DEPARTMENT OF DEFENSE

AGENCY-WIDE FINANCIAL STATEMENTS

REQUIRED SUPPLEMENTAL STEWARDSHIP INFORMATION

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NATIONAL DEFENSE PROPERTY, PLANT AND EQUIPMENT
For Fiscal Year Ending September 30, 1998
(Quantities in the Actual Amounts of Systems or Items)

Categories/Major Types	As of 10/01/97	Additions/ (Deletions)	As of 09/30/98	Percent Operational As of 9/30/98[1]
Aircraft				
Combat	9,047	(434)	8,613	75
Airlift	2,380	(62)	2,318	83
Other Aircraft	8,916	(857)	8,059	88
Ships				96[2]
Submarines	137	(14)	123	
Aircraft Carriers	16	2	18	
Surface Combatants	229	2	231	
Amphibious Warfare Ships	78	5	83	
Mine Warfare Ships	34	4	38	
Support Ships	238	(10)	228	
Other Ships	1,209	(62)	1,147	
Small Boats	3,237	(684)	2,553	30[3]
Missiles				
Ballistic Missiles	3,905	(652)	3,253	87
Other Missiles	[4]	[4]	725,346	88
Combat Vehicles				
Tanks	10,889	(827)	10,062	85
Other Combat Vehicles	43,844	(6,360)	37,484	89
Space Systems				
Satellites	69	9	78	100
Other Weapons Systems				
Torpedoes	7,436	1,050	8,486	50[5]
Other Weapons	13,490	(1,696)	11,794	82

Footnotes:

[1] The Percent Operational provides the percent of the Natioanl Defense PP&E assets that are operational or mission ready as of 9/30/98.
[2] The Percent Operational is applicable to all ships and not to Small Boats.
[3] Most of the Navy's Small Boats are being held as Mobilization assets and are in need of only minor repairs.
[4] The amount as of 10/01/97 and Additions/Deletions were not available from all sources.
[5] Torpedo maintenance encompasses unique considerations, an explaination appears in the notes (below).

Notes:

The Department of Defense elected to implement in FY 1998 the Federal Accounting Standards Advisory Board's (FASAB) amendments to the Statement of Federal Financial Accounting Standards Number 6 and Number 8. The FASAB encouraged early implementation of proposed federal-wide accounting standards. Accordingly, the quantities of National Defense Property, Plant, and Equipment (PP&E) are disclosed in this report.

The amendments to the Statement of Federal Financial Accounting Standards Number 6 and Number 8 require the Department of Defense to separately report additions and deletions of National Defense PP&E. Currently, the Department's property systems used for National Defense PP&E do not capture and/or retain addition and deletion information; therefore, the Department could not separately report such amounts. Rather, the report reflects the net amount between the opening and closing balances. As the Department's property systems are modified or upgraded, appropriate modifications will be made to accommodate the reporting of additions and deletions separately.

The quantities of National Defense PP&E presented in this consolidated report reflect the sum of the quantities reported by the Military Departments. Quantity and other National defense PP&E information by Military Department is presented in the Required Supplemental Stewardship Information contained in each of the Military Department's financial statements. National Defense PP&E deferred maintenance information is disclosed in Note 17 to the Statement of Net Cost.

Torpedoes. The serviceable or unserviceable condition of torpedoes changes on a daily basis. As of September 30, 1998, 50 percent of the Department of the Navy torpedoes were in a serviceable condition and mission ready. There are several factors that contribute to torpedoes not being in a serviceable condition. For example, torpedoes are tested every five months, as well as when they are off-loaded from a ship or boat. While in testing status, torpedoes are considered unserviceable. Additionally, some quantity of torpedoes are stored in component parts in a manner that facilitates easy assembly as either WARSHOT or exercise torpedo configurations; while stored in this manner, applicable torpedoes are considered unserviceable. Further, additional quantities of torpedoes are maintained in an inactive status. Torpedoes in an inactive status do not receive regular maintenance and, therefore, as considered unserviceable. Lastly, funding levels for maintenance do not always permit every torpedo to receive the desired level of maintenance at the desired period of time. Thus maintenance funding levels also can effect the number of torpedoes that are unserviceable.

NATIONAL DEFENSE PROPERTY, PLANT AND EQUIPMENT

Yearly Investments in National Defense Property, Plant and Equipment
For Fiscal Year Ending September 30, 1998
(In Millions of Dollars)

Categories/Major Types	FY 1998
Aircraft	
Combat	$5,269
Airlift	3,727
Other Aircraft	1,512
Aircraft Support Principal End Items	3,340[1]
Ships	
Submarines	$1,090
Aircraft Carriers	1,301
Surface Combatants	2,879
Amphibious Warfare Ships	753
Mine Warfare Ships	89
Support Ships	0
Other Ships	575
Ship Support Principal End Items	851
Missiles	
Ballistic Missiles	$587
Other Missiles	1,271
Missile Support Principal End Items	1,339[1]
Combat Vehicles[2]	
Tanks	$38
Other Combat Vehicles	489
Combat Vehicle Support Principal End Items	842
Space Systems	
Satellites	$517
Satellite Support Principal End Items	667
Other Weapons Systems	
Torpedoes	$125
Other Weapons	132
Other Weapon Systems Support Principal End Items	135
Mission Support PP&E[3]	$4,968
Weapons Systems Support Real Property[4]	$28

Footnotes:

[1] Air Force investments in Principal End Items are included in the above appropriate major-type categories.
[2] Air Force investments in Combat Vehicles are not included in amounts reported.
[3] Includes various types of military equipment, such as ordnance support equipment, vehicular equipment, electronics equipment, and communications equipment. The amount reported does not include Air Force investments.
[4] Includes ammunition bunkers and missile silos in active use.

Notes:

The Department of Defense elected to implement in FY 1998 the Federal Accounting Standards Advisory Board's (FASAB) amendments to the Statement of Federal Financial Accounting Standards Number 6 and Number 8. The FASAB encouraged early implementation of proposed federal-wide accounting standards. Accordingly, the quantities of National Defense Property, Plant, and Equipment (PP&E) are disclosed in this report.

Recently, the FASAB modified the requirements for reporting the acquisition costs of National Defense PP&E to require the full cost in accordance with the Statement of Federal Financial Accounting Standards (SFFAS) Number 4. The DoD currently does not have cost accounting systems that capture the full cost in accordance with SFFAS Number 4 and will not for many years. Therefore, the amounts that are reported in this report represent the Department's annual disbursements for each category of National Defense PP&E.

The investment amounts in National Defense PP&E presented in this consolidated report reflect the sum of the investment amounts reported by the Military Departments. Investments by Military Department are presented in the Required Supplemental Stewardship Information contained in each Military Department's financial statements.

HERITAGE ASSETS
For Fiscal Year Ending September 30, 1998
(Quantities in Actual Amounts)

	As of 10/01/97	Additions	Deletions	As of 9/30/98
Collection Type[1]				
Documents				7,577
Works of Art				8,746
Military Artifacts				124,092
Non-Military Artifacts				904
Classic Weapon Systems				119
Other				171,877
Total Collection Type				313,315
Non-Collection Type				
Historic Structures and Buildings	2,153	262	97	2,481
Monuments	2,071	54	0	2,737
Battlefields	47	0	0	47
Cemeteries and other Burial Grounds	53	1	0	306
Archeological Sites	19,038	3	0	19,041
Total Non-Collection Type	23,362	320	97	24,612

Footnotes:

[1] Amounts as of 10/01/97 and Additions/Deletions were not available from all sources.

Notes:

Collection Type Heritage Assets are reported by the number of items, collections or locations, predicated on the manner in which each Military Department maintains control for safeguarding the assets.

The quantities of Heritage Assets presented in this consolidated report reflect the sum of the quantities reported by the Military Departments. Quantity information by Military Department is presented in the Required Supplemental Stewardship Information contained in each of the Military Department's financial statements.

STEWARDSHIP LAND
For Fiscal Year Ending September 30, 1998
(Acres in Thousands)

Land Use	As of 10/01/97	Additions	Deletions	As of 9/30/98
Mission				
Army	6,571	13	6	6,578
Navy	1,909	0	0	1,909
Air Force	7,700	0	0	7,700
Total	16,180	13	6	16,187
Heritage				
Army	1	0	0	1
Grand Total	16,181	13	6	16,188

Notes:

The majority of the Department's land is Stewardship Land and is used for mission-essential purposes (military bases, installations and training ranges). The very minimal amount of Stewardship Land reported as Heritage is for cemeteries.

Note 11 to the Balance Sheet contains environmental cleanup information applicable to some of the Department's Stewardship Land.

NONFEDERAL PHYSICAL PROPERTY
Yearly Investment in State and Local Governments
For Fiscal Year Ending September 30, 1998
(In Millions of Dollars)

Categories	FY 1998
Army National Guard	$138

Notes:

Only the Department of the Army incurred expenses (investments) in Nonfederal Physical Property during FY 1998. The amount reported was for investments in "state-owned" property, such as Armories for the National Guard, for which the Department of the Army maintains a proprietary use interest for 25 years. The Department of the Navy and Air Force did not incur any FY 1998 investments in Nonfederal Physical Property.

INVESTMENTS IN RESEARCH AND DEVELOPMENT
Yearly Investment in Research and Development
For Fiscal Year Ending September 30, 1998
(In Millions of Dollars)

Categories	FY 1998
Basic Research	
Defense Research Sciences (all Military Departments)	$528
University & Industry Research Centers (Army)	177
In-House Lab Independent Research (Army and Navy)	26
Subtotal	$731
Applied Research	
Medical Technology (Army)	$171
Command, Control and Communication Technology (all Military Departments)	158
Advanced Weapons (Air Force)	113
Materials (Army and Air Force)	89
Systems Support Technology (Navy)	82
Human Systems Technology (Air Force)	75
Ocean and Atmospheric Support Technology (Navy)	68
Aerospace Propulsion (Air Force)	64
Combat Vehicle & Automotive Technology (Army)	62
Environmental Quality Technology (Army)	59
Aerospace Flight Dynamics (Air Force)	59
Aerospace Avionics (Air Force)	57
Military Engineering Technology (Army)	56
Surface Ship Technology (Navy)	48
Mission Support Technology (Navy)	44
Anti-Submarine Warfare Technology (Navy)	44
Mine and Special Warfare Technology (Navy)	42
Conventional Munitions (Air Force)	38
Ballistics Technology (Army)	37
Electronic Warfare Technology (Army and Navy)	33
Anti-Aircraft Warfare/Anti-Submarine Warfare Technology (Navy)	28
Undersea Warfare Weapon Technology (Navy)	28
Weapons and Munitions Technology (Army)	28
Sensors and Electronic Survivability (Army)	25
Electronics & Electronic Devices (Army)	24
Aircraft Technology (Navy)	24
Aviation Technical (Army)	23
Missile Technology (Army)	22
Modeling and Simulation Technology (Army)	20
Human Factors Engineering Technology (Army)	17
Logistics Technology (Army)	17
Night Vision Technology (Army)	16
Marine Corps Landing Force Technology (Navy)	16
Manpower, Personnel, & Training Technology (Army)	11
Hypersonic Flight Technology (Air Force)	11
Counter Mine Systems Device (Army)	10
Joint Service Small Arms Program (Army)	9
Other (Navy)	8

Tractor HIP (Army)	7
Chemical Smoke & Equipment Defeating Technology (Army)	4
Computers and Software Technology (Army)	1
Artificial Intelligence Technology (Army)	1
Subtotal	$1,749
Grand Total	$2,480

Notes:

Descriptions of the research and development programs presented in the table are provided below by Military Department and by type of research (Basic and Applied).

Department of the Army

Basic Research:

In-House Laboratory Independent Research. In-House Laboratory Independent Research (ILIR) provides a source of competitive funds to technical directors to stimulate high quality, innovative research with significant opportunity for payoff in Army warfighting capability. The ILIR program serves as a catalyst for major technology breakthroughs by giving laboratory directors flexibility in implementing novel research ideas and nurturing senior researchers as well as the most promising, developing scientists. The ILIR funding allocation is based on the quality of past performance. Each year, ILIR project reports are submitted from competing Army research organizations to the Office of the Assistant Secretary of Army (Research, Development, and Acquisition). ILIR funding allocation for the subsequent year is based on the score assessed by the ILIR review committee. This project provides the funding for ILIR research, allocated among the seven Research, Development and Engineering Centers in the Army Materiel Command.

Defense Research Sciences. This program is focused on sustaining Army technological superiority for effectiveness in land warfighting capability and the Army Vision for Force XXI and the Army After Next. The program focus is in-house laboratory research on Army unique expertise and capabilities, capitalizing on the scientific talent and specialized facilities to expeditiously transition the resulting knowledge and technology into the appropriate developmental activities. The extramural program leverages the research efforts of other government agencies, academia, and industry for those areas where the Army does not have the technical lead. This translates to an integrated program which is executed by the following six primary contributors: (1) The Army Research Laboratory (ARL), (2) the seven Army Materiel Command Research, Development and Engineering Centers, (3) the four Army Corps of Engineer laboratories, (4) the six Army Medical Research and Materiel Command Laboratories, (5) the Army Research Institute, and (6) the Army Research Office.

University & Industry Research Centers. The Army initiative to create three open, federated laboratories is an approach focusing the talents of industry and academia on critical technology needs of the Army. The federated laboratory is a partnership between the ARL and the private

sector involving cooperative agreements, integrated management and staff rotations, education and communication. The basic construct of a federated laboratory is to continue strong in-house involvement to meet Army-unique requirements where there is little external expertise in the technologies, and to forge direct associations with industry/university consortia with recognized competencies in specific technology areas where the centers of expertise are definitely outside of the Government (e.g., telecommunications). Under the federated laboratory approach, ARL formed partnerships with consortia consisting of at least one each of an industrial company, a major university, and a Historically Black College or University/Minority Institution. Long-term cooperative agreements (five years) were established in three key areas with consortia that have become "virtual labs" within ARL and function as any other ARL division. Research is jointly planned and executed. Centers have proven to be highly effective in many applications-oriented projects, in areas such as rotary wing technology and electronics. Centers couple state-of-art research programs with broad-based graduate-education programs to increase the supply of scientists and engineers in areas of Army importance.

Applied Research:

Materials Technology. This program provides materials technology for armor and armaments to enable US dominance in future conflicts across a full spectrum of threats in a global context. Project AH 84 is directed toward developing materials technology that will make our heavy forces lighter and more deployable, and our light forces more lethal and survivable. Project HM1 focuses on developing the materials technology needed so that future strategic missile interceptor can meet stringent performance demands. Work in this program has been coordinated with the other military services through the Materials/Processes Area Plan to prevent duplication of effort and to maximize the return on investment. Work in this program is consistent with the Army Science and Technology Master Plan, the Army Modernization Plan, and Force XXI.

Sensors and Electronic Survivability. This program provides the enabling technology necessary to demonstrate advanced Combat Identification (CI) concepts and systems for mission areas not considered to date. The hardware and software improvements and modeling and simulation advances provided by this project is essential to expand and build upon the midterm C architecture. The operational impacts to be realized are reduced fratricide and a significant increase in combat effectiveness. CI is also strongly related to the Army's larger objective of Battlefield Digitization and synergistically supplements that effort by addressing the fusion of situational awareness and point-of-engagement target identification.

Aviation Technology. The objective of this program is to conduct applied research in rotary wing vehicle (RWV) technologies for transition to advanced development technology demonstrations that support development of new and/or upgraded DoD/Army rotorcraft systems in support of Joint Vision 2010 and Army After Next. RWVs offer a practical solution to many of the DoD/Army's operational needs because of their ability to operate efficiently and effectively at or below tree top level for nap-of-the-earth (NOE) missions. Accordingly, RWVs present unique design challenges and require significantly different analysis compared with traditional fixed wing vehicles, which do not have rotors and do not fly in NOE. The Army Aviation Science and Technology program's functional organization is the focal point for DoD

efforts in rotorcraft technology. Technical areas include aeromechanics, aerodynamics, flight controls, aeroacoustics, structures, propulsion, reliability, and maintainability, safety and survivability, mission support equipment, aircraft system synthesis, advanced helicopter analysis, flight simulation, aircrew-aircraft integration, avionics and aircraft weapons integration.

Electronic Warfare (EW) Technology. This program investigates electronic warfare technologies for current and future systems. The efforts in EW will enable the Army to deny the enemy use of the radio spectrum for command, control, communications and computer intelligence purposes, and provide a decisive advantage to our operational forces against the full range of traditional and non-traditional threat forces. Electronic countermeasures and self protection developments will protect Army forces from a broad range of radio frequency (RF) surveillance/tracking systems, imaging radars, advanced RF/electro-optical infrared missiles and smart munitions. Applied research also is being accomplished on automated intelligence fusion system and techniques for managing assets on the battlefield. This program will lead to information to control the electromagnetic spectrum and conducting successful electronic disruptive/destructive operations inside the enemy decision cycle.

Missile Technology. This applied research program is designed to provide the Army with missile, rocket, and unmanned vehicle technology for enhancement of existing assets. Its overall objective is to provide a continental U.S. based Army with weapon systems enabling immediate worldwide deployment of forces with the capability to initially contain and ultimately achieve decisive victory against hostile forces equipped with modern weapons. The program is driven by U.S. Army Training and Doctrine Command Battle Labs and mission area analyses of deficiencies in the area of close combat, fire support, air defense, intelligence/electronic warfare, and the priorities set forth in the Army Science and Technology Master Plan. The program is focused on technologies with enhanced weapon system deployability, flexibility, lethality, survivability, and affordability. Work within the program is conducted through system simulation, virtual prototyping, concept synthesis, hardware development, and focused technology demonstrations.

Modeling and Simulation Technology. Work in this program advances development and use of modeling and simulation, including Advanced Distributed Simulation, related to Army-specific experiments/demonstrations and industry participation at the U.S. Army Training and Doctrine Command Battle Labs, Army's Force XXI and Army After Next experiments. It develops standards, architecture and interfaces essential to realizing the DoD/Army vision of creating a verified, validated and accredited synthetic "electronic battlefield" environment. The electronic battlefield is used to investigate and demonstrate new warfighting concepts, including development of tactics, doctrine, training techniques, soldier support systems and system upgrades. It directs and stimulates advances in those technologies required for real time interactive linking within and among constructive, virtual and live simulation.

Combat Vehicle and Automotive Technology. This program advances technologies for affordable and effective ground combat and tactical vehicles. Emphasis is placed on technologies needed for vehicles that are more mobile, affordable, versatile and highly survivable for the post Cold War era. New technologies are needed to achieve more deployable

advanced armored vehicles that reflect the Army's need to lighten the force while retaining the ability to survive in diverse, worldwide environments and missions.

Ballistics Technology. This program element, composed of several projects, provides ballistic technologies required for armaments and armor across a full spectrum of threats in a global context. Project AH37 is directed toward solving remaining technology challenges identified under previous attempts to weaponize liquid propellant technology. It capitalizes on the large Army investment in liquid propellant technology. Project AH75 focuses on pulsed power technology for electric armaments which offer the potential to field leap-ahead capability in providing hypervelocity and hyperenergy launch well above the ability of the conventional cannon. It also includes work in hypervelocity penetrator effectiveness and electrothermal chemical technology that will greatly increase anti-armor capabilities. Project AH80 is focused on applied research in ballistics technology to enhance the lethality and survivability of future weapons. Focus areas include advanced solid propellants, launch and flight dynamics, weapons concepts for light forces, warheads and projectiles, armor and munitions-target interactions. Project AH81 taps the innovations of industry and pursues the most promising and affordable approaches to developing armor/anti-armor technologies.

Chemical Smoke and Equipment Defeating Technology. This program provides applied research for technologies to increase survivability with enhanced smoke and obscurant capabilities, and solve critical light force needs to defeat enemy targets (e.g., non-lethal and flame/incendiary devices). The project provides applied research of several capabilities to counter enemy weapon systems and to provide a capability to degrade enemy capability. Improved multispectral smokes/obscurants will be explored to enhance survivability by providing effective, affordable, and efficient screening of deployed forces from threat force surveillance sensors and effective defeat of target acquisition devices, missile guidance, and directed energy weapons, all of which can operate anywhere from the visible through the microwave portion of the electromagnetic spectrum. These systems will be designed to be safe and environmentally acceptable. Flame and incendiary payloads will be developed to defeat a variety of targets ranging from personnel to bunkers and light armored vehicles.

Joint Service Small Arms Program. The objective of this program is to develop key individual and crew served weapons technologies that will enhance the fighting capabilities and survivability of dismounted battlefield personnel of the Services.

Weapons and Munitions Technology. The objective is to perform applied research of advanced direct and indirect fire weapons (except small arms) and munitions. The project also funds modeling and analytic codes for thermal analysis and high impetus low flame temperature propellants to reduce wear on gun tubes, high energy explosives technologies that increase projectile and warhead lethality; advances armament fire control, and decision aids and software architecture; advances acoustic sensor technology to enhance performance of smart munitions, technology advances in acoustic sensors and thermal management of high performance, high rate of fire, large caliber guns, and advanced air-to-air guns in enhanced rotary wing aircraft armaments, as well as ways to make artillery systems more flexible and deployable through range extension and weight reduction technologies.

Electronics and Electronic Devices. This program consists of research in the physical sciences essential to all land combat systems that contain electronics, chemical/biological sensors, photonics, magnetic materials, ferroelectrics, microwave and millimeter-wave components, batteries, electromechanical systems (engine generator sets) and fuel cells. Supported systems include the Future Soldier System, autonomous missile systems, advanced land combat vehicles, smart anti-tank munitions, electric weapons, secure jam-resistant communication, automatic target recognition, foliage-penetrating radar, combat identification, and digitizing of the battlefield. The work under this program provides enabling capability to perform precision deep fires against critical mobile and fixed targets, to provide exceptional all-weather, day or night, theater air defense against advanced enemy missiles and aircraft, and to develop low-cost, lightweight, high-energy density power sources to power for communications, target acquisition, miniaturized displays, combat service support applications and microclimate cooling for Future Soldier System.

Night Vision Technology. This program develops core night vision and electronic sensor technologies for Army weapons systems. Advanced next generation focal plane arrays, both mega-pixel infrared and multispectral, are being developed that will see farther, provide advanced signal processing, and improve performance on the dirty battlefield. Advanced drive electronics are being developed to reduce power consumption and improve contrast and brightness of miniature flat panel displays for future aviation, infantry, armored vehicle, and field maintenance application. Multi-wavelength and micro-laser sources will provide affordable, high performance technology options for the individual soldier, and tactical laser rangefinding, designating, obstacle avoidance, laser radar and missile countermeasures. Extended battlespace micro-sensors will provide a revolutionary increase in battlespace awareness that will improve soldier survivability, lethality, and situation awareness, and enable commanders and staffs to plan, decide, and execute operations with greater speed and tempo. Aided/automatic target recognition technologies will enable dramatic reductions in the time to acquire targets, detect land mines, and collect intelligence data while also reducing the warfigher's cognitive workload. Hardware-in-the-loop multispectral sensor simulations are being developed that will allow end-to-end predictive modeling, hardware design, and evaluation of new technologies in a virtual environment while allowing warfighters to test these capabilities, develop tactics and techniques, and train in parallel with the hardware development process.

Countermine Systems Device. This program provides countermine and advanced signature management technologies. The specific countermine efforts include close in detection of individual mines utilizing manportable technologies, detection and neutralization from moving vehicles, and remote detection of minefields. Advanced robotics technologies will be emphasized to minimize threats to weapon systems and personnel. Breaching and neutralization techniques will be developed for both conventional and electronically activated mines that can act at a distance. A Center of Excellence for land mine detection will coordinate and standardize development of mine signature simulations, provide a catalogue of mine signatures, and support evaluation of mine detection algorithms. Advanced signature management techniques will provide mobile and semi-mobile assets with low cost, low burden survivability enhancements addressing detection avoidance in global battlefield conditions.

Human Factors Engineering Technology. The objectives are to maximize the effectiveness of soldiers in concert with their materiel so that they may survive and prevail on the battlefield. Specialized laboratory studies and field evaluations are conducted to collect performance data on the capabilities and limitations of soldiers, with particular attention on soldier and equipment interaction. This program also focuses on the development, field testing and empirical validation of methods for improving the coordinated functioning of civilian and military emergency medical teams. This work complements related Army programs in soldier performance, training and evaluation methodologies, and will provide direct research benefits to the Army's medical community, including combat casualty care on the battlefield and in other remote areas of operations.

Environmental Quality Technology. This program provides technology that allows the Army to comply with regulations mandated by all Federal, State and local environmental/health laws and to reduce the cost of this compliance. Examples of key laws include the Superfund Amendments and Reauthorization Act of 1986 and the Defense Environmental Restoration Act (the DoD equivalent of this law), in addition to the Resource Conservation and Recovery Act of 1984, as amended. The project provides the Army with a capability to decontaminate or neutralize Army-unique hazardous and toxic wastes at sites containing waste ammunition, explosives, heavy metals, propellants, smokes, chemical munitions, and other organic contaminants. The current DoD estimate for the total Army cost of completing this cleanup program is eight to ten billion dollars. This program also provides technology to avoid the potential for future hazardous waste problems, by reducing hazardous waste generation through process modification and control, materials recycling and substitution. This program develops pollution control technology, which assists installation to comply with environmental regulations at less cost. The program also provides technology to mitigate noise impacts and maneuver area damage resulting from Army training activities.

Command, Control, Communications Technology. This program conducts research of those advanced communications technologies required to provide a worldwide communications capability. The objective of the command/control and platform electronics technology is to expand scientific knowledge for demonstration of state-of-art technologies, including command/control and electronic systems/subsystems, performance reliability, maintainability, safety, survivability, and man-machine interface for all Army air ground platforms, including soldier systems and equipment. Investigation of an infrastructure that will allow timely distribution, display and use of command/control data on Army platforms will lead to greater battlefield functional capabilities, survivability and total integration into the digitized battlefield. These technologies will provide field commanders with the capability to communicate to and from virtually any place on earth.

Information and Communication Technology. This program develops and applies information and communication technology to improve the performance and reduce the cost of Army tactical Command and Control systems and tactical embedded real-time systems. Efforts capitalize on computationally intensive approaches that exploit the rapidly evolving capabilities of emerging commercial computer technology. Focus I on the providing general solutions that can be applied to a wide variety of Command and Control problems.

Military Engineering Technology. The applied research conducted in this program provides technology in direct support of critical warfighter functions of mobility, counter-mobility, survivability, sustainment engineering, and topography needed to win on the modern battlefield. Research is conducted that supports the special requirements for battlefield visualization, tactical decision aids, weather intelligence products, and capabilities to exploit space assets. Key operational technologies developed are demonstrated to Army units. Results are tailored to support the material development, test and acquisition community in evaluating the impacts of weather, terrain, and atmospheric obscurants in military operations. Research develops and exploits a wide range of innovative technologies and applies them to Defense unique planning, acquisition, revitalization, and sustainment processes. The goal of this research is to improve the efficiency and cost effectiveness as it relates to supporting the training/readiness/force projection missions in garrison and force sustainment missions in theaters of operations.

Personnel Performance and Training Technology. The objectives of this program are to provide the scientific basis to improve the selection and classification procedures to ensure the right person is placed in the right job, to determine leader skills and requirements for the future, to evaluate the impact of deployments on personnel issues (e.g., career commitment, retention, etc.), and to provide the behavioral technologies required for the development of effective individual and collective (unit) training strategies including simulation-based synthetic environments. Research topics include training strategies for the digitized battlefield, training strategies in simulated environments, optimum designs of simulators and training devices to achieve maximum learning at minimum costs, and modernization of the selection and classification system to maintain warfighting capabilities in a downsized Army.

Logistics/Warfighter Technology. This program provides technology for the individual soldier and airdrop. The future soldier and that soldier's support systems must address challenging and unique battlefield and weapons demands. In order to achieve required individual performance, mobility, and effectiveness, there must be associated technology developments evolving in soldier support equipment, supplies, and systems to make them smaller, lighter, more reliable and durable, more survivable, more mobile, affordable and less manpower intensive. Technology efforts on clothing and equipment and cutting edge technologies for high-pressure airbeam supported shelters provide enhanced warfighter protection from both combat threats and from the natural field environment. The Joint Services Food/System Technology program supports all military Services with research and development of high impact/high payoff technologies for performance enhancing military food products, packaging and combat food service equipment. Work includes the establishment of sensory quality parameters and criteria for enhancing consumption and nutrient composition, developing technologies to minimize physical, chemical and nutritional degradation of combat rations during storage, and providing for logistically effective, mobility and performance enhancing rations to meet the needs of individual soldiers in highly mobile battlefield situations. Similarly, work on advanced airdrop technology supports all Services' requirements for air dropping larger combat logistics loads while improving delivery accuracy, minimizing vulnerability of aircraft and reducing life cycle costs as well as the need for safer, more combat efficient personnel parachutes. This is a critical capability for rapid force projection, particularly into hostile environments.

Medical Technology. This program funds applied research in DoD medical protection against naturally occurring diseases of military importance and combat dentistry, as well as applied research for Department of Army care of combat casualties, health hazard assessment of military materiel and medical factors enhancing soldier effectiveness. The primary goal of medical research and development is to sustain medical technology superiority to improve the protection and survivability of U.S. forces on conventional battlefields as well as in potential areas of low intensity conflict and military operations short of war. This program is the core DoD technology base to develop methods and materials to combat infectious diseases; provide prevention and treatment through the use of prophylactic and therapeutic drugs, insect repellents, and methods of diagnosis and identification of naturally occurring infectious diseases; prevention and treatment of combat maxillofacial injuries, and essential dental treatment on the battlefield; combat casualty care of trauma and burns due to weapons, organ system survival, shock resulting from blood loss and infection, blood preservation and potential blood substitutes for battle field care; assessment of health hazards of military materiel, and the sustainment or enhancement of soldier performance.

Department of the Navy

Basic Research:

In-House Lab Independent Research. The In-House Lab Independent Research program supports the missions of various Navy commands with high-risk/high-payoff research, responding to the Navy Joint Mission Areas/Support Areas and enables the technologies that could significantly improve Joint Chiefs of Staff's Future Joint Warfighting Capabilities.

Defense Research Sciences. The Defense Research Sciences program sustains U.S. naval scientific and technological superiority, provides new concepts and technological options for the maintenance of naval power and national security, and provides the means to avoid scientific surprise, while exploiting scientific breakthroughs.

Applied Research:

Anti-Aircraft Warfare/Anti-Submarine Warfare Technology. The Anti-Aircraft Warfare/Anti-Submarine Warfare Technology program develops new and innovative technologies which will support future weapons systems for surface and air platforms for Naval Warfare.

Surface Ship Technology. The Surface Ship Technology program provides for surface ship, submarine, logistics, and environmental quality applied research that contributes to meeting joint warfare capabilities.

Aircraft Technology. The Aircraft Technology program develops technology for naval aviation, with emphasis on the demands imposed by aircraft carrier flight operations and Marine Corps amphibious and field operations relating to the Joint Mission Areas of Strike and Littoral Warfare.

Marine Corps Landing Force. The Marine Corps Landing Force program develops and demonstrates, in conjunction with the Army and Air Force, those phases and technologies of amphibious operations that pertain to tactics, techniques, and equipment used by the landing force.

Command, Control and Communication Technology. The Command, Control and Communication Technology program supports future command, control, communications and intelligence, surveillance and reconnaissance systems for surface, air and space platforms and ashore for Naval Warfare.

Mission Support Technology. The Mission Support Technology program provides generic affordable technologies in support of all Joint Mission Areas/Joint Support Areas (JSA), in particular, the JSAs for Readiness, Manpower and Personnel, and Training.

Systems Support Technology. The Systems Support Technology program provides Applied Research to support all Navy advanced weapon and platform system concepts and needs in the areas of materials, electronics, and computer technology.

Electronic Warfare Technology. Electronic Warfare Technology program addresses identified technology requirements in cooperation with the other Services, placing special emphasis on Naval electronic warfare roles in information electronic warfare.

Anti-Submarine Warfare. Anti-Submarine Warfare program is classified.

Mine and Special Warfare Technology. The Mine and Special Warfare Technology program provides technologies for naval mine countermeasures, sea mines, and Department of Defense Explosive Ordnance Disposal.

Ocean and Atmospheric Support Technology. The Ocean and Atmospheric Support Technology program provides the fundamental programmatic instrument by which basic research on the natural environment is transformed into technological developments that provide new or enhanced warfare capabilities.

Undersea Warfare Weapon Technology. The Undersea Warfare Weapon Technology is classified.

Department of the Air Force

Basic Research:

Basic research includes all effort of scientific study and experimentation directed toward increasing knowledge and understanding in those fields of the physical, engineering, environmental, and life sciences related to long-term national security needs. It provides farsighted, high payoff research, including critical enabling technologies that provide the basis for technological progress. It forms a part of the base for (a) subsequent exploratory and

advanced developments in Defense-related technologies, and (b) new and improved military functional capabilities in areas such as communications, detection, tracking, surveillance, propulsion, mobility, guidance and control, navigation, energy conversion, materials and structures, and personnel support.

Defense Research Sciences. The Defense Research Sciences Program supports Air Force research efforts comprised of in-house investigations in Air Force laboratories and extramural activities in academia and industry. The program funds broad-based scientific and engineering basic research in technologies critical to the Air Force mission. These technologies include aerospace structures, aerodynamics, materials, propulsion, power electronics, computer science, directed energy, conventional weapons, life sciences, and atmospheric and space sciences.

Applied Research:

Applied research translates promising basic research into solutions for broadly defined military needs, short of major development projects. This type of effort may vary from fairly fundamental applied research to sophisticated bread-board hardware, study, programming and planning efforts that establish the initial feasibility and practicality of proposed solutions to technological challenges. It includes studies, investigations, and non-system specific development efforts. The dominant characteristic of this category of effort is that it be pointed toward specific military needs with a view toward developing and evaluating the feasibility and practicality of proposed solutions and determining their parameters.

Materials. The Applied Research program is the primary source of advanced materials and processes to reduce life cycle costs and improve performance, affordability, supportability, reliability, and survivability of current and future Air Force systems. Structural, propulsion, and sub-systems materials and processes are developed for aircraft, missile, space, satellite, and launch systems applications.

Aerospace Flight Dynamics. The Aerospace Flight Dynamics program determines the technical feasibility of aerospace vehicle technologies in aeromechanics, structures, flight control, air vehicle-pilot interface, vehicle subsystems, and air base technologies to reduce life cycle costs and improve the performance of existing and future manned and unmanned aerospace vehicles, and the maintenance and survivability of air bases.

Human Systems Technology. The Human Systems Technology program establishes technology feasibility and develops the technology base for Air Force human interface needs required for weapon systems, operational readiness, and environmental quality. The program addresses crew systems; manpower, personnel, training, and logistics; aerospace physiology investigation; occupational and environmental safety; and environmental compliance, site remediation, and pollution prevention.

Aerospace Propulsion. The Aerospace Propulsion program develops airbreathing propulsion and aerospace power technologies. The prime areas of focus are turbine engines, dual-mode ramjets, combined cycle engines, fuels, lubricants, and aerospace power technologies.

Aerospace Avionics. The Aerospace Avionics program determines the feasibility of active and passive electronic countermeasure technologies and explores, develops, expands, and refines the most promising and cost-effective technologies. The technologies pursued support passive sensing of the entire electromagnetic spectrum in order to provide signal collection, detection, recognition, analysis, identification, location, and countering of enemy electronic emissions whether intentional or unintentional.

Hypersonic Flight Technology. The Hypersonic Flight Technology program develops advanced hypersonic technologies and will provide revolutionary technology options to satisfy future Air Force needs such as future hypersonic weapons and space launch concepts. This program will focus on hydrocarbon fueled hypersonic vehicle technologies and demonstrate their feasibility.

Advanced Weapons. This is the Advanced Weapons program for space technology, rocket propulsion, and directed energy for the Air Force Research Laboratory.

Conventional Munitions. The Conventional Munitions program investigates, develops and establishes the technical feasibility and military utility of advanced guidance and ordnance technologies for conventional munitions.

Command, Control and Communication. The Command, Control and Communication program is the primary source of new concepts, feasibility demonstrations, and advanced technology for Air Force Command, Control and Communications. Current developments include: improving effectiveness and survivability through secure communication; improving surveillance range and detection capabilities against low-observable threats and enemy electronic countermeasures; and improving the timeliness and quality of data acquisition for decision making.

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