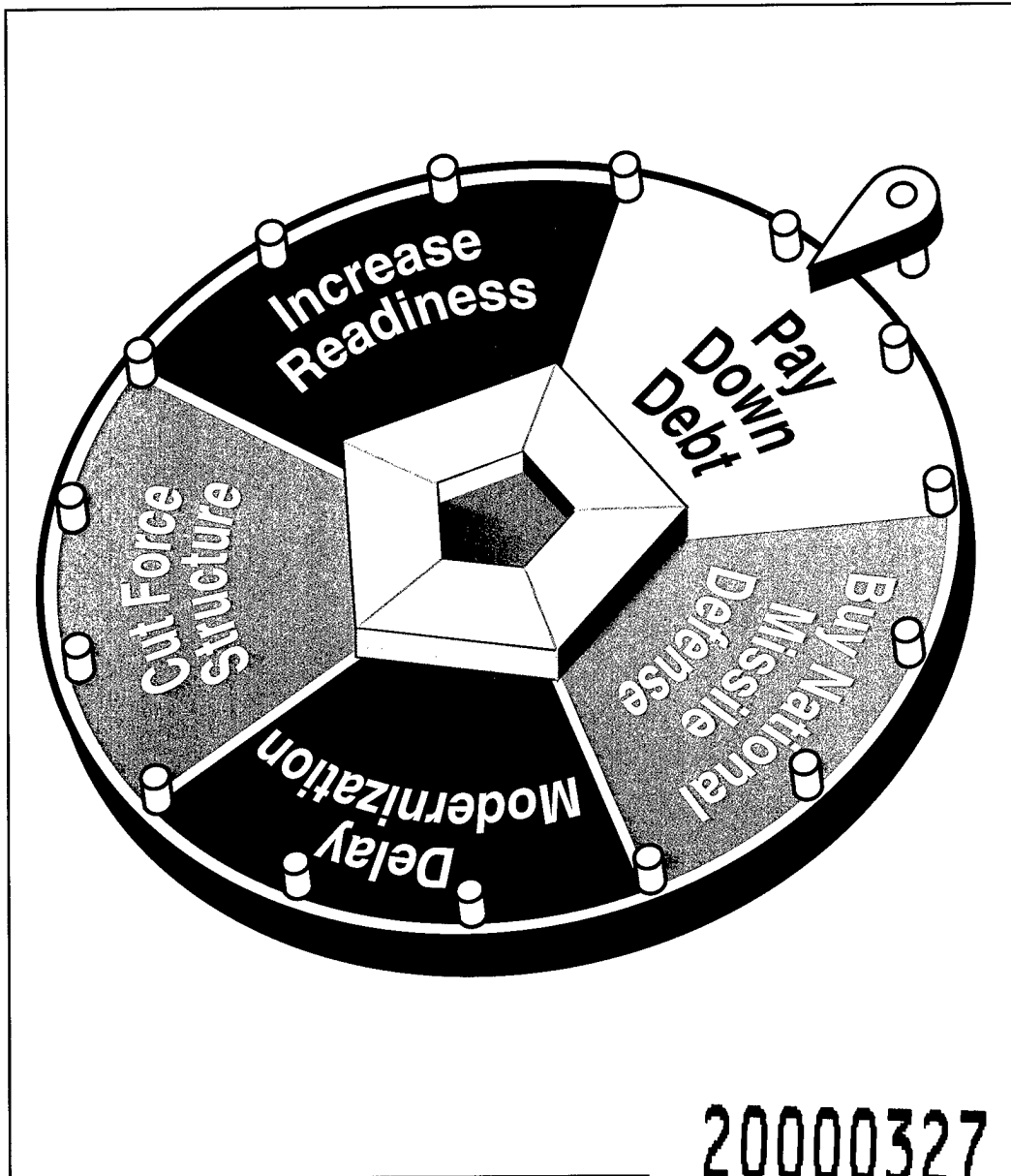


Budget Options for National Defense



20000327 071

DISTRIBUTION STATEMENT A:
Approved for Public Release -
Distribution Unlimited



MARCH 2000

**BUDGET OPTIONS
FOR NATIONAL DEFENSE**

The Congress of the United States
Congressional Budget Office

NOTES

Unless otherwise indicated, all years referred to in this report are fiscal years.

Numbers in the text and tables may not add up to totals because of rounding.

Preface

This Congressional Budget Office (CBO) report—prepared at the request of the Chairman of the Senate Committee on the Budget—addresses some of the major defense issues likely to be debated during the second session of the 106th Congress. It includes a variety of options for altering the defense program that would affect force structure, modernization programs, personnel policies, and support activities. Some of those options would require additional funding to carry out; others would provide budgetary savings.

The specific policy options are drawn from many sources. In keeping with CBO's mandate to provide objective and impartial analysis, the discussion of each option presents the cases for and against it. The inclusion or exclusion of a particular option does not represent an endorsement or rejection by CBO. As a nonpartisan Congressional staff agency, CBO does not make recommendations about policy.

This report is confined to activities funded through the budget function for national defense (function 050), which includes the atomic energy activities of the Department of Energy as well as the military functions of the Department of Defense. Spending and revenue options for a wide variety of federal activities can be found in CBO's *Budget Options* report, published in March 2000 (where some of these options also appeared).

This report was prepared by the staff of CBO's National Security Division, which is directed by Christopher Jehn. R. William Thomas served as overall coordinator for the volume and wrote Chapter 1 and much of the introductory material of Chapters 2 and 3. Deborah Clay-Mendez coordinated the options that appear in Chapter 4 and wrote much of the introductory material for that chapter. Estimates of costs and savings were prepared by the staff of the Defense, International Affairs, and Veterans' Affairs Cost Estimating Unit of CBO's Budget Analysis Division under the direction of Michael A. Miller. (A list of all CBO staff members who wrote or prepared cost estimates for the options in this report can be found in the appendix.)

Christian Spoor edited the report, and Leah Mazade proofread it. Cynthia Cleveland and Judith Cromwell typed and revised the drafts of the chapters and options. Kathryn Quattrone prepared the report for publication, and Laurie Brown prepared the electronic versions for CBO's World Wide Web site. Barry Anderson designed the cover.

Dan L. Crippen
Director

March 2000

This study and other CBO publications
are available at CBO's Web site:
www.cbo.gov

Contents

ONE	INTRODUCTION	1
	Today's Security Environment: Fewer Forces and More Peacetime Operations 1	
	Concerns About Military Readiness 2	
	The Congress's Response 3	
	The Structure of This Volume 4	
	Some Limitations of This Volume 5	
TWO	SIZING AND SHAPING U.S. FORCES TO MATCH THEIR MISSIONS	7
	Conventional Conflict Against a Major Regional Power 7	
	Military Participation in Operations Other Than War 19	
THREE	MODERNIZING WEAPON SYSTEMS AND COUNTERING EMERGING THREATS	25
	Aging Equipment 25	
	Strategic Forces and Missile Defenses 28	
	Other Emerging Threats and the Revolution in Military Affairs 41	
	Ending or Slowing Some Acquisition Programs to Pay for New Initiatives 47	
FOUR	SUPPORTING MILITARY FORCES: PERSONNEL, EQUIPMENT, AND FACILITIES	57
	Resources and Readiness 57	
	The Military Compensation Package 59	
	Cash Compensation 60	
	Health Care Benefits 66	
	Other Noncash Benefits 76	
	Requirements for Personnel 87	
	Military Equipment and Facilities 90	
APPENDIX	Contributors to This Volume	101

BUDGET OPTIONS

2-01	Increase the Attack Submarine Force to 68	9
2-02	Buy More Amphibious Ships	10
2-03	Preposition Equipment for Bombers at Forward Bases	12
2-04	Buy More JSTARS and Global Hawk UAVs	13
2-05	Increase the Aircraft Carrier Fleet to 14	14
2-06	Reduce the Number of Aircraft Carriers to Ten and Air Wings to Nine	15
2-07	Use Marine Corps Squadrons to Fill Out Navy Air Wings	16
2-08	Reduce Air Force Tactical Forces	17
2-09	Eliminate Two Army National Guard Combat Divisions	18
2-10	Increase Staffing Levels in Military Units	20
2-11	Create Additional Support Forces in the Active Army	22
2-12	Add Forces to the Active Army for Peace Operations	22
3-01	Buy More Current-Generation Fighter Aircraft for the Air Force	27
3-02	Buy Additional Integrated Mechanical Diagnostics Systems for Navy and Marine Corps Helicopters	27
3-03-A	Reduce U.S. Forces to START II Levels by 2007	30
3-03-B	Reduce Nuclear Delivery Systems Within Overall Limits of START II	31
3-04	Terminate Production of D5 Missiles After 2000	32
3-05	Reduce the Scope of DOE's Stockpile Stewardship Program	33
3-06	Fully Fund the Administration's Proposed Plan for National Missile Defense	34
3-07	Fully Fund the THAAD and Navy Theater Wide Missile Defenses	36

3-08	Establish a Space-Based Capability to Search For and Track Adversaries' Spacecraft	37
3-09	Increase Funding for Nuclear Nonproliferation Efforts in Russia	39
3-10	Buy an Additional MILSTAR Communications Satellite	42
3-11	Increase Funding for Tactical UAVs	43
3-12	Convert the Four Oldest Trident Submarines to Carry Conventional Land-Attack Missiles	45
3-13	Cut U.S. C-17 Costs and Create Common NATO Airlift	46
3-14	Cancel the Army's Comanche Helicopter Program	48
3-15	Cancel the Army's Crusader Artillery Program	49
3-16	Cancel the Army's Tank Upgrade Program	49
3-17	Reduce Procurement of the Virginia Class New Attack Submarine	50
3-18	Defer Purchases of the Marine Corps's V-22 Aircraft	51
3-19-A	Reduce Purchases of the Air Force's F-22 Fighter	52
3-19-B	Cancel Production of the Air Force's F-22 Fighter	53
3-20	Slow the Schedule of the Joint Strike Fighter Program	54
4-01	Modify Planned Pay Raises for Military Personnel	60
4-02	Increase Reliance on Selective Reenlistment Bonuses	62
4-03	Eliminate Differences in Pay Between Married and Single Service Members	64
4-04	Deny Unemployment Compensation to Service Members Who Leave Voluntarily	65
4-05	Increase Access to Care for Active-Duty Families at Military Treatment Facilities	68
4-06	Offer Comprehensive Health Coverage to Older Military Retirees	70

4-07	Offer a Nationwide Mail-Order Prescription Service to Older Military Retirees and Their Dependents	71
4-08	Downsize the Military Medical System	73
4-09	Revise Cost Sharing for Military Health Benefits	74
4-10	Have DoD and VA Purchase Drugs Jointly	75
4-11	Consolidate Military Personnel Costs in a Single Appropriation	77
4-12	Increase Housing Allowances to the Full Cost of Adequate Housing	78
4-13	Increase Competition Between DoD and Private-Sector Housing	79
4-14	Create Incentives for Military Families to Save Energy	80
4-15	Improve Military Families' Access to Child Care	81
4-16	Consolidate DoD Retail Activities and Increase Cash Compensation	83
4-17	Consolidate and Encourage Efficiencies in Military Exchange Activities	85
4-18	Eliminate DoD's Elementary and Secondary Schools	86
4-19	Cut Requirements for Pilots in Nonflying Positions	87
4-20	Restructure the Officer Corps	88
4-21	Increase Funding for Military Construction	91
4-22	Increase Funding for Real Property Maintenance	91
4-23	Close and Realign Additional Military Bases	92
4-24	Demolish Excess and Obsolete Structures	93
4-25	Apply Technology to Reduce the Cost of Operating Equipment	95
4-26	Change the Management and Pricing of Repairs	97
4-27	Consolidate Depot Functions and Close Some Facilities	99

TABLES

1.	U.S. Military Forces in Selected Fiscal Years, 1989-1999	8
2.	Average Ages of Selected Equipment	26

Introduction

In fiscal years 1999 and 2000, the Congress provided considerable additions to the funding for the U.S. military, both through regular defense appropriations and through emergency spending. Nevertheless, the debate over military programs and the defense budget is far from over. Some observers argue that past budget cuts and increased deployments have put stress on U.S. forces, diminishing their readiness for their primary mission—fighting and winning the nation's wars. Other observers believe that the military is spending too much to maintain Cold War forces and equipment and too little to develop capabilities appropriate for the kinds of threats that are probable in the 21st century.

This volume summarizes the major defense issues likely to be debated during the second session of the 106th Congress and the arguments on both sides of those issues. It also presents a variety of options for change that reflect the proposals of advocates from various parts of the policy spectrum, together with the advantages, disadvantages, and budgetary impact of those options. Because the Congressional Budget Office (CBO) is a nonpartisan support agency of the Congress, it does not make recommendations about policy. Thus, CBO neither endorses nor opposes any of the options in this volume.

This report confines itself to activities funded through the budget function for national defense (function 050), which includes the military functions of the Department of Defense (DoD) and the atomic energy activities of the Department of Energy. Spending and revenue options for other federal activities can be found in CBO's *Budget Options* report, published in March 2000. (Part One of that report illustrates the possible scope and effects of some broad policy pro-

posals to use projected budget surpluses or to cut taxes. Part Two provides specific spending and revenue options that lawmakers might adopt to offset the cost of new initiatives, to reorder priorities, or to help maintain overall budgetary discipline.)

Today's Security Environment: Fewer Forces and More Peacetime Operations

The collapse of the Warsaw Pact and the dismantling of the Soviet Union a decade ago removed the single largest military threat to the United States and its allies in Europe and Asia. As the ramifications of those developments became clearer, policymakers concluded that a major reduction in U.S. forces was possible. Consequently, between 1989 and 1999, the numbers of active-duty military personnel as well as civilian DoD employees were reduced by about 34 percent. The number of reservists was also cut significantly—by 26 percent in the case of selected reservists organized in units. The magnitude of the reductions is illustrated by the changes to major elements of the force structure: the number of active Army divisions decreased from 18 to 10, the number of battle force ships in the Navy went from 566 to 317, and the number of fighter-air-wing equivalents in the Air Force declined from 37 to 20.

Besides cutting forces, policymakers have greatly redefined the responsibilities of the military services in the past decade. The lessening of Cold War tensions

has permitted a reduction in the alert status of certain strategic nuclear forces. Conventional forces have been redirected to prepare for hostilities against one or two regional powers. And U.S. foreign policy has placed much greater emphasis on using the military for operations other than war. Overseas deployments for such operations are occurring much more frequently than they did during the Cold War. Those deployments vary considerably in the demands they place on military forces. Some are major operations of long duration involving tens of thousands of personnel; others are more modest in scope and limited in duration.

Among the most significant operations other than war are peace missions conducted under the auspices of the United Nations or the North Atlantic Treaty Organization. Since 1990, the U.S. military has begun six such operations—in Somalia, Haiti, Bosnia, Macedonia, East Timor, and Kosovo. Only the operations in Somalia, Haiti, and Macedonia have officially ended. (U.S. troops first entered Haiti in 1994, and the last contingent remained until January 2000.)

The extended length of some peace operations requires that the units originally deployed be relieved by replacements. Thus, for every unit actually involved in such a mission, there may be another unit that has just returned from it and is recovering and a third unit that is training in preparation for deployment. To the extent that the tasks performed during peace missions differ from those performed during combat, that can mean that all three units are less able to prepare for their primary combat missions.

A second class of operations other than war is one sometimes referred to as "watch standing." Those operations have one thing in common with peace missions—the extended nature of the commitment. Today, U.S. forces stand watch in the Persian Gulf region to ensure that Saddam Hussein does not threaten the safety of U.S. allies or his own people. Those operations (Northern Watch and Southern Watch) involve U.S. aircraft that fly over Iraq to enforce the no-fly zones set out in U.N. sanctions. The operations have continued since the end of the Gulf War in 1991. Until the outbreak of hostilities in Kosovo, those operations represented the most demanding commitment for Air Force and Navy flyers since 1991.

A third type of frequent operation is humanitarian intervention. Examples include relief operations after flooding in Bangladesh, support for refugees from Rwanda, and, more recently, support for refugees from Kosovo and East Timor. In contrast to the other two sorts of peacetime operations, humanitarian missions are generally of short duration (weeks, not months or years). They tend to place strains on particular types of units—especially airlift forces, supply and other support units, and military police.

Concerns About Military Readiness

Military leaders argue that the recent pace of peacetime operations, coupled with reduced numbers of forces, is having an adverse impact on readiness for conventional war. In September 1998, the chiefs of the military services testified to the Congress that the readiness of their forces was declining. Many quantitative measures of readiness—including the C-ratings in Status of Resources and Training System (SORTS) data—indicated that most U.S. forces were still near their peaks at that time. But according to the service chiefs, some of those indicators were beginning to decline enough to establish a downward trend. Moreover, some military leaders question whether those overall quantitative measures provide an accurate picture.

In their testimony before the Senate Committee on Armed Services on September 29, 1998, and before that committee and the House Committee on Armed Services in January 1999, the service chiefs cited four main problems with readiness.

- o *Recruitment and Retention.* The services are having trouble retaining experienced officers and enlisted personnel in certain specialties, such as pilots and crew chiefs in the Air Force. Furthermore, all of the services had difficulty meeting their recruiting objectives last year, and recruits' scores on the Armed Forces Qualification Test are lower than in the recent past.

- o *Material Readiness.* Mission-capable rates—the percentages of equipment ready for action—have declined for many units, in part because of shortages of spare parts. So far, that problem seems to be concentrated in units in the United States rather than units deployed abroad. Equipment and parts managers are apparently making sure that deployed units get what they need at the expense of nondeployed units.
- o *Overseas Deployments.* According to the chiefs, the pace of overseas deployments was significantly greater in the 1990s than during the Cold War era. That increase has placed particular stress on "high-demand/low-density" units, such as military police and civil affairs companies in the Army, and security, airborne warning and control system (AWACS), and Joint Surveillance Target Attack Radar System (JSTARS) squadrons in the Air Force. More frequent deployments have also necessitated repeated call-ups of reserve units as well as the use of individual volunteer reservists to support those missions.
- o *Quality of Life.* Several factors have had an adverse impact on the quality of life for military families, the chiefs said. One is increased time away from home as a result of more frequent and longer deployments. Another is aging and poorly maintained facilities and family housing units for military personnel.

The level of funding for operations and maintenance—the type of appropriation that contributes most directly to readiness by paying for training, fuel, and maintenance depots—is actually higher today per active-duty service member than it was when the force reductions began. Nonetheless, readiness may still be suffering for a number of reasons. First, DoD's involvement in operations other than war may mean large hidden costs in terms of wear and tear on equipment. Second, today's smaller force may require higher expenditures per capita than a larger force. (For example, certain costs, such as satellite reconnaissance, are fixed and do not fall with the level of active-duty personnel.) Third, aging equipment may be adding to the costs of maintenance. And fourth, DoD may have been unable or unwilling to give up costly business practices and facilities from the Cold War era. For example, it has not reduced its base

structure commensurate with the reduction in forces and personnel. DoD estimates that by 2003, its base structure will be 21 percent smaller than in 1989, whereas its forces will be 36 percent smaller. Even after four rounds of base realignments and closures—the last in 1995—DoD retains a system of equipment maintenance depots with capacity substantially in excess of its requirements. In addition, it keeps a peacetime medical establishment far greater than its wartime requirements. (Chapter 4 of this volume provides more information about current trends in readiness.)

The Congress's Response

The 106th Congress has responded to concerns about the military by increasing DoD's appropriations. For fiscal year 2000, the Congressional budget resolution set the ceiling for budget function 050 at \$288.8 billion in budget authority—some \$8.5 billion more than the Administration had requested. The enacted version of the defense authorization act and the sum of the various appropriation acts for national defense also totaled \$288.8 billion in budget authority.¹

In providing that funding, the Congress followed three main priorities. First and foremost was ensuring the ability of U.S. forces to meet their commitments worldwide. To further that goal, the Congress increased funds directed at supporting the readiness of personnel, modernizing forces, and researching and developing new weapon systems.

A second Congressional goal was to counter future threats to national security. Resources were added to combat emerging threats—such as the proliferation of nuclear, chemical, and biological weapons and of the means to deliver those weapons against U.S. allies or the United States itself.

The Congress's third major goal was to provide service members with a compensation package that would enable DoD to meet its requirements for per-

1. Appropriations for the national defense budget function are provided mainly through three appropriation acts, the ones for national defense, military construction, and energy and water (which provides funds for atomic energy activities of the Department of Energy).

sonnel. For example, the Congress provided for a series of annual across-the-board pay raises that—beginning with the 4.8 percent increase in 2000—would exceed the growth rate of private-sector wages. The Congress also approved an Administration initiative to modify the structure of military pay. That initiative provided an additional pay increase of up to 5.5 percent for personnel in certain ranks and with particular lengths of service. Finally, the Congress increased retirement benefits for military personnel who entered the armed forces after the Military Retirement Reform Act of 1986 took effect and who thus had been in line for less generous retirement benefits than service members who preceded them.

The Structure of This Volume

Recent Congressional actions by no means represent the last word on the U.S. defense budget. The major issues likely to be debated by the Congress in the future fall into three main categories: sizing and shaping military forces to match their missions; modernizing their weapons and their ability to counter emerging threats; and providing the military personnel, equipment, and facilities that those forces require. Each of those categories is the subject of a chapter in this report. The chapters summarize the issues and present various options for further action. In each option, the text provides general background information, discusses the pros and cons of the change, and estimates the savings or costs for the 2001-2010 period. As noted above, the inclusion or exclusion of a specific option does not represent an endorsement or rejection of that option by CBO.

Sizing and Shaping U.S. Forces to Match Their Missions

In the post-Cold War era, U.S. conventional forces are organized in accord with the requirement to be able to fight two major theater wars (MTWs) that occur nearly simultaneously. The number of forces required for that scenario—10 Army divisions, 20 tactical fighter wings, 10 aircraft carrier battle groups, three Marine divisions, and so forth—generally corresponds

to current force levels. But in certain instances, elements of today's forces are still either larger or smaller than required for the two-MTW scenario.

Examples of forces in excess of those requirements include some combat troops in the Army National Guard, which have little or no planned role in executing the two-MTW strategy. Examples of forces that fall short of the requirements include units that would have to swing from one combat zone to another if a second MTW broke out, such as strategic bombers and airlift and sealift forces. In addition, the Army generally does not have enough support forces for two regional conflicts at the same time. Chapter 2 presents various options for sizing and shaping U.S. forces.

Modernizing Weapon Systems and Countering Emerging Threats

In contrast to more recent concerns about near-term readiness, the lagging pace of modernization efforts has been a concern for several years. While the military services were being downsized, it made sense to halt weapons purchases. In fact, the military was retiring many types of equipment well before their useful lives had ended because they were no longer needed to equip the smaller forces that remained. By the mid-1990s, however, the downsizing was virtually complete, and the services wished to resume buying equipment. At that point, General John Shalikashvili, then Chairman of the Joint Chiefs of Staff, called for increasing procurement appropriations from \$45 billion a year to \$60 billion. Since then, the Administration has requested and the Congress has appropriated greater amounts for procurement, but they have yet to reach the \$60 billion goal. (The President's budget request for fiscal year 2001 includes \$60 billion for procurement. But when adjusted for inflation since 1995, General Shalikashvili's goal would correspond to \$65 billion for 2001.)

Modernization efforts face more obstacles than simply lack of funds. Weapons can frequently take too long to develop, be too expensive to buy in large quantities, and be left behind by the rapid advance of technology. As a consequence, even when money is available, addressing shortfalls in equipment or arrest-

ing a trend toward aging weapons can be difficult to do in the short run.

Chapter 3 discusses modernization programs and presents options that deal with the military services' acquisition efforts. Some of those options would try to halt the trend toward aging equipment by, for instance, buying more current-generation aircraft for the Air Force. Others would develop and procure entirely new capabilities, such as fully funding national missile defense programs—which the Congress recently declared a national policy—or buying tactical unmanned aerial vehicles for all of the services. Other options would extend the usefulness of existing assets—for example, by converting ballistic missile submarines into conventional missile platforms. Finally, some options would cancel or limit procurement of systems that may not fit the military's current needs as well as alternative systems do.

Supporting Military Forces: Personnel, Equipment, and Facilities

Chapter 4 presents options for recruiting, retaining, and supporting a high-quality force. It includes options that would increase funding in response to shortfalls identified by the services as well as options that might reduce costs in the long run by changing the way DoD compensates service members and manages its support activities.

Among the options that would require increased funding are ones that would improve the quality of life for service members through greater housing allowances, better access to child care, and the promise of comprehensive medical care for military retirees. Military health care and housing are major Administration priorities that are likely to be the subject of significant Congressional debate this year, just as military pay and retirement issues were last year. Other options would provide additional funding to construct or maintain DoD facilities, areas in which the Congress has often questioned the adequacy of DoD's budget requests.

Among the options designed to reduce the costs of supporting U.S. forces are ones that would downsize the military medical system, consolidate the networks of commissaries and exchanges, and close more bases and maintenance depots. Because those options would require DoD to change the way it does business, if they were not managed well, they could put military readiness at greater risk in the short run. In the long run, however, such initiatives might contribute to readiness by freeing additional resources that could be used for modernization.

Some Limitations of This Volume

This report focuses on the advantages and disadvantages of options that are the subject of public debate and that address issues of significant concern. Because CBO drew mainly on its own research and knowledge base in putting together the options, this volume excludes important issues that CBO has not yet had a chance to analyze thoroughly (such as the availability of spare parts or whether current funding for training is adequate). The omission of options in those and other areas in no way reflects on their importance for military readiness compared with the options that are discussed.

Estimates of costs or savings for the options in this report were calculated relative to program levels that predate the Administration's budget request for fiscal year 2001. Future CBO cost estimates for bills that include these options may not match the savings or costs shown in this report, for various reasons. The policy proposals in a bill may not match the assumptions used in developing these options, or the budget projections or defense plans against which a proposal is measured may have changed from the ones used here.

Sizing and Shaping U.S. Forces to Match Their Missions

In today's world, the U.S. military faces two main tasks: preparing for war against a major regional power and participating in operations other than war. This chapter presents options for reshaping military forces to better match those tasks. The dramatic reduction in forces that occurred during the past decade makes determining the best size and shape of the forces that remain a paramount concern for the military.

In 1989, the Department of Defense had 2.2 million active-duty military personnel, 1.2 million selected reserve personnel organized into units, and 1.1 million civilians working for the military departments and defense agencies. After the collapse of the Soviet Union and the Warsaw Pact, DoD cut its active-duty personnel by 748,000, or roughly one-third. Moreover, between 1989 and 1999, the Army went from 18 active divisions to 10, the number of battle force ships in the Navy declined from 566 to 317, and the Air Force dropped from 37 tactical-fighter-wing equivalents to 20 (see Table 1).

The reserve components of the services also experienced reductions over that period. Their overall cut amounted to 26 percent between 1989 and 1999, compared with 34 percent for active-duty personnel. But among the individual reserve components, the percentage reductions varied greatly. The Army Reserve and Navy Reserve saw the largest cuts—36 percent and 41 percent, respectively. The Army National Guard was reduced by 22 percent between 1989 and 1999. The other reserve components were much less affected: reductions over 10 years were 6 percent for the Marine Corps Reserve, 9 percent for the Air Na-

tional Guard, and 13 percent for the Air Force Reserve. Those three reserve components are arguably the ones most highly valued by their service leaders and also the best equipped and most ready.

To some extent, each military department attempted to shape its post-Cold War force to the new security environment by making selective cuts to its combat forces. The Air Force, for example, reduced tactical fighter forces by more than 45 percent but made smaller reductions in its airlift forces. The Navy reduced attack submarines from 103 to 55, whereas surface combatants experienced a much lower percentage reduction. Even so, some critics argue that the remaining forces are still oriented toward fighting a major conflict from prepared positions and bases rather than being the mobile forces required for today's unstable world. As a result, many military analysts maintain that more radical changes in the way forces are organized for deployment and combat are necessary.

Conventional Conflict Against a Major Regional Power

The standard scenario that U.S. military planners adopt for shaping conventional forces today is a conflict with a major regional power. Although the standard examples of such a power are Iraq and North Korea, planners assume that major wars could erupt in other regions or against other powers that might require the United States to use force. The Clinton

Table 1.
U.S. Military Forces in Selected Fiscal Years, 1989-1999

	1989	1993	1995	1997	1999
Strategic Forces					
Land-Based ICBMs	1,000	787	585	580	550
Strategic Bombers	263	194	140	126	143
Submarine-Launched Ballistic Missiles	576	408	360	408	432
Conventional Forces					
Land Forces					
Army divisions ^a					
Active	18	14	12	10	10
Reserve	10	8	8	8	8
Marine Corps divisions ^b	4	4	4	4	4
Naval Forces					
Battle force ships	566	435	372	354	317
Aircraft carriers					
Active	15	13	11	11	11
Reserve	1	0	1	1	1
Navy carrier air wings					
Active	13	11	10	10	10
Reserve	2	2	1	1	1
Air Forces					
Tactical fighter wings					
Active	25	16	13	13	13
Reserve	12	11	8	7	7
Airlift aircraft					
Intertheater	401	382	374	345	331
Intratheater	492	380	428	430	425

SOURCE: Congressional Budget Office using data from Office of the Secretary of Defense, *Annual Report to the President and the Congress* (various years).

NOTE: ICBMs = intercontinental ballistic missiles.

a. Excludes separate brigades.

b. Includes one reserve Marine Corps division.

Administration's 1993 Bottom-Up Review and 1997 Quadrennial Defense Review (QDR) both assumed that U.S. conventional forces must be sized to meet (in concert with regional allies) such threats occurring "in two theaters in overlapping time frames."¹ The QDR

also assumed that some U.S. forces would be engaged in other missions, such as peacekeeping, and might need to extricate themselves from those missions and regroup before taking part in a regional conflict.

The QDR defined requirements for conventional forces as including 10 active Army divisions; three active Marine expeditionary forces (MEFs), each con-

1. Secretary of Defense William S. Cohen, *Report of the Quadrennial Defense Review* (May 1997), p. 31.

sisting of a division, an air wing, and support and command elements; 12 aircraft carrier battle groups and 12 amphibious ready groups; and at least 12 active Air Force fighter wings (or their equivalents). Requirements for reserve forces included about 40 Army brigades (some of which are organized into eight divisions), one reserve MEF, one of the 12 aircraft carriers, and eight wings of Air Force tactical fighters. Reserve forces are also highly represented in the Air Force's and Navy's strategic mobility forces (long-range transport aircraft and sealift ships).

The QDR cited various types of units whose numbers were not sufficient to support two overlapping major theater wars. Those units included long-range bombers, stealth tactical bombers (F-117s), electronic warfare aircraft, airborne warning and control aircraft, Joint Surveillance Target Attack Radar System aircraft, special-operations forces, and some amphibious assault forces. Planners assumed that those assets could shift from one theater to the other as the situation demanded.

Although the QDR conducted a more thorough review of force requirements than its predecessor, the Bottom-Up Review, it too received criticism. Some critics felt that the QDR's force cuts were far smaller than the current national security situation permitted. They argued that a different scenario—say, one major theater war and one smaller-scale contingency operation—would have allowed much larger reductions in military and civilian personnel. Other critics argued that the military had already been cut too far and that the QDR failed to analyze alternatives that would add to forces.

Some of the options that follow would provide more forces that may be limiting factors in regional conflicts or would add to forces that provide peacetime presence or are ready to respond to crises. Other options would reduce certain force elements—both active and reserve—that some critics of Administration policy believe are larger than needed to deal with future threats.

Option 2-01 Increase the Attack Submarine Force to 68

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	1,500	270
2002	2,920	960
2003	5,810	1,280
2004	4,450	2,140
2005	4,700	3,190
2001-2005	19,380	7,840
2001-2010	35,580	25,980

In the 1997 Quadrennial Defense Review, Secretary of Defense William Cohen called for reducing the Navy's force of attack submarines to 50. According to some Navy officials, the size of that force is being determined not by operational requirements but by budget constraints. Indeed, Navy officials say today's force of about 56 submarines is already overworked: the number of intelligence and surveillance missions, which are the principal job of submarines in peacetime, has doubled since the end of the Cold War, while the size of the force has fallen by 40 percent. As a result, the Navy's leadership argues, there are no longer enough submarines to perform all of the missions required of them. Moreover, according to Navy officials, submarines' intelligence missions generally cannot be performed by any other U.S. intelligence-gathering asset.

This option would increase the attack submarine force to 68 and maintain it at that size indefinitely. In a recently released study, the Joint Chiefs of Staff assert that the Navy needs a fleet of 68 submarines to fulfill the peacetime and wartime tasks that the unified commands have set for attack submarines.

To achieve the force reduction mandated by the QDR, the Navy has been deactivating submarines before the end of their useful service life, which is 30 to 33 years. The Navy plans to deactivate eight Los Angeles class submarines between 2001 and 2008. If instead it refueled those submarines and kept them until they reached 33 years of age, the Navy could retain a larger force.

Nevertheless, to reach a force of 68, the Navy would also need to build four submarines a year beginning in 2003 and continue at that pace beyond 2010. (That would give the Navy 68 attack submarines by 2016 or 2017.) By contrast, the Navy's budget request for 2000 envisioned building one submarine a year between 2001 and 2005 and two or three submarines a year between 2006 and 2010. (The 2001 budget plan would build four submarines between 2001 and 2005 and two a year between 2006 and 2010.) Building four submarines a year would compensate for the decommissioning of Los Angeles class submarines as they reached the end of their service lives. (Those submarines were funded during the 1970s and 1980s at rates of two to four a year.) In the very long run, to sustain a force of about 68 submarines, the Navy would need to build an average of two and one-quarter submarines a year.

Although this option would allow the Navy to meet its requirements, the costs would be high. Compared with the Navy's current plans, this option would buy an additional 17 Virginia class submarines between 2001 and 2010 at an added cost of \$32 billion in procurement spending. Refueling eight additional Los Angeles class submarines would cost about another \$2 billion, partially offset by savings of about \$400 million from not retiring those subs. Operating costs for the additional submarines of both classes would total another \$2.2 billion through 2010. Overall, the price tag for this option would come to \$1.5 billion in 2001 and nearly \$36 billion over 10 years.

Not everyone would agree that the Navy needs a fleet of 68 submarines. Besides the Quadrennial Defense Review, other DoD studies with different priorities and planning factors have concluded that a smaller force would be sufficient. The 1993 Bottom-Up Review stated that 45 to 55 submarines were enough to meet peacetime and wartime requirements, although it

qualified that finding by saying the smaller number might be too low for peacetime. However, the report did not specify how it determined those force levels. The QDR, which argued that the submarine force could shrink because of reduced requirements, also did not specify which requirements were being reduced.

Other analysts have argued that the attack submarine force could be even smaller than the level set by the Quadrennial Defense Review. For example, according to a study by the Cato Institute, the United States needs only 25 submarines because of reduced threats in the post-Cold War period. That study argued in favor of substantially curtailing the fleet's mission of overseas presence and not assigning attack submarines to support aircraft carrier battle groups.

Option 2-02 Buy More Amphibious Ships

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	0	0
2003	0	0
2004	0	0
2005	1,640	120
2001-2005	1,640	120
2001-2010	6,100	4,260

One of the Marine Corps's stated requirements is for enough transport capacity (or lift) in the Navy's amphibious warfare fleet to carry the assault echelons of three Marine expeditionary brigades (MEBs). According to the Corps, that amount of lift would allow Marines to perform forcible-entry operations in two widely separated theaters at the same time. Fiscal constraints have kept the Navy's amphibious fleet short of that goal, however. In their current plans, the Congress and DoD are providing funds for an amphib-

ious fleet of 36 ships—only enough to transport two and a half MEBs.

This option would make up the difference by buying seven additional ships. Current plans would buy eight LPD-17 amphibious transport docks from 2001 through 2004 at a rate of two per year. This option would continue purchases at the same rate for a few more years, buying seven additional LPD-17s after 2004. The option would cost a total of about \$6 billion over the next 10 years, virtually all of it coming from building the additional ships. Eventually, the costs to operate the seven extra ships would amount to about \$200 million per year in today's dollars, but almost all of those costs would not occur until after 2010.

According to the Marine Corps, the almost 14,000 troops of a Marine expeditionary brigade are the smallest force capable of conducting a forcible-entry operation. The 3-MEB capability could allow the Marines to conduct one such operation in, say, the South Pacific and another in the Mediterranean region at the same time. (Under normal conditions, that capability would be enough to transport MEBs for operations in only two regions because some of the amphibious fleet would be undergoing repairs.) Alternatively, those MEBs could compose the assault echelon of a Marine expeditionary force, which could conduct a large amphibious assault in a major theater war.

The Navy's plan for an amphibious fleet of 36 ships envisions having 12 large-deck amphibious assault ships of the LHA or LHD type, 12 dock landing ships (LSDs), and 12 amphibious transport docks (LPDs). The Navy is currently building the new LPD-17 class of amphibious transport dock. Once those ships are completed and delivered late in the next decade, the amphibious fleet will have a 2.5-MEB lift capability. (The current lift capability is less than 2 MEBs.) In addition, the Navy plans to replace its LHA amphibious assault ships, which are nearing the end of their useful service life, with a variant of the LHD starting in 2005.

Lift capability for Marine expeditionary brigades can be broken down into five components: the number of troops that can be carried, the number of spots for vehicles, the cargo capacity, the number of vertical

take-off and landing spots, and the number of landing-craft spots. The 36-ship amphibious force will have enough cargo capacity, vertical take-off and landing spots, and landing-craft spots to meet the 3-MEB requirement. The shortfall is in the numbers of troops and vehicle spots. Seven additional LPD-17s could carry enough troops and vehicles to fulfill the 3-MEB requirement.

The primary advantage of this option is that it would help the military adapt to changing conditions. In the post-Cold War era, the United States has conducted only one major theater war (the Gulf War) but several small-scale, low-intensity operations such as those in Haiti, Somalia, and Liberia. If that trend continues, the United States may be making much greater use of the Marine Corps. The Corps's mobile, amphibious force structure is particularly well suited for smaller, quick-response operations. In addition, the Navy's doctrine statement, *Forward . . . From the Sea*, argues that the United States is most likely to be involved in relatively small conflicts along the world's coastal regions—precisely the kind of expeditionary warfare that the Marine Corps emphasizes. Thus, being able to put a crisis-response force in two theaters at the same time could be very useful. Moreover, although the United States has not conducted a large amphibious assault since the Korean War, a 3-MEB lift capability would give it the ability to do so again if necessary.

Critics of this option might argue that the additional ships are unnecessary and that even the goal of a 2.5-MEB lift capability is too high. Since the end of the Korean War, most Marine Corps operations have been conducted by Marine expeditionary units (MEUs) of 2,800 troops or less. One MEU can be carried by three ships (usually an LHA or LHD, an LSD, and an LPD), so with 36 ships, the Navy would have enough amphibious lift to deploy 12 MEUs, or about 34,000 troops. Moreover, in peacetime, three MEUs are always kept deployed overseas. Thus, critics could argue, the current amphibious fleet is more than large enough for most operations that the Marine Corps is likely to conduct. And in a large war, the difference between transporting 2.5 or 3 MEBs would probably not matter—either force would eventually require substantial support from the Army and Air Force.

Option 2-03 Preposition Equipment for Bombers at Forward Bases

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	316	46
2002	249	165
2003	267	234
2004	334	265
2005	340	301
2001-2005	1,506	1,010
2001-2010	1,752	1,736

RELATED CBO PUBLICATIONS:

Options for Enhancing the Bomber Force (Study), July 1995.

Moving U.S. Forces: Options for Strategic Mobility (Study), February 1997.

The Air Force has spent a great deal of money to preposition equipment for its shorter-range combat aircraft on board ships and at storage sites around the world. But it has not done anything as extensive for its bomber force. According to official analyses such as DoD's *Heavy Bomber Force Study* and the 1999 *U.S. Air Force White Paper on Long Range Bombers*, in a regional war that occurred without warning, bombers could play a crucial role during the earliest phase—before the United States had deployed its ground and short-range air forces. Current plans call for bombers to operate from the United States during the early days or weeks of a war. But the very long transit times from the United States to many likely theaters would allow each bomber to make only about one sortie every three days.

This option would buy enough equipment to support 52 bombers and preposition it at two forward bases: Guam and Diego Garcia. (Those bombers would be 16 B-2s, 18 B-1Bs, and 18 B-52Hs.) Buying and prepositioning the equipment would cost a total of about \$1.7 billion through 2010, including \$17 million a year to maintain it.

The principal advantage of this option would be on the battlefield. With prepositioned equipment, bombers could take off from the United States, deliver their bombs in theaters in the Middle East or Asia, and then recover at one of the forward bases, where fresh crews would meet them. From those bases, the Congressional Budget Office estimates, bombers would be able to conduct roughly one sortie per day—increasing by 50 percent to 80 percent the number of weapons they could deliver in the theater during the critical first 15 days of a conflict.

Although this option would not be cheap, it would be at least 10 times less expensive than buying 20 additional B-2 bombers, as some analysts have proposed. It would also be more effective early in a conflict that began with very little warning—the type of conflict in which U.S. forces would be at the greatest disadvantage and bombers would be the most effective, according to DoD.

Several drawbacks weigh against those advantages. Prepositioning equipment would do nothing to increase the size of the bomber force, as some analysts have advocated. And although it would boost the capability of the force at a critical point in a conflict, it would not address other scenarios in which more bombers might be needed. Other options—such as increasing the types of weapons that bombers can carry, improving their avionics, keeping all 94 B-52Hs in the fleet, buying more B-2s, or buying more precision munitions—would provide improvements that would be useful in a wider range of scenarios, but in most cases at higher cost. Finally, some critics would contend that the money this option would require would be better spent improving the Air Force's ability to deploy its short-range aircraft to regional conflicts.

Option 2-04 Buy More JSTARS and Global Hawk UAVs

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	298	43
2002	600	204
2003	579	430
2004	215	530
2005	197	447
2001-2005	1,888	1,655
2001-2010	3,442	3,269

RELATED CBO PUBLICATION:

Options for Enhancing the Department of Defense's Unmanned Aerial Vehicle Programs (Paper), September 1998.

The Joint Surveillance Target Attack Radar System is a joint Army/Air Force reconnaissance system designed to detect mobile and stationary targets on the ground and transmit their location to ground commanders and combat aircraft. The Air Force originally planned to buy 19 aircraft equipped with JSTARS, but in the 1997 Quadrennial Defense Review, the Secretary of Defense called for cutting that number to 13. DoD officials said that number would provide enough radar coverage for one major theater war. If a second major war occurred at the same time, however, some of those aircraft would have to be redeployed, possibly opening gaps in coverage. In either case, the JSTARS aircraft operate at the forward edge of U.S. forces rather than far in front, limiting the risk to the 20 or more crew members who operate them. In such a position, JSTARS's radar coverage extends for only about 180 kilometers—far less than the range of many of the weapons that the services will operate under their deep-strike strategy for future warfare.

This option would restore five of the six JSTARS aircraft cut by the Quadrennial Defense Review, at a cost of \$298 million in 2001 and \$3.4 billion over 10 years. (The Congress has already appropriated money for one of those planes.) To provide deeper coverage of enemy ground forces, this option would also buy 11 extra Global Hawk unmanned aerial vehicles (UAVs), another platform the Air Force is developing for aerial reconnaissance. The high-altitude, long-endurance Global Hawk is expected to provide the same type of radar imagery as JSTARS, although it will be less capable in terms of coverage area and several other important aspects. Buying and operating those 11 UAV systems would cost a total of about \$430 million through 2010.

The radars on both JSTARS and Global Hawk incorporate a moving-target indicator and a synthetic aperture radar. The moving-target indicator detects and tracks formations of moving vehicles. Skilled analysts can often use that information to determine the size and type of the formations. Should the vehicles come to a stop and thus disappear from the moving-target indicator, the synthetic aperture radar can still be directed to provide a detailed image for commanders to rely on.

Such imagery is a valuable tool in achieving information superiority on the battlefield, as envisioned in DoD's official doctrine statement, *Joint Vision 2010*. In a major theater war, knowing what types of enemy forces are moving toward U.S. troops is crucial to attacking them with precision munitions or air power before they can engage U.S. ground forces. Similarly, in a peacekeeping operation, moving-target indicators can tell the commander whether opposing parties are moving large numbers of troops and equipment—perhaps in a way that would violate the peace.

This option would improve the U.S. military's capability for aerial reconnaissance. According to the Air Force, 19 JSTARS aircraft are enough to provide coverage for two major theater wars. In addition, the unmanned Global Hawks would be advantageous in situations in which U.S. air and ground commanders needed to collect intelligence with a moving-target indicator far beyond the forward line of U.S. troops. If

the UAV was shot down during such a mission, no lives would be put at risk.

Critics of this option could point out that JSTARS has an older airframe and has suffered from problems integrating its radar and command-and-control systems with that aircraft. Putting a cheaper system into a smaller, more modern aircraft such as a business jet might be more cost-effective. In addition, using Global Hawks in the way that this option envisions would pose some technical challenges associated with transmitting large amounts of data to ground stations for processing. That could add even more risk to a program that is already technologically complicated.

Option 2-05 Increase the Aircraft Carrier Fleet to 14

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	210	20
2003	840	100
2004	4,840	530
2005	0	1,050
2001-2005	5,890	1,700
2001-2010	23,440	17,070

RELATED CBO PUBLICATION:

Improving the Efficiency of Forward Presence by Aircraft Carriers (Paper), August 1996.

Today's Navy includes 12 aircraft carriers: 11 active-duty carriers plus one, manned partly by reserves, that is used for training. That size fleet—recommended in the 1993 Bottom-Up Review (BUR)—represented a fiscal compromise between 10 carriers, the number

needed to conduct two nearly simultaneous major theater wars, and 15, the number needed to keep at least one carrier deployed in three theaters (the western Pacific, the Indian Ocean, and the European area—usually the Mediterranean Sea) at all times. The Quadrennial Defense Review of 1997 reaffirmed the decision to limit the carrier fleet to 12. As a result of that limit, the Navy is able to keep an aircraft carrier deployed in the western Pacific year-round, but it experiences gaps totaling about two months a year in the other two areas.

This option would add two carriers and two air wings to the Navy's forces, closing almost all of the gaps in carrier presence. Specifically, it would buy a new carrier in 2004 and another in 2008, giving the Navy a force of 13 carriers in 2010 and 14 by 2015. It would also buy enough tactical aircraft to fill out the two new wings that would be created to deploy on those carriers.

The Navy considers providing a strong forward presence its principal peacetime mission. According to proponents, forward presence deters potential aggressors from threatening U.S. interests, reassures friends and allies about the United States' commitment to them, and allows the military to respond to a crisis faster than if ships had to sail from U.S. ports. An aircraft carrier and its battle group are particularly well suited to provide forward presence because they can respond quickly and perform a variety of missions, such as conducting air strikes against land-based targets, supporting U.S. troops that go ashore, reinforcing U.S. diplomacy, enforcing maritime sanctions or no-fly zones, or assisting in humanitarian crises. Thus, when gaps in carrier coverage occur, the United States risks responding to a crisis less quickly or with a less capable force.

Although the BUR said 15 aircraft carriers were needed to provide full-time presence in three regions, a fleet of 14 would probably suffice because the Navy is implementing an incremental maintenance plan. To keep carriers ready for use during crises, it is eliminating the complex overhaul period for each ship and spreading upkeep more evenly throughout the ship's operating cycle. By doing so, the Navy can squeeze a little more deployment time out of a carrier's service life.

Closing the gaps in carrier presence would be expensive. This option would cost a total of more than \$23 billion over the next 10 years—\$12 billion to purchase the two carriers and \$11 billion to purchase 107 additional aircraft for the first carrier. Buying 107 more aircraft for the second carrier would cost roughly \$12 billion, but those costs would not occur until after 2010. (The costs would be higher for the second air wing because of inflation.) This estimate also excludes nearly \$1 billion a year in operating costs from deploying the two additional aircraft carriers and their associated air wings, because those costs would not start until 2011.

This option would not buy the additional surface and support ships that accompany a carrier when it deploys. The Navy's notional carrier battle group comprises one carrier, six surface combatants, two attack submarines, and a combat logistics ship. To provide sufficient escort for the new carriers, the Navy would have to either reduce the number of ships that accompany its existing carriers or curtail the independent operations of surface ships and attack submarines.

Not everyone would agree that the Navy should spend more money on aircraft carriers. Critics might ask why the Navy needs full-time carrier presence in Europe and the Indian Ocean. Gaps in coverage there, they might argue, could readily be filled by groups of surface ships, which almost always include ships equipped with the powerful Aegis air-defense system and Tomahawk land-attack missiles. Furthermore, the gaps in carrier presence in the European and Indian Ocean theaters presumably do not usually overlap; thus, a carrier based in the Mediterranean could respond to a crisis in the Persian Gulf relatively quickly.

Proponents of a smaller international role for the U.S. military assert that the United States maintains too much forward presence around the world. They favor a foreign policy that does not deploy U.S. forces around the globe. They could argue that the United States had little reason to intervene in places such as Kosovo, Iraq, or Haiti—all of which involved using aircraft carriers. If the nation changed its foreign policy accordingly, the Navy would have less reason to deploy carriers overseas and could perhaps keep fewer carriers, not more (see the next option).

Other critics contend that the Navy should spend its money elsewhere. In future conflicts, they see aircraft carriers as potentially large, lucrative targets for opponents who may be armed with relatively inexpensive antiship cruise missiles or diesel electric submarines. Many of the weapon systems in a carrier battle group, such critics argue, are designed to protect a carrier rather than deliver ordnance at an enemy. Thus, it might make more sense for the Navy to invest in weapons that deliver relatively more punch for the money spent.

Option 2-06 Reduce the Number of Aircraft Carriers to Ten and Air Wings to Nine

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-4,460	-850
2002	-1,610	-1,930
2003	-1,940	-2,320
2004	-2,880	-2,360
2005	-1,740	-2,410
2001-2005	-12,630	-9,870
2001-2010	-24,370	-22,660

RELATED CBO PUBLICATION:

Improving the Efficiency of Forward Presence by Aircraft Carriers (Paper), August 1996.

The aircraft carrier is the centerpiece of the U.S. Navy. The Administration's defense plans call for a fleet of 12 carriers—11 active ships plus one, manned partly by reserves, that can also be used for training. Those ships require a total of 10 active and one reserve air wings. (The number of active air wings is one less than the number of active carriers because one of the Navy's carriers is usually undergoing a ma-

major overhaul.) They will also be accompanied by a mix of surface combat ships (usually cruisers and destroyers) and submarines to defend against aircraft, ships, and subs that threaten the carriers. The surface combatants and submarines can also attack targets on land.

Since the Cold War ended, some policymakers have argued that the United States does not need a force of 12 carriers. The total capability of U.S. tactical aircraft in the Navy and Air Force will substantially exceed that of any regional power that seems potentially hostile. Moreover, the capabilities of U.S. ships are unsurpassed worldwide.

This option would immediately retire one conventionally powered aircraft carrier and one nuclear-powered carrier. By the end of 2001, the Navy would have 10 carriers (nine active ships and one partial reserve carrier for training purposes). In addition, this option would eliminate two active air wings, leaving eight active and one reserve wings.

Compared with the Administration's planned forces, those cuts could save \$4.5 billion in 2001 and \$24 billion over the next 10 years. Of that amount, \$9 billion would result from not buying new carriers in 2001 and 2006, as now planned. The remaining savings would come from reduced operating costs associated with retiring two carriers and air wings. Those estimates include the cost of decommissioning the retiring ships—roughly \$100 million apiece. (Cutting carriers could also reduce the number of surface combatants, submarines, and aircraft the Navy would need to accompany them. Thus, the Navy might save more money on procurement and operations by not having to buy and operate as many other new ships and aircraft. Conversely, the Navy might need those ships to perform other missions, such as forward presence, once it had fewer carriers.)

Although reducing the force to 10 carriers might not impair the United States' ability to fight and win two regional wars (according to one analysis by the Department of Defense), having fewer ships would limit the Navy's ability to keep three carriers deployed overseas most of the time. That could substantially increase the strain put on the carrier force as long as policymakers continued to use aircraft carriers to respond to crises or to provide U.S. presence overseas as

extensively as they have in recent years. With fewer ships available, the time that those ships spent at sea could increase. The high-quality sailors the Navy needs would therefore spend more time away from their homes and families, perhaps making them less inclined to stay in the service.

The Navy might be able to maintain more overseas presence with fewer carriers by bringing new crews to the ships while they were at their foreign posts rather than waiting for them to return home. (The Navy does that with some minesweepers.) In addition, the Navy could use ships other than carriers (such as large flat-deck amphibious vessels or Aegis cruisers) to help maintain U.S. presence overseas.

Option 2-07 Use Marine Corps Squadrons to Fill Out Navy Air Wings

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-129	-103
2002	-265	-229
2003	-273	-259
2004	-280	-274
2005	-516	-320
2001-2005	-1,463	-1,186
2001-2010	-15,500	-11,522

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study),
January 1997.

The F/A-18 is the workhorse of both Navy and Marine Corps fighter fleets. It has operated from the decks of aircraft carriers and in Marine air wings since the early 1980s. The Navy has a requirement for 34 squadrons of F/A-18s for its carrier air wings. (Each squadron consists of 12 planes.) The Marine Corps

has 18 squadrons of F/A-18s to provide air support to Marine ground forces.

To decrease what some critics see as unnecessary redundancy between the Marine Corps and Navy forces, this option would cut six of the Navy's F/A-18 squadrons—the planes in two operational carrier air wings—and use six Marine Corps F/A-18 squadrons in their place. That change would result in operating savings of about \$300 million per year and a total of \$2.8 billion through 2010.

Investment savings would also result because the Navy could decrease its purchases of the F/A-18E/F by about 185 planes (taking into account the aircraft in the six eliminated squadrons, as well as the additional planes that the military would have needed to buy for maintenance and training purposes and to make up for expected attrition.) Assuming those planes were eliminated from the end of the F/A-18E/F procurement program, savings in procurement would amount to \$228 million in 2005 and \$12.7 billion over 10 years. Savings from fighter-procurement funds could be especially helpful to the Department of Defense since its planned spending on fighters may exceed the amount it will actually be able to devote to such purchases.

DoD may not need all of the F/A-18 squadrons in the Navy and Marine Corps for the type of conflict that is probable today. In the Cold War era, Navy, Air Force, and Marine Corps fighters would have been likely to operate in different areas during a major European war. Each of the Navy's operational carriers would have needed its full complement of aircraft to provide air support for itself and its accompanying ships. Those carriers might well have been assigned to missions that would take them away from the flanks of NATO, where Marine Corps ground operations were likely to have taken place. Air Force fighters would have been engaged in combat with fighters of the former Soviet Union over central Europe. Thus, the Marine Corps would have had to rely on its own squadrons for air support. But today, critics say, even major theater wars will probably be sufficiently confined that aircraft carriers and their air wings will be able to remain in the theater to provide air support. Air Force fighters might also be on hand to give air support to Marine forces.

When operating in the same area, however, those various fighters face a problem of space. Because Marine Corps F/A-18 squadrons cannot operate from the shorter decks of the amphibious ships that transport marines and their equipment, those squadrons must use aircraft carriers while at sea. But they cannot operate from carriers that have a full complement of Navy aircraft, because the number of planes associated with today's notional carrier wings approaches the number that can actually operate from a carrier deck. Thus, in wartime, either the Marine Corps's or the Navy's fighter squadrons—but not both—could operate from the carriers' decks. In the face of equipment shortages, the Navy is already using five Marine Corps squadrons to fill out its carrier wings.

This option assumes that Marine Corps squadrons are kept rather than Navy squadrons. Marine Corps officers argue that the emphasis on both air and ground operations in their training makes them better suited to provide support to Marine ground units than pilots in Navy squadrons are. Moreover, Marine Corps pilots already train for aircraft carrier operations.

This option would have some significant drawbacks, however. It would cut a part of DoD's tactical air force structure that may be among the most useful in the future. Tactical aircraft have made significant contributions in recent conflicts. Fighter and attack aircraft have also been heavily used in recent peacetime operations, so cutting their number could further strain personnel and equipment in the units that remained. But an option such as this one may represent a force cut that will take place anyway, if future Administrations and Congresses are unable to devote more funds to fighter purchases.

Option 2-08

Reduce Air Force Tactical Forces

Today's Air Force includes about 20 tactical air wings—13 on active duty and seven in the reserves. (An Air Force tactical air wing traditionally consists of 72 combat planes, plus another 28 for training and maintenance purposes.) Substantial disagreement exists about whether all of those air wings are necessary,

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-307	-245
2002	-632	-550
2003	-650	-623
2004	-669	-654
2005	-688	-678
2001-2005	-2,945	-2,750
2001-2010	-6,679	-6,438

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study),
January 1997.

since U.S. tactical aircraft enjoy overwhelming superiority compared with the forces of any regional power that appears potentially hostile to the United States.

This option would reduce the Air Force's tactical fighter forces to 18 air wings by the end of 2001. That pace of reductions might be feasible inasmuch as the Air Force has cut the size of its fleet quickly in the past: it eliminated six air wings between 1990 and 1992 and another six by the end of 1996. Reducing the number of Air Force wings from 20 to 18 would lower the service's operating costs by \$307 million in 2001 and \$6.7 billion through 2010.

Further savings might be possible if the Air Force accompanied the force reduction with a reorganization that increased the number of planes per squadron and eliminated more squadrons. That practice (known as "robusting") allocates resources more efficiently, since each squadron or wing has high fixed costs. Increasing all Air Force squadrons to 24 planes could add significantly to the savings from this option, though only if the Department of Defense restructured units and bases to reduce overhead costs.

A reduction to 18 Air Force wings might leave the United States with an acceptable number of capable fighters. Even in terms of simple numbers, U.S. fighter inventories exceed those of any potential re-

gional aggressor. Also, U.S. aircraft are more sophisticated than those of potential enemies.

However, retaining only 18 wings in the Air Force would not meet the military's current estimate of its requirements. Today's force planning assumes that the United States needs to be able to fight virtually simultaneous wars in two regions of the world—one in the Middle East and another, perhaps, in Asia. Winning two nearly simultaneous regional conflicts would require a minimum of 20 air wings, DoD has suggested.

Some analysts would also argue that additional cuts in Air Force wings ignore a major lesson from the Persian Gulf War: that aerial bombardment by tactical aircraft can be very effective and may greatly accelerate the end of a war, thus reducing loss of life among U.S. ground troops. The recent war in Kosovo was waged chiefly by U.S. and allied air forces, further emphasizing their key role in future conflicts. A sizable inventory of tactical aircraft—perhaps more than would be maintained under this option—might therefore be a wise investment.

Option 2-09 Eliminate Two Army National Guard Combat Divisions

The Army National Guard has eight combat divisions. In 1995, the Commission on Roles and Missions of the Armed Forces reported that several of those divisions were not needed to carry out the nation's military strategy of being able to fight two nearly simultaneous major theater wars. Overall, the commission said, the Army has more than 100,000 excess combat troops that are not required for that security strategy. The commission also argued that the Guard has too many combat divisions even given its other missions, such as providing forces for rotation during wartime and supporting civil authorities at the state level.

This option would eliminate two National Guard combat divisions: one armored division and one mechanized infantry division. Doing so would reduce the Army's excess combat forces by about 35,000. The Army is planning to convert about 48,000 Guard com-

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-247	-218
2002	-510	-473
2003	-527	-516
2004	-544	-536
2005	-561	-554
2001-2005	-2,389	-2,296
2001-2010	-5,460	-5,325

RELATED CBO PUBLICATIONS:

Making Peace While Staying Ready for War: The Challenges of U.S. Military Participation in Peace Operations (Paper), December 1999.

Structuring the Active and Reserve Army for the 21st Century (Study), December 1997.

bat troops into combat-support and combat-service-support troops (through the Army National Guard Division Redesign program), but that conversion would still leave the Army with more than 50,000 extra combat troops. This option would eliminate most of that excess. (Since the Army has identified a shortage of support forces, this option would retain all of the support personnel associated with the eliminated divisions.)

The primary advantage of this option is the savings it would generate. Cutting the two divisions would save the Army an average of about \$550 million a year in operating costs over 10 years—funds that could be used to modernize the rest of the Army's active-duty and reserve forces more quickly. Eliminating those divisions could also help the Army avoid some future costs, since the equipment in the two disbanded divisions would not need to be modernized.

This option would have several disadvantages, however. First, it would reduce the number of reserve forces available as reinforcements during wartime. But how risky such a reduction would be is unclear, because analysts disagree about whether Guard combat forces could be ready to fight in time to help in a

major theater war. Second, these cuts might reduce the Army's flexibility by leaving fewer reserve forces to use in peacetime missions. The Army has sent reserve combat troops to peace operations such as the long-running one in the Sinai Peninsula, and it plans to send more reservists to similar operations in the future. Third, this option would reduce the number of forces available for governors to call on to support missions in the states.

Military Participation in Operations Other Than War

The U.S. military's increasingly frequent involvement in operations other than war raises two key operational questions. First, are U.S. forces well structured to carry out those operations on a routine basis? And second, how does participating in such operations affect the ability of U.S. troops to carry out their primary mission of fighting and winning a conventional war? At first glance, deployments on the scale of those in Somalia, Bosnia, or Kosovo (involving 15,000 to 30,000 U.S. troops) would seem to pale in comparison with the half-million personnel the United States sent to the Gulf War or the similar numbers stationed in Vietnam for nearly 10 years. How can deployments that are so much smaller create significant stress on the military?

One part of the answer is that the forces needed for operations other than war are not necessarily the same types as those needed for major theater wars. Certain kinds of ground forces—combat-support and combat-service-support units such as transportation, civil affairs, and water purification—are critical to such operations. Those special units are in much heavier demand for such operations than other types of units are. To complicate the equation, those support functions are most commonly performed by reserve units, so the few active-duty units of that type are required to deploy extremely often.

Another part of the answer may be the degree to which resources can be readily mobilized. When a nation goes to war, its military mobilizes fully. Personnel alter their expectations, accept hardships, and

shelve training and education plans; at the same time, all of a military department's resources are devoted to meeting the threat to national security. But operations other than war are conducted under "peacetime" rules and processes. While the deployed units seek to accomplish their missions, the rest of the military establishment goes about its normal peacetime activities. Furthermore, the military expects to rotate personnel back home after six months or so. Conducting military operations under peacetime conditions takes a toll not only on a military department's forces but also on its budget, its supply and depot structure, and DoD's transportation system.

The options below are intended to ease some of the burden that operations other than war impose by adding to the force structure or converting existing units to the type of units most in demand for such operations.

Option 2-10 Increase Staffing Levels in Military Units

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	637	546
2002	1,812	1,609
2003	3,070	2,820
2004	3,781	3,593
2005	3,900	3,812
2001-2005	13,200	12,380
2001-2010	34,407	33,354

At any given time, some units in all of the services have fewer people available to work than their personnel requirements specify. Some of those shortfalls are deliberate; others may reflect the difficulties of managing a large workforce with people constantly shifting among assignments. Still others occur simply because

people are on leave, ill, or away for training or other temporary assignments. In recent years, the succession of small-scale operations other than war has added a new problem, especially in the Army and the Air Force: portions of units are sent overseas, often on short notice, drawing personnel from the rest of the unit and leaving it scrambling to perform its routine mission and to train effectively. In such cases, readiness can suffer, and the personnel left behind may have to work long hours.

This option would try to reduce the impact of personnel shortages on existing units by adding a total of 50,000 active-duty personnel to the military over the 2001-2003 period. Doing that would cost DoD an extra \$546 million in outlays in 2001 and \$33.4 billion over 10 years.

Although DoD's official position is that planned force levels are adequate, officials from each of the services have expressed desires for more personnel. The Secretary of the Army has called for an increase of 20,000 to 50,000 people for his service, and the retiring Marine Corps Commandant has said that his service could use another 5,000 troops. Air Force officials have been cited as saying they need 3,000 additional personnel. The Secretary of the Navy has said only that he would like to forgo that service's remaining planned personnel cuts (about 2,000). But in 1999, the Navy reported that even though it was within 3,000 of its total authorized personnel level, 15,000 authorized positions in the fleet were unfilled.

The added personnel in this option would be distributed as follows: 25,000 for the Army (an increase of about 5 percent); 10,000 each for the Navy and Air Force (increases of 3 percent); and 5,000 for the Marine Corps (an increase of 3 percent). The services would be left to decide how those additional personnel would be used. For example, they might be used to fill empty positions, provide an overstrength "cushion" for units to ease the strain of routine or unforeseen personnel shortages, or increase staffing in occupational specialties that have been in high demand for peacetime operations.

This option's \$33.4 billion price tag over 10 years reflects both the direct costs of the additional personnel and added costs for operations and support, including training at both the individual and unit lev-

els. In addition, the estimate assumes that DoD would double its spending on new reenlistment bonuses—at an annual cost of roughly \$165 million in 2006 and beyond (see option 4-02 in Chapter 4)—so the services could increase end strength without lowering standards or relying solely on new recruits. The added bonuses should help improve retention both overall and in occupations suffering from particularly severe shortages. (The option assumes that no new units would be formed, so it would have no direct effect on the quantity of weapons and other systems procured in the future.)

The strains caused by frequent deployments have been most evident in the Army and the Air Force. The Army deliberately understaffs many of its operational units, providing a full complement of personnel only to those scheduled to deploy first in the case of a major conflict. For small-scale deployments, however, the burden of providing troops may fall on the understaffed units. One example occurred in 1998, when the 1st Cavalry Division was ordered to send a brigade and its division headquarters to Bosnia. To fill out the deploying elements, it drew 581 personnel from the nondeploying portions of the division as well as 166 people from elsewhere in the Army. Even fully staffed units can be affected, however, as when an Air Force unit must send a large complement of security police and other support personnel to accompany a small portion of its combat force on an overseas deployment. In both the Army and the Air Force, training for the units left at home can suffer as experienced noncommissioned officers are sent with the deploying units.

Besides decreasing the readiness of military units, personnel shortages can affect service members' satisfaction with the military and thus, potentially, their decision whether to remain in the service. As noted above, when deployments involve parts of units, those left behind can face increased workloads, either because understaffing becomes more severe or because the routine work of the military installation is spread among a smaller number of personnel. A 1999 survey by the General Accounting Office found that the level of unit staffing and the frequency of deployments were important sources of dissatisfaction among a sample of personnel in occupational specialties with

critical retention problems. Although those findings may not apply to the military as a whole, they suggest that increased staffing could help solve some of the services' retention problems.

Critics of increased staffing could argue that, as a practical matter, the services would have difficulty expanding personnel strength at a time when some of them are reporting problems with recruiting and retention. Secretary of Defense William Cohen made that point to the Senate Armed Services Committee, stating: "While [Army] Secretary Caldera may think they need more forces, they can't fulfill their current requirements." Other opponents of expansion might argue that the strains caused by recent deployments simply reflect the need for the services—particularly the Army and the Air Force—to adapt to a new environment. The Air Force's new concept of the Expeditionary Aerospace Force, which gives each unit a predictable "window" during which it is subject to possible deployment, may be a solution to some of the problems that service has experienced and could be a useful model for the Army to follow.

Some critics of this option might say the real problem is that the services have tried to maintain more force structure than they can effectively staff within existing strength limits. By eliminating units, they could free up personnel for other assignments. That objection might apply best to the Army, which some analysts maintain could reduce its active-duty force structure and place greater reliance on reserve forces in the event of a major theater war. Other critics of this option might argue that instead of being used to fill out existing units, any additional personnel for the active Army should be assigned to new units dedicated to taking part in peace operations (see option 2-12).

Proponents of increased staffing in existing units could dispute some of the critics' claims. Problems in recruiting and retention, they might argue, have already been addressed by planned military pay raises and improved retirement benefits (see Chapter 4). In addition, the Expeditionary Aerospace Force concept will not solve the problem of overwork in nondeployed units, they might say, and would not affect the Army's deliberate understaffing of some units.

Option 2-11

Create Additional Support Forces in the Active Army

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	210	45
2002	310	155
2003	320	251
2004	330	298
2005	-177	85
2001-2005	993	834
2001-2010	19	107

RELATED CBO PUBLICATIONS:

Making Peace While Staying Ready for War: The Challenges of U.S. Military Participation in Peace Operations (Paper), December 1999.

Structuring the Active and Reserve Army for the 21st Century (Study), December 1997.

To fight two major theater wars that occurred nearly simultaneously, the Army would need more than 58,000 additional support forces, according to the service's *Total Army Analysis 2003*. The Army plans to alleviate that shortfall by converting about 48,000 National Guard combat troops into support troops.

This option would address the rest of the shortage by converting one active-duty armored division entirely into support units (thus eliminating the division from the Army's combat forces). That conversion would entail a one-time cost of about \$1.2 billion through 2004. Afterward, it would save about \$190 million a year, compared with the cost of the current Army, because the new support units would cost less to operate and maintain than the combat units they replaced.

This option would have several advantages. By creating more support units in the active component, it would enable a more rapid buildup of forces for an initial conflict. Also, because support units have been in high demand for peace operations, creating more of those units in the active force could reduce the deployment rate for current active-duty support troops. It could also reduce the need to activate support units in the reserves for such missions, which would save the Army more money.

Adding support forces to the active component could be inefficient, however, in that the Army would be paying for some full-time units that received little use on a day-to-day basis. Many support forces that exist solely in the reserves—such as civil affairs and prisoner-of-war units—are there because they were originally seen to be in low demand during peacetime. However, those types of units were called up for peace operations in Haiti and Bosnia. If the Army is going to conduct similar operations on a regular basis in the future, the units it will need should perhaps be in the active component.

The major disadvantage of this proposal is that it would reduce the number of active combat forces available for a second major theater war. The Army says it needs 5-1/3 combat divisions for each MTW. Just 4-1/3 active divisions would be available to fight in the second conflict under this option, so the Army would have to rely more heavily on combat units in the Guard. The service would still have enough combat troops in the Guard to provide the additional forces needed for a second conflict. But according to DoD estimates, entire Guard divisions could not be ready in time to participate in a nearly simultaneous second war. The Guard's enhanced readiness brigades would probably be ready in time, but substituting three separate Guard brigades for one division could present some operational problems.

Option 2-12

Add Forces to the Active Army for Peace Operations

DoD policy assumes that forces deployed to peace operations could switch quickly to fighting a major

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	643	556
2002	1,369	1,249
2003	2,141	2,006
2004	2,208	2,164
2005	2,277	2,247
2001-2005	8,639	8,221
2001-2010	21,066	20,535

RELATED CBO PUBLICATIONS:

Making Peace While Staying Ready for War: The Challenges of U.S. Military Participation in Peace Operations (Paper), December 1999.

Structuring the Active and Reserve Army for the 21st Century (Study), December 1997.

theater war if one broke out. But such a switch may take too long to be feasible. Army forces, particularly combat units, that participate in peace operations may need considerable time to repolish their combat skills through exercises, recondition their equipment, and acquire personnel before being ready to fight a conventional war. Moreover, analysis by the Army indicates that even in the absence of peace operations, the service would need all of its active-duty combat forces and all of its active and reserve support forces to fight two nearly simultaneous major theater wars.

This option would address those problems by creating four specialized brigades and three headquarters units dedicated to peace operations, thus increasing the active-duty Army by 20,000 soldiers. The four brigades could be deployed singly or in combination, depending on the requirements of the particular peace operation. In addition, each brigade would have some of the high-demand support units (such as civil affairs, military police, and transportation) needed for most peace operations.

A special force of 20,000 soldiers would probably be large enough to carry out most of the operations

that occurred in peacetime. The Army's rate of deployment since 1990, and recent attempts by the Office of the Secretary of Defense to project the forces needed to conduct small-scale operations other than war in the future, suggest that the Army will deploy an average of about 8,500 personnel to such operations at any given time. Nevertheless, peace operations requiring more than 20,000 personnel at once have occurred every two years or so for the past decade, and DoD projects that they will continue at a similar pace for the foreseeable future. Thus, in times of heavy activity, a peace operations force of 20,000 soldiers would have to be augmented by other troops.

This option would have two major advantages. First, it would improve the Army's ability to conduct peace operations. The specialized units would be fully staffed at all times (unlike many regular Army units, which are 10 percent to 20 percent below their authorized personnel levels when not deploying) and would train primarily for peace operations. As a result, those units would be ready to deploy to such operations on short notice. In addition, the high-demand support units in the new brigades would allow the Army to reduce its reliance on support troops in the reserves during peacetime. Thus, the Army could avoid the potential problems associated with calling up reservists frequently, such as having to secure Presidential authorization and disrupting reservists' civilian careers, possibly harming morale and recruitment. Moreover, the specialized headquarters that this option would create would give the Army a stable, consistent source of leadership skills and commanders for peace operations.

Another and perhaps more important advantage of this option is that it would increase the Army's capability and readiness for conventional war. Because the Army would have enough forces both to fight two major theater wars and to conduct most peace operations, forces would not be expected to extricate themselves from a peace operation to take part in a conventional war. Adding units dedicated to peace operations would also allow existing units to focus primarily on preparing for conventional war.

The greatest drawback of this option is that it would be expensive. Paying 20,000 additional active-duty personnel and operating the new headquarters

and brigades would cost about \$2.4 billion a year, on average, between 2003 and 2010. The new brigades could use tanks, armored personnel carriers, attack helicopters, and other equipment from retiring National Guard combat units, so the costs to equip them would be negligible. But recruiting the additional soldiers could pose a challenge and also increase costs. And although this option would allow the Army to avoid the expense of putting reservists on active duty, those savings would offset the costs of the option to only a very small extent.

Another disadvantage of this option is that the new forces, being designated for peace operations, could be subject to a high rate of deployment. Fre-

quent deployments could be hard on the morale of the soldiers in those units and their families. That problem might not turn out to be significant, however, since troops would presumably rotate in and out of those units and personnel-management practices could help keep deployment rates to a reasonable level.

A third disadvantage is that since the new units would be equipped and trained specifically for peace operations, they would not be thoroughly trained for combat. Some observers might argue that troops who are not fully trained for combat are less intimidating to potential aggressors, thus making them less effective at keeping the peace.

Modernizing Weapon Systems and Countering Emerging Threats

Among the most important decisions that officials of the Department of Defense make are those that relate to initiating, continuing, or canceling modernization programs. Such decisions will affect the capability and readiness of the military over many decades.

In setting policies and developing programs, DoD leaders must try to balance competing priorities. They must deal with the issues raised by an aging stock of equipment. They must address gaps in military capabilities that require the development and deployment of new systems to perform new missions. And they must manage the defense technology base so that future weapons designers will have a broad menu of new technologies and capabilities on which to draw. This chapter presents options that address those various issues. It also includes several options that would cancel or scale back existing modernization programs to pay for new initiatives.

Aging Equipment

DoD's acquisition managers substantially reduced purchases of equipment in the 1990s. They justified those reductions on two main grounds. First, the Soviet threat was gone, and Russia (with a few notable exceptions) was no longer turning out newer and better versions of weapons. Second, U.S. forces were being considerably reduced in numbers, so a surfeit of equipment existed from the buying programs of the 1980s. In fact, in the early 1990s, when forces were being cut most rapidly, so much older equipment was

retired that the average age of equipment held steady or even fell for some systems.

Today, by contrast, as a result of that hiatus in procurement, many kinds of military equipment exhibit a higher average age than they ever did in the past. Those aging trends will continue for a number of years for most systems, even those for which replacement systems are in production or development (see Table 2).

Service leaders have expressed concern about a number of problems caused by using older equipment—including increased maintenance costs, decreased availability of parts, the need to cannibalize one unit to keep another running, and various other difficulties in supporting and maintaining equipment. All of those problems result in lower mission-capable rates, decreased readiness, and increased workloads for maintenance personnel. In the worst case, a significant part of the equipment that supports DoD's force structure could be rendered inoperable if unanticipated problems arise related to aging.

To halt or slow trends in aging, DoD could reduce the number of its forces, spend more on procurement, or buy cheaper equipment in greater numbers. For missions that have no replacement system in or approaching production, DoD might also need to fund modifications to existing systems, extending their service life and making them easier to maintain. The department may also wish to improve its capability to monitor the stresses that its fleets of older weapons experience. And it may have to pay more to maintain older fleets.

If the services purchased fewer of their newest and most capable systems, they could buy larger numbers of the systems already in the inventory. Some of the options at the end of this chapter—in the section on ways to pay for new initiatives—would slow production and reduce purchases of next-generation systems. One of the options below would buy more of today's weapons.

Another way to deal with aging would be to extend service lives for certain systems and upgrade their capabilities at the same time. Costs for upgrades vary, but a rough rule of thumb is that services can

increase a planned service life by about half for two-thirds of the cost of the original system. The Air Force has used that approach to extend the life of its B-52 bombers and KC-135 tankers; the Army and Marine Corps have done the same thing to keep their helicopter fleets in the air.

Another response to problems of aging is to monitor more actively the strains that operations place on a system. The commercial aviation industry has used that approach successfully to target maintenance toward problem areas. An option below would apply that approach to Navy and Marine Corps helicopters.

Table 2.
Average Ages of Selected Equipment (In years)

Type of Equipment	Specific System(s)	Service	Past or Planned Service Life of System(s)	Average Age	
				In 1999	In 2007
Systems Without Replacement Plans					
Tanks	M1 Abrams	Army	30	12	20
Shore-Based Maritime Patrol Aircraft	P-3C	Navy	30-40	23	31
Support Aircraft	E-2, EA-6B, S-3B	Navy	20-36	18	24
Bombers	B-52, B-1, B-2	Air Force	50-70	23	30
Tankers	KC-135, KC-10	Air Force	50-66	39	47
Systems With Replacement Plans					
Light Attack and Scout Helicopters	OH-58 Kiowa, Comanche	Army	20-36	21	28
Surface Combatants	DDG-51, DD-21, CG-47, Others	Navy	30-40	12	15
Multirole Fighters, Close Air Support	F-14, F/A-18, AV-8B, Joint Strike Fighter	Navy	20-30	13	16
	F-16, A-10, Joint Strike Fighter	Air Force	20-30	12	19
Air Superiority Fighters	F-15A-D, F-22	Air Force	20-30	18	23

SOURCE: Congressional Budget Office based on data from the Department of Defense.

Option 3-01 Buy More Current-Generation Fighter Aircraft for the Air Force

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	582	84
2002	323	277
2003	297	339
2004	280	316
2005	286	295
2001-2005	1,769	1,311
2001-2010	2,666	2,584

The Air Force's fleet of tactical fighter aircraft is older, on average, than it has been for many years. Over the next 12 years that average age will rise to unprecedented levels, despite the planned purchase of two new planes: the F-22 and the Joint Strike Fighter (JSF). The programs to produce those fighters could prove both challenging and difficult to afford, so they might be delayed or extended (see options 3-19-A, 3-19-B, and 3-20 later in this chapter). Such delays would only exacerbate the aging of the fleet.

To counteract that trend somewhat, this option would buy new models of current-generation fighters (F-15s and F-16s) to replace older models. Those purchases would cost a total of \$582 million in 2001 and \$2.7 billion through 2010.

Buying modest numbers of F-15s and F-16s would allow the Air Force to keep both its production lines and its options open should anything go awry with the two new fighter programs. The Congress added funds to DoD's budget to purchase five F-15s in 2000. This option assumes that the Air Force continues buying F-15Es (since that plane has no new foreign sales to keep it in production) at a rate of six per year through 2003, when the F-22 is scheduled to complete operational testing. Those additional F-15s

would cost \$322 million in 2001 and \$941 million over the 2001-2003 period of the added purchases.

DoD also received funds to purchase about 10 F-16s in 2000, and it plans to buy 10 more in 2002 and 2003. Because of budget constraints, however, the department did not plan any F-16 purchases in 2001. This option would buy 10 F-16s in 2001 and continue purchasing them at that annual rate through 2008, when the Air Force would receive its first large deliveries of JSFs under the current schedule. Those additional F-16 purchases would add \$261 million in 2001 and \$1.7 billion over the 2001-2010 period, compared with the program set forth in fiscal year 2000. If the JSF program slipped beyond 2008 but its costs remained on schedule—a not uncommon pattern in design efforts, in which increased development costs can offset some or all of the savings from deferred purchases—adding another year's purchase of six F-16s in 2009 would cost \$312 million.

Option 3-02 Buy Additional Integrated Mechanical Diagnostics Systems for Navy and Marine Corps Helicopters

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	17	6
2002	7	5
2003	-1	2
2004	-2	-1
2005	-7	-4
2001-2005	14	8
2001-2010	-53	-37

As part of a plan to improve its ability to monitor the maintenance status of its rotary-wing fleet, the Navy is developing the Integrated Mechanical Diagnostics (IMD) system for newer Navy and Marine Corps heli-

copters. If properly used, systems such as IMD can increase flight safety and decrease maintenance turn-around times and spare parts usage; as a result, they can save both lives and money. The systems work by monitoring the vibrations that various helicopter subsystems give off to determine when those vibrations suggest maintenance problems. Maintenance personnel can access data about how reliably the subsystems are operating by using offboard computers—another feature of IMD.

The Navy plans to install IMD on a variety of newer helicopters. But because of budget constraints, it does not plan to install the system on the Marine Corps's fleet of medium assault CH-46 helicopters, which are scheduled to retire as newer aircraft are fielded. The plan for installing IMD on the Marine Corps's heavy lift CH-53 helicopters is also slower than it might be because of budget limitations, according to the Marine Corps. This option would purchase the IMD system for CH-46s, accelerate purchases for CH-53s, and fund miscellaneous shortfalls in the program. To pay for those actions, the Congress would need to add about \$17 million to the Navy's budget for 2001.

The Navy's Office of Safety and Survivability evaluated a commercial variant of IMD, which is already used in the helicopter fleets of the United Kingdom and Canada, as well as on helicopters that transport personnel and equipment to offshore mining rigs, and which may be available for off-the-shelf purchases. It adds an expanded flight data recorder (similar to the "black boxes" on airliners) to each helicopter and provides computer systems that let maintenance personnel quickly read the data that are recorded.

According to the Navy office, augmenting and accelerating purchases of such systems would save money in the long run by lowering maintenance costs. In the Congressional Budget Office's estimate, this option would cost a total of \$24 million in 2001 and 2002 but would begin saving money as early as 2003. As a result, over five years the option would have a total net cost of \$14 million, but over 10 years it would yield total net savings of \$53 million.

More important, the integrated diagnostics systems would save lives by alerting maintenance person-

nel to potential system failures before they happened. The Navy's Office of Safety and Survivability estimated that installing such systems would reduce peacetime crashes by one-fifth. A reduction in crashes would save lives because, since helicopters exhibit erratic flight patterns when they leave controlled flight, crews and passengers cannot eject safely and are less likely to survive a crash. Reducing crashes of the older aircraft considered in the option would not also save investment dollars, according to the Navy, because those planes would not be replaced. But the fleets of older Marine Corps helicopters might be less taxed by flight operations if they lost fewer aircraft to attrition.

If installing IMD proved to save both lives and costs, other services might decide to use some variant of the system in all of their rotary-wing aircraft, even those that were scheduled to remain in service for only a short period. Therefore, the Navy program might serve as a model for other services' modification efforts.

Strategic Forces and Missile Defenses

The end of the Cold War has fueled a vigorous debate about the proper role for nuclear weapons and ways to increase nuclear security more broadly. Tensions between Russia and the United States have eased greatly. Both sides have reduced their numbers of short- and long-range nuclear weapons through arms control agreements and unilateral actions. The two countries' conventional forces in Europe have also been cut significantly.

New Threats

Today's security environment is characterized not so much by superpower confrontation as by threats from regional powers and subnational groups. Although such threats were also present during the Cold War, their nature has changed. During the past decade, potentially hostile powers have greatly increased their programs to develop weapons of mass destruction

(chemical, biological, and nuclear) and the ballistic missiles to deliver such weapons.

For much of the 1990s, nuclear issues were on the back burner of the national debate on defense. After its conventional forces proved their dominance during the Gulf War, the United States turned its attention to maintaining enough of those forces to fight and win two nearly simultaneous major theater wars. Regional powers, however, took an entirely different lesson away from the Gulf War: U.S. conventional dominance means that a conventional fight is doomed to failure, but U.S. vulnerability to ballistic missiles and aversion to casualties create other opportunities. An opponent could keep U.S. forces at bay by using missiles tipped with nuclear, chemical, or biological weapons to threaten U.S. regional bases and ports, the populations of allied nations, or even the United States itself.

The ability as well as the motivation to acquire nuclear weapons increased during the 1990s. The nuclear ambitions of regional powers were freed from the constraints of their former Cold War protectors. In addition, the collapse of the Soviet Union and loosening of the old Soviet security apparatus boosted the risk that such powers could get hold of the necessary technologies, materials, and know-how to develop their arsenals. The accelerating pace of proliferation was brought home vividly in 1998 when India and Pakistan tested nuclear weapons, and North Korea, India, Pakistan, and Iran tested intermediate-range ballistic missiles.

Thus, despite the U.S. focus on conventional forces for much of the past decade, concerns about nuclear weapons and other weapons of mass destruction have reemerged as important factors in the debate about the future of U.S. forces. The success that the United States has in reducing those threats will affect how it can shape, size, and use its conventional forces in the future.

Possible U.S. Responses

In the wake of the geopolitical changes discussed above, the United States is reexamining its nuclear policies, including those relating to forces, nuclear weapons, missile defenses, nonproliferation, and U.S.-

Russian cooperation to reduce nuclear threats. Some experts advocate cutting U.S. nuclear forces significantly below the 3,500 warheads that the second Strategic Arms Reduction Treaty (START II) allows, arguing that the United States would still have more than enough to deter aggression. Others disagree. Citing the Russian parliament's refusal to ratify START II, they contend that the United States should not reduce its forces below current levels (some 8,000 warheads) until Russia does the same. Still others believe that the United States should trim its forces to START II levels now, both to encourage Russian ratification and to save money.

Experts also disagree about how the United States should conduct its programs to develop and maintain nuclear warheads. Should it follow the Administration's approach of continuing the moratorium on testing nuclear weapons by explosion and instead rely on an active program of laboratory testing, experimentation, and computer modeling to ensure the reliability of the nuclear stockpile? Or should the United States resume explosive testing to ensure that the stockpile remains in working order? Should it reestablish a robust production capability that would allow nuclear weapons to be replaced every 20 years (their nominal design life) or keep weapons for as long as possible by relying on the ability of the nuclear weapons laboratories to predict when they will wear out? If the latter, is the science-based approach being funded appropriately?

Some analysts' response to emerging threats is to push for defenses against ballistic missiles—both theater defenses (designed to protect troops deployed abroad from short- and intermediate-range missiles) and national missile defenses (designed to protect the United States itself from long-range missiles). The Administration has active programs to develop and deploy both types of systems, but some critics do not think those programs are moving quickly enough.

Although the end of the Cold War has increased the appetite for weapons of mass destruction in some quarters, it has also created new opportunities to control their spread. For example, the changed relationship between Russia and the United States has allowed collaborative efforts—unimaginable during the Cold War—to mitigate those threats. Some of those efforts, including ones by the current and previous Adminis-

trations, have helped Russia destroy missiles, bombers, and submarines that are being eliminated under arms control treaties; improve the physical security of its nuclear weapons and nuclear materials; keep its weapons scientists from selling their skills abroad; and improve its ability to deter nuclear smuggling.

The options below illustrate a variety of possible approaches for making the United States more secure from weapons of mass destruction.

Option 3-03-A Reduce U.S. Forces to START II Levels by 2007

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	0	0
2003	0	0
2004	0	0
2005	-20	-10
2001-2005	-20	-10
2001-2010	-920	-840

RELATED CBO PUBLICATION:

Letter to the Honorable Thomas A. Daschle regarding the estimated budgetary impacts of alternative levels of strategic forces, March 18, 1998.

The second Strategic Arms Reduction Treaty will require the United States to cut its long-range nuclear forces to 3,500 warheads by 2003—roughly one-third of the 1990 level. START II was ratified by the Senate in 1996, but it faces an uncertain future in Russia's parliament, the Duma. Presidents Clinton and Yeltsin agreed to delay full implementation of the treaty until December 31, 2007, in an effort to encourage ratification by the Duma. However, the forces to be disman-

ted by that date must be made inoperable by the end of 2003.

Today's forces remain largely consistent with the START I treaty—50 Minuteman III intercontinental ballistic missiles (ICBMs) with three warheads each; 50 Peacekeeper ICBMs with 10 warheads each; 18 Trident submarines (each carrying 192 warheads on 24 missiles); and 94 B-52H, 94 B-1B, and 21 B-2 bombers. The Administration would achieve the 3,500-warhead limit in START II by eliminating all 50 Peacekeepers, four Trident submarines, and 23 B-52H bombers by the end of 2007. It would also reduce the number of warheads on Minuteman III missiles from three to one and on Trident D5 missiles from eight to five and redesignate its B-1B bombers as conventional bombers. Although the Administration has decided to eliminate the four Trident submarines over the next five years to save money, it plans to keep all 50 Peacekeeper missiles and 94 B-52Hs in the force until the Duma ratifies START II.

This option would reduce U.S. forces to START II levels even if the Duma does not ratify the treaty. Those cuts would be made by the end of 2007, the treaty's modified implementation date. The primary motivation would be financial; those changes would save \$920 million through 2010 relative to the Administration's plans. All of the savings would come from not having to operate Peacekeeper missiles after 2007. (There would be no savings from retiring the 23 B-52Hs because the Administration does not operate them today.) Savings could be \$750 million higher through 2010 if the forces were retired by 2003, the original implementation date for START II. If the Duma never ratifies START II and the Air Force is required to keep Peacekeeper in the force beyond 2010—when it will run out of missiles for test flights—there would be significant costs associated with either reestablishing the Peacekeeper production line or developing a replacement missile. Compared with that possibility, this option might save several hundred million dollars through 2010.

Supporters of this approach argue that keeping long-range forces at today's levels is unnecessary. According to several reports, Russia will have trouble maintaining its forces at START I levels. Many of its missiles and submarines are nearing the end of their

service life, and production of replacements has slowed to a trickle or stopped altogether. For that reason, several prominent former opponents of START II in the Duma have recently urged ratification. Some advocates of this option also argue that adopting it will encourage the Duma to ratify the treaty.

Critics argue that U.S. forces should remain at START I levels. They oppose any unilateral disarmament. They also worry that Russia might build up its nuclear forces if a hard-line government came to power. In their view, the Duma will only ratify the treaty if it is faced with a robust U.S. START I force.

Option 3-03-B Reduce Nuclear Delivery Systems Within Overall Limits of START II

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-670	-240
2002	-420	-340
2003	-620	-440
2004	-690	-540
2005	-830	-710
2001-2005	-3,230	-2,270
2001-2010	-8,330	-7,880

RELATED CBO PUBLICATION:

Letter to the Honorable Thomas A. Daschle regarding the estimated budgetary impacts of alternative levels of strategic forces, March 18, 1998.

This option would go one step farther than the previous alternative (3-03-A). It would reduce the number of missiles and submarines below the levels planned by the Administration for START II but keep the number of warheads at START II levels. Specifically, it would retire four additional Trident submarines and 200 Minuteman III intercontinental ballistic missiles

by 2003, retaining 10 Tridents and 300 Minuteman IIIs. To keep the same number of warheads, the smaller Trident force would carry seven warheads on each missile instead of five (see option 3-04). Minuteman III missiles would carry one warhead. This option would keep the same number of nuclear bombers as option 3-03-A, each carrying an average of 16 warheads. In all, those forces would carry nearly 3,500 warheads—the limit set in START II.

Compared with keeping U.S. forces at START I levels, this option would save \$670 million in 2001 and \$8.3 billion through 2010. One-fifth of those savings—which were outlined in option 3-03-A—would come from reducing forces to the START II levels planned by the Administration and thus do not represent savings from the Administration's budget plan. However, this option would save an additional \$670 million in 2001 and \$7.4 billion through 2010 compared with the Administration's plan: \$3.1 billion from reduced operation and support costs (from retiring 200 Minuteman ICBMs and four additional Trident submarines) and \$4.3 billion from lower levels of investment spending (from canceling production of the D5 missile after buying 12 in 2000, extending the service life of fewer Minuteman missiles, and forgoing the Administration's plans to reconfigure four Trident submarines under START II so they can carry new D5 missiles).

During the Cold War, this option might have raised concerns about stability. By putting more nuclear "eggs" in fewer baskets, the United States would have increased its vulnerability to a surprise attack. But today those concerns are less acute. The United States may now decide that it can save money safely by deploying its warheads on fewer weapon systems. Moreover, this option would retain three types of nuclear systems—the so-called nuclear triad—and thus provide a margin of security against an adversary's developing a new technology that would render other legs of the triad more vulnerable to attack.

The disadvantages of this option include those raised in option 3-03-A about cutting forces below START I levels before Russia ratifies START II. In addition, carrying more warheads on D5 missiles would reduce the targeting flexibility of U.S. planners, and deploying fewer submarines might increase their vulnerability to Russian antisubmarine forces. Unilat-

erally cutting forces would also limit the United States' ability to increase the number of warheads it deployed if Russia decided not to abide by START II. Indeed, some critics argue that unilateral cuts would reduce U.S. leverage to get Russia to ratify START II. Supporters of this option, however, counter that U.S. cuts would encourage ratification because they would reduce the United States' potential to break out of START II—one of Russia's major concerns about the treaty.

Option 3-04 Terminate Production of D5 Missiles After 2000

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-670	-240
2002	-420	-340
2003	-620	-440
2004	-690	-540
2005	-920	-780
2001-2005	-3,320	-2,340
2001-2010	-4,870	-4,710

RELATED CBO PUBLICATION:

Rethinking the Trident Force (Study), July 1993.

Under both Strategic Arms Reduction Treaties, the Navy plans to deploy a force of 14 Trident submarines. Each one will carry 24 D5 missiles—the most accurate and powerful submarine-launched ballistic missile (SLBM) in the U.S. inventory. Today, the Navy has 10 Trident submarines armed with D5s and eight armed with older C4 missiles. To keep 14 submarines, it must convert four older subs to carry D5s as well. To arm that force, CBO estimates, the Navy will have to purchase a total of 425 D5 missiles, 372 of which it has already bought. If Russia ratifies

START II, the Administration will probably cut the number of warheads on each missile from eight to five (for a total of 1,680) to keep the number of U.S. warheads near the ceiling allowed by that treaty.

This option would terminate production of D5 missiles after 2000 and retire all eight C4 submarines by 2005. The Navy would then have 372 D5s—25 more than it says it needs to support a 10-submarine force. Like the Administration's plan for START II, this option would wait to retire the C4 submarines to encourage Russian compliance with START II and to give the United States flexibility to stay at higher START I levels if Russia does not comply. To retain 1,680 warheads, the option would increase the number of warheads on each D5 missile from five to seven.

Compared with the Administration's plan for START I and II, this option would save \$670 million in 2001 and \$4.9 billion through 2010. The savings would come from canceling missile production (\$2.6 billion), retiring all eight C4 submarines rather than upgrading four of them (\$1.1 billion), and operating fewer subs (\$1.2 billion).

Terminating production of the D5 would have several drawbacks. Loading more warheads on existing missiles would reduce their range by roughly 20 percent, limiting the areas in which submarines could operate. It would also reduce the flexibility of the force, since missiles with fewer warheads can cover more widely dispersed targets. Deploying D5 missiles with seven warheads would also constrain the United States' ability to expand its SLBM force by adding back the extra warheads if Russia violated or never ratified START II. In addition, reducing the fleet to 10 submarines could increase its vulnerability to attack by Russian antisubmarine forces.

Nevertheless, some people may consider the capability retained under this option sufficient to deter nuclear war. Although the missiles' range and the submarines' patrol areas would be smaller, they would still exceed the levels planned during the Cold War—when Russia had more antisubmarine forces and the United States intended to deploy the D5 with eight large warheads (W-88s). Moreover, less targeting flexibility might not reduce the nuclear deterrent: 1,680 warheads deployed on 336 missiles might not

deter an adversary any more than if they were on the 240 missiles called for in this option. Also, the smaller likelihood of nuclear war and Russia's atrophying nuclear forces may have weakened the rationale for the United States to be able to increase its forces rapidly by adding warheads to the D5. In fact, since the U.S. ability to do that is one of Russia's biggest concerns about START II, adopting this option could make passage of the treaty more likely.

Option 3-05 Reduce the Scope of DOE's Stockpile Stewardship Program

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-50	-40
2002	-120	-100
2003	-200	-170
2004	-280	-250
2005	-340	-310
2001-2005	-990	-870
2001-2010	-2,790	-2,650

RELATED CBO PUBLICATION:

Preserving the Nuclear Weapons Stockpile Under a Comprehensive Test Ban (Paper), May 1997.

The Department of Energy (DOE) has developed the Stockpile Stewardship Program to preserve the long-term reliability and safety of U.S. nuclear weapons without testing them by exploding them underground. To carry out the program, DOE plans to continue operating both of its weapons-design laboratories (Los Alamos and Lawrence Livermore) and its engineering lab (Sandia). It will also construct several new facilities to provide data on the reliability and safety of nuclear weapons as they age. In addition, DOE will conduct "zero-yield" subcritical tests at the Nevada Test

Site so it can keep enough skilled technicians there to be able to resume testing nuclear weapons by exploding them underground if the United States decides that doing so is in the national interest—a capability that the President has ordered DOE to retain.

DOE plans to spend an average of \$2.5 billion a year over the next 10 years on what has historically been known as weapons research, development, and testing. To some observers, a budget of that size today is excessive and unnecessary.

This option would reduce the scope of the stewardship program by consolidating the two design laboratories and halting all testing activities at the Nevada Test Site. However, it would preserve the other elements of the stewardship program, including the Dual-Axis Radiographic Hydrotest (DARHT) facility at Los Alamos and the National Ignition Facility (NIF) at Lawrence Livermore. Taken together, the changes in this option would reduce employment by about 2,000 people. They would also save \$50 million in 2001 and \$2.8 billion through 2010 compared with the program in the Administration's 2000 budget.

Those savings assume that weapons-design activities would be consolidated over five years at Los Alamos, which developed most of the weapons that are likely to remain in the stockpile. Lawrence Livermore's primary focus would become other scientific research. To ensure that the warheads it developed could be reliably maintained, some designers from Lawrence Livermore would be relocated to Los Alamos. However, a cadre of weapons scientists would remain at Livermore to act as an independent review team for Los Alamos's efforts. To provide them with challenging work, Livermore would keep large computational facilities for modeling the complex processes inside nuclear weapons and would build NIF as currently planned. (Alternatively, stewardship activities could be consolidated at Lawrence Livermore, but the savings would be lower.)

To some people, this option would cut the planned stewardship program too deeply. They believe that the program is the minimum effort necessary to maintain the nuclear stockpile without underground testing. In their view, scientists will need new facilities to obtain data on reliability that were formerly

provided directly by such testing. They also contend that consolidation would reduce competition and peer review, result in the loss of some facilities that could not easily be transferred, and eliminate Lawrence Livermore's central unifying mission (and thus its motivation for excellence). For those reasons, the President has directed DOE to retain both labs. Closing the Nevada Test Site would increase the time needed to resume underground testing if Russia started a new arms race or the United States discovered a serious problem with its stockpile that could only be corrected by testing. Closing the test site would also stop scientists from conducting subcritical experiments to learn more about how aging affects the plutonium components in nuclear weapons.

To other people, this option would not cut deeply enough. In their view, keeping part of a second lab and building DARHT and the \$1.2 billion NIF are unnecessary to support the nuclear stockpile. Furthermore, they claim, those facilities might allow DOE scientists to continue designing and testing weapons and circumvent the restrictions imposed by the Comprehensive Test Ban Treaty. Even if DOE has no such intentions, the perception of such a capability could make it difficult to convince countries such as India, which are critical of the United States' plans to preserve its nuclear weapons under a test ban, that the United States has really given up designing new weapons. Critics also argue that NIF should be funded outside the nuclear weapons program if it can help scientists understand how to harness fusion for civilian energy, as supporters claim.

Finally, some analysts are fundamentally opposed to a U.S. moratorium on testing (which will become permanent if the United States ratifies the test ban treaty). They contend that the only way to ensure the reliability of U.S. nuclear weapons is to explode those weapons underground. They also worry that by halting the development and testing of new types of weapons, the United States will lose the skilled people necessary to preserve the stockpile. This option does not address the test ban directly, but the cuts it would make to the laboratories would probably be resisted by test-ban opponents.

Option 3-06 Fully Fund the Administration's Proposed Plan for National Missile Defense

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	200	210
2002	700	320
2003	430	350
2004	270	360
2005	670	410
2001-2005	2,270	1,650
2001-2010	5,370	4,910

The Clinton Administration is developing a limited system for national missile defense but has yet to commit to deploying it. The Administration's approach assumes that development will continue through this year, at which time the President will review both the progress of the program and the potential threats and decide whether to continue development or to deploy the system within five years. In its 2000 budget request, the Administration included enough money between 2000 and 2005 to develop an initial system with 20 interceptor missiles. But that budget did not include enough development or procurement funding for the 100-interceptor system that the Administration now favors.

This option would fully fund deployment of the 100-interceptor defense that the Administration has included in its 2001 budget plan. (The option assumes that the decision to deploy that defense is made in the summer of 2000.) The interceptor missiles would be located at a single site in Alaska; a battle-management center and a new X-band radar would also be constructed there. In addition, five existing early-warning radars would be upgraded to provide early tracking

data. The resulting system, called Expanded Capability 1, would defend against many warheads that perhaps were accompanied by rudimentary countermeasures, according to DoD. (The department is also considering a Capability 2 system that it says would be able to handle a few warheads that were more challenging in the sophistication of their countermeasures.) The system would be functional—with 20 interceptors—by the end of 2005, according to Administration documents, and would be completely deployed by 2007.

Deploying the Expanded Capability 1 system in Alaska would cost a total of \$17 billion over the next 10 years, CBO estimates, or about \$5 billion more than the Administration included in its 2000 budget plan. About \$2 billion of that increase would come from buying additional interceptors and upgrading the radars; another \$2 billion from increased system integration; and the remaining \$1 billion from increased operations.

Supporters of quickly deploying a national missile defense argue that the threat of an attack on the United States by intercontinental ballistic missiles from developing countries is imminent, if it does not exist already. They cite North Korea's recent test of a Taepo Dong missile as evidence that hostile nations in the developing world will soon be able to target the United States. A commission established by the Congress to evaluate that threat (known as the Rumsfeld Commission after its chairman) also reported that the threat could emerge quickly and perhaps without warning. In the view of supporters, a national missile defense could also prevent such hostile countries from limiting the United States' freedom of action overseas simply by deploying a few long-range missiles. In that view, U.S. leaders might be reluctant to aid their allies if the U.S. population was vulnerable to a ballistic missile attack.

Other advocates of deploying a national missile defense would not support this option, however. Some believe that the United States should deploy more extensive defenses, either on the ground or in space. They worry about accidental launches of Russian missiles—particularly given the effect of economic collapse on that country's command-and-control system—and argue that the United States must do every-

thing it can to protect itself from such attacks. Still other supporters of a national missile defense believe the system should be based on ships.

Opponents of an immediate decision to build a national missile defense argue that the United States should wait until the threat warrants such an expensive investment. The longer the United States waits, they say, the better the technology will be. Some critics maintain that the hit-to-kill technology that DoD is pursuing is not technically feasible now because it is too vulnerable to simple countermeasures. They point out that none of the flight tests conducted so far have demonstrated the system's ability to counter realistic countermeasures. Nor would the system protect against shorter-range ballistic or cruise missiles that could be launched from ships off U.S. coasts. Other opponents believe that the United States' nuclear deterrent has been and will continue to be more effective at protecting the United States than any missile defense.

Some critics also contend that deploying a national missile defense would seriously harm other aspects of U.S. security. They worry most about Russia's reaction: such a defense would violate the Anti-Ballistic Missile (ABM) Treaty as it now stands, which many people in the United States and Russia consider the cornerstone of nuclear arms control. If the United States abandoned that treaty, Russia might refuse to reduce the size of its nuclear force. It might even increase that force to ensure that it could overcome the U.S. defense system. Moreover, the hard feelings that a missile defense might create in Russia could jeopardize ongoing cooperative efforts to address U.S. concerns about nuclear proliferation. Opponents of a national missile defense also fear that China would respond by sharply increasing the number of weapons it could use to strike the United States and increasing the day-to-day readiness of its forces to launch quickly. If the North Korean threat is driving the United States to deploy a national missile defense, one approach to that threat that might address Russian concerns and be more effective against countermeasures would be to deploy a boost-phase defense near Vladivostock, Russia (as Richard Garwin from the T.J. Watson Research Center and Ted Postol of the Massachusetts Institute of Technology have proposed).

The ABM treaty and Russia's possible reaction to a U.S. national missile defense are hotly debated even among supporters of quick deployment. Some argue that the treaty is a product of a bygone era and should be abandoned altogether. In their view, it is no longer in effect because one of the original signatories, the Soviet Union, no longer exists. Other supporters of a national missile defense, including the Administration, believe that the treaty is still in force but can be modified through negotiations to allow the planned system to be deployed without jeopardizing arms control efforts and nuclear stability.

Option 3-07 Fully Fund the THAAD and Navy Theater Wide Missile Defenses

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	0	0
2003	0	0
2004	0	0
2005	300	80
2001-2005	300	80
2001-2010	5,970	4,360

The United States is developing two defenses against longer-range theater ballistic missiles: the Army's land-based Theater High Altitude Area Defense (THAAD) and the Navy's ship-based Theater Wide system. The Administration's budget plan for fiscal year 2000 did not include enough money to deploy both of those as soon as possible. Instead, the Administration plans to have a competition between them over the next two years. The winner will be deployed in 2007 or 2008; the loser will continue development at a slower pace and be deployed sometime after 2010.

This option, by contrast, would fully fund both THAAD and the Navy Theater Wide system so they could be deployed beginning in 2008. Doing so would cost about \$6 billion over 10 years.

Those systems, known as upper-tier defenses, are designed to provide an upper layer of protection for broad areas within a theater of combat. They complement lower-tier defenses, such as the Patriot and Navy Area systems, which protect relatively small areas. (Theater defenses are distinct from national missile defenses in that only the latter can protect against missiles with intercontinental ranges.) The THAAD program is well established: the Army and the Ballistic Missile Defense Organization (BMDO) have been developing it for nine years. The Navy Theater Wide program is a relative newcomer. It would be deployed on Aegis cruisers and would consist of an upgraded Aegis radar and a number of Standard missiles carrying the lightweight exoatmospheric projectile (or LEAP) kill vehicle. To be fully effective, the system would also require that the United States deploy the 24 satellites that make up the low-orbit segment of the Space Based Infrared System.

Because the funding in the Administration's 2000 budget reflects the projected requirements for deploying THAAD, not the Navy program, this option would effectively accelerate the Navy upper-tier system. An initial version of that system—called Block 1—would be deployed by 2007, speeding up the program by at least three years. A more capable, Block 2 system would be deployed in 2010. Like the Administration's 2000 plan, this option would also fully fund THAAD for deployment in 2008.

The primary motivation for fully funding both programs is that a number of countries—including North Korea, Pakistan, Iran, and India—are developing and deploying ballistic missiles with ranges of more than 1,000 kilometers, which will begin to exceed the capability of lower-tier defenses. Both upper-tier systems have unique capabilities that would help protect U.S. forces and allies from such longer-range missiles. THAAD could protect forces on land, particularly those away from coastal regions. The Navy upper-tier system could protect areas near coasts and might provide the only upper-tier defense in a theater

of combat until THAAD could be set up. The Navy system is also uniquely suited to defend Japan from North Korea. A few Aegis ships off the coast of North Korea could protect all of Japan by intercepting missiles as they left the atmosphere during their ascent phase. For an extra layer of protection, ships off the Japanese coast could intercept any surviving warheads as they reentered the atmosphere near that country. In some cases, the Navy upper-tier system could also intercept missiles launched by Iran against Israel or Saudi Arabia, although the locations of the ships would not be ideal.

Accelerating the Navy upper-tier system has other potential advantages. In some situations the system could be very effective against missiles that carry many small warheads. Those so-called submunitions can easily overwhelm ground- and sea-based defenses located near the targeted areas because instead of having to intercept one warhead, the defenses must contend with dozens or even hundreds. If the Navy upper-tier system could intercept such missiles during their ascent phase, it could destroy them before they had a chance to deploy their submunitions. In addition, speeding up the Navy upper-tier system would provide a backup in case the THAAD system was unable to overcome its development problems quickly. Finally, according to BMDO, the Navy system has the potential in some scenarios (if it is upgraded to the Block 2 configuration by improving its kill vehicle) to defend far western parts of the United States, such as Alaska and Hawaii, from the Taepo Dong II missile that North Korea is developing. Accelerating the system would make it possible to deploy that advanced capability sooner.

Those advantages must be balanced against several disadvantages. First, although the Navy upper-tier system can protect large areas, it is more susceptible to countermeasures than THAAD, which can operate in the upper portions of the atmosphere as well as in space. Discriminating between actual warheads and objects designed to look like warheads (such as lightweight balloons) is more difficult outside the atmosphere. In addition, the kill vehicle on the Navy interceptor missiles will be relatively simple and less able to distinguish warheads than the larger exoatmospheric kill vehicle that is being developed for a national missile defense.

Second, some analysts are concerned that the Navy upper-tier system could violate the Anti-Ballistic Missile Treaty. Although the United States and Russia negotiated an agreement that would allow the United States to designate that system as a theater missile defense, neither side has ratified the agreement, and it is not clear that Russia's legislature will accept it. Other analysts contend that such concern is moot: the ABM treaty is no longer in force, they argue, because the Soviet Union no longer exists.

Third, using the Navy upper-tier system (in its Block 2 configuration) would not be the only option for intercepting North Korean missiles aimed at the United States. One alternative would be to use the Air Force's Airborne Laser—which could be available a few years earlier than the Block 2 system. Another alternative would be to deploy a ground-based defense near Vladivostok, Russia, that could intercept those missiles during their boost phase, when they would be easier to detect and kill and when countermeasures would be more difficult to overcome.

Option 3-08 Establish a Space-Based Capability to Search For and Track Adversaries' Spacecraft

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	5	2
2002	10	7
2003	59	35
2004	60	55
2005	69	63
2001-2005	203	162
2001-2010	590	552

The United States is the leading "spacefaring" nation of the world. The U.S. military has incorporated sat-

ellites into almost all levels of its operations: from providing early warning of long-range missile attacks to guiding bombs as they fall toward their targets. Although space has given the United States extraordinary capabilities, it has also made the country vulnerable if its satellites are attacked. Potential adversaries have noted the advantage that satellites gave the United States in the Gulf War, and they are proceeding with their own plans to utilize space. The United States cannot fully respond to such threats without accurate and timely knowledge of where other countries' spacecraft are located.

This option would build and operate a fleet of three satellites dedicated to searching for and tracking the satellites of potential adversaries in low-Earth orbit or higher. Doing that would cost DoD a total of \$590 million over 10 years. The sensors on the three new satellites would be based on the same technologies being used on the United States' only current space-surveillance satellite. Furthermore, the satellites would be relatively small, since they would be dedicated to one task. Thus, their launches could be conducted with only two space-launch vehicles; after the first satellite had been put into orbit for a brief testing period, the second and third could be launched on a single Delta II rocket. Once the fleet was in orbit, operating it would cost \$6 million a year. Each satellite would have a lifetime of seven years; funding for long-lead items for replacement satellites is included in the estimated costs of this option.

Although space may appear to be a borderless void, there are distinct regions above the Earth that accommodate some purposes better than others. Thus, simply knowing a satellite's altitude can give a good indication of its intended mission. Photoreconnaissance satellites are placed in low-Earth orbits to optimize their views; navigational satellites, such as the Global Positioning System, are in medium-Earth orbits a little farther out; and communication satellites are often even farther out in geostationary orbits, in a part of the region known as deep space. Other details of a satellite's orbit—such as the longitude over which it spends most of its time—might indicate the intentions and interests of its owner. For example, shortly before the end of the Persian Gulf War, Russia put an early-warning satellite into geostationary orbit roughly over the combat zone. That is not the nation's highest-priority position, which can be determined by

looking at how often it places a satellite there. (Russia eventually moved this satellite to its highest-priority position—over the Atlantic where it can watch U.S. missile fields.) Positioning the satellite near the Gulf War combat zone at that time possibly signaled Russia's interest in the region.

The United States uses a network of surveillance facilities to search for and track spacecraft orbiting the Earth. Those facilities include radars and optical telescopes based on the ground as well as the existing space-based telescope, which joined the surveillance network in 1998. The ground-based assets, however, face a number of limitations in when they can operate, the size of the objects they can see, and how far into space they can search. Radars can view low-altitude satellites (including most photoreconnaissance satellites), but they can detect only the largest satellites in geostationary orbits, because of the long distances—nearly 50,000 miles—that the radar beams must travel. Thus, the United States uses optical telescopes to search for and track such high-altitude satellites. But optical telescopes based on the ground are effective only at night and in clear weather.

The U.S. space-surveillance network tracks nearly 10,000 objects—orbital debris as well as satellites. The parameters that describe the orbits of those objects allow the Air Force to predict their future positions. But those parameters must be updated periodically with new observations because a host of factors—from atmospheric variations to human actions—can cause a satellite's orbit to change substantially. The Air Force updates the orbits of Russia's photoreconnaissance satellites every seven hours, on average. Satellites in higher orbits are tracked less often: every 24 hours, on average, in the case of Russia's early-warning satellite in geostationary orbit.

On some occasions, however, several days have gone by without the U.S. network tracking that satellite. Such gaps might pose a danger not only for U.S. space assets—if the Russian satellite had been a space mine, it could have maneuvered close to a U.S. satellite and exploded—but also for U.S. ground forces. In 1998, a Russian early-warning satellite in geostationary orbit reportedly observed the flashes from attacks on Baghdad by U.S. Tomahawk missiles. Observations of such flashes from munitions can be used to

increase battlefield awareness and directly assist combat troops.

Further, a global trend is taking place toward satellites that are smaller but still capable of making sophisticated observations. That trend poses at least two distinct dangers to the U.S. military. First, it "lowers the bar" for developing countries to orbit satellites, because less powerful rockets can be used. Second, small satellites—which some analysts worry could be smaller than a bowling ball—are much more difficult to detect in the vastness of space or to track once they have been found.

The fleet of three satellites that this option envisions would significantly improve the U.S. space-surveillance network by allowing virtually all potential enemy spacecraft to be tracked and their location updated at least every six hours—and all satellites in geostationary orbits at least every 15 hours. Moreover, that fleet is expected to be capable of detecting and tracking near-Earth satellites smaller than a bowling ball.

Critics of this option could point out that many potential U.S. adversaries are no match for the United States in terms of being able to orbit sophisticated military satellites. For example, North Korea has tried to develop a space-launch capability along with an intercontinental ballistic missile, but it failed in its first attempt to orbit a satellite. Thus, critics might argue, the United States can afford to wait until the threat is more pressing before adding to its space-surveillance network.

Other opponents might argue that this fleet of spacecraft would be too limited in its ability to track photoreconnaissance satellites. (Because of interference from sunlight reflected off the Earth's surface, the window for tracking such spy satellites might be limited to a half-dozen or so brief intervals each day, CBO estimates.) Those critics might feel that photoreconnaissance satellites are the only near-term space threat that the United States should be concerned about. In their view, a preferable option might be to add satellite-tracking sensors to the planned fleet of low-orbit satellites in the Space Based Infrared System (SBIRS), which is intended to detect and track warheads that are coasting through space. Giving that system the ability to track photoreconnaissance satel-

lites in low-Earth orbit could be less expensive than launching a new fleet.

Still other critics of this option would argue that the U.S. military should have a fleet of satellites dedicated to tracking spacecraft but that the positioning of the satellites in this option would not be optimal for detecting and tracking satellites in low-Earth orbit. They would call for adding a fourth new satellite that would be placed in an orbit varying from very close to the Earth to very far away. That satellite would spend most of its time far from the Earth and could search for reconnaissance satellites as they came around the Earth's edge.

Proponents of this option, by contrast, might argue that the spacecraft of potential adversaries already pose a significant threat: they could gather information on U.S. ground forces and even destroy U.S. satellites. In that view, the United States should not only prepare for emerging space powers like North Korea but also carefully watch Chinese and Russian satellites at all altitudes.

Proponents could also argue that launching three satellites dedicated to space surveillance would be better than trying to add another requirement to the low-orbit SBIRS satellites, which already have a difficult and complex task just finding and tracking missile warheads. An extra telescope, sensor, and associated computers would add a new level of complexity to the communications and control of SBIRS and might require redesigning the architecture of the whole system. Moreover, proponents would say, the improvements that a new space-surveillance fleet would make in searching out and tracking potential adversaries' higher-orbit satellites are important enough to justify a dedicated system. Further, they might argue, the system could adequately track known low-orbit satellites if its resources were allocated carefully.

Option 3-09

Increase Funding for Nuclear Nonproliferation Efforts in Russia

Since the collapse of the Soviet Union in 1991, the United States has been concerned about the security of

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	110	70
2002	110	100
2003	110	110
2004	120	110
2005	120	120
2001-2005	570	510
2001-2010	1,120	1,060

RELATED CBO PUBLICATION:

Cooperative Approaches to Halt Russian Nuclear Proliferation and Improve the Openness of Nuclear Disarmament (Memorandum), May 1999.

the nuclear materials and weapons in the former empire. Social upheaval in the former Soviet republics and the loosening of the Soviet-style security apparatus have left nuclear weapons, nuclear materials, and weapons-design expertise vulnerable to proliferation. This option would increase funding for programs aimed at reducing those threats.

Over the past seven years, the United States has instituted several programs to help Russia and the former Soviet republics prevent such proliferation. Those programs include the Department of Defense's Cooperative Threat Reduction program (also known as Nunn-Lugar), which is helping Russia secure its existing nuclear weapons as well as the fissile materials (including highly enriched uranium and plutonium) from weapons it is dismantling under the Strategic Arms Reduction Treaties; the Materials Protection, Control, and Accounting (MPC&A) program of the Department of Energy, which has helped the former Soviet states protect their far-flung stocks of weapons-usable nuclear materials; and other programs aimed at keeping weapons scientists in Russia and helping the former Soviet states halt nuclear smuggling. In all, the United States spends about \$700 million a year on those efforts.

This option would increase funding for nuclear nonproliferation programs by nearly 15 percent, or a total of \$1.1 billion over the next 10 years, compared with the Administration's 2000 budget request. Specifically, to reduce the chances that fissile materials could be stolen, this option would improve the security of those materials at 80 additional sites (at an average cost of \$10 million per site), install nuclear detection equipment at 15 high-priority border crossings, and help Russia establish an export-control system. (For more details of those initiatives, see Congressional Budget Office, *Cooperative Approaches to Halt Russian Nuclear Proliferation and Improve the Openness of Nuclear Disarmament*, CBO Memorandum, May 1999.)

In addition, this option would fund two new programs to give nuclear weapons scientists and other key nuclear workers less incentive to sell their skills abroad out of financial desperation. First, it would establish nonproliferation, arms control, and environmental research facilities at both of Russia's weapons-design laboratories and pay for 200 weapons scientists to do work there of interest to the United States and Russia. Those centers would be similar to the ones that the United States has set up at all three of its weapons labs. Second, this option would spend \$15 million a year to improve economic opportunities in Russia's "nuclear cities" (the formerly closed, isolated towns devoted to weapons research and production). That money could be used in a variety of ways, such as to establish business "incubators" in those cities to provide equipment and support to new businesses, offer business education to weapons scientists, and help identify and find capital for good business ideas.

Of the \$1.1 billion that this option would cost over the next decade, \$920 million would help Russia secure fissile materials, \$80 million would equip border crossings and establish export controls, \$30 million would fund research centers, and \$90 million would improve economic opportunities in the nuclear cities.

Several analysts have argued that the United States should step up its efforts to address the proliferation threat from Russia. Those efforts are critical, they say, because of continued economic troubles in

Russia, which mean that nuclear workers often go unpaid for months at a time; the rise in organized crime in that country; and the persistent efforts of some rogue nations and terrorist groups to develop weapons of mass destruction and the means to deliver them.

Critics of expanding U.S. efforts would argue that the United States is already doing enough to reduce the proliferation threat from Russia and that additional money would be better spent on other defense needs. Other critics might take issue with specific aspects of this option. For example, some argue that securing fissile materials through the MPC&A program should continue to be the United States' first priority. After all, they say, access to fissile materials, not weapons expertise, is the primary obstacle for a country bent on developing nuclear weapons—and the most effective way to stop fissile materials from leaving the former Soviet Union is to keep them securely locked up.

Other critics worry that trying to secure Russia's borders against nuclear smuggling may be too big a problem to solve. Under this option, 15 high-priority locations would have the ability to detect smuggling of nuclear materials and items that could be used to make nuclear weapons. But another 500 locations would not. Supporters acknowledge that borders cannot be made impervious, but they counter that effective export-control laws and increased surveillance at border posts would at least make nuclear smuggling more difficult.

Efforts to reemploy workers in the nuclear cities also face potential problems. Trying to create vibrant civilian economies in those cities could prove difficult, particularly during Russia's current economic crisis. Nonproliferation research centers, by contrast, would not depend on the health of the Russian economy for success, but employing 200 scientists at such centers would not address the estimated 20,000 other workers in Russia's nuclear weapons facilities who have important skills or access to fissile materials. Paying all of those workers to stay in the nuclear cities would cost significantly more—perhaps as much as \$240 million a year.

Other Emerging Threats and the Revolution in Military Affairs

As it formulates plans for research and development and sets priorities for modernization, DoD must be keenly aware of emerging threats and devise new ways to cope with them. DoD officials and other analysts have identified a number of those threats in analyses such as the Quadrennial Defense Review, the National Security Strategy, the Strategic Assessment, and the Report of the National Defense Panel. In addition to the one just discussed—the proliferation of nuclear, biological, and chemical weapons and the means to deliver them—two other major emerging threats are often cited:

- o Advanced weapons that could threaten the ability of U.S. forces to enter a theater (for example, enemy air-defense systems and weapons directed at choke points, such as straits, ports, and airports); and
- o Information warfare (disrupting the military's ability to communicate and transmit information as well as the abilities of civilian agencies and businesses).

To counter those threats, some of the options below would improve the military's reconnaissance systems. Another would add to the number of surface-launched cruise missiles that the United States could deploy in a theater.

In addition to those approaches, improving precision-guided munitions would add to the United States' ability to quickly identify, target, and destroy conventional weapons used to threaten deploying U.S. forces. Moreover, research and development programs could be directed toward establishing improved capabilities in such areas as detecting and disabling sea mines, repairing runways, and quickly reestablishing the ability (if it was lost) to deliver equipment and

supplies from ship to shore. An important related NATO initiative is to improve the alliance's ability to deploy forces out of its area and to support them once deployed. One of the options below examines the idea of creating a common NATO airlift fleet of C-17 aircraft.

Such initiatives are part of a broader effort by DoD to pursue technological advances that can fundamentally transform the way military operations are conducted—what many experts call the revolution in military affairs. Technological advances (such as cannons and gunpowder, steam-powered ships, and aircraft) have clearly played a key role in past military revolutions. And certainly, the past 20 or so years have seen advances in sensor and information technologies that also appear to have major implications for warfare.

Technological trends affecting the military are part of larger forces shaping society as a whole. Those trends include high-speed, distributed computational power; dramatic increases in communication capabilities; networked communications (ranging all the way from local office networks to the Internet); microminiaturization of machines; and advances in biological sciences, such as genetic engineering. All of those trends have potential military applications, and DoD's lead innovator, the Defense Advanced Research Project Agency, and its service counterparts are actively pursuing them.

Technological advancements also carry with them additional risks and complexities. Any new advance—such as a battlefield network linking all active forces with surveillance assets and commanders—becomes a target of attack for a sophisticated enemy. The increased complexity and interconnectedness of modern industrial society also present opportunities for attack, and if the enemy is less advanced, it is at less risk from a similar counterattack. Furthermore, change requires more than technological advances to be effective. It can require changes in organization, tactics, doctrine, and training.

Several of the options presented below relate to DoD's efforts to incorporate new technologies into its operations and equipment, including options that would purchase more unmanned air vehicles as recon-

naissance assets or launch dedicated satellites for space surveillance.

Option 3-10 Buy an Additional MILSTAR Communications Satellite

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	200	50
2002	490	190
2003	210	260
2004	50	220
2005	0	130
2001-2005	950	850
2001-2010	950	950

The Air Force's Military Strategic and Tactical Relay (MILSTAR) satellites provide protected communications during both strategic (intercontinental) and tactical (theater) conflicts. Two older satellites are already in orbit, though nearing the end of their service life. The Air Force had planned to put four redesigned MILSTAR satellites into orbit over the next several years; it says that number is necessary to maintain full global communications coverage. Those four satellites—referred to as flights 3 through 6—are collectively known as the MILSTAR II program. But when the flight 3 satellite was launched in April 1999, it failed to reach its intended orbit. The Air Force considers that satellite a loss. Flight 4 is awaiting launch later this year, and flights 5 and 6 are expected to be launched in 2001 and 2002.

This option would aim to get four MILSTAR II satellites into orbit at the earliest feasible date. Thus, it would begin production of a flight 7 satellite immediately and launch it by 2004 using an expendable launch vehicle. Purchasing an additional MILSTAR satellite could cost about \$200 million in advance

funding in 2001 and almost \$1 billion over the next 10 years. That estimate assumes that the launch vehicle would cost about \$200 million.

The focus of the MILSTAR program has changed over the years. The first two satellites—flights 1 and 2—were designed to meet the national command authority’s requirements for low-data-rate (LDR) communications. Such communications use lower bandwidths that are less likely to be disrupted by nuclear explosions. Those two satellites were launched into orbit in 1994 and 1996. Since then, because the threat of nuclear war has declined greatly in the post-Cold War era, MILSTAR satellites have been redesigned to emphasize their usefulness for tactical forces. For example, later satellites are designed to provide not only LDR capability but also medium-data-rate (MDR) communications, which use higher bandwidths that allow faster processing of information. (MILSTAR can also overcome jamming that would overwhelm other, less robust communication systems.) The average service life of those satellites is about seven years. To replace them, the Air Force is developing advanced extremely high frequency (EHF) satellites, which it plans to begin launching around 2006.

Proponents would argue that buying an additional MILSTAR II satellite now is essential, for three reasons. First, the Air Force says four of those satellites are necessary to ensure 24-hour MDR communications capability over trouble spots around the globe. Consequently, the loss of the flight 3 satellite means at least a 25 percent degradation in that capability by 2006. According to the Air Force, current satellites lack excess capacity, and the enhanced EHF program cannot be accelerated enough to close the gap in coverage significantly, so that gap would persist for at least five years. Second, the Army has already made substantial investments in ground terminals for MILSTAR MDR communications and has eliminated many of its older LDR terminals in anticipation of the switch. Third, the last two MILSTAR satellites are expected to finish production by the end of this year. By purchasing another satellite now, the Air Force could avoid the significant cost increases that would result from shutting down production temporarily.

Opponents of this option would argue that closing the anticipated gap in coverage is not critical

enough to warrant spending \$1 billion on another MILSTAR satellite. Rather, they would argue, devoting that money to the next-generation EHF satellite would make more sense given the limited resources that the Department of Defense is likely to face in the next decade. In the meantime, opponents might say, the Air Force could fill the gap in strategic communications for several years with its two earlier LDR satellites and could rely on the Navy’s existing UFO satellites to fill some of the gap in tactical communications.

Option 3-11 Increase Funding for Tactical UAVs

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	121	30
2002	83	74
2003	74	88
2004	52	76
2005	52	62
2001-2005	381	330
2001-2010	808	745

RELATED CBO PUBLICATION:

Options for Enhancing the Department of Defense's Unmanned Aerial Vehicle Programs (Paper), September 1998.

The Department of Defense maintains that one of its top priorities in the area of reconnaissance and surveillance is to give brigade commanders access to unmanned aerial vehicles. The Army, in particular, could use UAVs to support its brigade commanders as well as the commanders of its corps and divisions. After several, generally unsuccessful, programs to develop UAVs, the Army has selected the Shadow system to meet the requirements of brigade commanders. The Hunter, a more capable and highly reliable UAV,

could do so for division and corps commanders. The Navy, too, is examining several alternatives to replace its UAV systems. Its current systems are old, expensive to maintain, and hazardous to shipboard operations since they are powered by gasoline rather than less dangerous diesel fuel.

This option would provide 40 Shadow tactical UAV systems for the Army's brigades, 14 Hunter systems for the Army's divisions and corps, and 32 diesel-powered UAV systems with vertical take-off and landing (VTOL) capability for the Navy's aircraft carrier battle groups, amphibious ready groups, and surface combat ships. Both the Army and the Navy are planning to spend about \$670 million on UAV systems over the next five years, but this option would purchase more systems than they envision. Consequently, it would cost about \$120 million in 2001 and a total of about \$800 million over 10 years. (For an option relating to Air Force UAVs, see option 2-04 in Chapter 2.)

Unmanned aerial vehicles are a valuable asset to a commander because they can conduct reconnaissance and surveillance missions without risking the lives of an aircrew. UAVs could let brigade commanders view nearly instantaneous video footage of what lay just over the next hill. Higher-echelon commanders could use UAVs to send back imagery of enemy troop movements farther away. UAVs could perform other useful missions, such as locating and identifying particular targets, designating targets for attack by precision munitions, assessing the damage that targets have suffered after an attack, serving as communications relays, jamming an enemy's electronics and communications systems, and operating in environments too dangerous for humans, including areas contaminated by nuclear, chemical, or biological agents.

Although the Army and Navy have said they want to give their forces UAV capability, unmanned aerial vehicles do not appear to have had a high priority. After the Army terminated the Hunter program in 1996, it placed seven Hunter systems (with eight air vehicles apiece) in storage. It has since used most of two of those systems for training, and their performance has been considered outstanding. Nevertheless,

the Army appears unwilling to use those systems to give its corps and division commanders UAV capability (although it did use Hunter systems during operations in Kosovo). By reorganizing its existing Hunter assets and buying a little more equipment, the Army could equip 10 divisions with Hunter systems of four air vehicles each and four corps with systems of six air vehicles each.

For their part, the Navy and Marine Corps have been operating Pioneer UAVs since the 1980s and are looking for a replacement. They are testing several UAVs with VTOL capability to fulfill their requirements, but the Navy does not plan to commit funds to buy a new system until at least 2003. This option would acquire greater UAV capability than the Navy now plans.

The option would have several disadvantages, however. The first is the uncertain state of some UAV technology. The Army recently revised its requirements for tactical UAVs. During the fall of 1999, it held a flight competition of several UAV systems to determine which one could meet its revised requirements. The Shadow 200, built by the AAI Corporation, won that competition. But whether the Army will require more development of that system is not yet clear.

A second disadvantage is that using Hunter UAVs to provide reconnaissance for Army divisions and corps could impose a burden on those units. Hunters typically require a large amount of equipment and personnel to operate them. The Army expects that new UAV systems will be easier to support. However, reducing the size of Hunter systems may be possible with some modest changes and upgrades.

Third, the Army ultimately wants to use the same type of UAV to provide reconnaissance and surveillance at the brigade, division, and corps levels. Using Hunter and Shadow would mean having two different types of UAVs for those missions. But fielding a system to provide reconnaissance to divisions and corps might take the Army at least five years. The service could deploy Hunters within several months at a relatively low cost as an interim measure.

Option 3-12 Convert the Four Oldest Trident Submarines to Carry Conventional Land-Attack Missiles

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	0	0
2003	850	380
2004	860	620
2005	110	410
2001-2005	1,820	1,410
2001-2010	3,290	3,090

RELATED CBO PUBLICATION:

Rethinking the Trident Force (Study), July 1993.

The Navy currently deploys 18 Trident strategic submarines, which carry nuclear-armed ballistic missiles. Ten of those submarines have D5 missiles, and the other eight are fitted with older C4 missiles, which are less accurate and have a shorter range than D5s. The Navy plans to upgrade four of the C4 submarines over the next seven years so they can carry D5 missiles. It plans to retire the other four submarines (the *Ohio*, *Michigan*, *Florida*, and *Georgia*), which are the oldest Tridents. However, once they were refueled, those submarines would still have 22 to 25 years of useful life. Consequently, some defense analysts, Members of Congress, and Navy officials have proposed converting those submarines from carrying nuclear-armed ballistic missiles to carrying conventional land-attack missiles and special-operations forces.

This option would convert the four oldest Trident submarines to a conventional land-attack configuration rather than retire them. It would alter 22 of the 24 missile tubes on a Trident to carry seven conventional missiles each, for a total of 154 missiles per

submarine. That would give each Trident about the same land-attack capability as all of the escort ships in an aircraft carrier battle group. The conventional missiles loaded on Tridents could be Tomahawk cruise missiles or a naval version of the Army Tactical Missile System (a short-range ballistic missile that can attack enemy infrastructure, armor, communication facilities, and command centers). Or, because the Navy will begin producing its advanced land-attack missile, the Tactical Tomahawk, in 2001 and the first two submarines would not be finished with their conversion until 2005, the submarines could be armed with those missiles. The Navy plans to buy 1,350 Tactical Tomahawks for various purposes. This option would purchase another 850 to arm the submarines and to provide extra missiles for use in maintenance.

In addition to those changes, the four Tridents would receive a full suite of communications equipment as well as tactical-surveillance and intelligence-collection equipment to conduct reconnaissance missions before and during hostilities. Further, the space freed up by the two unused missile tubes would be converted to carry and house special-operations forces.

Taken together, those changes would cost a total of about \$3.3 billion over 10 years compared with the Administration's 2000 budget request (which assumes that the Navy will retire the four oldest Trident submarines). Of that total, \$2.5 billion would go to refueling the submarines' nuclear reactors, converting them to carry Tomahawk missiles, and purchasing the missiles. The remaining \$0.8 billion would represent increased operating costs for the submarines.

By changing four submarines into conventional missile carriers, the Navy could make effective use of a valuable asset that would be well suited to support its doctrine of littoral warfare, as expressed in the white paper *Forward . . . From the Sea*. Some analysts fear that surface combat ships are becoming increasingly vulnerable to attack by antiship missiles in coastal waters. Trident submarines, by contrast, are very difficult to detect and therefore harder to attack. They could provide a powerful capability in areas of potential conflict without revealing their presence. Potential adversaries would know that retaliation for aggression could occur at any time and would be very

difficult to prevent or preempt. That knowledge alone could prove an effective deterrent.

In addition, by deploying more Tomahawk missiles on converted Tridents, the Navy would free other ships to perform missions other than land attack. For example, in the future the Navy may need to dedicate a force of Aegis ships for missile defense (see option 3-07). Consequently, those ships may not be available to launch Tomahawks. The Navy is planning to buy 28 surface ships over the next decade, each carrying dozens, if not hundreds, of land-attack missiles. Rather than buy all of those additional surface ships, the Navy could use the converted Tridents to perform land-attack missions that might otherwise have been done by some of those ships.

This option could have several drawbacks, however. For example, according to naval authority Norman Polmar, Trident submarines could be highly vulnerable to detection when preparing for and executing a land-attack mission. Land attack usually requires a great deal of communication and data transmission between ships and authorities on shore. That would be especially true if Tridents were carrying Tactical Tomahawk missiles, which were designed for quick reaction and in-flight retargeting. The high volume of communications traffic might enable an opponent to detect the submarine. The Trident could also be vulnerable to detection when it was launching its missiles.

Polmar also questions whether the Navy really needs additional capability to make stealthy strikes. He argues that such strikes were not particularly important during the Gulf War and in subsequent Tomahawk missile operations, and they may be no more valuable in the future. If that proves to be the case, the value of converting Trident submarines is less clear.

In addition, altering the Tridents would have implications for the size of the strategic weapons force. Under the terms of the Strategic Arms Reduction Treaties, ballistic missile submarines can only be converted to perform other missions using a specific method that eliminates their missile tubes. According to information provided by the Navy, converting the submarines to eliminate the missile tubes would add costs that could approach twice those estimated for

this option. If the Navy converted the Tridents using a less expensive method that essentially left the missile tubes intact—as this option assumes—the United States would have to count those tubes under the terms of START and allocate "phantom" warheads to them. (Russia might agree to allow a less expensive conversion procedure, but that appears unlikely.) With respect to the force level under START I, the additional phantom warheads would make no difference. But if Russia ratified START II—which the President has signed and the Senate approved—the United States would be allowed to deploy only about 1,350 warheads on the Trident force, about 330 less than the Navy is planning.

Option 3-13 Cut U.S. C-17 Costs and Create Common NATO Airlift

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	-1,893	-274
2003	-943	-890
2004	-80	-981
2005	-179	-637
2001-2005	-3,094	-2,783
2001-2010	-4,037	-3,983

RELATED CBO PUBLICATIONS:

Moving U.S. Forces: Options for Strategic Mobility
(Study), February 1997.

*Assessing Future Trends in the Defense Burdens of
Western Nations* (Paper), April 1993.

The C-17 Globemaster III is a four-engine transport aircraft that can carry at least 110,000 pounds of cargo for 3,200 nautical miles without aerial refueling. Because it is designed to land at small airfields with short runways, the C-17 could help meet transport

needs within a theater of combat as well as over long distances. The current plan for transporting U.S. forces to regional conflicts calls for a fleet of 120 C-17s. At the same time, seven of the United States' European allies in the North Atlantic Treaty Organization are planning to buy a total of 289 transport aircraft to carry reaction forces to crisis spots outside the territory of NATO members, in accordance with NATO's Strategic Concept.

This option would create a common NATO airlift fleet of 20 C-17s (similar to the common NATO AWACS fleet based in Germany, for which the United States pays 41.5 percent of operating and modernization costs). Twenty C-17s that the Air Force plans to buy in 2002 and 2003 would be transferred to NATO, which would reimburse the Air Force for them by the beginning of each year in order to comply with full-funding requirements. The average cost of those planes is about \$200 million apiece.

A common NATO airlift fleet would enable the allies to deploy forces to a crisis zone, while allowing the United States to draw on those assets for non-NATO missions under the Combined Joint Task Force (CJTF) concept approved in 1996. That concept allows NATO members—with consensus from the alliance—to use NATO assets for missions other than defense of a member state.

Assuming that the United States paid 41.5 percent of the cost of the NATO airlift fleet, this option would achieve net savings for the United States of \$3.1 billion over five years and \$4.0 billion over 10 years, including net savings of about \$200 million per year in operation and support costs once all 20 aircraft were delivered. It also would give the European allies faster access to strategic airlift than would otherwise be the case.

This option would face two main obstacles, however. The first is the European countries' desire to protect their defense industries by building their own strategic transport plane. The seven countries involved have committed to a joint program to develop the Future Large Aircraft (FLA), to be produced by the Airbus consortium. That plane would carry less cargo than the C-17 and be cheaper (at \$75 million apiece). Alternatively, the Europeans could consider

buying Airbus commercial aircraft, although such planes are more difficult to load and unload, cannot carry very large cargo, and cannot land on some shorter or unpaved runways. Enthusiasm for developing the FLA is waning, however. In an indication that they will consider alternatives, Britain, France, Spain, and Belgium have all solicited bids from U.S. firms for a total of 143 aircraft, and Britain intends to lease four C-17s or their equivalent.

The second obstacle involves the political ramifications of relying on NATO to provide part of the U.S. Air Force's lift capability. The CJTF concept, designed to let European coalitions act without U.S. involvement, is new and evolving. Conceivably, if a NATO member opposed a mission (such as France opposing military action against Iraq), it might be able to veto U.S. use of NATO assets. Some Members of Congress might find that saving money would not outweigh the risk of diminishing the U.S. ability to act unilaterally if necessary.

Ending or Slowing Some Acquisition Programs to Pay for New Initiatives

Finding the funds to support all of DoD's desired initiatives could be a problem. Part of the task of acquisition managers is to identify systems in development or production that no longer fit well with DoD's new strategic or operational concepts and to cancel those systems. A few options that would do so are included below.

Army systems are particularly subject to reexamination because the new Chief of Staff, General Eric Shinseki, has enunciated a concept of a new Army built around units with lighter equipment that would be more deployable to small-scale operations as well as to major theater wars. The heavy armored forces of the current Army are well suited to conventional land wars. But Army leaders now feel that those forces are simply too heavy and require too much support to be dispatched quickly around the world.

Option 3-14 Cancel the Army's Comanche Helicopter Program

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-42	-71
2002	-165	-183
2003	-178	-232
2004	-277	-296
2005	-247	-278
2001-2005	-909	-1,060
2001-2010	-6,270	-4,531

RELATED CBO PUBLICATION:

An Analysis of U.S. Army Helicopter Programs (Study),
December 1995.

Many of the Army's helicopters are beyond the end of their useful service life. Initially, the Army had planned to replace some of those older scout, attack, and utility helicopters with more than 5,000 new Comanche (RAH-66) helicopters. Comanche has had a troubled development program, however. The utility version of the helicopter was dropped in 1988 because the program had become too costly. In 1990, the size of the planned purchase was reduced from more than 2,000 aircraft to just under 1,300. Later, the Army delayed the projected start of Comanche production from 1996 to 2005.

Those changes have caused the procurement cost per helicopter to nearly double since the program began—from \$11.7 million (in 2000 dollars) in 1985 to \$21.5 million, based on current Army estimates. With that cost growth, Comanche is now more expensive than the Army's Apache (AH-64) attack helicopter, even though it was developed to be less costly to buy, operate, and maintain than other attack helicop-

ters. Moreover, the General Accounting Office (GAO) and the Department of Defense's Inspector General (IG) have stated that costs could grow by as much as another 30 percent. In addition, GAO recently reported that there are significant risks that Comanche will enter service later than expected and will not work as well as planned.

The primary advantage of Comanche over existing aircraft is its sophisticated stealth, avionics, and aeronautics technologies. However, some analysts would argue that the helicopter, which was conceived at the height of the Cold War, will no longer face threats of the same scale or sophistication as those for which it was designed. According to the DoD IG, the Army has not reexamined the mission requirements for Comanche in any depth since the end of the Cold War (although it will need to do so in the context of the Army Chief of Staff's new restructuring plan). Comanche is intended both to serve as a scout for Apache and to fill the scout and light attack role independently. But whether Comanche really does have a unique role to play in Army aviation is unclear. The Army is planning to use Apaches in both scout and attack roles for the next 15 to 20 years, as it did successfully during the Persian Gulf War. The Army also used armed scout helicopters, known as Kiowa Warriors, in the Persian Gulf both as scouts for Apache and as light attack aircraft. Moreover, the Army could use unmanned aerial vehicles for some scout functions. Secretary of Defense William Cohen testified that U.S. forces used UAVs as scouts in Kosovo effectively and without the risk of losing aircrews.

This option would cancel the Comanche program. The Army has already purchased enough Apaches to fill the attack role assigned to 13 of its 18 divisions, but it does need to replace the aging Cobras assigned to the attack aviation units of the remaining divisions. This alternative would buy 519 Kiowa Warriors by the end of 2010 to replace the Cobras still in service. Net savings would total about \$6.3 billion over the 2001-2010 period. Some of the savings could be used to fund a program to continue development of advanced helicopter technologies. Abandoning the Comanche program, however, would mean that the Army would have to rely on helicopters designed in the 1960s and 1970s for years to come.

Option 3-15 Cancel the Army's Crusader Artillery Program

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-201	-117
2002	-365	-245
2003	-280	-225
2004	-602	-352
2005	-569	-419
2001-2005	-2,016	-1,358
2001-2010	-6,687	-5,444

The Army plans to invest \$13.7 billion (in 2000 dollars) to develop and procure more than 1,100 Crusader artillery systems. It considers the Crusader—which includes a self-propelled howitzer and a resupply vehicle—to be technologically advanced and significantly more effective than the service's current artillery systems.

Supporters cite several reasons why Crusader is needed. The Paladin, the Army's most modern artillery system, is too slow to keep up with other combat vehicles when armored forces advance. Its range is shorter than that of several foreign systems available to potential adversaries. And Paladin's peak firing rate of four rounds per minute is significantly slower than the 10 to 12 rounds per minute that the Army says it needs. Crusader's current design includes an automated resupply system, which makes a higher firing rate possible and reduces the crew size to six from Paladin's nine. Crusader is also designed with more sophisticated automation and better crew protection.

Opponents, however, question whether a heavy system such as Crusader has a role in the lighter, more mobile force envisioned for the future Army. Some also question how much improvement Crusader will actually deliver. It may be only 9 kilometers per hour

faster than Paladin, and it has encountered technical difficulties. The original concept called for a gun using liquid propellant. The Army had to abandon that technology in 1996 because of technical and schedule problems. In addition, some Crusader subsystems embody technological innovations that have not yet been proved, and some have no backups in case of failure. For example, if the automatic munition reloader fails, Crusader will not be able to fire since it cannot be loaded manually. Those technical risks could prevent Crusader from meeting some of the Army's key requirements, in which case it might be no more effective than current systems. As part of the restructuring plan proposed by the Army Chief of Staff, the Army is now scaling back its requirements for Crusader to reduce the system's weight and is cutting the number of systems it will buy by more than 50 percent.

This option would cancel the Crusader program and provide funds to procure 550 German PzH 2000 self-propelled howitzers (with resupply vehicles), which the General Accounting Office has identified as a viable alternative to Crusader. The PzH 2000 fires eight to 10 rounds per minute, and its cross-country speed of 45 kilometers per hour is within the range required for Crusader. Purchasing that system could hedge against potential threats while freeing \$6.7 billion over 10 years for the Army to pursue other promising technologies. For fire support in fast-moving advances, the Army could rely on the PzH 2000 systems or on the multiple-launch rocket system, which it used successfully in that role during the Persian Gulf War.

Option 3-16 Cancel the Army's Tank Upgrade Program

The downsizing of the U.S. military and the unprecedented peacetime investment in modern weapons that occurred in the 1980s have sharply reduced the need for new weapons. In particular, the Army now has enough of the latest type of tank, the Abrams, to equip the forces it plans to field for the foreseeable future. As a result, the Army does not intend to buy new tanks for at least the next 15 years.

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-525	-85
2002	-366	-295
2003	-377	-379
2004	-323	-357
2005	-123	-307
2001-2005	-1,712	-1,422
2001-2010	-2,107	-2,064

RELATED CBO PUBLICATION:

Alternatives for the U.S. Tank Industrial Base (Paper),
February 1993.

Instead, the Army has proposed upgrading about 1,000 M1s (the first model of the Abrams) to a later configuration, designated the M1A2. The upgrade program, which began in 1991 and ends in 2003, has two major goals: to increase the capability of Army tanks and to keep the facilities that produce tanks in business pending the need for a new tank to replace the Abrams. (Most of those facilities are owned by the government and operated by private contractors.)

In late 1999, the Army Chief of Staff presented a new vision for a much lighter and more rapidly deployable Army. One of its goals is a force that can deploy a brigade in four days, a division in five days, and five divisions in 30 days. Another goal is a force that can deploy aboard C-130 transport aircraft. What role heavy, current-generation tanks have in such a force is unclear. Upgrading those tanks might not be the best use of scarce funds. Also, although the M1A2 is 20 percent more capable than the M1 (as measured by one scoring system developed for the Department of Defense), converting 1,000 M1s to M1A2s would increase the total capability of the Army's 7,880 Abrams tanks by only 3 percent. That slight increase in capability would come at a high price—a total of about \$3 billion over the next 10 years.

This option would cancel the Army's upgrade program but would keep some of the major components of the tank industrial base in a mothballed status. By preserving production facilities, the United States would retain the capability to make new or existing types of tanks in the future. Mothballing the government-owned facilities would require an initial investment. But after taking those costs into account, this option would save \$525 million in 2001 and a total of \$2.1 billion through 2010. Those funds could be used to develop new, lighter vehicles for the future Army.

Closing the tank production line would have some disadvantages, however. Without an upgrade program, the U.S. inventory would include fewer of the most capable M1A2 tanks. As regional powers acquired better tanks, the absence of M1A2s might erode the United States' advantage in a war, even though the M1A1 remains a highly capable tank. Perhaps the most important drawback of this option is that some companies that manufacture tank components might close and thus be unavailable to produce tanks in the event of a crisis. A related concern is the potential loss of workers whose skills are unique to tank manufacturing.

Option 3-17 Reduce Procurement of the Virginia Class New Attack Submarine

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	0	0
2003	0	0
2004	-400	-30
2005	-440	60
2001-2005	-840	30
2001-2010	-12,970	-5,270

As a result of the Quadrennial Defense Review, the Navy is reducing its force of attack submarines from 80 in 1996 to 50 by 2003. To meet that ambitious schedule, the Navy is decommissioning some of its Los Angeles class (SSN-688) submarines before they reach the end of their 30-year service life. (A recently released study prepared for the Chairman of the Joint Chiefs of Staff, however, calls for a force of 55 to 68 submarines. For a discussion of increasing the attack submarine force to 68, see option 2-01 in Chapter 2.) Even as it is discarding older subs, though, the Navy is building newer ones. It ordered three Seawolf class submarines in the late 1980s and 1990s and is procuring the Virginia class New Attack Submarine (NSSN) to be their lower-cost successor. The reason for the additions is that the Joint Chiefs of Staff believe that the Navy will need 10 to 12 very quiet submarines by 2012 to compete with Russia's newest subs, which have become quieter, making them harder to locate and track.

The Virginia class submarine is designed to be as quiet as the Seawolf but will be smaller and slower, carry fewer weapons, and not be able to dive as deep. Although the Seawolf was designed primarily to counter the more severe threat posed by Russian submarines in the open ocean, the Virginia is being developed to operate in coastal waters close to potential regional foes.

The Navy ordered the first Virginia class submarine in 1998. It plans to buy one Virginia per year from 2001 to 2005 and two or three subs per year thereafter. Under that plan, 15 Virginia class submarines would be authorized between 2001 and 2010.

This option would save money by keeping the Los Angeles class submarines in service until the end of their normal 30-year life and slowing procurement of the Virginia class. To help maintain the industrial base for building subs and to modernize the fleet, the option would produce one Virginia per year from 2001 to 2010. At that pace, 10 Virginia class subs would be authorized between 2001 and 2010.

Producing the Virginia at low annual rates would save a total of almost \$13 billion over the next 10 years. Most of those savings would occur after 2005, when the submarines would be produced at a lower

rate. (Had CBO reflected a higher force goal in this option, savings would be lower.)

During the Congressional debate on producing the third Seawolf, the Navy emphasized that although Russia's economic troubles mean it cannot operate its nuclear submarine fleet up to potential, it is still buying new, very quiet attack submarines at low rates. The Seawolf and the Virginia would both be quiet enough to meet the Joint Chiefs' goal of competing with those new Russian subs. Procuring a total of 10 Virginias in addition to the three Seawolfs would enable the Navy to field a force of 13 very quiet submarines by 2012, meeting the Joint Chiefs' requirement.

Option 3-18 Defer Purchases of the Marine Corps's V-22 Aircraft

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	0	0
2003	0	0
2004	-22	-3
2005	-637	-110
2001-2005	-658	-113
2001-2010	-3,270	-2,285

RELATED CBO PUBLICATION:
Moving the Marine Corps by Sea in the 1990s (Study),
October 1989.

The V-22 aircraft, which entered production in 1997, is designed to help the Marine Corps perform its amphibious assault mission (seizing a beachhead in hostile territory) and its subsequent operations ashore. The plane's tilt-rotor technology enables it to take off and land vertically like a helicopter and, by tilting its rotor assemblies into a horizontal position, to become

a propeller-driven airplane when in forward flight. As a result, the V-22 will be able to fly faster than conventional helicopters. The Marine Corps argues that the plane's increased speed and other design features will make it less vulnerable when flying over enemy terrain and will provide over-the-horizon amphibious assault capability.

Despite all of those advantages, the Bush Administration tried to cancel the V-22, largely because of its price tag. Each aircraft bought for the Marine Corps is expected to have a unit procurement cost of \$61 million, on average—considerably more than most conventional helicopters. Nevertheless, the Congress has continued to fund the V-22, and the Marine Corps plans to buy a total of 360 planes. (The Air Force may eventually buy 50 V-22s for its special-operations forces, and the Navy plans to buy 48 for combat search-and-rescue missions and for logistics support of its fleet.)

The Marine Corps expects to acquire several other planes at the same time. During many of the years that it is purchasing V-22s, it also plans to buy large numbers of Joint Strike Fighters to replace its short-range bomber, the AV-8B, and its F/A-18 fighter attack aircraft. JSFs are expected to be relatively inexpensive as tactical fighters go—perhaps 60 percent of the price of the Air Force's sophisticated F-22. But when bought in quantity and combined with the cost of the V-22, their purchase would bring peak annual spending on the V-22 and JSF to about \$5.5 billion—roughly five times the amount requested for Marine Corps combat aircraft in this year's budget. (Technically, the V-22 and JSF are bought with Navy procurement funds.) If the Marine Corps cannot increase funding for those aircraft, it may have to modernize either its fighter fleet, its airborne amphibious assault fleet, or both more slowly.

This option would halve the Marine Corps's annual procurement of V-22s during the 2005-2010 period, when both V-22s and JSFs would be bought. As a result, the service's average funding requirements during those years would decrease to about \$5 billion. That sum may be more manageable than the Marine Corps's current plan and would save almost \$3.3 billion over 10 years.

Deferring purchases of V-22s would have drawbacks, however. The current amphibious assault fleet is made up of CH-46 and CH-53 helicopters that are more than 30 years old, on average. The CH-46s would remain in the fleet until their average age approached 50 if the V-22s deferred under this option were bought beginning in 2013, when planned V-22 purchases decrease sharply. (If the Marines had to engage in an extensive modification effort to retain those helicopters longer, the savings from this option would be lower.) Also, the amphibious assault fleet provides more unique services than the Corps's fighter attack fleet. The Marines can probably count on the Navy's carrier-based F/A-18 aircraft to provide them with additional firepower, but they cannot get aerial amphibious assault assets anywhere else. Also, cutting V-22 purchases might decrease the Corps's ability to perform humanitarian missions and other peace-keeping activities, which have grown more common in recent years.

Option 3-19-A Reduce Purchases of the Air Force's F-22 Fighter

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	-320	-46
2003	-1,735	-378
2004	-1,842	-1,045
2005	-1,906	-1,541
2001-2005	-5,803	-3,010
2001-2010	-22,223	-16,242

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study),
January 1997.

The F-22 is being developed as the Air Force's next premier fighter aircraft and is scheduled to begin replacing the F-15 soon. But the plane has experienced repeated delays, reductions in quantity, and increases in price during its almost 20-year development. This option would decrease the planned purchase of F-22s by 219 planes. Assuming that the reduction was evenly distributed over the F-22's purchase period, it would save a total of \$22.2 billion through 2010, although the savings would not begin until 2002. (A related option, 3-19-B, would cancel production of the F-22 altogether.)

The Air Force originally planned to buy more than 800 F-22s. After a series of cuts, the latest plan will buy only 339 aircraft—enough for about three air wings. Even if the Air Force makes no further cuts to planned purchases, it will have to pay \$120 million apiece for the F-22. That price will purchase a number of improvements in capability over other fighters. Even so, the F-22's cost makes it the most expensive fighter ever built.

The F-22 is the only tactical fighter program to survive from the Cold War period. (The other two fighters that the Department of Defense is planning—the Joint Strike Fighter and the Navy's F/A-18E/F—entered development after 1990. They are likely to be both less capable and less expensive than the F-22, although they may face many of the same threats.) The F-22's sophistication and cost, plus concerns about whether the plane will actually realize promised improvements in capability, have led some people to suggest that the F-22 is a legacy of the Cold War—a plane designed to fight many sophisticated Soviet fighters rather than the modest regional fighter forces it is more likely to encounter today. Such critics recommend canceling the program, or at least cutting planned procurement further. In its report on its fiscal year 2000 defense appropriation bill, the defense subcommittee of the House Committee on Appropriations expressed concerns about the plane's cost and capability. The Senate concurred and the Congress directed DoD to complete testing of the F-22 before spending procurement funds on production.

The Air Force could reduce production quantities to a total of 120 F-22s, enough to let the service field one air wing of the sophisticated fighters. Such a "silver-bullet" purchase would allow the Air Force to

learn lessons about producing aircraft of the F-22's technological complexity but might still leave more than enough planes to perform the missions for which the service needs the F-22's degree of stealth and other performance advantages.

One possible disadvantage of this option is that it would make the Air Force's fighter fleets, which are already aging under current plans, even older. However, buying 219 F-15s to replace the cut in F-22s would remedy that problem. Although the F-15 is much less capable than the F-22, it is far more capable than the fighters of almost any of the United States' regional adversaries. A one-for-one offset of F-15s for F-22s would lower the 10-year savings from this option to \$10 billion.

Option 3-19-B Cancel Production of the Air Force's F-22 Fighter

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-3,069	-655
2002	-3,952	-2,080
2003	-5,037	-3,174
2004	-4,799	-3,969
2005	-4,799	-4,467
2001-2005	-21,657	-14,344
2001-2010	-43,091	-36,842

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study),
January 1997.

As the previous option discussed, although the Air Force has great hopes for its new F-22 fighter, the aircraft's development program has experienced numerous delays, reductions in quantity, and increases in price over almost 20 years. If the program does not

deliver as promised—or if leaders in the Congress and the Department of Defense decide that the plane's capabilities are too expensive to afford in today's budget environment—the F-22 could be canceled. Doing that without making any provisions for replacing the plane would save \$3.1 billion in 2001 and a total of \$43 billion over 10 years. If F-22 purchases were offset with F-15s, savings would drop to \$2.4 billion in 2001 and \$25 billion over 10 years.

Outright cancellation would save more money than a "silver-bullet" purchase of F-22s (as described in option 3-19-A). But it would have several disadvantages. Cancellation of the F-22 could affect development of the Joint Strike Fighter, since DoD expects the two planes to have common design elements. In addition, the U.S. military might need the F-22's stealthy design and other characteristics if other countries improved their fighter capabilities. Finally, if beginning another top-of-the-line fighter program to replace the F-22 proves necessary, some of the costs already incurred in developing the F-22 could be paid again in a new development program, adding to the government's overall costs.

Option 3-20

Slow the Schedule of the Joint Strike Fighter Program

One of the military's most ambitious aircraft development programs is the Joint Strike Fighter program. Variants of the JSF are intended to replace planes in the Air Force, Navy, and Marine Corps; they account for two-thirds of the fighter aircraft the military expects to buy through 2020. The Department of Defense intends to develop and begin purchasing the JSF by 2005—only nine years after the plane's first acquisition milestone. That interval is about 40 percent less than the time DoD has spent developing the F-22, the other new jet fighter it is developing from scratch. Many experts question whether DoD will actually be able to keep to such a tight schedule in a program that is supposed to produce three versions of the aircraft for three services.

Costs or Savings (-)
(Millions of dollars)

	Budget Authority	Outlays
--	------------------	---------

2001	-687	-407
2002	73	-183
2003	-284	-178
2004	-557	-398
2005	-1,604	-675
<hr/>		
2001-2005	-3,058	-1,841
2001-2010	-22,320	-16,051

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study),
January 1997.

This option would postpone fielding the JSF by two years to make the program's schedule more closely reflect recent experience with fighter development. That slowdown in development and production would decrease requirements for funding by \$3 billion over the next five years and \$22.3 billion through 2010.

The program office expects to need a total of about \$23.4 billion to develop the three variants of the Joint Strike Fighter: an inexpensive multirole fighter for the Air Force; a longer-range, stealthy, ground-attack plane for the Navy; and a short-takeoff/vertical-landing fighter for the Marine Corps. (That sum includes about \$1.3 billion invested by several foreign governments, including the United Kingdom's, that expect to purchase one or more of the variants.) The JSF program amalgamated three fighter programs that had been under way: the Air Force's multirole fighter, the Navy's A/FX, and the Marine Corps's ASTOVL program. Although the JSF variants will perform significantly different missions, they are expected to have much in common. DoD wants them to be more capable than current-generation aircraft but only slightly more expensive, if at all.

Satisfying the diverse needs of prospective users of the JSF could be challenging. Nevertheless, DoD plans to begin buying the planes just six years from now. The Joint Strike Fighter became a major defense acquisition program in May 1996; under the current schedule, the first formal review will take place in 2001, when the program is scheduled to enter the engineering and manufacturing stage of development (EMD). The JSF would then be produced in 2005, just four years after EMD began and nine years after it became a major acquisition program. The F-22 program, by contrast, has already been running for 14 years and may take a year or more to enter low-rate production (see options 3-19-A and 3-19-B). Some analysts might argue that the F-22's experience is not a good indicator for the JSF, since the F-22 was expected to represent a greater technological leap over its predecessor. But with the JSF's multiple missions and sponsors and the services' ambitious cost goals for the fighter, others might argue that the JSF program will be even more complex.

If the original JSF schedule is actually attainable, delaying it by two years would have several major drawbacks. Despite saving money in the near term, the delay could add to development costs. In addition, delay would exacerbate the aging problem of DoD's fighter fleets. Even under current plans for the JSF, when large-scale deliveries begin toward the end of the decade, fighters in the Navy and Marine Corps fleets will be an average of almost 15 years old. The Air Force fighter fleet will average almost 20 years of age when that service receives bulk deliveries of JSFs. Both averages exceed the ages at which each of those services has retired fighter planes in the past.

If, however, delays in developing the JSF are inevitable, a less ambitious, more realistic schedule would add to neither costs nor fleet ages. Revising the JSF schedule would permit DoD to plan its future courses of action better. For example, actions to deal with fleet aging might include buying more current-generation aircraft or modifying the planes in existing fleets.

Supporting Military Forces: Personnel, Equipment, and Facilities

Although military capability depends on having the right size and configuration of forces with modern weapons, it also depends on how well those forces are supported. Do they have adequate numbers of experienced, trained personnel? Are the equipment and facilities they use maintained in good condition? The options in this chapter focus on the manpower, equipment, and facilities that support the readiness of U.S. forces. It includes options that would provide more funding for such resources as well as options that might allow the Department of Defense to meet its readiness goals at lower cost by changing the way the department manages its resources.

Resources and Readiness

Although the term readiness is used in different ways, the Joint Chiefs of Staff formally define it as the ability of units to deploy quickly and perform initially in wartime as they were designed to.¹ That ability reflects many factors. Traditional quantitative indicators of readiness compare units' resources—training, supplies, the condition of their equipment, and the number, grade, and skill distribution of their personnel—with standards based on wartime requirements. Other indicators of readiness examine the quality of recruits entering the force and the quality of the facilities in which military personnel live and work. Intangible factors, such as leadership and morale, also play

an important role in readiness but are less easily quantified.

As U.S. forces were being reduced during the 1990s, both the Congress and DoD gave high priority to readiness. That commitment reflects the experience of senior military leaders, who, as junior officers during the post-Vietnam drawdown of the late 1970s, dealt first-hand with a military that was dubbed the "hollow force." Responding to fears that the post-Cold War drawdown could lead to similar problems, the three most recent Secretaries of Defense each identified readiness as the department's highest priority. That emphasis has been institutionalized through the creation of DoD's Senior Readiness Oversight Council and Congressionally mandated reports on readiness.

Perhaps because of that focus, the early years of the most recent drawdown brought little evidence of readiness problems. In 1994, a review by the Congressional Budget Office of trends in indicators of readiness concluded that the readiness of deployable units remained relatively good.² The quality of new recruits, the experience level of the force, aggregate C-ratings (indicators of whether units have the resources required to perform their missions), and mission-capable rates for equipment were all high compared with historical levels. That study also cited factors that might lead to lower readiness in the future, such as shortfalls in funding to maintain real property. It also indicated that because the end of the Cold War left the

1. Joint Chiefs of Staff, *The Dictionary of Military and Associated Terms*, JCS Publication 1-02 (March 1994, as amended through June 1999).

2. Congressional Budget Office, *Trends in Selected Indicators of Military Readiness, 1980 Through 1993*, CBO Paper (March 1994).

military with a cushion of excess equipment, supplies, and personnel, DoD's ability to provide those things over the long run was not being tested.

Current Trends in Readiness

Today, reports of readiness problems are increasing. Many of those reports focus on personnel problems. Both the Army and the Air Force failed to meet their goals for recruiting enlisted personnel in 1999, and the Air Force also fell short of its goals for retaining enlisted personnel. In the case of officers, both the Navy and Air Force are unable to meet their stated requirements for pilots, the Army reports shortages of captains, and the Navy says it cannot retain enough young surface warfare officers. The Joint Chiefs cited concerns about recruiting, retention, and morale to explain why initiatives to increase compensation were their number one budget priority in 1999.

Military leaders have also expressed concern about the condition of equipment. The Air Force reports that mission-capable rates for its aircraft have declined by 10 percentage points—from 83 percent to 73 percent—since 1991. And rates of cannibalization (a measure of how often maintenance crews must take a part off one aircraft to maintain another) increased by 78 percent between 1995 and 1998, indicating a shortage of spare parts. The adequacy of training for Army units also became an issue in 1999 because of the poor performance of some armored units at the National Training Center.

Interpreting Current Trends

Readiness has clearly declined in some areas. But in many cases, the implications of such declines for national security and defense budgets are unclear. Do the reported readiness problems threaten national security, and if so, can they be resolved through additional funding?

Determining the policy implications of reported trends is complicated by the fact that some of those trends are spotty, affecting one service but not another. For example, in 1999, first- and second-term retention rates for enlisted personnel in the Air Force

were at their lowest level in almost 20 years. But that same year, the Army experienced unusually high retention rates. Such a pattern makes it difficult to generalize about the adequacy of military compensation.

Another complication is that advocates of additional resources for readiness often overstate their case by measuring declines in readiness indicators from some peak level that existed only under exceptional circumstances. Thus, the Air Force reports its decline in mission-capable rates relative to the peaks achieved during and immediately after the Gulf War. Similarly, declines in the quality of recruits are often measured relative to the peaks achieved during the drawdown, when the services, having cut their demand for recruits more quickly than resources for recruiting, substantially exceeded their quality goals. At what point do declines from peak levels threaten national security? How much readiness is enough?

In addition, some of the most widely publicized problems with readiness appear to stem—at least in part—from management problems rather than from inadequate budgets. The roots of the current pilot shortage, for example, can be found in personnel-management decisions made during the drawdown. In 1993, the Air Force responded to a surplus of pilots by cutting the number of new pilots being trained so it could retain its older, more experienced pilots (including those in staff positions). Management issues may also contribute to the services' current recruiting shortfalls. Once the Navy recognized that the youth market had changed and that new approaches were necessary, it was able to overcome many of the recruiting problems it experienced in 1998.

An even more fundamental concern is that the ability of units to do what they were designed to do may not adequately define readiness in a period when national security depends, to a significant degree, on the ability of units to quickly undertake and successfully carry out new tasks. The commanders of two Army divisions that had units engaged in the Balkans reported recently that their divisions were not ready (the divisions were category C-4 in the Joint Chiefs' Status of Resources and Training System ratings). That assessment was accurate in the sense that, given the absence of the deployed units, those divisions could not deploy quickly to a major theater war and perform their primary mission as they were designed

to. Yet the fact that some units from those divisions went to the Balkans—where they received not merely training but actual experience in peacekeeping—could contribute to the divisions' ability to respond to future contingencies.

Various Approaches to Readiness Issues

Evidence of declining readiness could be a sign that the military needs greater funding for such things as pay and health benefits, real property maintenance, equipment maintenance, and inventories of spare parts. Yet budget increases may not be the most appropriate solution for every readiness problem. In some cases, changes in Cold War programs or management and budgeting practices—an approach proposed by the 1996 Defense Science Board study of DoD infrastructure—may be necessary if high levels of readiness are not to prove prohibitively expensive. In other cases, either additional funding or management changes are already working their way through the system, or the readiness problem, although real, is a risk that DoD might choose to accept. Despite the department's stated commitment to readiness, many observers argue that it needs to strike a different balance between current readiness and the modernization and force-structure initiatives that are increasingly referred to as "future readiness."

The options in this chapter take varying approaches to improving readiness. Some would add resources without changing management practices. Those options involve the fewest risks and offer the greatest prospect for immediate increases in readiness. Other options would change traditional management practices—for example, by moving away from a pay system that differentiates between personnel on the basis of marital status; reducing DoD's direct role in providing housing, health care, and retail services; or consolidating depot maintenance functions. Whether accompanied by additional resources or not, those options could increase risks to readiness in the short run. But in the long run, they might lower the cost of maintaining readiness and free up resources for modernization.

The Military Compensation Package

The military compensation package includes both cash compensation (including deferred cash in the form of retirement pay) and noncash benefits (such as health care, housing, child care, and commissaries). Increases in that package were at the top of DoD's priorities in its budget for 2000 and continue to receive emphasis in the budget request for 2001. A military compensation package that can attract and retain high-quality, versatile personnel, who are able to learn new tasks and adapt to new practices quickly, might be an especially wise investment today—when the major threat to national security is diffuse and uncertain and deployments can involve a wide range of tasks that are not the focus of standard training.

The options in the sections below take varying approaches to the military's concerns about retaining a high-quality force. Some would add resources to compensation programs to improve DoD's ability to meet its personnel requirements; others would reduce the cost of meeting those requirements by changing the mix and type of benefits in the compensation package; and still others would lower costs or increase capabilities by changing the number or mix of personnel that DoD identifies as required.

Another tool that DoD might use to attract and retain personnel is working conditions—a category that includes such diverse elements as the frequency of deployments, the condition of facilities and equipment, the quality of military leadership, and opportunities for meaningful, patriotic service. Although such conditions are often determined by operational needs and are not normally considered part of the overall compensation package, failure to provide satisfying conditions of work can affect recruiting and retention. Many of the options in this chapter that address the condition of facilities and equipment—as well as some of the options in other chapters, such as the one that would increase staffing in military units—are aimed in part at changing the conditions of work for service members.

Cash Compensation

The Congress included a variety of pay changes in the National Defense Authorization Act for Fiscal Year 2000 in an effort to make military service more attractive and address the personnel problems reported by the Joint Chiefs. Those changes raised retirement benefits for service members who entered the force after 1986, provided an across-the-board pay raise of 4.8 percent (with a provision for future raises that would continue to exceed the growth of private-sector earnings), and restructured the military pay table to increase the importance of promotions rather than time in service. Those actions are expected to boost retention in the military as a whole (compared with what it would otherwise have been). But whether they will resolve the services' specific recruiting and retention problems is unclear.

Moreover, those gains in overall retention will be costly. One reason for the high cost is that service members—like others in U.S. society—place a much higher value on current income than future income. Thus, existing manpower models indicate that the increases in retirement pay are likely to be a less cost-effective tool for increasing recruiting and retention than additional pay raises would be. Another reason for the high cost of those provisions—and their questionable impact on DoD's most serious personnel shortages—is that the pay raises are not targeted toward those shortages. The 4.8 percent across-the-board raise will be paid not only to people in occupations where DoD has shortages but also to people in occupations where DoD has excess personnel.

Because frequent changes in any retirement system can disrupt expectations, further changes in the military retirement system may not be appropriate right now. But changes in basic pay are determined by DoD and the Congress on an annual basis. The options below examine possible policies for setting future pay raises, the potential for using special pay targeted toward personnel whose skills are in short supply, and the role of the unemployment compensation program in rewarding separation from active duty. An additional option would eliminate the difference between pay for married and single personnel; it illustrates how some analysts believe the military com-

pensation system might be fundamentally restructured to make it more cost-effective.

Option 4-01 Modify Planned Pay Raises for Military Personnel

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
Larger Pay Raises		
2001	635	612
2002	1,534	1,500
2003	2,524	2,485
2004	3,600	3,556
2005	4,770	4,721
2001-2005	13,064	12,874
2001-2010	46,467	46,137
Smaller Pay Raises		
2001	-212	-204
2002	-507	-496
2003	-827	-814
2004	-1,168	-1,154
2005	-1,533	-1,518
2001-2005	-4,247	-4,186
2001-2010	-14,862	-14,757

In 1999, the Congress established temporary procedures designed to increase basic pay in the military at a greater rate than pay in the private sector. Those procedures set the annual military pay raise between 2001 and 2006 at 0.5 percentage points above the increase in the employment cost index (ECI) for wages and salaries of private-sector workers. According to widely published reports, a "pay gap" of more than 13 percent separates military personnel from workers in the civilian sector. In advocating the new pay procedures, the Senate Armed Services Committee cited the

need to "close the gap between military pay and private sector wages." The House Armed Services Committee called for smaller raises (equal to the increase in the ECI), referring only to the services' recent negative trends in retaining personnel. The temporary procedures enacted in 1999, combined with the raise authorized for 2000, will increase basic pay by about 3.3 percent (with compounding) above the change in the ECI.

This option would change the procedures that the Congress established, providing for either larger annual increases or smaller ones. The alternative of larger raises would increase basic pay by 2 percentage points more than the change in the ECI each year from 2001 through 2006, thus eliminating the reported pay gap. That change would add \$612 million to defense outlays in 2001 and a total of \$46.1 billion through 2010. The second alternative would follow the example of the House Armed Services Committee, limiting raises to the annual increase in the ECI without an additional 0.5 percentage points and leaving pay almost 3 percent lower in 2006 and beyond than under the temporary procedures. That alternative would save \$204 million in 2001 and \$14.8 billion through 2010.

Various policymakers and analysts disagree about the need to increase military pay relative to pay in the civilian sector. That disagreement centers on two issues: the meaning of the reported pay gap and the severity of current problems in recruiting and retaining military personnel.

The common approach to comparing increases in military and civilian pay has several shortcomings, according to studies by RAND (a federally funded research center) and the Congressional Budget Office. A 1999 paper by CBO noted that the 13 percent gap reported in the press measures changes in relative pay between the two sectors rather than absolute levels of pay, takes no account of the age and education level of workers, and uses an essentially arbitrary starting point, 1982. CBO's analysis indicated that among all groups of military personnel, on average, pay increases since 1982 have roughly matched those among comparable workers in the civilian economy. Moreover, the level of pay for military personnel, whether officer or enlisted, falls at about the 75th percentile of

pay rates for workers in the civilian sector of the same age and education.

Notwithstanding such analyses, some proponents of higher military pay continue to argue that military personnel are paid less than they could earn in civilian jobs. The Chairman of the Joint Chiefs of Staff stated in 1998 that "You can argue about how big the pay gap is . . . but nobody [in the Pentagon] denies there's a gap." Some Members of Congress reportedly favored a plan to "close the pay gap" over three years through raises several percentage points higher than the average increase in private-sector pay. Thus, regardless of what the true situation may be, belief in the existence of a large pay gap remains a powerful force in discussions about the best course for military pay policy.

Advocates of smaller pay raises would probably take strong issue with the assertion that a pay gap exists or even matters. First, they would point out, no one has demonstrated a gap as proponents of higher pay think of it—a difference between civilian and military pay scales. Second, they would say, the pay of military personnel overall has not fallen relative to the pay of civilian workers of the same age and education level. In addition, they could argue, the notion of a pay gap—a measured difference between levels of pay in the military and civilian sectors—is not relevant to decisions about military pay. Depending on how service members and potential recruits view the advantages and disadvantages of military service, the armed forces might have to pay considerably more than civilian employers, or conceivably less, to attract and retain enough qualified personnel.

A second issue of contention is the services' recent ability to meet their personnel needs. The Air Force reported unusually heavy losses of experienced personnel in recent years, perhaps because of the large number of small-scale deployments during the 1990s. Such deployments affect both the personnel sent overseas and those who stay behind (see option 2-12 in Chapter 2). In addition, reenlistment rates among Air Force personnel completing their first and second enlistment terms have fallen recently. Moreover, every service but the Marine Corps had trouble meeting its recruiting objective in 1999, and the Army succeeded only because it reduced its objective. Advocates of

larger pay raises would argue that increased pay could mitigate retention and recruiting problems that might otherwise become more severe.

Proponents of smaller pay raises might argue that retention problems are not widespread and that if recruiting difficulties persist, they are better addressed through less expensive policies than an across-the-board pay raise. The Army has been as stressed by deployments as the Air Force, those proponents might argue, yet the Army was able to reduce its planned accessions of recruits in 1999 because it retained more enlisted personnel than it had expected. The Air Force's problems, they might say, should be solved by the greater predictability of deployments under the service's new Expeditionary Aerospace Force concept or dealt with by expanding reenlistment bonuses (see the next option). Finally, proponents of smaller raises could argue that increasing pay is an expensive way to solve recruiting problems; less expensive alternatives include increasing the number of recruiters, spending more on advertising, and offering more generous education benefits or enlistment bonuses.

Opponents of both alternatives in this option—people who would prefer the status quo of planned pay raises slightly exceeding average increases in private-sector pay—might offer two arguments for their position. Some would say that if the reported pay gap or retention problems warrant raising military pay, slow change is the best approach. Better to see the effects of the planned raises and improvement in retirement benefits, they would argue, than to commit immediately to a large pay increase. Others would contend that even if retention problems are not serious or the reported pay gap does not exist, the planned increases are necessary because service members believe the reports that they are underpaid and their perceptions will determine their actions. According to advocates of the status quo, when the service chiefs supported members' belief that they were underpaid and the Congress set out to increase military pay, a course was set that could not be reversed without serious consequences.

Option 4-02 Increase Reliance on Selective Reenlistment Bonuses

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	85	78
2002	105	101
2003	125	122
2004	144	141
2005	154	152
2001-2005	613	594
2001-2010	1,438	1,413

Selective reenlistment bonuses (SRBs) are monetary incentives used to encourage the reenlistment of qualified service members in occupational specialties with high training costs or demonstrated shortfalls in retention. Eligible personnel generally receive half of their bonus when they reenlist and the remainder in annual anniversary payments over the course of their additional obligated service. Each service regularly adjusts its SRBs to address current retention problems, adding or dropping eligible specialties and raising or lowering bonus levels. Despite their use of reenlistment bonuses and other incentives, however, each of the services has at times had difficulty meeting its need for career personnel, particularly in some occupations.

This option would increase the services' spending on initial bonus payments to \$400 million annually—roughly double the 1999 levels—and remove current restrictions on the maximum bonus amount that an individual can receive. Compared with funding for new bonuses in 2000, the higher level would represent an increase of 27 percent (the Congress responded to

concerns about poor retention by adding \$79 million for new bonuses to the services' budget request for 2000). Total spending on initial and anniversary SRB payments would rise from roughly \$340 million and \$465 million in 1999 and 2000, respectively, to more than \$770 million in 2006 and beyond. That increase reflects both the cost of this option—\$78 million in outlays in 2001 and \$1.4 billion over 10 years—and the long-run cost of the earlier growth in initial payments.

Although this option would have a substantial direct effect on defense costs, the actual increase in personnel costs could be much smaller, or even negative. Increased spending on reenlistment bonuses should improve retention, allowing policymakers to slow the growth of basic pay or other elements of military compensation (see option 4-01). The estimated costs of this option do not reflect those offsetting savings, however, because the extent of the savings would depend on what actions, if any, policymakers took.

The four services use SRBs to differing extents. In late 1999, for example, almost half of the Navy personnel completing their initial enlistment term who were eligible for a bonus could receive one equal to a year's basic pay or more if they reenlisted for four years. In the Army, by contrast, only about 15 percent of equivalent personnel could receive a bonus equal to more than four months of pay for a four-year reenlistment. Large bonuses were less prevalent in the Air Force and the Marine Corps than in the Navy, but far more common than in the Army.

Advocates of expanding the SRB program might argue that current bonus levels are too small to provide meaningful differences in pay among occupations. One year's basic pay for a four-year reenlistment—the bonus level for first-term Air Force personnel in several computer-related occupations and the largest bonus that the Army offers—actually amounts to only about a 13 percent addition to total pay over four years after accounting for the other elements of cash compensation and for pay raises over those four years (which do not affect the bonus). The largest bonuses add somewhat more than one-third to recipi-

ents' pay, but only the Navy offers bonuses at that level and only for a few occupations that involve operating and maintaining nuclear power plants on ships and submarines. In the civilian sector, by contrast, differences in average pay of one-third or more are common, even among blue-collar occupations.

Proponents of this option would argue that larger pay differences among occupations would be a cost-effective tool for improving military readiness. Compared with across-the-board increases in pay or benefits, bonuses are more efficient because they can reduce shortages of experienced personnel in those occupations most critical for readiness without contributing to surpluses in other occupations. Bonuses can also be focused on the years of service in which personnel make career decisions. (Pay raises can be focused on certain grades or years of service, but policymakers have rarely been willing to do so.) And compared with pay increases, bonuses avoid the heavy cost of "tag-alongs"—the elements of compensation, such as retirement benefits, that are tied to levels of basic pay.

Some critics of expanding reenlistment bonuses would argue that large pay differences among occupations violate a longstanding principle of military compensation: that personnel with similar levels of responsibility should receive similar pay. In their view, reenlistment bonuses should be limited to a few critical specialties with severe shortages. Other critics of bonuses and other special and incentive pays would turn the "tag-along" argument of proponents on its head. Increasing reenlistment bonuses, those critics would say, unfairly deprives service members of the retirement and other benefits that they would receive if that money were instead made part of basic pay throughout their career.

Other opponents of this option might agree that the military should offer large pay differences among occupations but criticize the origin or timing of the expansion in bonuses. They would argue that decisions about reenlistment bonuses should be left to the individual services, who are better able than outsiders to compare the cost of added bonuses with the cost of alternatives for addressing shortages of experienced

personnel, such as recruiting and training new personnel. Those critics might also point out that the Congress recently improved retirement benefits for many personnel and committed itself to increasing military pay at a rate greater than the increase in private-sector pay. Thus, they would argue, bonuses are not an alternative to across-the-board increases but an addition to them, and the results of those increases should be seen before the Congress considers expanding other incentives.

Option 4-03 Eliminate Differences in Pay Between Married and Single Service Members

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	79	72
2002	503	466
2003	927	879
2004	1,308	1,259
2005	1,774	1,716
2001-2005	4,591	4,391
2001-2010	35,060	34,173

NOTE: These numbers do not include additional tax receipts.

The military generally pays married personnel more than single personnel performing the same job. The difference derives from the military's unique system of either providing food and housing to its members directly or paying them cash allowances to cover food and housing costs. Married personnel are generally thought to need more housing than single personnel, so both DoD-provided housing and housing allowances are larger for service members with dependents than for those without dependents. In addition, most single personnel in the junior enlisted pay grades (E-5 and below) are expected to eat in government dining facili-

ties and live in DoD housing; they may provide their own meals and rent an apartment if they choose, but without specific authorization they cannot receive cash allowances to help cover the cost.

This option would eliminate the pay differences between married and single personnel by dropping the separate allowances for food and housing—in other words, moving to a salary system. Over a five-year transition period beginning in 2001, housing allowances for single personnel would gradually rise to the married level. In 2006, the food allowance and all but the locality-specific component of the housing allowance would be rolled into basic pay. (The locality-specific component would be combined with an existing allowance that accounts for differences in non-housing costs.) An additional amount would be added to basic pay to compensate members for the increased liabilities they would incur for Social Security and federal income taxes when the nontaxable allowances were converted to taxable pay. Also in 2006, computation procedures for retirement pay and other elements of compensation that are linked to basic pay would be revised to prevent any increase in their costs. Making those changes would add \$72 million to defense outlays in 2001 and a total of \$34.2 billion through 2010—or about 6 percent to military personnel costs once the transition was completed in 2006. Increased tax receipts, however, would offset about \$14.4 billion of the costs in the 2006-2010 period.

Since long before the modern volunteer military began in 1973, outside studies and government-sponsored commissions have recommended adopting a salary system for the military. A common argument is that paying two people with the same rank and job at different rates simply because one is married and the other unmarried is inequitable. The pay difference also creates an incentive for service members to marry, which raises the military's costs for dependents' health care and other benefits. In addition, proponents note that eliminating the separate food and housing allowances would make total military compensation more visible and thus more effective. It would also increase the visibility of another portion of defense costs: the tax revenues that are forgone because the current allowances are tax-free. Another advantage of this option is that most of the cost reflects a pay increase for single personnel, which could improve their retention.

Some critics might argue that this option would represent an ill-advised meddling with a pay system that has served the military well for over 50 years. But the most recent DoD study of moving to a salary system focused on the practical difficulties of making the transition. For example, devising payment schemes for the elements of compensation now tied to basic pay could prove difficult, in part because converting the allowances into basic pay would raise the basic pay of some groups of personnel more than that of others. Most of the difficulties, however, would derive from the current tax-free nature of the allowances. Calculating the increase in federal tax liabilities for a typical service member in each pay grade would be straightforward, but some personnel would wind up better off than before the transition and others worse off. In addition, Congressional budget rules might make it difficult to recognize the increase in tax receipts that would occur when the allowances were converted into taxable pay as an offset to the costs of this option. Finally, the cost estimate for this option assumes that service members would not be compensated for their additional liabilities for state and local taxes because those would depend on where members chose to establish residency; critics could point out that ignoring state and local taxes would effectively cut the pay of military personnel.

Another question that would arise in the transition to a salary system would be how to set rents for government housing for both single and married personnel once the current practice of charging an implicit rent equal to the service member's housing allowance was no longer practical. The cost estimate for this option assumes that rents would be based on the housing allowances at the end of the transition period, adjusted annually for changes in local housing costs. Rents for family housing would be equal to the full allowance. For bachelor housing, a "dorm fee" would gradually decline from the full allowance at the beginning of the transition period to half the allowance at the end. The estimate assumes that the services would continue their current policy of expecting most single personnel in grade E-5 or below to live in barracks or aboard ship; for such personnel, the dorm fee would be mandatory.

An alternative plan for family housing that might be appropriate after the transition would be to raise rents to levels sufficient to eliminate waiting lists for

the available government housing. That alternative is examined in option 4-13.

Option 4-04 Deny Unemployment Compensation to Service Members Who Leave Voluntarily

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-134	-134
2002	-145	-145
2003	-162	-162
2004	-181	-181
2005	-188	-188
2001-2005	-810	-810
2001-2010	-1,852	-1,852

Many military personnel who voluntarily leave active-duty service are eligible for unemployment benefits. That situation contrasts with the situation of civilian workers—who must have left their job involuntarily to qualify for unemployment compensation—even though payment amounts for the two groups are calculated the same way.

This option would subject former military personnel to the same rules as members of the civilian labor force; in other words, only personnel who left the service involuntarily would be eligible to receive unemployment benefits. That change would reduce the number of departing personnel eligible for benefits by at least two-thirds and save an average of \$185 million annually through 2010. Because the Department of Defense ultimately reimburses the Department of Labor for the cost of unemployment payments to former service members, most of those savings (\$1.8 billion through 2010) would occur in the defense budget. A small portion of the savings (\$57 million through 2010) would occur in the Department of La-

bor's budget. (The latter savings would be in mandatory spending.)

Most personnel who leave military service do so voluntarily. Many choose not to reenlist after completing a term of service; others, who have served for a minimum of 20 years, opt for voluntary retirement. A much smaller group is separated involuntarily for reasons related to job or promotion performance or, in recent years, to the drawdown of military forces. Although the pressures associated with the drawdown may have blurred the line between voluntary and involuntary separation in the past, the end of the drawdown has restored that distinction.

Proponents of this option would argue that in addition to saving money, it would subject military personnel to the same rules as the rest of the workforce. Thus, in their view, it would make more equitable use of an entitlement program that was established with the intent of aiding people who lost their job involuntarily.

Critics, by contrast, might argue that the frequent moves associated with military service mean that members who separate voluntarily are unlikely to take up residence in the area of their final posting, making it difficult for them to find a new job before they leave the service. In those critics' view, voluntary separation from military service is not comparable with voluntary termination of civilian employment and therefore should not be subject to the same restrictions on eligibility for unemployment compensation.

Health Care Benefits

Health care, which costs DoD about \$17 billion annually, is arguably the most important noncash element in the military's overall compensation package. A service member's degree of satisfaction with the military health care system can play an important role in his or her decision to remain in the military. That system is likely to be the focus of much DoD and Congressional attention this year. The Joint Chiefs of Staff recently created an advisory panel, the Defense Medical Oversight Committee, to help them identify

how the military health care system could be improved. Thus, options that examine potential changes to that system may be especially timely.

The Structure of the Military Health Care System

The fundamental reason for the military to have a medical system is to keep service members ready for duty and provide them with care during military operations. During the Cold War, the military medical system was structured to fit scenarios involving mass casualties in a major European war. In peacetime, that structure would be available to provide large amounts of care to beneficiaries not on active duty, including the families of active-duty personnel, military retirees, surviving military spouses, and their dependents. More recent planning scenarios require less medical capacity; as a result, DoD has substantially reduced its system of military treatment facilities. Yet even with those reductions, the system is much larger than that required for current wartime scenarios. Most of its budget is devoted to caring for non-active-duty beneficiaries. Of the 8.1 million people eligible to use the system, only about one in six is a service member on active duty.

Active-duty personnel receive free health care through DoD's hospitals and clinics (called the direct care system) and a closely affiliated network of civilian providers. Family members and other beneficiaries who are not on active duty (and are not yet eligible for Medicare) have two health care options. One is to enroll in the plan known as Tricare Prime and agree to seek treatment through the same direct care system and network of civilian providers that serve active-duty personnel. Patients who use Tricare Prime face low (often no) fees and copayments for comprehensive care in exchange for the limited flexibility of a managed care approach. The second option is to use Tricare Standard or Extra—insurance programs that allow military beneficiaries to seek care from a larger number of civilian providers. Those plans feature benefits, copayments, and deductibles similar to the ones in private-sector fee-for-service plans and preferred provider plans, respectively. Beneficiaries who choose Tricare Standard or Extra can also receive care

at very little cost from DoD's direct care system. But unlike people enrolled in Tricare Prime, they can do so only when space is available.

When military retirees and dependents reach age 65 and become eligible for Medicare, they may no longer use Tricare. However, they may still receive free care at military hospitals and clinics when space is available. They may also continue to fill prescriptions and get laboratory services free of charge at military treatment facilities.

Criticisms of Military Health Care

Three interrelated criticisms are often directed at DoD's health care system. First, some Tricare users complain of long waits for appointments at military hospitals and clinics or difficulty getting access to the limited number of specialists available through Tricare's networks of preferred providers. Some Tricare beneficiaries have also found it hard to get care when they are away from home.

To some extent, those concerns about access may reflect growing pains in the Tricare system, which DoD started in 1995 but only gradually expanded nationwide. Under Tricare, DoD relies on private contractors in different regions of the country to provide advice lines staffed by nurses, schedule appointments with military and civilian providers, set up networks of providers, negotiate payment rates, and process claims for reimbursement. Many of the complaints about Tricare focus on the service that those contractors provide. However, enrollees' satisfaction with Tricare has generally improved as the contractors and DoD have gained experience with the system and with coordinating benefits across different regions of the country.

Yet some of the reported problems with access to care under Tricare may reflect more fundamental problems. Long delays for patients seeking treatment in military facilities may indicate a lack of focus on customers' needs, inefficiency in the use of doctors' time, or the crowding out of Tricare Prime enrollees by other, lower-priority beneficiaries. Moreover, pa-

tient behavior is such that a medical system that does not use copayments to control usage may have to rely instead on implicit costs in the form of waiting time. In the absence of copayments, increasing the capacity of the system could lead to an increase in the number of patients, with no significant change in the average waiting time for a visit.

Second, some retirees over age 65, who are excluded from Tricare, claim that DoD has reneged on a promise to provide them with free lifetime medical care. Although the legal basis for such a claim has been denied by the U.S. Court of Appeals, many defense officials say they recognize an obligation to offer some care to older beneficiaries. But in some areas, base closures have limited DoD's ability to provide them with care on a space-available basis.

One reason that many older military beneficiaries would like comprehensive health coverage through DoD is that they face significant out-of-pocket costs under Medicare. Besides paying Part B premiums (about \$550 per year), beneficiaries who receive treatment through Medicare's fee-for-service program must typically pay deductibles and coinsurance. Some military retirees over 65 get supplemental coverage through employers who hired them after their military service; others invest in medical savings accounts to cover future out-of-pocket costs or enroll in Medicare +Choice managed care plans. In addition, more than 50 percent of military retirees report that they buy private supplemental insurance, known as medigap policies, to cover some of the costs that Medicare does not.

Third, critics maintain that DoD's medical system has trouble planning for and controlling health care costs. Civilian health care plans must also plan for and control costs, but the structure of military health care benefits makes those tasks particularly difficult for DoD. Planning is complicated by the fact that beneficiaries who choose not to enroll in Tricare Prime can still turn to space-available care at military facilities or to Tricare Standard or Extra whenever that coverage is convenient for them. As a result, the amount of medical care they will seek from DoD in any given year is uncertain.

Cost control is complicated by the fact that care at military hospitals and clinics is free (or nearly free) to its recipients. Although DoD tries to manage the use of care, the system's incentive structure causes beneficiaries to use substantially more care than other U.S. residents—even though more care does not necessarily lead to better health outcomes. In addition, as private-sector employers and insurers have required beneficiaries to pay more of the cost of their care, beneficiaries who are also eligible for DoD's system have increased their reliance on military facilities for services, such as pharmacy and laboratory services, that would otherwise entail out-of-pocket costs.

The experience of private-sector health care programs suggests that charging a nominal copayment for routine outpatient visits and pharmacy services gives consumers an incentive to use care more prudently without significantly affecting their health. In the past, DoD has characterized options that would institute copayments for treatment in military facilities as cost-cutting initiatives that would harm the quality of life of service members. (In fact, the Administration's proposed budget for military health care includes additional funds in 2001 to eliminate existing copayments for active-duty family members enrolled in Tricare Prime who are treated by civilian providers.) Nevertheless, beginning to charge copayments at both military and civilian facilities could be viewed as a way to make DoD's efforts to provide improved access to health care and more uniform benefits affordable. Under the current system, high costs could limit efforts to expand benefits for retirees over 65 and to improve access for Tricare beneficiaries.

The options presented below represent a mix of approaches to those and other problems. Some of the options would try to provide better and more uniform benefits by adding resources to the military medical system; others would combine efforts to expand benefits with copayments aimed at making those initiatives more affordable; and still others would fundamentally restructure DoD's role in providing health care in the post-Cold War era.

Option 4-05 Increase Access to Health Care for Active-Duty Families at Military Treatment Facilities

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	114	79
2002	269	142
2003	277	208
2004	282	248
2005	287	269
2001-2005	1,229	945
2001-2010	2,737	2,360

Most families of active-duty personnel enroll in Tricare Prime, a health plan that promises comprehensive care at minimal cost. But many of those families complain that obtaining appointments to receive care at military hospitals and clinics—where Tricare Prime is centered—is difficult.

This option would improve access for active-duty personnel and their families at military treatment facilities through three approaches. It would expand DoD's capacity to offer outpatient services at those facilities by hiring more civilian staff to support military health care providers. It would also increase the number of exam rooms available for outpatient visits at military facilities. And it would change the incentives of physicians who supply care at military hospitals and clinics. Together, those measures would cost \$1.2 billion through 2005, or a total of more than \$2.7 billion over 10 years.

Some DoD planners say the military health care system is greatly in need of support staff, such as registered nurses and other skilled personnel who provide technical assistance and follow-up care. Over the past 10 years, DoD has cut the number of civilian workers in its system by 22 percent, while the number of military medical personnel has fallen by 13 percent. According to DoD analyses, military outpatient clinics have a lower ratio of support staff to health care providers (including physicians, physical therapists, and psychologists) than many health maintenance organizations (HMOs) in the private sector.

In a 1998 hearing before the House National Security Committee, the Surgeons General of the Army and Navy both identified support staff as a high-priority need within the military health system, since those personnel can free up physicians' time to see more patients. For its part, the Air Force has set a goal of having 3.5 support personnel per provider throughout its clinics based on what it believes are norms among HMOs. This option would give DoD new funding to bring its ratio of support staff to providers of outpatient care closer to private-sector levels.

Besides staffing, military facilities also differ from the private sector in their physical capacity for outpatient care. Most DoD hospitals were built decades ago and were designed to focus on inpatient beds rather than outpatient visits. Many civilian HMOs, by contrast, do not operate their own inpatient facilities at all. This option would provide new funding to build more rooms for outpatient exams at military facilities.

Although these measures would expand DoD's capacity for outpatient visits at base facilities, they might not be sufficient to improve access to care among active-duty families. For example, physicians could resist moves to add to their current workload of patients. This option would try to counter that possibility through monetary incentives for military physicians. Specifically, providers who serve as primary care managers would be eligible to receive up to \$22,000 per year in bonus compensation that would be

tied to the productivity of a group of military physicians, as measured by quality of care and patients' satisfaction and access. Bonuses would be divided among groups of physicians rather than awarded to individuals for two reasons: to use peer pressure to ensure that providers offered high-quality care, and to avoid the need to adjust measures of an individual physician's productivity for the relative complexity of his or her cases.

Supporters of this option would argue that expanding outpatient capacity and changing the incentives of providers could make the military health care system more accessible. Those changes could reduce waiting times and make it easier to schedule appointments at military hospitals and clinics. In addition, if health care is a key consideration in service members' decisions about whether to leave or stay in the military, such measures might help increase retention.

Opponents of expanding the number of support staff at military clinics might argue that DoD should have a lower ratio than is common in the private sector. DoD's health care providers must furnish more on-the-job training than civilian providers do, since active-duty support personnel often have not had much instruction in health care before entering military service. Moreover, critics of this option would contend that before DoD devotes more funding to hiring support staff or building exam rooms, it should first look at how it can better manage its current resources. Some might argue that DoD has too many physicians on active duty.

Other critics of this option contend that increasing the capacity of the system could do little to reduce delays in appointments because, in the absence of copayments, the additional capacity might simply induce beneficiaries to seek more care. (Such delays might be reduced, however, if DoD also began charging nominal copayments for outpatient visits; see option 4-09 below.) Moreover, the performance bonuses for physicians could create an incentive for them to provide unnecessary or poorer-quality care.

Option 4-06 Offer Comprehensive Health Coverage to Older Military Retirees

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
Provide Medigap Payments		
2001	359	369
2002	718	737
2003	1,057	1,094
2004	1,431	1,478
2005	1,383	1,425
2001-2005	4,948	5,104
2001-2010	12,335	12,623
Offer FEHB Coverage		
2001	788	799
2002	2,044	2,066
2003	3,228	3,270
2004	4,577	4,630
2005	4,775	4,821
2001-2005	15,412	15,586
2001-2010	44,079	44,395

RELATED CBO PUBLICATION:

Restructuring Military Medical Care (Paper), July 1995.

Over the past decade, DoD has closed 35 percent of its military hospitals and replaced others with smaller clinics, leaving less capacity in its direct care system. Because beneficiaries age 65 and older are eligible for health benefits through DoD only if space is available at military facilities, some of those people have had to seek care elsewhere, which increases the share of costs they bear themselves. As a result, service organizations that lobby on behalf of military retirees argue that DoD has broken a promise to provide free health care for life to people who agreed to pursue a career in the military.

This option would give military beneficiaries age 65 and older comprehensive health coverage through DoD using one of two distinct approaches. Under the first approach, beneficiaries would receive a payment from DoD approximately equal in value to a basic type of medigap plan (a supplemental insurance policy for Medicare). Beneficiaries could use that payment to buy supplemental coverage or could apply it toward any health expenses they now pay out of pocket. The second approach would offer beneficiaries coverage under the Federal Employees Health Benefits (FEHB) program, with DoD paying the same share of an enrollee's premium that it does for federal civilian workers. That approach would be more costly to DoD but more generous to older beneficiaries. To offset some of DoD's costs for either form of coverage, older military retirees who chose to accept the new benefit would no longer be permitted to use military health care facilities.

About half of older military beneficiaries report that they purchase private medigap insurance to protect themselves from high out-of-pocket expenses under Medicare. Ten standard medigap plans exist. Their annual premiums can vary widely—from about \$600 per person to more than \$2,000—depending on the types of benefits covered and the state in which the policyholder lives. In addition, if beneficiaries wait more than six months after turning 65 to buy a medigap plan, insurers may subject them to a waiting period for coverage or even refuse to sell them a policy because of their medical history or health status.

Under this option's first approach, the payment that DoD provided to older military retirees and dependents would roughly equal the value of a standard medigap "A" plan, the least generous type that covers core benefits such as copayments for physicians' services and long inpatient stays. (That value is about \$700 in 2000.) Beneficiaries could use that payment to offset the cost of any medigap or employer-sponsored wraparound plan they chose, although they would have to make up the difference in price for plans with more generous benefits. Alternatively, they could deposit the tax-exempt payment in a medical savings account or apply it toward out-of-pocket premiums and copayments charged by managed care providers in the Medicare+Choice program.

Those payments would cost DoD \$3 billion between 2001 and 2005, or a total of \$9 billion over 10 years (assuming that most of the 1.4 million military beneficiaries in the United States age 65 and older would apply to receive such a payment). Over that 10-year period, however, DoD's costs would be more than offset by over \$10 billion in savings from a smaller workload in the military health care system. Besides DoD's costs, the Medicare program would face an additional \$13.7 billion in costs between 2001 and 2010. Those costs would arise because some beneficiaries who formerly received care at military treatment facilities would instead begin using Medicare and because a few who previously had no medigap coverage would tend to use more services once they had supplemental coverage. In sum, net costs under this option would total more than \$12 billion through 2010.

Under the second approach, older military beneficiaries could enroll in one of the various health plans in the FEHB program each year and pay about 30 percent of the premium (the same share that other FEHB participants pay). In the case of a standard Blue Cross/Blue Shield policy, their share in 2000 would be \$781 for an individual or \$1,736 for a family. DoD would pay the remainder of the premium (\$2,050 for an individual or \$4,575 for a family policy, in this example). Such a plan would act as a wraparound policy for people enrolled in Medicare—covering most or all of Medicare's copayments and deductibles as well as most of the cost of prescription drugs. In many cases, an FEHB plan would cost Medicare beneficiaries less and provide more generous benefits than a private medigap policy. However, the total costs of such a plan—that is, the sum paid by DoD, Medicare, and enrollees—would be high.

This second approach would cost DoD more than \$13 billion for FEHB premiums through 2005, or a total of more than \$40 billion over 10 years (assuming that roughly 70 percent of older military beneficiaries would eventually choose to enroll in the FEHB program, including all those who now buy medigap plans, some who contribute toward employer-sponsored coverage, and a few who formerly relied on Medicare alone). Those 10-year costs, however, would be offset by more than \$11 billion in savings over 10 years as fewer elderly patients went to DoD for care. As under the first approach, Medicare would also face higher

costs—totaling \$15 billion through 2010. When combined, net costs under this option would total \$44 billion over the 10-year period.

Although neither approach in this option would be the same as providing free health care for life, either one would give older military retirees and their families a more uniform benefit than exists today. The reason is that the payment or FEHB enrollment would be available to all beneficiaries age 65 or older, whereas today only people who happen to live within driving distance of a military treatment facility receive many health care benefits. Supporters of this option would also point out that either approach is much more generous than the benefit that civilians receive through Medicare alone. In addition, the change would allow older military beneficiaries to choose from a broad range of civilian health care providers.

Opponents of the option could argue that either approach would impose significant new health care costs on the federal government without producing a clear effect on military recruiting and retention. In addition, some critics contend that excluding older beneficiaries from care at military treatment facilities would hurt DoD's ability to attract, train, and keep military doctors and other medical personnel because it would provide a less varied mixture of cases for them to treat.

Option 4-07

Offer a Nationwide Mail-Order Prescription Service to Older Military Retirees and Their Dependents

Any military beneficiary can fill a prescription—written by either a military or civilian physician—free of charge at DoD's pharmacies. For beneficiaries age 65 and older, prescription drugs can represent a major health expense, because older people are more likely to have chronic conditions than younger people and because fee-for-service Medicare does not cover the cost of most outpatient prescription drugs. Most of the 1.4 million military beneficiaries age 65 and older can obtain pharmacy services only if they are willing to

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	91	74
2002	302	256
2003	438	399
2004	473	453
2005	507	493
2001-2005	1,811	1,674
2001-2010	4,799	4,602

RELATED CBO PUBLICATION:

Restructuring Military Medical Care (Paper), July 1995.

travel to a military facility to have their prescriptions filled. Two exceptions to that system exist, however. In 1997, DoD added a mail-order pharmacy program for older beneficiaries who no longer have access to military facilities because of base closures and realignments. And beginning in spring 2000, DoD will provide a retail and mail-order pharmacy benefit to about 6,000 people age 65 and older if they choose to pay an enrollment fee to participate in the demonstration program.

This option would broaden the current mail-order pharmacy service to include all military retirees and their dependents age 65 and older living in the United States. Users of the mail-order service would pay \$8 per prescription filled (up to a 90-day supply), which is similar to copayments that private-sector health maintenance organizations charge. Such a service would cover a wide variety of medications for chronic conditions (although retirees would probably still want to purchase drugs for acute illnesses at retail pharmacies rather than wait to receive them through the mail).

Expanding its mail-order service would cost DoD an additional \$91 million in 2001 and \$4.8 billion through 2010. That estimate is net of the revenue that DoD would collect in copayments.

Like other health care providers, DoD is facing rising pharmacy costs because of the broad availability of new drugs. Those costs increased by more than 6 percent a year between 1995 and 1997, according to the General Accounting Office, compared with an increase of just 1 percent a year in DoD's overall health care spending during that period. As pharmacy costs have risen, so has the value of DoD's drug benefit; thus, proponents of this option would argue, it might be reasonable to expect beneficiaries to share that increase by making copayments. In addition, studies suggest that charging a copayment gives consumers an incentive to use pharmacy products more prudently without significantly affecting their health.

This option would provide more uniform health care benefits to older military retirees and their dependents than the current system. And although beneficiaries would face some costs, those would probably be much lower than what most older civilians pay out of pocket to fill their prescriptions. In 1996, for example, Medicare enrollees spent an average of about \$680 on pharmaceuticals, nearly half of which they paid out of pocket. (Many people hold medigap insurance policies to supplement their Medicare benefits, which may also help defray pharmacy expenses. People who buy a medigap policy must pick one of the more expensive types of plans to get any drug coverage at all and then pay half of the price of each prescription as well. In addition, their maximum pharmacy benefit is capped at \$1,250 or \$3,000 per year, depending on the type of medigap policy they buy.)

This option would have several potential disadvantages. First, it would add costs to DoD at a time when its budget already faces constraints. (However, an expanded mail-order pharmacy program would be less expensive to the federal government than helping older military beneficiaries buy supplemental coverage through a medigap policy or the Federal Employees Health Benefits program, as discussed in option 4-06.) Second, advocates for retirees would argue that a mail-order pharmacy benefit would not begin to provide the free health care for life that many retirees believe they were promised when they agreed to a career in the military.

Option 4-08 Downsize the Military Medical System

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	241	408
2002	700	1,041
2003	-222	442
2004	-1,284	-736
2005	-3,204	-2,719
2001-2005	-3,770	-1,565
2001-2010	-31,097	-27,687

RELATED CBO PUBLICATION:

Restructuring Military Medical Care (Paper), July 1995.

This option would substantially reduce the size of DoD's direct care system, cutting the number of beds in military facilities to the amount that DoD would need to care for two-thirds of the casualties it anticipates from two nearly simultaneous major wars. As part of that downsizing, DoD would convert many military hospitals into outpatient clinics, close other facilities, and reduce the number of active-duty physicians. This option would also discontinue the Tricare program for retirees and all types of dependents, requiring them to seek care in the civilian sector. Those younger than 65 would be offered coverage through the Federal Employees Health Benefits program, and those 65 or older (who now receive care at military hospitals and clinics only when space is available) would use their Medicare coverage and any private insurance they obtained.

Such restructuring of the military medical system would require additional spending in the near term but would offer substantial savings later on. Total net savings in outlays would be nearly \$28 billion through 2010. That estimate reflects savings from operating a smaller military system, assuming that DoD faces the same upward pressures on the cost of care that

private-sector providers and insurers do. It also takes into account higher Medicare spending (as older military beneficiaries rely more heavily on their Medicare benefits), the costs of closing facilities, and the costs of providing FEHB coverage to beneficiaries younger than 65. Under this option, DoD would pay the same share of the premiums for FEHB health plans that other federal agencies do for their civilian employees. In addition, families of active-duty service members who enrolled in FEHB would receive a voucher that covered much or all of the remaining share of the premium.

Supporters of downsizing note that although DoD's wartime medical requirements during the Cold War were based on the scenario of a large conventional conflict in Europe, more recent planning scenarios have led to sizable cuts in those requirements. Today, between military medical facilities, hospitals run by the Department of Veterans Affairs, and civilian facilities that have agreed to provide beds during a national emergency, the United States has more than twice the hospital capacity needed to meet the current wartime demand for 13,400 beds. Moreover, even after making the reductions in this option, DoD would still have about 9,000 beds in its expanded system—a much higher percentage of its wartime requirement than it met during the Cold War.

DoD would probably see several disadvantages, however, to making such deep cuts to its health care system. Military medical officials argue that DoD facilities and the care they provide in peacetime are essential for recruiting and training physicians and ensuring medical readiness. Downsizing that system to such an extent would require DoD to modify the way it trains and prepares for wartime. For example, it would need to strengthen ties with the civilian sector to provide casualty training for military medical personnel and to continue ensuring an adequate supply of beds for wartime.

Another potential drawback of this option is that those older beneficiaries who are able to rely on military facilities would have to seek care elsewhere. In addition, some beneficiaries who enrolled in FEHB plans would pay substantially more out of pocket than they do for care in the military system. Military retirees and their dependents would pay about 30 percent of their FEHB premium. (Dependents of active-duty

members would pay little or no premium after receiving their voucher.) And enrollees in most FEHB plans would face copayments or deductibles for outpatient visits, prescription drugs, and other medical services.

Proponents of this option would counter that higher out-of-pocket costs could prompt more prudent use of medical care than in DoD's direct care system, where many services are provided at no or low cost. In addition, they might say, many FEHB plans would offer improved coverage and so might be worth the greater out-of-pocket expense. Moreover, the value of DoD's health benefits has grown dramatically with advances in technology and medical practices. Thus, proponents would argue, it is reasonable for military beneficiaries to share more of the costs associated with those advances—as many people covered by employer-sponsored plans in the private sector already do.

Option 4-09 Revise Cost Sharing for Military Health Benefits

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-327	-276
2002	-437	-411
2003	-444	-436
2004	-455	-451
2005	-467	-463
2001-2005	-2,131	-2,037
2001-2010	-4,135	-4,025

RELATED CBO PUBLICATION:

Restructuring Military Medical Care (Paper), July 1995.

This option would make three changes to the military health care system. First, all beneficiaries (except

those on Medicare) would have to enroll in Tricare Prime, Standard, or Extra before using the military health care system. The annual enrollment fee for Tricare Prime would remain the same (no charge for active-duty personnel and their families and \$230 for single coverage or \$460 for family coverage for retirees). Under Tricare Extra or Standard, active-duty families would still pay no fee, but retirees would pay \$115 a year for single or \$230 for family coverage. Second, DoD would adjust enrollment fees for inflation by the annual change in the consumer price index for medical expenses. Third, users of Tricare Prime would pay the same copayments for outpatient care at military facilities (where they now pay nothing) as they do at civilian providers. In addition, all retirees would begin to pay small copayments if they chose to receive care at military facilities.

Together, those three changes would save DoD \$327 million in 2001 and \$4.1 billion through 2010. The savings would stem from enrollment fees, increased copayment charges, and more prudent use of care by beneficiaries. Under current law, DoD is allowed to spend some of the revenues it collects through copayments. This estimate assumes that the Congress would reduce DoD's appropriations by the amount of revenue collected under the option. However, if the Congress revoked DoD's automatic reimbursement authority, some of the estimated savings would take the form of an offset to mandatory spending.

By requiring beneficiaries to enroll, DoD could identify who uses its system. Military providers need to plan for the health care needs of a defined population to develop per capita budgets and build cost-effective delivery networks.

Proponents of this option could argue that the value of DoD's health benefits has risen with advances in medical technology, so users should expect to bear some of the associated cost, just as employees of private firms have. In addition, charging copayments would help curb excessive use of services by creating the same incentives for beneficiaries who receive care on-base as for those who use civilian providers. It would also eliminate the inequity of providing more generous benefits to people who live near a military hospital or clinic.

On the negative side, many military families and retirees would view even modest copayments at military facilities as an erosion of their benefits. Retention and morale might suffer, even though this option would still offer service members and their families more generous health benefits than most government or private-sector employers do.

Option 4-10 Have DoD and VA Purchase Drugs Jointly

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-26	-21
2002	-74	-63
2003	-78	-74
2004	-82	-80
2005	-86	-84
2001-2005	-346	-323
2001-2010	-843	-810

In 1997, the Departments of Defense and Veterans Affairs (VA) spent about \$1 billion and \$1.3 billion, respectively, on pharmaceutical products for patients in their health care systems. Nationwide, spending on prescription drugs has grown roughly twice as fast in recent years as total national health spending. Constraining such cost growth is an important goal for DoD and VA: each operates its large health care system on a fixed annual appropriation, so spending more on prescription drugs means it has fewer resources to devote to other types of care for its beneficiaries.

This option would consolidate DoD's and VA's purchases of pharmaceutical products, as the Congressional Commission on Servicemembers and Veterans Transition Assistance has recommended. Specifically, it would require the two agencies to organize a joint procurement office and develop a common clinically

based formulary (a list of prescription drugs that both agencies' health plans would agree to provide). Formularies can save money by encouraging providers to substitute generic versions for brand-name drugs or by selecting one or more preferred brand-name drugs within a therapeutic class. The joint formulary would apply throughout the VA health system, to mail-order pharmacy services, and at military hospitals and clinics. Once in place, it would allow the agencies to enter into more "committed-volume" contracts with pharmaceutical manufacturers, which generally lead to lower drug prices. In addition, this option would merge the two agencies' mail-order pharmacy services. Those changes would save DoD and VA a total of \$21 million in outlays in 2001 and \$810 million through 2010.

In recent years, DoD and VA have made efforts to combine some purchases, but that collaboration is limited, and they continue to maintain separate formularies and procurement offices. The VA's National Acquisition Center is responsible for purchasing prescription drugs for most federal agencies except DoD, and it negotiates and maintains the federal supply schedules of prices for those items. The Defense Supply Center Philadelphia (DSCP), an office of the Defense Logistics Agency, negotiates prices for pharmaceuticals and draws up contracts with vendors to buy and deliver those products to military treatment facilities. DSCP also makes plans to deliver those items overseas quickly in the event of a conflict.

Proponents of joint purchasing would argue that DoD and VA need to rein in the rapid growth of prescription drug costs. Without such measures, both agencies may be forced to ration more tightly the care they provide. In addition, those proponents would say, the need for separate procurement offices is not apparent. According to a 1998 report by DoD's Inspector General, only 0.05 percent of the items that the DSCP procures on behalf of military facilities are "militarily unique"; most are common items. VA officials maintain that the National Acquisition Center has already achieved significant savings on many of its pharmaceutical purchases through committed-volume contracts.

In developing a common formulary, the two agencies would need to adopt procedures by which physicians could prescribe nonformulary drugs to pa-

tients who needed them. (For example, a patient would require an alternative drug if he or she was allergic to the formulary drug in a therapeutic class.) The design and execution of such an exception process would affect the savings from this option. The stricter the process, the higher would be the cost of documenting and judging the patient's need for a nonformulary drug. A less restrictive process, however, would reduce the government's bargaining power and could reduce the savings from this option.

Critics of consolidation argue that such savings are unachievable anyway. The veterans who obtain health care from the VA make up a very different mix of medical cases than military beneficiaries do—for example, more of them suffer from mental illness, substance abuse, or severe disabilities (such as spinal cord injuries). Thus, the degree of overlap in prescription drugs dispensed by the two agencies may be limited.

Opponents of this option also argue that DoD and VA have already taken important steps to expand their joint procurement. They have entered into 19 joint national contracts to buy pharmaceutical products. Some officials believe that the agencies will achieve the bulk of any possible savings simply by sharing pricing data with one another so they can negotiate the lowest prices with pharmaceutical manufacturers and suppliers. Moreover, DoD officials contend that they must maintain their own procurement office to ensure that drug supplies will be available quickly in the event of war.

Other critics, however, might argue that this option would not go far enough. Savings could be even larger if DoD implemented a uniform formulary for all three types of pharmacies that its beneficiaries use: pharmacies at military hospitals and clinics, the mail-order service, and retail pharmacies (where beneficiaries receive partial reimbursement through insurance). DoD officials say that as they have tightened the formularies of drugs available at military facilities, beneficiaries have increasingly turned to retail outlets—which often costs DoD more than if the department had purchased the drugs at federal prices and dispensed them itself. (Consequently, the estimate for this option assumes that DoD's insurance claims for pharmacy services would increase.) If DoD could en-

force a single formulary at all pharmacy outlets, it would enjoy more substantial savings.

Other Noncash Benefits

The military has traditionally provided a much broader array of noncash benefits than most civilian employers. Apart from health care, the list includes subsidized on-base housing; commissaries (on-base grocery stores); exchanges (general retail stores); child care; and morale, welfare, and recreation programs (golf courses, fitness centers, clubs, and the like). For the most part, DoD has chosen to rely on in-house organizations rather than private contractors to provide those subsidized goods and services.

In general, both economic theory and the commonsense notion that people are the best judge of where they would like to spend their money suggest that cash payments, rather than in-kind or noncash benefits, should play a dominant role in compensation. When private employers provide health care and other noncash benefits, it is often because that approach allows them to offer tax-free compensation or to take advantage of their ability to purchase goods and services at a lower price than employees could on their own.

Nonetheless, noncash benefits are likely to offer some special advantages to both individual service members and DoD. Those benefits mean that military personnel have familiar services readily available as they and their families move from one unfamiliar base to another. Noncash benefits, and the associated on-base lifestyle, can also provide a sense of belonging to an organization that cares for its members and their families. Likewise, such benefits can send the message that DoD is not just another employer and military service is not just a job. Among officers in critical specialties, military values and lifestyle and a sense of esprit de corps are the most frequently cited reasons to stay in the military.³

3. General Accounting Office, *Perspectives of Surveyed Service Members in Retention Critical Specialties*, GAO/NSIAD-99-197BR (August 1999), p. 30.

DoD's noncash benefit programs entail significant costs. In recent years, those costs have been raised by changes in the civilian economy (such as the growth of discount retailers that compete with on-base stores) or by the aging of DoD's infrastructure of housing and other facilities. In addition, post-Cold War rotation patterns could increase the number of service members who are able to spend much of their career at a single installation, making the advantages of distinct military communities less clear. A 1997 report by the Congressionally mandated National Defense Panel—a group that included four retired general officers—suggested that it might be time for DoD to reassess the role of military communities and non-cash benefits.⁴ Panel members said that military personnel might be better off if some of the resources that DoD devotes to providing benefits such as housing, schools, medical care, and retail stores were instead devoted to raising cash compensation.

This section provides an array of options dealing with noncash benefits. Some of the options would increase funding for those programs. Others would reduce the cost of providing noncash benefits or replace them with cash payments. Still others would make the costs of noncash compensation more visible to encourage DoD and service members to make choices between cash and noncash benefits.

Option 4-11

Consolidate Military Personnel Costs in a Single Appropriation

More than 20 percent of the federal government's costs to recruit and retain military personnel fall outside the military personnel appropriation of the Department of Defense. The costs for many personnel benefits—commissaries, medical care, DoD schools, and on-base family housing—are paid by DoD out of other appropriations. Some additional benefits, such as the Montgomery GI Bill and veterans' disability payments, are paid by the Department of Veterans Affairs. This option would realign appropriations so

the full cost of attracting and retaining military personnel appeared in DoD's military personnel account.

Under this option, each of the DoD-funded personnel-support costs mentioned above would become a budget activity or subactivity within the military personnel appropriation. Some VA programs might also be funded in the defense budget. The realignment of appropriations would have two related goals: to provide more accurate information about how much money is being allocated to support military personnel, and to give DoD managers more incentive to use resources wisely.

The current distribution of personnel costs among different appropriations makes it difficult for DoD, the Congress, or taxpayers to track the total level of resources devoted to supporting military personnel. Changes in the appropriation level for military personnel can be either offset or enhanced by changes in the resources devoted to health care, housing, or education benefits. The total picture is rarely, if ever, seen—making it hard to analyze total compensation or make comparisons with civilian compensation.

In addition, because personnel-support costs and military training and operating costs are mixed within the operation and maintenance (O&M) appropriation, interpreting trends in that important appropriation can be difficult. How much of the past growth in O&M spending per active-duty member resulted from growth in personnel costs, such as medical benefits, and how much resulted from changes in the cost of operating military units and installations?

The current distribution of personnel costs among appropriations and agencies can also distort the incentives that managers face. For example, because the costs of enhanced benefits under the Montgomery GI Bill would be paid by the VA, managers at DoD have little reason to ask whether other recruiting incentives might be more cost-effective. Similarly, compensation managers have little incentive to seek the most cost-effective mix of cash and in-kind benefits as long as DoD pays for in-kind benefits such as commissaries and housing out of different appropriations than cash benefits. With separate appropriations, no reliable mechanism exists to ensure that funds taken from in-kind benefits will be returned to service members in the form of pay raises. If both cash and in-

4. National Defense Panel, *Transforming Defense: National Security in the 21st Century* (December 1997), p. 83.

kind benefits were paid from a single appropriation, the demand for greater in-kind benefits might be muted, and it might be easier for both the Congress and DoD managers to show service members that changes in benefits were not an erosion in the total compensation package. A consolidated budget for personnel support could even lead to growth of in-kind compensation when that was, in fact, the most cost-effective approach.

How much this option might save is unknown (thus, no savings table is shown). But with the total cost of supporting military personnel at about \$95 billion a year, the potential savings from better management of those costs are substantial. (Savings of just 1 percent, for example, would equal almost \$1 billion annually.)

In addition to providing savings, this option could lead to a realignment of responsibilities within the military services. Although no change would be required, the new approach to appropriations might eventually result in the consolidation of personnel-support functions under a single Assistant Secretary in each service and the Office of the Secretary of Defense. That realignment might in turn contribute to better coordination among the different personnel-support functions.

One potential disadvantage of this option is that it would require DoD to revise both the financial management systems used to track budget authority and outlays and the budget exhibits it prepares for the Congress. But because DoD already tracks the costs of its various personnel-support programs separately, moving those programs to a different appropriation would involve reorganizing current data rather than collecting new data.

A much more serious drawback of this option is that the new structure for appropriations could require changing the responsibilities and possibly the structure of the various Congressional subcommittees that authorize and appropriate funds for defense. That could prove difficult and controversial.

Option 4-12 Increase Housing Allowances to the Full Cost of Adequate Housing

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	491	455
2002	950	909
2003	1,434	1,388
2004	1,474	1,458
2005	1,513	1,502
2001-2005	5,862	5,711
2001-2010	14,065	13,855

The Department of Defense houses about one-third of military families in housing units it owns on military bases. Although many of those units are aging and in poor repair, the demand for on-base housing exceeds the supply in most areas. Military families who live off-base receive a cash allowance in lieu of housing; it typically covers only part of their housing costs, leaving them to pay 18.8 percent of those costs out of pocket. That situation contributes to the demand for on-base family housing and raises issues of equity between personnel living on- and off-base. Moreover, the fact that DoD cannot ensure that military families have access to high-quality housing presents a serious quality-of-life issue in the eyes of many senior military leaders.

This option would raise housing allowances to 100 percent of the estimated cost of adequate housing. Allowances would rise over a three-year period, reducing out-of-pocket costs to an average of 12 percent in the first year, 6 percent in the second year, and eliminating them in the third year. This option would increase allowances at a more rapid rate than the Administration's current proposal, which would reduce out-of-pocket costs to 15 percent in the first year and eliminate them within five years.

Raising housing allowances would directly benefit the roughly 752,000 active-duty personnel (both single and married) who live off-base. In addition, it would contribute indirectly to the quality of DoD's on-base units. Currently, DoD is experimenting with public/private partnerships designed to provide private capital to replace and revitalize on-base housing. Higher allowances would make the partnerships—whose return on investment typically depends on the size of housing allowances—more appealing to private firms. Another advantage is that service members would no longer have an incentive to accept on-base units that were not comparable in quality with available private-sector units. Queues for on-base housing would decline, and base commanders would have a strong incentive either to improve or to demolish substandard units.

The principal disadvantage of this option is its cost—approximately \$1.4 billion a year more than the current system. This option would also further enshrine the current pay and allowance system, making it difficult to eliminate differences in pay between married and single personnel (see option 4-03). In addition, this option would represent a sharp break from DoD's historical goal of setting allowances to cover 85 percent of service members' housing costs. Although that practice holds down the cost of allowances, it contributes to long waiting lines for on-base units and to a perception that the department is not committed to providing service members and their families with a high quality of life.

The cost of this option would be equivalent to that of raising basic military pay by about 3 percent, but its impact would probably be much greater. Although service members accustomed to press reports that cite a 13 percent pay gap might not view a 3 percent pay raise as a major improvement in their quality of life, they would probably see the elimination of out-of-pocket housing costs as dramatic, visible evidence of DoD's commitment to improving service members' welfare. Thus, such a change could have an immediate impact on morale and retention. Further, the higher allowances might resolve DoD's housing prob-

lems by decreasing the demand for on-base units and allowing the department to reduce its role as a direct provider of housing.

Option 4-13 Increase Competition Between DoD and Private-Sector Housing

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-627	-32
2002	-637	-271
2003	-648	-452
2004	-660	-540
2005	-671	-604
2001-2005	-3,243	-1,899
2001-2010	-6,775	-5,286

RELATED CBO PUBLICATION:

Military Family Housing in the United States (Study),
September 1993.

Most military families receive cash allowances for housing and buy or rent dwellings in the private sector. About one-third, however, live rent-free in on-base housing. It costs DoD about 35 percent more to provide a housing unit than it costs to rent a comparable unit in the private sector. Despite the cost, DoD intends to keep its inventory of housing. The department is experimenting with public/private partnerships that could provide private capital to replace or revitalize on-base housing units, many of which are nearing the end of their service life. But those partnerships are proceeding more slowly than planned, leaving many families in substandard units. Moreover, it is uncer-

tain whether such partnerships will reduce the long-run costs to DoD of providing on-base housing.

This option would reduce the demand for on-base housing by requiring it to compete with private-sector housing. All military families would receive the cash allowance and be free to choose between DoD and private-sector units. DoD—and any companies it takes on as partners—would act like a private landlord, setting rents for on-base units at market-clearing levels (levels at which there would be neither excess vacancies nor waiting lists). On-base housing units would be replaced or revitalized if they met one of two criteria: their value to service members (the market-clearing rent they could command) was sufficient to cover both operating costs and amortized capital costs, or DoD deemed the units indispensable because of their historical nature or importance for military readiness. Those criteria would limit DoD to revitalizing or replacing about 25 percent of its existing housing stock.

The principal advantage of this option would be savings to DoD, which could amount to more than \$5 billion in outlays through 2010. The main source of those savings would be lower revitalization and replacement costs as DoD retired aging units rather than investing in ones that could not cover their costs in competition with private-sector housing. Among other advantages, this option would let DoD focus on its warfighting mission rather than on real estate management, eliminate waiting lists for on-base units, and equalize the value of the housing benefits that it provides to families living on- and off-base. Moreover, the housing costs that service members as a whole pay out of pocket would not change: if rents paid to DoD exceeded the housing allowances paid to personnel living in DoD units, the excess would be returned to all service members through an increase in allowance rates.

The main disadvantage of this option is that reducing DoD's role as a provider of housing would limit the benefits associated with the current policy. Advocates argue that housing soldiers and their families on-base promotes esprit de corps, morale, and a sense that the military "takes care of its own." This option would represent a significant break with military tradition. As a result, it could have a negative

impact on morale unless it received strong public support from senior military leaders.

On-base units are in high demand among military families primarily because of their low cost to service members. The allowance that families living in DoD housing forfeit equals only about 60 percent of the costs that the federal government incurs in providing a unit. Under this option, families that chose to live on-base would face higher costs than they do today because their rent to DoD would most likely exceed their housing allowance.

Option 4-14 Create Incentives for Military Families to Save Energy

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-5	-5
2002	-26	-26
2003	-54	-54
2004	-67	-67
2005	-68	-68
2001-2005	-220	-220
2001-2010	-580	-580

RELATED CBO PUBLICATION:

Military Family Housing in the United States (Study),
September 1993.

The Department of Defense spent almost \$310 million last year on gas, electricity, and water for the approximately 216,000 family housing units that it owns in the United States. DoD's efforts to reduce those costs by promoting resource conservation have met with limited success. One reason is that service members living in DoD-owned housing do not pay for their utilities and may not even know how much gas, electricity, and water they use. Landlords in the private sector

have found that utility use typically declines by about 20 percent when tenants are responsible for their own utility bills.

This option would install utility meters in DoD housing units, provide cash utility allowances to the families living there, and then charge for utilities based on actual use. Residents who spent less than their allowance could keep the savings; those who spent more would pay the extra cost out of pocket. The budget for allowances would be set equal to the expected cost of utilities under the new system, or about 80 percent of what DoD now spends. The department would allocate that amount among the different housing units on the basis of their size, energy efficiency, and location. Once the program was established, the allowance budget for each year could be set equal to the previous year's actual utility charges plus an adjustment for inflation. As such, if service members were able to cut their utility usage by more than 20 percent, allowances would fall and the savings from this option would increase. If, however, 20 percent overestimates members' true ability to conserve, allowances would be higher and the savings would be less.

Because families who conserved aggressively would receive more in allowances than they would be charged for utilities, this option would reward people who tried to conserve energy. Families who did not economize would face utility bills in excess of their allowance. However, there is a risk that the allowances for some units might not accurately reflect their characteristics. People living in such a unit might find that the allowance did not cover all of their utility costs even after they had made reasonable conservation efforts.

The principal advantage of this option is that it would reduce DoD's costs by giving military families who live on-base the same incentives for conservation as most homeowners and renters—including military families living off-base. Although DoD would incur the up-front costs of determining allowance amounts, setting up a billing system, and installing meters, this option could provide total savings of about \$580 million from 2001 through 2010.

Many DoD housing units already have a connection where a meter could be installed. Nonetheless, a

temporary exemption from the metering requirement (and the utility allowances and charges) could be given for some older units if the Secretary of Defense certified that metering them was not feasible.

Option 4-15 Improve Military Families' Access to Child Care

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	544	421
2002	981	923
2003	944	982
2004	910	956
2005	943	947
2001-2005	4,322	4,229
2001-2010	9,575	9,464

Access to affordable, high-quality child care is important to many families of DoD military and civilian workers. Obtaining that access, however, can be particularly difficult for employees at isolated bases or for military families who must move frequently.

This option would increase DoD's support for child care in two ways. First, it would provide \$350 million over six years for constructing DoD child care centers (to create spaces for an additional 25,000 children) as well as funds to cover DoD's share of the operating costs of those spaces. Second, it would provide matching funds to military families with eligible child care expenses who were either unable to get slots in DoD centers or preferred to rely on in-home or other sources of care. (Eligible expenses would be defined in the same way that they are for the federal tax credit for child care.) DoD's matching rates would be set so that families who received matching funds got the same kind of subsidy as families who used DoD child care centers. Thus, although DoD

would, on average, match expenditures on a one-to-one basis, the matching rate could be higher for junior personnel and lower for senior personnel. DoD's matching payments would be capped at \$3,926 per child per year (adjusted for inflation), which equals the department's average share of the operating cost of a slot in a child care center.

DoD helps ensure access to child care through two main programs. One program consists of around 800 day care centers (known as child care development centers) that DoD runs on military bases. Those high-quality centers have the capacity to care for about 60,000 children. Fees paid by patrons cover about half of their operating costs, and appropriated funds cover the rest. The other program is a network of DoD-certified in-home caregivers, or family child care homes. Those in-home caregivers are often the spouses of military personnel. Currently, DoD has certified almost 10,000 in-home caregivers who can offer care to about 60,000 children. Military families who use in-home care generally pay the full cost, although the Navy shares part of that cost at some of its installations.

Despite their size, those two programs serve only a minority of the DoD workers in need of child care. Most military families rely on the same kinds of public and private child care arrangements as non-DoD employees do. In some cases, that is a matter of preference; in other cases, it reflects a shortage of DoD-sponsored care. According to DoD estimates, an additional 256,000 child care spaces (either in centers or in family day care) are necessary to meet the needs of military families fully. The demand for additional spaces in DoD's child development centers is particularly acute; applicants often face long waiting lists. But DoD's ability to provide additional slots in those centers is limited both by the initial cost of construction and by the need to cover half of the annual operating costs associated with the slots.

This option would not resolve all of DoD's child care issues; some DoD child care centers might continue to have waiting lists. Nonetheless, the additional funds for child care facilities and matching grants included in this option would have an immediate impact on service members' access to high-quality, affordable

child care. Not only would care in the DoD centers be more readily available, but the subsidy would encourage families who do not use those centers to seek higher-quality care than they might otherwise, since they would pay only half of the additional cost of that care.

This option's price tag would be substantial—about \$1 billion annually—because the option would benefit all military families who needed child care, not just those for whom the child care centers were an option. Families who preferred in-home care for their children, had special needs that their local DoD center could not meet, were seeking care near their off-base home or near the military spouse's workplace, or needed child care on an unscheduled basis, only in the summer, or overnight would no longer be at a disadvantage relative to those preferring care in large on-base centers. A child care system that provided support to all families in need might appear more equitable than the current system.

Wider access to child care benefits would also have a negative aspect, however. It would widen the already significant gap between the value of the compensation packages that DoD provides to single and to married personnel (see option 4-03). One way to alleviate that concern and also reduce the cost of this option would be to lower the average matching rate. But unless the law that requires DoD to pay half of the operating costs of on-base centers was changed, that approach would leave families who relied on the matching grants at a disadvantage relative to those who used on-base centers.

In the long run, the matching grants in this option could reduce the pressure on DoD to expand its system of on-base care. That would be a disadvantage in the eyes of people who feel that the current system helps foster a sense of community among military personnel by encouraging families to bring their children to the base for day care even if they live off-base. But two advantages would potentially offset that disadvantage. First, this option would allow DoD to concentrate more on its core missions. Second, and perhaps more important, this option would provide immediate relief to many military families seeking affordable child care.

Option 4-16 Consolidate DoD Retail Activities and Increase Cash Compensation

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	0	0
2003	0	0
2004	0	0
2005	0	0
2001-2005	0	0
2001-2010	0	0

RELATED CBO PUBLICATION:

The Costs and Benefits of Retail Activities at Military Bases (Study), October 1997.

The Department of Defense operates four separate retail systems: a DoD-wide network of grocery stores, or commissaries, run by the Defense Commissary Agency (DeCA), and three chains of general retail stores, or exchanges (the Army and Air Force Exchange Service, the Navy Exchange Command, and the U.S. Marine Corps exchange system). Both commissaries and exchanges try to give military personnel access to low-cost goods, but they operate under very different funding mechanisms. Commissaries receive a Congressional appropriation of about \$1 billion a year in addition to about \$5 billion in revenue from sales to customers. Exchanges, which have annual sales of about \$10 billion, do not receive direct appropriations but rely solely on sales revenue to cover their costs. One reason the exchanges are able to operate without an appropriated subsidy is that they charge their customers a higher markup over wholesale prices than commissaries do. Another reason is that the exchange systems are nonappropriated-fund (NAF) entities rather than federal agencies, which enables them to use relatively flexible and businesslike personnel and procurement practices. Because DeCA is a fed-

eral agency, by contrast, commissaries must employ civil service personnel and use standard DoD procurement practices.

This option would consolidate all of DoD's commissaries and exchanges into a single NAF exchange system, which would operate without any appropriated subsidy. That system would be responsible for ensuring access to low-cost groceries and other retail goods at all DoD installations, including those in isolated or overseas locations. The consolidation would take place gradually over a two-year period. When it was complete, DoD's costs would be reduced by about \$1.1 billion a year (in 2000 dollars)—about \$1 billion from eliminating the commissary subsidy and an additional \$100 million from eliminating duplicative functions among the exchange systems. Rather than saving that money, however, this option would return the \$1.1 billion to active-duty service members through either an increase in basic pay (averaging about \$600 per member per year before taxes) or a tax-free grocery allowance of \$1,000 per year payable to each member eligible for cash subsistence payments. Payments to service members would be phased in to coincide with the consolidation of the commissary and exchange stores at each base.

Low-cost, on-base shopping has long been a benefit of military service. But recent declines in the size of U.S. forces and changes in the civilian retail industry have made it more difficult and costly for DoD's fragmented retail systems to provide that benefit. A recent study conducted for DeCA found that a \$1 billion annual appropriation would not be enough to maintain the quality of commissaries in the future. Both commissaries and exchanges must now compete with large discount chains that offer low-cost, one-stop shopping for groceries and general merchandise just outside the gates of many military installations.

DoD has considered a variety of initiatives designed to duplicate the benefits of an integrated retail system: consolidating or encouraging cooperation among the exchanges; converting DeCA into a so-called performance-based organization with the freedom to use NAF-like personnel and procurement practices; building commissaries and exchanges next to one another at military bases; and providing combined commissary and exchange stores on an experimental

basis. To date, however, those efforts have met with limited success.

This option would run into a problem that has hampered past attempts to consolidate the three exchange systems: the services' concerns about losing control over exchange earnings. The three exchange systems generate about \$400 million in net earnings each year, most of which the services use to support morale, welfare, and recreation programs for their troops. How those earnings are allocated is a sensitive issue—even though the exchanges would produce little or no earnings if they had to pay for all of the in-kind support (including transportation of goods overseas and some building maintenance) that the services provide.

Moreover, by consolidating commissaries with exchanges, this option would face another, arguably more significant, problem. An exchange system operating without a subsidy would have to charge about 10 percent more for groceries than commissaries do now. (That estimate is based on the difference between the 20 percent markup that exchanges charge and the 5 percent markup that commissaries charge, the amount that commissary customers currently pay to have their groceries bagged, and evidence that exchanges pay lower wholesale prices than commissaries do.) At the current level of commissary sales, a 10 percent price increase would cost customers an extra \$500 million annually.

About \$230 million of the price increase would be borne by the military retirees who currently shop in commissaries. As a result, this option could face strong opposition from associations of military retirees, who would view it as a violation of the military's obligation to its retired personnel. On average, retirees could pay an additional \$140 per year, but some retirees would be affected more than others. A retired couple who purchased all of their groceries at a commissary would pay about \$330 more per year.

In contrast, active-duty service members—including those with large families who buy all of their groceries at commissaries—would clearly benefit. The average active-duty family would pay about \$230 more per year for groceries—far less than the additional basic pay or grocery allowance that they would receive under this option. (A military family would

have to spend about \$10,000 per year on groceries in commissaries before a 10 percent price increase outweighed the benefits of a \$1,000 allowance.) Cash allowances would be particularly attractive to personnel who live off-base and can shop near their home more conveniently than on-base. Moreover, all military families—active-duty, reserve, and retired—would gain from longer store hours, more convenient one-stop shopping, access to private-label groceries (not currently available in commissaries), and the security of a military shopping benefit that did not depend on the annual appropriation process.

DoD could target the \$1.1 billion in cash payments to service members in a variety of ways. An allowance based solely on pay grade might be the most effective in enhancing retention and rewarding service members for their work, although some people might argue that an allowance tied to pay grade and family size would be more equitable. If desired, supplemental payments could be made to junior enlisted personnel who have large families and might otherwise be eligible for food stamps.

This option would provide a more cost-effective form of compensation than the current system of separate commissary and exchange benefits. In effect, commissary patrons would as a whole give up about \$500 million a year in savings in exchange for \$1.1 billion in cash payments to active-duty personnel. Such a trade could increase retention among active-duty members. Nonetheless, the option would represent a break with military tradition. Thus, unless it received strong public support from senior military leaders, it could harm the morale of the active-duty force despite the financial savings it would provide. Obtaining that support might require a Congressional commitment to a grocery allowance that would be tied to the cost of groceries and would not become simply an increase in military pay.

Option 4-17

Consolidate and Encourage Efficiencies in Military Exchange Activities

The Department of Defense's three exchange systems—the Army and Air Force Exchange Service, the

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-62	-47
2002	-85	-76
2003	-108	-99
2004	-111	-107
2005	-114	-112
2001-2005	-479	-442
2001-2010	-1,093	-1,048

RELATED CBO PUBLICATION:

The Costs and Benefits of Retail Activities at Military Bases (Study), October 1997.

Navy Exchange Command, and the Marine Corps system—provide a wide array of retail stores and consumer services at military bases. With combined annual sales of approximately \$10 billion, operating costs of about \$2 billion, and 80,000 employees, the exchanges constitute one of the largest retail businesses in the United States.

The Congress does not directly appropriate funds to the exchanges, but DoD provides them with about \$400 million worth of free services each year. Those services include maintaining the exterior of exchange buildings (such as roofs, windows, and heating and cooling systems), transporting goods overseas, and providing utilities at overseas stores. The federal status of DoD exchanges offers other advantages as well: exemption from state and local excise taxes, a monopoly over on-base sales of goods and services, and access to free land and interest-free capital. Those exemptions and other subsidies are worth more than \$1 billion a year, the Congressional Budget Office estimates.

Part of that annual subsidy is translated either into lower prices for military personnel and their families or into exchange earnings that support the services' morale, welfare, and recreation (MWR) programs. Another portion is absorbed by inefficiencies. Private retailers in the United States must be efficient

to survive in the face of competition. The subsidies that exchanges receive, by contrast, alleviate the pressure of competition and allow the exchanges to operate in ways that private retailers could not afford to. For example, although economies of scale in the private sector often force private retailers to merge, DoD's three exchange systems remain separate—despite numerous studies showing that consolidation would significantly reduce operating costs. Subsidies also distort the incentives that exchange managers face. Because DoD provides free utilities overseas, the Army and Air Force Exchange Service can operate an ice cream production line in Germany without regard to utility costs. And because DoD pays to transport goods overseas, the exchanges can ship beer and carbonated beverages abroad rather than buying them locally.

This option would consolidate the three exchange systems into a single entity and introduce incentives for more efficient operations. Rather than receive DoD support services free of charge, the exchanges would receive a lump-sum appropriation equal to the historical cost of those services and would (like DoD's industrially funded activities) reimburse the providers of those services. Over the long run, consolidating the three exchange systems could save about \$65 million a year in overhead costs. Requiring the exchanges to reimburse DoD for support services would save another \$40 million a year if it induced the exchanges to reduce the costs of those activities by 10 percent. In all, savings would total \$1.1 billion between 2001 and 2010. Initially, the savings might provide additional funding for MWR activities. Over the long run, the increase in exchange earnings would allow DoD to provide its planned level of MWR activities with less support from appropriated funds.

Option 4-18 Eliminate DoD's Elementary and Secondary Schools

The Domestic Dependent Elementary and Secondary Schools (DDESS) system operates schools on several military bases in the United States to educate depend-

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	10	9
2002	-4	-3
2003	-20	-18
2004	-33	-31
2005	-44	-42
2001-2005	-90	-85
2001-2010	-466	-456

ents of military personnel living on those bases. The Department of Defense also operates a separate school system for military dependents living overseas.

This option would phase out most of the schools that DDESS runs in favor of increased use of local public schools and would consolidate management of any remaining DDESS schools into the much larger overseas school system. Those changes would save DoD a total of \$1.5 billion between 2001 and 2010. Savings for the federal government as a whole would be less—about \$400 million through 2010—because the Department of Education would have to spend more on Impact Aid, which it provides to local school districts that enroll dependents of federal employees. (These cost estimates assume that funding for Impact Aid would increase enough that the average amount paid per student living on federal land would remain at its current level.)

Critics would argue that DDESS takes an uneven and largely arbitrary approach to educating the dependents of active-duty service members. The distribution of DDESS schools is mainly a historical accident, dating to the time when segregated public schools in the South did not adequately serve an integrated military. The great majority of military bases in the United States have no DDESS school. And where such schools do exist, they generally enroll only dependents of active-duty members who live on-base; those living off-base, and dependents of civilian employees, are the responsibility of local school districts. In addition, most bases with DDESS facilities offer

only elementary and middle schools; high school students living on-base use the public schools. In most of the places where DDESS operates schools, accredited public schools are readily available—with the possible exceptions of Guam, Puerto Rico, and West Point, where DoD would continue to run domestic schools under this option.

Closing DDESS schools need not create major disruptions. The roughly 30,000 students who might be affected already change schools frequently, in large part because they move often as their military parent is reassigned. In many locations, the public school district could continue to use the DDESS facility. (DoD already offers support to some local districts by allowing public schools to operate on-base or providing additional limited funding on a per-student basis.) Finally, to ease the transition, DDESS schools would be phased out at a rate of one per district per year rather than all at once. And the local school districts would receive additional one-time funding and transfer of facilities and equipment to help them absorb their new teaching load.

This option might have several disadvantages, however. First, many parents of DDESS students might be reluctant to see the schools phased out because they believe DoD schools offer higher-quality educations. Second, if local school districts did not maintain the on-base schools, former DDESS students might face longer commutes. Third, some of the savings to the federal government from this option would be offset by increased costs to local school districts. In the past, those districts have effectively been subsidized by not having to pay any of the costs of educating DDESS students while receiving at least some direct and indirect tax revenues from their parents. This option would eliminate that subsidy.

Requirements for Personnel

The military compensation package is one tool that DoD can use to adjust its number of personnel to meet requirements. But because there is not always a clear relationship between DoD's stated requirements for personnel and its military capabilities, reassessing those requirements is sometimes more appropriate

than meeting them. Weaknesses in DoD's process for setting requirements for support activities are suggested by the fact that studies to determine the requirements of the department's civilian organizations often conclude that additional staffing is needed, even though those organizations find ways to restructure work and cut staff significantly if they must do so to prevent the work from being contracted out.

Since the advent of the all-volunteer force, DoD has made great strides in reducing requirements for military personnel by substituting civilians or contractors. Its ongoing effort to lower support costs by introducing competition between in-house organizations and contractors may encourage further cuts in the number of military personnel assigned to those organizations.

DoD also aims to reduce personnel requirements by substituting capital for labor. Over the long run, the most effective way to do that is to design new weapon systems that can be operated and maintained by smaller crews. For example, the Navy hopes to operate its new destroyer, the DD-21, with a crew of 95, compared with the crew of 340 for today's DDG-51.

The Navy is also working to foster a greater awareness of the cost of military manpower and to change long-standing traditions that treat sailors as a cheap source of labor. For instance, rather than rely on general-detail enlistees to chip paint on ships in the traditional, labor-intensive manner, the Navy is exploring alternative approaches: doing more painting in port using civilian contractors who have specialized tools and expertise, introducing new types of paint or surfaces that do not require frequent painting, and providing more and better hand tools. So-called "smart ship" technologies—such as sensors that replace sailors who would otherwise stand watch at stations throughout the ship—might allow significant reductions in manpower even on the Navy's existing fleet.

Yet despite recent efforts to use manpower more efficiently, DoD's stated manpower requirements remain heavily influenced by traditional personnel practices. Moreover, rather than driving changes in the mix of personnel, requirements may change over time in response to changes in that mix. This section includes two options that address DoD's requirements

for military personnel. One option outlines ways to reduce requirements for Air Force and Navy pilots by changing the traditional career paths for those officers. The other option returns the ratio of enlisted personnel to officers and the proportion of officers in the field grades to the levels seen before the recent drawdown. That option is consistent with the view that recent trends in the officer corps have been driven not by requirements but by changes in the mix of personnel that emerged as a result of the drawdown.

Option 4-19 Cut Requirements for Pilots in Nonflying Positions

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-145	-115
2002	-204	-184
2003	-238	-224
2004	-272	-259
2005	-306	-294
2001-2005	-1,164	-1,077
2001-2010	-2,862	-2,754

RELATED CBO PUBLICATION:

Statement of Christopher Jehn, Assistant Director, National Security Division, on Pilot Retention: Issues and Possible Solutions, before the Subcommittee on Military Personnel of the House Committee on Armed Services (Testimony), March 4, 1999.

The Air Force and the Navy have fewer pilots than their stated requirements call for. In 1999, both services reported shortfalls of more than 1,000 pilots. The two services have undertaken several initiatives to address that problem, including paying special bonuses under the Aviation Continuation Pay program. But despite those efforts, pilot shortfalls are expected to persist for the foreseeable future.

This option would use an additional approach to address that problem: reducing the stated requirements for pilots in nonflying positions. Cutting those requirements by two-thirds would save \$115 million in outlays in 2001 and \$2.7 billion over 10 years by reducing the number of pilots who would need to be trained.

Both the Air Force and the Navy have many more pilots than they need for critical cockpit or flying positions. The shortfalls reflect the fact that the services have included many nonflying positions in their requirements for pilots. At the end of 1998, for example, nearly one-fourth of the Air Force's roughly 13,400 pilots were in nonflying positions, as were about half of the Navy's 6,600 pilots.

Supporters of this option would argue that some of the nonflying positions identified as requiring pilots are already being adequately filled by personnel with other backgrounds. In addition, the services could employ aviation navigators in some nonflying positions that require the expertise of a pilot.

The principal disadvantage of this option is that reducing the number of nonflying positions reserved for pilots could limit pilots' opportunity to gain the broader experience they need to progress in their careers. That problem might be alleviated, however, if the Air Force and Navy established a fly-only career path specifically for pilots who wanted to spend all 20 years of their military service in flying assignments. (Some pilots have indicated that they joined the military to fly and might be willing to stay in such a career path even if it limited their ability to be promoted.) A fly-only career path would lessen the number of nonflying positions needed to provide pilots with career-broadening opportunities. Another disadvantage of this option is that it might not leave enough shore positions for Navy pilots to rotate into between their tours at sea.

Option 4-20 Restructure the Officer Corps

As part of the post-Cold War drawdown in the military, each of the services cut its officer corps signifi-

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	242	-35
2002	-123	-331
2003	-517	-655
2004	-904	-982
2005	-1,644	-1,394
2001-2005	-2,945	-3,397
2001-2010	-12,120	-11,990

RELATED CBO PUBLICATION:

The Drawdown of the Military Officer Corps (Paper),
November 1999.

cantly. Those cuts, however, were accompanied by a change in the composition of the armed forces. The ratio of enlisted personnel to officers declined from 6.0 to 1 in 1989 to 5.2 to 1 in 1999 because the officer corps was cut by a smaller percentage than enlisted personnel. The percentage of senior officers—those in the general or flag grades as well as the so-called field grades (major through colonel)—increased. The percentage of officers who entered the military through the service academies also rose.

This option would offset those apparent consequences of the drawdown. It would return the enlisted-to-officer ratio and the percentage of general and flag-level officers to the levels that existed in 1989, when the drawdown began. In addition, the percentage of newly commissioned officers trained in the service academies would be reduced. The option would also reduce the number of field-grade officers, restoring the limits on those positions to levels consistent with the Defense Officer Personnel Management Act before the drawdown. Compared with the Administration's budget request for 2000, those changes would save \$35 million in outlays in 2001 and a total of \$12 billion through 2010.

In carrying out the drawdown, the services tried to protect officers who were already in the force, many of whom had based their career expectations and fi-

nancial plans on continued military service. The decline in the enlisted-to-officer ratio suggests that those efforts may have created an unbalanced force. The services might argue that the decline was driven by changing requirements as a result of new technologies and military doctrines that have decreased the need for enlisted personnel relative to the need for officers. But some critics see the timing of the shift as suspicious. Moreover, when the drawdown began, none of the services expected that their future requirements for enlisted personnel would fall as much as they did relative to requirements for officers. This option would restore the enlisted-to-officer ratio to the 1989 level of 6.0 to 1 by reducing the size of the officer corps by about 15,900 and increasing the size of the enlisted force by an equal amount.

That reduction would be targeted primarily toward officers in the field, general, and flag grades. The percentage of general and flag officers would be reduced gradually to the 1989 level by restricting promotions into those grades. Reductions in the field grades could be achieved by encouraging officers to leave the service voluntarily, through such programs as the temporary early retirement authority (TERA), voluntary separation incentive (VSI), and special separation benefit (SSB).

Over a period of four to five years, the number of general or flag officers would be reduced by about 200 through attrition, while about 12,600 field-grade officers and 3,100 junior officers (second lieutenant through captain) would be separated. Assuming that field-grade officers with less than 20 years of service would receive TERA and those with 6 to 15 years of service would receive VSI or SSB, the savings in pay would initially be offset entirely by the cost of separation payments. Net savings in pay would amount to a total of \$9.6 billion through 2010.

Supporters of this option would argue that the services' actions have resulted in a force that is too senior and contains more officers than needed to lead the remaining enlisted personnel. In their view, much of the expertise and combat readiness that senior officers provide could be obtained at lower cost from highly capable senior enlisted personnel and junior officers. Opponents, by contrast, might argue that

separating additional senior officers would constitute a breach of faith because it would cut short the careers of some service members. Moreover, the services' efforts to implement the Goldwater-Nichols Defense Reorganization Act of 1986 and the Defense Acquisition Workforce Act of 1990 may have increased requirements for those relatively senior officers.

This option would also return the mix of academy and nonacademy graduates entering active duty to the level that prevailed before the drawdown. Although the number of students in the service academies declined during the drawdown, academy graduates account for 14 percent of new officers now compared with 9 percent in the early 1980s. Under this option, the total number of officer accessions would remain near the level planned by the Department of Defense, but the services would draw more officers from lower-cost commissioning programs—the Reserve Officer Training Corps (ROTC) and Officers Candidate School/Officer Training School (OCS/OTS)—and fewer from the more costly service academies. The estimated savings from that action reflect only the costs that would change in the near term, such as operating expenses and pay for faculty and cadets. Those savings would be partially offset by additional costs of about \$350 million over 10 years to procure officers from OCS and ROTC to replace those from the academies. As a result, this change would save \$75 million in outlays in 2001 and a total of nearly \$2.4 billion through 2010. In the longer term, savings might also accrue from changes in the academies' physical plant.

Supporters of changing the mix of new officers might argue that the academies are larger than many successful private colleges and that additional cuts to them are feasible. Moreover, a balanced mix of academy graduates and accessions from other commissioning programs may be needed to maintain good civil/military relations and ensure that the officer corps reflects the full diversity of U.S. society. Opponents of that change would contend that the service academies are the best source of future military leaders and that academy graduates are well worth the dollars spent on them. Some opponents might also argue that the academies have already reduced their class size to the minimum efficient level.

Military Equipment and Facilities

To be ready for their missions, military units must have well-maintained equipment and facilities. Much of DoD's spending on readiness is devoted to that purpose. The department spends approximately \$38 billion a year on maintaining its equipment—including the costs of intermediate maintenance performed at on-base repair shops, repair tasks performed at DoD's centralized maintenance depots, and tasks performed by contractors. In addition, the department devotes more than \$22 billion a year to replacing, operating, and maintaining its infrastructure of buildings and facilities.

Maintaining equipment and facilities contributes to readiness directly by improving a unit's ability to carry out its assigned duties. That effect is most evident in the case of maintenance for combat systems: the extent to which its equipment is maintained in a condition that allows a unit to perform its missions is one of DoD's most important readiness indicators. The link between facilities and readiness is less direct, although senior defense officials argue that poorly maintained operational facilities can affect the safety and speed at which tasks are performed.

The quality of military equipment and facilities also contributes to readiness indirectly through its impact on morale, recruiting, and retention. That relationship may be most obvious in the case of quality-of-life facilities, such as on-base housing or buildings devoted to morale, welfare, and recreation programs. But poor working conditions and inadequately maintained equipment can also affect morale.

In addition, funds spent on keeping equipment and facilities from deteriorating and developing more serious maintenance problems contribute to readiness over the long run. By reducing the cost of future maintenance, they free up resources for other readiness needs. Even in the short run, failure to budget enough for maintaining and operating buildings can force base commanders to shift resources away from high-priority readiness programs (including unit training) to meet emergency needs.

Support of DoD Facilities

DoD is trying to develop a consistent and objective method for determining how much funding it requires to provide high-quality facilities for military personnel. Until it achieves that goal, estimates of funding shortfalls for maintenance of real property will remain uncertain. Nonetheless, comparisons of DoD spending with levels in the private sector suggest that the department tends to underfund real property maintenance. At various times, both the Congress and the Office of the Secretary of Defense have tried to increase that funding. In the late 1970s, the Congress responded to concerns about the "hollow force" by trying to keep the backlog of unfunded requirements for real property maintenance at the 1978 level. At other times, the defense planning guidance issued by the Secretary has set a minimum for the amount of real property maintenance to be funded relative to requirements. Among the options in this section are ones that would provide additional funding to maintain or replace aging facilities.

Yet in many cases, DoD may not need to maintain its existing inventory of real property. The military has large numbers of excess bases and facilities. Since the beginning of the drawdown, the average square feet of DoD buildings per active-duty service member has risen by about 35 percent. Options that would allow the department to close additional bases might help DoD bring its ownership costs under control. Other options that would reduce the need for additional funding would demolish excess buildings or lower the costs of operating buildings that remain in the inventory. In addition, previous options in this chapter that would reduce DoD's role in providing retail stores, housing, and medical care could significantly cut ownership costs by allowing the department to scale back the number of facilities it maintains.

Option 4-21 Increase Funding for Military Construction

When defense budgets are tight, one type of investment that is frequently deferred is military construc-

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	764	50
2002	777	382
2003	791	604
2004	805	729
2005	821	781
2001-2005	3,958	2,546
2001-2010	8,302	6,815

tion—particularly construction not associated with base realignment and closure actions. Eventually, however, outdated or inadequate facilities can have a negative impact on the readiness and morale of U.S. troops. This option would increase funding for military construction by \$750 million a year (in 2000 dollars) through 2010. Those funds would allow DoD to increase its military construction by about 17 percent above planned levels.

At the current level of spending, the Department of Defense could replace its inventory of real property every 145 years—more than double the 67-year service life that the department recommends. Thus, when the average DoD facility (now 44 years old) reaches the end of its designated service life, it will be maintained rather than replaced. But as facilities age, they become more expensive to maintain. At some point, it may be cheaper to construct a new facility than to continue maintaining an older one. Additional funding for military construction would allow the services to replace facilities when that was cost-effective.

In February 1999, the service chiefs requested an additional \$400 million to meet their construction requirements for fiscal year 2000. They argued that the additional funds could help finance projects directly related to mission capabilities (such as runways, piers, and training facilities) as well as quality-of-life projects (such as barracks) that contribute to readiness through their impact on retention and morale. The services always have a long list of construction projects they could undertake if funds were available,

however, so it is difficult to know how much military construction funding they actually need.

One way to estimate that amount is to compare current funding with the levels of the 1980s, a period of relatively ample defense spending. The results of that comparison, however, vary widely depending on the measure used. To match the levels of spending per active-duty member seen in the 1980s, the department would have to increase its planned spending by about \$750 million a year (in 2000 dollars). To keep funding proportional to the square feet of buildings in DoD's inventories, by contrast, the needed annual increase would be about \$2.3 billion. That latter amount is probably an overestimate because DoD has a large number of excess buildings in its inventories that will be demolished when they reach the end of their service life. To avoid giving DoD money to replace unneeded facilities, the funding increase in this option is based on the lower estimate.

The principal disadvantage of this option is its cost, which would amount to \$8.3 billion over 10 years. Because military construction has an indirect impact on mission capabilities, the benefits of additional construction projects are difficult to quantify. Thus, it is unclear whether additional funds would be better spent on construction projects or on other defense needs, such as weapons procurement. In addition, extra funds run the risk of being earmarked for projects that DoD does not consider its most pressing.

Option 4-22 Increase Funding for Real Property Maintenance

The services' real property maintenance (RPM) accounts are used to finance major and minor repairs, recurring maintenance, and related activities for the Department of Defense's stock of real property. RPM contributes to the readiness of U.S. forces by helping to ensure that facilities such as runways, docks, and piers are properly maintained and capable of their intended uses. In addition, DoD argues, having properly maintained facilities contributes to the quality of life of U.S. soldiers; crumbling roofs and exposed wiring

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	713	93
2002	725	486
2003	738	650
2004	752	714
2005	766	743
2001-2005	3,694	2,686
2001-2010	7,749	6,618

in barracks, military hospitals, or work areas could be detrimental to morale, if not dangerous.

This option would increase funding for real property maintenance by \$700 million per year (in 2000 dollars) in 2001 through 2010 (from the current level of \$5.3 billion to \$6 billion). That increase would cost DoD a total of about \$7.7 billion through 2010.

According to testimony given by the services, the condition of DoD facilities has degraded in recent years. The average facility is 44 years old and approaching the end of its designated service life (67 years). As facilities age, the amount of maintenance they require increases. Commanders at some installations have reallocated resources originally appropriated for training and other operation and maintenance activities to their RPM accounts, which suggests the need for additional funding.

According to some criteria, DoD is significantly underfunding the maintenance of its facilities. For example, the Federal Facilities Council recommends funding maintenance activities for real property at a level of 2 percent to 4 percent of the cost to replace the property. DoD currently funds RPM at less than 1 percent of the replacement value of its facilities inventory. Following the council's recommendation and funding maintenance at just 2 percent of replacement value would require an additional \$7 billion per year.

The \$700 million annual increase in this option would improve DoD's ability to maintain its facilities

but would be unlikely to result in overfunding that might encourage the department to maintain unneeded facilities. The actual amount of additional funding that DoD might need is uncertain, however. DoD's Installations Policy Board is trying to determine the appropriate level of spending on property maintenance. The board is encouraging a number of cross-service programs to provide common definitions and standards for measuring requirements, but their work is not yet complete.

Some critics of this option would argue that DoD has other pressing needs, including weapons procurement, that have a better claim to additional resources. DoD could control maintenance costs, they would say, through other approaches, such as demolishing excess facilities or replacing aging structures. Other opponents of this option, however, would contend that an increase of \$700 million a year might not be enough to allow DoD to stem the deterioration of its facilities.

Option 4-23 Close and Realign Additional Military Bases

Beginning in the late 1980s, DoD sought to reduce its operating costs by closing unneeded military bases. Significant reductions in force structure at the end of the Cold War made many bases unnecessary. Because political and procedural difficulties had long made closing bases nearly impossible, the Congress set up four successive independent commissions on base realignment and closure. Those commissions recommended shutting or realigning (moving departments and facilities at) hundreds of military installations in the United States, Puerto Rico, and Guam. When all of the actions from the four BRAC rounds are completed, DoD will save about \$5.6 billion a year in operating costs, it estimates.

This option would authorize two additional rounds of base closures and realignments in 2003 and 2005. In the long run, such actions can produce substantial savings. However, they require some up-front investment, so costs would increase in the short run. Between 2001 and 2010, this option would reduce

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	0	0
2003	0	0
2004	558	173
2005	1,189	570
2001-2005	1,747	743
2001-2010	-4,666	-1,099

RELATED CBO PUBLICATIONS:

Review of *The Report of the Department of Defense on Base Realignment and Closure* (Letter), July 1998.

Closing Military Bases: An Interim Assessment (Paper), December 1996.

DoD's costs by a net total of \$4.7 billion. Beginning in 2012, the department could realize recurring savings of around \$4 billion per year. Those estimates are based on DoD's experience and current projections for the four earlier rounds of base closings. (The estimates do not include the costs of environmental clean-up, since DoD is obligated to incur such costs regardless of whether it operates or closes bases.)

Closing and realigning additional military bases is consistent with DoD's overall drawdown of forces. By several measures, planned force reductions significantly exceed the projected decrease in base capacity. For example, the department intends to cut the number of military and civilian personnel by 34 percent from the 1990 level. But according to DoD, only 21 percent of the base infrastructure in the United States has been eliminated.

The Secretary of Defense asked the Congress in early 1998 and again in early 2000 to authorize two more rounds of base closures. In *The Report of the Department of Defense on Base Realignment and Closure* of April 1998, DoD stated that opportunities exist for further cutbacks and consolidations at several types of bases—such as defense laboratories, test and

evaluation installations, training facilities, naval bases, aircraft installations, and supply facilities.

Some analysts, however, argue that the BRAC cuts have gone far enough in matching the planned reductions in forces. The base structure, they say, should retain enough excess capacity to accommodate new risks to national security that could require a surge in the number of military forces. Opponents of more closures also cite the possible adverse economic effects on local communities. Some opponents suggest that savings could be made by demolishing certain buildings or by achieving other operating efficiencies short of closing bases.

Option 4-24 Demolish Excess and Obsolete Structures

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	30	21
2002	23	23
2003	15	17
2004	-22	-11
2005	-23	-21
2001-2005	23	28
2001-2010	-98	-93

The defense drawdown has left many military bases with structures that the services no longer need and that have no remaining asset value. Those structures include buildings, such as schools and family housing units, as well as other facilities, such as piers and runways. In some cases, the structures are dangerous eyesores. In other cases, their availability attracts marginal users who benefit from occupying them because the users are not required to pay the full costs of the utilities and other support that the bases provide. Although demolishing those structures would entail

up-front spending, it would allow the Department of Defense to avoid future maintenance costs. Estimates by DoD suggest that demolition projects may pay for themselves in as little as five years.

This option would increase funding to tear down excess, obsolete structures by \$35 million a year over the 2001-2003 period. A majority of those annual funds, \$30 million, would be allocated to the services' operation and maintenance (O&M) accounts to fund the demolition of excess facilities that are maintained with O&M dollars. The remaining \$5 million would be allocated to the family housing accounts to pay for demolishing obsolete family housing units that are too costly to repair. Those funds would allow DoD to increase demolitions by 6 percent from planned levels and would generate \$22 million in annual savings after 2003.

The services expect to tear down 80 million square feet of buildings by 2003 in accordance with a management reform that the Office of the Secretary of Defense (OSD) began in 1997. Recent defense plans have extended the Air Force's and Navy's demolition programs to 2005 to accommodate their large inventories of structures other than buildings. DoD plans to spend a total of \$773 million on demolition programs during the 2000-2003 period, with an estimated savings in O&M costs of \$160 million a year after that.

However, DoD officials maintain that the department's inventory of real property will still contain excess structures, such as buildings and other facilities that are maintained with O&M dollars, after the current demolition programs are completed in 2005. Funding above planned levels would be necessary to demolish the rest of those excess structures and generate additional O&M savings. In addition, current OSD plans do not fund the destruction of excess, obsolete family housing units. Although the services' family housing commands have adopted demolition as a key tool in their strategies for real property management, critics argue that the resources devoted to those activities are inadequate.

The primary disadvantage of this option is that the quantity of structures that are both excess and obsolete is unclear. If DoD has underestimated its requirements for facilities, demolition programs may destroy a structure that has a potential use in the fu-

ture. One alternative to demolition is to board up a facility and cease maintaining it. Nonetheless, as long as structures remain in DoD's inventory, the department is likely to feel pressure to maintain them and make them available to potential users.

Support of Equipment

The military faces a number of challenges in its efforts to keep equipment in good working order. According to the services, the aging of equipment (described in Chapter 3) increases both the hours that must be spent on maintenance activities and the number and cost of spare parts. Other concerns cited by military leaders include a lack of well-trained maintenance personnel and wear and tear on equipment from an increased pace of operations. A further problem is shortages of spare parts—resulting not only from inadequate funding but also from inaccurate forecasts of requirements and poor control over existing inventories.

Despite those challenges, neither the Army nor the Marine Corps is reporting major problems with the readiness of equipment in its ground units. Moreover, a recent review of 16 of the Army's key air and ground systems—including CH-47D (Chinook) and AH-64D (Apache Longbow) helicopters, M1 tanks, and Bradley fighting vehicles—found "no increase in percent of equipment not mission capable and no downward trends that would indicate worsening conditions."⁵

Some observers believe, however, that the two services' success in keeping their aging equipment mission-capable is being achieved at the cost of unreasonably long working hours for maintenance personnel. To the extent that excessive workloads affect retention, that may not be a sustainable strategy. Unit commanders in the Army report that the availability of maintenance personnel with the right skills and experience is their most significant equipment readiness problem. And if maintenance personnel are heavily pressed in peacetime, their ability to maintain equipment at a wartime tempo of operations could be doubt-

5. General Accounting Office, *Military Readiness: Readiness Reports Do Not Provide a Clear Assessment of Army Equipment*, GAO/NSIAD-99-119 (June 1999).

ful. Both the Army and the Marine Corps argue that modernization of equipment is necessary to prevent greater demands for maintenance in the future (see Chapter 3).

In the Air Force and Navy, by contrast, shortages of spare and repair parts have hurt the readiness of aviation units. The Navy reports that maintenance problems have contributed to a cycle in which the readiness of nondeployed air wings has declined further each year since 1996, forcing ever-greater shifts in resources to units just before deployment. In the Air Force, lack of adequate spare parts accounts for about half of the 10 percentage-point decline in overall mission-capable rates since 1991. Shortages of spare parts have also been a problem for Marine Corps aviation units. According to DoD, such shortages for Navy, Air Force, and Marine Corps aircraft result in part from unexpectedly high failure rates for some parts, past constraints on funding, and problems encountered in trying to introduce modern business practices.

Those problems, however, are not necessarily a sign that additional funding is needed now. It can take 12 to 36 months for spare-parts funding to affect supplies at the unit level, so today's low mission-capable rates in some operational units could be primarily a legacy of past problems. The Navy says it has begun to see reductions in rates of aircraft cannibalization and maintenance backlogs and increases in the percentage of aircraft available. The Air Force predicts that funding now in the pipeline will improve its mission-capable rates.

Whether past increases in funding for spare parts will significantly improve readiness in the near term remains to be seen. And even if current funding is adequate and problems with equipment readiness are being resolved, additional steps may be needed to forestall future problems in both ground and air units as weapon systems continue to age.

One of the options below looks at improving the condition of existing systems by replacing components that have high failure rates or rely on obsolete technology with more reliable components that, because they use current technology, might also be easier for the supply system to stock. Other options focus on DoD's ability to manage and control the cost of its mainte-

nance activities. Although management initiatives are generally seen as ways to reduce costs, they could also make high-quality maintenance more affordable and thus more available over the long run.

Option 4-25

Apply Technology to Reduce the Cost of Operating Equipment

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	600	241
2002	600	433
2003	359	345
2004	-74	10
2005	-600	-455
2001-2005	886	575
2001-2010	-4,625	-4,654

RELATED CBO PUBLICATION:

Paying for Military Readiness and Upkeep: Trends in Operation and Maintenance Spending (Study),
September 1997.

In some circumstances, agencies need to spend money to save money. This option would provide an additional \$600 million a year to invest in technologies to reduce the operation and maintenance (O&M) costs of weapon systems. The funds would go into "technology insertion accounts" that would be held at the headquarters level of each service and be applied to equipment already used by military units in the field—for example, to support the research, development, procurement, and installation of reliable digital compasses in place of antiquated analog versions, or to replace universal joints on truck axles with constant-velocity joints, which reduce a fleet's tire wear by one-third. Such investments can lessen the need to repair or replace failed components, freeing up maintenance workers and ultimately reducing the costs of operating

equipment. Similar opportunities to save on O&M costs without sacrificing performance exist for all of the services' aging weapon systems. Over 10 years, the \$6 billion investment in this option could produce \$10.6 billion in savings—for net savings of \$4.6 billion through 2010.

The services currently spend relatively little on technology insertion. Of the \$38 billion spent each year on maintaining weapon systems, only about \$600 million is devoted to technology insertion to reduce costs. As an extreme example, the program manager for the M1A1 Abrams tank—the Army's second largest weapon system—received only \$1.2 million for research and development (R&D) on ways to reduce the system's \$2.9 billion annual operating costs. Studies conducted for DoD by the Logistics Management Institute and others have concluded that funding for technology insertion is inadequate.

The military's current funding for technology insertion programs is limited for three main reasons:

- o The services focus their O&M spending on short-term needs rather than long-term investment. A March 1998 report by the Air Force Materiel Command stated, "The key barrier in today's increasingly tight budgetary environment is finding funding for an activity that will yield net benefits only in the future."
- o Technology insertion initiatives typically need small quantities of funds from different appropriations—R&D, procurement, and O&M. But the services are prohibited (partly by law and partly by DoD regulations) from using R&D or procurement dollars for components that reduce O&M costs. The dilemma is that officials who want to reduce O&M costs cannot tap into the correct pots of money—R&D or procurement—to do so.
- o No incentives exist to encourage technology insertion. Maintenance depots do not have a vested interest in improving the reliability of equipment, because that would reduce their already dwindling workload. Officials who control R&D or procurement funds often focus on the costs not of systems already in the field but of the next emerging weapon system.

This option would promote technology insertion through a combination of new funds and new funding mechanisms. The newly created accounts would be "fenced," or earmarked only for technology insertion, and would contain a blend of R&D, procurement, and O&M funds. Within each service, program managers of weapon systems would compete for access to the funds on the basis of their ability to demonstrate potential gains from technology insertion. Thus, program managers could have the resources to change the O&M costs of their systems. Establishing a separate pool of money for technology insertion would also create incentives within industry to vie for those dollars. If equipment manufacturers, subcontractors, and even depots knew that funding was available for R&D and procurement, they would have an incentive to devise and promote options for reducing O&M costs. Burden-sharing of R&D costs with private industry could increase because more dollars would be available for procuring the new technologies. (Industry officials have stated a willingness to assume the risks associated with research and development, but only if they can be assured of future procurement funding if the R&D is successful.)

The 10-year savings of \$4.6 billion estimated for this option assume that each \$1 invested in technology insertion yields a return of \$3 over five years. The services report a range of returns on such investments, from 3-to-1 to as much as 20-to-1. But the dozens of separate O&M cost-reducing programs now in place suffer from inaccurate accounting of realized savings, so counting on high rates of return might be unrealistic. Many of those programs do not attempt to track the results of technology insertion. To help ensure a high rate of return under this option, project managers would provide account managers with detailed proposals that would include information about the past O&M costs of their systems, estimates of projected savings, and procedures to track and verify those savings.

Although potentially large, the savings under this option are uncertain. And as with any investment, there is a risk that DoD would not receive a good return on the investment. Service leaders claim they cannot absorb many more proposals for R&D or engineering changes without adding personnel to analyze and implement the proposals—thus adding to the cost of technology insertion and reducing the return. In

addition, estimated savings might not materialize because reducing the labor force simply because of a labor-saving initiative is often difficult, both politically and practically. Finally, accurate data on costs and savings are not readily available, further clouding claims of gains made.

Each of the services is currently reforming its programs to account for the life-cycle costs of weapon systems, which could help better identify savings, but those efforts are not closely tied to technology insertion programs. Therefore, some observers argue that DoD should wait until the services can track costs better before offering additional funds to reduce costs.

Option 4-26 Change the Management and Pricing of Repairs

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	-46	-35
2002	-154	-125
2003	-735	-586
2004	-403	-447
2005	-352	-370
2001-2005	-1,691	-1,563
2001-2010	-3,434	-3,321

When subcomponents of weapon systems (such as transmissions and radars) break down, unit commanders often have them repaired in the unit's own maintenance and repair shops—called intermediate maintenance facilities, or general support facilities in the Army. That is the case even if it would be less costly for DoD as a whole if the subcomponents were sent to large, centralized maintenance facilities—called depots—for repair.

This option would reduce costs by changing the way in which DoD manages and charges for repair of those subcomponents—known as depot-level repairables (DLRs). Under this option, repair work for DLRs would be allocated to either depots or intermediate facilities by managers who were aware of the full costs of both sources of repair and had an incentive to minimize DoD's total repair bill. Such a system could save the department \$3.4 billion over 10 years through improving inventory efficiency alone.

In the early 1990s, DoD tried to reduce the demand for repairs and make unit commanders more careful in their use of DLRs by shifting repair funds out of central accounts and into the budgets of individual units. To a large degree, the plan succeeded: demand for repair and replacements of DLRs declined. But because of problems in the price structure for repairs, shifting financial responsibility to unit commanders had unintended consequences. The prices that depots charge for DLRs overstate the actual cost of doing repairs because depots must cover their overhead and management costs. By contrast, some of the costs that intermediate facilities face (including the costs of capital and military labor) are not included in the prices that units pay. Thus, commanders have a financial incentive to repair DLRs in their own facilities regardless of the actual cost, and repair jobs that before would have gone to a depot are being handled by intermediate facilities. According to one joint Navy/Office of the Secretary of Defense study, intermediate maintenance is up to twice as expensive as depot repairs. Because intermediate facilities are not as well equipped for some tasks as depots, repairs could take longer or have higher failure rates. Besides raising costs, the shift in workload has increased excess capacity in the depots and may have decreased the quality of repairs overall.

This option would try to improve the distribution of the DLR workload between depots and intermediate maintenance facilities by centralizing management of DLRs. More important, it would provide a pricing system that more accurately reflects the actual cost of repairs. Within each service, equipment (or item) managers would assume control of all DLR inventories and allocate repairs between depots and intermediate facilities. They, not unit commanders, would de-

cide which source of repair was less costly. Commanders would have a single point of contact—the item manager—for each type of DLR, regardless of whether the work had been allocated to an intermediate facility or a depot.

Under this option, both depots and intermediate facilities would charge item managers for repairs. Each repair facility would set its prices to cover only those costs that varied with the DLR workload, taking into account the time to complete the work, quality, and return of broken DLRs. In other words, it would cover the additional costs that would be incurred for each specific repair, such as materials, labor, and transportation. That pricing structure has been proposed by economists at RAND, the Center for Naval Analyses, and elsewhere. By encouraging item managers to send DLRs to the facility that could do the work at the lowest cost, it would let DoD minimize its total repair bill.

Intermediate facilities would continue to rely on direct appropriations to cover their fixed capital and overhead costs. In addition, military personnel who would deploy as part of maintenance units in wartime could continue to be assigned to intermediate facilities in peacetime and be paid from their service's central military personnel account. However, costs that varied with the amount of repair work at the intermediate facility would be covered not through direct appropriations but through the prices charged for DLR repairs. Those costs would include the salaries of civilian workers and military personnel whose positions were required not because of wartime deployments but because of the DLR repair workload in peacetime. In turn, the intermediate maintenance facilities would be required to reimburse the services' military personnel accounts for those salaries.

In the case of depots, repair costs that did not vary with workload would be paid by customers through a flat charge that did not depend on how much work they sent to the depot that year. Such a two-part pricing system—a flat charge plus a variable fee based on workload—is similar to the system that some telephone companies use. Costs that were not related to ongoing repair tasks but were previously included in DLR prices would be covered by direct appropriations. For example, the costs of maintaining excess

facilities for wartime, such as the Army's Watervliet facility (a unique plant that manufactures large gun barrels), would not be charged to depot customers. That approach to pricing would allow the depot to cover its total costs but not charge more for an additional task than the task would cost to perform. A study by RAND concluded that such an approach would reduce the prices that depots charge for repairs. A price reduction could shift a significant amount of the DLR workload back to depots.

One disadvantage of this option is that commanders would have less control over their intermediate maintenance facilities. Thus, it would be harder for them to ensure that those facilities provided an adequate minimum number of personnel to cover wartime tasks or to support deployments and contingency operations. In addition, centralization and worldwide management of the DLR inventory would require new software and computer systems.

Another disadvantage is that developing appropriate prices for the depots and intermediate facilities could prove difficult. Depot managers, anxious to attract work by keeping their prices as low as possible, might try to move costs into the flat charge or direct appropriations that were in fact part of the costs of repair that varied with workload. Alternatively, depot managers might be reluctant to separate repair costs that varied with workload from those that were fixed because doing so would highlight their degree of excess capacity. In addition, an accurate historical database of repair costs at intermediate facilities does not exist, which makes pricing DLR repairs there difficult.

A more fundamental concern is that it might be difficult to predict exactly how managers would respond to the new prices. (DoD, for example, failed to predict how managers would respond to the current DLR pricing scheme.) The unintended consequences of changing prices could outweigh the benefits if this option was not implemented carefully and systematically. Opponents of this option might argue that it would be simpler for DoD to just order work to go to the facility that could perform it at the least cost. Supporters might counter that DoD already has rules about where DLRs are to be repaired but that current DLR prices are driving units to ignore those rules.

Option 4-27 Consolidate Depot Functions and Close Some Facilities

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2001	0	0
2002	386	120
2003	243	111
2004	94	32
2005	-311	-54
2001-2005	411	208
2001-2010	-1,232	-1,234

RELATED CBO PUBLICATION:

Public and Private Roles in Maintaining Military Equipment at the Depot Level (Study), July 1995.

Despite four rounds of base realignment and closure, the services still have a large number of underutilized buildings and equipment within their network of maintenance depots. The individual services, the Office of the Secretary of Defense, and the General Accounting Office (GAO) have all recommended closing additional depot facilities to reduce that excess capacity, which GAO has estimated at about 50 percent and rising.

This option would authorize a BRAC commission that would focus exclusively on maintenance depots. Assuming the commission identified up to five facilities for closure, this option could save a total of \$1.2 billion between 2001 and 2010. Closing additional depots would require some up-front investment, but the Department of Defense would probably break even within five to six years.

When the actions recommended by the four previous BRAC rounds are completed next year, 19 of the 38 major government-owned and -operated depots that existed in 1988 will no longer be functioning as government entities. Nevertheless, the depot network will still have excess capacity because its workload is declining for four reasons: the overall military force structure and stocks of weapons and equipment continue to be reduced, most new or modified weapon systems are more reliable than previous systems, manufacturers of weapon systems are seeking greater control over maintenance support for their systems, and some unit commanders are conducting more repairs in their own local maintenance facilities.

Proponents of a BRAC commission specifically for maintenance depots would argue that the unique characteristics of depots—including nondeployable personnel, huge fixed capital assets, and a mostly civilian workforce—set them apart from conventional military bases. In that view, the special expertise required to understand depot-industry issues—to determine to what extent repairs could be made more efficiently in the private sector and to define and identify excess capacity from an overall DoD perspective—underscores the need for a specialized BRAC panel whose members have knowledge of the unique attributes of the depot system. (That argument could also apply to the defense laboratories, research facilities, and test and evaluation facilities.)

Opponents of this option, by contrast, might argue that depot realignments and closures have gone far enough. Many critics feel that DoD should retain enough capacity within its depot system to accommodate new risks to national security that could require a surge in depot-level maintenance. In addition, depot closures could have adverse economic effects on local communities—at least in the short run.

Instead of closing more depots, opponents would argue, DoD could reduce excess capacity by entering into public/private partnerships that utilized that capacity during peacetime and thus made depots more cost-effective. For example, the commercial aviation industry reportedly faces a shortfall in its depot capacity and could potentially become a partner in sharing the costs of maintaining military depots.

Contributors to This Volume

The following Congressional Budget Office analysts prepared cost estimates for or wrote the options that appear in this volume:

Michael Aguilar	Facilities investments
Russell Beland	Department of Defense schools
John J. Cadigan	Housing, unemployment compensation
Kent R. Christensen	Base closures
Anne M. DePree	Facilities investments
Richard L. Fernandez	Pay and bonuses
Geoffrey E. Forden	Strategic systems, satellites and other space systems, atomic energy defense activities
Raymond J. Hall	Strategic systems, ships, space programs, atomic energy defense activities
Sarah T. Jennings	Officer personnel, military child care
Gregory T. Kiley	Equipment maintenance
Eric J. Labs	Ships, unmanned aerial vehicles and other reconnaissance systems
Matthew A. Martin	Military construction, operation and maintenance
David E. Mosher	Strategic systems, national and theater missile defenses, atomic energy defense activities
Sam Papenfuss	Military health care
Lane Pierrot	Air Force, Navy, and Marine Corps aircraft
Dawn A. Sauter	Military personnel
Marvin M. Smith	Officer personnel
Rachel Schmidt	Military health care
Jo Ann Vines	Army and Air Force weapons and forces
Laurinda L. Zeman	Army weapons and forces