analysis system for shipboard logistics (\$5,228,000), VME standard components for the MILSTAR antenna positioning control unit (\$158,000), discontinuous reinforced aluminum sheet for the F16 (\$2,170,000), commercially based processing for the F15 avionics (\$10,361,000), VME standard bus for the mini-mutes system (\$1,485,000), data distribution kits for mobile command centers (\$4,011,000), exhaust nozzle for the F110 engine (\$6,640,000).

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA 3	R-1 ITEM NOMENCLATURE COMMERCIAL O & S SAVINGS INITIATIVE PE 0604805D8Z	

(U) **FY 1999 Plans:**

Funding and management responsibility for COSSI was transferred to the Services and OSD in FY1999. A solicitation was issued for COSSI proposals in December, 1998. Twenty-eight proposals were received and approximately ten more are expected. Many of the proposals involve the use of commercial computers, electronics, and interfaces to reduce O&S costs on legacy aircraft, system redesigns for improved fuel efficiency and improved test equipment. The proposed projects have the potential to substantially reduce O&S costs. The proposals are being evaluated by the Services and the best ones will be provided funding.

(U) **FY 2000 Plans:**

DoD will again issue a joint solicitation for the FY2000 program. Lessons learned during previous rounds of COSSI 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.

(U) **FY 2001 Plans:**

DoD will issue a joint solicitation for the FY2001 program. Lessons learned during previous rounds of COSSI will be used to further refine the program. DoD will use the OSD line to incentivize joint projects.

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA 3	R-1 ITEM NOMENCLATURE COMMERCIAL O & S SAVINGS INITIATIVE PE 0604805D8Z	

<b><u>(U) B. Program Change Summary</u></b>	<b><u>FY1998</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>To Complete</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	0	13.410	17.243	15.384	Continuing	Continuing
Appropriated Value	0	8.000				
Adjustments to Appropriated Value	0					
a. Congressionally-directed undistributed reduction						
b. Below threshold reprogramming		(-.099)	-.267	-.255		
c. Other						
Current Budget Submit/President's Budget		7.901	16.976	15.129	Continuing	Continuing

**Change Summary Explanation:**

- (U) **Funding:** Reductions due to Congressional adjustments as well as programmatic changes and revised inflation estimates.
- (U) **Schedule:** Not Applicable
- (U) **Technical:** Not Applicable
- (U) **C. Other Program Funding Summary Cost:** Not applicable
- (U) **D. Schedule Profile:** Not Applicable
- (U) **E. Acquisition Strategy:** Not Applicable

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**Exhibit R-1, RDT&E Programs**

**Department of Defense**

**Appropriation: RDT&E, Defense Wide**

**Date: January 26, 1999**

<u>R-1 Line Item No</u>	<u>Program Element Number</u>	<u>Item</u>	<u>Budget Activity</u>	<u>Past Year Cost</u>	<u>TOA, \$ in Millions</u>		
					<u>Current Year Cost</u>	<u>FY99 Cost</u>	<u>FY00 Cost</u>
	0603858D8Z	Unexploded Ordnance	BA6	0	0	1.259	1.226

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification								Date: February 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/Budget Activity 6					R-1 ITEM NOMENCLATURE Unexploded Ordnance Detection & Clearance - PE 0603858D8Z					
COST (\$ in millions)	FY PY	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	Cost to Complete	Total Cost
Total PE Cost	0	0	1.259	1.226	1.221	1.215	0	0	Continuing	Continuing
Project A Name/No. & subtotal cost										
Project B Name/No. & subtotal cost										
Project C Name/No. & subtotal cost										
Quantity of RDT&E Articles										

**A. Mission Description and Budget Item Justification**

**Brief Description of Element**

This program element funds the Joint Unexploded Ordnance Coordinating 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, 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 1998 Accomplishments:**

- Stood-up the Joint UXO Coordination Office (JUXOCO) at Ft. Belvoir, VA.
- Focused the expertise, capabilities and technologies of the government, academia and industry to improve the detection and clearance of UXO nationally and internationally. Developed a MOU between DOE and DOD for the conduct of Cooperative R&D programs for UXO/Mine Detection and Neutralization (Not Applicable)
- Assessed current technology capabilities against mission requirements and developed investment strategies. This involved conducting a requirements workshop, a resource managers workshop, and technology workshops in aided target recognition, magnetometry, radar, chemical sensors, active electromagnetics, electro-optics, robotics, large area clearance, and render safe/neutralization. (Not Applicable)
- Updated and maintained the UXO clearance/detection database and computer website to promote active interaction and sharing of information, concepts and technology within DoD and with other US and international agencies, academia, and industry. See www.denix.osd.mil/UXOCOE. (Not Applicable)
- Developed standardized target UXO, benchmarks, metrics, milestones and deliverables. Established a pilot site at Ft. A.P. Hill, VA to demonstrate test protocols. (Not Applicable)
- Drafted a report for review in preparation for submission to the EXCOM and Congress. (Not Applicable)

(U) **FY 1999 Plans:**

- Preparation of updated report for submission to Congress. (\$ 0.100 million)
- Continue to function as the focal point for UXO detection and clearance expertise. (\$ 0.159 million)
- Promote international cooperation and forge coordinated working research efforts in promising technologies. (\$ 0.100 million)
- Continue development of standards, test sites, test targets and test protocols. Select and establish common test sites, data formats, and metrics. (\$ 0.780 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. (0.120 million)

(U) **FY 2000 Plans:**

- 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. (\$.926 million)

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Exhibit R-2, RDT&E Budget Item Justification								Date: February 1999	
<ul style="list-style-type: none"> <li>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)</li> </ul>									
(U) <b>FY2001 Plans:</b>									
<ul style="list-style-type: none"> <li>Conduct requirements and technology workshops to update the technological thrusts for UXO RDT&amp;E. (\$0.100 million)</li> <li>Integrate international and industrial research and equipment into a computerized database of UXO RDT&amp;E to enhance information sharing. (\$0.100 million)</li> <li>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. (\$1.021 million)</li> </ul>									
<b>B. Program Change Summary:</b> Not Applicable									
<b>C. Other Program Funding Summary:</b> 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>	<u>To</u>	<u>Total</u>
0	1.5	0.5	0.5	0.5	0.5	0.5	0	Continuing	Continuing
<b>D. Acquisition Strategy:</b> Not Applicable									
<b>E. Schedule Profile:</b> Not Applicable									

**UNCLASSIFIED**

Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
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 PY	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	Cost to Complete	Total Cost
Total PE Cost	0	0	1.259	1.226	1.221	1.215	0	0	Continuing	Continuing
RDT&E Articles Qty										

**A. Mission Description and Budget Item Justification**

**Brief Description of Element**  
 This program element funds the Joint Unexploded Ordnance Coordinating 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, 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.

**Program Accomplishments and Plans:**

(U) FY 1998 Accomplishments:

- Stood-up the Joint UXO Coordination Office (JUXOCO) at Ft. Belvoir, VA.
- Focused the expertise, capabilities and technologies of the government, academia and industry to improve the detection and clearance of UXO nationally and internationally. Developed a MOU between DOE and DOD for the conduct of Cooperative R&D programs for UXO/Mine Detection and Neutralization (Not Applicable)
- Assessed current technology capabilities against mission requirements and developed investment strategies. This involved conducting a requirements workshop, a resource managers workshop, and technology workshops in aided target recognition, magnetometry, radar, chemical sensors, active electromagnetics, electro-optics, robotics, large area clearance, and render safe/neutralization. (Not Applicable)
- Updated and maintained the UXO clearance/detection database and computer website to promote active interaction and sharing of information, concepts and technology within DoD and with other US and international agencies, academia, and industry. See www.denix.osd.mil/UXOCOE. (Not Applicable)
- Developed standardized target UXO, benchmarks, metrics, milestones and deliverables. Established a pilot site at Ft. A.P. Hill, VA to demonstrate test protocols. (Not Applicable)
- Drafted a report for review in preparation for submission to the EXCOM and Congress. (Not Applicable)

(U) FY 1999 Plans:

- Preparation of updated report for submission to Congress. (\$ 0.100 million)
- Continue to function as the focal point for UXO detection and clearance expertise. (\$ 0.159 million)
- Promote international cooperation and forge coordinated working research efforts in promising technologies. (\$ 0.100 million)
- Continue development of standards, test sites, test targets and test protocols. Select and establish common test sites, data formats, and metrics. (\$ 0.780 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. (0.120 million)

(U) FY 2000 Plans:

- 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. (\$.926 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) FY2001 Plans:

- 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)

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Exhibit R-2a, RDT&E Project Justification								Date: February 1999	
<ul style="list-style-type: none"> <li>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. (\$1.021 million)</li> </ul>									
<b>B. Other Program Funding Summary:</b> 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>	<u>To Complete</u>	<u>Total Cost</u>
0	1.5	0.5	0.5	0.5	0.5	0.5	0	Continuing	Continuing
<b>C. Acquisition Strategy:</b> Not Applicable									
<b>D. Schedule Profile:</b> Not Applicable									

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification								Date: February 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/Budget Activity 6					R-1 ITEM NOMENCLATURE Unexploded Ordnance Detection & Clearance - PE 0603858D8Z					
COST (\$ in millions)	FY PY	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	Cost to Complete	Total Cost
Total PE Cost	0	0	1.259	1.226	1.221	1.215	0	0	Continuing	Continuing
Project A Name/No. & subtotal cost										
Project B Name/No. & subtotal cost										
Project C Name/No. & subtotal cost										
Quantity of RDT&E Articles										

**A. Mission Description and Budget Item Justification**

**Brief Description of Element**

This program element funds the Joint Unexploded Ordnance Coordinating 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.

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**Program Accomplishments and Plans:**

(U) FY 1998 Accomplishments:

- Stood-up the Joint UXO Coordination Office (JUXOCO) at Ft. Belvoir, VA.
- Focused the expertise, capabilities and technologies of the government, academia and industry to improve the detection and clearance of UXO nationally and internationally. Developed a MOU between DOE and DOD for the conduct of Cooperative R&D programs for UXO/Mine Detection and Neutralization (Not Applicable)
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- Developed standardized target UXO, benchmarks, metrics, milestones and deliverables. Established a pilot site at Ft. A.P. Hill, VA to demonstrate test protocols. (Not Applicable)
- Drafted a report for review in preparation for submission to the EXCOM and Congress. (Not Applicable)

(U) FY 1999 Plans:

- Preparation of updated report for submission to Congress. (\$ 0.100 million)
- Continue to function as the focal point for UXO detection and clearance expertise. (\$ 0.159 million)
- Promote international cooperation and forge coordinated working research efforts in promising technologies. (\$ 0.100 million)
- Continue development of standards, test sites, test targets and test protocols. Select and establish common test sites, data formats, and metrics. (\$ 0.780 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. (0.120 million)

(U) FY 2000 Plans:

- 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. (\$.926 million)

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification								Date: February 1999	
<ul style="list-style-type: none"> <li>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)</li> </ul>									
(U) <b>FY2001 Plans:</b>									
<ul style="list-style-type: none"> <li>Conduct requirements and technology workshops to update the technological thrusts for UXO RDT&amp;E. (\$0.100 million)</li> <li>Integrate international and industrial research and equipment into a computerized database of UXO RDT&amp;E to enhance information sharing. (\$0.100 million)</li> <li>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. (\$1.021 million)</li> </ul>									
<b>B. Program Change Summary:</b> Not Applicable									
<b>C. Other Program Funding Summary:</b> 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>	<u>To</u>	<u>Total</u>
0	1.5	0.5	0.5	0.5	0.5	0.5	0	Continuing	Continuing
<b>D. Acquisition Strategy:</b> Not Applicable									
<b>E. Schedule Profile:</b> Not Applicable									

**UNCLASSIFIED**

Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
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 PY	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	Cost to Complete	Total Cost
Total PE Cost	0	0	1.259	1.226	1.221	1.215	0	0	Continuing	Continuing
RDT&E Articles Qty										

**A. Mission Description and Budget Item Justification**

**Brief Description of Element**  
 This program element funds the Joint Unexploded Ordnance Coordinating 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.

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**Program Accomplishments and Plans:**

(U) FY 1998 Accomplishments:

- Stood-up the Joint UXO Coordination Office (JUXOCO) at Ft. Belvoir, VA.
- Focused the expertise, capabilities and technologies of the government, academia and industry to improve the detection and clearance of UXO nationally and internationally. Developed a MOU between DOE and DOD for the conduct of Cooperative R&D programs for UXO/Mine Detection and Neutralization (Not Applicable)
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- Drafted a report for review in preparation for submission to the EXCOM and Congress. (Not Applicable)

(U) FY 1999 Plans:

- Preparation of updated report for submission to Congress. (\$ 0.100 million)
- Continue to function as the focal point for UXO detection and clearance expertise. (\$ 0.159 million)
- Promote international cooperation and forge coordinated working research efforts in promising technologies. (\$ 0.100 million)
- Continue development of standards, test sites, test targets and test protocols. Select and establish common test sites, data formats, and metrics. (\$ 0.780 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. (0.120 million)

(U) FY 2000 Plans:

- 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. (\$.926 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) FY2001 Plans:

- 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)

**UNCLASSIFIED**

**UNCLASSIFIED**

Exhibit R-2a, RDT&E Project Justification								Date: February 1999	
<ul style="list-style-type: none"> <li>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. (\$1.021 million)</li> </ul>									
<b>B. Other Program Funding Summary:</b> 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>	<u>To Complete</u>	<u>Total Cost</u>
0	1.5	0.5	0.5	0.5	0.5	0.5	0	Continuing	Continuing
<b>C. Acquisition Strategy:</b> Not Applicable									
<b>D. Schedule Profile:</b> Not Applicable									

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification								Date: February 1999		
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	4.655*	3.868**	4.900	5.000	5.100	5.200	5.300	5.400	Continuing	Continuing
National Assessment Group Project Code: 842	4.655*	3.868**	4.900	5.000	5.100	5.200	5.300	5.400	Continuing	Continuing

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

**(U) BRIEF DESCRIPTION OF ELEMENT:** The National Assessment Group (NAG) charter mandates the organization to continue providing low cost, responsive, evaluations of National Level programs belonging to Department of Defense. The NAG shall continue to encompass the provisions for comprehensive evaluations support, instrumentation, open sources integrated research and analyses, technical engineering, operations security, risk management, logistics support, rapid assessments, and integration of technology prototypes, and their applications for DOD programs. In addition, the NAG will continue an emphasis on quick reaction to current warfighter requirements. \*The FY 1998 DoD Appropriations Conference Report directed the transfer of \$4.655 thousand from DT&E to RDT&E, Defense Wide, Assessment and Evaluation Program Element. The actual transfer did not occur until FY-99. The NAG was funded from DT&E for FY 1998.

**PROGRAM ACCOMPLISHMENTS AND PLANS:**

**(U) FY 1998 Accomplishments:**

- Provided evaluation support, instrumentation, open source integrated research and analysis and technical engineering in support of DOD programs. (\$1.500 Million)
- Provided integration of technology prototypes and their application for DOD programs, projects and operations. (\$.300 Million)
- Infrastructure support of the NAG ensuring ability to provide quick reaction to current warfighter requirements. (\$2.855 Million)

**UNCLASSIFIED**

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification		Date: February 1999
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 1999 Plans:

- Continue to provide evaluation support, instrumentation, open source integrated research and analysis and technical engineering in support of DOD programs. (\$1.168 Million)
- Provided integration of technology prototypes and their application for DOD programs, projects and operations. (\$.255 Million)
- Continuation of infrastructure support of the NAG ensuring ability to provide quick reaction to current warfighter requirements. (\$2.340 Million)
- Purchase and maintenance of instrumentation equipment in support of DOD programs. (\$.105 Million)

(U) FY 2000 Plans:

- Continue to provide evaluation support, instrumentation, open source integrated research and analysis and technical engineering in support of DOD programs. (\$1.568 Million)
- Continue to provide integration of technology prototypes and their application for DOD programs, projects and operations. (\$.343 Million)
- Continuation of infrastructure support of the NAG ensuring ability to provide quick reaction to current warfighter requirements. (\$2.842 Million)
- Purchase and maintenance of instrumentation equipment in support of DOD programs. (\$.147 Million)

(U) FY 2001 Plans:

- Continue to provide evaluation support, instrumentation, open source integrated research and analysis and technical engineering in support of DOD programs. (\$1.600 Million)
- Continue to provide integration of technology prototypes and their application for DOD programs, projects and operations. (\$.350 Million)

**UNCLASSIFIED**

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E – Defense Wide/Budget Activity: 6	R-1 ITEM NOMENCLATURE Assessments and Evaluations – PE: 0604942D8Z	

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

- Continuation of infrastructure support of the NAG ensuring ability to provide quick reaction to current warfighter requirements. (\$2.900 Million)
- Purchase and maintenance of instrumentation equipment in support of DOD programs. (\$.150 Million)

<b>(U) B. <u>Program Change Summary</u></b>	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	4.655	3.916	0	0	Continuing

Appropriated Value

Congressional Directed Transfer (From DT&E 0450; PE65804D)	4.655	3.916			
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Adjustments to Appropriated  
Value/Transferred Amount

- |  |  |        |  |  |  |
|--|--|--------|--|--|--|
| a. Congressionally-directed<br>undistributed reduction |  | (.132) |  |  |  |
| b. Other   |  |        |  |  |  |

Current Budget Submit/President's Budget	4.655*	3.868**	4.900	5.000	Continuing
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(U) Funding: The change in FY 1999 is due to Congressional undistributed reductions.

(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

**UNCLASSIFIED**

**UNCLASSIFIED**

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE <b>February 1999</b>		
APPROPRIATION/BUDGET ACTIVITY <b>Research, Development, Test &amp; Evaluation, Defense-wide</b>					R-1 ITEM NOMENCLATURE <b>Technical Studies, Support &amp; Analysis PE 0605104D</b>				
<b>COST (In Millions)</b>	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	
Total Program Element (PE) Cost	30.592	29.641	29.506	30.016	30.459	30.870	31.517	32.180	
P421 Tech Studies, Support & Analysis	30.592	29.641	29.506	30.016	30.459	30.870	31.517	32.180	

**A. Mission Description and Budget Item Justification**

**BRIEF DESCRIPTION OF ELEMENT:** This program element is classified in Budget Activity 6 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 and Technology [USD(A&T)], 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.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY <b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	R-1 ITEM NOMENCLATURE <b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

**PROGRAM ACCOMPLISHMENTS AND PLANS:****General Support for USD(ACQUISITION & TECHNOLOGY):****FY1998 Accomplishments**

- Developed prototype training tool to advance Program Manager's knowledge of PPBS and programmers' and budgeters' knowledge of the acquisition system
- Developed lessons learned regarding processes used in first Quadrennial Defense Review (QDR), offered options for improving such processes in future reviews of this kind, and provided initial proposals for acquiring assessment capabilities that benefit DoD in the next QDR.
- Supported National Partnership for Reinventing Government (NPR) goal of providing visibility into weapon systems life cycle cost by providing a basis for estimating costs of future systems.
- Supported National Performance Review goal of defining requirements and establishing a cost accounting system that provides routine visibility into weapon system life-cycle costs through activity based costing and management.
- Spin-off research required after the cost and operational effectiveness assessments of deep attack weapons mix
- Analyses of technical issues affecting the relative performance of ballistic and cruise missile defense systems.
- Independent assessment of the Navy's Surface Ship Torpedo Defense program at the request of Congress.
- Analysis and planning for clearance of anti-personnel land mines and unexploded ordnance
- Assessments of schedule and technical risks associated with tactical aircraft and missile programs in preparation for acquisition milestone meetings.
- Analysis of cost and schedule impacts of applying stealth technology to tactical aircraft and other systems.
- Developed automated Purchase Request, as a prototype initiative for Paperless Contracting
- Benchmarking, analysis and modeling of private and public sector career development, continuing education, and professional certification programs to support the design of a comprehensive continuous learning policy and program for the defense acquisition workforce.

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- Development and application of an analytical model and resulting recommendations for determining Defense Acquisition University core requirements and faculty structure for policy-level application and decision-making.
- Currently updating the Congressional mandated Joint Warfighting Science and Technology Plan for year 1999 and the companion science and technology planning documents.
- Currently conducting affordability activities with industry.
- Development of acquisition workforce decision support system specifications, including a data model, function flow diagrams, and prototype screen designs.
- Collected and conformed DoD-wide position and organization data to algorithm developed for analysis of individual position designations.
- Assessed feasibility of using recent technology advances in browser-based information technology to improve OUSD (A&T) information access and management.
- Determined environmental costs associated with weapon systems' life cycles.
- Reviewed and recommended a process for scrapping marine vessels in an environmentally prudent manner.
- Performed analysis of European Industrial Strategies, Cooperative Programs and Possible U.S. responses/ICOG
- Initiated the development and maintenance of International MOU Data Base for use by OSD, all Services and Components
- Support for the International Cooperative Research and Development (Nunn) process
- Developed Defense Modeling and Simulation Initiative with the Republic of Korea
- Developed Integrated Product and Process (IPPD) handbook and training, risk and software policy in DoD 5000.2-R, and risk and software practices in the Acquisition Deskbook.

#### FY 1999 Program

- Program Schedule and Cost Risk Assessment for the Assembled Chemical Weapons Assessment (ACWA)
- Examining the Implications of Transatlantic Industrial Cooperation
- Examining Leasing and Other Alternative Uses of Non-Excess Military Property

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Laboratory Restructuring & Consolidation: an independent analysis of functions and costs at all Defense labs, toward possible re-engineering
- Cost Benefit Analysis of Raising Micro Purchase Card Threshold, especially as it impacts small and minority-owned businesses
- Attack Submarine Force Structure Study
- Working Capital Funds Reform
- Property, Plant and Equipment Accountability - Analysis and Scope of New Mission
- Co-sponsor a multi-Federal Agency effort, underwriting an initiative to assess the European air transport industry
- Design, develop, and apply optimization technology techniques for improving long range planning of defense acquisitions in areas found most promising.
- Improve the overall management of Defense contracts by integrating earned value management with technical accomplishments. Determine key technical performance parameters for a contract, map them to the Work Breakdown Structure elements, and assess cost and schedule.
- Support the Deputy Secretary's goal of paperless operations by obtaining the planning and analysis needed to support paperless processing of FY00 Program Objective Memorandum.
- Support National Partnership for Reinventing Government (NPR) goal of reducing cycle time by 25 percent.
- Advance acquisition workforce staff understanding of PPBS by developing simulation/game teaching tools
- Continue analysis of cost-effectiveness of incorporating stealth technologies into aircraft, unmanned systems, and certain classes of weapons.
- Analyses of Theater and National Missile Defense requirements, including technology and system performance issues related to development and use of laser systems for missile defense
- Address issues affecting relative performance of deep attack systems, including modeling system survivability at low altitudes.
- Respond to Congressional direction to analyze requirements for reactive armor tiles.
- Update the Congressional mandated Joint Warfighting Science and Technology Plan for year 2000
- Planning affordability activities with industry
- Recruit, develop, reward and retain technology leaders

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Conduct strategic planning and implementation support for cross-service restructuring of laboratories
- Provide senior consultant to laboratory legislative issues
- Implement metrics for dual use science & technology programs
- Continue refinement of prototype design, methodology, and analytical plan to validate the business necessity of academic degrees for acquisition professionals by career field clusters.
- Full deployment of an acquisition workforce decision support system which integrates all military and civilian personnel, position, and organization data for convenient, desk-top use by acquisition functional managers and department leaders.
- Completion of a system of metrics linking career program features, as well as education and training, to functional (performance) outcomes to support workforce management and program design decisions.
- Identification of additional education and training requirements resulting from re-identification of acquisition workforce under the refined Packard model, and develop alternative implementation strategies.
- Develop Web-based automated Purchase Request, in support of Paperless Contracting goals
- Conduct two Program Executive Officer/System Commander Conferences
- Develop a methodology to reduce military impacts on the environment through implementation of the International Standards Organization (ISO) 14000 "Environmental Management Programs" standard.
- Develop strategy for military-to-military environmental cooperation with the People's Liberation Army of China.
- C4SI Interoperability between US and Republic of Korea (ROK)
- Russian/Former Soviet Union Cooperative Efforts Analysis
- Document the International Cooperative Research and Development process
- Support for the International Cooperative Research and Development (Nunn) process
- Analytic Support: International Armaments Cooperative Programmatic, Industrial and Politico-Military Initiatives
- Analytic Support for International Cooperative Opportunities (ICOG) Development

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Development and maintenance of International MOU Data Base for use by OSD, all Services and Components
- Continue development and implementation of systems engineering, simulation, software policy, best practices, and procedures as initiatives assigned by the Defense Systems Affordability Council to the Systems Engineering Steering Group.
- Integrate the Software, Systems Engineering and Integrated Product/Process Development (IPPD) Capability Maturity Models.

### FY2000 Plans

- Remain cognizant of latest management techniques that could be applied to DoD's weapons systems process and determine best way to apply them.
- Find or develop tools to support the paperless office initiative, to protect the information infrastructure, to simplify using the PPBS, and to optimize resource allocation.
- 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.
- Continue implementation, tracking, and metrics of acquisition reform initiatives-the heart of Revolution in Business Affairs needed to help pay for Revolution in Military Affairs.
- Finalize a strategy to minimize DoD's greenhouse gas emissions to minimize global climate change.
- Finalize a plan to incorporate environmental justice into DoD programs, policies, and activities.
- Initiatives from the Defense Systems Affordability Council in Systems Engineering functional areas.
- Annual update of the Congressional mandated Joint Warfighting Science and Technology Plan for 2000 and the companion science and technology planning documents.
- Depending on annual funding for the above list, the remainder will stay active until completion.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
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**FY2001 Plans**

- 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 implementation, tracking, and metrics of acquisition reform initiatives - the heart of the Revolution in Business Affairs needed to help pay for the Revolution in Military Affairs.
- Finalize unexploded ordnance detection and neutralization strategies.
- Finalize environmental security modeling and simulation of operational and technological systems.

**General Support for USD (POLICY)****FY 1998 Accomplishments:**

- Analyzed operational and strategic implications of specific issues related to the use of biological weapons and the threats they pose in a variety of regional contingencies
- Analyzed specific dimensions of the threats posed by the use of weapons of mass destruction, and how best to deter that threat.
- Analyzed threat from radiological dispersion devices, how those weapons might be used against U.S. forces, and how the U.S. might best respond
- Analyzed threat from biological terrorism, helped develop appropriate response mechanisms
- Identify and assess novel options that may be exploited by regional states for delivery of nuclear, chemical, and biological weapons.
- Analyzed nuclear weapon employment, supporting force/operational issues, and U.S. missile defense. Analyzed the relationships between missile defense, deterrence policy and counterproliferation efforts.
- Continued the development of analytical tools to better understand theater, component, and operational suppression of enemy air defense systems and battlefield operations.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
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- Develop and assess alternative approaches to conducting major theater wars
  - Continued development of computer gaming capability based on warfare simulation methodology designed to model effects of modern forces in nontraditional engagements.
  - Initiated the development of a comprehensive net assessment of space capabilities.
  - Developed plans for the OSD continuity of operations program. Conducted a series of exercises, which focused on specific problem areas. Developed a plan of action for improving continuity of operations policy and planning
  - Continued development of indicators/methodologies to help assess US/allied capabilities and US/allied performance toward meeting force improvement objectives. Analyzed selected burden-sharing indicators between NATO allies and others worldwide
  - Analyzed U.S. policy in the Balkans with a view toward identifying ways the U.S. could, in concert with its allies, promote greater regional stability and cooperation, as well as strengthen defense cooperation.
- Initiated analysis of logistics requirements needed to support new NATO missions and force structures

**FY 1999 Plans:**

- Continue the development of an African Center for Security Studies
- Analyze options for a sustainable long-term presence in the Asia Pacific region
- Develop a better understanding of Taiwan's evolving defense requirements in accordance with the Taiwan Relations Act
- Identify and evaluate priority measures that the US could take to maintain Alliance military effectiveness, with emphasis on interoperability and defense cooperation
- Develop long-term strategic framework in which force plans of new Allies can be evaluated and programs of military assistance can be prioritized
- Continue the analysis of logistics requirements needed to support new NATO missions and force structures

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY <b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	R-1 ITEM NOMENCLATURE <b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Identify ways to encourage the development of civilian defense expertise in Latin America and the Caribbean
- Continue work on biological terrorism and the role of the DoD in crisis response and consequence management
- Continue work on threats to military operations in chemical/biological environment
- Continue work on the joint suppression of enemy air defense (JSEAD)
- Explore alternative approaches and concepts for engaging Russia.
- Analyze a range of compellant strategies, with particular but not exclusive attention to the military dimension, drawing implications for U.S. strategy and force posture
- Conclude study of effectiveness of humanitarian airdrops initiated in FY 1998
- Analyze and explain DoD's strategy for countering terrorism, including the use of weapons of mass destruction on U.S. soil.
- Continue the implementation of the Interagency Terrorism Response Awareness Program to enhance our approaches for dealing with terrorism.
- Provide quick turnaround analyses in response to regional contingencies and emerging international crises

### **FY 2000 Plans**

- Continue to conduct regionally-focused studies on critical issues of concern to the department at that time. For example, China's continued growth as a regional military power raises issues concerning appropriate U.S. approaches and responses
- 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
- 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.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
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<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Continue development of a comprehensive net assessment of space capabilities.
- Assess implementation of nuclear employment policy guidance and examine critical policy issues involved with national and theater ballistic missile defense
- Continue investigating new operational concepts that existing US forces might use in conjunction with active and passive defense measures to mitigate the threat from enemy "anti-access" capabilities.
- Continue efforts in the area of modeling and simulation of future warfare in support of the QDR (Quadrennial Defense Review).
- Continue the assessment of asymmetric threats to U.S. security interests and help develop alternative U.S. strategies in accordance with the QDR.
- Examine alternate force structures, budget and strategy in support of the next (QDR).

#### **FY 2001 Plans:**

- Continue analysis of nuclear weapon employment policy and the relationship between missile defense, counterproliferation policy and counterproliferation policy.
- Continue to analyze the threat posed by proliferation of weapons of mass destruction and the impact on U.S. force structure, acquisition, logistics, training, and doctrine
- 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.
- Continue work on asymmetric threats and challenges and related follow-on issues raised by the QDR
- Continue the development of ideas and concepts for "transforming the force," as determined by the Quadrennial Defense Review. The goal would be a force structure better organized and equipped to deal with emerging threats and challenges.
- Continue work on development of anti-access approaches and methodologies as determined by the Quadrennial Defense Review

#### **General Support for the USD (Personnel & Readiness)**

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY <b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	R-1 ITEM NOMENCLATURE <b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

**FY 1998 Accomplishments:**Military Personnel Policy

- Congressional mandate: Investigated aviation pay authorities, explored alternative means of compensation and retention of aviators, and currently developing legislative recommendations.
- Congressional mandate: Examined effects of occupation consolidation and elimination (used to generate savings during the drawdown) on skill shortages/overall readiness.
- Evaluated the effectiveness of civilian-contracted telemarketing as a "tool" to enhance recruiting, and continue to examine the cost effectiveness of alternative mixes of national and local advertising.
- Developed innovative strategies to explore new markets to enhance recruiting: attracting college-bound youth into the military.
- Completed evaluation of JROTC Career Academy Program, which provides special military instruction and academic/ vocational training for "at-risk" high school students.
- Demonstrated importance of personnel support programs for military service members and families.
- Determined the impact of alternative retirement plans on civilian manpower supply.

**FY 1999 Plans:**Military Personnel Policy

- Continue to develop analytic tools to examine ways in which the military pay system and non-pecuniary factors (quality of life, promotion policies, etc.) affect overall recruiting and retention, and determine the most cost-effective mix of compensation and personnel policies to meet force strength objectives.
- Develop a model of recruiting for the Selected Reserves.
- Determine the impact of special duty assignment pay on difficult-to-fill and critical occupational specialties.
- Evaluate privatization of military recruiting.

Personnel and Family Support

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Continue 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.
- Continue to devise a cost-effective DoD civilian manpower plan in the drawdown, as budgets are constrained and military force levels decline.  
Reserve Force Utilization
- Continue to develop and evaluate alternative policies to foster more effective Active/Reserve Force integration.
- Continue to examine individual skill qualifications within the Reserve Component.
- Prepare to conduct a Reserve Component survey on readiness, Quality of Life, family issues, and attitudes of Service members and spouses toward military life.  
Military Health Policy
- Examine the future of the Military Health System in terms of its competitiveness with civilian benefits.
- Develop a methodology to determine the value of the medical health benefit.  
Equal Opportunity Policy
- Congressional mandate: Develop a survey that identifies and tracks sexual harassment in the military.

**FY 2000-2001 Plans:**

- Explore new concepts and develop analytical tools to measure personnel and unit readiness for Active and Reserve Components.
- Develop methods to improve the determination of total force requirements for manpower.
- Improve the technological capability of personnel systems to acquire, distribute, train, and utilize qualified personnel for Active and Reserve forces
- Evaluate alternatives for managing total force manpower.
- Monitor quality of life, equal opportunity and diversity of the force.
- Address congressional mandates and directives.

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General Support to Director, Program Analysis & Evaluation

FY 1998 Accomplishments:

Part I. Current Agenda Issues:

Infrastructure

- Examined steps needed to reap planned savings and whether expected savings will continue over time.
- Reviewed distribution and location of DoD family housing, and categorized housing based on availability and cost of private sector housing.
- Evaluated types of training for which organizational and procedural changes, such as outsourcing, appear most promising.
- Developed method and model to estimate size of theater stockpile: resupply ammunition.

Implementing QDR Strategy

- Analyzed AF and Navy tactical aircraft and weapons modernization.
- Reexamined amphibious lift requirements in context of 2 MTW requirements and impact of other factors of lift.
- Analyzed key international resource issues--NATO enlargement and allied burden sharing.
- Developed analytic foundation for examining opportunities and challenges from operating with non-U.S. military organizations in future SSCs.
- Refined cost methodologies and data for use in updating initial DoD cost of NATO enlargement.
- Developed methodologies for estimating marginal costs of contingencies and options for managing those resources.

Personnel, Readiness, and Quality of Life

- Assessed balance between Army structure and manning. Assessed readiness and warfighting impacts of personnel turmoil.
- Developed methodologies for estimating marginal costs of contingencies and options for managing those resources.

Supporting QDR Modernization Approach

- Expanded models for tracking aging of equipment.

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- Assessed capabilities and limitations of potential replacement interdiction aircraft.
- Analyzed impact of Army "digitization."
- Upgraded SSADM model to reflect future joint "netted" air defense operations.
- Analyzed cost-effectiveness of ICH program. Focused on predicted O&S cost savings.
- Explored cost-effectiveness of service life extension options for F-16 and A-10.
- Performed independent assessments of technical concepts and designs for satellite, reconnaissance, theater missile defense, and national missile defense systems.
- Determined overall cost-effectiveness of SOCOM naval craft modernization program.

## Part II. Development of Analytic Capabilities

### Cost Analysis Research & Tools

- Implemented FSC system for use as a cost-estimating tool for evaluating proposed changes to forces and the support infrastructure.
- Developed cost estimating tools relevant to attributes of next generation tactical aircraft including low observable advanced materials, integrated avionics, and unique propulsion designs.
- Reviewed best practices in estimating costs for large-scale product developments.
- Expanded personnel model to include warrant officers, integrate with officer and enlisted models, and assessed implications of inventory changes.
- Updated SARs database and addressed current policy issues.
- Developed understanding of implications of advanced materials/processes.
- Developed cost estimating relationships for streamlined manufacturing environment.
- Improved reporting of actual costs incurred in development of software for advanced weapon systems.
- Reexamined how DoD cost community estimates support labor costs.
- Developed parametric estimates based on historical engine components and experience from current technology.
- Updated database of overhead costs of defense contractors.
- Quantified cost savings of product initiatives from acquisition reform.

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- Supported economic analysis for major automated information systems.
- Improved ability to assess feasibility and risk of information program assumptions on which estimates of lifecycle costs and benefits are based.
- Developed methodologies for estimating marginal costs of contingencies and options for managing those resources.  
Effectiveness Analytical Capabilities & Tools
- Developed capital stock and capabilities metrics to support DPP.
- Provided insights on ways to mitigate problems.
- Examined full spectrum of air defense operations involving aircraft, cruise missiles, and TMD threats.
- Continued improvements to JICM.
- Developed representations of C4ISR and WMD in JWARS.
- Developed recommendations regarding warfare representations using expertise from other theater-level simulations.
- Supported defense analysis professional forum.
- Continued preparations for the next QDR.

### FY 1999 Plans:

#### Part I. Current Agenda Issues:

##### Infrastructure

- Maintain AIS EA database and continue development "Cost Pro" relational data base model. Train and assist DoD components, and provide analytical support for the assessment of AIS program benefit/cost risk.
- Improve ability to evaluate program assumptions in areas related to software. Improve ability to evaluate costs and benefits of software development programs and strategies.  
Implementing QDR Strategy
- Examine the relationship between airfield infrastructure and airlift throughput; identify and rank infrastructure investments for several lift scenarios.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
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<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Continued development of a comprehensive set of capabilities metrics for incorporation into the DPP materials used to provide DoD senior leadership with an overview of the long term trends and "health" of the defense program.
- Conduct systematic study across most Army munitions of requirements, approved acquisition objectives, approved procurement objectives, wartime expenditures, training requirements, inventories, and budgets since the Cold War. This will compliment a PRG-directed study on Army's CBMR process and results.
- Update and extend past efforts to increase understanding and ability to program medical program resources as effectively as possible.  
Personnel, Readiness, and Quality of Life
- Analyze both requirement and adequacy of funding for non-major procurement items particularly those contributing to individual soldier support and correlation to enhanced readiness, quality of life, retention, and recruitment. Determine whether focus on major procurement has shortchanged non-major procurement.  
Supporting QDR Modernization Approach
- Continue development of an existing fast running model of the Army Internet, provide a necessary parametric tool, and apply it to project messaging rates and other basic figures of merit expected of the future Army tactical internet.
- 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.
- Develop a methodology for combining different means of enhancing aircraft survivability through common measures of performance and effectiveness. Expand current aircraft survivability methodology to include a more detailed treatment of lethal SEAD and air-to-air engagements.
- Develop additional infrastructure cost modules to Force and Support Cost (FSC) System.
- Provide analytical foundation for a cost-effective allocation of resources among space, missile defense, and reconnaissance systems.  
Congressional Mandates

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- 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. *A number of reports are mandated each year by the Congress, for which PA&E have responsibility for preparation, including the annual responsibility sharing report.*

Part II. Development of Analytic Capabilities

Cost Analysis Research & Tools

- Improve quality/scope of VAMOSC data to capture life cycle costs of major weapon systems.
- Develop metrics to better measure outputs of various business areas in the Defense Working Capital Funds.
- Provide complete database of all DoD-sponsored cost-related research.
- Improve reporting of actual costs for software projects associated with major weapon systems.
- Develop DoD "Best Practices" for estimating costs of new development programs in key product sectors.
- Modernize and improve efficiency of the Department's cost estimating process to support PPBS and acquisition process for major defense acquisition programs.
- Provide necessary data to address policy issues related to the magnitude, sources, and characteristics of cost growth and schedule growth.
- Improve cost models and estimating methodologies by exploring new ways of constructing learning curves (or cost improvement curves) to forecast expected cost of new systems.
- 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.

Effectiveness Analysis Tools

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
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<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Analyze Army's non-TBMD ground based air defense structure in light of actual threats faced in post Cold War environment. Develop and evaluate possible changes in force structure, force component, and acquisition strategies.
- Enhance the functionality, utility, and credibility of JWARS theater-level warfare simulation, which is to be used in the upcoming QDR.
- Examine and develop selected critical air defense factors including sensor resource management, sensor data quality, data fusion, and information latency. Derive proper translation of the impact of these factors into the existing SSADM model. Examine contribution/added-value of new systems and concepts (AADC and JCTN) to the outcome of ship AAW defense engagements.
- Analyze the DWCF programming process for ordering goods and services and the accounting system for those expenditures.
  - Planning, Programming, and Budgeting System (PPBS)
- Support defense analysis professional forum.
- Improve the FYDP to enhance its value to DoD decision-makers.
  - Other Analytic Support Activities
- Reestimate translator vectors to improve accuracy of Defense Employment and Purchases Projection System (DEPPS) projections of DoD spending.
- Sponsor symposium for DoD cost research activities among OSD, the military services, and defense agencies.
  - Anticipating Future Analytic Requirements
- Provide basic handbook for use by DoD cost analysis and acquisition communities for consideration of cost reduction initiatives undertaken by defense contractors.
- Collect, analyze, exploit latest available information to develop databases and methods for estimating development/production costs of next generation tactical aircraft.
- Provide a detailed assessment of defense aircraft industry in accordance with "lean" manufacturing concepts and processes.
- Develop 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.

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Part III. Anticipating Future Analytic Issues

- Continue preparations for the next QDR.

**FY 2000/2001 Plans: Evaluate** readiness, quality of life, modernization, and infrastructure issues, critical in a downsized military, and, as related to the Quadrennial Defense Review, outsourcing, lean logistics, and maintaining forces (active and reserve). Study long-term investment requirements, equipment aging trends, and the revolution in military affairs. Examine future security challenges, regional assessments, weapons proliferation, and global defense threats in view of the changing world scene. Build/capitalize upon effectiveness tools such as theater models or other capability analyses to look at incremental costs, effectiveness, and relative contribution of planned acquisitions. Continue FYDP reform efforts. Provide tools essential for analyzing and supporting the acquisition process; continue cost analyses of the military medical delivery system; conduct independent cost and operational effectiveness of planned weapons systems; and improve techniques to better understand and project DoD infrastructure and requirements. Continue Congressionally mandated efforts. FY2000 is a critically important period for preparing data, analyses, and tools for supporting the next QDR 2001, which will require significant analyses in all of the above areas.

**General Support for ASD (C3I)**

**FY 1998 Accomplishments:**

- Planned and conducted IW exercise with the British in June 98.
- Provided technical advice and consultation to Director, C-E Division and Defense Advisor, U.S. Mission to NATO on NATO Information Systems, NATO C3 Architecture and Implementation Plan, Partnership for Peace initiatives and other selected program areas
- Represented the U.S./participated in a broad range of NATO C3 policy, architecture planning, standardization and implementation activities in various NATO C3 fora and associated technical working groups

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Contributed as the U.S. technical expert to the multi-national ADP working group dealing with technical review of NATO funded Automated Information Systems (AIS) and MIS projects, as well as the O&M support to existing AIS infrastructure
- Contributed as a U.S. technical expert to European Atlantic Partnership Council (EAPC) activities regarding C3 Matters Foreign Cooperation Analysis and Assessment
- MOU on Launch Site Operations
- DoD/NASA Cooperation Initiative
- GPS Resource Analysis and Track
- Developed a framework for CI and related areas of security that ties together: (1) the primary protection missions (2) Core functional capabilities within CI and security (3) resources associated with the security functions.
- Updated previous estimates of security resources for the years FY 1991-2003 consistent with Defense programming and budgeting structures and OMB Circular A-11.
- Developed proposals for reflecting the resource implications of potential security policy changes in the area of Force Protection and Antiterrorism.
- Proposed a methodology that can be used by the Defense components to conduct mission area analyses of their CI and security functions using the prescribed framework

**FY1999 Plans:**

- GPS NAVWAR Technical Assessment
- Extensive Space Control Analysis and Assessment
- Space Launch Infrastructure Assessment
- Commercial Space Launch Services Analysis and Assessment
- Satellite Control Architecture Assessment
- Commercial Spaceport Assessment and Coordination
- Analysis and Assessment of FAA Flight Vehicle Certification Cases
- Support to Civil and Commercial Cooperation Initiatives
- Support to Space Systems Acquisition and Review

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Support to GPS Systems and Resources Issues
- Work NATO Enlargement technical issues, with particular focus on new accession Nations: Poland, Hungary, Czech Republic
- Provide technical support for the development of the NATO C3 Common Operating Environment (COE)
- Provide technical support for the NATO ACE ACCIS Implementation Plan
- Provide technical support for the Rolling Interoperability Program (RIP)
- Provide technical guidance on development of the NC3 Technical Architecture
- Participate in Working Group of National Technical Experts-ADP
- Participate in the NATO Open Standards Working Group (NOSWG)
- Update the current estimate of DoD security resources for FY 1997-FY 2005,
- Develop a conceptual framework for security and counterintelligence to structure management decisions to reduce risk in the areas of force protection, classified and sensitive information protection, and critical infrastructure protection.

#### **FY2000 Plans:**

- GPS Modernization and NAVWAR Technical Support
- Extensive Space Control Analysis and Assessment
- Space Launch Infrastructure Assessment
- Commercial Space Launch Services Analysis and Assessment
- Satellite Control Architecture and Systems Assessment
- Commercial Spaceport Assessment and Coordination
- Analysis and Assessment of FAA Flight Vehicle Certification Cases
- Support to Civil and Commercial Cooperation Initiatives
- Support to Space Systems Acquisition and Review
- Support to GPS Systems and Resources Issues
- Provide technical support for the Rolling Interoperability Program (RIP)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE <b>February 1999</b>
APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	
<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Provide technical guidance on development of the NC3 Technical Architecture
- Participate in Working Group of National Technical Experts-ADP
- Participate in the NATO Open Standards Working Group (NOSWG)
- Update Security/CI resource estimates used to validate Component inputs

**FY2001 Plans:**

- GPS Modernization and NAVWAR Technical Support
- Extensive Space Control Analysis and Assessment
- Space Launch Infrastructure Assessment
- Commercial Space Launch Services Analysis and Assessment
- Satellite Control Architecture and Systems Assessment
- Commercial Spaceport Assessment and Coordination
- Analysis and Assessment of FAA Flight Vehicle Certification Cases
- Support to Civil and Commercial Cooperation Initiatives
- Support to Space and GPS Systems Acquisition and Review and resource issues
- Provide technical support for the Rolling Interoperability Program (RIP)
- Provide technical guidance on development of the NC3 Technical Architecture
- Update Security/CI resource estimates used to validate Component inputs

**General Support for the Joint Staff**

**FY 1998 Accomplishments:**

- Improved representation of logistics in warfare modeling and simulation tools.
- Provided Chairman, JCS with recommendations for a unified command structure by 2010, part of a long-range plan to be implemented by regular two-year cycles.

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<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Provided overall strategy to coordinate, manage, and facilitate implementation of deployment process improvement initiatives to support the warfighter from identification of requirements (planning) through final consumption in an Area of Operations (execution), including predeployment, deployment, reception, onward movement, and integration, sustainment and redeployment.
- Provided a refined analytical framework that encompasses the application of enhanced visualization techniques, increased efficiency and effectiveness through meta-analysis (compound analysis) and the ability to better anticipate the decision maker's analytical needs.
- Developed a decision support model and feasible alternatives for a joint CID (Combat Identification) investment strategy directly supporting the JS Short Term CID.

#### **FY 1999 PLANS:**

- Provide more efficient method to build domain specific architectures/components for DOD application/software systems, advanced modeling and simulation tools, and a repeatable process for fielding Global Command and Control System components.
- Pursue 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.
- Streamline the joint deployment planning and execution process and save current and life cycle support funding.
- Provide strategic and inter-theater guidance for coherent sustainment and resupply operations, to include the roles and functions of the Services, Defense Logistics Agency, and third party logistics.
- Identify critical joint logistics requirements, and then translate those requirements into Joint Simulation System (JSIMS) capabilities to support existing and future training, mission rehearsals, and other areas.
- Develop 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.

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<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

- Assess existing capabilities in the context of negotiating options development. Decision support tools, e.g., data bases and information management systems, briefing materials and supporting documentation describing required doctrine, plans, read-ahead packages and post-event reports and CINCs' Nuclear Arms Control operational and administrative requirements, shortfalls, and options.
- Monitor events that would drive changes to the Master Navigation Plan (MNP) from the previously issued version revise the MNP
- Publish a handbook on the proliferant Electromagnetic Pulse (EMP) threat environment, as well as establishing nuclear power tactical EMP capabilities.
- Survey the basic processes necessary to make Network-centric Warfare (NCW) work and assess the probabilities that these organizational methods or processes could be adopted in DOD, the Joint Staff, and CINCs/Services/Agencies.
- Identify and define all the functions and associated tasks required to perform the J6 C4I Interoperability and C4ISP Assessment Certification Process of Mission Needs Statements, Operational Requirements Documents (ORDs) and Capstone Requirement Documents (CRD). Propose measures to provide the J-6 staff adequate time to perform all the functions associated with the J6 C4I Interoperability and C4ISP Assessment Certification of MNS, ORDs, and CRDs at current staffing levels.
- Produce a primer that will explain how each Service uses the 14 Joint Standard Air Operations Software applications specified in CJCSI 6271.01A.
- Identify opportunities for further study, experimentation, or development of alternative operational concepts, advanced technologies, organizational architectures, and doctrine required for joint interdiction.
- Technical support to ensure quick-turn analysis tools for evaluation of high value Strike precision platforms.
- Develop and implement a coherent, actionable near-and mid-term Joint investment strategy for CID programs - in effect, progress in CID.
- Optimize available resources through analysis of the Reserve Component contribution in support of the National Military Strategy.

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**FY 2000 Plans:**

- "Quick-turnaround" assessments directed by Chairman of the Joint Chiefs of Staff
- JV2010 implementation--careful analysis in organization dynamics and structuring.
- Develop and maintain joint doctrine for the employment of the Armed Forces.
- QDR--Assess the CINCs' Theater-Engagement.
- QDR--Follow-on Reserve Component study to identify and evaluate alternative concepts for employing Reserves

**FY 2001 PLANS:**

- Continue to provide responsive wargaming, analysis and assessment capabilities to support future Chairman of the Joint Chiefs of Staff requirements
- Provide Joint Modeling and Simulation to the Joint Staff and CINCs
- Assess Joint Warfighting Capabilities
- Continue to use collaborative analysis process to exploit the existing analytic expertise in the Services and to help in the assessment of complex joint issues.
- QDR--Develop total force employment database for peacetime requirements/tempo analysis
- QDR--Warfighting impact changes spawned from MRS 05

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<b>Research, Development, Test &amp; Evaluation, Defense-wide</b>	<b>Technical Studies, Support &amp; Analysis PE0605104D8Z</b>	

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>TOTAL COST</u>
Previous President's Budget	29.178	30.021	30.519	31.058	N/A
Appropriated Value	30.376	30.021	N/A	N/A	
Adjust to Appropriated Value/President's Budget	0.216	(0.380)	(1.013)	(1.042)	
Congressional Distributed and Undistributed Reductions	2.260	1.312	N/A	N/A	
Current Budget Submit/President's Budget	30.592	29.641	29.506	30.016	
Below Threshold Reprogramming	2.400	.948			

Funding: FY1999 adjustment to former President's Budget due to Appropriations Conference Report.

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost 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/ BA: 6					R-1 ITEM NOMENCLATURE USD(A&T)-Critical Technology Support PE 0605110D8Z					
COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	
Total Program Element (PE) Cost	2.487	0*	0*	0*	0*	0*	0*	0*	Cont.	
Critical Technologies Program P204	2.487	0*	0*	0*	0*	0*	0*	0*	Cont.	

\*These funds previously contained in PE0605110D8Z were transferred to PE0605110T for FY1999 and then to PE0605110BR for FY2000 and beyond. PE0605110BR reflects an administrative transfer to accommodate recommendations of the Defense Reform Initiative (DRI).

A. (U)Mission Description and Budget Item Justification

A1. (U)BRIEF OVERVIEW DESCRIPTION OF TOTAL PROGRAM:

(U)This program element supports development and publication of the Congressionally mandated Militarily Critical Technologies List (MCTL). The MCTL is the fundamental source document for identification of leading edge and current technologies which must be monitored and assessed world-wide for national security and nonproliferation control of weapons of mass destruction and advanced conventional weapons. Funds continuous technical support to interdepartmental and international processes which develop multinational control agreements on technologies of concern to DOD. Provides foreign technology assessments for the MCTL and other critical technologies efforts. Identifies and

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APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide/ BA: 6	R-1 ITEM NOMENCLATURE USD(A&T)-Critical Technology Support PE 0605110D8Z	

A1. (U) BRIEF OVERVIEW DESCRIPTION OF TOTAL PROGRAM: (Continued)

determines technical parameters for proposals for international control of weapons of mass destruction. Provides technical assessments to support treaty compliance inspections and decisions on foreign ownership of US industrial assets. Identifies foreign technologies of interest to the DOD and develops opportunities for international cooperative research and development. Includes funding for travel by OSD personnel in support of the management and technical objectives. This program element is responsive to time critical requirements established in interdepartmental and international processes required to meet Congressional mandates to identify, control, transfer and develop militarily critical technologies.

A2. (U) FY 1998 ACCOMPLISHMENTS:

(U) In concert with Department of State provided leadership and technical support in the development of United States Government (USG) proposals for multinational negotiations at the Wassenaar Arrangement (successor to CoCom) to ensure continued control of technologies critical to US military and economic security. Analyzed and documented the US and International participation on the Wassenaar Arrangement. Developed proposals for Missile Technology, Nuclear and BW/CW export control regimes. (\$.050 Million)

(U) Developed and published the MCTL-Part II Weapons of Mass Destruction Technologies. Updated and published MCTL part I Weapons Systems Technologies on the Internet and on CD-ROMs. (\$1.487 Million)

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A2. (U) FY 1998 ACCOMPLISHMENTS: (Continued)

(U) Provided on site support at international technology negotiations and analyzed and documented US and International Participation. (\$.100 Million)

(U) In concert with industry, Government and academia conducted worldwide technical assessments of dual use technologies related to Theater Missile Defense and Defense Technology Planning to determine the militarily critical technology parameters. The assessments clearly highlight critical technologies and provided technical rationale for export control changes. (\$.800 Million)

(U) Identified Developing Critical Technologies and Commercial Technologies which are candidates for application in US weapons systems. (\$.050 Million)

A3. (U) FY 1999 PLANS: \*These funds previously contained in PE0605110D8Z were transferred to PE0605110T. PE0605110T reflects an administrative transfer to accommodate recommendations of the Defense Reform Initiative (DRI).

A4. (U) FY 2000 PLANS: \*These funds previously contained in PE0605110BR were transferred to PE0605110T. PE0605110T reflects an administrative transfer to accommodate recommendations of the Defense Reform Initiative (DRI).

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A5. (U) FY 2001 PLANS: \*These funds previously contained in PE0605110BR were transferred to PE0605110T. PE0605110T reflects an administrative transfer to accommodate recommendations of the Defense Reform Initiative (DRI).

A6. (U) JUSTIFICATION FOR BUDGET ACTIVITY ASSIGNMENT FOR THE PROGRAM ELEMENT:

(U) The program element is correctly classified in Budget Activity 6 because it provides operational technical support for the Office of the Under Secretary for Acquisition and Technology by identifying and assessing militarily critical technologies DOD assesses as critical to maintaining superior US military capabilities. Some technologies may require protection under one of the multinational control regimes. Other technologies may be eligible for use in multinational technology programs.

A7. (U) ACQUISITION STRATEGY:

(U) The completion of the task detailed in this program element requires technical analyses across a broad spectrum of technologies which are deemed critical to continuing US military superiority. These analyses provide the basis for: the Militarily Critical Technologies List (required by the Export Administration Act); economic and national security assessments of controls in specified technology areas; foreign technology assessments to support economic and national security policy decisions; development of export control proposals for negotiations at the Wassenaar Arrangement and multinational

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control regimes and the identification of international cooperation opportunities. The USD(A&T) provides the technical management and oversight but does not have the broad technical expertise required to accomplish these tasks. This breadth of technical knowledge can only be obtained from Government, industry and the academic community.

A7. (U) ACQUISITION STRATEGY: (Continued)

(U) These tasks are best performed by a Federally Funded Research and Development Center (FFRDC). An FFRDC can produce independent and objective analyses of multinational programs which require access to the proprietary technical data of US and foreign defense industries, the existence and nature of which must be kept secret from potential competitors. The required access to sensitive US Government policies, and decision-making procedures concerning multinational defense critical technology programs, and the close collaboration with Government agencies required to perform these tasks, would give a contractor the marketing intelligence necessary to position itself unfairly in future multinational technology markets.

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B. (U) Program Change Summary:

	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	2.690	N/A*	N/A*	N/A*	Cont.
Appropriated Value	2.690	N/A*	N/A*	N/A*	
Adjustments to Appropriated Value/ Presidents Budget					
Closed Account Adjustments	N/A	N/A	N/A	N/A	
SBIR	N/A	N/A	N/A	N/A	
Undistributed Congressional Adjustments	-.203	N/A	N/A	N/A	
Current Budget Submit	2.487	N/A*	N/A*	N/A*	Cont.

\*These funds previously contained in PE0605110D8Z were transferred to PE0605110T for FY1999 and then to PE0605110BR for FY2000 and beyond. PE0605110BR reflects an administrative transfer to accommodate recommendations of the Defense Reform Initiative (DRI).

C. (U) Other Program Funding Summary: N/A

D. (U) Schedule Profile: N/A

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						<b>ISR/Space Systems Support to C3I</b> <b>(PE 0605116D8Z)</b>			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	*	*	2.000	2.000	2.000	2.000	2.000	2.000		
<b>Total Project Cost/No. and Subtotal Cost Support to C3I</b>	*	*	2.000	2.000	2.000	2.000	2.000	2.000		

\* This PE has been reactivated IAW PBD 172 which transferred the funding to OASD C3I beginning with FY 00.

**Mission Description and Budget Item Justification**

**Brief Description of Element:** Funding is provided for technical and analytical support to the OASD (C3I) to improve the management, collection, presentation, tracking, and oversight of DoD space resources and acquisition actions for existing and planned National Security Space Programs. It provides analysis supporting the development, drafting, coordination, review, publishing, and promulgation of DoD space policy. As a result of the Defense Reform Initiative, DUSD (Space) was dissolved and the studies and analysis funds were transferred to OASD (C3I).

**Programs Accomplishments and Plans: (\$ in millions)**

**FY 2000 Plans: (\$2.000)**

- Continue efforts on the Integrated Capstone Strategic Plan (ICSP)
- Provide studies and analysis support for the development, coordination, review, and promulgation of DoD space policy

**B. Program Change Summary**

	<b><u>FY 1998</u></b>	<b><u>FY 1999</u></b>	<b><u>FY 2000</u></b>	<b><u>FY 2001</u></b>	<b><u>Total Cost</u></b>
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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	<b>ISR/Space Systems Support to C3I</b> (PE 0605116D8Z)	

Previous President's Budget	*	*	*	*
Net Change			2.000	2.000
President's Budget Request	*	*	2.000	2.000

Change Summary Explanation:

Funding: \*Mid 1998 the Deputy Secretary of Defense reorganized space and C3 functions within OSD. DUSD Space ceased to exist as a separate organization most of the functions being integrated into ASD(C3I). There is no longer a need for a separate budget for contractor support for space functions. Accordingly, the alternative estimate transfers 2 million per year from DSRP (0305159I) to OASD(C3I) beginning in FY 2000.

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost**

N/A

**D. 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
<b>Integrated Capstone Strategic Plan</b>																
Publish Plan											X					
<b>Studies and Analysis Support</b>										X	—————→					

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<b>APPROPRIATION/BUDGET ACTIVITY</b>  <b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	<b>R-1 ITEM NOMENCLATURE</b> ISR/Space Systems Support to C3I (PE 0605116D8Z)	

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Exhibit R-2, RDT&E Budget Item Justification									DATE: FEBRUARY 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 6						R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. <b>Foreign Material Acquisition and Exploitation PE 0605117D8Z</b>				
COST(\$In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total PE Cost	34.782	34.591	34.937	35.458	36.078	36.765	37.534	38.327	Continuing	Continuing
Project Name/No. and Subtotal Cost FMA&E/P411	34.782	34.591	34.937	35.458	36.078	36.765	37.534	38.327	Continuing	Continuing
Quantity of RDT&E Articles	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**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 and military applications, and technologies, as well as related technical and operational documents. The FY 1998 and outyear program is a classified activity about which information is available to properly cleared authorized government personnel. The Foreign Material Program Review Board (FMPRB) approves Foreign Material Acquisition (FMA) lists that target high-priority foreign materiel that is potentially available.

UNCLASSIFIED

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Exhibit R2, RDT&E Budget Item Justification		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 6	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0605117D8Z FOREIGN MATERIAL ACQUISITION AND EXPLOITATION	

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	35.996	35.035	35.547	36.092	Continuing
Appropriated Value					
Adjustments to Appropriated Value					
a. DoD PBD Realignment	-.600				
b. Undistributed Congressional Reduction	-.142				
c. Below Threshold Program	-.472				
d. Inflation Adjustment		-.444	-.610	-.634	
Amended Budget Estimate Submission	34.782	34.591	34.937	35.458	Continuing

**Change Summary Explanation:** None

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Exhibit R2, RDT&E Budget Item Justification		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 6	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0605117D8Z FOREIGN MATERIAL ACQUISITION AND EXPLOITATION	

C. Other Program Funding Summary: None

D. Acquisition Strategy: N/A

APPROPRIATION/BUDGET ACTIVITY  
RDT&E, Defense-wide / BA 6

R-1 ITEM NOMENCLATURE

**Industrial Capabilities Assessments PE 0605122D8Z**

COST (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	0	0	3,299	3,373	3,446	3,525	3,605	3,688	Cont.	Cont

**A. Mission Description and Budget Item Justification**

This program provides funding for analytical research across economic, financial, and technical areas related to the industrial capabilities necessary to meet Defense needs. The program will support critical industrial analysis to support acquisition and investment decision-making. The program objective is to ensure the Department will have access to a competitive and innovative industry capable of meeting Defense requirements when needed. Results and analytical findings will support the development and improvement of Defense policies, practices, and resource allocations to ensure availability of adequate, competitive industrial capabilities. The research agenda will initially address concerns of prime and subtier competitiveness from the system to the commodity levels.

Research projects address sector consolidation, capacity issues, prime and subtier contractor capabilities, government-owned industrial and technological facilities, and system/component availability. Projects will examine supplier relationships in and between the traditional domestic Defense industry, commercial industry, and the global marketplace. Projects will identify potential competitive and capability retention issues to improve the Department's insight of sector, supplier, and system/component areas for key defense product and technology requirements. Industrial capability benchmarks, analysis tools, and educational modules are developed to improve DoD managers' understanding of acquisition decision impacts on industrial resource availability and competitiveness.

**B. Program Change Summary:** Not Applicable

**C. Other Program Funding Summary:** Not Applicable

UNCLASSIFIED

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								DATE <b>February 1999</b>		
<b>BUDGET ACTIVITY</b> <b>6 - Management Support</b>				<b>PE NUMBER AND TITLE</b> <b>0605160D8Z Counterproliferation Management Support</b>						
<i>COST (In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	6310	0	0	0	0	0	0	0	0	6310
P542 CP Architecture Studies and Mgt/ Oversight	5042	0	0	0	0	0	0	0	0	5042
P545 Nuclear Matters	1268	0	0	0	0	0	0	0	0	1268
<b><u>Mission Description and Budget Item Justification:</u></b>										
<p>In August 1994, DoD established the Counterproliferation Support Program specifically to address the DoD shortfalls in counterproliferation operational capabilities documented in the May 1994 Report to Congress titled <i>Report on Nonproliferation and Counterproliferation Activities and Programs</i>. Counterproliferation Support Program funds are used to leverage DoD acquisition programs to meet the counterproliferation priorities of the Commanders-in-Chief (CINCs) of the Combatant Commands and accelerate the deployment of enhanced capabilities to the field. Specifically, the goal of the Counterproliferation Support Program is to improve specific military counterproliferation capabilities by (1) building on ongoing programs in the Services, DoD agencies, Department of Energy and U.S. Intelligence; (2) focusing on the most critical counterproliferation shortfalls to address major gaps in deployed capabilities (as reflected in the CINCs' priorities and the Counterproliferation Review Committee's (CPRC) prioritized list of counterproliferation Areas for Capability Enhancements); (3) leveraging existing program funding to more rapidly field capabilities by accelerating the deliverables of DoD programs; (4) identifying and enhancing the development of high payoff technologies to accelerate capabilities to the warfighter; (5) identifying and promoting key non-materiel initiatives that complement technological advances; and (6) transitioning Counterproliferation Support Program projects to the Services as soon as practicable.</p> <p>The FY 1998 Defense Reform Initiative (DRI) directed the establishment of the Defense Threat Reduction Agency (DTRA) effective 1 October 1998. The DTRA will be formed through the consolidation of three existing agencies: the Defense Special Weapons Agency (DSWA), the On-Site Inspection Agency (OSIA), and the Defense Technology Security Administration (DTSA). In addition, several functions from the Office of the Secretary of Defense (OSD) and Washington Headquarters Services (WHS) currently involved in the management of associated programs will transfer to DTRA as well. The DTRA will also carry out programs to counter proliferation and reduce threats posed by weapons of mass destruction and provide nuclear weapon stockpile and related support.</p> <p>As part of this budget submission, Counterproliferation Support Program funding and manpower resources programmed for FY 1999 and out are transferred to the DTRA. A five-percent military and civilian personnel savings associated with the DTRA consolidation has already been applied and is reflected in the funding and personnel transfers to DTRA.</p>										
Exhibit R-2 (PE 0605160D8Z)										

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								DATE <b>February 1999</b>		
BUDGET ACTIVITY <b>6 - Management Support</b>				PE NUMBER AND TITLE <b>0605160D8Z Counterproliferation Management Support</b>					PROJECT <b>P542</b>	
COST <i>(In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
P542 CP Architecture Studies and Mgt/ Oversight	5042	0	0	0	0	0	0	0	0	5042
<b>A. <u>Mission Description and Budget Item Justification</u></b>										
<p><b><u>Project P542 - Counterproliferation Architecture Studies and Management/Oversight:</u></b> The Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs (ATSD(NCB)) was designated by the Secretary of Defense as the OSD focal point for Counterproliferation (CP) activities within the DoD. The ATSD(NCB) assigned management responsibilities for the CP Support Program to the Deputy for Counterproliferation (DATSD(NCB) (CP/CBD)). This project provides essential technical, architectural, and integration support to the CP Support Program. The project will (1) conduct analyses and planning activities necessary for program development, project prioritization and management oversight; (2) prepare required program deliverables such as the annual CP Report to Congress and internal DoD and interagency documents; and (3) provide technical and analytical support to the established CP review groups, including the congressionally mandated Counterproliferation Program Review Committee (CPRC). This project provides the critical manpower necessary to support the DATSD(NCB) (CP/CBD) in conducting the day-to-day operations of the CP Support Program and in providing the required OSD management oversight as described in the CP Support Program's Program Management Plan.</p>										
<b><u>Acquisition Strategy:</u></b>										
<b><u>FY 1998 Accomplishments:</u></b>										
<ul style="list-style-type: none"> <li>• 2650 Systems Engineering and Technical Analysis</li> <li>• Continued CP program management, programmatic and technical planning support</li> <li>• Continued CP technical analyses support and technical program oversight support</li> <li>• Continued CP interagency program coordination and integration activities (CPRC, Nonproliferation and Arms Control Technology Working Group)</li> <li>• Continued CPRC Annual Report to Congress</li> <li>• Continued support to PA&amp;E and Joint Staff analysis for WMD effects analysis</li> <li>• 2276 CP architectural studies and assessments</li> <li>• Continued trade-off analyses of contributions of selected DoD acquisition efforts to DoD counterproliferation capabilities <ul style="list-style-type: none"> <li>assessed impact of adversarial use of WMD on US campaign plans; provide support to Osprey Daisy Program</li> <li>assessed alternatives to improve campaign operations in a WMD environment</li> <li>completed evaluation of hyper/multi/ultra spectral analysis for counterproliferation applications</li> <li>assessed merits of candidate hard target kill technologies against WMD targets</li> </ul> </li> <li>• 116 SBIR/STTR</li> </ul>										
Project P542						Exhibit R-2 (PE 0605160D8Z)				

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 1999			
BUDGET ACTIVITY	PE NUMBER AND TITLE					PROJECT				
<b>6 - Management Support</b>	<b>0605160D8Z Counterproliferation Management Support</b>					<b>P542</b>				
Total	5042									
<b>FY 1999 Planned Program</b>										
Total	0 Funds and activities transferred to PE 0605160BR. P542									
<b>FY 2000 Planned Program</b>										
Total	0 Funds and activities transferred to PE 0605160BR. P542									
<b>FY 2001 Planned Program</b>										
Total	0 Funds and activities transferred to PE 0605160BR. P542									
<b>B. <u>Project Change Summary</u></b>										
	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>					
Previous President's Budget	5133	0	0	0	Continuing					
Appropriated Value	5133	N/A	N/A	N/A	N/A					
Adjustments to Appropriated Value	91	N/A	N/A	N/A	N/A					
Current Budget Submit/President's Budget	5042	0	0	0	Continuing					
<b>C. <u>Other Program Funding Summary</u></b>										
	<u>FY 1998</u>	<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</u>	<u>Total</u>
0605160BR Counterproliferation Management Support	0	9307	5315	4629	4848	5082	5210	5433	<u>Compl</u> Cont	Cont Cost
0603160D8Z Counterproliferation Advance Development	74196	0	0	0	0	0	0	0	Cont	Cont
0603160BR Counterproliferation Advance Development	0	52951	81245	74841	74654	75955	77681	79264	Cont	Cont
Project P542										
Exhibit R-2 (PE 0605160D8Z)										

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>	DATE <b>February 1999</b>
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<b>BUDGET ACTIVITY</b> <b>6 - Management Support</b>	<b>PE NUMBER AND TITLE</b> <b>0605160D8Z Counterproliferation Management Support</b>	<b>PROJECT</b> <b>P542</b>
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**D. Schedule Profile**

	FY 1998				FY 1999				FY 2000				FY 2001			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
• Systems Engineering and Technical Analysis	X	X	X	X												
• CP Architectural studies and assessments		X		X												

UNCLASSIFIED

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								DATE <b>February 1999</b>		
BUDGET ACTIVITY <b>6 - Management Support</b>				PE NUMBER AND TITLE <b>0605160D8Z Counterproliferation Management Support</b>					PROJECT <b>P545</b>	
COST <i>(In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
P545 Nuclear Matters	1268	0	0	0	0	0	0	0	0	1268
<p><b>A. <u>Mission Description and Budget Item Justification</u></b></p> <p><b><u>Project P545 - Nuclear Matters:</u></b> In accordance with the Defense Reform Initiative (DRI), the Nuclear Matters (NM) office is in the process of being realigned. Budget justification and missions descriptions reflect the transition of the NM office to the new staff structure. Nuclear weapons receive special consideration within the Office of the Secretary of Defense (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. NM provides technical policy guidance to senior OSD leadership on complex and demanding issues pertaining to nuclear stockpile sustainment. The office works closely with OSD Policy, the Department of Energy (DOE), Congress, and foreign governments to provide policy guidance for – and oversight of – a wide variety of nuclear weapons activities. In support of these activities, Project 545 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.</p> <p><b><u>Acquisition Strategy:</u></b></p> <p><b><u>FY 1998 Accomplishments:</u></b></p> <ul style="list-style-type: none"> <li>• 495 Recurring Obligations and Requirements Development: Produced analyses 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. Conducted analyses and assessments which provided guidance for preparation of the annual Nuclear Weapons Stockpile Memorandum, Long Range Planning Assessment to the President, the Nuclear Weapons Council (NWC) Chairman’s Annual Report to Congress, and NWC Standing and Safety Committee actions. Products provided basis for technical policy recommendations to the President, Secretary of Defense, and NWC Chairman.</li> <li>• 400 Nuclear Weapons Council (NWC) Support: Provided support to the NWC staff and members via products on technical issues concerning the evolution of the nuclear weapons complex and infrastructure. Analyses supported development of agenda items for the NWC.</li> <li>• 200 Maintaining the Deterrent Infrastructure: Provided analyses on sustaining nuclear weapons safety, use control, survivability, certification, transportation, and reliability. These efforts supported DoD oversight of such DOE stockpile stewardship activities as: nuclear weapon sustainment and revalidation, development of an assured tritium supply, life extension programs, and stockpile stewardship and maintenance.</li> <li>• 152 Policy Support and Guidance for International Obligations: Provided oversight and guidance to activities and organizations such as the North Atlantic Treaty Organization (NATO) Senior Level Weapons Protection Group, the Joint Theater Surety Management Group, and congressionally approved technical exchanges with foreign nations.</li> </ul>										
Project P545						Exhibit R-2 (PE 0605160D8Z)				

UNCLASSIFIED

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE <b>February 1999</b>																																																			
<b>BUDGET ACTIVITY</b> <b>6 - Management Support</b>	<b>PE NUMBER AND TITLE</b> <b>0605160D8Z Counterproliferation Management Support</b>	<b>PROJECT</b> <b>P545</b>																																																			
<ul style="list-style-type: none"> <li>• 21 SBIR/STTR</li> <li>Total 1268</li> </ul> <p><b>FY 1999 Planned Program</b> Total 0 Funds and activities transferred to PE 0605160BR. P545</p> <p><b>FY 2000 Planned Program</b> Total 0 Funds and activities transferred to PE 0605160D8Z. P545</p> <p><b>FY 2001 Planned Program</b> Total 0 Funds and activities transferred to PE 0605160D8Z. P545</p>																																																					
<p><b>B. <u>Project Change Summary</u></b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;"><u>FY 1998</u></th> <th style="text-align: center;"><u>FY 1999</u></th> <th style="text-align: center;"><u>FY 2000</u></th> <th style="text-align: center;"><u>FY 2001</u></th> <th style="text-align: center;"><u>Total Cost</u></th> </tr> </thead> <tbody> <tr> <td>Previous President's Budget</td> <td style="text-align: center;">1914</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">Continuing</td> </tr> <tr> <td>Appropriated Value</td> <td style="text-align: center;">1914</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td>Adjustments to Appropriated Value</td> <td style="text-align: center;">-646</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td>Current Budget Submit/President's Budget</td> <td style="text-align: center;">1268</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">Continuing</td> </tr> </tbody> </table>				<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>	Previous President's Budget	1914	0	0	0	Continuing	Appropriated Value	1914	N/A	N/A	N/A	N/A	Adjustments to Appropriated Value	-646	N/A	N/A	N/A	N/A	Current Budget Submit/President's Budget	1268	0	0	0	Continuing																					
	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>																																																
Previous President's Budget	1914	0	0	0	Continuing																																																
Appropriated Value	1914	N/A	N/A	N/A	N/A																																																
Adjustments to Appropriated Value	-646	N/A	N/A	N/A	N/A																																																
Current Budget Submit/President's Budget	1268	0	0	0	Continuing																																																
<p><b>C. <u>Other Program Funding Summary</u></b> Not Applicable</p>																																																					
<p><b>D. <u>Schedule Profile</u></b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th colspan="4" style="text-align: center;"><u>FY 1998</u></th> <th colspan="4" style="text-align: center;"><u>FY 1999</u></th> <th colspan="4" style="text-align: center;"><u>FY 2000</u></th> <th colspan="4" style="text-align: center;"><u>FY 2001</u></th> </tr> <tr> <th></th> <th>1</th><th>2</th><th>3</th><th>4</th> <th>1</th><th>2</th><th>3</th><th>4</th> <th>1</th><th>2</th><th>3</th><th>4</th> <th>1</th><th>2</th><th>3</th><th>4</th> </tr> </thead> <tbody> <tr> <td>• Analysis and Support Activities</td> <td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </tbody> </table>				<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	• Analysis and Support Activities	X	X	X	X												
	<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																																					
• Analysis and Support Activities	X	X	X	X																																																	
Project P545		Exhibit R-2 (PE 0605160D8Z)																																																			

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									DATE February 1999	
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6					R-1 ITEM NOMENCLATURE SBIR PE 0605502D8Z					
COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	31.858	*	*	*	*	*	*	*	continuing	cont.
SBIR Administration No. P-518	31.858	*	*	*	*	*	*	*	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:** In accordance with US Code Title 15, the Small Business Innovation Research (SBIR) program is required to allocate 2.5 percent of their extramural RDT&E budgets in FY 1997 and thereafter, to fund mission-oriented R&D projects at small technology companies. Congress recently reauthorized the SBIR program with broad bipartisan backing, based on DoD's finding that the program makes a significant contribution to the technological strength of our armed forces, as well as highly favorable reviews of the program by the GAO, the National Academy of Sciences, and other federal agencies. In addition, a DoD report to Congress in May 1996 found that "SBIR-developed technologies have resulted in significant improvements in U.S. military capabilities and major savings to the taxpayer."

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 1999
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6	R-1 ITEM NOMENCLATURE SBIR PE 0605502D8Z	

**PROGRAM ACCOMPLISHMENT AND PLANS:**

FY 1998-2005: This program element funds early-stage R&D projects at small technology companies, in accord with the requirements of Public Law 102-564. The FY98 technology areas are: Army Human Systems Technology, Navy Theatre Air Defense and Aging Aircraft Technologies and Air Force Defense Air Reconnaissance. The research areas planned for FY99 are: Special Operations Biomedical, Sensors & Information Technology, and Materials Technology; Army Medical Research biomedical research technology; Naval Systems Materials Process Technology.

**B. Program Change Summary**

FY 1998 funding for this program element was \$ 31.858 million, which represents 2.5 percent of extramural RDT&E funds appropriated to OSD in FY 1997. Funding for FY 1999 through FY 2005 will be 2.5 percent of extramural RDT&E, in accord with Public Law 102-564.

**C. Other Program Funding Summary:** N/A

**D. Schedule Profile** N/A

**UNCLASSIFIED**

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Exhibit R-2, RDT&E Budget Item Justification									DATE FEBRUARY 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 6					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. <b>CLASSIFIED PROGRAMS C3I</b> <b>PE 0605710D8Z</b>					
COST(\$In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total PE Cost	.929	6.359	.627	.645	.655	.667	.681	.695	Continuing	Continuing
Project Name/No. and Subtotal Cost Classified Programs C3I/P711	.929	6.359	.627	.645	.655	.667	.681	.695	Continuing	Continuing
Quantity of RDT&E Articles	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** Funding provides for accomplishment of studies, assessments and technical evaluations of C4I programs and activities. Resources are used to support efforts including the integration of C4 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 1998 Accomplishments:**

- Implement the Joint Personnel Adjudication System (JPAS) (0.929 Million)

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<b>Exhibit R2, RDT&amp;E Budget Item Justification</b>		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 6	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0605710D8Z CLASSIFIED PROGRAMS C3I	

**FY 1999 Plans:**

- Perform special studies directed to determine future concepts and future mixes of C4I capabilities to support the environment anticipated into the next century(0.434 Million)
- Conduct classified activity (5.925 Million)

**FY 2000 Plans:**

- Perform special studies directed to determine future concepts and future mixes of C4I capabilities to support the environment anticipated into the next century (0.627 Million)

**FY 2001 Plans:**

- Perform studies and assessments of intelligence customer requirements. (0.645 Million)

**B. Program Change Summary**

FY1998

FY1999

FY2000

FY2001

Total

UNCLASSIFIED

<b>Exhibit R2, RDT&amp;E Budget Item Justification</b>		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 6	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0605710D8Z CLASSIFIED PROGRAMS C3I	

					Cost
Previous President's Budget	.343	.439	.637	.656	Continuing
a. Congressional Transfer		+6.000			
Appropriated Value	.343	6.439	.637	.656	Continuing
Adjustments to Appropriated Value					
a. Below threshold program Adjustment	+.600				
b. Undistributed Congressional Reduction	-.002				
c. Below threshold program Adjustments	-.012				
d. Inflation Adjustment		-.080	-.010	-.011	
Amended Budget Estimate Submission	.929	6.359	.627	.645	Continuing

**Change Summary Explanation:** None

**C. Other Program Funding Summary:** None

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Exhibit R2, RDT&E Budget Item Justification		DATE FEBRUARY 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA 6	R-1 ITEM NOMENCLATURE Program Element (PE) PE 0605710D8Z CLASSIFIED PROGRAMS C3I	

D. Acquisition Strategy: N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									DATE February 1999	
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6					R-1 ITEM NOMENCLATURE SBIR Administration PE 0605790D8Z					
COST (In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	1.609	1.799	1.713	1.757	1.786	1.822	1.862	1.900	Continue	Continue
SBIR Administration No. P-518	1.609	1.799	1.713	1.757	1.786	1.822	1.862	1.900	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 favorable independent evaluations by the GAO, National Academy of Sciences, National Bureau of Economic Research at Harvard, and others.

PE 0605790D8Z is the only source of funds for the coordinated administration 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 administration that are required by law and have been a standard part of the program since it was initiated at DoD in 1983, including:

- **Coordination, publication, and distribution of SBIR R&D solicitations**, as required by 15 U.S.C. 638(g)(2);
- **Monitoring of DoD-wide SBIR program expenditures**, to meet Congressionally-mandated reporting requirements in 15 U.S.C. 638(g)(8), (j)(2)(F), and (l)(2);
- **Sponsorship of national SBIR conferences**, which are the only existing forum for small technology companies to interact directly with DoD program and technical personnel, and thereby learn how to prepare research proposals that serve DoD's needs.

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This program element also funds recent USD(A&T) initiatives to develop and implement program improvements, including performance-based metrics of the program's effectiveness in spawning new products/technologies of benefit to DoD.

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
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 1998 Accomplishments: This budget item funded the coordination and publication of three SBIR/STTR research solicitations, as well as their distribution to over 30,000 potential applicants. The solicitations are the means, prescribed by statute, through which DoD describes its research needs and solicits research proposals from small technology companies. This budget item also funded the monitoring of DoD-wide SBIR program expenditures, as required by law, as well as DoD's annual reporting to Congress and the Small Business Administration on the operation of DoD's SBIR program. And this budget item funded two national SBIR conferences each attracting 800-1000 companies, in which the companies met directly with DoD scientists, contracting officers, and program managers, and learned how to prepare SBIR proposals and design research projects that will serve the DoD mission. In addition, this budget item funded USD(A&T) initiatives to streamline the SBIR process and facilitate participation in the program by companies not used to doing business with the government. Such initiatives included the creation and distribution of an SBIR desk reference for DoD contracting officers and technical personnel, the operation of an SBIR Help Desk (800/382-4634) for program participants, the operation of an SBIR Home Page, and other projects. Lastly, it funded the first stage of a USD(A&T)-directed evaluation of DoD's new SBIR "Fast Track" policy, under which small businesses that attract matching funds from outside investors receive a significantly higher probability of SBIR award. (\$1.609 Million)

FY 1999 Plans: This budget item continues to fund the core administrative functions discussed above - coordination, publication, and distribution of the solicitations; monitoring and reporting on the DoD-wide operation of the program; and sponsorship of the national SBIR conferences. It also continues to fund the USD(A&T) initiatives to streamline the SBIR process (SBIR Desk Reference, SBIR Help Desk, SBIR Home Page). It will also fund the second stage of the Fast Track evaluation (see FY 1998 discussion). Finally, it will fund a new initiative launched by the USD(A&T) in February 1998 to: (1) develop and implement quantifiable, performance-based metrics of the SBIR program's effectiveness in spawning viable new products

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sold to DoD and others; and (2) systematically monitor the track record of multiple award winners in developing successful new products, and to use that track record in the SBIR proposal evaluation process. This program element includes funding for travel, including invitational travel, in support of the above activities. (\$1.799 Million)

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE February 1999
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 6	R-1 ITEM NOMENCLATURE SBIR Administration PE 0605790D8Z	

FY 2000 Plans: This budget item will continue to fund the core administrative functions and USD(A&T) initiatives to streamline the SBIR process, facilitate participation by new companies, track performance-based metrics of the SBIR program's effectiveness, and systematically monitor the track record of multiple award winners for use in the proposal evaluation process. It will also provide support for a new initiative, included in the FY 1999 Defense Authorization Act, to accelerate the transition of SBIR R&D into DoD acquisition programs. (\$1.713 Million)

FY 2001 - 2004: This budget item will continue to fund the core administrative functions (solicitations, monitoring of program expenditures and operations, national conferences), as well as initiatives, such as those discussed above, to streamline the SBIR process, facilitate participation by new companies, track metrics of the program's effectiveness, and increase the program's success in converting SBIR research into affordable, high-performance new products of benefit to DoD.

**B. Program Change Summary**

	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>Total</u> <u>Cost</u>
Previous President's Budget	1.738	1.820	1.713	Continuing
Appropriated Value	1.738	1.820		
Adj. to Approp. Value/President's Budget	(.129)	(.021)		
Current Budget Submit	1.609	1.799	1.713	Continuing

Change Summary Explanation:

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Funding: The change in funding in FY1998 and FY 1999 is the result of undistributed Congressional reductions.

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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R-2 Exhibit RDT&E Budget Item Justification									DATE FEBRUARY 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA7					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. <b>C3I INTELLIGENCE PROGRAMS</b> PE 0305190D8Z					
COST (\$ In Millions)	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY200	Cost to Complete	Total Cost
Total PE Cost	8.827	9.551	9.480	10.332	11.384	12.500	12.760	13.027	Continuing	Continuing
Project Name/No. and Subcost C3I Intelligence Programs/P481	8.827	9.551	9.480	10.332	11.384	12.500	12.760	13.027	Continuing	Continuing
Quantity of RDT&E Articles	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**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 provides 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. ISSO currently provides:

- ISSO Oversight & Administration
- Battlefield Information Collection and Exploitation System (BICES) Developmental Efforts
- Open House Program (OH)

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- National Drug Intelligence Center (NDIC) for DoD -See Descriptive Summary in NFIP for program details.
- Advanced Sensor Applications Program (ASAP) - See ASAP RDT&E Descriptive Summary for program details.
- Throttle Car (TC)- See Descriptive Summary in the Counterdrug submission for program details.
- Gulf States Initiative (GSI)- See Descriptive Summary in the Counterdrug submission for program details
- Strategic Technical Assessment Program (STAP)
- Battle Damage Assessment Technology (BDAT)
- Technology Transfer Program for Office of Narcotics and Drug Control Program (ONDCP)
- Other Classified Programs

Beginning in FY 1999, the Integrated Information Architecture Development (IIAD) funds were moved to this program element from the Defense Intelligence Agency as a result of the Defense Reform Initiative. The IIAD supports the analysis, management, and technical efforts to improve the development, coordination and integration of the DoD Information Technology Architecture required by the Information Technology Management Reform Act (ITMRA). Existing architecture initiatives, such as the Joint Technical Architecture, C4ISR Architecture Framework and individual operational and systems architectures, require integration and synchronization to usefully serve as coherent and executable guidance for DoD Information Management (IM) activities. These efforts will assist the DoD with the strategic direction and management of information technology programs and investments.

**Program Accomplishments and Plans:**

**FY 1998 Accomplishments:**

- Salaries for Program and Financial Managers and Administrative Staff (1.677 Million)
- Facility leased space (0.250 Million)
- Logistical Support (0.410) Million)
- System Engineering and Technical Support (SETA) (0.700 Million)
- Program and Technical Support to the DoD/Library of Congress OPEN HOUSE Initiative (0.450 Million)
- Technology Integration and Systems Development (0.200 Million)
- Program Oversight and Technical Support to BICES (2.030 Million)
- Developed and Tested STAP Methodology in support of USFK IO Planning Requirements(0.20 Million)
- Developed and tested on-line vulnerability methodology for SAF/AA (0.050 Million)

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- Definitized Technology Demonstration (0.050 Million)
- Developed Battle Damage Assessment Technology (BDAT) (0.050 Million)
- Explored database development for Foreign Military Acquisition Community (0.010 Million)
- Initiated program planning arrangement with ONDCP technology transfer projects (0.010 Million)
- Supported Air Force continued upgrade of HAARP (2.000 Million)
- Defined high priority applications for HAARP (0.330 Million)
- Defined modeling and experimental design for detection (0.410 Million)

**FY 1999 Plans:**

- Salaries for Program and Financial Managers and Administrative Staff (1.800 Million)
- Facility leased space (0.250 Million)
- Logistical Support (0.400 Million)
- System Engineering and Technical Support (SETA) (0.670 Million)
- Program and Technical Support to the DoD/Library of Congress OPEN HOUSE Initiative (0.450 Million)
- Technology Integration and Systems Development (0.223 Million)
- Program Management and Technical Support to BICES (1.850 Million)
- Continue Technology Demonstration (0.100 Million)
- Explore Battle Damage Assessment Technology (BDAT) (0.100 Million)
- Continued support to Strategic Technology Assessment Technology Program (STAP)(0.100 Million)
- Continued support to ONDCP (0.010 Million)
- Support the development of an enterprise level information network and information management architecture to address the needs of forces for relevant and timely information (0.740 Million)
- Analyze Defense-wide, cross command and coalition issues relating to defense information Infrastructure in support of the Unified Commands and coalition partners. (0.613 Million)
- Support the development of a technical plan to migrate legacy C3 systems into compliance with the Defense Information Infrastructure. (0.500 Million)
- Support classified intelligence operations program research at the Services and Commands (1.745 Million)

**FY 2000 Plans:**

- Salaries for Program and Financial Managers and Administrative Staff (2.220 Million)
- Facility leased space (0.250 Million)

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- Logistical Support (0.330 Million)
- System Engineering and Technical Support (SETA) (0.500 Million)
- Program and Technical Support to the DoD/Library of Congress OPEN HOUSE Initiative (0.400 Million).
- Technology Integration and Systems Development (0.100 Million)
- Program Management and Technical Support to BICES (1.850 Million)
- Continue Battle Damage Assessment Technology (BDAT) (0.100 Million)
- Continued support to STAP (0.100 Million)
- Support the insertion of the DoD Architecture Framework into DoD information Technology efforts to ensure consistency of architecture developments. (0.493 Million)
- Continue to analyze Defense-wide, cross-command, and coalition issues relating to Defense Information Infrastructure in Support of the Unified Command and coalition partners. (1.275 Million)
- Support classified intelligence operations program research at the Services and Commands (1.862 Million)

**FY 2001 Plans:**

- Salaries for Program and Financial Managers and Administrative Staff (2.300 Million)
- Facility leased space (0.250 Million)
- Logistical Support (0.340 Million)
- System Engineering and Technical Support (SETA) (0.500 Million)
- Technology Integration and Systems Development (0.2340 Million)
- Program Management and Technical Support to BICES (1.850 Million)
- Continue Battle Damage Assessment Technology (BDAT) (0.100 Million)
- Continue support to STAP (0.100 Million)
- Continue to assess the information superiority capabilities of the Unified Commands and coalition partners. (1.246 Million)
- Continue to explore evolving technology to ensure compliance with Defense Information Infrastructure. (0.550 Million)
- Support classified intelligence operations program research at the Services and Commands (2.862 Million)

C3I Intelligence Programs is in Budget Activity 7, Operational Systems Development because it is consistent with established DoD definitions for BA 7.

**B. Program Change Summary**

Total

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	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u> Cost
Previous President's Budget	5.978	9.672	9.658	10.517 Continuing
Appropriated Value				
Adjustments to Appropriated Value				
a. Internal Reprogramming	+3.000			
b. Below threshold program Adjustments	-.151			
c. Inflation Adjustment		-.121	-.178	-.185
Amended Budget Estimate	8.827	9.551	9.480	10.332 Continuing

**Change Summary Explanation: N/A**

**C. Other Program Funding Summary: N/A**

**D. Acquisition Strategy: N/A**

**E. Schedule Profile: N/A**

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<b>Exhibit R2a RDT&amp;E Project Justification</b>									DATE FEBRUARY 1999	
APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/BA7					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. <b>C3I INTELLIGENCE PROGRAMS PE 0305190D8Z</b>					
COST ( <i>In Millions</i> )	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Project Cost	8.827	9.551	9.480	10.332	11.384	12.500	12.760	13.027	Continuing	Continuing
RDT&E Articles Qty									Continuing	Continuing

**A. Mission Description and Budget Item Justification:**

The C3I Intelligence Programs project includes funding for:

ISSO: resources and manpower in support of projects managed by the Intelligence Systems Support Office (ISSO) as directed by the ASD(C3I). ISSO provides a full spectrum of Program Oversight and 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.

IIAD: The Integrated Information Architecture Development supports the analysis, management, and technical efforts to improve the development, coordination and integration of the DoD Information Technology Architecture required by the Information Technology Management Reform Act (ITMRA). Existing architecture initiatives, such as the Joint Technical Architecture, C4ISR Architecture Framework and individual operational and systems architectures, require integration and synchronization to usefully serve as coherent and executable guidance for DoD Information Management (IM) activities. These efforts will assist the DoD with the strategic direction and management of information technology programs and investments. Note: Funding was moved to this PE beginning in FY99 from DIA (CISA) as part of the OSD (C3I) reorganization under the Defense Reform Initiative.

**B. Other Program Funding Summary:** None

**C. Acquisition Strategy:** N/A

**D. Schedule Profile**

Fiscal Year actual and planned events by quarter.

**ISSO:**

- Initiated contractor sponsored C4ISR Independent Research & Development (IRAD)activities 1QFY98
- Explored Battle Damage Assessment Technology 3QFY98
- Assessed DoD Vulnerability on the Internet Study 3QFY98
- Developed Transnational Threat Program Concept 4QFY98
- Pursue Industrial Base Alliances 2QFY99
- Develop International Interoperability Architecture 4QFY99

**OPEN HOUSE:**

- Continued site operations activities at all sites 1QFY98
- Site activation in Bulgaria investigated and declined 1QFY98
- Investigated expanding program to Russian Military archives in Moscow 1QFY98
- Film processing site established in Moscow 3QFY98
- New site established at Russian Academy of Sciences Library, St. Petersburg 3QFY98
- State Public Historical Library added to Moscow participation 3QFY98
- Investigated activation of a site at the Slovakian Military Archives 3QFY98
- Investigated activation of a site at the Russian State Library, Moscow 4QFY98
- Complete Activation of Slovakian Military Archives 2QFY99
- Continue site operations activities at all sites 1QFY00
- Prepare for transfer or close of OPEN HOUSE Program 1QFY00

**BICES:**

- Implemented Global Switching capability for US BICES Connectivity 1QFY98
- Implemented DIA Proliferation and MIPS Database on BICES 2QFY98
- Completed initial development of US Gateway Web access software 2QFY98

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- Developed/tested/evaluated Security Voice capability for BICES Network (Voice over IP technology) 3QFY98
- Developed and implemented X.500 Directory Services for BICES Backbone Network 3QFY98
- Developed and tested improved integrated BICES communications architecture (Improved bandwidth sharing) 4QFY98
- Design, Develop and integrated BICES Interpersonal Services into the US BICES components 1QFY99
- Integrate and test US BICES Gateway National Contribution database migration to web technology access for Target Architecture Version.2 2QFY99
- Initiate development to extend US Gateway to Invited Nations 3QFY99
- Migrate GCCS and the DII/COE to BICES 4QFY99
- Develop and Integrate US Gateway/NCD into USEUCOM theater intelligence architecture to include NATO Four Domains architecture 4QFY99
- Integrate intelligence products into US National Contribution Database 2QFY00
- Expand TAV 2.0 to Lower National Levels 3QFY00
- Expand US Gateway/NCD to Support Invited Nations to NATO 4QFY00
- Migrate US portion of BICES Backbone Network to NATO communications Circuits 1QFY01
- Develop BICES C4ISR TAV 3.0 hardware/software baseline and implement Lower National Levels 2QFY01
- Integrate BICES TAV 3.0 C4ISR functions with NATO 3QFY01
- Develop and integrate Multinational information intranets and regional fusion centers 4QFY01

**STAP:**

- Provided initial assessment for Joint Staff requirements 4QFY98
- Define target criteria 1QFY99
- Assess joint agency support requirements 3QFY99
- Assess critical foreign technologies for evaluation 3QFY99
- Define emerging country infrastructures 4QFY99
- Evaluate technology trends and impacts 4QFY99

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- Provide joint staff technology updates 2QFY00
- Provide specific technology evaluation for target countries 4QFY00
- Continue updates and system enhancements 2QFY01
- Evaluate specific technologies for foreign acquisition 4QFY01

**BDAT:**

- Defined system requirements 2QFY98
- Established operational concepts 4QFY98
- Pursue Organizational Alliances 3QFY99
- Defined target characterizations 4QFY99
- Establish signal processing improvements 2QFY00
- Define platform parameters 3QFY00
- Optimize UAV requirements 4QFY00
- Complete UAV platform evaluation 2QFY01
- Provide airborne testbed 3QFY01
- Evaluate technology enhancements 4QFY01

**ONDCP:**

- Defined system specifications 4QFY98
- Completed project reviews 3QFY99
- Evaluate Defense technologies 4QFY99
- Provide system recommendations 4QFY99

**IIAD:**

- Completed JPAS Software Development 3QFY98
- Developed prototype Personnel Recovery C4ISR architectures 3QFY98
- Completed initial development of integrated C4ISR architectures 4QFY98
- Complete technical plan to migrate C3 systems 4QFY99
- Support development of enterprise level network & information management architecture 4QFY99
- Analyze department-wide defense information issues 4QFY99

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- Evaluate DoD Information Technology efforts 3QFY00
- Analyze department-wide defense information issues 4QFY00
- Assess information superiority capabilities of commands 4QFY01
- Evaluate evolving technology impacting Defense Information Infrastructure 4QFY01

**HAARP:**

- Support Air Force HAARP enhancements 2QFY98
- Define HAARP system parameters 2QFY98
- Support Air force HAARP requirements 2QFY98

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Exhibit R-3 Cost Analysis								Date: February 1999				
APPROPRIATION/BUDGET ACTIVITY RDT&E,DW/BA7			PROGRAM ELEMENT PE0305190D8Z			PROJECT NAME AND NUMBER C3I Intel Programs/481						
Cost Categories (Tailor to WBS, or System /Item Requirements)	Contract Method & Type	Performing Activity Location	Total PYs Cost	CY Cost	CY Award Date	BY1 Cost	BY1 Award Date	BY2 Cost	BY2 Award Date	Cost To Complete	Total Cost	Target Value Contract
Development Test & Evaluation	multiple	various	26.086	1.767	4/99	1.949	4/00	2.913	4/01	Cont.	Cont.	
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			26.086	1.767		1.949		2.913				
Remarks												
C3I Intelligence Programs includes the development of Systems and Technology. When the project reaches Full Operating Capacity (FOC) they may be transferred to the appropriate service of agency for sustainment.												
Contractor Engineering Support	multiple	various	13.470	1.986	4/99	1.947	4/00	1.319	4/01	Con't	Con't	
Government Engineering Support	Multiple	various	1.199	.500	4/99	.500	4/00	.500	4/01	Con't	Con't	
Program Management Support			1.389	.190	4/99	.190	4/00	.190	4/01	Con't	Con't	
Program Management Personnel												
Travel			1.430	.230	4/99	.230	4/00	.230	4/01	Con't.	Con't	
Labor (Research Personnel)				1.170		1.126	4/00	1.262	4/01	Con't.	Con't	
Overhead	multiple	various	26.843	3.708	4/99	3.538	4/00	3.918	4/01	Con't	Con't	
Subtotal Management			44.331	7.784		7.531		7.419				
Remarks												

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Total Cost			70.417	9.551		9.480		10.332			
Remarks											

(Exhibit R-3, Page 2 of 4)

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	53.871	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. and Subtotal Cost Tactical Control System (TCS)/P802</b>	42.013	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. and Subtotal Cost Common Systems Development (CSD)/P803</b>	11.858	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The non-lethal tactical UAV systems for DoD provide warfighters with a dedicated capability for day/night aerial reconnaissance, surveillance and target acquisition (RSTA); intelligence; communications/data relay; electronic warfare; weather data collection to support combat operations; minefield detection; and nuclear, biological and chemical reconnaissance in limited adverse weather. Tactical UAVs provide ground and naval commanders with near-real-time reconnaissance capability for sustained, deep RSTA support, and combat assessment (CA). UAV support to the maneuver battalions and brigades incorporates downsized, portable equipment that is capable of rapid deployment, easy to operate and maintain with minimum manpower and training requirements, and capable of launch and recovery in a constrained operating environment. The shipboard capability supports the Naval Task Forces. UAVs are intended for deployment in environments where immediate feedback is necessary and manned aircraft are unavailable or excessive risk makes the use of manned aircraft undesirable. Current Hunter UAV assets support training and UAV commonality and interoperability efforts. Scaleability requirements are captured in the Tactical Control System (TCS) to meet users' operational needs at multiple echelons. The Outrider Tactical UAV (TUAV) Advanced Concept Technology Demonstration (ACTD) provided a single UAV that moves towards meeting Joint Services tactical UAV requirements. The TUAV endurance objective is to provide four hours flying time on station at a distance of up to 200 kilometers. The baseline

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z	

payload is electro-optical/infra-red (EO/IR). Growth payloads will expand TUAV RSTA capabilities. The basic ACTD includes risk mitigation efforts of a UAV Common Automatic Recovery System (UCARS).

The Outrider ACTD program demonstrated Joint Services (Army, Navy, and Marine Corps) tactical UAV requirements culminating in each Service's Military Utility Assessment. Low Rate Initial Production (LRIP) and Operational Test and Evaluation (OT&E) addresses the ground based and shipboard operations of tactical UAVs. In addition, efforts are underway to develop a common TCS to provide an interoperable capability for control of the spectrum of present and future tactical UAV air vehicles and payloads utilized by the military services for RSTA and CA. TCS will interface with the High Altitude Endurance (HAE) UAV systems and multiple C4I systems. TCS is structured to develop concepts of operation in conjunction with warfighters, to transform the operational concepts into a technical architecture with technical performance parameters, to demonstrate key capabilities through a rapid prototyping and demonstration effort, and to conduct supporting analyses, simulations, and trade studies leading to production in FY99. The Systems Integration Laboratory (SIL) is an integral part of the TCS development. The SIL allows the integration and simulation of air vehicles, payloads, and system upgrades prior to actual flight. Integration of software and hardware within this controlled laboratory environment reduces the cost of test and evaluation and the risks associated with actual flight test. The Common Systems Development (CSD) provides for system interoperability and commonality among UAVs. Efforts such as open architecture, payload development, joint logistics, and simulation and modeling continue to ensure reduced life cycle costs, improved supportability, and the exploitation of technological advancement having UAV application. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of operational system development.

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	53.871	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. and Subtotal Cost Tactical Control System (TCS)/P802</b>	42.013	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The Tactical Control System (TCS) provides interoperability and commonality for mission planning, command, control, communications, and data dissemination for the current and future family of tactical and Medium Altitude Endurance (MAE) Unmanned Aerial Vehicles (UAVs). It provides a full range of scaleable UAV capability from passive receipt of air vehicle and payload data to full air vehicle command and control. TCS functionality supports the joint warfighter with a common core operation environment to receive, process, and disseminate UAV air vehicle and payload data from two or more different UAV types for reconnaissance, surveillance, and combat assessment. TCS also has an objective capability to receive and disseminate payload information from the Global Hawk and DarkStar endurance UAVs. TCS supports seamless integration into the existing C4I architecture and interfaces with other manned and unmanned reconnaissance platforms and intelligence systems providing information superiority through cross cueing. TCS maximizes the use of Commercial and Government off-the-shelf (COTs and GOTs) hardware and software whenever possible. TCS software will be interoperable and operate on existing service computer platforms and compliant with the ASD(C3I) Joint Technical Architecture (JTA), Distributed Common Ground System (DCGS), Common Imagery Ground/Surface Station (CIGSS), and the United States Imagery Standards, and Defense Information Infrastructure/Common Operating Environment (DII-COE). The UAV Joint Technology Center and Systems Integration Laboratory (JTC/SIL) supports the assessment of system integration readiness prior to actual flight testing. The JTC/SIL provides for hardware-in-the-loop tests of payloads, air vehicles (A/V), ground system components, and joint interoperable interface and UAV Concept of Operations (CONOPS) evaluations using the Multiple UAV Simulation Environment (MUSE) in Advanced Warfighting Exercises (AWEs). The NATO Industrial

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z	

Advisory Group, Project 35, has undertaken a study to define a common interoperable NATO UAV ground control system architecture. Current plans include an interoperable demonstration with a German UAV.

**Programs Accomplishments and Plans: (\$ in millions)**

**FY 1998 Accomplishments: (\$42.013)**

- Continued prototype demonstrations of land and sea-based TCS including mission planning, air vehicle, and payload control of Predator and TUAV (\$8.373)
- Continued TCS evolutionary development, engineering and integration efforts to include demonstration of scaleability, portability, mission planning and C4I integration, and select a Systems Integration contractor (\$15.620)
- Continued documentation of system requirements (\$2.120)
- Continued JTC/SIL rapid prototyping, simulation and modeling, systems integration and interoperability and test including establishment of a development baseline (\$6.000)
- Continued participation in joint warfighting experiments and Service exercises for refinement of CONOPS: FLTEX 98, Division XXI experiments, etc. (Contingent on funding from Services: \$0.000)
- Acquired Predator AV and additional supporting assets (\$8.000)
- Selected Logicon Corporation for Flight Route and Payload Planning Software for integration into TCS (\$0.900)
- Awarded LRIP System Design, Test and Integration (SDTI) contract (\$1.000)
- Conducted MS II review

**\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).**

**Acquisition Strategy:** The TCS design and development effort completed its Program Definition and Risk Reduction phase (Phase I) at the end of FY98; Engineering and Manufacturing Development (EMD) phase (Phase II) begins in September 1998. A major effort during the EMD phase will be the integration of government furnished TCS hardware and software components by a Systems Design, Test and Integration (SDTI) contractor for four Low Rate Initial Production (LRIP) systems. The SDTI contract will be a full and open competitive procurement

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z	

with a planned award date of 4Q FY98. Options for Full Rate Production (Phase III) of additional TCS systems will be included in the basic SDTI contract. The scheduled Initial Operational Capability (IOC) of the TCS is 2Q FY00; Full Operational Capability (FOC) is 2Q FY01. IOC will be achieved after each service has fielded one production representative system with interim Integrated Logistics Support (ILS) (training, spares, technical publications, support equipment) in place and testing (developmental and operational) completed. FOC will be achieved when full attainment of capability is provided by in-place maintenance and repair support, software support, test equipment and spares and systems are effectively employed and operated by the service's hosting unit or force.

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	40.7	*	*	*	*
Net Change	<u>1.3</u>				
President's Budget Request	42.0	*	*	*	*

\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).

**Change Summary Explanation:**

- Funding: The change in funding is a result of internal realignments within the DARP.
- Schedule: N/A
- Technical: N/A

**C. Other Program Funding Summary Cost**

N/A

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z	

**D. 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
<b>Acquisition Milestones</b>																
MS II				X												
<b>Engineering Milestones</b>																
SIL (System Integration/Test)	_____															
MAE/TUAV Interoperability	_____															
<b>Other Program Events</b>																
TCS Capability for Predator/Outrider																
Receive Payload Data	X	X														
Mission Plan		X	_____	X												
<b><u>Tactical Control System (TCS)</u></b>																
AV Control		X	_____	X												
C4I Integration	X															
Demos	X														X	

\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	53.871	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. and Subtotal Cost CSD/P803</b>	11.858	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).

**Brief Description of Element:** Common Systems Development (CSD) pursues the RDT&E and production of systems common to the tactical family of UAVs (Pioneer, Outrider, Predator), including growth payloads and subsystems; performs user demonstrations of emerging UAV technologies; manages UAV joint international programs; and provides cross-functional support in the areas of logistics, simulation, test, and operations research. CSD supports testing, common system integration, and subsystems development for UAVs, including the UAV Common Automatic Recovery System (UCARS) and Modular Integrated Avionics Group (MIAG); and supports initiatives to reduce life cycle costs, improve supportability, and exploit commercial and Non Developmental Item (NDI) technology having UAV applications. CSD also provides user demonstration, integration, test, and qualification of JROC-prioritized growth payloads such as communication/data relay, electronic warfare, laser designator, and chemical/biological reconnaissance; demonstrates alternative UAV technologies and concepts, including Vertical Take Off and Landing (VTOL) and Multifunction Self-Aligned Gate (MIAG) active array antennas; provides small UAV capabilities in response to unique warfighter requirements. CSD's International program efforts include cooperation R&D arrangements with major NATO and non-NATO allies, and providing day-to-day management and policy oversight regarding UAV export control and foreign military sales.

**Programs Accomplishments and Plans:** (\$ in millions)

**FY 1998 Accomplishments:** (\$11.858)

- Conducted Congressionally-directed research of Multi-function Self-Aligned Gate (MSAG) active array antenna (\$3.795)
- Continued Congressionally directed flight demonstration of VTOL UAV technology (\$1.921)

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z	

- Initiated Congressionally directed Stopped-Rotor/Reaction Drive/High Speed VTOL UAV Concept Technology Demonstration (\$6.142)

**\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).**

**Acquisition Strategy:**

The CSD promotes the maximum use of common and interoperable hardware, software, and non-developmental items (NDI) technology in an effort to support Joint Service UAV operations, streamline maintenance/support, and reduce life cycle cost. It exploits technology advancements that have UAV application through integration and demonstrations.

<b>B. <u>Program Change Summary</u></b>	<b><u>FY 1998</u></b>	<b><u>FY 1999</u></b>	<b><u>FY 2000</u></b>	<b><u>FY 2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	11.5	*	*	*	*
Net Change	<u>.4</u>				
President's Budget Request	11.9	*	*	*	*

**\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).**

**Change Summary Explanation:**

- Funding: The change from previous funding is a result of internal realignments within the DARP.
- Schedule: N/A
- Technical: N/A

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z	

**C. Other Program Funding Summary Cost**

N/A

\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).

**D. 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
<b>Engineering Milestones</b>																
UCARS Baselined				X												
<b>T&amp;E Milestones</b>																
UCARS Systems Qualification				X												
VTOL Flight Test				X-X												
Pioneer/ MIAG Demonstration				X												
MIAG Production Qualification				X	-----	X										
MSAG Active Array Antenna Flight Demo				X												
<b>Contract Milestones</b>																
VTOL Demonstration Contract Awards				X			X									
VTOL Advanced Technology Contract Award				X												
- UCARS/MIAG Upgrade Award																

\* Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Tactical Unmanned Aerial Vehicles (TUAV) PE 0305204D8Z	

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Exhibit R-3 Cost Analysis (page 1)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305204D8Z						Tactical Unmanned Aerial Vehicles (TUAV)/P802		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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			3.378									
Ancillary Hardware Development			4.593									
Systems Engineering			3.736									
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			11.707									
Remarks												
Ancillary Hardware Development includes C4I and Data Link Interfaces.												
Development Support												
Software Development			4.563									
Training/Integrated Logistics Support			1.159									
Technical Data/Configuration Management			.751									
GFE												
Subtotal Support			6.473									
Remarks												

**Exhibit R-3, Project Cost Analysis**  
(Exhibit R-3, page 1 of 2)

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305204D8Z						Tactical Unmanned Aerial Vehicles (TUAV)/P802		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Development Test & Evaluation			4.970									
Operational Test & Evaluation												
Subtotal T&E			4.970									
Remarks												
Contractor Engineering Support												
Systems Integrator	CPAF		.500									
Alliant Techsystems	CPFF	Hopkins, MN										
Labor			.959									
Material			.191									
Award Fees			.123									
General Atomics	CPFF	San Diego, CA										
Labor			2.016									
Material			.075									
Award Fee			.151									
Logicon	CPFF	San Pedro, CA										
Labor			.300									
Program Management Personnel			4.195									
Travel			.825									
Overhead			1.193									
Other			8.335									
Subtotal Management			18.863									
Remarks Overhead includes PEO CU support. Other includes early UAV development efforts and MUSE support.												
Total Cost			42.013									
Remarks * Per FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the TUAV funds for FY00-05 were transferred to the Navy (PE 0305204N).												

(Exhibit R-3, page 2 of 2)

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>  <b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						<b>R-1 ITEM NOMENCLATURE</b> Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	181.165	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost</b> Global Hawk (CONV HAE )/P804	93.509	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost</b> DarkStar (LO-HAE)/P805	41.898	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost</b> HAE Common Ground Segment/P807	45.758	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the EUAV Program funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** This program includes the Medium Altitude Endurance (MAE) - Conventional High Altitude Endurance (CONV HAE) - Global Hawk; Low Observable High Altitude Endurance (LO HAE) - DarkStar; HAE UAV Common Ground Segment (CGS) and associated support items. These systems will provide all-weather, day/night, reconnaissance and surveillance in direct support of the Joint Forces Commander. They integrate existing airborne reconnaissance architectures for mission planning, data processing, exploitation and dissemination.

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999		
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>				
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z				

<b>Total PE Cost</b>	181.165	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. and Subtotal Cost</b>	93.509	*	*	*	*	*	*	*	*	*
<b>Global Hawk (CONV HAE)/P804</b>										
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Global Hawk funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The High Altitude Endurance (HAE) UAV Advanced Concept Technology Demonstration (ACTD) program consists of two types of air vehicles, the Conventional HAE (CONV HAE) - Global Hawk and a Low Observable HAE (LO HAE) - DarkStar, and a Common Ground Segment (CGS), common and interoperable with both types of air vehicles (A/Vs). The DarkStar and HAE UAV Common Ground Segment projects are documented separately. The objective of the program is to place the assets in the hands of the warfighter as quickly as possible to assess the utility of the system in the context of military exercises with other service/theater systems. The execution of the Global Hawk project is dependent on funding of the HAE UAV Common Ground Segment project which contains the ground segment RDT&E, and government developmental and demonstration support funding for both Global Hawk and DarkStar A/Vs. The Global Hawk will provide continuous, all-weather, day/night, wide area reconnaissance and surveillance in direct support of the Joint Forces Commander. The system consists of aircraft, sensors, communications and interfaces to theater systems to support tactical warfighters at various levels of command. The Global Hawk will be a fully automatic, high altitude, long endurance unmanned aircraft that is directly responsive to Theater force tasking. The Global Hawk will integrate with the existing tactical airborne reconnaissance architectures for mission planning, data processing, exploitation, and dissemination. It will provide both wide area search radar and Electro Optical (EO) or Infrared Radar (IR) imagery (40,000 sq nm per mission) at 1m resolution and up to 1900 spot images per mission at 0.3m resolution, and will support targeting accuracy of at least 20m CEP. The Global Hawk is the primary “workhorse” of the HAE UAV ACTD system and will be capable of supporting an estimated

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z	

80 percent of all military HAE UAV operational reconnaissance needs. It will be designed for long endurance, high altitude, standoff, image collection capabilities. The Global Hawk will operate in low-to-moderate air defense threat environments with the ability to fly above, standoff, and look into high threat areas. This project is categorized as Budget Activity 7 because it provides for technologies and capabilities in support of Operational System Development.

**Program Accomplishments and Plans: (\$ in millions)**

**FY 1998 Accomplishments: (\$93.509)**

- Continued development and integrate design updates (\$24.598)
- Continued fabrication and integration of the demonstration A/Vs (#3, #4, #5) (\$38.319)
- Provided contractor participation in planning for test and evaluation of military utility (\$10.043)
- Provided contractor fabrication, demonstration and evaluation support (\$20.549)

**\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Global Hawk funds for FY00-05 were transferred to the Air Force (PE 0305205F).**

**Acquisition Strategy:** The HAE system will be procured as a design-to-cost program to acquire maximum reconnaissance capability for a firm unit flyaway price (UFP) of \$10M (FY94\$) per vehicle (including payload). Global Hawk was selected at the end of a competition involving multiple contractor teams. Streamlined procurement, using DARPA's Other Transaction Authority, is being used to delete all non value-added tasks and documentation from the program. Under the Developmental Phase agreement, the contractor is responsible for building and testing two Global Hawk air vehicles. As part of this agreement, the contractor will also build a developmental ground segment. During the Demonstration Phase, program management responsibility will transition to the Air Force. Funding for the ACTD program ends in the first quarter of FY2000. Funding for the post ACTD RDT&E and production begins in FY2001.

**B. Program Change Summary**

**Total**

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z	

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Cost</u>
Previous President's Budget	95.2	*	*	*	*
Net Change	(1.7)	*	*	*	*
President's Budget Request	93.5	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Global Hawk funds for FY00-05 were transferred to the Air Force (PE 0305205F).

Change Summary Explanation:

Funding: The change in funding is a result of internal realignments within the DARP.

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost**

	<u>FY 1998</u>	<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>
HAE CGS, RDT&E, DW	45.758	*	*	*	*	*	*	*	*	*
DarkStar, RDT&E, DW	41.898	*	*	*	*	*	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Global Hawk funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**D. Schedule Profile**



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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>  <b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>		<b>R-1 ITEM NOMENCLATURE</b> Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	181.165	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. and Subtotal Cost DarkStar (LO-HAE)/P805</b>	41.898	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DarkStar funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The High Altitude Endurance (HAE) UAV Advanced Concept Technology Demonstration (ACTD) program consists of two types of air vehicles, the Conventional HAE (CONV HAE) - Global Hawk and a Low Observable HAE (LO HAE) - DarkStar, and a Common Ground Segment (CGS), common and interoperable with both types of air vehicles. The Global Hawk and the HAE UAV Common Ground Segment projects are documented separately. The objective of this program is to place the assets in the hands of the warfighter as quickly as possible to assess the utility of the system via military exercises with other service/theater systems. The execution of the DarkStar project is dependent on funding of the HAE UAV Common Ground Segment project which contains the ground segment RDT&E and government developmental and demonstration support funding for both DarkStar and Global Hawk A/Vs. The DarkStar will provide continuous, all-weather, day/night, wide area reconnaissance and surveillance in direct support of the Joint Forces Commander. The system consists of aircraft, sensors, communications and interfaces to theater systems to support tactical warfighters at various levels of command. The DarkStar will integrate with the existing tactical airborne reconnaissance architectures for mission planning, data processing, exploitation, and dissemination. The DarkStar will provide wide area search, over 15,000 sq nm per mission, with either the Electro Optical (EO) or Synthetic Aperture Radar (SAR) sensors at 1m resolution. In addition, the DarkStar is capable of 600 spot images per mission with either sensor at 0.3m resolution. The search and spot modes can be interleaved with attendant reductions in the overall coverage. The system will support a targeting accuracy of at least 20m CEP. The stealth capabilities of the DarkStar allow the system to operate in high threat environments before

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z	

suppression of enemy air defenses (SEAD) where manned reconnaissance and the Global Hawk are not viable options. The optimization of this UAV for survivability means the UAV is less capable than the Global Hawk in terms of total endurance and payload capability. This project is categorized as Budget Activity 7 because it provides for technologies and capabilities in support of Operational System Development.

**Program Accomplishments and Plans: (\$ in millions)**

**FY 1998 Accomplishments: (\$41.898)**

- Continued fabrication of DarkStar demonstration A/Vs (#3, #4) (\$10.085)
- Completed rebuild and checkout of DarkStar A/V #2 (\$14.845)
- Completed development of DarkStar to include qualification of an operational configuration air data system (\$0.829)
- Provided contractor participation in planning for test and evaluation of military utility (\$7.759)
- Provided fabrication, demonstration and evaluation support (\$8.380)

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DarkStar funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**Acquisition Strategy:** The LO HAE system will be procured as a design-to-cost program to acquire the most reconnaissance capability for a firm unit flyaway price of \$10 million (FY94\$) per air vehicle (including payload). DarkStar was a sole-source award that leveraged substantial previous government investment in low-observable technology. Streamlined procurement using DARPA's Other Transaction Authority is being used to delete all non value-added tasks and documentation from the program. During the Demonstration Phase (previously referred to as Phase III), program management responsibility will transition to the Air Force. Funding for the ACTD program ends in the first quarter of FY2000. Funding for post ACTD and production begins in FY 2001.

**B. Program Change Summary**

**Total**

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z	

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Cost</u>
Previous President's Budget	42.6	*	*	*	*
Net Change	<u>(.7)</u>				
President's Budget Request	41.9	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DarkStar funds for FY00-05 were transferred to the Air Force (PE 0305205F).

Change Summary Explanation:

Funding: The change in funding is a result of internal realignments within the DARP.

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost**

	<u>FY 1998</u>	<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>
Global Hawk, RDT&E, DW	93.509	*	*	*	*	*	*	*	*	*
HAE CGS, RDT&E, DW	45.758	*	*	*	*	*	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DarkStar funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**D. Schedule Profile**

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z	

Fiscal Year actual and planned events by quarter

	<u><b>FY 1998</b></u>				<u><b>FY 1999</b></u>				<u><b>FY 2000</b></u>				<u><b>FY 2001</b></u>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>												
<b>Test &amp; Evaluation Milestones</b>																
Resume Developmental Flight Tests				X												
<b>Contract Milestones</b>																
Demonstration Support Agreement Award							X									
<b>Other Program Events</b>																
Fabricate Demonstration Air Vehicles												X				

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DarkStar funds for FY00-05 were transferred to the Air Force (PE 0305205F).

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<b>Exhibit R-3, RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN</b>		<b>DATE</b> September 1998
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z/P806	

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	181.165	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. Subtotal Cost</b>	45.758	*	*	*	*	*	*	*	*	*
<b>HAE Common Ground Segment/P807</b>										
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CGS funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The High Altitude Endurance (HAE) UAV Advanced Concept Technology Demonstration (ACTD) program consists of two types of air vehicles, the Conventional HAE (CONV HAE) - Global Hawk and a Low Observable HAE (LO HAE) - DarkStar, and a Common Ground Segment (CGS) which is interoperable with both types of air vehicles. The HAE UAV CGS is comprised of a Launch and Recovery Element (LRE), a Mission Control Element (MCE), and associated logistics support activities. The HAE UAV Common Ground Segment integrates many technologies for communications between the Global Hawk, DarkStar, and exploitation centers/users. Without the HAE UAV Common Ground Segment project, the Global Hawk and DarkStar projects cannot be executed. The LRE prepares, launches, and recovers the air vehicles. The MCE plans and executes the mission; dynamically re-tasks the air vehicles, including the sensors; and processes, stores and/or disseminates the data as required. The CGS supports tactical warfighters at various levels of command with digital, near real-time, high quality imagery in exploitable form. Prior to fielding of an integrated CGS, an Interim Ground Segment (IGS) composed of the Global Hawk LRE #1/MCE #1, and the DarkStar Launch Control Recovery System (LCRS) and Data Processing Element (DPE) will be used to conduct flight test and CGS development. The HAE UAV CGS project also funds government support and studies, GFE, and field demonstration support for both the Global Hawk and DarkStar systems. This Project is categorized as Budget Activity 7 because it provides funds for technologies and capabilities in support of Operational System Development.

**Program Accomplishments and Plans: (\$ in millions)**

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z	

**FY 1998 Accomplishments: (\$45.758)**

- Completed development, integration and testing of developmental CGS (IGS) and performance testing with DarkStar A/V (\$11.103)
- Continued development of enhanced planning capability for Global Hawk and DarkStar to support military utility evaluation (\$4.337)
- Continued development and test of demonstration CGS (\$10.822)
- Provided contractor participation in planning for test and evaluation of military utility (\$1.641)
- Provided government test and evaluation support (\$5.949)
- Conducted service exploitation system interface development for integration and test (\$1.270)
- Performed CGS, Global Hawk, and DarkStar government support, studies, and related tasks (\$9.867)
- Conducted assessment of Y2K impact on HAE UAV system (\$0.769)

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CGS funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**Acquisition Strategy:** The HAE UAV Common program provides the ground segment and support items common to the Global Hawk and DarkStar demonstrations. During the development phase, the ground segment originally designed for Global Hawk will be modified to include the capability to; 1) launch and recover; 2) command and control; and 3) receive, process, and disseminate DarkStar sensor data. Addition of this capability defines the Common Ground Segment (CGS) configuration. One (1) developmental and one (1) demonstration CGS are planned to be fabricated during the ACTD. Streamlined procurement, using DARPA's Other Transaction Authority, is being used to delete all non value-added tasks and documentation from the program. During the Demonstration Phase, program management responsibility will transition to the Air Force. Funding for the ACTD program ends in the first quarter of FY 2000. Funding for post ACTD RDT&E begins in FY2001.

<b>B. <u>Program Change Summary</u></b>	<b><u>FY 1998</u></b>	<b><u>FY 1999</u></b>	<b><u>FY 2000</u></b>	<b><u>FY 2001</u></b>	<b><u>Total Cost</u></b>
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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z	

Previous President's Budget	46.6	*	*	*	*
Net Change	<u>(.8)</u>				
President's Budget Request	45.8	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CGS funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**Change Summary Explanation:**

Funding: The change in funding is a result of internal realignments within the DARP.

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost**

	<u>FY 1998</u>	<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>	<b>To <u>Complete</u></b>	<b>Total <u>Cost</u></b>
Global Hawk, RDT&E, DW	93.509	*	*	*	*	*	*	*	*	*
DarkStar, RDT&E, DW	41.898	*	*	*	*	*	*	*	*	*

Related Activities. The Global Hawk program cannot be executed without the complementary HAE UAV Common Ground Segment project. This project also supports the DarkStar project.

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CGS funds for FY 00-05 were transferred to the Air Force (PE 0305205F).

**D. Schedule Profile**

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Endurance Unmanned Aerial Vehicles (EUAV) PE 0305205D8Z	

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
<b>Test &amp; Evaluation Milestones</b>																
Flight Readiness Review					—	X										
Start Developmental Flight Test with Global Hawk						X										
<b>Contract Milestones</b>																
Demonstration Support Agreement Award								X								
<b>Other Program Events</b>																
Fabricate Demonstration Common Ground Segment (CGS)					—										X	

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CGS funds for FY00-05 were transferred to the Air Force (PE 0305205F).

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Exhibit R-3 Cost Analysis (page 1)									DATE February 1999			
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT					PROJECT NAME AND NUMBER			
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305205D8Z					Endurance Unmanned Aerial Vehicles (EUAV)/P804			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
AV 3-5 Fabrication	C/CPFF/IF/AF	Teledyne Ryan Aeronautical (TRA)	12.846									
Development & Test/AV 1&2 Fabric.	C/CPFF/IF	TRA	69.970									
Award Fee for AV 3-5 Fabrication	AF	San Diego, CA	2.108									
Contractor Acquired Property	C/CPFF	TRA	1.514									
Miscellaneous			1.025									
Subtotal Product Development			87.463									
Remarks												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks												

**Exhibit R-3, Project Cost Analysis**  
(Exhibit R-3, page 1 of 2)

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY					PROGRAM ELEMENT					PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7					PE 0305205D8Z					Endurance Unmanned Aerial Vehicles (EUAV)/P804		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Demonstration & Evaluation Support	C/CPFF/IF	TRA	3.139									
Integrated Logistics Support	C/CPFF	TRA	3.907									
Tooling												
GFE												
Subtotal T&E			6.046									
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			93.509									
Remarks												
* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Global Hawk funds for FY00-05 were transferred to the Air Force (PE 0305205F).												

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Exhibit R-3 Cost Analysis (page 1)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305205D8Z						Endurance Unmanned Aerial Vehicles (EUAV)/P805		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Air Vehicle (AV) 3-4 Fabrication	SS/CPIF	Lockheed Martin	6.146									
Design, Develop and Fabricate AV 1-2	SS/CPIF	Palmdale, CA	27.994									
Miscellaneous												
GFE												
Award Fees												
Subtotal Product Development			34.140									
Remarks												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305205D8Z						Endurance Unmanned Aerial Vehicles (EUAV)/P805		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Demonstration and Evaluation Support	SS/CPIF	LMSW	7.758									
Subtotal T&E			7.758									
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			41.898									
Remarks												
* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DarkStar funds for FY00-05 were transferred to the Air Force (PE 0305205F).												

(Exhibit R-3, page 2 of 2)

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Exhibit R-3 Cost Analysis (page 1)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305205D8Z						Endurance Unmanned Aerial Vehicles (EUAV)/P807		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Fabricate Demonstration CGS	C/CPAF/IF	Raytheon Systems Group (RSG), Falls Church, VA	12.956									
Fabricate Developmental CGS	C/CPAF	RSG	24.240									
User Recommended Improvements	C/CPAF		3.343									
Common Imagery Processor	C/CPAF	ESC, Hanscom AFB	1.255									
Miscellaneous												
Subtotal Product Development			41.794									
Remarks												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
Miscellaneous												
Subtotal Support												
Remarks												

**Exhibit R-3, Project Cost Analysis**  
(Exhibit R-3, page 1 of 2)

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305205D8Z						Endurance Unmanned Aerial Vehicles (EUAV)/P807		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Government Support	Allot	AFFTC/Edwards AFB	1.333									
Government Support	Allot	AFOTEC/Kirtland AFB	.867									
Government Support	Allot	NAWC-AD/Pax River	.726									
CGS Spares	C/CPFF	RSG	.938									
Repair Support												
CGS Demonstration Support	C/CPFF	RSG	0.100									
Miscellaneous												
Subtotal T&E			3.964									
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Support												
Miscellaneous												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			45.758									
Remarks												
* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the HAE CGS funds for FY00-05 were transferred to the Air Force (PE 0305205F).												

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE:</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Airborne Reconnaissance Advanced Development (ARAD) PE 0305206D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	186.090	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. Subtotal Cost Airborne Reconnaissance Common Data Link (CDL)/P810</b>	42.889	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CDL funds for FY00-05 were transferred to the Air Force (PE 0305206F).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The objective of the CDL effort within the DARP is to define an interoperable command, control and communications capability for intelligence and reconnaissance assets to include both manned and unmanned platforms. CDL will achieve interoperable communications paths by employing an architecture based on developed hardware, software, and waveforms to promote commonality among the Services. The CDL program will maintain design configuration commonality resulting in lower life-cycle costs. The CDL design will permit existing and future reconnaissance assets to operate worldwide, providing sensor data directly to ground sites or via satellite or air-to-air relay when the asset and ground site are not within line-of-sight. This effort will integrate commercial satellite communications into the available satellite relay options to ensure sufficient wideband data relay capability. The system will have sufficient bandwidth to accommodate numerous sensors collecting SIGINT, IMINT and Multi-spectral data. Modular design allows for future technology insertion. The commonality of modular components reduces non-recurring engineering and life cycle costs to the DoD user. Interoperability provides for the exchange of data across service or agency boundaries. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of Operational System Development.

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE:</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development (ARAD) PE 0305206D8Z	

**Program Accomplishments and Plans:** The CDL program supports development of advanced communications capabilities which offer common, interoperable, and modular attributes to future warfighters under all circumstances, situations, or force structures. The CDL funds are expended for the initial development and demonstration of new data link capabilities and functions. In addition, these funds are leveraged with other Service/Agency funds to provide data link capabilities that are applicable to multiple programs. Specific initiatives include the continuation of design, development, test and demonstration activities associated with common/interoperable communications and control capabilities for airborne reconnaissance platforms and sensors.

**Program Plans and Accomplishments:** (\$ in millions)

**FY1998 Accomplishments:** (\$42.889)

- Continued configuration control of CDL architecture, specifications and modules (\$2.918)
- Continued development of CDL interface on additional platforms (\$2.920)
- Continued to access development of commercial network interface standards and incorporated commercial technologies where practical to the CDL interface (\$1.062)
- Continued engineering and integration of commercial satellite communications network to support airborne reconnaissance platform relay requirements (\$12.959)
- Continued covert waveform development/miniaturization/air-to-air link under the ABIT program and integration engineering of ABIT in ISR platforms (\$12.200)
- Continued SATCOM interoperability enhancements (\$0.450)
- Continued development of Tactical CDL demonstration hardware and flight demonstration, and continued to develop design for operational suitability on ISR platforms (\$10.380)

**\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CDL funds for FY00-05 were transferred to the Air Force (PE 0305206F).**

**Acquisition Strategy:** The CDL involves a multitude of technology projects which will provide for a common, interoperable wideband data link standard that has been mandated by ASD/C3I policy. Program funds are leveraged with the Service program funds to satisfy project objectives.

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE:</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development (ARAD) PE 0305206D8Z	

Funds are provided to various government laboratories and program offices to fund on-going technology efforts. The individual Services use Engineering Change Proposals (ECPs) and modify existing contracts that have been awarded both competitively and on a sole source basis to implement various technology efforts.

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	43.4	*	*	*	*
Net Change	(.5)				
President's Budget Request	42.9	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CDL funds for FY00-05 were transferred to the Air Force (PE 0305206F).

Change Summary Explanation:

Funding: The change from previous funding is a result of internal realignments within the DARP.

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost**

N/A

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the EUAV Program funds for FY00-05 were transferred to the Air Force (PE 0305205F).

**D. Schedule Profile**

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE:</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development (ARAD) PE 0305206D8Z	

Fiscal Year actual and planned events by quarter

	<u><b>FY 1998</b></u>				<u><b>FY 1999</b></u>				<u><b>FY 2000</b></u>				<u><b>FY 2001</b></u>			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Other Program Events</b>																
Start Tactical CDL Phase 2 Detail Design/ CDL Interoperability Testing		X														
U-2 ABIT Prototype Delivery			X													
SATCOM Interoperability Study Complete				X												
Start ARL/CDL SATCOM Design		X														
Complete ARL/CDL SATCOM Design			X													
ARL SATCOM Testing				X												

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>  <b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						<b>R-1 ITEM NOMENCLATURE</b> Airborne Reconnaissance Advanced Development PE 0305206D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	186.090	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost</b> Advanced Sensors/P808	104.066	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost</b> Airborne Reconnaissance Advanced Technology Development Program, P809	39.135	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost</b> Common Data Link (CDL)/P810	42.889	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Sensor funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** This program funds and coordinates the development of advanced defense airborne reconnaissance technologies to ensure systems satisfy strategies and architectures to assure U.S. ability to support warfighter intelligence needs in the face of rapidly developing threat technology, proliferation of advanced weaponry, and uncertain political alignments. This program funds the development of the technologies that respond to evolving threats by emphasizing multi-service utility, interoperability among existing and planned complementary systems (i.e., sensors, ground systems, data links, and manned and unmanned platforms), and timely dissemination of intelligence information to operational forces. It also funds the architecture and master planning activities that will provide the overall guidance for airborne reconnaissance SIGINT and IMINT, and manned/unmanned airborne reconnaissance systems. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of operational system development.

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Airborne Reconnaissance Advanced Development PE 0305206D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	186.090	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. Subtotal Cost Advanced Sensors/P808</b>	104.066	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Sensor funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** Provides funds for the development of sensor systems to improve present airborne reconnaissance capabilities. The developments are driven by evolving collection requirements and modern technology advances. The developments allow for the necessary changes required to meet an integrated, objective airborne reconnaissance architecture as defined in the Integrated Airborne Reconnaissance Strategy (IARS) and amplified in the Airborne Reconnaissance Information Technical Architecture (ARITA). Particular emphasis is placed on multi-platform interoperability. The Advanced Sensors Development Program implements successful proof-of-concept efforts accomplished in the Advanced Technology Program, other Service/Agency developments, and Congressionally-funded initiatives leading to producible sensor systems for airborne platforms. Upon successful sensor prototype demonstration, technology sensor developments are turned over to the Services for procurement and platform integration. The advanced sensor program includes technical analyses, systems engineering assessments, planning, and development for advanced airborne sensor systems. This effort focuses on developments which support sensor system interoperability and standardization of multi-Service and multi-platform applications. The advanced sensor developments will provide the technology transition modules for operational use necessary for the overall migration of the airborne fleet (manned and unmanned) to a Joint Airborne SIGINT Architecture (JASA) (i.e., sensors, ground systems, data links, and platforms), and provide the mechanism required for timely dissemination of intelligence information to operational forces. The development and modification of the lead integration aircraft (EP-3E) for the initial JASA modules will provide a mechanism to begin development and operational assessment of the Joint SIGINT Avionics Family (JSAF) components. Coordinated and complementary airborne sensor development across the military Services and the Defense and Intelligence

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development PE 0305206D8Z	

Agencies are being established for inclusion into the JASA. This sub-project also includes funding for U-2 sensor upgrades and multispectral imaging (MSI) developments. This program is categorized as Budget Activity 7 because it provides for the development of technologies and capabilities in support of Operational Systems Development.

**Programs Plans and Accomplishments: (\$ in millions)**

**FY 1998 Accomplishments: (\$104.066)**

**JASA (\$93.659)**

- Developed JSAF components (\$92.182)
  - Completed High band Prototype (HBP) Flight Testing (\$10.400)
  - Continued Low-Band Sub-Systems (LBSS) development (\$33.000)
  - Awarded and started High-Band Sub-Systems (HBSS) development (\$12.300)
  - Continued platform development for JSAF integration and testing (\$36.092)
    - ARL (\$5.700)
    - RIVET JOINT (\$10.400)
    - EP-3 (\$9.700)
    - AF Special (\$10.292)
- Continued development and refinement of JASA Air and Ground standards (\$1.867)

**Advanced Developments (\$10.407)**

- Continued Signal Recognition (Story Series development) (\$ 3.072)
  - Completed Story Book fusion software development (\$.872)
  - Completed Story Book Programmable Interface Processor (PID) (\$0.700)
  - Initiated Story Finder AOITF modifications (\$1.500)
- Continued COMPASS BRIGHT (advanced technologies supporting JSAF development) (\$2.451)
  - Began NexGen wide-band digital receiver development through Air Force Research Labs – Sensors Division (\$1.551)
  - Began advanced SIGINT development at Air Force Research Labs – Information Systems Division (\$0.900)
- Initiated COMBAT SENT wideband system development (\$1.866)

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development PE 0305206D8Z	

- Initiated component design and simulation
- Other (\$3.018)

**\*Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Sensor funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N).**

**Acquisition Strategy:** The Advanced Sensors line funds virtually all airborne advanced sensor developments necessary to collect against an increasingly sophisticated and rapidly evolving collection threat. It consists of one large SIGINT program (JASA) and several smaller programs - SIGINT, IMINT, & MASINT. The DoD placed increased emphasis in making the numerous SIGINT systems flying on Service platforms more interoperable and common. A Joint SIGINT Avionics Family is being developed to achieve this goal. In the interim, collection capability must be sustained in existing manned reconnaissance aircraft until more enhanced, capable JASA systems become available. This line also funds IMINT and MASINT developments and upgrades such as the MSI H/SIP and SYERS upgrades and the imagery sensor development to be flown on the Predator UAV.

**B. Program Change Summary**

	<u><b>FY 1998</b></u>	<u><b>FY 1999</b></u>	<u><b>FY 2000</b></u>	<u><b>FY 2001</b></u>	<u><b>Total Cost</b></u>
Previous President's Budget	105.4	*	*	*	*
Net Change	<u>(1.3)</u>	*			
President's Budget Request	104.1	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Sensor funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N).

**Change Summary Explanation:**

Funding: The change in funding is a result of internal realignments within the DARP.  
 Schedule: N/A

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development PE 0305206D8Z	

Technical: N/A

**C. Other Program Funding Summary**

N/A

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Sensor funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N).

**D. 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
<b>Engineering Milestones</b>	_____															
Standards Development	_____															
High Band Prototype (HBP)	— X															
System Development	_____															
EP-3 HBP Integration	X															
HBP Flight Test	X — X															
High-Band Sub-System (HBSS) Develop.	_____ X															
Low-Band Sub-System (LBSS) Develop.	X _____ X															

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development PE 0305206D8Z	

**D. 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
SB Fusion Software				X												
SB Programmable Interface Processor (PIP)			X													
NexGen Digital Receiver Development	X															
COMBAT SENT Wideband System Dev																
<b>Contract Milestones</b>	X			X												
JSH Updates Published	X		X													
HBP Ground/Flight Tests				X												
HBP Complete	X															
LBSS PDR			X													
LBSS CDR	X															
HBSS Contract Award		X														
HBSS SRR				X												
HBSS PDR	X															
Story Finder Architecture Requirements Begun				X												
Story Finder Flight Test				X												
Story Finder AOITF CDR			X													
SYERS P3I/U-2 MSI System First Delivery				X												
NexGen Digital Receiver (CDR-Unit 1)																

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Sensor funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N).

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Airborne Reconnaissance Advanced Development (ARAD) PE 0305206D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	186.090	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. Subtotal Cost</b> Airborne Reconnaissance Advanced Technology Development Program,P809	39.135	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Tech funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N), Army (PE 0305206A).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** There are two primary objectives for the Advanced Technology funding: (1) to evaluate the utility and maturity of technology for airborne reconnaissance applications; and (2) to reduce the risk of employing emerging technologies in system upgrades, new system acquisitions, or Advanced Concept Technology Demonstrations (ACTDs), by integrating and exercising them in developmental and operational tests. Once technologies are matured under this project, they often feed into Advanced Sensor projects for further development prior to being transitioned to the Services for procurement. These technologies help satisfy the requirements of the objective architecture set forth in the Integrated Airborne Reconnaissance Strategy (IARS). These technology investments are also identified in the Airborne Reconnaissance Technology Program Plan (ARTPP), published in November 1994. They were carefully selected from a broad range of technologies to provide utility to the warfighter at acceptable levels of cost and risk. This project continues technology transition programs in the critical areas identified in the ARTPP. Included are: exigent target detection; advanced exploitation, geolocation; communications, advanced digital reconnaissance, and advanced signals intelligence (SIGINT). This is not a prioritized listing. A new category, technology initiatives, includes technology transition programs including those designated by Congress. This program is categorized as Budget Activity 7 because it provides for the development of technologies and capabilities in support of operational system development.

**Program Accomplishments and Plans:** (\$ in millions)

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development (ARAD) PE 0305206D8Z	

**FY 1998 Accomplishments: (\$39.135)**

- Exigent Target Detection (Adaptive Spectral Reconnaissance Program (ASRP), Multi-Sensor Exploitation Testbed (MSET), Reconnaissance Infrared Surveillance & Targeting Acquisition System (RISTA II)) (\$5.322)
  - Initiated development of Predator-version hyperspectral imager and conduct demonstration on a manned surrogate in cooperation with DARPA as part of the ASRP (\$3.700)
  - Demonstrated near-real-time target detection and cueing, second phase exploitation, and integration tools in the laboratory (MSET) (\$0.927)
  - Performed demonstration of RISTA II long wave infrared sensor on Altus unmanned aerial vehicle (\$0.695)
- Advanced Exploitation (Moving Target Exploitation (MTE), Advanced Common Processor (ACP), Intelligence Bandwidth Compression (IBC)) (\$4.727)
  - Demonstrated Moving Target Exploitation functionality in virtual testbed (\$2.780)
  - Completed and demonstrated real-time Intelligent Bandwidth Compression applicable to the U-2 and Global hawk (\$0.927)
  - Continued development of a common airborne/satellite processing capability (\$1.020)
- Geolocation (Precision Geolocation – SIGINT, Interferometric Synthetic Aperture Radar (IFSAR), Geolocation, Radar Tags) (\$9.122)
  - Modified aircraft for cooperative SIGINT geolocation capabilities (\$4.006)
  - Initiated development of interferometric SAR to provide DTED V single pass data from high altitude platforms (\$3.711)
  - Initiated development of coregistration of imagery on SAR generated maps (\$0.278)
  - Completed development of radar tags in cooperation with DARPA (\$1.127)
- Communications (Data terminal, laser Air-to-Air) (\$2.921)
  - Initiated concept phase for development of high-data-rate communications and begin design (Classified Program) (\$0.927)
  - Completed terminal fabrication and instrument test aircraft (\$1.994)
- Advanced Digital reconnaissance (Framing reconnaissance Cameras) (\$9.278)
  - Complete development of 4-Megapixel IR framing camera and test (\$3.450)
  - Begin development of high-performance, IR cameras (25 megapixels/second) (\$5.828)
- Technology Initiatives (\$7.764)

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development (ARAD) PE 0305206D8Z	

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Tech funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N), Army (PE 0305206A).

**Acquisition Strategy:** A variety of acquisition strategies are being incorporated depending on the specific advanced technology in question and the organization developing the technology.

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	39.6	*	*	*	*
Net Change	(.5)				
President's Budget Request	39.1	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Tech funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N), Army (PE 0305206A).

Change Summary Explanation:

Funding: The change in funding is a result of internal realignments within the DARP.

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost**

N/A

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Airborne Reconnaissance Advanced Development (ARAD) PE 0305206D8Z	

**D. 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
<b><u>Exigent Target Detection</u></b>																
Demonstrate real-time TD/C in lab (MSET)				X												
<b><u>Advanced Exploitation</u></b>																
Demonstrate Moving Target Exploitation Functionality in Virtual Testbed				X												
Complete Demonstrate Single-Scale Intelligent Bandwidth Compression (IBC) in Real-Time				X												
<b><u>Communications</u></b>																
Begin Data Terminal Concept Phase		X														
Begin Design/Modification Phase				X												
Crosslink Test Aircraft and Terminal Delivery		X														
<b><u>Advanced Digital Reconnaissance</u></b>																
Initiate 100 Megapixel FPA Tech Demo		X														
Test 4 Megapixel IR Framing Camera		X														
<b><u>Advanced SIGINT</u></b>																
NexGen Digital Receiver (CDR-Unit 1)				X												

\*Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Adv Tech funds for FY00-05 were transferred to the Air Force (PE 0305206F), NSA (PE 0305206G), Navy (PE 0305206N), Army (PE 0305206A).

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Exhibit R-3 Cost Analysis (page 1)								DATE February 1999				
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT				PROJECT NAME AND NUMBER				
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305206D8Z				Airborne Reconnaissance Advanced Development (ARAD)/P809				
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Product Development			39.135									
Subtotal Product Development			39.135									
Remarks  Advanced Technology consists of various projects which, while being supportive of the development of the airborne reconnaissance architecture, are not necessarily managed by the same agencies or Services.												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks												

**Exhibit R-3, Project Cost Analysis**  
(Exhibit R-3, page 1 of 2)

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PROGRAM ELEMENT PE 0305206D8Z						PROJECT NAME AND NUMBER Airborne Reconnaissance Advanced Development (ARAD)/P809		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Development Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E												
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			39.135									
Remarks												
* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Advanced Technology funds for FY00-05 were transferred to the Air Force (PE 0305206F), Army (PE 0305206A), Navy (PE 0305206N), and the NSA (PE 0305206G).												

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Exhibit R-3 Cost Analysis (page 1)									DATE February 1999			
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT					PROJECT NAME AND NUMBER			
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305206D8Z					Airborne Reconnaissance Advanced Development (ARAD)/P808			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Product Development			104.066									
Product Development												
Product Development												
Subtotal Product Development			104.066									
Remarks												
Advanced Sensors consists of various projects which, while being supportive of the airborne reconnaissance architecture, are not managed by the same agencies or Services.												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks												

**Exhibit R-3, Project Cost Analysis**  
(Exhibit R-3, page 1 of 2)

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PROGRAM ELEMENT PE 0305206D8Z					PROJECT NAME AND NUMBER Airborne Reconnaissance Advanced Development (ARAD)/P808			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Development Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E												
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			104.066									
Remarks												
* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Advanced Sensors funds for FY00-05 were transferred to the Air Force (PE 0305206F), Navy (PE 0305206N), and the NSA (PE 0305206G).												

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Exhibit R-3 Cost Analysis (page 1)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305206D8Z						Airborne Reconnaissance Advanced Development (ARAD)/P810		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Product Development			42.889									
Subtotal Product Development			42.889									
Remarks												
Remarks												

**Exhibit R-3, Project Cost Analysis**  
(Exhibit R-3, page 1 of 2)



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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>  <b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						<b>R-1 ITEM NOMENCLATURE</b> Manned Reconnaissance Systems PE 0305207D			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	26.402	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost</b> Manned Reconnaissance Systems U-2/P811	26.402	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs: per the Program Decision Memorandum (PDM), the Manned Reconnaissance Systems funds for FY 00-05 were transferred to PE 0305207F and PE 0305207G.

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** Manned reconnaissance programs provide for a wide variety of reconnaissance tasks in support of the entire range of users from the tactical level to the national command authorities. Signals Intelligence, Imagery, Measurement and Signatures Intelligence, Target Acquisition, and Surveillance missions are performed by manned reconnaissance systems, across the spectrum of conflict. Manned reconnaissance systems also conduct missions in support of counter narcotics, disaster relief, mapping, charting and geodesy, scientific requirements, military and operations other than war. This element provides for manned reconnaissance platforms resident in the DARPA. The activity ensures continued viability of both the platforms and the associated sensors as mission requirements and threats change. As DoD fosters greater commonality among systems, this element develops a means of compliance with the emerging architecture. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of Operational System Development.

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Manned Reconnaissance Systems PE 0305207D			

<b>Total PE Cost</b>	26.402	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. Subtotal Cost U-2/P811</b>	26.402	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Manned Reconnaissance Systems funds for FY 00-05 were transferred to PE 0305207F and PE 0305207G.

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The U-2 Program provides unique capabilities to remotely collect and relay signals to Remote Operating Facility Airborne (ROFA), either directly via satellite or indirectly through ground satellite relay stations. This element provides RDT&E for the continued enhancement of capabilities to receive and exploit those signals. This program also funds the RDT&E portion of high payoff upgrades for the U-2 Advanced Synthetic Aperture Radar System (ASARS-2). ASARS-2 upgrades and modifications will extend the usable life of this critical sensor as well as enhance its area search, precision geolocation, and image quality characteristics sufficiently to support the targeting of precision guided munitions (PGMs). Several key Line Replaceable Units (LRUs) including the Process Control Unit (PCU), receiver - exciter, and waveform generator are approaching the end of their supportability life. Replacing the LRUs with next generation technology will make ASARS-2 supportable through the expected service life of the U-2 and provide capability enhancements necessary to support PGMs. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of Operational System Development.

Note: The ASARS-2 portion of the U-2 Program was previously justified in separate budget documents under the title “U-2 Support for Precision Guided Munitions”.

**Program Accomplishments and Plans: (\$ in millions)**

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Manned Reconnaissance Systems PE 0305207D	

**FY 1998 Accomplishments: (\$26.402)**

- Upgrade airborne collection capabilities (\$3.689)
- ASARS 2 Radar hardware development (\$8.124)
- ASARS 2 Radar software development (\$8.989)
- ASARS 2 Integration & flight test (\$4.600)
- ASARS 2 Data Link (\$1.000)

**\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Manned Reconnaissance Systems funds were transferred to PE 0305207F and PE 0305207G.**

**Acquisition Strategy:**

For airborne collection capabilities upgrades, modify existing platform and associated ground control equipment via Engineering Change Proposals (ECPs)/Task orders to existing USAF and NSA contracts. For defensive system capability add, select defensive system candidate from currently available systems, then evaluate and test on the U-2 aircraft. For ASARS-2, develop and test new technology line replaceable units (LRU's) for subsequent retrofit into the U-2's during normal U-2 Programmed Depot Maintenance (PDM), or during other ongoing U-2 modifications. LRUs for subsequent installation during PDM will be funded by the Air Force.

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	26.6	*	*	*	*
Net Change	<u>(.2)</u>				
President's Budget Request	26.4	*	*	*	*

**\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Manned Reconnaissance Systems funds were transferred to PE 0305207F and PE 0305207G.**

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Manned Reconnaissance Systems PE 0305207D	

Change Summary Explanation:

Funding: The change in funding is a result of internal realignments within the DARP.  
 Schedule: N/A  
 Technical: N/A

**C. Other Program Funding Summary Cost**

	<u>FY 1998</u>	<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>	<b>To</b> <b>Complete</b>	<b>Total</b> <b>Cost</b>
U-2, Procurement, AF	162.047	*	*	*	*	*	*	*	Continuing	Continuing

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Manned Reconnaissance Systems funds were transferred to PE 0305207F and PE 0305207G.

**D. 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
<b>Engineering Milestones N/A</b>																
See Note: SRR/SDR					X											
See Note: CDR					X											
<b>Test &amp; Evaluation Milestones N/A</b>																
See Note:					X											
<b>Contract Milestones</b>																
See Note: Award					X											

\* Per the Program Decision Memorandum (PDM), the Manned Reconnaissance Systems funds were transferred to PE 0305207F and PE 0305207G.

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Manned Reconnaissance Systems PE 0305207D	

Note: This line funds Quick Reaction Capability (QRC) Upgrades to the U-2 sensor to allow response to emergency, high priority threats. Project duration varies depending on complexity—between 9 and 21 months from definition through integration and test.

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<b>Exhibit R-3, RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAK DOWN</b>		<b>DATE</b> September 1998
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Manned Reconnaissance Systems PE 0305207D8Z/P811	

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Exhibit R-3 Cost Analysis (page 1)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305207D8Z						Manned Reconnaissance Systems/P811		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Product Development			26.402									
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			26.402									
Remarks												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305207D8Z						Manned Reconnaissance Systems/P811		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Development Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E												
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			26.402									
Remarks												
* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Manned Reconnaissance Systems funds for FY00-05 were transferred to PE 0305207F and PE 0305207G.												

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Distributed Common Ground Systems (DCGS) PE 0305208D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	34.879	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost: Airborne Reconnaissance Ground SIGINT Systems (ARGSS)/ P812</b>	0.386	*	*	*	*	*	*	*	*	0.399
<b>Project Name/No. and Subtotal Cost: Common Imagery Ground/Surface Systems (CIGSS)/ P813</b>	28.139	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost: Distributed Common Ground System Interoperability (DCGSI)/P814</b>	6.354	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DCGS funds for FY00-05 were transferred to the Air Force (PE 0305208F), Army (PE 0305208A), Navy (PE 0305208N), NIMA (PE 0305208BQ), NSA (PE 0305208G), DIA/CMO (PE 0305208L).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The Distributed Common Ground System (DCGS) Program is a cooperative effort between the services, agencies and DoD to provide systems capable of receiving, processing, exploiting, and disseminating data from airborne and national reconnaissance platforms. The DCGS program is developing a family of systems, both fixed and deployable, that is capable of supporting all levels of conflict, is interoperable with all reconnaissance platforms and sensors, and is integrated into the Joint C4I environment. The program consists of Common Imagery Ground/Surface Systems (CIGSS) which process, exploit and disseminate imagery data; United States MASINT Systems (USMS) which process, exploit, and disseminate MASINT data; Airborne Reconnaissance Ground SIGINT Systems (ARGSS) which process, exploit, and disseminate SIGINT data; Multi-Intelligence Reconnaissance Ground Systems (MIRGS) which support inter-intelligence interoperability initiatives that process, exploit, and correlate data simultaneously from multi-intelligence sources; and Distributed Common Ground System Interoperability (DCGSI) which focuses on IMINT, SIGINT, MASINT, and multi-discipline system flexibility and

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>  <b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	<b>R-1 ITEM NOMENCLATURE</b> Distributed Common Ground Systems (DCGS) PE 0305208D8Z	

interoperability, test, and architecture compliance. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of Operational System Development.

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Distributed Common Ground Systems (DCGS) PE 0305208D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	34.879	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost: Airborne Reconnaissance Ground SIGINT Systems (ARGSS)/P 812</b>	0.386	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DCGS funds for FY00-05 were transferred to the Air Force (PE 0305208F), Army (PE 0305208A), Navy (PE 0305208N), NIMA (PE 0305208BQ), NSA (PE 0305208G), DIA/CMO (PE 0305208L).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** HEARTLEAF adds two additional ground station processing capabilities at a centralized facility that will receive, process, and disseminate information from national, theater, and tactical reconnaissance sensors. It provides a centralized facility that will ensure commonality between ground systems and airborne sensors. EAGLE TOT will develop hardware and software modifications for the C-ROFA to allow receipt of U.S. and Allied radar data from airborne platforms. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of Operational System Development.

**Program Accomplishments and Plans: (\$ in millions)**

**FY1998 Accomplishments: (\$0.386)**

- Fielded additional reporting channel (EAGLE TOT) to remote sites (\$0.386)

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Distributed Common Ground Systems (DCGS) PE 0305208D8Z	

**Acquisition Strategy:** Develop integrated ground architecture and distributed communications capability via ECP/Task orders to existing USAF and NSAW contracts.

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	0.4	*	*	*	
Net Changes					
President's Budget Request	0.4	*	*	*	

Program Change Summary

Funding: N/A

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost**

	<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>To Complete</u>	<u>Total Cost</u>
ARGSS, Proc, DW	3.245	*								

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PE's.

**D. Schedule Profile**

Fiscal Year actual and planned events by quarter

N/A

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<b>Exhibit R-2, BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Distributed Common Ground Systems (DCGS) PE 0305208D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	34.879	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost: Common Imagery Ground/Surface Systems (CIGSS)/P813</b>	28.139	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funds for FY 99 were transferred to the Services/Defense Agencies in various PEs; per the PDM the CIGSS funds for FY00-05 were transferred to the Air Force (PE 0305208F), Army (PE 0305208A), and Navy (PE 0305208N).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** This project supports the engineering development and acquisition of Service imagery ground/surface systems. The Common Imagery Ground/Surface System (CIGSS) is a Department of Defense (DoD) project, which integrates all imagery ground/surface systems into a single project. The CIGSS objective is to enable all systems to receive, process, exploit, and report any imagery source regardless of platform or sensor type to meet the intelligence and targeting needs of tactical commanders. The CIGSS project provides the warfighter with an integrated and interoperable airborne reconnaissance imagery processing and exploitation capability that can be tailored for all levels of conflict. CIGSS consolidates the JROC and DARSC approved restructure of the Joint Service Imagery Processing System (JSIPS) program including JSIPS-Navy, JSIPS-Air Force, JSIPS-Marine Corps, Enhanced Tactical Radar Correlator (ETRAC), Modernized Imagery Exploitation System (MIES), PACAF Interim National Exploitation System (PINES), and Tactical Exploitation Group (TEG) into a single project. The Navy CIGSS component, JSIPS-N, includes three major components, the Digital Imagery Workstation Suite Afloat (DIWSA), the National Input Segment (NIS), and a subset of equipment from the Tactical Input Segment (TIS). DIWSA receives, exploits, and disseminates imagery products based on multi-source imagery. The NIS and TIS provide the capability to receive, record, and process imagery from multiple sources. The Air Force CIGSS component consists of two deployable JSIPS systems, a deployable commercial imagery ground system (Eagle Vision), and the fixed PINES system. The Army CIGSS components consists of the MIES, ETRAC and the imagery portion of the Tactical Exploitation System (TES) systems. MIES receives and exploits imagery from national and theater sources and provides intelligence reports and exploited imagery products to the field commander. ETRAC is a C-130 drive on/off capable system that receives Synthetic Aperture Radar (SAR) data inputs from various platforms, converts the SAR data to exploitable images, and is capable of stand-alone operations. ETRAC and MIES are combined in the TES to be fielded beginning in FY 1999. The Marine Corps component of CIGSS consists of a JSIPS system identical to the

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<b>Exhibit R-2, BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Distributed Common Ground Systems (DCGS) PE 0305208D8Z	

Air Force JSIPS and three JSIPS variants referred to as the Tactical Exploitation Group (TEG). It will be a small, highly mobile system that will provide the Marine Expeditionary Forces (MEFs) with the capability of processing and exploiting SAR and Electro-Optical/Infra-Red (EO/IR) imagery from theater and tactical reconnaissance aircraft. A mobile CIGSS testbed was developed to support the integration and test of CIGSS components and validation of interfaces prior to the introduction of CIGSS into the operational environment. The testbed will also be used by Program Offices to test interfaces with new sensors, applications, and other modifications. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of Operational System Development.

**Program Accomplishments and Plans: (\$ in millions)**

**FY 1998 Accomplishments: (\$28.139)**

- Continued JSIPS-N Imagery Exploitation Support System (IESS) support (N) (\$0.580)
- Continued DIWSA support (N) (\$0.437)
- Continued JSIPS-N alternative architecture support (N) (\$0.561)
- Continued Test and Evaluation support (N) (\$0.116)
- Completed upgrade of MIES with IPL/COTS workstations/ATM LAN for CIGSS Compliance (A) (\$0.200)
- Continued CIGSS elements sustaining engineering to implement software upgrades and enhancements to maintain compatibility with changing national and tactical interfaces (A) (\$4.287)
- Continued ETRAC sustaining engineering to implement upgrades to process data from ASARS-2 sensors and the ASARS Improvement Program (A) (\$1.000)
- Completed integration of IESS into ETRAC (A) (\$0.500)
- Continued CIGSS/DCGS elements sustaining engineering to implement software upgrades and enhancements to maintain compatibility with changing national and tactical interfaces (AF) (\$5.386)
- Continued development of CIGSS/DCGS Testbed (AF) (\$2.000)
- Continued system engineering and technical support (AF) (\$1.500)
- Continued upgrades for JSIPS/TEG to remain compliant and interoperable with Distributed Common Ground Station Architecture (AF) (\$1.920)
- Continued the integration of CIGSS core components into the delivery of the first Tactical Exploitation Groups (TEGs) (AF) (\$3.200)

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<b>Exhibit R-2, BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Distributed Common Ground Systems (DCGS) PE 0305208D8Z	

- Continued the integration of evolving CIP to keep pace with current and projected modification programs (AF) (\$6.452)

**\* Per the FY 1999 Appropriations Act, funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CIGGS funds for FY00-05 were transferred to the Air Force (PE 0305208F), Army (PE 0305208A) and Navy (PE 0305208N).**

**Acquisition Strategy:** As approved by the Joint Requirements Oversight Council (JROC), Defense Airborne Reconnaissance Steering Committee (DARSC), and Under Secretary of Defense (Acquisition & Technology) a family of rapidly deployable imagery ground/surface systems, capable of operating in the Joint C4I environment and tailorable to support all levels of conflict will be developed. These systems are under the umbrella program called the Common Imagery Ground/Surface System (CIGSS). An acquisition baseline was established for CIGSS outlining JROC approved joint requirements and DARO/NIMA approved standards. All existing imagery ground/surface systems, and those currently in the pipeline, will be modified to meet the CIGSS acquisition baseline. All new imagery ground/surface systems must be delivered CIGSS compliant. Program management responsibility for CIGSS systems will rest with the individual Service or Agency developing the CIGSS system. The systems will be acquired using streamlined acquisition procedures. DoD will provide oversight to ensure compliance with joint airborne reconnaissance architectures, requirements, and standards.

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	29.1	*	*	*	*
Net Change	<u>(1.0)</u>				
President's Budget Request	28.1	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CIGGS funds for FY00-05 were transferred to the Air Force (PE 0305208F), Army (PE 0305208A) and Navy (PE 0305208N).

Change Summary Explanation:

Funding: The change in funding is a result of internal realignments within the DARP.

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<b>Exhibit R-2, BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Distributed Common Ground Systems (DCGS) PE 0305208D8Z	

Schedule: N/A

Technical: N/A

**C. Other Program Funding Summary Cost**

	<u>FY 1998</u>	<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>
CIGSS Proc, Defense Wide	89.473	*	*	*	*	*	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CIGGS procurement funds for FY 00-05 were transferred to the Air Force (PE 0305208F), Army (PE 0305208A) and Navy (PE 0305208N). The Air Force CIGSS funding line includes funding for Marine Corps JSIPS.

**Related Activities:** To ensure no duplication of effort, this project is coordinated with the Office of the Secretary of Defense, Army, Air Force, Marine Corps, and Navy TENCAP offices, CIO, DIA, and other agencies.

**D. 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
<b>Acquisition Milestones</b>																
N-TIS Low Rate Initial Production (LRIP)																X
<b>Contract Milestones</b>																
Integrate National RFCs					X											

**D. 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>
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<b>Exhibit R-2, BUDGET ITEM JUSTIFICATION</b>											<b>DATE</b> February 1999							
<b>APPROPRIATION/BUDGET ACTIVITY</b>											<b>R-1 ITEM NOMENCLATURE</b>							
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>											Distributed Common Ground Systems (DCGS) PE 0305208D8Z							

	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Integrate IPL/COTS WS/ATM into MIES		X														
Integrate IESS into ETRAC			X													
<b>Engineering Milestones</b>																
ETRAC #1 System Upgrades - (User Test)		X														
ETRAC #2 System Upgrades - (User Test)			X													

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the CIGGS procurement funds for FY00-05 were transferred to the Air Force (PE 0305208F), Army (PE 0305208A) and Navy (PE 0305208N).

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>								<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>			
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>						Distributed Common Ground Systems (DCGS) PE 0305208D8Z			

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003*</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	34.879	*	*	*	*	*	*	*	*	*
<b>Project Name/No. and Subtotal Cost: Distributed Common Ground System Interoperability (DCGSI)/P814</b>	6.354	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DCGSI funds for FY00-05 were transferred to the Air Force (PE 0305208F), NIMA (PE 0305208BQ), NSA (PE 0305208G) and DIA/CMO (PE 03050208L).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** The Distributed Common Ground System (DCGS) Interoperability project funds and coordinates engineering development work directed toward defense airborne reconnaissance ground processing technologies. The project will ensure that intelligence processing systems are developed to satisfy strategies and architectures that support warfighter intelligence needs in the face of rapidly developing threat technologies, proliferation of advanced weapons, and uncertain political alignments. This project supports IMINT, SIGINT, MASINT, and multi-discipline system interoperability and, consolidates the R&D efforts of the Ground/Surface System Development Program (GSSDP). This project focuses the Department's ground system efforts to improve flexibility, commonality, interoperability, and efficiency in supporting Joint Task Force and Service unique intelligence requirements. The DCGS is a system of systems that does not need to be collocated but must be interconnected by a robust communications structure that will provide data streams between intelligence collector, exploiters, producers, disseminators, and users. The DCGS Interoperability project goal is to provide a near-real-time, day/night, all weather intelligence processing system which meets the warfighter's need for timely intelligence on enemy forces. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of Operational System Development.

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Distributed Common Ground Systems (DCGS) PE 0305208D8Z	

**Program Accomplishments and Plans: (\$ in millions)**

**FY 1998 Accomplishments: (\$6.354)**

- Completed “Clip-kit” for CIGSS/HAE interoperability with the Common Imagery Processor and continued systems engineering and integration of UAV ground station into CIGSS (\$.913)
- Continued systems engineering, integration, and development of airborne ground/surface systems standards and interfaces to ensure commonality and interoperability with the DCGS architecture. (\$1.000)
- Continued architecture and standards development, as well as certification and testing for multi-“INT” baseline under DCGS (\$0.933)
- Continued Rapid Intelligence Transmission (RIT) implementation and graph reporting module development (\$0.186)
- Continued to ensure JASA is incorporated in ground/surface system migration efforts (\$1.000)
- Supported additional sensor processing capability to Common Imagery Processor (CIP) (\$0.300)
- Continued data recording standards and technology support (\$0.300)
- Continued DCGS and NATO Standards Imagery Format (NSIF) test and certification support (\$0.100)
- Completed DCGS Capstone Requirements Document (CRD) (\$0.184)
- Continued DCGS MASINT planning, architecture description and management plan (\$0.105)
- Supported Semi-Automated Imagery Intelligence (IMINT) Processing (SAIP) for operational systems (\$0.250)
- Provided HAE Moving Target Indicator (MTI) processing support within ETRAC (\$0.933)
- Continued to support NATO STANAG development for reconnaissance infrastructure elements (data links, recorders, and information exchange) (\$0.150)

**\* Per the FY 199 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DCGSI funds for FY 00-05 were transferred to the Air Force (PE 0305208F), NIMA (PE 0305208BQ), NSA (PE 0305208G) and DIA/CMO (PE 03050208L).**

**Acquisition Strategy:** As outlined in the Integrated Airborne Reconnaissance Strategy (IARS) and approved by the JROC, DARSC, and Under Secretary of Defense (A&T), a family of fixed and rapidly deployable Distributed Common Ground Systems, capable of operating in the Joint C4I environment and tailorable to support all levels of conflict will be developed to support the nation's Defense Airborne Reconnaissance

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Distributed Common Ground Systems (DCGS) PE 0305208D8Z	

Systems. DoD is restructuring the Ground/Surface System Development program and the other DARP Ground/Surface Programs into the DCGS Program that includes the JSIPS program, GSSDP, Multi-intelligence Reconnaissance Ground Systems Projects (CARS and KCOIC), and Airborne Reconnaissance SIGINT Ground Systems (HEARTLEAF). DoD is establishing liaison with the UAV Program Offices to ensure interoperability with DARP ground systems. The development of modifications to ensure interoperability among these systems will be directed under DoD oversight, implemented by Service acquisition agencies and funded under this project.

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
Previous President's Budget	6.6	*	*	*	*
Net Change	<u>(.2)</u>				
President's Budget Request	6.4	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DCGSI funds for FY 00-05 were transferred to the Air Force (PE 0305208F), NIMA (PE 0305208BQ), NSA (PE 0305208G) and DIA/CMO (PE 03050208L).

**Change Summary Explanation:**

Funding: The change in funding is a result of internal realignments within the DARP.  
 Schedule: N/A  
 Technical: N/A

**C. Other Program Funding Summary Cost**

N/A

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	Distributed Common Ground Systems (DCGS) PE 0305208D8Z	

**D. 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

**Acquisition Milestones: N/A**

**Contract Milestones: N/A**

**Engineering Milestones: N/A**

**T&E Milestones: N/A**

**Other Program Events**

CIGSS Testing by GITC

X ————— X

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs: per the Program Decision Memorandum (PDM), the DCGSI funds for FY 00-05 were transferred to the Air Force (PE 0305208F), NIMA (PE 0305208BQ), NSA (PE 0305208G) and DIA/CMO (PE 03050208L).

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Exhibit R-3 Cost Analysis (page 1)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305208D8Z						Distributed Common Ground Systems/P814		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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			6.354									
Ancillary Hardware Development												
Systems Engineering												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			6.354									
Remarks												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305208D8Z						Distributed Common Ground Systems/P814		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Development Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E												
Remarks												
Contractor Engineering Support												
Contractor Engineering Support												
Contractor Engineering Support												
Contractor Engineering Support												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			6.354									
Remarks												
* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the DCGSI funds for FY00-05 were transferred to the Air Force (PE 0305208F), NIMA (PE 0305208BQ), DIA/Central MASINT Office (CMO) (PE 0305208L) and NSA (PE 03050208G).												

(Exhibit R-3, page 2 of 2)

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Exhibit R-3 Cost Analysis (page 1)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305208D8Z						Distributed Common Ground Systems/P813		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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			28.139									
Ancillary Hardware Development												
Systems Engineering												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			28.139									
Remarks												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												

**Exhibit R-3, Project Cost Analysis**  
(Exhibit R-3, page 1 of 2)

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305208D8Z						Distributed Common Ground Systems/P813		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Development Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E												
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Program Management Personnel												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks												
Total Cost			28.139									
Remarks												
* Per the FY 1999 Appropriations ACT, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs: per the Program Decision Memorandum (PDM), the CIGSS funds for FY00-05 were transferred to the Air Force (PE 0305208F), Army (PE 0305208A) and Navy (PE 03050208N).												

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>									<b>DATE</b> February 1999	
<b>APPROPRIATION/BUDGET ACTIVITY</b>						<b>R-1 ITEM NOMENCLATURE</b>				
<b>RDT&amp;E DEFENSE WIDE/BUDGET ACTIVITY 7</b>						Defense Airborne Reconnaissance Program (DARP) PE 0305209D8Z				

<b>COST (IN MILLIONS)</b>	<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>Cost to Complete</b>	<b>Total Cost</b>
<b>Total PE Cost</b>	7.101	*	*	*	*	*	*	*	*	*
<b>Total Project Cost/No. Subtotal Cost DARP Integration &amp; Support/P815</b>	7.101	*	*	*	*	*	*	*	*	*
<b>Quantity of RDT&amp;E Articles</b>										

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Integration & Support funds for FY 00-05 were transferred to OASD C3I (PE 0902198D).

**A. Mission Description and Budget Item Justification**

**Brief Description of Element:** This project funded Defense Airborne Reconnaissance Office (DARO) functions required to carry out management oversight responsibilities specified in DoD Directive 5134.11 (5 April 1995). It included DARO civilian pay costs for assigned civil service employees, Systems Engineering and Technical Assistance (SETA) for development, integration, and support of Defense Airborne Reconnaissance Program (DARP) activities. It included DARO Administration, MIS and Security Support. As part of this project, DARO:

- established and maintained the DoD Integrated Airborne Reconnaissance Architecture to guide the development, demonstration, and acquisition of improved airborne reconnaissance capabilities; established and enforced commonality and interoperability standards; conducted trade-off analyses of Joint Military Department and Defense-wide manned and unmanned aerial vehicles (UAVs), sensors, data links, data relays, and associated processing systems to ensure future operational systems satisfy validated warfighter requirements; and served as focal point for coordinating policies, standards, and architectures with all other OSD organizations.
- supported the planning and execution of capability demonstrations and operational exercises to evaluate airborne reconnaissance capabilities with respect to evolving Unified Combatant Commander requirements.

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b> Defense Airborne Reconnaissance Program (DARP) PE 0305209D8Z	
<b>RDT&amp;E DEFENSE WIDE/BUDGET ACTIVITY 7</b>		

- coordinated with the intelligence community on military intelligence needs, intelligence requirements analyses and priorities, resource planning and programming, exploitation management, and intelligence data dissemination; provides USD(A&T) advice and supporting studies and analyses directed by USD(A&T).
- provided planning and resource guidance activities to support Military Departments and Defense Agencies in the development of DARP inputs to the DoD Planning, Programming and Budgeting process, and those activities necessary to develop and support the presentation and justification of DARP budget requests to the Congress.

This program is categorized as Budget Activity 7 because it provides for the development of technologies and capabilities in support of Operational System Development.

**Programs Plans and Accomplishments: (\$ in millions)**

**FY 1998 Accomplishments: (\$7.101)**

- Continued to assess and refine the Department's integrated airborne reconnaissance architecture (\$2.403)
- Developed plans in conjunction with the program offices, services and users to transfer UAV capabilities to users (\$0.734)
- Completed special studies to determine the programmatic, operational and budgetary impacts of changes to UAV requirements (\$0.669)
- Continued assessments of design issues for high data rate communications, complete assessment of 100 Megapixel equivalent Infrared Framing cameras (\$0.619)
- Maintained DARP financial oversight; coordinate DARP budget justifications with executing agents, provide special studies and reports as necessary to support DARSC, EDRB, and other Department and Congressional direction (\$1.354)
- Assessed the impact of operational, technological and industrial requirements and changes on manned reconnaissance capabilities (\$0.728)
- Oversaw Advanced Development initiatives for Global Broadcast Systems, High Band Prototype Demonstrations, JSAF standards development and implementation requirements (\$0.594)

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E DEFENSE WIDE/BUDGET ACTIVITY 7</b>	Defense Airborne Reconnaissance Program (DARP) PE 0305209D8Z	

**\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Integration & Support funds for FY00-05 were transferred to OASD C3I (PE 0902198D).**

**Acquisition Strategy:** The DARP Integration and Support line funds architecture, oversight, and standardization across all areas of the DARP including manned and unmanned, systems, sensors, infrastructure, and technology development. It consists of government civilian personnel salaries, SETA support, operations and maintenance of government facilities and equipment, security and travel support. The initial SETA contract was competitively awarded in September 1995 for a five-year period of performance. Contract taskings are issued on a delivery order basis as required to meet requirements. The DARO Director maintains stringent restrictions on the utilization of SETA contractors.

**B. Program Change Summary**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost*</u>
Previous President's Budget	7.2	*	*	*	*
Net Change	<u>(.1)</u>				
President's Budget request	7.1	*	*	*	*

\* Per the FY 1999 Appropriations Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the Integration & Support funds for FY 00-05 were transferred to OASD C3I (PE 0902198D).

**Change Summary Explanation:**

- Funding: The change in funding is a result of internal realignments within the DARP.
- Schedule: N/A
- Technical: N/A

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>		<b>DATE</b> February 1999
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	
<b>RDT&amp;E DEFENSE WIDE/BUDGET ACTIVITY 7</b>	Defense Airborne Reconnaissance Program (DARP) PE 0305209D8Z	

**C. Other Program Funding Summary Cost**

N/A

**D. 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
<b>Contract Milestones</b>																
Award SETA contract subtasks					X											
<b>Architecture and Integration Milestones</b>																
Baseline DARP Systems Architecture Developed																
Airborne Reconnaissance Information Technical Architecture (ARITA) – Ver 1.0 Published					X											
DARP Objective Architecture Options Completed								X								
1st DARP Systems Architecture Document Published											X					
DARP Operational Architecture Compiled/Published								X								

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<b>Exhibit R-3, RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN</b>		<b>DATE</b>
<b>APPROPRIATION/BUDGET ACTIVITY</b>	<b>R-1 ITEM NOMENCLATURE</b>	<b>September 1998</b>
<b>RDT&amp;E, DEFENSE-WIDE/BUDGET ACTIVITY 7</b>	<b>Defense Airborne Reconnaissance Program (DARP) PE 0305209D8Z/P815</b>	

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Exhibit R-3 Cost Analysis (page 1)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7					PROGRAM ELEMENT PE 0305209D8Z					PROJECT NAME AND NUMBER Defense Airborne Reconnaissance Program (DARP) P815		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development												
Remarks												
Development Support												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks												

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Exhibit R-3 Cost Analysis (page 2)										DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY				PROGRAM ELEMENT						PROJECT NAME AND NUMBER		
RDT&E, DEFENSE-WIDE/BUDGET ACTIVITY 7				PE 0305209D8Z						Defense Airborne Reconnaissance Program (DARP) P815		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY 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
Development Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E												
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support			7.101			*		*		*	*	
Program Management Personnel						*		*		*	*	
Travel						*		*		*	*	
Labor (Research Personnel)												
Overhead						*		*		*	*	
Subtotal Management			7.101			*		*		*	*	
Remarks												
Total Cost			7.101			*		*		*	*	
Remarks												
* Per the FY 1999 Appropriation Act, the funding for FY 99 was transferred to the Services/Defense Agencies in various PEs; per the Program Decision Memorandum (PDM), the I&S funds for FY 00-05 were transferred to OASD(C3I) (PE 0902198D).												

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Exhibit R-2, RDT&E Budget Item Justification									Date: February 1999	
APPROPRIATION/BUDGET ACTIVITY					R-1 ITEM NOMENCLATURE					
RDT&E, Defense Wide, Budget Activity 7					PE1001017D8Z Partnership for Peace (PfP)					
COST (\$ in Millions)	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	Cost to Complete	Total Cost
Partnership for Peace Information Management System (PIMS)										
<b>Total PE Cost</b>	0	4.896*	0	0	0	0	0	0	Continuing	Continuing
<p>A. <u>Mission Description and Budget Item Justification</u></p> <p>Partnership for Peace (PfP) is a major initiative introduced by NATO at the January 1994 Brussels Summit. The Partnership is working to expand and intensify political and military cooperation throughout Europe, increase stability, diminish threats to peace, and build strengthened relationships by promoting the spirit of practical cooperation and commitment to democratic principles that underpin the Alliance.</p> <p>Partnership for Peace Information Management System (PIMS) is a DOD leadership project that will enhance cooperation and coordination bilaterally and multilaterally in accordance with US policy and to US benefit. Firmly based on priority requirements, PIMS is part of the NATO Enlargement Facilitation Act of 1996 and one of only two specifically highlighted activities. PIMS implements the Congressional endorsement for the modernization of Defense capabilities in eligible PfP countries relative to their telecommunications infrastructures. R&amp;D funding is critical to provide tailored database development support to US and NATO-approved PfP Cooperative Areas such as Peacekeeping, Civil-Military Emergency Planning, and Exercises. It is also necessary to provide the requisite technical support to establish an information sharing capability to achieve the JCS Chairman's interoperability and integration goals outlined in Joint Vision 2010 for working in concert with allied and coalition forces in future operations. In addition, R&amp;D dollars are essential to the enhanced systems development required to support the recently announced SecDef three-part proposal for building an enhanced PfP education and training framework. This framework incorporates a Consortium of Defense Academies and Security Institutes; an exercise simulation network focused on peace support operations; and a cooperative network of nationally sponsored PfP training centers. The proposal envisions a lead role for PIMS to provide research, development, and specialized engineering services in support of a distributed training environment. Moreover, R&amp;D dollars must be directed to ensuring that PIMS is compliant with the evolving Defense Information Infrastructure and follows the guidance and recommendations of the Clinger-Cohen Act. The program is in Budget Activity 7, Operational Systems Development, because it supports currently employed systems and training activities.</p> <p><i>* Includes Congressionally-mandated funding plus-up for IT support to international educational medical programs utilized on PIMS.</i></p>										

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**Exhibit R-2, RDT&E Budget Item Justification**

**Date:** February 1999

Program Plans

- Database development in support of OSD and Joint Staff policy objectives, i.e. Peacekeeping, Emergency Planning, and Professional Military Education, tailored to PfP mission enhancement. (\$1.0 million)
- Research, testing, evaluation, and integration of AIS security guards, filters, and firewalls to enhance bilateral and NATO interoperability, and technologies to support incorporation of the Defense Message System and other C3I, J-6, and DISA policy-driven improvements to the Defense Information Infrastructure. (\$1.0 million)
- System enhancements which leverage new communications technologies, devices, and software to maximize PIMS accessibility, flexibility, and utility in support of increased US DOD processing requirements for preparedness in coalition operations (simulation, tools, exercise support, and interactive training). (\$1.0 million)
- Per Congressional mandate, development of a satellite-based telecommunications distribution and delivery network through PIMS to support the military medical database development to Partner countries. (\$1.896 million)

Specific Application and Process Improvements represent specific types of program and system enhancements which will directly support development of OSD databases, interoperability initiatives, and communications enhancements. In addition these funds provide directly support to the PIMS Program Office in implementing the multiple facets of the PIMS program for both US and Partners.

**B. Program Change Summary:**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
FY 1999 President's Budget	0	1.957	0	0	1.957
FY 1999 Appropriated Value	0				
Adjustment to Appropriated Value	0	3.000			3.000
Inflation Adjustment	0	-.061			-.061
FY 2000 Budget Estimate Submission	0	4.896			4.896

Change Summary Explanation

US Policy changes that enhance the Partnership for Peace program have put new emphasis on the requirement for the DOD to develop capabilities for information exchange that will not only serve coalition efforts in military operations but in complex contingency operations such as Peacekeeping and Emergency Planning. Increased PIMS funding is essential to enhanced systems development to support expanded technical and procedural interoperability among US organizations, PfP nations, and allies.

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**Exhibit R-2, RDT&E Budget Item Justification**

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**C. Other Program Funding Summary**

	<u>FY 98</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>	<u>FY 05</u>	<u>To Complete</u>	<u>Total Cost</u>
O&M (PfP)	41.2	36.4	43.9	44.6	46.6	48.6	49.8	51.1	TBD	TBD
O&M (PfP – PIMS)	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	Continuing	36.0
Total PfP	44.2	41.4	48.9	49.6	51.6	53.6	54.8	56.1	TBD	TBD

**D. Acquisition Strategy:**

PIMS employs an evolutionary acquisition strategy by establishing a well-defined core capability while planning for incremental upgrades and enhancements to the overall system capabilities. Each enhancement is treated as an individual acquisition; its scope and content the result of continuous feedback from PIMS users, supporting organizations, and the desired application of new technology balanced against the constraints of time and cost. Whenever possible, existing assets are leveraged to preserve US IT infrastructure investments and offer an economically prudent solution to increase mission effectiveness across the spectrum of PIMS participants.

**E. Schedule Profile**

Per developmental milestones listed below.

<b>Quarter</b>	<u>FY 1999</u>				<u>FY 2000</u>				<u>FY 2001</u>				<u>FY 2002</u>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>												
<b>Milestone I</b>	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<b>II</b>	x	x	x	x												
<b>III</b>			x	x	x	x										
<b>IV</b>			x	x			x	x								
<b>V</b>			x	x	x	x	x	x	x	x						
<b>VI</b>				x	x	x	x	x	x	x	x		x	x	x	x
<b>VII</b>					x	x	x	x	x	x	x		x	x	x	x
<b>VIII</b>							x	x	x	x	x		x	x	x	x
<b>IX</b>								x	x	x	x		x	x	x	x

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**I Database Development** – *R&D support to multiple DOD office with international outreach initiatives, i.e. OSD/SOLIC (Peacekeeping), OSD (P) (Emergency Planning), OSD (P) (Environmental Security), Joint Staff (Exercise Planning and Professional Military Education (NDU))*

Identify information requirements, common formats and exchange mechanisms between, PfP, NATO, and US

Develop databases and support mechanisms to allow collaborative data warehousing and sharing by relevant participants

Test and execute solutions in exercise environment

Upgrade/modify warehousing and data mining techniques

Continued development of databases supporting US requirements

Development of transitional approaches to other CINCS

**II Year 2000 Conversion**

Evaluate system for Y2K deficiencies

Test solutions

Implement solutions or contingency plan

**III Enhance Network and System Management**

Evaluate network management tools

Test in operational configuration and evaluate results

Implement Solution

Develop diagnostic tools for IT and systemic measurement

**IV Mandated System Migration**

Identify appropriate segments

Migrate PIMS servers to DII-compliant Architecture

Develop and tailor GCCS applications to PfP mission requirements

**V Develop Low-Bandwidth Video Teleconferencing Capability**

Research video compression techniques

Test in operational environment

Implement initial solution

Enhance video capability

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**VI Integrate Defense Messaging System (DMS)**

Evaluate requirement for implementation across constrained bandwidth architecture  
Initiate for test and evaluation  
PIMS modification/enhancement  
Full implementation of DMS

**VII Expand Long Haul/Wide Area Communications Infrastructure**

Assess current network capacity and new requirements  
Design, engineer, and test necessary upgrades  
Implement expanded, improved architecture  
Continued evaluation of new technologies to enhance cost avoidance

**VIII Theater Interoperability**

Evaluate interface requirements with existing target Theater and NATO systems  
Develop required interface  
Evaluate and test security guards, filters, and firewalls  
Implement

**IX Implement Voice Systems**

Identify voice over TCP/IP network solution  
Test and select most efficient process  
Implement enhanced connectivity.  
Research customer and mission driven security options.