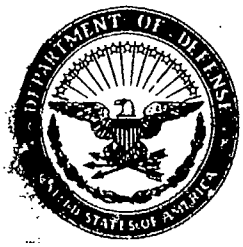
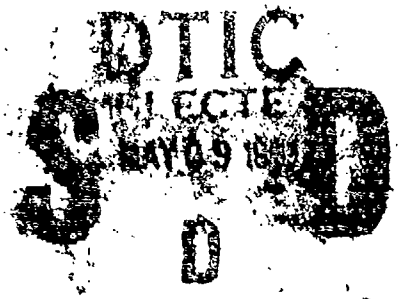


Total Force Policy Report to the Congress

Supplement



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Total Force Policy

Report to the Congress

Supplement

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INDEX TO SUPPLEMENT

This supplement to the Total Force Policy Study provides additional information on selected topics covered in the Final Report. The material is organized into eight papers focusing on different aspects of the Total Force. The content of the papers is described briefly below.

MEMBERSHIP AND ACTIVITIES OF THE TOTAL FORCE POLICY STUDY GROUP

Formal Meetings

The Secretary of Defense signed the charter establishing the Total Force Policy Study Group on December 26, 1989. The Study Group was composed of 24 senior civilian and military officials appointed by the Secretary of Defense (see membership roster on page 2). The Assistant Secretary of Defense (Force Management and Personnel) and the Assistant Secretary of Defense (Reserve Affairs) served as chairman and vice chairman, respectively, of the Study Group.

The Study Group held its first meeting on February 2, 1990, with the Secretary of Defense and the Chairman of the Joint Chiefs of Staff in attendance. Over the course of the study, the group met formally approximately 20 additional times. In these sessions, it addressed topics such as:

- Possible conflict scenarios and the forces and capabilities needed to respond to them;
- Short-warning contingencies and their force and capability needs;
- The advantages and disadvantages of alternative techniques for gaining the use of reserve forces for operational missions, including voluntary participation and use of the Presidential call-up authority;
- Alternative methodologies to evaluate the relative costs of active and reserve forces;
- Land, naval, and tactical air force requirements and capabilities;
- Strategic mobility requirements and capabilities;
- Manpower, personnel, and training policies; and
- Medical manpower requirements.

Colloquia with Outside Experts

To obtain the insights and recommendations of outside experts and policymakers, the Study Group hosted three colloquia. The first colloquium was held on April 10, 1990, and was attended by former senior military and civilian officials and representatives of important public or private policy groups, including:

TOTAL FORCE POLICY STUDY GROUP

Chairman: Assistant Secretary of Defense for Force Management and Personnel

Vice Chairman: Assistant Secretary of Defense for Reserve Affairs

Members: Assistant Secretary of Defense for Health Affairs
Assistant Secretary of Defense for Legislative Affairs
Assistant Secretary of Defense for Production and Logistics
Assistant Secretary of Defense for Program Analysis and Evaluation
Department of Defense General Counsel
Assistant Secretary of the Army for Manpower and Reserve Affairs
Assistant Secretary of the Navy for Manpower and Reserve Affairs
Assistant Secretary of the Air Force for Manpower, Reserve Affairs, Installations, and Environment
Principal Deputy Under Secretary of Defense for Strategy and Resources
Chairman, Reserve Forces Policy Board
Director, J-5 (Strategic Plans and Policy), representing the Chairman of the Joint Chiefs of Staff
Deputy Chief of Staff (Operations and Plans), U.S. Army
Director, Strategy, Plans, and Policy Division, U.S. Navy
Deputy Chief of Staff (Programs and Resources), U.S. Air Force
Deputy Chief of Staff (Plans, Policies, and Operations), U.S. Marine Corps
Assistant Deputy Chief of Staff (Manpower and Reserve Affairs) for Reserve Affairs, U.S. Marine Corps
Chief, Army Reserve
Director, Naval Reserve
Chief, Air Force Reserve
Director Army National Guard
Director, Air National Guard
Chief, Office of Readiness and Reserve, Coast Guard

- A former Secretary of the Air Force;
- A former Assistant Secretary of Defense (Program Analysis and Evaluation);
- A former Principal Deputy Assistant Secretary of Defense (Systems Analysis);
- A former director of the Joint Staff;
- Two former chiefs of the National Guard Bureau;
- Representatives of the Reserve Officers Association; and
- The director of the Selective Service System.

At the first colloquium, the participants addressed topics such as the allocation of active and reserve missions, the use of section 673(b) call-up authority, resource allocation trends, and manpower efficiency.

The second colloquium, held on April 24, 1990, was devoted to Total Force issues of importance to the commanders-in-chief (CINCs) of the operational commands. The CINC or a senior representative from each of the following commands participated in that session:

- Atlantic Command (USLANTCOM)
- Central Command (USCENTCOM)
- European Command (USEUCOM)
- Forces Command (USFORSCOM)
- North American Aerospace Defense Command (NORAD)
- Pacific Command (USPACOM)
- Special Operations Command (USSOCOM)
- Transportation Command (USTRANSCOM)

The third colloquium was held on April 30 and May 1, 1990. At that meeting, the Study Group was addressed by the Secretary of Defense. A wide range of current and former federal officials participated in the session. They included:

- The Honorable John McCain, United States Senator
- The Honorable Herbert R. Bateman, Member of Congress
- The Honorable Beverly B. Byron, Member of Congress
- The Honorable William L. Dickinson, Member of Congress
- The Honorable G.V. (Sonny) Montgomery, Member of Congress
- Three former Members of Congress
- The director of the Congressional Budget Office
- Two former Secretaries of the Army
- A former Assistant Secretary of the Army for Manpower and Reserve Affairs
- A former Deputy Under Secretary of the Navy
- A former chairman of the Defense Advisory Committee on Women in the Services
- The executive director of the Reserve Officers Association
- A former U.S. Ambassador to NATO
- Two Adjutants General

The discussion topics focused on national strategy, force structure and force mix issues, appropriate missions and roles for reserve forces, the Presidential call-up authority, transfers of wartime missions to the reserves, resource allocation considerations, and public support issues.

Several outside experts who had been invited to attend the colloquia were unable to do so because of schedule conflicts or other reasons. Consequently, the chairman and vice chairman of the Study Group met individually with the following:

- A former Commandant of the Marine Corps
- A former chairman of the Reserve Forces Policy Board
- Two Adjutants General--one the president of the Adjutants General Association of the United States and the other the president of the National Guard Association of the United States

Technical Conferences

The work of the Study Group has been supplemented by two technical conferences. The first conference focused on costing methodologies and related matters, and addressed various techniques for evaluating the comparative costs of active and reserve forces in the performance of specific missions. That conference also permitted a discussion in some detail of the knotty definitional and data problems that hinder efforts to determine the transition, operating, and support costs associated with active and reserve units. The conference was attended by cost experts from each of the services. The second technical conference focused on key manpower, personnel, and training issues.

Commissioned Studies

In addition to the colloquia, conferences, and other meetings of the Study Group, several studies on topics related to the Total Force were commissioned. These are listed below.

Bailey, Ronald B. and W. Stanford Smith, *Army Cadre Divisions,* Logistics Management Institute, FP004-02TR3 (forthcoming).

Bailey, Ronald B., David V. Glass, and W. Stanford Smith, *Total Force Policy History,* Logistics Management Institute, FP004-02TR1, Bethesda, MD, December 1990.

Bailey, Ronald B., *Update of 1984 LMI Report on the Total Force,* Logistics Management Institute, FP004-02TR2, Bethesda, MD, February 1991.

Dial, Elizabeth B., *Contracting DoD Industrial Activities to the Private Sector: The Commercial Activities Program,* Logistics Management Institute, FP004-03TR2, Bethesda, MD, December 1990.

Dial, Elizabeth B. and Donald C. Frettol, *Host Nation Support,* Logistics Management Institute, FP004-03TR3, Bethesda, MD, December 1990.

Gotz, Glenn A., and Marygail K. Brauner, *Active Component Support for U.S. Army Reserve Component Training,* The RAND Corporation, R-4017-RA/FMP/PAE, Santa Monica, CA (forthcoming).

Grissmer, David, Richard Eisenman. William Taylor, Jennifer Kawata, *Managing the Enlisted Personnel Reductions,* The RAND Corporation, N-3274-FMP/RA/PAE, Santa Monica, CA (forthcoming).

Grissmer, David W., and Bernard Rostker, *Military Manpower Issues for the 1990's,* The RAND Corporation, N-3273-FMP/RA/PAE, Santa Monica, CA (forthcoming).

Grissmer, David W. and Jennifer Kawata, *Total Force Manpower Management: Personnel Flows Between Active and Reserve Components,* The RAND Corporation, R-4036-FMP/RA/PAE, Santa Monica, CA (forthcoming).

Heiser, Joseph M., *Civilian Combat Support in Vietnam: Some Lessons Learned,* Logistics Management Institute, FP004-03TR4, Bethesda, MD, December 1990.

Hix, William M. and Susan D. Hosek, *Elements of Change in Medical Force Structure: A White Paper,* The RAND Corporation, N-3272-FMP/RA/PAE, Santa Monica, CA (forthcoming).

Jennings, John B. and Elizabeth B. Dial, *Transportation Activities in Support of Operation Desert Shield,* Logistics Management Institute, FP004-03TR1, Bethesda, MD, December 1990.

Lacy, James L., *Cadre Approaches to Force Structure: The Army, Past and Future -- A White Paper,* The RAND Corporation, R-4023-PAE/RA/FMP, Santa Monica, CA (forthcoming).

Tillson, John, et al., *Alternative Concepts for Organizing the Total Force,* Institute for Defense Analyses, R-378, Alexandria, VA, November 1990.

CIVILIAN, CONTRACTOR, AND HOST NATION SUPPORT

The civilian component of the Total Force includes U.S. government employees, private firms providing contract services to the U.S. military, and civilian support provided by host nations to U.S. forces. While the use of nonmilitary personnel has been a success, civilian components are not interchangeable with all military positions. There are unique capabilities and limitations associated with each component, all of which must be considered in planning for the most effective and efficient Total Force. Currently, nonmilitary personnel constitute approximately 25 percent of the Total Force.

U.S. Government Employees. Federal civilian personnel make significant contributions to the Total Force. Although less expensive than active-duty personnel, government workers are more expensive than reservists, contractors, or host nation support. Even though they are more costly than the other nonmilitary alternatives, federal employees represent a reliable, controllable personnel base that can be used for sensitive full-time duties (such as intelligence operations) where maintaining government control is important but the skills of military personnel are not necessary.

Private Contractors. Contractors represent a manpower resource that can be acquired when and where needed at a predetermined cost. Contractors eliminate the need for government overhead structure (although contractor overhead costs are included in the price of contracts). Contractors, even when performing full-time duties, may be less expensive than active-duty military or government civilian personnel because they have greater flexibility in managing their businesses and may pay benefits and retirement compensation that are less than the standard for military or government civilians. In some cases, first-year savings from shifting to contractor support have been estimated at 30 percent of the cost of providing comparable services "in house." Reliance on contractors has provided the U.S. military with flexible low-cost services and promoted greater efficiency in the military and civilian government positions that have survived competitive review.

Contractors are a viable alternative both in the United States and abroad, in peacetime or war. At the peak of the Vietnam conflict, nearly 150,000 contractor personnel were employed in Southeast Asia in support of U.S. combat forces. Most of these individuals were Vietnamese nationals, but U.S. citizens and third-country nationals also were employed. These workers provided construction, transportation, supply, maintenance, and general logistics services. In some cases, they performed combat support functions, substituting for reserve forces, which were not recalled in large numbers. Pre-planned arrangements with contractors for infrastructure development and support in Third World wartime locations, such as were used in Vietnam, can act much like a host nation agreement as a means of avoiding costs in peacetime.

Since 1979, more than 80,000 U.S. military and civilian government positions have been reviewed as competitive candidates for contracting, and today over 220,000 positions in the Total Force are filled by contractors. More than 50,000 of the positions currently under contract are a direct result of the Commercial Activities program, while over 13,000 military and civilian government positions that were reviewed have been retained. The remaining contractor positions either existed prior to the inception of the Commercial Activities program or have always been filled by contractors.

More than 200,000 additional military and civilian government positions remain potential candidates for contracting out. Other positions have been removed from consideration, including those exempted from the Commercial Activities program by the Congress. Examples of such exemptions include more than 128,000 core logistics activities positions, and nearly 40,000 installation services positions.

Host Nation Support (HNS). Host nation support agreements reduce requirements for U.S. military support personnel. Host nation support avoids costs during peacetime, enhances the deployment of combat forces in wartime, and promotes burdensharing among allies. There is no uniform format or structure for HNS agreements, nor is such uniformity possible. Indeed, some nations, owing to political sensitivities, may not wish to conclude formal agreements, even though they intend to provide support. Lack of formal agreements does not preclude extensive host nation support, however, as can be seen from the support provided for Desert Shield/Desert Storm operations.

The United States obtains host nation support in varying degrees from almost all of its NATO allies, as well as from other nations, including Korea and Japan. The type and level of support varies from country to country, and may include facilities, exercise support, prepositioning facilities, or infrastructure. Estimates of the value of host nation support depend on the type of assistance provided, but all such arrangements reduce the costs of maintaining U.S. forces abroad. For example, as stated in the 1990 report to Congress, *Allied Contributions to the Common Defense*, the Japanese government paid at least 50 percent of the cost of employing Japanese workers at U.S. military facilities in Japan in 1990, with the total support from that country equating to about $40,000 for each U.S. service member stationed there.

Wartime host nation support (WHNS) consists of civilian or military assistance provided by host nations to allied forces operating from, or transiting through, their territory in time of war. It has been estimated that, for the Army alone, WHNS agreements provide capabilities equivalent to over 120,000 U.S. military support personnel. These are spaces not formed or paid for because of our ability to rely on allied assistance. The United States relies extensively on WHNS in Europe and Northeast Asia but, until recently, has had few such initiatives in the Americas and Southwest Asia.

The wartime host nation support agreement between the United States and Germany is the most comprehensive such arrangement, with 93,000 German reservists committed to the direct support of U.S. forces. Germany also has agreed to provide 22,000 items of equipment mobilized from its civilian sector. The savings to the United States from having Germany provide this equipment amount to approximately $578 million.

Implications of Reliance on Nonmilitary Force Elements. The use of nonmilitary force components has been a success. Host nation support agreements, especially in Europe, have enabled the United States to rely on smaller numbers of military personnel and to develop a base of structured, pre-planned burdensharing with its allies. Conversion of military and federal civilian billets to contractor positions under the Commercial Activities program has lowered military support costs in the United States and has fostered a more entrepreneurial approach to the provision of those services.

Reliance on nonmilitary personnel is driven primarily by efforts to reduce the cost of providing military services. A trade-off to cost in adding civilian elements to the defense structure is that control of the Total Force becomes more difficult. If cost were not a consideration, the United States could rely entirely on military personnel to meet its defense needs. A force consisting solely of military personnel would have one command structure, minimizing the external factors that compete for the attention and loyalties of personnel. With the addition of nonmilitary force elements, some degree of control and flexibility is lost.

Reliance on federal civilian personnel and contractors must be balanced against the need to maintain an adequate rotation base for military forces. To the extent that civilian personnel replace military personnel in the continental United States (CONUS), they reduce the number of slots available to military personnel between overseas tours. Thus, in designating CONUS positions, consideration must be given to the fact that while some forward-deployed military personnel may be displaced by civilians--including host nation personnel--most of our forward assignments are filled by military personnel.

In the new strategic environment, the probability of regional contingency operations and the need for rapid response to crises may diminish the value of contract and host nation support. Such operations often require close control, surprise and rapid execution. Contractors or host nations may not be able to respond on that basis or, more importantly, operational security may preclude the use of those resources even if contract or host nation agreements exist. In such cases, sufficient support capability needs to be maintained in the active or reserve component to execute military operations successfully.

Effective use of nonmilitary personnel is location and scenario dependent. Deliberate plans need to exist to determine the potential use and value of such resources. Without such scenario-specific plans, actions to increase or decrease

the contribution of nonmilitary force elements may be counterproductive. Even existing agreements may not be appropriate or sustainable in the future. For example, current NATO agreements may change as the alliance undergoes a major review of military strategy. Sufficient resources need to exist within the military force structure to meet rotation needs and carry out crisis and contingency operations at some level without the use of nonmilitary personnel.

RECENT PEACETIME RESERVE ACTIVITIES

As the Total Force Policy has evolved, a subtle yet dramatic change has occurred in the manner in which reserve forces are viewed and used. Historically, the principal mission of the reserve components has been to provide well-trained, fully equipped units and individuals in time of war, national emergency, or when required for national security purposes. Until the early 1970s, the reserve components were generally viewed as a source of augmentation for the active components when the national security was threatened. While this primary mission remains constant, important new dimensions to reserve service have emerged under the Total Force Policy.

The reserve components today are not merely a "force in waiting." Particularly since the late 1970s, the reserves have assumed a major role in performing missions crucial to DoD's day-to-day functions. In addition, capabilities currently exist in the National Guard and Reserves that do not exist in the active force. The reserve components have been increasingly integrated with their active counterparts and now make significant contributions to ongoing active missions. Tables 1-5 at the end of this section list activities performed by Guard and Reserve personnel in FY 1990.

Army

Participation in a broad spectrum of intraservice and interservice readiness exercises allows Army reserve component personnel to hone their wartime skills. A significant amount of both exercise and real contingency planning is accomplished by reservists. This includes preparation of plans for exercises like Reforger and Bright Star. In addition, some parts of the plans for Operation Just Cause were written by reservists who later were called upon to implement those plans. During many training exercises, the Army National Guard and Reserve also undertake "nation building" functions. For example, since 1983, the National Guard and Reserve have each deployed nearly 40,000 soldiers to Latin America to conduct medical, veterinary, communications, and engineer training missions. These operations have included building bridges, roads, and airfields, and treating sick patients. The exercises not only assist local governments but also provide quality training for the soldiers.

The Equipment Maintenance Center-Europe (EMC-E) was established in January 1989 to receive and employ Guard and Reserve maintenance units assigned the theater general support maintenance mission. So far, Guardsmen and Reservists have contributed nearly 40,000 direct labor man-hours to this mission.

Similar to the EMC-E is the Aviation Classification Repair Activity Depot (AVCRAD) in Belgium. The AVCRAD is manned by National Guard personnel

performing annual training on two- to three-week rotations. It provides U.S. forces in Europe with a forward-deployed, pre-mobilization, depot-level aircraft maintenance capability.

The Army Guard and Reserve operate schools and state academies that provide alternative means for reserve component personnel to receive advanced training close to home. In some cases, these same institutions also are attended by active component personnel. The Army Reserve Training Divisions and Separate Brigades provide initial entry training each year for about 5,000 soldiers from both the active and reserve components. Additionally, the Army Reserve operates Forces Schools, Noncommissioned Officer (NCO) Academies, and Regional Training Sites to augment the Training and Doctrine Command (TRADOC) training base. The Army Reserve also provides assistance in organizing and training reserve units in other countries. For example, in response to a request from the government of Venezuela, drill instructors from the U.S. Army Reserve 95th Training Division have participated in training new Venezuelan reservists. The Army National Guard also operates several schools and training courses for both active and reserve component personnel; these include the Mountain Warfare School, the Air Assault School, the Tank Commanders Course, and a Battle Skills Course.

Army Reserve Military Intelligence Detachments (MIDs) conduct both weekend drills and annual training, accomplishing real intelligence missions on-site in a variety of intelligence agencies. Each year, about 250 Army Reserve soldiers perform "real-time" military intelligence training in the REDTRAIN program. This type of operation combines training with support of a real world mission. MIDs also provide some intelligence collection and analysis in support of counternarcotics activities.

Reserve component fixed-wing aircraft are coordinated through the regional Centralized Army Aviation Scheduling Offices (CAASOs), thereby providing capabilities to fulfill both active and reserve component requirements.

The Army National Guard and Army Reserve have undertaken important responsibilities in support of the nation's counternarcotics efforts. During FY 1989, more than 1,811 missions were conducted by 6,700 Army National Guard personnel in support of law enforcement agencies. The missions of these personnel ranged from ground and aerial reconnaissance, surveillance, and transportation of law enforcement officers to training, administrative, engineering, communications, and maintenance support.

Air Force

In recent years, the Air Force has shifted numerous missions to and placed additional reliance on the Air Reserve Components. Perhaps the most dramatic illustration is military airlift, where nearly 60 percent of current capability is

provided by Air National Guard and Air Force Reserve squadrons flying C-130, C-141, and C-5 aircraft. These pilots and aircraft were among the first U.S. military forces to respond to the President's call for volunteers following Iraq's August 1990 invasion of Kuwait. Another illustration of a critical ongoing mission performed by reserve forces is continental air defense. Flying F-16 aircraft, Air National Guard fighter-interceptor units are responsible for 92 percent of continental air defense operations. In addition, almost 100 percent of tactical reconnaissance missions are flown by reserve component units.

The Air Force Reserve and Air National Guard also have had total responsibility for C-130 airlift rotations in Central and South America since 1977. Averaging about 6,000 flight hours annually, the Air Reserve Components provide support to the U.S. Southern Command and to U.S. embassies throughout Central and South America. Also, from 1977 to 1990, the Air National Guard maintained a continuous A-7D fighter rotation to Panama in support of the Canal Zone defense mission (Coronet Cove). Today, this Air National Guard mission is being shared by air defense and air superiority F-16 and F-15 units.

Since the mid-1970s, the Air Reserve Components have played a vital role in providing aerial-refueling support for Air Force aircraft. Today, about one-fourth of this worldwide mission is carried out by Air National Guard and Air Force Reserve aircrews flying KC-135 and KC-10 tanker aircraft. In the continental United States, KC-135 squadrons operated by the Air National Guard and Air Force Reserve provide around-the-clock support for Strategic Air Command bombers maintained in alert status.

By the end of FY 1989, the Air Reserve Components were responsible for 92 percent of the aeromedical evacuation mission. Today, 100 percent of aerial spraying capability is assigned to the Air Force Reserve in support of requirements worldwide.

Navy

Since the late 1970s, Naval Reservists have been responsible for 100 percent of the U.S.-based medium and heavy Navy logistical airlift mission. Twelve Naval Reserve squadrons logged nearly 61,900 flying hours in FY 1989 while airlifting 13 million pounds of cargo and transporting 500,000 passengers.

The Naval Reserve initiated the Shore Intermediate Maintenance Activity (SIMA) program in 1980 to provide maintenance support for both active and reserve ships. The SIMAs perform intermediate as well as organizational-level maintenance. They provide meaningful shore assignments for sea/shore rotations and help retain the skilled petty officers necessary to staff the fleet. Upon mobilization, SIMAs are scheduled to augment destroyer tenders and repair

ships for forward battle damage repair. Selected Reservists are being trained to backfill the SIMAs.

The Naval Reserve has actively supported DoD's drug interdiction efforts. Naval Reserve frigates provided 13 percent of the total steaming days in support of drug interdiction operations during FY 1990. They accounted for 12 percent and 1 percent, respectively, of the total cocaine and marijuana confiscated during that year.

Since the mid-1970s, Naval Reservists have provided more than 35 percent of the Navy's maritime air patrol capability. During FY 1989, the 13 Naval Reserve air patrol squadrons logged about 13,000 flight hours and Navy Reserve frigates steamed 465 days in support of Atlantic and Pacific fleet missions, including drug interdiction.

Since 1974, Naval Reservists have performed a critical role in the production of intelligence information for the Navy. Comprising more than 60 percent of uniformed naval intelligence personnel, Naval Reservists contributed more than 78,000 man-days during FY 1989 in direct support of the fleet commanders.

Marine Corps

Marine reservists participate on a daily basis in drug interdiction operations in the Caribbean with the U.S. Coast Guard and along the southwest border of the United States with the U.S. Border Patrol. They also take part in disaster and emergency relief operations, such as those undertaken in 1989 in the aftermath of Hurricane Hugo and the San Francisco earthquake.

Coast Guard

The cornerstone of the Coast Guard Reserve training program is augmentation training, which provides peacetime assistance to the active force. When conducting augmentation training, reservists work side-by-side with their active-duty counterparts, performing such missions and support functions as search and rescue, law enforcement, and port and marine safety. Specifically, they provide all waterside and range recovery area security for space shuttle launches. Port security support for U.S. Marine Corps maritime prepositioning ships is another Coast Guard Reserve mission. Coast Guard Reservists man search-and-rescue stations in the Great Lakes annually during peak boating periods. They are also used during national emergencies, such as the Exxon Valdez oil spill, Hurricane Hugo, and the San Francisco earthquake.

The Coast Guard Reserve also plays a role in nation building. Coast Guard training teams, composed of active and reserve members, regularly provide training to the navies and coast guards of developing countries.

State Role of the National Guard

Because of the National Guard's dual status (members serve both state and federal governments), Guard units are immediately available to the state governors to deal with local and regional matters. Illustrative of the more than 5,000 state call-ups to which the Guard has responded during the past seven years are: the Mount Saint Helen's volcanic eruption, the Alaskan oil spill, the San Francisco earthquake, the Sioux City airline crash, Hurricanes Gilbert and Hugo, forest fires, widespread flooding throughout the South and Midwest, tornadoes, blizzards, energy and water shortages, search-and-rescue operations, medevacs, civil disturbances, public employee strikes, and state employee "walkouts." It is significant to note that these missions were paid for by state funds. Although they are a federal force, during major emergencies the Army, Navy, Marine, and Air Force Reserves may be called upon to lend assistance to state governors. Table 6 details National Guard involvement in state missions in FY 1989.

Also in support of the governors, the Army and Air National Guard provide an average of 2,000 personnel per day in support of local, state, and federal anti-drug agencies; during 1991 this will equate to 730,000 man-days. Specific National Guard anti-drug support missions include physical search of containerized cargo, intelligence analysis, ground and aerial reconnaissance and surveillance, transportation, special operations, loan of equipment, and specialized instruction to law enforcement agencies. In addition to its stateside operations, the Air National Guard provides reconnaissance and interceptor support to selected CINC drug-interdiction initiatives abroad. Table 7 summarizes the FY 1989 National Guard counternarcotics support missions. Although more restricted than the National Guard, the Army, Navy, Marine, and Air Force Reserves are authorized indirect involvement in U.S. counternarcotics activities by lending equipment, providing personnel support, conducting training, and sharing information with law enforcement agencies.

Summary

The extent to which reserve forces are involved in ongoing, day-to-day military missions is significant and varies by service and reserve component. Augmenting the capabilities of active forces in diverse mission areas attests not only to the effective training and dedication of reservists, but also to the benefits to be gained from fully integrating reserve and active forces.

The extensive peacetime responsibilities of U.S. reserve forces often go unnoticed. Their activities enhance diplomatic efforts in the Third World, extend crucial support to U.S. counternarcotics efforts, and safeguard property and lives throughout the country. At the same time, these personnel continue to train for wartime duties.

Table 1
Army National Guard and Army Reserve Contributions to the Total Army, FY 1990

Unit Types[a]	National Guard % of Army	Army Reserve % of Army	Combined % of Army
Heavy Helicopter Units	100	0	100
Infantry Scout Groups	100	0	100
TOW Light Antitank Infantry Battalions	100	0	100
Training Divisions and Brigades	0	100	100
Railroad Units	0	100	100
Judge Advocate General Units	2	98	100
Civil Affairs Units	0	97	97
Infantry Battalions	90	6	96
Supply and Service Companies	52	42	94
Public Affairs Units	58	29	87
Heavy Equipment Maintenance Companies	76	10	86
Chemical Smoke Generator Units	12	72	84
Light Equipment Maintenance Companies	28	56	84
Pathfinder Detachments	0	83	83
Separate Brigades	70	10	80
Truck Companies POL	24	55	79
Hospital Units	16	59	75
Engineer Bridge Companies (Nondivisional)	48	26	74
Corps Support Groups, Headquarters	15	58	73
Petroleum, Oil, and Lubricant (POL) Companies	16	56	72
Truck Companies Cargo	49	23	72
Engineer Battalions (Combat)	35	36	71
Military Police Companies (Nondivisional)	44	27	71
Military Intelligence Units	6	63	69
Psychological Operations Units	0	68	68
Conventional Ammunition Companies	25	43	68
Theater Defense Brigades	50	17	67
Truck Companies	44	22	66
Equipment Maintenance Companies (Nondivisional)	45	20	65
Engineer Battalions (Combat Heavy)	25	32	57
Signal Battalions (Corps Area)	39	14	53
Field Artillery Battalions	45	8	53
Area Support Groups, Headquarters	26	26	52
Aviation Assault Companies	36	16	52
Mechanized Infantry Battalions	49	2	51
Armored Battalions	48	2	50
Special Forces Groups	22	22	44
Aviation Attack Battalions	39	4	43
Watercraft Units	13	27	40
Armored Cavalry Regiments	40	0	40
Infantry Battalions (Light)	31	8	39
Combat Divisions	36	0	36
Aviation Lift Companies	11	11	22

SOURCES: Army National Guard, Army Reserve, and Army (DAMO-FDF)

a. Percentages determined by counting like-type units.

Table 2
Air National Guard and Air Force Reserve Contributions to the Total Air Force, FY 1990

Unit Types	Air National Guard % of Air Force	Air Force Reserve % of Air Force	Combined % of Air Force
		Flying Units	
Aircraft[a]			
Aerial Spraying	0	100	100
Strategic Interceptor Force (U.S.-Based)	92	0	92
Air Rescue/Recovery	32	42	74
Tactical Airlift	38	26	64
Tactical Reconnaissance	60	0	60
Tactical Air Support	41	0	41
Weather Reconnaissance	0	40	40
Tactical Fighters	25	9	34
Aerial Refueling/Strategic Tankers	20	5	25
Special Operations	11	18	29
Support Aircraft	23	0	23
Strategic Airlift	6	11	17
Aircrews[b]			
Aeromedical Evacuation	26	71	97
Strategic Airlift (Associate)	0	50	50
Tanker/Cargo (Associate)	0	43	43
Aeromedical Airlift (Associate)	0	30	30
		Non-Flying Units[c]	
Aircraft Control and Warning	94	0	94
Aerial Port	13	58	71
Engineering Installation	70	0	70
Combat Communications	65	0	65
Combat Logistics Support Squadrons	0	59	59
Tactical Control	49	0	49
Civil Engineering	26	18	44
Strategic Airlift Maintenance (Associate)	0	40	40
Medical[c]	11	7	18
Weather	14	1	15
Reconnaissance (Technical)	13	0	13
Communications Flights	3	3	6
Electronic Security	1	0	1

SOURCES: Air National Guard and Air Force Reserve

a. Percentages determined by counting primary authorized aircraft.

b. Percentages determined by counting authorized personnel.

c. Excludes aeromedical evacuation personnel.

Table 3
Naval Reserve
Contributions to the Total Navy, FY 1990

Unit Types[a]	Naval Reserve % of Navy
Combat Search and Rescue Squadrons	100
Fighter/Composite (Adversary/Service Squadrons (U.S.-Based)	100
Logistic Airlift Squadrons (U.S.-Based)	100
Mobile Inshore Undersea Warfare Units	100
Naval Embarked Advisory Teams	100
Strike Rescue/Special Warfare Support Helicopter Squadrons	100
Naval Control of Shipping (Military Personnel)	99
Cargo-Handling Battalions	93
Military Sealift Command (Military Personnel)	85
Ocean Minesweepers	70
Mobile Construction Battalion	68
Fleet Hospitals	53
Intelligence Program Personnel	48
Mobile Mine Assembly Groups	48
Mobile Diving and Salvage Units	44
Airborne Mine Countermeasures Squadrons	40
Maritime Air Patrol Squadrons	35
LAMPS MK-1 Antisubmarine Warfare Squadrons	33
Frigates (FFG-7s/FF-1052s)	29
Carrier Air Wings	14
Amphibious Warfare Ships	5

SOURCE: Naval Reserve

a. Percentages determined by counting like-type units or personnel.

Table 4
Marine Corps Reserve
Contributions to the Total Marine Corps, FY 1990

Unit Types[a]	Marine Corps Reserve % of Marine Corps
Force Reconnaissance Companies	50
Air Naval Gunfire Liaison Companies	50
Tank Battalions	40
Light Antiaircraft Missile Battalions	25
Low-Altitude Air Defense	25
Engineer Support Battalions	25
Landing Support Battalions	25
Artillery Regiments	25
Infantry Regiments	25
Aircraft Types[b]	
Adversary Aircraft	100
Observation Aircraft	33
Aerial-Refueling Aircraft	29
Light Attack Aircraft	28
Fighter Aircraft	20
Electronic Warfare Aircraft	18
Helicopters	18

SOURCE: Marine Corps Reserve

a. Percentages determined by counting like-type units.

b. Percentages determined by counting primary authorized aircraft.

Table 5
Coast Guard Reserve
Contributions to the Total Coast Guard, FY 1990

Unit Types[a]	Coast Guard Reserve % of Coast Guard
Deployable Port Security	100
Marine Safety Office	43
Operational Shore Facilities	31
Command and Control	28
Repair/Supply/Research	23
Vessels	15
Air Stations	3

SOURCE: Coast Guard Reserve

a. Percentages determined by counting mobilization billets.

Table 6
National Guard State Military Support Missions, 1989

State	Dates	Mission	Personnel
ALABAMA			
De Kalb County	20 Aug 88	Water Haul	4 ARNG
Jefferson County	27 Jun 88	Water Haul	6 ARNG
Talladega County	2 Sep 88	Water Haul	2 ARNG
Marengo County	23 Dec 88	Water Haul	2 ARNG
Talladega	10 Mar 89	Tornado Support	15 ARNG
Phenix City	16 Feb 89	Water Haul	5 ARNG
Hamilton	19 Apr 89	Tornado Support	11 ARNG
Etowah County	22 Apr 89	Water Haul	2 ARNG
Statewide	2 May 89	Drug Support	8 ARNG
Statewide	2 Apr 89	Drug Support	8 ARNG
Plantersville	22 Jun 89	Water Haul	2 ARNG
Tallapoosa	26 Jul 89	Engineer Support	30 ARNG
ALASKA			
Nome	5 Jan 89	Evacuation Support	4 ARNG
Anchorage	27 Jan - 15 Feb 89	Snow Emergency	7 ARNG
Valdez	26 Mar - 1 Jun 89	Oil Spill	130 ARNG
Seward	12 May 89	Search and Rescue	3 ARNG
Oscarville	14 May 89	Search and Rescue	6 ARNG
Bethel	25 May 89	Search and Rescue	3 ARNG
Nunivak Island	26-27 May 89	Search and Rescue	3 ARNG
King Salmon	5 Jul 89	Search and Rescue	3 ARNG
Anchorage	15-21 Aug 89	Search and Rescue	15 ARNG
Nome	6 May 89	Community Support	8 ARNG
Anchorage	18 Feb 89	Community Support	26 ARNG
Anchorage	1-30 May 89	Engineer Support	10 ARNG
Anchorage	20 Aug 89	Aviation Support	6 ARNG
Nome	15-16 May 89	Aviation Support	3 ARNG
Anchorage	15-17 May 89	Aviation Support	6 ARNG
Anchorage	4 Jul 89	Community Support	24 ARNG
Fairbanks	16 Jul 89	Community Support	12 ARNG
Eagle River	21 Jul 89	Community Support	4 ARNG
Nome	12 Aug 89	Aviation Support	3 ARNG
Dillingham	12 Sep 89	Aviation Support	9 ANG
Anchorage	16-18 Sep 89	Transportation Support	2 ARNG
Nome	10 Feb 89	Search and Rescue	3 ARNG
Statewide	18-25 Apr 89	Aviation Support	45 ARNG/ ANG
ARIZONA			
Winslow	3 Jan 89	Aerial Search	3 ARNG
Yuma County	28-31 Dec 88	Drug Support	8 ARNG
Yavapai County	4 Jan 89	Aerial Support	3 ARNG
Nogales	14 Jan 89	Drug Support	10 ARNG
Mesa	23 Jan - 31 Mar 89	Shelter for the Homeless	4 ARNG
Phoenix West	23Dec88 - 31Mar89	Shelter for the Homeless	4 ARNG

State	Dates	Mission	Personnel
ARIZONA (CONT'D)			
Phoenix 52th St	23Dec88 - 31Mar89	Shelter for the Homeless	4 ARNG
Tucson	6 Feb - 31 Mar 89	Shelter for the Homeless	4 ARNG
Yuma	6 Feb - 31 Mar 89	Shelter for the Homeless	4 ARNG
Yavapai County	11 May 89	Search and Rescue	3 ARNG
Border Entry Points	15 May 89	Drug Support	29 ARNG
Yavapai County	18 Jun 89	Search and Rescue	3 ARNG
Pina County	7-31 Jul 89	Forest Fire	15 ARNG
Graham County	7-31 Jul 89	Forest Fire	16 ARNG
Cochise County	8-31 Jul 89	Forest Fire	15 ARNG
Maricopa County	7-31 Jul 89	Forest Fire	15 ARNG
Coconino County	14 Aug 89	Search and Rescue	3 ARNG
ARKANSAS			
Statewide	8-11 Mar 89	Snowstorm Support	8 ARNG
Statewide	8 Jun 89	Drug Support	9 ARNG
CALIFORNIA			
Tuolumne County	17-19 Mar 89	Shelter for Law Officials	1 ARNG
Grand Canyon, AZ	28 Jun 89	Aviation Support	8 ARNG
Off Coast of San Francisco	5 Jul 89	Medevac	16 ANG
Lassen County	8 Jul 89	Forest Fire	4 ARNG
Butte County	8 Jul 89	Forest Fire	4 ARNG
Statewide	7 Jul 89	Forest Fire	31 ANG
New Mexico	7 Jul 89	Forest Fire	31 ANG
Lassen County	10 Jul 89	Laundry Support	2 ARNG
San Diego	10 Jul 89	Forest Fire	18 ARNG
Monterey County	10-18 Jul 89	Forest Fire	14 ARNG
Orange County	11-13 Jul 89	Aerial Fire Suppression Spt	15 ARNG
Monterey County	14 Jul 89	Aviation Support	3 ARNG
Lassen County	15 Jul 89	Facility Support	1 ARNG
Fresno County	19 Jul 89	Search and Rescue	4 ARNG
El Dorado County	14 Jul 89	Aerial Search	4 ARNG
Nevada County	26-27 Jul 89	Medevac	4 ARNG
Inyo County	30 Jul 89	Medevac	4 ARNG
Inyo County	30 Jul 89	Search and Rescue	5 ARNG
Inyo County	18 Aug 89	Ground Transportation Spt	4 ARNG
Statewide	10Nov88 - 31Mar89	Shelter for the Homeless	57 ARNG
Trinity County	19-21 Sep 89	Search and Rescue	6 ARNG
Amador County	21 Sep 89	Search and Rescue	4 ARNG
COLORADO			
Larimer County	11-16 Jul 89	Forest Fire	12 ARNG
CONNECTICUT			
Litchfield County	11-16 Jul 89	Tornado Aerial Damage Survey	12 ARNG
DELAWARE			
New Castle	25-30 Jun 89	Oil Spill Cleanup Support	197 ARNG/33 ANG
New Castle	5 Jul 89	Rescue and Evacuation	20 ARNG

State	Dates	Mission	Personnel
DIST OF COL			
Ft. Belvoir, VA	25-26 Feb 89	Aviation Support	3 ARNG
Ft. Belvoir, VA	15-16 Apr 89	Aviation Support	3 ARNG
Ft. Belvoir, VA	17-18 Jun 89	Aviation Support	3 ARNG
Ft. Belvoir, VA	8-9 Jul 89	Aviation Support	3 ARNG
Ft. Belvoir, VA	5-6 Aug 89	Aviation Support	3 ARNG
Ft. Belvoir, VA	9-10 Sep 89	Aviation Support	3 ARNG
FLORIDA			
Taylor County	9-14 Apr 89	Aviation Support	13 ARNG
Lafayette County	9-14 Apr 89	Aviation Support	13 ARNG
Baker County	28 Apr-2 May 89	Transportation Support	10 ARNG
Columbia County	28 Apr-2 May 89	Transportation Support	10 ARNG
GEORGIA			
Demorest	26 Jun 89	Water Haul	3 ARNG
Baldwin	26 Jun 89	Water Haul	3 ARNG
Atlanta	20-21 Jan 89	Security Support	1,119 ARNG
GUAM	None		
HAWAII	None		
IDAHO			
Dubois	6-10 Feb 89	Aerial Search	4 ARNG
Spencer	6-10 Feb 89	Aerial Search	4 ARNG
Statewide	6-10 Feb 89	Snow Removal Support	31 ARNG
Statewide	9 Sep 89	Aviation Support	3 ARNG
Coeur d'Alene	3-11 May 89	Aviation Support	35 ARNG
Boise	3-4 May 89	Aviation Support	4 ARNG
Pocatello	11 May 89	Aviation Support	4 ARNG
Statewide	28 Jul-Aug 89	Forest Fire Support	509 ARNG
ILLINOIS	None		
INDIANA			
Shelby County	18 May 89	Aviation Support	2 ARNG
Madison County	13-22 Jul 89	Dining Facility Support	34 ARNG
IOWA			
Benton	10 May-28 Jul 89	Water Haul	2 ARNG
Maloy	10 May-28 Jul 89	Water Haul	2 ARNG
Delphos	10 May-28 Jul 89	Water Haul	2 ARNG
Redding	10 May-28 Jul 89	Water Haul	2 ARNG
Beaconsfield	10 May-28 Jul 89	Water Haul	2 ARNG
Granddriver	8 May-28 Jul 89	Water Haul	2 ARNG
Pleasanton	9 May-15 Aug 89	Water Haul	2 ARNG
Thayer	8 May- 3 Aug 89	Water Haul	2 ARNG
Pleasant Plain	10 Jul-16 Aug 89	Water Haul	2 ARNG
Packwood	16 May- 9 Aug 89	Water Haul	2 ARNG

State	Dates	Mission	Personnel
IOWA (CONT'D)			
Kossuth County	3 Apr 89	Generator Support	4 ARNG
Sioux City	19 Jul-31 Aug 89	Airliner Crash Recovery Support	1200 ARNG/ 67 ANG
KANSAS			
Atwood	29-30 Jun 89	Aviation Support	8 ARNG
Atwood	29-30 Jun 89	Flood Recovery Support	50 ARNG
Rawlins County	29-30 Jun 89	Flood Recovery Support	7 ARNG
KENTUCKY	None		
LOUISIANA			
Baton Rouge	17-22 May 89	Flood Recovery Support	63 ARNG
Epps	6-7 May 89	Tornado Debris Removal Support	39 ARNG
MAINE			
Penobscot County	11 Jan 89	Search and Rescue	5 ARNG
Franklin County	22 Jan 89	Search and Rescue	5 ARNG
York County	17 Feb 89	Aviation Support	3 ARNG
Cumberland County	17 Feb 89	Aviation Support	3 ARNG
Hancock County	28 May 89	Medevac Support	5 ARNG
York County	3 Jul 89	Search and Rescue	2 ARNG
Bangor County	16 Jul 89	Crash/Fire/Rescue Support	5 ANG
Penobscot County	30 Jul 89	Medevac Support	4 ARNG
Penobscot County	19 Sep 89	Search and Rescue	4 ARNG
Washington County	26-27 Sep 89	Medevac Support	4 ARNG
MARYLAND			
Garrett County	17-22 Feb 89	Water Haul	11 ARNG
Calvert County	24 Feb 89	Snow Emergency	2 ARNG
MASSACHUSETTS			
Springfield	7-8 Jun 89	Food Transportation	5 ARNG
Fall River	10-11 Jun 89	Water Haul	2 ARNG
Randolph	25 Jun 89	Dining Facility Support	10 ARNG
Mattapoisett	11-17 Jun 89	Water Haul	2 ARNG
MICHIGAN	None		
MINNESOTA	None		
MISSISSIPPI	None		
MISSOURI			
Barry County	10-18 Mar 89	Snow Emergency	30 ARNG
McDonald County	10-18 Mar 89	Snow Emergency	30 ARNG
Newton County	10-18 Mar 89	Snow Emergency	27 ARNG
St. Joseph	7-10 Feb 89	Water Haul	40 ARNG
MONTANA			
Helena	2-3 Feb 89	Train Wreck Emergency	21 ARNG

State	Dates	Mission	Personnel
MONTANA (CONT'D)			
Deer Lodge	7 May 89	Aviation Support	2 ARNG
Flathead County	2 Aug 89	Transportation Support	2 ARNG
NEBRASKA			
Valentine	30 Mar 89	Life Saving Neonatal	2 ARNG
Crawford	9-14 Jul 89	Forest Fire	231 ARNG
Belmont County	8-9 Jul 89	Water Haul	2 ARNG
Belmont County	19 Jul 89	Water Haul	2 ARNG
Belmont County	29 Jul 89	Water Haul	2 ARNG
Belmont County	4-5 Aug 89	Forest Fire	23 ARNG
Dawes County	31 Aug-5 Sep 89	Forest Fire	4 ARNG
NEVADA			
Mojave County, AZ	1-6 Jan 89	Water Haul	4 ARNG
Alameda County	18 Jan 89	Aviation Support	4 ANG
Carson County	28-29 Jun 89	Water Haul	2 ARNG
Lassen County	10-11 Jul 89	Forest Fire	9 ARNG
Lincoln County	16-21 Jul 89	Forest Fire	14 ARNG
Douglas County	15-22 Aug 89	Water Haul	4 ARNG
Fresno County, CA	30 Jul-4 Aug 89	Forest Fire	6 ARNG
NEW HAMPSHIRE	None		
NEW JERSEY	None		
NEW MEXICO			
Rio Arriba County	8-9 Feb 89	Search and Rescue	8 ARNG
Torrance County	20-21 Mar 89	Snow Emergency	9 ARNG
Statewide	8-30 Sep 89	Emergency Food Haul	92 ARNG
NEW YORK			
New York City	1 Oct 88-31 Oct 89	Shelter	65 ARNG
Island of Jamaica	1 Oct 88-14 Sep 89	Hurricane Recovery Support	371 ARNG/ 186 ANG
Statewide	3-5 May 89	Space Shuttle Support	6 ANG
	6 Sep 89	Aerial Rescue	6 ANG
	7 Sep 89	Aerial Rescue	6 ANG
	10 Sep 89	Aerial Rescue	6 ANG
	28 Sep 89	Aerial Rescue	6 ANG
NORTH CAROLINA			
Hertford	24-25 Feb 89	Snow Emergency	5 ARNG
Wallace	23-25 Feb 89	Snow Emergency	5 ARNG
Pitt County	18-19 Feb 89	Ice Storm Emergency	4 ARNG
Dare County	13-14 Mar 89	Coastal Storm	4 ARNG
Beaufort County	8-9 Mar 89	Generator Support	2 ARNG
Forsyth County	22-29 May 89	Tornado Recovery Support	8 ARNG
Lincoln County	8 May 89	Tornado Recovery Support	4 ARNG
Cleveland County	8 May 89	Tornado Recovery Support	4 ARNG
Union County	8 May 89	Tornado Recovery Support	4 ARNG
Union County	17-19 May 89	Debris Removal Support	2 ARNG

State	Dates	Mission	Personnel
NORTH CAROLINA (CONT'D)			
Rowan County	8 May 89	Fire Protection Support	2 ARNG
Lincoln County	8 May 89	Tornado Recovery Support	4 ARNG
Cleveland County	8 May 89	Tornado Recovery Support	4 ARNG
Union County	8 May 89	Tornado Recovery Support	4 ARNG
Stanly County	17-19 Jun 89	Aviation Support	7 ARNG
Alamance County	17-19 Jun 89	Generator Support	7 ARNG
Guilford County	17-19 Jun 89	Aviation Support	7 ARNG
Randolph County	17-19 Jun 89	Aviation Support	7 ARNG
Union County	17-19 Jun 89	Generator Support	2 ANG
Caldwell County	4-6 Jul 89	Flood Recovery Support	7 ARNG
NORTH DAKOTA			
Burleigh County	18-20 Feb 89	Dining Facility Support	1 ARNG
Red River Valley	3-20 Apr 89	Flood Recovery Support	10 ARNG
Maddock	10-14 Jul 89	Tornado Recovery Support	9 ARNG
OHIO			
Centerburg	12-15 Jun 89	Water Haul	27 ARNG
Portage County	22-29 Jul 89	Water Haul	53 ARNG
Anderson County	2-4 Sep 89	Shelter	3 ARNG
OKLAHOMA			
Farris	3-5 Apr 89	Dining Facility Support	3 ARNG
Pauls Valley	5-6 Mar 89	Snow Emergency	2 ANRG
Ardmore	5-6 Mar 89	Snow/Ice Storm Emergency	11 ARNG
Little Axe	15-23 Mar 89	Snowstorm Emergency	2 ARNG
Statewide	18-25 Sep 89	Transportation Support	16 ARNG
OREGON			
Baker County	28 Jul-21 Aug 89	Forest Fire	150 ARNG
Wallowa County	28 Jul-21 Aug 89	Forest Fire	143 ARNG
PENNSYLVANIA			
Lackawanna County	2 May 89	Aviation Support	3 ARNG
PUERTO RICO			
Island Wide	16-30 Sep 89	Hurricane Recovery Support	732 ARNG
RHODE ISLAND			
Cranston	31 Jan 89	Hospital Support	70 ARNG
Cranston	19-23 Feb 89	Hospital Support	393 ARNG
Bristol County	23-25 Jun 89	Oil Spill Recovery Support	400 ARNG
SOUTH CAROLINA			
Saint Matthews	19 Aug 89	Transportation Support	3 ARNG
Statewide	22-30 Sep 89	Hurricane Recovery Support	3477 ARNG
SOUTH DAKOTA	None		
TENNESSEE	None		

State	Dates	Mission	Personnel
TEXAS			
Houston	22 Feb 89	High Rise Emergency Training	3 ARNG
Cooke County	16 May 89	Flood Recovery Support	4 ARNG
UTAH			
Diamond Peak	3-13 Jul 89	Forest Fire	27 ARNG
Uintah County	5-12 Jul 89	Forest Fire	3 ARNG
Duchesne County	7-12 Jul 89	Forest Fire	4 ARNG
Sanpete County	11-17 Jul 89	Engineer Support on Burning Land	6 ARNG
Uintah County	19-24 Jul 89	Forest Fire	21 ARNG
Grand County	19-24 Jul 89	Forest Fire	21 ARNG
Salt Lake County	21-26 Jul 89	Hospital Air Conditioning Support	3 ARNG
VERMONT	None		
VIRGINIA			
Virginia Beach	1-5 Sep 89	Civil Disturbance	485 ARNG
VIRGIN ISLANDS			
Virgin Islands	16 Sep 89-Present	Hurricane Hugo	954 ARNG/29
WASHINGTON	None		
WEST VIRGINIA			
Statewide	1-31 Mar 89	Food Distribution	32 ARNG
Statewide	1-31 Apr 89	Food Distribution	23 ARNG
WISCONSIN			
Statewide	23 Dec 88-5 Feb 89	Armenian Relief Support	10 ARNG/51 A
WYOMING			
Lovell	7 Jan 89	Search and Rescue	12 ARNG
Lincoln County	5-11 Aug 89	Forest Fire Support	1 ARNG

Table 7
National Guard Anti-drug Support to Law Enforcement Agencies, 1989

State	Dates	Mission	Personnel
ALABAMA			
	2Oct88 - 30Apr90	Cargo Inspection	8 ARNG
	2 May - 4 Jun 89	Cargo Inspection	8 ARNG
	2 Apr - 30 Apr 89	Cargo Inspection	8 ARNG
	5 Jun - 30 Sep 89	Aerial Reconnaissance	5 ARNG
	5 Jun - 30 Sep 89	Ground Transportation	4 ARNG
	17 Jun - 30 Sep 89	Ground Reconnaissance	6 ARNG
ALASKA			
	10-20 Jun 89	Cargo Inspection	15 ANG
	21 Jun 89	Aviation Support	5 ARNG
	22 Jun - 1 Sep 89	Ground Surveillance	8 ARNG
	15-30 Sep 89	Cargo Inspection	27 ARNG
ARKANSAS			
	8 Jun - 30 Sep 89	Aviation Support	9 ARNG
ARIZONA			
	22Nov88 - 19Dec89	Cargo Inspection	12 ARNG
	6Nov88 - 30Apr89	Cargo Inspection	12 ARNG
	14 Jan - 14 May 89	Cargo Inspection	10 ARNG
	28Dec88 - 30Sep89	Cargo Inspection	8 ARNG
	20Dec88 - 30Sep89	Vehicle Inspection	7 ARNG
	22Nov88 - 30Sep89	Operation Aviation Support II	12 ANG
	15 May - 30 Sep 89	Cargo Inspection	29 ARNG
	8 Aug - 30 Sep 89	Aerial Reconnaissance	8 ARNG
	14 Aug - 30 Sep 89	Cargo Inspection	18 ARNG
CALIFORNIA			
	24Oct88 - 9Jan89	Aviation Support	26 ARNG
	10 Jan - 30 Sep 89	Aviation Support	1 ARNG
	10 Jan - 30 Sep 89	Aviation Support	2 ARNG
	22 Mar - 30 Sep 89	Aviation Support	2 ARNG
	9 May - 30 Sep 89	Cargo Inspection	468 ARNG
	21 Jul - 30 Sep 89	Aerial Reconnaissance	15 ARNG
COLORADO			
	27 Jul - 29 Sep 89	Aerial Reconnaissance	10 ARNG
CONNECTICUT			
	29 Aug - 29 Sep 89	Ground Reconnaissance	3 ARNG
DISTRICT OF COLUMBIA	1 Jun - 30 Sep 89	Command/Control Support	3 ARNG/2 ANG
	3 Jun - 30 Sep 89	Military Police Support	40 ARNG/33 ANG
	9 Jun - 30 Sep 89	Aviation Support	4 ARNG
	28 Aug - 30 Sep 89	Hotline Support	2 ARNG/3 ANG

State	Dates	Mission	Personnel
DELAWARE			
	4 Sep - 30 Sep 89	Cargo Inspection	10 ARNG
	29 Aug - 30 Sep 89	Cargo Inspection	9 ARNG
FLORIDA			
	24 Apr - 29 Jul 89	Cargo Inspection	81 ARNG/17 A
	30 May - 30 Sep 89	Aerial Reconnaissance	13 ARNG
	17 Jun - 30 Sep 89	Ground Radar Monitoring	24 ARNG
	30 Jul - 30 Sep 89	Cargo Inspection	6 ARNG
GEORGIA			
	8 May - 30 Sep 89	Aviation Support	7 ARNG
	23 May - 30 Sep 89	Aviation Support	7 ARNG
	5 Jun - 30 Sep 89	Aerial Reconnaissance	7 ARNG
GUAM			
	16 Sep 89	Aerial Reconnaissance	0 ARNG/0 AN
HAWAII			
	13Dec88 - 20Feb89	Aviation Support	5 ARNG
	26Oct88 - 30Sep89	Marijuana Eradication	5 ARNG
	22 Feb - 19 Mar 89	Aviation Support	6 ARNG
	20 Mar - 15 May 89	Aviation Support	7 ARNG
	16 May - 30 Sep 89	Aviation Support	9 ARNG
	5 Jun - 21 Aug 89	Aerial Reconnaissance	10 ARNG
	22 Aug - 30 Sep 89	Aerial Reconnaissance	2 ARNG
IOWA			
	24 Jul - 30 Sep 89	Aerial Reconnaissance	14 ARNG
	29 Jul - 25 Aug 89	Tactical Control Radar	23 ANG
	26 Aug - 30 Sep 89	Tactical Control Radar	23 ARNG
IDAHO			
	11 May - 30 Sep 89	Aerial Photo/Recon	10 ANG
	24 Aug - 30 Sep 89	Aerial Reconnaissance	3 ARNG
ILLINOIS			
	17 May - 1 Jun 89	Aviation Support	3 ARNG
	6 Jun - 30 Sep 89	Aviation Support	3 ARNG
INDIANA			
	24 Jul - 21 Aug 89	Aerial Transport	2 ARNG
	22 Aug - 30 Sep 89	Aerial Transport	2 ARNG
KANSAS			
	30 May - 30 Sep 89	Radar Support	24 ANG
	10-31 Jul 89	Aerial Transport	3 ARNG
	1 Aug - 30 Sep 89	Aerial Transport	10 ARNG
KENTUCKY			
	31 Jul - 30 Sep 89	Aerial Reconnaissance	60 ARNG
	31 Jul - 30 Sep 89	Ground Surveillance	20 ARNG

State	Dates	Mission	Personnel
LOUISIANA			
	24 Apr - 30 Sep 89	Cargo Inspection	21 ARNG
	16-30 May 89	Aviation Support	3 ARNG
	31 May - 13 Jun 89	Aviation Support	3 ARNG
	14 Jun - 30 Sep 89	Aviation Support	4 ARNG
	22 Jun - 30 Sep 89	Administrative/Intelligence/ ADP/Logistic Support	8 ARNG
	9 Aug - 30 Sep 89	Ground Surveillance	4 ARNG
MASSACHUSETTS			
	23 Aug - 30 Sep 89	Aerial Reconnaissance	4 ARNG
	28 Aug - 30 Sep 89	Cargo Inspection	13 ARNG
MARYLAND			
	23 May - 15 Jul 89	Cargo Inspection	11 ARNG
	5 Jul - 30 Sep 89	Aerial Reconnaissance	2 ARNG
	17 Jul - 29 Sep 89	Cargo Inspection	13 ARNG
MAINE			
	4 Mar - 30 Sep 89	Aviation Support	4 ARNG
	13 Aug - 30 Sep 89	Vehicle Inspection	9 ARNG
	30 Aug - 30 Sep 89	Ground Surveillance	8 ARNG
MINNESOTA			
	25Nov88 - 29Sep89	Aviation Support	3 ARNG
	14-24 Nov 88	Aviation Support	3 ARNG
MISSOURI			
	11 Jun - 30 Sep 89	Cargo Inspection	62 ARNG
	31 Jul - 30 Sep 89	Aerial Reconnaissance	28 ARNG
MISSISSIPPI			
	21 Jun - 30 Sep 89	Aviation Support	6 ARNG
	17 Jul - 30 Sep 89	Cargo Inspection	11 ARNG
MONTANA			
	24 Jul - 30 Sep 89	Aerial Reconnaissance	26 ARNG
NORTH CAROLINA			
	21 Jun - 30 Sep 89	Aviation Support	35 ARNG
NEBRASKA			
	2 Jun - 30 Sep 89	Aviation Support	5 ARNG
	1 Jun - 30 Sep 89	Aerial Photo/Recon	5 ARNG
	6-30 Sep 89	Ground Surveillance	4 ARNG
NEW HAMPSHIRE			
	9-30 Sep 89	Aerial Reconnaissance	53 ARNG
NEW JERSEY	1 Jun - 30 Sep 89	Cargo Inspection	12 ARNG
	24 Jul - 30 Sep 89	Aerial Reconnaissance	2 ARNG

State	Dates	Mission	Personnel
NEW MEXICO			
	26 May - 30 Aug 89	Aviation Support	4 ARNG
	29 May - 30 Jun 89	Transportation Support	4 ARNG
	11 Jul - 20 Sep 89	Transportation Support	7 ARNG
	22 Aug - 30 Sep 89	Ground Surveillance	18 ARNG
	30 Aug - 30 Sep 89	Ground Surveillance	3 ARNG
	13-30 Sep 89	Aerial Surveillance	3 ARNG
	22-30 Sep 89	Aerial Transport	4 ARNG
NEVADA			
	11 Jun - 22 Aug 89	Aerial Photo/Recon	2 ANG
	23 Aug - 30 Sep 89	Aerial Reconnaissance	0 ARNG/0 AN
	30 Aug - 30 Sep 89	Training for LEO	6 ARNG
NEW YORK			
	18 Feb - 20 May 89	Aviation Support	8 ARNG
	24 May - 30 Sep 89	Aviation Support	2 ARNG
	19 Jun - 30 Sep 89	Cargo Inspection	16 ARNG
	7 May - 15 Jun 89	Cargo Inspection	80 ARNG
	26 Jun - 30 Sep 89	Aerial Reconnaissance	4 ARNG
OHIO			
	19 Jun - 30 Sep 89	Aviation Support	16 ARNG
OKLAHOMA			
	7 Jun - 30 Sep 89	Aerial Reconnaissance	6 ARNG
	7 Jun - 30 Sep 89	Transport of LEO	6 ARNG
	7 Jun - 30 Sep 89	Transport/Destruct Drugs	48 ARNG
OREGON			
	4 Mar - 30 Sep 89	Aerial/Ground Surveillance	200 ARNG
	5 Jul - 30 Sep 89	Administrative/Intelligence/ ADP/Logistic Support	36 ARNG
PENNSYLVANIA			
	1 Jul - 24 Sep 89	Tactical Radar Support	23 ANG
	15 Aug - 21 Sep 89	Cargo Inspection	2 ARNG
	22-30 Sep 89	Cargo Inspection	10 ARNG
	21 Aug - 30 Sep 89	Cargo Inspection	7 ARNG
PUERTO RICO			
	28Nov88 - 11Jun89	Aviation Support	9 ARNG
	2 Jan - 30 Sep 89	Radar Support	20 ANG
	12 Jun - 30 Sep 89	Cargo Inspection	14 ARNG
	12 Jun - 30 Sep 89	Aerial Reconnaissance	6 ARNG
	12 Jun-30 Sep 89	Aerial Photo Support	4 ARNG
	12 Jun - 30 Sep 89	Aerial Reconnaissance	2 ARNG
RHODE ISLAND			
	23 May 89	Aviation Safety Brief	3 ARNG
	12-30 Sep 89	Cargo Inspection	3 ARNG

State	Dates	Mission	Personnel
SOUTH CAROLINA			
	28 Mar - 6 Jul 89	Cargo Inspection	45 ARNG
	7 Jul - 30 Sep 89	Cargo Inspection	28 ARNG
	31 Jul - 29 Sep 89	Aerial Reconnaissance	12 ARNG
SOUTH DAKOTA			
	10 Aug - 30 Sep 89	Aerial Reconnaissance	3 ARNG
TENNESSEE			
	19 Jun - 30 Sep 89	Aviation Support	19 ARNG
TEXAS			
	15 Oct - 30 Sep 89	Ground Reconnaissance	44 ARNG
	27Dec88 - 30Mar89	Cargo Inspection	7 ARNG
	1-20 Apr 89	Cargo Inspection	49 ARNG
	16-20 Apr 89	Drug Operations	40 ARNG
	21 Apr - 20 Jun 89	Cargo Inspection	49 ARNG/31 ANG
	21 Jun - 30 Sep 89	Cargo Inspection	49 ARNG
	10 Jul - 30 Sep	Aerial Reconnaissance	8 ARNG
UTAH			
	1 Jul - 30 Sep 89	Tactical Control Radar	23 ANG
VIRGINIA			
	19 Jun - 30 Sep 89	Aerial Reconnaissance	18 ARNG
	19 Jun - 30 Sep 89	Cargo Inspection	18 ARNG
VERMONT			
	6-30 Sep 89	Aerial Reconnaissance	4 ARNG
WASHINGTON			
	8 Aug - 30 Sep 89	Aerial Reconnaissance	4 ARNG
	15 Aug - 30 Sep 89	Cargo Inspection	13 ARNG
	29 Jul - 25 Aug 89	Tactical Control Radar	23 ANG
	26 Aug - 30 Sep 89	Tactical Control Radar	23 ANG
WISCONSIN			
	27 Jun - 30 Sep 89	Aerial Reconnaissance	2 ARNG
WEST VIRGINIA			
	29 Aug - 25 Sep 89	Aerial Reconnaissance	9 ARNG
	13-30 Sep 89	Ground Reconnaissance	21 ARNG
	27-30 Sep 89	Aerial Photo/Recon	5 ARNG

ROTATION BASE

The need to provide adequate time in the continental United States (CONUS) for service members returning from tours abroad is a key concern in force planning. The CONUS force structure that enables forward deployments to be maintained over prolonged periods is called the rotation base. A small rotation base may necessitate more frequent overseas deployments, which can lead to serious morale and retention problems. The amount of time service members spend overseas, particularly if separated from their dependents, is a key quality-of-life issue influencing reenlistment decisions and morale in the all-volunteer force. In part due to inherent service differences, there is currently no standard DoD policy for determining rotation base needs, although the length of individual tours is regulated. Current service policies provide for 12 to 36 months of stateside duty between overseas assignments, although the amount of time spent in CONUS varies considerably among units and individuals.

Overseas tours can be characterized as either short (normally unaccompanied by dependents) or long (normally accompanied). Currently, each service has general guidelines for determining how frequently personnel are expected to serve in each category. There are many exceptions, however, to the stated guidance. Special pays and bonuses, such as selective reenlistment bonuses (SRBs) and sea pay, are used to enhance retention in specialties requiring extensive time overseas (either due to the nature of the specialty or to a small rotation base). SRBs are pay supplements that make military compensation more competitive with salaries in the private sector. They are given in most cases to offset the salary incentives that draw trained personnel to the civilian sector.

Rotation base needs are a consideration in the determination of when and where forces are deployed in peacetime, although national security objectives, U.S. military strategy, and treaty commitments are the primary determinants. In crises or conflicts, forces are deployed to forward locations in response to DoD or National Command Authority (NCA) guidance, requests from combatant commanders (CINCs), and treaty obligations. The nature and scope of these deployments can change frequently, with significant effects on planned rotation schedules.

The rotation base, or overseas queue, varies widely among military occupational specialties (MOS). (The term MOS is used generically here to denote the job classifications used by the various services. As such, it encompasses the Naval Enlisted Classification (NEC) codes used by the Navy and the Air Force Specialty Codes (AFSCs) employed by that service.) While all of the services state a need for adequate billets in CONUS to maintain a rotation base, service policies do not explicitly address the proportion of CONUS forces (personnel and units) needed to sustain an overseas force of a given size. The services do track personnel rotations by MOS, with the Air Force, for

example, maintaining an Unsatisfactory Rotation Index (URI) for each MOS in the force. Where necessary to provide relief from frequent overseas tours, some CONUS billets that otherwise would be candidates for conversion to civilian positions or transfer to the reserves are filled by active-duty personnel.

Table 1 shows the distribution of personnel, by service, in the United States and abroad. The approaches adopted by the individual services to meet rotation base needs are described in the sections that follow.

Table 1
Disposition of Forces[a]
(In thousands)

	CONUS		OCONUS	
	Ashore	Afloat	Ashore	Afloat
Army	443	0	307	0
	(59%)	--	(41%)	--
Navy	268	195	70	48
	(46%)	(34%)	(12%)	(8%)
Air Force	392	0	151	0
	(72%)	--	(28%)	--
Marine Corps	142	1	47	5
	(73%)	(1%)	(24%)	(2%)

SOURCE: Department of Defense, *Defense 90 Almanac* (November/December 1990).
a. As of March 31, 1990.

Service Rotation Policies

Army. The Army sustains its forward-deployed forces primarily through individual replacements. Tour lengths are classified by geographical location. In planning troop rotations, the Army attempts to alternate long and short overseas tours, with at least 12 months (24 if possible) spent in CONUS between overseas assignments. Long tours are 36 months accompanied or 24 months unaccompanied; short tours last less than 24 months.

An MOS is declared imbalanced if 55 percent or more of its authorized billets are overseas. Programs exist to remedy those MOSs that are determined to be imbalanced. Examples include the Overseas Tour Extension Incentive program and the Space Imbalanced MOS (SIMOS) program. The Cohesion,

Operational Readiness, and Training (COHORT) program also may help alleviate imbalances overseas, but it is primarily a training and readiness program; the total number of personnel in the COHORT program is relatively small.

Air Force. Like the Army, the Air Force relies on individual replacements to sustain its forces overseas. Tour lengths are classified as long (more than 18 months) or short (less than 18 months). As a matter of policy, the Air Force prefers its personnel to spend no more than eight years of a 20-year career overseas, with at least 24 months (36 are desired) of stateside duty between involuntary short tours.

Programs exist to remedy those specialties that are found to be imbalanced. Some of these programs are the Overseas Tour Extension Incentive Plan, the Extended Overseas Tour Volunteer program, and the Unsatisfactory Rotation Index program.

Navy. The Navy establishes rotation base objectives in terms of ship types (e.g., if four carriers are constantly deployed, the Navy believes that at least 14 carriers are needed to accommodate overhaul and training requirements, allow for transit and deployment time, etc.). After decisions on force positioning and deployment are made, the MOSs needed for all ship types are aggregated and managed by occupational specialty. However, even a reasonable rotation base for ship types will result in unfavorable sea-to-shore ratios for some MOSs.

The Navy has established eight categories of tour assignments, each with varying lengths of deployed time. Since assignment to a ship results in sailors leaving their families for extended periods even if the ship is based in CONUS, the normal definitions of short or long tours cannot accurately reflect deployed time. Even though a ship is CONUS-based, a sailor assigned to "sea duty" can expect to spend more than 150 days per year at sea. The Navy's policy sets a goal that significant deployments out of home port be limited to six months deployed, six months in maintenance standdown, and six months in training for the subsequent deployment.

Tour types and lengths are specified for individual MOSs. The Navy frequently uses a sea/shore rotation ratio to express the amount of time a sailor can expect to spend on sea duty. The desired ratio is 3:3, with time split equally between sea and shore tours. The majority of MOSs exceed that objective, however. Some MOSs have sea/shore rotation ratios that result in sailors spending 60 months at sea for every 24 months ashore.

The Navy has several programs to remedy imbalances and provide relief from frequent or lengthy deployed tours. Some shore billets (such as recruiters or instructors) are open to any MOS. A number of these positions could be transferred to the civilian sector were it not for the need to provide relief from constant sea tours.

Marine Corps. The Marine Corps sustains its forward-deployed forces through a combination of individual and unit replacements. Individual overseas tours are classified as "accompanied" (normally 36 months), "dependents restricted" (normally 12 months), or "all others" (24 months). An "all others" tour is one in which a Marine would normally be accompanied by his or her dependents but elects to go alone. The Marine Corps attempts to provide at least 24 months of duty in CONUS for its personnel between overseas tours.

Deployments to the western Pacific region are sustained through unit replacements under the Unit Deployment Program (UDP). Entire units (infantry battalions, artillery batteries, aircraft squadrons) are rotated to the western Pacific for six months, followed by 12 to 18 months of CONUS duty. A similar system of rotating units provides replacement forces for Marine Expeditionary Units (MEUs).

MOS monitors track deployed time for individual Marines in all of these tours. Like the Navy, the Marine Corps uses non-MOS-specific billets ("B" billets), such as recruiters and drill instructors as well as staff positions, to provide some relief from overseas tours.

All Services. In all services, rotation base needs are determined on the basis of individual MOSs. While the Navy has a clearly defined system for determining the number of ships needed to sustain deployed battle groups, it manages its personnel rotation base on an occupational specialty basis. Even the Marine Corps manages its total rotation base needs on an individual basis since not all overseas tours are sustained by the UDP. Generally, the Army and Air Force contend that the ratio of CONUS to overseas forces should be about 2:1, while the Navy and Marine Corps prefer a 3:1 ratio due to the significant deployed time experienced by CONUS-based units.

Alternative Rotation Base Policies

Although there are some problems within individual MOSs, the present overseas force is being sustained adequately. Each service has a network of programs to fine-tune assignment policies and provide relief from, or compensation for, excessive overseas tours.

The different manning and deployment requirements of the services would make it difficult to implement a standard, DoD-wide rotation policy. If such a policy were in force, the exceptions would be numerous. There are simply too many variations among the services to expect a single policy to address unique needs adequately. On the other hand, the services might alleviate some of their rotation base problems by "borrowing" policies and procedures from each other.

Unit Rotations. A unit rotation system similar to that employed by the Marine Corps might relieve some rotation problems in the other services.

Forces deploying as units would maintain a higher degree of readiness, since they would simply be changing location. MOS assignment problems might be lessened somewhat under a unit rotation scheme, as forces would deploy with appropriate mixes of personnel. Costs also might decrease, since the services should not have to pay as much for permanent change of station (PCS) moves for short tours. If units spent 6 months abroad, followed by 18 months in CONUS, the effect of frequent deployments on service members and their families should be lessened.

A unit rotation program would benefit operations of maritime prepositioning ships (MPS) and POMCUS (Prepositioning of Material Configured to Unit Sets) units. Such a program would foster greater uniformity of doctrine, tactics, and procedures among units stationed in CONUS and abroad. Not all force elements, however, are amenable to a unit rotation policy. Headquarters (brigade, regiment, and division) and support (administration, supply, maintenance) organizations do not lend themselves to unit rotations as readily as do smaller units. These units should continue to be sustained by PCS moves.

There are several potential drawbacks to implementing a wider policy of unit rotation. To provide a proper CONUS rotation base, two or three like units would have to be stationed in the same geographic area in CONUS for each unit deployed overseas. The value of unit replacements is that service members could deploy unaccompanied for six months, then return to their former CONUS location and their families. If two or three like units could not be maintained in the same location, service members might have to be reassigned elsewhere upon their return to CONUS, requiring their families to move and increasing PCS costs.

Likewise, units in a common rotation base would have to use the same equipment. This could be a problem for aviation units, which often operate different models or series of aircraft overseas than they do in CONUS. To implement a unit rotation program, CONUS units would either have to deploy overseas with their aircraft and equipment (incurring additional expenses) or rotate only their personnel, which would require significant additional training time at the new location. A unit rotation program for ship crews could encounter similar problems, given the differences in equipment among ships of the same class. The alternative would be to rotate units with their equipment, at a great increase in cost.

Expanded Bonuses. If unit rotations cannot be implemented on a large scale, a significant increase in incentives for overseas tours might be another way to improve retention and reduce shortfalls within MOSs. A flexible program that targeted bonuses on "short-staffed" MOSs could allow the services to match personnel more closely with unit needs. Compensation increases would, of course, cause manpower costs to rise, although the amount of cost growth is difficult to project. Factors influencing the size of bonuses that might

be needed include domestic economic conditions and the length of time between CONUS tours. Furthermore, there is probably a limit on the extent to which deployed time could be increased, regardless of compensation level.

Increased Use of Reserves. It may be possible to make greater use of reserve forces in routine peacetime deployments although further study is needed before implementing such policies. Substituting reserve for active units in selected elements of deployed forces might reduce pressures on the rotation base by lowering active manning requirements. In considering such a step, however, it is important to remember that for major combat structure, active force size is driven as much by contingency response needs as by forward presence and rotation requirements.

There has already been some successful, albeit limited, use of reserve units in operational missions. Such has been the case with Air National Guard and Air Force Reserve C-130 rotations to Panama and Europe, KC-135 rotations to Pacific and European tanker task forces, and Air National Guard tactical fighter and air defense fighter rotations to Panama and Europe. Also noteworthy have been the deployment of Naval Reserve P-3 aircraft squadrons in antisubmarine warfare (ASW) operations and the use of Army National Guard heavy equipment maintenance companies in Europe.

Units that place a premium on individual or small-team skills (e.g., mechanics, technicians, aircrews) might be more effective in periodic rotations than units emphasizing collective skills (e.g., infantry units and ship crews). Also, units that are CONUS based but have missions requiring frequent short deployments, such as ASW aircraft and strategic airlift squadrons, might be easier to augment with reserve units than forces based permanently overseas. The use of reserve components for extended peacetime missions outside CONUS is now, however, constrained by legislation that limits the availability of these forces and by the ability of the reserves to provide sufficient resources even if unconstrained by legislation.

Increasing the use of reserves in overseas deployments could have some advantages. Reserve forces could be more closely tied to the doctrine, tactics, and procedures employed by active units. The readiness of reserve forces also should improve. Rotating reserve forces routinely to forward locations would reinforce the concept of the reserves as an integral part of the "first team," while increasing their skill levels and refining the procedures and systems needed to deploy for war. These potential benefits can be seen in the Air National Guard, which currently operates in such a manner, employing the same doctrine, tactics, procedures, and readiness standards as the active component, training regularly overseas in combat-tasked areas of operation, and deploying together with active units in wartime. Conflicts between military and civilian job obligations might be mitigated by the fact that reservists would be deployed for finite periods that could be anticipated well in advance.

The increased use of reserves in forward locations might have drawbacks, however. Deployment costs would rise as reserve units rotated to and from overseas postings at more frequent intervals than their active-duty counterparts, who typically deploy for periods of 12 to 36 months. To provide continuous coverage in a single force element for one year, as many as 30 reserve units could be needed, assuming two weeks' active duty per unit plus transit and turnover time. Increasing active duty for training to three weeks would reduce the number of reserve units needed to about 20 per year, but would entail either increased overall reserve pay costs or a reduction in other reserve component units. A more telling constraint is that there are very few reserve units of the same type in the current force structure; much greater numbers would be needed to provide continuous coverage.

The learning curve for reserve units, coupled with their short deployment times, may make them substantially less effective than their active counterparts. Reserve component units currently participating in annual active-duty training overseas generally require considerably more transportation, administration, and preparation time than similar units training in CONUS, and much more time than active units permanently based overseas.

CALL-UP AUTHORITIES

Title 10 U.S. Code Section 673b provided the authority for the President's call-up of reservists for Operation Desert Shield. Although the call-up authority was granted to the President in 1976, Desert Shield marks the first time it has been exercised. Under the law, the President may authorize the involuntary call to active duty of as many as 200,000 members of the Selected Reserve for up to 90 days, with an additional 90-day extension if needed. (The call-up authority applies both to members of Selected Reserve units and to Selected Reservists not assigned to units.) For FY 1991, the Congress extended the time limit for combat forces serving in Operation Desert Shield to 180 days plus a 180-day extension.

A unit is defined as any group or detachment of two or more individuals organized to perform a particular function, whether or not such a group is part of a larger group. One of the restrictions on using the call-up authority is that reserve component units and individuals may *not* be ordered to active duty under 673b for the purpose of training. While a declaration of war or national emergency is not required, the President must report to Congress within 24 hours of exercising the 673b authority or upon use of the 90-day extension authority. Under this authority, National Guard and Reserve forces become part of the active armed forces of the United States during their period of active duty.

In 1976, when Congress initially gave the President this authority, the call-up limit was set at 50,000 personnel for a maximum of 90 days. In 1980, based on exercise experience that indicated a greater need for augmentation in the early stages of a crisis-response buildup, the Defense Department recommended, and the Congress approved, an increase from 50,000 to 100,000 in the number of Selected Reservists that the President could order to active duty. In 1986, the Congress again amended Section 673b, raising the limit to 200,000 personnel and extending the 90-day active service limitation to allow for a second 90-day period.

In addition to Section 673b, other call-up authorities can be used to place reserve components on active duty. These authorities, identified in Title 10 of the United States Code, are summarized below in Tables 1 and 2.

Table 1
Reserve Component Activation Authorities

RESOURCE	TITLE 10 AUTHORITY	SITUATION	WHO CALLS UP?	LIMIT	PERIOD (TIME)	PURPOSE	REMARKS
RC Units and Individuals (IMAs and IRRs), Retired Reserve, Standby Reserve	672(a)	War or national emergency declared by Congress or when otherwise authorized	Service Secretary or designee	None	Duration plus 6 months	General activation of reserve components; "Order to active duty other than for training"	a) Activated without member's consent b) Used as authority for full and total mobilization c) See Addendum #1
RC Units and Individuals (IMAs and IRRs), Retired Reserve, Standby Reserve	672(b)	Anytime	Service Secretary or designee	None (Governor's consent required for National Guard)	Not more than 15 days a year	Training	a) Activated without member's consent b) See Addendum #2 c) See Addendum #3 d) See Addendum #4
Any reservist	672(d)	Anytime	Service Secretary or designee	None (Governor's consent required for National Guard)	Indefinite	General purpose reserve components	a) Member's consent required b) See Addendum #5
RC Units and Individuals (IMAs and IRRs)	673	National emergency declared by the President	Service Secretary or designee	1,000,000	Not more than 24 months	Augmentation of active component for national emergencies; "Order to active duty other than for training"	a) Activated without member's consent b) Used as authority for partial mobilization
Individuals in RC Troop Program Units (TPUs)	673a(a)	Unsatisfactory performance in a TPU or possibly a call-up authority for individual reservists	President	None	Until total service on active duty equals 24 months	Ready Reserve: members not assigned to or participating satisfactorily in units	a) Sends individual to active duty for unsatisfactory performance (remnant of now-expired Russell Amendment used during Vietnam) b) See Addendum #6

Table 1 (Cont'd)
Reserve Component Activation Authorities

RESOURCE	TITLE 10 AUTHORITY	SITUATION	WHO CALLS UP?	LIMIT	PERIOD (TIME)	PURPOSE	REMARKS
RC Units and IMAs (Selected Reserve only)	673b	Anytime as determined by the President	Secretary of Defense/ Transportation	200,000 total for all services	90 days with additional 90-day option	Augmentation of active component by Selected Reserve for any operational mission; not to be used for insurrection, threat of invasion or rebellion, or disaster assistance.	Activated without member's consent
RC Units only	263	When more units are needed than are in the active force	Congress	None	No limit	Basic policy for activating Ready Reserve	
Individuals in RC units	270(b)(c)	Unsatisfactory performance	Service Secretary	None	Not more than 45 days	Fulfillment of service obligation	Sends individuals to Active Duty for Training (ADT) for unsatisfactory performance
Federalize Militia	331	Insurrection	President	Upon request of the state legislature or governor	No limit	Federal aid for state government	Allows militia to be called to federal service to suppress an insurrection
Federalize State Militia	332	Unlawful obstructions, combinations, assemblages or rebellion against state authority	President	As considered necessary	No limit	Enforcement of federal authority	Allows militia components to be called to federal service as necessary to suppress a rebellion

Table 1 (Cont'd)
Reserve Component Activation Authorities

RESOURCE	TITLE 10 AUTHORITY	SITUATION	WHO CALLS UP?	LIMIT	PERIOD (TIME)	PURPOSE	REMARKS
Federalize State Militia	333	Suppress insurrection, domestic violence, or conspiracy	President	As considered necessary	No limit	Enforce state and federal law on behalf of any part or class of people within the state	a) Allows militia to be called to federal service as necessary to suppress domestic violence or conspiracy b) Used to protect individual civil rights
Federalize Army National Guard	3500	Invasion/rebellion	President	As considered necessary	Duration	Repel invasion, suppress rebellion, execute laws of the United States	Orders issued through governors
Federalize Air National Guard	8500	Invasion/rebellion	President	As considered necessary	Duration	Repel invasion, suppress rebellion, execute laws of the United States	Orders issued through governors

Table 1 (Cont'd)
Reserve Component Activation Authorities

ADDENDUM

Title 10, Section 672(a)

Addendum #1. Provides authority to call up inactive status and Retired Reserve personnel when there are not enough qualified reservists in the Ready Reserve.

Title 10, Section 672(b)

Addendum #2. While this law does not directly require this duty to be training related, legislative history implies that it should be used as such, and therefore this section normally should not be used for operational missions or "ramp ups" for the 200,000 call-up ceiling.

Addendum #3. This section was enacted to permit training of Army Reserve and Air Reserve personnel. Enactment of Section 270 rendered it obsolete for practical purposes.

Addendum #4. National Guard units and individuals must have the consent of the state governors, territories, Puerto Rico, and the Commanding General of the District of Columbia.

Title 10, Section 672(d)

Addendum #5. National Guard units and individuals must have the consent of the state governors, territories, Puerto Rico, and the Commanding General of the District of Columbia.

Title 10, Section 673a(a)

Addendum #6. United States Court of Appeals for the Eighth Circuit has held that this authority can be used to mobilize "any member not assigned to a unit of the Ready Reserve, whether or not that individual is performing satisfactorily."

Table 2
Five Major Categories of Reserve Component Duty

RESOURCE	TITLE 10 AUTHORITY	SITUATION	WHO CALLS UP?	LIMIT	PERIOD (TIME)	PURPOSE	REMARKS
Initial Period of Active Duty (IADT); pertains to RC individuals	Title 10, 672(d); DoD 1215.6, Para E, 4	Basic military training and technical skill training	Service Secretary or designee	None	Any	Basic training and technical skill training	May not be deployed outside the United States in time of war or national emergency if basic training is less than 12 weeks
Annual Training (AT), pertains to Ready Reserve	Title 10 672(b), 270 (a), Title 32, 502 (a)	Annual training	Service Secretary or designee	None	Not less than 14 days (exclusive of travel) for Reserves; 15 days (including travel) for National Guard	Readiness training	Cannot exceed a 30-day period during any fiscal year for Federal Reserve personnel
Active Duty for Training (ADT)	Title 10, 672(d)	Provide RC members necessary skills to support RC missions (e.g., professional development flight training, specialized skill training)	Service Secretary or designee	None	Length of training requirement	Used to provide readiness training	Requires consent of the state governor for members of the National Guard

Table 2 (Cont'd)
Five Major Categories of Reserve Component Duty

RESOURCE	TITLE 10 AUTHORITY	SITUATION	WHO CALLS UP?	LIMIT	PERIOD (TIME)	PURPOSE	REMARKS
Active Duty for Special Work (ADSW); pertains to RC individuals	Title 10, 672(d); DoD 215.6, Para E, 4, d	Utilized for projects supporting AC or RC programs and requiring RC experience or qualifications	Service Secretary	None	If extended past 179 days, may be counted against active duty or AGR end strength limitations	Special projects	
Temporary Tour of Active Duty (TTAD), pertains to RC individuals	Title 10, 672(d); DoD 1215.6, Para E, 4, c AR 135-200 Chap 1-4c	Utilized for projects supporting AC programs and requiring AC experience or qualifications	Service Secretary	None	Normally not longer than 139 days; if extended past 179 days, may be counted against AC end strength limitations	Special projects	Uses MPA funds

CONSIDERATIONS IN A COMPREHENSIVE TOTAL FORCE COST ESTIMATE

The methodologies used by the Department of Defense to estimate the cost effects of force structure changes are varied, reflecting differences in the organization of the services and in the cost characteristics of different types of forces. This can present problems in comparing alternative force structures unless estimates and comparisons are made using a consistent set of guidelines that ensure that all relevant costs are considered in a balanced manner. As long as the general guidelines are followed, the Department has sufficient tools to support Total Force policy decisions. Recognizing that the current estimating methods can and should be improved, the Department and the services have ongoing efforts to refine the data and estimating relationships applicable to force costing.

Force structure analyses consider the availability and effectiveness of different types of units, as well as cost impacts, when evaluating force mix alternatives. Cost is just one of the many factors that must be weighed in deciding on a force structure to meet essential national objectives.

Estimates of Total Force costs must consider changes in the size of the force as well as in the mix of active and reserve forces. Because of the scope of Total Force policy considerations, force-costing methodologies incorporate a broad perspective of defense program costs that encompasses the direct and indirect costs of owning, operating, and supporting forces and recognizes both short- and long-term effects on defense funding.

When defense force structure is changed, the effects on military pay and on the operating costs of primary force elements (e.g., divisions, regiments, wings, naval combatants) are nearly immediate. Inappropriately, these costs are sometimes the only ones considered, giving an incomplete picture of the funding implications of alternative force structures. Significant one-time ("nonrecurring") costs can be incurred during the transition to a new structure. Changes to primary force elements also can have secondary effects on units and programs that directly support those elements. Likewise, force structure changes influence defense infrastructure costs, and they affect spending to replace the inventory of defense systems. Each of these potential cost impacts is considered in Total Force policy deliberations.

The Department's approach to force costing also recognizes that not all defense program funding is directly related to force size or mix. For example, funding for national command and control and foreign intelligence programs may remain essentially unchanged even if the size of the Total Force is reduced or the active-reserve mix is changed. The need for a next-generation tactical fighter does not diminish if the total fighter force is reduced, nor does the need to deploy an improved attack submarine necessarily reflect the number of

submarines in the Navy inventory. In general, funding for major research, development, test, and evaluation (RDT&E) and science and technology programs is driven by threat estimates, technology issues, and even fiscal limitations, but not directly by the size of the force that ultimately will be modernized. Similarly, policy decisions that affect funding for military space programs and foreign aid are not closely related to force size. Force-costing methodologies should not attempt to tie the costs of these kinds of programs to Total Force policy decisions as an automatic consequence of force structure changes.

Table 1 illustrates the importance of considering more than just the pay and operating costs of units affected by changes in force structure. In the 1980s, personnel and operating costs accounted for about 25 percent of the budgets of the military departments. Cost estimates that consider only these expenses understate the total, long-term cost effects of changes in Total Force size. Investment programs, which provide primarily for the replacement and modernization of military equipment, made up nearly 30 percent of the defense budget in the 1980s. Since the amount of equipment purchased over the long term is related to the size of the Total Force, impacts on investment costs are taken into account when changes in force size are evaluated. Infrastructure costs constituted 35 percent of defense spending over the past decade, and the variable portion of these costs is considered in Total Force costing.

Table 1
Composition of Defense Spending in the 1980s
(In percents)

	Mission Programs			Programs Not Related to Force Size or Mix
	Pay and Operations	Investment	Infrastructure	
Army	27	21	44	8
Navy/Marine Corps	26	35	30	9
Air Force	17	29	32	22
All Services	23	29	35	13

Policy-level force structure decisions focus on primary defense mission elements such as divisions, wings, and naval combatants. For this reason, Total Force costing begins with the estimation of the costs directly related to those elements. These expenses, referred to as "direct unit costs," include the compensation of unit personnel, the day-to-day operating costs of units, and the long-term recurring investments required to replace unit equipment periodically and keep it up to date.

Changes in the size of primary force elements can have secondary effects on spending for other programs, such as war reserve procurement, training, and deployable support. These "direct support costs" generally must be examined on a program-by-program basis because their relationship to the Total Force is highly scenario dependent. Their budgetary impacts can be properly assessed only after the changes in primary force elements are identified.

Major changes in force size or mix will affect the size and cost of the defense infrastructure. Our approach is based on the observation that, historically, the size of the infrastructure program has been related to the size and operating tempo of primary force elements. Estimates of changes in infrastructure funding are therefore based on projected changes in the pay and day-to-day operating portions of direct unit costs.

As a final step in estimating the costs of any significant force change, the one-time costs that arise in implementing changes in force structure need to be identified and estimated. The costs of unit activations, deactivations, and transfers between active and reserve forces can run into the hundreds of millions of dollars, overshadowing the recurring savings in some circumstances.

Because of the variety of cost relationships associated with defense funding, our approach considers four types of costs: direct unit costs, direct support costs, infrastructure costs, and transition costs. These cost categories are defined as follows:

- *Direct Unit Costs.* Funding for personnel compensation, for the day-to-day operation of force structure units, and for the replacement of equipment in units that are primary force elements (e.g., ground divisions and battalions, including their deploying support forces; air wings and squadrons; and naval combatants).

- *Direct Support Costs.* Funding for programs and units that provide war reserve materiel (WRM) and non-centrally managed support benefiting specific portions of primary force elements (e.g., weapon system qualification training, tactical training, deployable mission command and control elements, deployable material-handling units).

- *Infrastructure Costs.* Funding for activities that benefit multiple primary force structure units, including installation support and centrally managed support activities.

- *Transition Costs.* One-time expenses associated with equipment, facilities, and personnel resulting from a force structure change.

The sections that follow discuss the methods used to calculate costs in each category and show how expenditures are affected by changes in force mix and size.

DIRECT UNIT COSTS

Direct unit costs are the total resources required to own and operate primary force elements in peacetime. The units of primary interest in this portion of force costing are the divisions/battalions, wings/squadrons, naval combatants, and Marine forces explicitly identified in Total Force policy decisions. (Nondivisional combat and tactical support forces associated with Army combat divisions and Marine Force Service Support Group (FSSG) elements are considered in the estimation of direct unit costs.) The calculations take into account the costs of personnel assigned to units, the day-to-day expenses of operating the forces, and the long-term average costs of replacing and upgrading unit equipment. Direct unit costs are driven by manning, equipping, and training policies (i.e., operating tempos). Differences in these "cost drivers" explain the major differences in direct unit costs between units in the active and reserve components, and provide a basis for estimating the direct funding impacts of different force sizes. Unit operating tempos and manning decisions are affected both by desired readiness levels and by the experience level of unit personnel.

Consistency in cost comparisons is important but difficult to achieve, given the multiplicity of data-gathering systems and models in use throughout the Department. The first step in attaining some degree of uniformity is to establish a common set of cost elements to be considered, recognizing that all elements are not relevant to all kinds of units. Table 2 shows the basic cost elements that should be included in unit costing.

Table 2
Elements of Direct Unit Costs

- Unit Manpower Costs
  - Pays and allowances
  - Accrual for retirement pay
- Unit Operating Costs
  - Fuel and other POL (petroleum, oil, and lubricants)
  - Replenishment parts
  - Consumable parts and supplies
  - Other unit training costs
    - Unit-funded transportation to training
    - Consumables such as ammunition and tactical missiles
  - Unit-funded contract services
  - Other sources of intermediate maintenance
- Equipment-Related Costs
  - Replacement of mission equipment
  - Major overhauls of primary mission equipment funded on a unit basis
  - Modifications
  - Replacement of support equipment

Unit Manpower Costs

Unit manpower costs are calculated based on individual pays, allowances, and the accrual value of retirement pay. The cost calculations cover all full-time and part-time military members and all civilian personnel who are assigned to units. Costs are estimated on the basis of current or planned manning policies, thus reflecting the personnel resource levels that will actually drive budgeted costs. Often, this is less than a unit's fully authorized wartime manning level.

Total compensation costs include amounts set aside for the annuities that military members will receive when they retire. Accrual rates differ for full-time active or reserve personnel and part-time reservists. Currently, full-time personnel have accrued retirement pay set aside at the rate of 43.9 percent of basic pay and part-time reserve personnel at the rate of 13.4 percent. This differential will gradually change as the new military retirement laws affect larger proportions of military members. The rates are projected to stabilize at 36.6 percent and 12.0 percent, respectively, for active and reserve component personnel. Direct unit cost estimates of retirement pay accrual are based on the rates that will apply in the six-year defense program period.

Total unit manpower costs are generally less for reserve units than for active units because the annual number of paid duty days is significantly higher in the active force. There are circumstances in which somewhat higher average grade levels in reserve units (together with the use of full-time civilian technicians in place of junior enlisted personnel) make the average man-day costs a little higher in those units. In most circumstances, however, this difference is more than overcome by the differences in retirement pay accrual rates and the lower number of full man-days served in reserve units each year.

The operational characteristics of some types of military units limit the extent to which part-time manning can be used and/or operating tempos can be reduced. The safe peacetime operation of complex equipment and the maintenance requirements of some equipment items can lead to relatively high levels of full-time manning in certain types of reserve units. For example, the technical complexity of aviation units limits the extent to which manning levels and operating tempos in reserve aviation squadrons can be reduced below active levels. Operating tempos are not permitted to fall below certain levels so as to maintain crew proficiency and ensure the safety of peacetime training operations. The higher operating tempo of reserve aviation units affects maintenance and general support requirements and leads to a relatively high level of full-time manning. Some reductions below active flying-hour rates are possible where the skill level of reservists is relatively high (because of prior active-duty training and experience), where skills can be recovered reasonably quickly following mobilization, or where civilian employment provides some degree of transferable proficiency. The conditions that determine minimum operating tempos limit the cost savings possible from active-to-reserve transfers.

Despite these limitations, savings are still achieved in most reserve aviation squadrons, even though they are not nearly as high as in many other types of forces.

Full-time manning and peacetime training levels in reserve units also are affected by readiness requirements, mission complexity, the transferability of civilian job skills, and the type of equipment employed by the units. In the case of naval combatants, the need to keep ships ready for deployment on short notice accounts for a relatively high level of recurring maintenance requirements. If the lead time from peacetime operations to active involvement in hostile operations is long, ships can be maintained differently or laid up during peacetime and the amount of full-time manning can be greatly reduced, as in the Navy's Innovative Naval Reserve Concept. Trade-offs between the risks of extending the transition period and the potential for cost savings have been and continue to be considered as the worldwide military environment changes.

Unit Operating Costs

The second major component of direct unit costing is the resources expended in the day-to-day operation and maintenance of forces. The costs of fuel, repair parts, supplies, and training consumables (e.g., ammunition, tactical missiles, etc.) account for the majority of these expenditures and apply to all types of units. In cases where intermediate maintenance is provided by organizations that are not part of the primary force element (e.g., shore-based intermediate maintenance activities in the Navy), the associated expenditures are counted as direct unit costs. Also included in this cost category are expenses that are unique to a unit's operation, such as the support services performed under contract for naval combatants in foreign ports of call. Where units regularly incur costs to travel to training locations, these expenditures also are counted as direct unit costs.

The Department is currently considering changes in the way certain support activities are funded. In the future, some activities that are now considered direct support or infrastructure costs may be funded with the units receiving the support. As such changes occur, the definition of unit cost elements will be revised accordingly.

Equipment-Related Costs

Estimates of manpower and operating costs capture the most apparent and immediate budgetary effects of force changes. These costs affect defense expenditures within one to two years of the time a force structure change is made. Equipment-related cost impacts are not as closely linked in time, but they do have a major long-term effect on defense spending. These costs are relevant in decisions related to the affordability of forces of different sizes.

All major force elements require a large investment in expensive equipment. As Table 1 showed, mission investment costs in the 1980s (which were driven almost entirely by procurement of new equipment) outpaced operating costs as a share of defense spending. Similar patterns existed in the 1970s. A methodology that omits procurement and major modification costs will underestimate the long-term costs of maintaining a total force of a given size. We include these costs in our consideration of Total Force policy decisions with the strong caveat that the full impact of equipment-related costs on defense budgets often is not felt in the near term.

Over the long term, force structure reductions are accompanied by a roughly proportional change in the total number of weapon systems procured annually. A 20 percent reduction in aviation units will, in the long run, lead to a 20 percent reduction in aircraft procurement. However, from a budgetary perspective, cost savings must be viewed in the context of the current acquisition profiles for weapon systems. If procurement plans do not support the replacement of equipment of existing forces, proportional savings in procurement will not necessarily be realized. If current plans do not even support the lower total force size, it is possible that no procurement savings can be realized in the budget years. In the extreme, it is possible that no new systems of a given class are planned for procurement over a given period of time. In that case, there is no rationale for projecting budget savings associated with procurement of those systems.

To be more specific, consider an aviation force in any of the services. If the force consisted of 1,000 aircraft with a projected lifetime of 30 years, approximately 33 new aircraft would be bought each year (on average). If the procurement budget for these aircraft supported only 25 purchases annually and a force reduction of 25 percent were being evaluated, it would be inappropriate to forecast annual savings equivalent to the procurement cost of eight aircraft (i.e., 25 percent of 33).

Not all types of equipment are bought as part of a regular, annual modernization program. Replacement equipment, for example, is procured only periodically as threats change or new technologies emerge. Moreover, to reduce production costs, these purchases often are made in lot sizes larger than the long-term annual average. A methodology that assumed an automatic reduction in procurement spending where none is currently programmed or budgeted would be incorrect. A practical and accurate methodology requires a more careful examination of the actual procurement programs for affected classes of equipment.

Because replacement costs cannot be estimated precisely, projections of these expenditures reflect approximate long-term average funding impacts. The estimates take into account current replacement costs of like equipment and expected average inventory life, recognizing that equipment in different types of units is replaced for a wide variety of reasons.

When equipment-replacement cost effects are relevant, they incorporate any differences that could arise from dissimilar operating practices in active and reserve units (e.g., average annual operating tempos). Some equipment is replaced or subject to major overhaul when it reaches a milestone with respect to total operating hours. The number of years required to reach this point could be higher in reserve units if equipment is used less intensively than in active units. This could be a consideration in decisions involving strategic mobility forces as well as other force elements.

Equipment-related costs include the expenditures associated with replacing primary and support equipment, conducting major overhauls where they are a routine and essential aspect of owning a class of equipment (e.g., ships), and modifying and upgrading equipment to maintain its military utility over its projected lifetime.

Over the long term, funding for the procurement of new equipment is related primarily to the size of the Total Force and only to a much lesser degree to the mix of active and reserve units within the force. A larger Total Force will require larger recurring investments to replace and modify equipment. The conversion of units from one component to another does not significantly affect equipment replacement needs. For example, a total force of a particular type of unit will, in general, require roughly the same average amount of equipment to be replaced annually, whether the force contains 70 percent active and 30 percent reserve personnel or 30 percent active-duty personnel and 70 percent reservists.

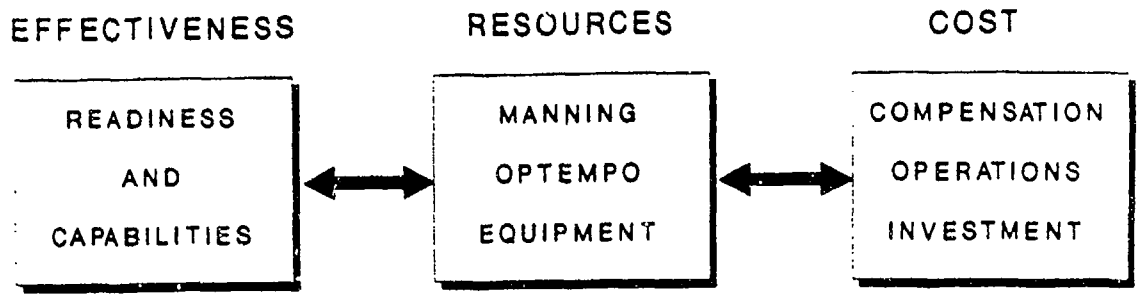
Equipment-replacement and other major costs associated with keeping military materiel ready for operation account for a major share of defense spending. These costs can be affected by Total Force policy decisions but in ways that vary from one time period to another and from one type of unit to another. These differences in circumstances require an informed use of this element of direct unit costs.

The Relationship Between Unit Cost Drivers and Unit Capability

The factors that underlie direct unit costs--the "cost drivers"--are levels of manning, tempos of operation, and equipage. Manning levels for full-time and part-time personnel drive manpower costs; operating tempos (e.g., flying hours, steaming hours, training miles) strongly influence unit operating costs; and equipment types and quantities largely determine recurring investment costs. The factors that drive unit costs also are the basic factors that determine unit capability and readiness. Figure 1 illustrates this relationship.

Direct unit costs are lower for force elements that have lower full-time manning levels, smaller equipment inventories, and lower operating tempos. The same factors that allow the cost of one unit to be lower than that of

Figure 1
The Relationship Between Unit Cost Drivers and Unit Capability



another also tend to limit unit capability and readiness, but this is not always the case. Many factors interact in determining how units are affected by reduced operating tempos. Mission and equipment complexity, unit personnel stability, average experience levels, transferability of civilian skills, and the relative importance of unit-level and individual skills all influence how annual training rates affect unit capability. While not generally the case, it is possible for active and reserve units with differing operating tempos to have essentially the same readiness, given the right combination of conditions. Some aviation units (e.g., strategic airlift) and certain medical units are cases in point.

In other instances, reduced manpower training and support resources prevent some types of reserve units from being as ready as their active counterparts. For example, it has been estimated that, while an active Army division with a SORTS rating of C-1 is ready to deploy immediately, a SORTS status C-4 National Guard division might not be able to deploy effectively until six months after mobilization, depending on the nature and extent of its readiness deficiencies. Similarly, it is not practical for naval aircrews to remain qualified for night carrier landings given their low peacetime operating levels, although they would require less than a month to requalify upon activation. The lower immediate readiness of many reserve units reflects their lower manning levels and operating tempos in peacetime. The readiness of these units may be quite adequate for their role in the Total Force, but they do not have the same capability as a fully resourced active unit. Active and reserve force mix deliberations take these differences into account. It should be understood that active and reserve units have a spectrum of SORTS ratings and that active unit ratings are not axiomatically higher.

Costing Data

Current information on actual expenditures for the direct unit cost categories discussed here is sometimes not readily available. In addition, exact relationships between operating tempo and some elements of cost are not

precise. However, data are available from the services that allow the most significant portions of the cost element structure to be addressed adequately in Total Force policy deliberations. The cost factors used for these estimates vary in reliability but are sufficiently accurate to ensure that Total Force policy options within a single service are properly compared.

The following sections apply the estimating structure described above to examples from each service. Active and reserve cost comparisons are provided for each force element evaluated.

Unit Costing for the Army. Policy-level decisions involving the Army's size and component mix are most often characterized in terms of changes in combat divisions and brigades. However, characteristics of Army force design make it difficult to accurately estimate the cost of Army force structure changes described at this "generic" level. Army divisions differ in ways that greatly affect costs. Armored divisions cost more to own and operate than do light infantry divisions. Divisions nominally of the same type are manned and equipped differently. Active divisions have different portions of their total combat and support capability provided by the reserve components. The magnitude and variety of the support provided at echelons above the division level further complicate the estimation problem. The character and amount of such support vary from corps to corps and theater to theater. To apply force costing in a policymaking environment where detailed unit-level decisions are not available for the dozens of affected organizations, it is necessary to adopt a generalized estimating approach and then tailor each application to the characteristics of a given policy alternative.

At a minimum, force costing for the Army requires identification of the type (e.g., armored, light infantry, etc.), theater, and component affiliation (i.e., active or reserve) of the affected combat units; the mix of active and reserve support units at echelons above the division level; and the anticipated manning and equipage levels and operating tempo of the affected units. These latter parameters (i.e., manning, equipage, and operating tempo) can be approximated by selecting a comparable unit to use as a baseline and, if desired, adjusting its manning and operating tempos for different readiness levels. For example, Authorized Levels of Organization (ALO) 3 units are manned at 80 percent of ALO 1 units.

Estimating Army direct unit costs is a two-step process. The first step is to identify the type (e.g., armor, light infantry) and component affiliation (i.e., active, Army National Guard, Army Reserve) of the combat division or brigade being evaluated. Using techniques described below, the manpower, day-to-day operating, and equipment-related costs of the combat unit are then estimated. Next, costs of supporting units above the division level are estimated and added to the cost of the combat unit. These two components make up what is called a "division slice," which typically consists of a mix of active and reserve units. Estimating the costs of support from echelons above the division level requires a

generalized approach that allows for a wide variety of mixes of active and reserve support.

Support above the division level comes from corps- and theater-level units. In general, corps-level support can be considered to be roughly proportional to the size of the combat units requiring support within a corps. Thus, removing one of five combat divisions from a corps would result in roughly a 20 percent reduction in requirements for nondivisional combat and tactical support. The same proportionality is not necessarily true of theater-level units and assets. Neither of these two generalizations is always borne out in actual practice, but errors arising from the fact that some corps-level support is fixed are balanced by the fact that not all theater-level support is completely fixed. A reasonable approximation can be obtained by treating corps-level support as varying with the number of combat units in a corps. (The amount of support varies according to the composition of combat divisions in each corps.)

If major reductions in theater-level forces are envisioned, they need to be specifically identified and costed as if the forces were "stand alone" units. An example is the 32nd Air Defense Command (ADCOM) in Europe. This unit provides combat support to all ground divisions in Europe. It is possible that a large number of U.S. combat divisions in Europe could be withdrawn, while leaving a major portion of the 32nd ADCOM in place to provide air defense for NATO.

To estimate the support portion of a division slice, representative "generic" corps are defined based on their warfighting structures. The examples that follow are based on the unit structures of V Corps and a generic CONUS-based corps composed of light and heavy divisions. These two corps were chosen because they represent opposite ends of the cost spectrum. At the high end is the European-based V Corps, with its large, well-resourced, heavily mechanized and highly modernized divisions and extensive corps-level support structure. The low end of the cost spectrum is represented by a generic CONUS-based corps, with a mix of light and heavy divisions and less extensive corps-level support.

To assess the cost impact of various mixes of active and reserve units within a corps, two nominal baselines were constructed: a 100 percent active corps and a 100 percent reserve corps. To evaluate units with different capabilities, baselines were formed for C-1/ALO 1 and C-3/ALO 3 active and reserve units with appropriate manning and operating levels. From these baselines, cost estimates for division slices of any mix of active and reserve units can be developed as consistent excursions.

Because requirements for support from echelons above the division level are derived from wartime combat requirements, the baseline corps include all of the units (division as well as corps level) that would be attached to the corps in wartime. Thus, the 100 percent active baseline V Corps includes the active

equivalent of two Army National Guard (ARNG) combat divisions and their associated support. The CONUS generic corps consists of three active heavy divisions, one active light division, the active equivalent of a reserve mechanized division, and all corps-level support. The active baselines then serve as the foundation from which 100 percent reserve baselines are formed.

Data to support this type of costing are constantly being updated and improved. The principal source of unit manpower data for existing units is the Army Force Builder data base. Data on manpower costs and asset values for active units are obtained from the Army Force Cost System (TAFCS), developed by the U.S. Army Cost and Economic Analysis Center. Manpower cost factors for Army Reserve (USAR) and ARNG units are from the Army Budget Office and the National Guard Bureau, respectively. Military pay and allowance (MPA) costs are computed using separate cost factors for six categories of personnel: Active OCONUS, USAR Ready Reserve, ARNG Ready Reserve, Active CONUS, USAR Active Guard Reserve (AGR), and ARNG AGR. Reserve units are assumed to consist of 4 percent AGR and 96 percent Ready Reservists (including 4 percent also serving as civilian military technicians). Army National Guard units are assumed to have 5 percent AGR personnel, and 5 percent of the Ready Reservists are assumed to be civilian military technicians.

Operations and maintenance (O&M) costs are computed using the Training Resources Model (TRM) employed by the Office of the Army Deputy Chief of Staff for Operations and Plans. The TRM model estimates O&M costs on the basis of readiness levels (expressed in terms of operating tempo), authorized equipment levels, and personnel levels. Costs are divided into two basic categories: those that are driven by unit operating tempo and those that are not. Costs that are not driven by operating tempo are assumed to be a function of numbers of personnel. TRM calculates operating-tempo-driven costs in three categories: petroleum, oil, and lubricants (POL); spares and repair parts; and other equipment-related costs. Operating-tempo-driven costs are derived from factors that are in turn derived from Army battalion-level training models (BLTMs). BLTMs specify the training resources required to achieve given readiness levels at given ALOs.

(The TRM model is currently used by the Department of the Army to compute its program and budget requirements. TRM is oriented toward providing detailed cost information at the Army Management Decision Package (MDEP) level. Each active division constitutes an MDEP; thus the MDEP process provides a relatively simple and consistent way of estimating costs at the division level and below.)

Models of 100 percent active corps were constructed based on the V Corps in Europe and a generic CONUS-based corps, using the current TRM structure as a baseline. For V Corps, the modifications consisted primarily of adding active versions of the reserve units that would be attached to V Corps in a war. For the generic CONUS corps, in addition to adding active versions of reserve

units, it was necessary to add active support units associated with wartime support of the corps.

Force structure is modeled in TRM by assigning BLTMs to an MDEP. For example, an armored division would be assigned BLTMs representing a division headquarters and headquarters company, six M1A1 tank battalions, four Bradley mechanized infantry battalions, a main support battalion, three forward support battalions, and so forth. For each modeled BLTM, TRM has associated cost factors representing operating-tempo-driven costs. Developing new force structures consists largely of identifying new BLTM associations.

TRM cost factors vary on an annual basis, reflecting changes in Army support policies. The most significant changes for cost-estimating purposes are those associated with the transition to unit funding of depot-level repairable items via the stock fund. The impact of changes associated with the stock fund are expected to stabilize by FY 1995. The baselines use factors that reflect these changes at the steady-state level.

Training ammunition costs are derived from the TAFCS data base, which in turn is based on actual training ammunition consumption. Asset values for active divisions are provided in the data base. These values are amortized over a 15-year period for each division.

Costs of purely USAR or purely ARNG division slices are derived from purely active division slices. MPA costs are computed using the same personnel levels but applying USAR or ARNG pay factors, as appropriate. Operating-tempo-driven OMA and training ammunition costs are scaled in accordance with the reduced operating rates associated with reserve component units. Currently, USAR units operate at 25 percent the rate of equivalent active units to achieve the same nominal readiness level (i.e., C-rating); ARNG units operate at 36 percent. Non-operating-tempo-driven costs are scaled in accordance with the number of duty-days for the reserve component in question.

Baseline data are presented in Tables 3 to 8. Each table provides separate breakouts at the division level and echelons above. Separate tables are provided for each component, and two different readiness levels are evaluated. (The examples include a full spectrum of division and support units in the active and reserve components. The full complement has been included for illustrative purposes only, as not all types of units are maintained in each component.)

The data show that about 80 to 90 percent of annual recurring operating costs for Army units are driven by manpower. Fuel, parts, travel, and ammunition associated with peacetime training are an important but small fraction of the total cost of both active and reserve component units. As a result, reserve component forces with very high percentages of part-time personnel have significantly lower annual operating costs. These examples also reveal differences in the cost of different types of divisions. Heavy divisions can

Table 3
Army Direct Unit Costs, 100% Active
(CI/ALO 1)

	Europe		CONUS	
	Armored Division	Mechanized Division	Mechanized Division	Infantry Division
			Division Only	
Manning	17,302	16,744	16,753	10,969
Cost (millions of FY 1992 dollars)				
Manpower	617	597	556	371
Unit Operations	184	136	125	29
Annual Recurring	801	733	691	400
Equipment-Related[a]	175	104	138	31
Long-Term Average Unit Cost	976	837	829	431
			Nondivisional Combat Increment	
Manning	10,615	10,273	9,039	5,820
Cost (millions of FY 1992 dollars)				
Manpower	379	366	306	197
Unit Operations	74	52	59	15
Annual Recurring	453	418	365	212
Equipment-Related[a]	57	34	57	13
Long-Term Average Unit Cost	510	452	422	225
			Tactical Support Increment	
Manning	14,322	13,860	12,195	7,853
Cost (millions of FY 1992 dollars)				
Manpower	511	494	412	266
Unit Operations	76	49	56	17
Annual Recurring	587	543	468	283
Equipment-Related[a]	38	23	44	10
Long-Term Average Unit Cost	625	566	512	293

a. Based on the costs of replacing equipment in these units over a 15-year period. Equipment types differ for the two mechanized divisions shown.

Table 4
Army Direct Unit Costs, 100% Active
(C3/ALO 3)

	Europe		CONUS	
	Armored Division	Mechanized Division	Mechanized Division	Infantry Division
Division Only				
Manning	13,751	13,642	13,402	8,775
Cost (millions of FY 1992 dollars)				
Manpower	494	486	453	297
Unit Operations	127	94	85	22
Annual Recurring	621	580	538	319
Equipment-Related[a]	175	104	138	31
Long-Term Average Unit Cost	796	684	676	350
Nondivisional Combat Increment				
Manning	8,492	8,218	7,231	4,656
Cost (millions of FY 1992 dollars)				
Manpower	303	293	245	157
Unit Operations	51	35	39	11
Annual Recurring	354	328	284	168
Equipment-Related[a]	57	34	57	13
Long-Term Average Unit Cost	411	362	341	181
Tactical Support Increment				
Manning	11,458	11,088	9,756	6,282
Cost (millions of FY 1992 dollars)				
Manpower	409	395	330	212
Unit Operations	57	37	41	13
Annual Recurring	466	432	371	225
Equipment-Related[a]	38	23	44	10
Long-Term Average Unit Cost	504	455	415	235

a. Based on the costs of replacing equipment in these units over a 15-year period. Equipment types differ for the two mechanized divisions shown.

Table 5
Army Direct Unit Costs, 100% ARNG
(C1/ALO 1)

	Europe		CONUS	
	Armored Division	Mechanized Division	Mechanized Division	Infantry Division
Division Only				
Manning	17,302	16,744	16,753	10,969
Cost (millions of FY 1992 dollars)				
Manpower	145	140	140	92
Unit Operations	66	49	45	11
Annual Recurring	211	189	185	103
Equipment-Related[a]	175	104	138	31
Long-Term Average Unit Cost	386	293	323	134
Nondivisional Combat Increment				
Manning	10,615	10,273	9,039	5,820
Cost (millions of FY 1992 dollars)				
Manpower	89	86	76	49
Unit Operations	27	19	21	5
Annual Recurring	116	105	97	54
Equipment-Related[a]	57	34	57	13
Long-Term Average Unit Cost	173	139	154	67
Tactical Support Increment				
Manning	14,322	13,860	12,195	7,853
Cost (millions of FY 1992 dollars)				
Manpower	120	116	102	66
Unit Operations	27	18	20	6
Annual Recurring	147	134	122	72
Equipment-Related[a]	38	23	44	10
Long-Term Average Unit Cost	185	157	166	82

a. Based on the costs of replacing equipment in these units over a 15-year period. Equipment types differ for the two mechanized divisions shown.

Table 6
Army Direct Unit Costs, 100% ARNG
(C3/ALO 3)

	Europe		CONUS	
	Armored Division	Mechanized Division	Mechanized Division	Infantry Division
Division Only				
Manning	13,751	13,642	13,402	8,775
Cost (millions of FY 1992 dollars)				
Manpower	116	114	112	73
Unit Operations	46	33	31	8
Annual Recurring	162	147	143	81
Equipment-Related[a]	175	104	138	31
Long-Term Average Unit Cost	337	251	281	112
Nondivisional Combat Increment				
Manning	8,492	8,218	7,231	4,656
Cost (millions of FY 1992 dollars)				
Manpower	71	69	60	39
Unit Operations	18	12	14	4
Annual Recurring	89	81	74	43
Equipment-Related[a]	57	34	57	13
Long-Term Average Unit Cost	146	115	131	56
Tactical Support Increment				
Manning	11,456	11,088	9,756	6,282
Cost (millions of FY 1992 dollars)				
Manpower	96	93	82	53
Unit Operations	21	13	15	5
Annual Recurring	117	106	97	58
Equipment-Related[a]	38	23	44	10
Long-Term Average Unit Cost	155	129	141	68

a. Based on the costs of replacing equipment in these units over a 15-year period. Equipment types differ for the two mechanized divisions shown.

Table 7
Army Direct Unit Costs, 100% USAR
(C1/ALO 1)

	Europe		CONUS	
	Armored Division	Mechanzied Division	Mechanized Division	Infantry Division
Division Only				
Manning	17,302	16,744	16,753	10,969
Cost (millions of FY 1992 dollars)				
Manpower	132	127	127	83
Unit Operations	50	37	34	8
Annual Recurring	182	164	161	91
Equipment-Related[a]	175	104	138	31
Long-Term Average Unit Cost	357	268	299	122
Nondivisional Combat Increment				
Manning	10,615	10,273	9,039	5,820
Cost (millions of FY 1992 dollars)				
Manpower	81	78	69	44
Unit Operations	20	14	16	4
Annual Recurring	101	92	85	48
Equipment-Related[a]	57	34	57	13
Long-Term Average Unit Cost	158	126	142	61
Tactical Support Increment				
Manning	14,322	13,860	12,195	7,853
Cost (millions of FY 1992 dollars)				
Manpower	109	105	93	60
Unit Operations	20	13	15	5
Annual Recurring	129	118	108	65
Equipment-Related[a]	38	23	44	10
Long-Term Average Unit Cost	167	141	152	75

a. Based on the costs of replacing equipment in these units over a 15-year period. Equipment types differ for the two mechanized divisions shown

Table 8
Army Direct Unit Costs, 100% USAR
(C3/ALO 3)

	Europe		CONUS	
	Armored Division	Mechanized Division	Mechanized Division	Infantry Division
Division Only				
Manning	13,751	13,642	13,402	8,775
Cost (millions of FY 1992 dollars)				
Manpower	105	104	102	67
Unit Operations	34	25	23	6
Annual Recurring	139	129	125	73
Equipment-Related[a]	175	104	138	31
Long-Term Average Unit Cost	314	233	263	104
Nondivisional Combat Increment				
Manning	8,492	8,218	7,231	4,656
Cost (millions of FY 1992 dollars)				
Manpower	65	62	55	35
Unit Operations	14	9	11	3
Annual Recurring	79	71	66	38
Equipment-Related[a]	57	34	57	13
Long-Term Average Unit Cost	136	105	123	51
Tactical Support Increment				
Manning	11,458	11,088	9,756	6,282
Cost (millions of FY 1992 dollars)				
Manpower	87	84	74	48
Unit Operations	15	10	11	4
Annual Recurring	102	94	85	52
Equipment-Related[a]	38	23	44	10
Long-Term Average Unit Cost	140	117	129	62

a. Based on the costs of replacing equipment in these units over a 15-year period. Equipment types differ for the two mechanized divisions shown.

have 50 percent more personnel than light infantry divisions but cost twice as much to operate on an annual basis. For this reason, it is not good practice to treat the cost of Army divisions as if they were all interchangeable, generic units.

Unit Costing for the Navy. The Navy maintains information that permits consistency in unit costing of Total Force policy alternatives. This information was used to develop a unit costing methodology for naval forces. It is necessary to draw on different sources to analyze ship and aircraft squadron costs. Personnel costs, operating costs, and equipage costs are assessed for both kinds of forces.

Manning data for active and reserve units of various types are available from the Navy. The examples given in this section are based on recent manning practices. If alternative manning patterns are analyzed, it is a relatively straightforward exercise to derive the associated manpower costs.

For ships, the VAMOSC (Visibility and Management of Operating Support Cost) data system is the primary source of information on operating and support costs. VAMOSC maintains historical data on many categories of costs for every active ship in the Navy. Information is available by ship class on active manning levels, active personnel costs, fuel costs, hours underway, maintenance performed at all levels, ammunition and other stores used in training, and fleet modernization costs. Data on equipment replacement costs are available from the Naval Sea Systems Command.

Table 9 provides estimates of the comparative cost of active and reserve ships of the FFG-7 class as an illustration of our costing methodology. The estimates were derived for ships whose manning and operating levels are representative of those historically associated with the FFG-7 class. (Manning and operating tempos are currently being increased to permit reserve FFGs to participate in anti-drug activities. These increases are not reflected in the table.)

Compared to active FFGs, reserve FFGs save money on both manpower and operating costs. The reserve ships have 35 percent fewer full-time personnel (saving $1.8 million a year) and lower operating tempos (saving $1.3 million annually). These savings are, however, offset in part by increases in other support activities. The Navy has found that it must increase the level of manning at shore-based intermediate maintenance activities (SIMAs) in order to accomplish required preventive maintenance on reserve ships. Up to 45 additional enlisted personnel may be needed for this task. These extra SIMA personnel can erode as much as $1.4 million of the manpower savings from an active-to-reserve transfer. Moreover, as noted above, the Navy has recently increased full-time manning levels for reserve FFGs participating in drug interdiction operations. This will further erode potential savings.

Table 9
FFG-7 Direct Unit Costs

	Active	Reserve	
		Ship	SIMA
Manning			
Active Officer	16	7	
Active Enlisted	194	65	Up to 23
TAR Officer	--	3	
TAR Enlisted	--	64	Up to 22
SelRes Officer	--	6	
SelRes Enlisted	4	69	
Total	214	214	Up to 45
Operating Tempo	2,700 hrs/yr (36 days/qtr)	1,350 hrs/yr (18 days/qtr)	
Cost (millions of FY 1992 dollars)			
Manpower	6.8	5.0	Up to 6.4
Operations			
Fuel	1.1	0.5	
Materials	3.4	2.7	
Purchased Services	0.3	0.4	
Other Maintenance	0.6	0.5	
Subtotal	5.4	4.1	
Annual Recurring	12.2	9.1	Up to 10.5
Equipment-Related			
Overhauls	1.1	1.1	
Modifications	2.8	2.8	
Replacement[a]	8.5	8.5	
Subtotal	12.4	12.4	
Long-Term Average Unit Cost	24.6	21.5	Up to 22.9

a. Ship cost is $297.9 million in FY 1992 dollars. Service life is 30 years.

The operating tempo of reserve FFGs is generally about half that of active ships. Fuel costs are roughly proportional to operating tempo. Maintenance costs also are related to operating tempo, but less closely so. Research indicates that about 60 percent of the material cost of organizational-level ship maintenance can be considered fixed, with the rest varying according to operating tempo. Training stores, included as part of materials in Table 9, also are assumed to vary in this way. Purchased services (rent, utilities, etc.) are required primarily when ships are not steaming. Since reserve ships spend about a third more time not steaming, they can be expected to spend a third more on purchased services. Taking all of these effects into consideration, reserve FFGs can be expected to cost $4.1 million per year versus $5.4 million for active ships, thus saving 24 percent in operating costs.

Table 9 shows that, if no additional SIMA resources are required, the long-term average annual cost of a reserve FFG is $3.1 million (or 13 percent) less than that of an active FFG. The equipment-related costs of active and reserve FFGs can be expected to be similar, as the two components follow the same overhaul and modernization policies. Including the cost of extra SIMA manpower can reduce the savings to as little as $1.7 million (or 7 percent below the cost of an active ship). When only manpower and operating costs are considered, reserve FFGs are cheaper by 14 percent to 25 percent, depending on the extent to which additional SIMA personnel are needed.

Although different data sources are used to estimate aircraft squadron costs, the analytic techniques are quite similar. Personnel costs are derived from current manning practices. To a greater extent than is the case with FFGs, some augmenting reserve personnel are associated with active naval air squadrons, which are not manned at their full wartime requirements.

Operating costs are driven by the costs of fuel, maintenance, and training munitions. The first two of these cost elements are assumed to be proportional to flying hours. This is consistent with the results of past studies of the determinants of aircraft operation and repair costs. Navy planning documents show that training munition requirements are roughly the same for active and reserve squadrons. Fuel and maintenance cost data are provided in Navy budget submissions. The cost of training munitions for active squadrons is derived from the VAMOSC Air data base.

Equipment costs include replacement costs and the cost of aircraft modifications. Replacement costs are incurred as aircraft wear out, become obsolete, or are lost in accidents. Reserve squadrons have fewer accidents because they fly less. Despite the lower operating tempo of reserve squadrons, their accident rate is no higher than that of active squadrons because their pilots are more experienced on average. Aircraft procurement costs are available from published sources. Data on the cost of modifications, the last element of equipment-related costs, are available from the VAMOSC Air system.

Replacement costs are calculated based on an average life of 25 years and a unit procurement cost of $49.8 million.

Depot-level rework costs for aircraft are treated as infrastructure costs rather than as direct program costs. This is unlike the treatment of ship overhaul costs. The reason for this methodological variation is practical rather than theoretical. The cost of ship overhauls is associated with individual ship types in the program element structure of the Planning, Programming, and Budgeting System. This is not the case for aircraft reworks for either the Navy or the Air Force.

Table 10 presents an illustrative cost comparison of F-14 squadrons in the active and reserve components. As the table shows, the manning of active and reserve squadrons is extremely similar. Manpower costs are $3.7 million less per year in reserve squadrons, however, because of the use of part-time personnel. The lower operating tempo of these squadrons reduces their annual operating costs by $4.4 million relative to the cost of active squadrons. The equipment-related costs of the reserve squadrons are $4.7 million less because of lower expected attrition.

Table 10
F-14 Direct Unit Costs

	Active	Reserve
Manning		
Active Officer	33	--
Active Enlisted	227	--
TAR Officer	--	6
TAR Enlisted	--	124
SelRes Officer	6	33
SelRes Enlisted	39	142
Total	305	305
Operating Tempo	4,018 hrs/yr	2,203 hrs/yr
Cost (millions of FY 1992 dollars)		
Manpower	9.1	5.4
Operations		
Fuel	3.0	1.7
Parts and Supplies	7.0	3.9
Training Stores	0.7	0.7
Subtotal	10.7	6.3
Annual Recurring	19.8	11.7
Equipment-Related		
Replacement		
Normal	23.9	23.9
Attrition	10.4	5.7
Modifications	5.7	5.7
Subtotal	40.0	35.3
Long-Term Average Unit Cost	59.8	47.0

In sum, over the long term, a reserve F-14 squadron will cost, on average, $12.8 million less per year than an active squadron. Therefore, over the long term, a reserve squadron costs 79 percent as much as an active squadron. Approximately $8.1 million of the cost differential represents nearly immediate savings in manpower and operating costs. When only these categories are considered, a reserve squadron costs 59 percent as much as an active squadron. Because of the greater manpower savings and because maintenance costs are more sensitive to operating tempo, naval aviation offers greater relative cost savings from active-to-reserve transfers than do ships.

Unit Costing for the Marine Corps. Marine forces are composed of three basic elements: land forces, air wings, and Force Service Support Groups (FSSGs). This structure serves as the basic organization for peacetime force management and training. Combat forces are assembled from these elements and organized into Marine Air Ground Task Forces (MAGTFs). MAGTFs take three basic forms: Marine Expeditionary Forces (MEFs), Marine Expeditionary Brigades (MEBs), and Marine Expeditionary Units (MEUs). A MEF, numbering nearly 45,000 personnel, consists roughly of a division, an air wing, and an FSSG. A MEB, with about 16,000 personnel, is composed of a regimental landing team (i.e., an infantry regiment with supporting artillery, tank, and other combat support units), a Marine air group (about 36 attack aircraft, 40 helicopters, and support aviation units), and a MEB service support group. A MEU, totaling approximately 2,400 personnel, normally consists of a battalion landing team (BLT), a composite air squadron made up primarily of helicopter and AV-8B aircraft, and a MEU service support group. MEFs, MEBs, and MEUs vary in composition depending on the specific mission of the task force. The forces are assembled from regimental, battalion, battery, and company units, and squadrons from divisions, air wings, and FSSGs.

The Marine Reserve has essentially the same peacetime structure as the active force. In crises and wartime, Marine reserve units would be called on to augment and reinforce existing task forces. Reserve infantry units would be integrated with active infantry battalions; reserve tank units would augment tank battalions. In all but extraordinary conditions, Marine reserves would not mobilize and deploy as task forces made up only of reservists. Because Marine task forces contain a mix of units (e.g., infantry, artillery, tank, combat engineer, etc.) tailored to the requirements of specific missions, it is more useful to estimate Marine force costs at the battalion or squadron level rather than as a cross section of a MEB or MEF.

Marine forces include both Marine Corps and Navy manning. Operations involving air wing elements are funded from both Marine Corps and Navy operations and maintenance (O&M). Cost estimates should reflect these practices by including costs from all funding sources. Funding for naval support that is integral to Marine unit operations is included as part of Marine force costing. Marine amphibious operations also depend on support from Navy amphibious ships and other amphibious elements, such as mobile construction

battalions, cargo-handling groups, beach groups, and miscellaneous other support. However, amphibious lift and naval amphibious support units are not tied on a one-for-one basis with Marine Corps forces. Therefore, changes in Marine force size and mix do not always produce corresponding changes in naval amphibious support. For this reason, force structure impacts on Navy amphibious ships and support units are considered in separate policy decisions and are addressed in Navy unit costing.

Data on the direct costs of Marine Corps units are obtained from the *Marine Cost Factors Manual* and U.S. Marine Corps Headquarters. Estimates derived from these data showing the costs of an infantry battalion, tank battalion, and aviation squadron are presented in Tables 11 through 13. Manning levels have been set at approximately 90 percent of the Fleet Marine Forces Table of Organization. Active and reserve manning reflect current policies within the Marine Corps.

Table 11
Marine Infantry Battalion Direct Unit Costs

	Active		Reserve	
	USMC	Navy	USMC	Navy
Manning				
Active Officers	40	3	6	--
Active Enlisted	775	59	34	--
Full-Time Reserve Officers	--	--	1	--
Full-Time Reserve Enlisted	--	--	14	--
Part-Time Reserve Officers	--	--	40	3
Part-Time Reserve Enlisted	--	--	775	59
Total	815	62	870	62
Cost (millions of FY 1992 dollars)				
Manpower	24.9		4.5	
Unit Operations	8.9		5.3	
Annual Recurring	33.8		9.8	
Equipment-Related[a]	0.6		0.6	
Long-Term Average Unit Cost	34.4		10.4	

a. Based on the costs of replacing equipment in these units over a 15-year period.

Table 12
Marine Tank Battalion Direct Unit Costs

	Active		Reserve	
Number of Tanks	70		70	
	USMC	Navy	USMC	Navy
Manning				
Active Officers	45	2	6	--
Active Enlisted	874	16	56	--
Full-Time Reserve Officers	--	--	--	--
Full-Time Reserve Enlisted	--	--	14	--
Part-Time Reserve Officers	--	--	45	2
Part-Time Reserve Enlisted			874	16
Total	919	18	995	18
Cost (millions of FY 1992 dollars)				
Manpower	26.4		5.2	
Unit Operations	7.7		5.7	
Annual Recurring	34.1		10.9	
Equipment-Related[a]	7.2		7.2	
Long-Term Average Unit Cost	41.3		18.1	

a. Based on the costs of replacing equipment in these units over a 15-year period.

Table 13
Marine CH-46 Squadron Direct Unit Costs

	Active		Reserve	
Number of CH-46s	12		12	
Operating Tempo	4,056 hrs/yr		2,041 hrs/yr	
	USMC	Navy	USMC	Navy
Manning				
Active Officers	32	1	2	--
Active Enlisted	173	3	71	--
Full-Time Reserve Officers	--	--	5	--
Full-Time Reserve Enlisted	--	--	35	--
Part-Time Reserve Officers	--	--	25	1
Part-Time Reserve Enlisted	--	--	67	3
Total	205	4	205	4
Cost (millions of FY 1992 dollars)				
Manpower	6.7		4.1	
Unit Operations	5.3		2.1	
Annual Recurring	12.0		6.2	
Equipment-Related[a]	14.4		12.8	
Long-Term Average Unit Cost	26.4		19.0	

a. Based on an aircraft cost of $18.93 million (FY 1992 dollars) and a service life of 20 years.

Unit Costing for the Air Force. Air Force Regulation 173-13, *U.S. Air Force Cost and Planning Factors*, provides a costing methodology and cost factors that support assessments of many of the components of direct unit costs. The methodology is based on years of research to develop models and data for estimating the budgetary requirements of active and reserve forces. Properly applied, this methodology permits direct unit costing of alternative force structures and provides meaningful squadron-level comparisons between active and reserve components. One of the models in AFR 173-13, designated SABLE (for Systematic Approach to Better Long-Range Estimating), provides a good representation of budgeted manpower and operating costs that is sensitive to manpower, operating tempos, and equipage. The SABLE model does not, however, address all of the costs of replacing and upgrading mission equipment. Additionally, it includes some indirect costs that are treated as part of infrastructure (as opposed to direct unit) costing.

SABLE uses a mixture of active and reserve cost factors to estimate Air Force Reserve (AFR) and Air National Guard (ANG) squadron operations and support (O&S) costs. Some factors are common to active and reserve components, while others are specific to a particular component. For application to Total Force costing, the SABLE model provides estimates of personnel costs, fuel, supplies, repairable exchangeables, training munitions, contracted services, reliability and maintainability modifications, and support equipment replacement.

The two direct unit cost elements that the SABLE model does not estimate are the replacement costs of primary mission equipment and mission enhancement modifications. An average annualized total procurement cost (i.e., total procurement costs/expected inventory life) for replacement equipment is needed to compare force alternatives properly. The expected lifetime of aircraft varies by system: fighters last 20 to 25 years, while strategic airlift aircraft, bombers, and tankers tend to last longer.

Differences in the direct costs of active and reserve component units are almost wholly driven by their respective flying-hour programs and the closely related manning practices. Reserve component units are able to retain required pilot proficiency and readiness levels with fewer total flying hours because the experience level of reservists is higher, on average, than that of active-duty personnel. If reserve units were required to fill aircrew positions with a lower percentage of prior-service pilots (e.g., insufficient numbers of active component pilots joined reserve units), overall experience levels would decrease and the flying-hour program would have to be increased to maintain the same capability.

As an illustration of our costing methodology, a comparison of the direct costs of active and reserve component F-16 squadrons is presented in Table 14. The manning includes a share of wing and group staff personnel, and flying-hour totals include proficiency flying for rated staff. Differences in flying hours and peacetime manning levels drive the direct unit cost differences reflected in the table. Reserve component squadrons fly, on average, 4,682 to 5,064 hours

Table 14
F-16C/D Direct Unit Costs

	Active	Reserve AFR	Reserve ANG
Aircraft per Squadron	24	24	24
Total Flying Hours	8,134	4,682	5,064
Manning			
Active Officers	48	--	4
Active Enlisted	573	--	30
Drill Officers	--	87	58
Drill Enlisted	--	679	537
Civilians	--	273	162
Total	621	1,039	791
Cost (millions of FY 1992 dollars)			
Manpower			
Active Military	20.22	--	1.49
Reserve Military	--	4.15	3.38
Civilian	--	10.50	6.20
Subtotal	20.22	14.65	11.07
Unit Operations			
Fuel	4.92	2.83	3.06
Consumable Supplies	2.47	1.42	1.54
Recoverable	5.52	3.18	3.43
Training (munitions)	0.85	0.85	0.85
Subtotal	13.76	8.28	8.88
Annual Recurring	33.98	22.93	19.95
Equipment-Related[a]			
Modifications/Overhauls	1.55	1.55	1.55
Replacement			
Support Equipment	1.35	1.35	1.35
Primary Equipment			
Aircraft	22.72	22.72	22.72
Attrition Aircraft	5.08	2.92	3.11
Subtotal	30.70	28.54	28.73
Long-Term Average Unit Cost	64.68	51.47	48.68

a. Based on an aircraft cost of $18.93 million (FY 1992 dollars) and a service of life 20 years.

per year compared to 8,134 hours for active squadrons. The reserve forces' lower flying hours result in a 40 percent reduction in expenditures for fuel and other materials. The differences in manpower costs reflect the fact that reserve squadrons contain a mix of full-time and drill personnel, whereas active squadrons rely exclusively on full-time personnel. The $2 million difference in recurring investment between the active and reserve components reflects the lower peacetime aircraft attrition rates of reserve squadrons resulting from their lower flying-hour programs. In sum, an active squadron (which trains at a higher peacetime rate with 100 percent full-time manning) will experience an annual recurring operating cost of $34 million versus $23 million for an Air Force Reserve unit and $20 million for an Air National Guard squadron. Over the longer term, the costs are $65 million for the active squadron versus $51 million for the AFR unit and $49 million for the ANG squadron.

A similar comparison for active and reserve component KC-135R tanker squadrons is presented in Table 15. A 10-aircraft squadron was selected for cost comparison purposes. As with the F-16, flying hours and peacetime manning levels are the two major determinants of differences in the direct costs of active and reserve component units. The AFR and ANG average 3,801 hours and 3,500 hours of flight time, respectively, per year compared to 2,840 hours for an active squadron. The requirement to provide two lines of alert aircraft results in the reserve components having a crew ratio of 1.5 versus 1.27 for active squadrons, resulting in 660 more flying hours for the ANG and 961 more for the AFR. ANG and AFR units also have different staff flying-hour requirements, and this accounts for the differences between the two reserve components.

In the active force, tanker squadrons normally are supported at the same facility as bomber squadrons. Unit collocation permits efficiencies in unit staff sizes, maintenance manning, and aircraft security personnel in active units that are not achieved in reserve units. The higher flying hours and manpower costs cause the annual recurring direct unit costs of reserve squadrons to exceed those of active squadrons by 50 to 65 percent. Equipment-related costs for active and reserve component squadrons are essentially the same, with the small differences reflected in the table resulting from the lower attrition rates associated with the active component's lower flying hours.

DIRECT SUPPORT COSTS

Each service has programs and/or force elements that can be affected in a secondary manner by changes in primary mission forces. Examples include training units managed and funded by operational commands (e.g., naval readiness groups and Air Force combat crew training wings); procurement of war reserve materiel (e.g., ammunition, tactical missiles, fuel); and combat support units that perform specialized (often theater or task force oriented) tasks in wartime (e.g., tactical communications, cargo handling, heavy runway repairs, special intelligence). The total funding for these force elements and activities is

Table 15
KC-135R Direct Unit Costs

	Active	Reserve[a] AFR	Reserve[a] ANG
Aircraft per Squadron	10	10	10
Total Flying Hours	2,840	3,801	3,500
Manning			
Active Officers	49	--	18
Active Enlisted	139	56	68
Drill Officers	--	90	65
Drill Enlisted	--	435	424
Civilians	--	206	115
Total	188	787	690
Cost (millions of FY 1992 dollars)			
Manpower			
Active Military	7.4	1.8	4.1
Reserve Military	--	3.1	3.0
Civilian	--	7.9	4.4
Subtotal	7.4	12.8	11.5
Unit Operations			
Fuel	2.5	4.2	3.8
Consumable Supplies	0.7	1.1	1.0
Recoverable	2.9	2.7	2.5
Subtotal	6.1	8.0	7.3
Annual Recurring	13.5	20.8	18.8
Equipment-Related[b]			
Modifications/Overhauls	1.7	1.7	1.7
Replacement			
Support Equipment	0.2	0.2	0.2
Primary Equipment			
Aircraft	19.9	19.9	19.9
Attrition Aircraft	1.2	1.6	1.5
Subtotal	23.0	23.4	23.3
Long-Term Average Unit Cost	36.5	44.2	42.1

a. The dollar totals shown below differ from those in the Final Report. The totals in this table are correct.

b. Based on an aircraft cost of $79.6 million (FY 1992 dollars) and a service life of 40 years

relatively small compared to the total size of the service budgets. The impact of force structure reductions on them must be assessed in the context of the total force structure changes being considered rather than as direct by-products of decisions about individual primary force elements.

Analysis of the cost impacts of force structure changes must recognize that there can be secondary effects on the operating costs of other units. Where unit operations provide both training and industrially funded reimbursable services, additional consideration must be given to the economic impact that changes in the operating tempo of these units will have on total defense spending (e.g., the cost of providing these services by other means). The cost of providing these services in other ways must be examined in evaluating the total cost effects of a force-mix decision. The most apparent (but not necessarily the only) example is the conversion of a strategic mobility program from active to reserve status. If the active unit provides peacetime airlift that will have to be replaced by other sources, the difference in the cost of these services is considered. Similar conditions could apply to other programs or activities that provide peacetime support services.

Some training that is oriented toward combat tactics and qualification in the operation of weapon systems is conducted by operational commands rather than as part of the central training programs of the services. The throughput of these programs can be related to the total size of the force and can even be affected by the mix of active and reserve units. Combat crew training in the Air Force provides the means for crew members to make the transition from one aircraft type to another and for new pilots to qualify in their first combat system. Historically, the Air Force has required one training aircraft for every four aircraft in active combat squadrons and one trainer for every eight fighters in reserve squadrons. Reserve requirements have historically been lower because new reserve crew members are often already qualified in the aircraft operated by their unit and pilot assignments are more stable. These historical patterns would change if the active-reserve mix changed to the point that the number of pilots leaving active duty and joining the reserves was insufficient to meet reserve manning requirements and the reserves were forced to train larger numbers of new pilots.

WRM and tactical missile procurement programs purchase materiel that is largely stored for use between the time hostilities arise and wartime production begins. Some of these purchases are related to force size and should be considered when evaluating major changes in the size of the Total Force. These programs are not normally affected by changes in force mix and so are not primary considerations in active/reserve mix decisions.

Adjustments to WRM procurement programs cannot be made on a proportional basis. Relatively small percentages of the tactical missiles and other smart munitions procured each year are used for peacetime training. (We account for appropriate changes in these buys as part of direct unit costing.)

Annual procurement levels for such items are driven largely by war reserve requirements. Procurement quantities for some materials are based on the number of targets to be attacked rather than the number of units or delivery platforms or force size. Because it takes several years to achieve total war reserve inventory requirements, procurement plans in the budget period may not be affected by reductions in force structure. Seldom are WRM requirements affected by conversion of units from active to reserve status.

Deployable support activities provide tactical support such as command, control, communications, and intelligence equipment and personnel and a variety of logistics services. These units normally support several combat elements, often under theater control. Changes in their number do not automatically follow changes in the number of primary mission units. Changes in the forward-deployed status of primary mission units can also affect the need to keep direct support units forward. Again, we examine impacts on these types of units on a program-by-program basis in the context of Total Force changes.

Direct support programs, such as those identified above, must be systematically examined for cost impacts but cannot be automatically changed. It is important that these programs not be treated as a form of proportionally related indirect cost. Systematic consideration of these "ripple effects" tailored to each service's operating structure is an integral part of Total Force costing.

INFRASTRUCTURE COSTS

Approximately one-third of the budgets of the military services goes to provide base-level and centrally managed services to the Total Force. Ideally, estimates of the impact of force structure changes on service infrastructure funding are based on detailed cost-estimating factors for each major type of indirect cost. Two problems limit the achievement of this ideal. First, cost-estimating factors have not been developed for the full spectrum of infrastructure costs in all services, and second, descriptions of force structure alternatives in the policymaking environment often do not provide sufficient detail to apply factors when they do exist. Despite these problems, it is important to estimate the impact that force structure alternatives will likely have on defense infrastructure costs.

Infrastructure programs include the activities and services shown in Table 16. These programs provide support that cannot realistically be directly tied to individual units. Base-level activities generally support more than one unit; central activities provide services (such as recruiting and basic training) whose benefits are spread over many units.

Where detailed estimates are not feasible, it is possible to approximate infrastructure cost effects using historical funding relationships at an aggregate level. Examination of historical funding trends for infrastructure programs

Table 16
Basic Infrastructure Activities

Installation Support
- Base Operating Support
- Real Property Maintenance
- Base-Level Communications

Central Logistics Activities
- Depot-Level Support Activities in Major Force Program 7

Central Training Activities
- Training in Major Force Program 8

Force Management and Administration
- Departmental and Management Headquarters
- Operational Headquarters

Central Medical Programs
- Regional Hospitals
- CHAMPUS

Central Communications Programs

Central Personnel Programs
- Personnel Management
- Recruiting and Examining
- Commissary Operations
- Family Housing
- Permanent Change of Station Funding
- Holding Accounts for Transient Status Personnel

shows that expenditures vary with changes in O&S spending for defense missio forces. Even though there is a historically observable linkage, estimating the relationship between infrastructure costs and the size of the force is not a precise calculus. Infrastructure costs, by their very nature, must be allocated t direct costs. This process always involves a degree of subjectivity.

Force costing recognizes that defense infrastructure costs are not totally variable with the size of the force. As in private industry, over the short to mid-term there are fixed costs of maintaining a large, ongoing establishment. Force cost estimation also accounts for the fact that reserve component units receive essential support from training, logistics, and other centrally funded active component programs. An appropriate means of allocating the costs of these services is provided in our Total Force costing methodology. There are also differences in the kinds of support provided to active and reserve units. Reservists do not use family housing, do not have the same medical benefits or access to commissaries as do their active-duty counterparts, and do not have to move to change assignments like active-duty personnel. Total Force costing recognizes these differences in allocating infrastructure costs. Each component

also funds support functions that benefit only that component. To account for the different ways that infrastructure activities are funded, cost effects for dedicated active and reserve support functions are considered separately from joint-support activities, which are centrally funded. The total effect of a force change on a service's infrastructure is the sum of the component-unique and joint support impacts.

We base our estimates of the impact of force structure changes on infrastructure costs on the historical relationship between O&S spending for mission programs and the funding for the kinds of programs listed in Table 16. We have analyzed how the services have adjusted infrastructure funding as primary force O&S spending both increased and decreased over the past twenty years. A sufficiently strong long-term relationship is evident to convince us that force structure changes do affect infrastructure costs.

The infrastructure estimation methodology applied to Total Force policy analyses recognizes that there are differences in the support provided to active and reserve component forces. Where infrastructure programs exist primarily to support active forces, the variable portion of their cost is allocated solely to active units. Such programs include, but are not limited to, PCS travel, family housing, medical services, and commissaries. The variable portion of infrastructure activities funded by reserve component budgets for reserve component support is allocated only to the reserve component. Activities such as central logistics and central training are largely funded by the active component but serve both active and reserve requirements. A portion of the costs of these centrally managed programs is allocated to both active and reserve units based on their O&S costs. Figure 2 illustrates our approach to allocating infrastructure costs to recognize the commonalities and differences in supporting active and reserve forces.

Data from the past 20 years demonstrate that while a portion of infrastructure costs is fixed, significant portions vary with Total Force size. It is also evident that infrastructure savings are not fully realized in the year that force structure changes are made. In periods of declining force levels, infrastructure reductions have lagged force reductions by as much as three years.

The services differ somewhat in their organization of infrastructure activities. Cost-estimating methodologies allow for the ways each service and component provides indirect support. Table 17 provides data on infrastructure spending by all four services for each infrastructure category during the 1980s. The table shows expenditures for the major types of infrastructure support by component affiliation (i.e., active-only, reserve-only, and joint support). Table 18 combines infrastructure spending and the average amount spent on mission O&S to show the average infrastructure spending per dollar of O&S spending.

Figure 2
Allocation of Infrastructure Costs

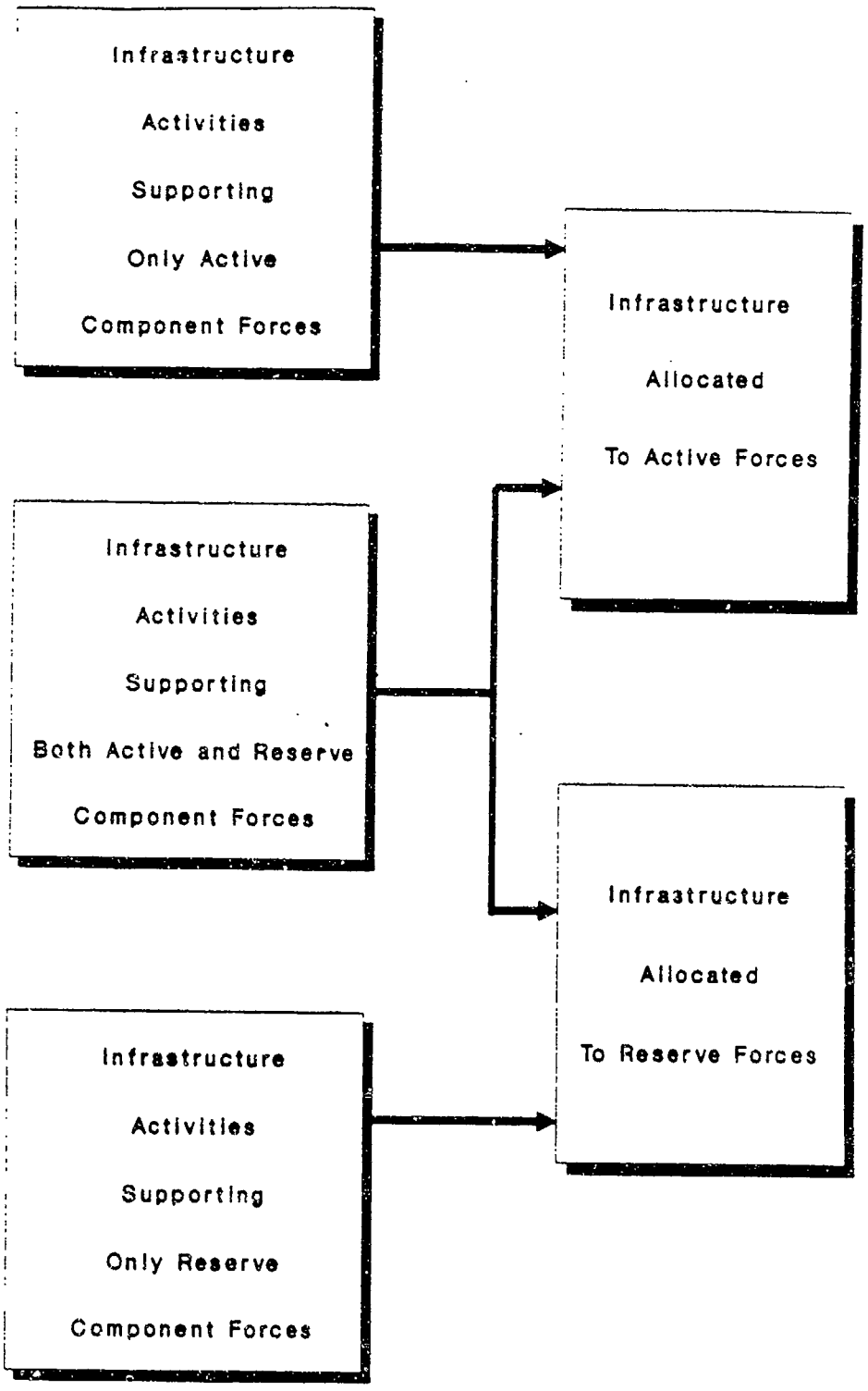


Table 17
Average Infrastructure Spending in the 1980s
(FY 1991 $B)

	Army	Navy	Marine Corps	Air Force	DoD
Infrastructure funding by active component for active-only support					
Installation Support	5.2	NA[a]	1.2	8.0	14.4
Force Management	1.0	NA[a]	0.1	1.2	2.3
Central Personnel	4.7	3.2	0.9	3.5	12.3
Subtotal	10.9	3.2	2.2	12.7	29.0
Central Medical Support					
Medical (Active)	4.0	2.9	NA[b]	3.2	10.1
Infrastructure funding by reserve component for reserve-only support					
Installation Support	0.6	NA[a]	--[c]	0.5	1.1
Force Management	0.2	NA[a]	--[c]	0.2	0.4
Central Personnel	1.6	NA[a]	--[c]	0.1	1.8
Subtotal	2.4	NA[a]	0.1	0.8	3.3
Infrastructure funding providing support to both active and reserve components					
Installation Support	0.4	4.6	--[c]	0.2	5.2
Force Management	1.4	1.9	0.2	1.4	4.9
Central Personnel	0.3	0.2	--[c]	0.1	0.6
Central Training[d]	7.5	4.4	1.3	3.3	16.5
Central Logistics	7.5	8.6	0.6	8.3	25.0
Central Comm	1.6	0.9	--[c]	1.8	4.4
Subtotal	18.7	20.6	2.2	15.1	56.6
Total	36.0	26.7	4.5	31.8	99.0

a. So little of the Navy's primary forces have been in the reserve component that it was not possible to develop a separate reserve-only infrastructure component. To maintain consistency, the only infrastructure costs retained in the active-only category were those for programs that should not be allocated to the reserve component (e.g., family housing, commissaries, permanent change-of-station costs).

b. Marine Corps medical support is provided by the Navy; the costs are allocated between the services on a pro rata basis.

c. Less than $0.1 million.

d. Excludes flight crew training costs.

Table 18
Variable Portion of Infrastructure Spending in the 1980s
(FY 1991 $B)

	Army	Navy	Marine Corps	Air Force	DoD
Active-Only	10.9	3.2	2.2	12.7	29.0
Reserve-Only	2.4	NA	0.1	0.8	3.3
Joint Support	18.7	20.6	2.2	15.1	56.6
Central Medical Support					
Medical	4.0	2.9	0.0	3.2	10.1
Average Mission O&S					
Active Forces	19.5	22.9	4.3	17.2	63.9
Reserve Forces	4.2	1.2	0.4	3.3	9.1
Total	23.7	24.1	4.7	20.5	73.0
Average Infrastructure Spending per $1.00 Mission O&S					
Active-Only	.55	.14	.52	.74	.45
Reserve-Only	.58	NA	.19	.25	.37
Joint Support	.79	.85	.46	.74	.77
Medical[a]	.10	.05	.05	.09	.08
Variable Portion of Infrastructure per $1.00 Mission O&S					
(50% fixed, 50% variable)					
Active Total[b]	.72	.53	.52	.78	.65
Reserve Total[c]	.69	.43	.33	.49	.57

a. Allows for 50% CHAMPUS and Regional Hospital funding for retirees.

b. 50% of (Active Only + Medical + Joint Support).

c. 50% of (Reserve Only + Joint Support).

Medical costs have been broken out as a separate part of active-only support in the tables because the cause of their variability differs from other types of support. Unlike other kinds of infrastructure, medical programs serve a large retired military population as well as full-time personnel. Medical cost factors vary by service, largely due to differences in the proportions of military members with dependents.

Because Total Force alternatives potentially cover such a broad spectrum of possible scenarios, we use a conservative assumption that infrastructure costs are 50 percent fixed and 50 percent variable. The second to last line of Table 18 shows the result of combining active-only, medical, and joint-support variable costs to form a total active infrastructure cost factor. The reserve total factor is obtained by adding the reserve-only and joint-support variable costs.

These figures show that active forces incur slightly higher total infrastructure costs per dollar of O&S spending than do their reserve counterparts. This occurs because active-duty personnel receive some support services not provided to part-time reservists. Even though the total active and reserve component infrastructure costs per dollar of mission O&S are nearly identical for several services, the Defense Department still realizes savings in its infrastructure programs for reserve component forces because reserve unit O&S costs (which are the basis for estimating infrastructure costs) are normally 30 to 75 percent those of active units.

Because of the relatively high cost of aviation training and the fact that this cost is relevant only to decisions involving flying units, special treatment is given to flight training in infrastructure calculations. Aviation crew training is a centrally provided training program and is not funded by or tied directly to units. Even though crew training costs for aviation units are estimated on the basis of unit manning, the impact of large force structure changes on such training can be assessed accurately only at the service level, where the impact of all prospective force changes can be considered.

Cost impacts on flight crew training are based on several interrelated factors, including the effect that prospective changes in the active-reserve mix will have on the total number of crews that must be trained. Historically, a large number of reserve component flight crews have entered reserve service already flight qualified. Valuable training that would have been lost to the Total Force when crew members left active duty has thus been retained, and the services have not needed to train as many new pilots. As long as the number of pilots joining reserve units upon leaving active duty exceeds the number needed to fill reserve component pilot billets, the number of pilots trained specifically for the reserves is not affected by the active-reserve mix (i.e., the supply exceeds the demand). As the relative size of reserve forces increases, however, there is a point where not enough prior-service personnel are available to fill reserve flying billets. The point at which the demand cannot be met by active separations is affected by the active-reserve mix, retention rates in both

components, and the rate at which prior-service personnel join reserve component units. Each of these factors changes over time, and the cost effects are best estimated on a Total Force basis using current retention data.

Table 19 illustrates the impact of pilot training costs on active and reserve units, using F-16 training as an example. The data assume a change to only a single squadron, and reflect the current Air Force active-reserve fighter force mix and current crew turnover rates. The assumption that there are enough pilots separating from active units to fill vacancies in reserve component units is critical to this comparison.

Table 19
Comparison of F-16 Pilot Training Costs

Number of Aircraft: 24
Crew Ratio: 1.25
Pilot Training Costs: $1.84 million per pilot

	Active	Air National Guard	Air Force Reserve
Pilot Turnover	8%	6%	8%
Non-Prior Service	100%	36%	10%
Total Training Costs	$4.42	$1.19	$0.44

NOTE: Total Training Cost = (Number of Aircraft) x (Crew Ratio) x (Pilot Training Cost) x (Pilot Turnover) x (Non-Prior-Service Fraction)

The data in Table 19 show that, on average, converting one active F-16 squadron to an Air National Guard unit will save $3.23 million annually in training costs, in addition to the savings in direct unit costs and other infrastructure-related expenditures. Savings from conversions to the Air Force Reserve would average almost $4 million per year. These results, while valid for small adjustments in force mix, cannot necessarily be extended to larger changes. Increasing the proportion of aviation forces in the reserves past a critical point would require that pilots and crews be trained directly for reserve units, thus increasing the percentage of non-prior-service personnel.

TRANSITION COSTS

Changes in force structure almost always require the expenditure of funds for one-time activities related to bases, facilities, equipment, and personnel. Existing bases affected by force structure changes require environmental impact studies and environmental cleanup, and may produce revenues if sold. Bases gaining new forces may require environmental studies, new construction, renovations, interim facilities, or purchases of property. Equipment must be destroyed, disposed of (e.g., decommissioned), moved, or stored. Large changes in personnel can require one-time separation pays and funding for changes of station above steady-state requirements. Increases in end-strength by either component may require increased recruitment and training, even when there are comparable reductions in other components of the same service. These costs can quickly add up to hundreds of millions of dollars and can potentially nullify a major portion of the anticipated near-term savings. Total Force costing needs to systematically consider these as well as the changes in recurring costs.

In the Army, for example, M-1 tanks from deactivated European armored units would be redistributed to replace older tanks in other units. First, however, the M-1 tanks would have to be brought to a standard configuration to meet transfer standards. The Army Cost and Economic Analysis Center estimates equipment preparation costs for an armored division (including all equipment, not just tanks) at $36 million. The cost of transporting an armored division from Europe back to CONUS is estimated at $45 million. This cost results from moving the division and would be incurred regardless of the division's component affiliation upon its return to CONUS.

Lower transportation costs are incurred when relocating fighter wings from Europe to CONUS. Although support equipment must be shipped, the aircraft themselves may be flown. Moreover, the fuel and other costs of flying the aircraft may be treated as operating tempo that would have been accumulated anyway in order to maintain pilot proficiency. For the Air Force, permanent change-of-station costs are relatively more important than transportation costs. Current Air Force factors used in the COBRA (Cost of Base Realignment Action) model imply PCS costs of $16 million to $25 million per fighter wing.

The main transition costs for the Navy are those associated with decommissioning ships. Decommissioning costs can run as high as $30 million for nuclear-powered ships, such as attack submarines. Mothballing a battleship costs at least $40 million. On the other hand, base realignment costs for the Navy would be minimal under most scenarios. Naval bases support many activities, such as Naval Air Rework Facilities (NARFs), in addition to providing berthing spaces for several ships. The loss of a few ships at a given base would have a minimal one-time impact on these facilities.

Forming new Marine Corps Reserve infantry battalions would require the leasing of interim facilities and funding for permanent armories. Even though

equipment may be available from active units being deactivated, activation of a large number of Marine reserve units would present challenges and incur additional costs for recruiting and initial training. These one-time costs could amount to $25 million for each battalion added to the reserves. Depending on the deactivation rate for the active units, additional costs could be incurred for separation and permanent change-of-station moves.

MILITARY PERSONNEL RESOURCES

The match between available personnel resources--the number of military personnel and their mix by military occupational specialty (MOS) and skill level --and the manpower requirements of the active and reserve units in the force structure is a major determinant of the capabilities of the Total Force. Achieving and maintaining a match between personnel resources and requirements is particularly difficult for some reserve components due to geographic and time constraints on their use of part-time personnel. Unlike the active components, the reserve components are not always free to reassign personnel to units on a worldwide basis or even to assign them to retraining on a full-time basis when there is a mismatch between skills and requirements. In addition, recruit quality is important in determining the quality of the force; this is particularly true for the reserve components, given the limited training time they have.

Non-Prior-Service Recruit Quality

Non-prior-service (NPS) recruits currently account for 95 percent of active component accessions and 40 percent of accessions in the reserve components. The quality of these recruits is high in both components. In 1990, 95 percent of active and 93 percent of reserve NPS recruits had a high school diploma or were high school graduates. Only 6 percent of active and 7 percent of reserve NPS recruits scored in the lowest category (IV) on the Armed Forces Qualification Test (AFQT). This contrasts with DoD's experience in 1973 through 1979, when low military pay and inadequate recruiting resources left both the active and reserve components unable to meet their quality goals for NPS recruits. In 1974--when the All Volunteer Force was established--only 61 percent of active and 53 percent of reserve NPS male recruits had a high school diploma or were high school graduates. At that time, more than 10 percent of active and 20 percent of reserve NPS recruits scored in the lowest category of the AFQT.

The recent success of the active and reserve components in NPS recruiting is particularly impressive given that the number of youths aged 18 to 24 in the U.S. population--the pool from which most NPS recruits are drawn--fell by 16 percent between 1981 and 1991. The services' recruiting success in the face of this decline is due in part to an improved attitude toward military service among youth and in part to increased pay and recruiting incentives. Recruiting incentives are not restricted to the active component. Today, the reserve components benefit from the use of the same types of enlistment incentives--cash bonuses, educational assistance, loan repayment programs--that are used to attract active-duty recruits. Other factors contributing to recent success in both recruiting and retention are improvements in the quality of life for active-duty personnel and in the quality (and hence the attractiveness) of training for reservists. It remains to be seen, however, whether these reserve enlistment

incentives will continue to prove effective in a post-Desert Shield/Desert Storm environment.

The size of the youth population will level off in the mid-1990s and then start to increase gradually. This, together with a reduction in the number of NPS recruits needed to support a smaller force structure, should enable DoD to maintain the quality of its NPS recruits during the 1990s. Yet while aggregate NPS recruiting goals will be met, some reserve components are experiencing significant recruiting problems in some regions, particularly the Northeast. Although innovative solutions--including bonuses targeted at specific locations--are being implemented, the least costly long-run solution is to place units in areas where demographic trends indicate that recruits will be available. Provided that DoD has the flexibility to select the best locations for reserve units, the ability of the reserve components to recruit high-quality non-prior-service personnel is not expected to be a factor constraining the mix of active and reserve units during the 1990s.

The long-run impact of Operation Desert Storm on reserve recruiting and reserve retention remains to seen, however, and will be carefully monitored by DoD. Reserve recruiters may face a more difficult environment now that potential recruits have a clearer understanding that reserve duty involves a commitment that can go far beyond one weekend a month and two weeks each summer.

Prior-Service Recruits

The reserve components depend heavily on prior-service (PS) personnel to provide the "hands-on" expertise that is acquired most readily through active-duty service. Some training experts question whether it is possible for NPS recruits--who, after completing their initial recruit and individual skill training, must rely primarily on weekend drills and two weeks of summer training to obtain hands-on expertise--to achieve the same skill levels in technical military occupations as their full-time counterparts in the active force or their colleagues in reserve units with previous active-duty experience.

The Air Force Reserve, the Air National Guard, and the Naval Reserve--three of the most technically-oriented reserve components--rely the most heavily on PS personnel. In the Air Force Reserve, 74 percent of recruits have prior military experience. The comparable figures for the Air National Guard and Naval Reserve are 67 percent and 87 percent, respectively. In ground units, the proportion of prior-service personnel is lower. At present, 57 percent of Army Reserve recruits have served previously in the military, while 48 percent of new Army National Guard members have prior military experience. The Marine Corps Reserve, with its emphasis on junior enlisted personnel in combat

specialties, takes in a recruit mix that contains only 27 percent prior-service personnel.

The current drawdown in the active component means that the number of personnel leaving active duty will increase somewhat during FY 1991 through FY 1994. This will (temporarily) increase the pool of prior-service personnel from which the reserve components can recruit. The short-run challenge in prior-service recruiting is how to take advantage of these skilled personnel. Tighter "up-or-out" policies (which restrict the number of years that reservists can spend in the same grade) and changes in the structure of reserve retirement (to encourage personnel with more than 20 years of service to leave) could play a role in opening up reserve billets for prior-service personnel with recent active-duty experience. Greater flexibility in grading billets--so that prior-service E4 or E5 personnel can be used instead of NPS E3 personnel--could also be of value. Since NPS personnel who are undergoing initial recruit and skill training count against unit authorizations in the reserve components, increased reliance on prior-service personnel might also increase trained manning levels in the reserve components.

Over the long run, however, a smaller active force means fewer individuals separating from active duty each year and a smaller pool of prior-service recruits from which the reserves can draw. Significant increases in the proportion of the Total Force that is in the reserves pose a potential challenge to the reserves' ability to recruit prior-service personnel. This potential is heightened by the fact that, due to improved retention in the active components during the 1980s, there is already a long-run trend toward a smaller pool of prior-service personnel. During the 1980s, reserve prior-service recruiting goals were met because the reserve components were able to recruit an ever-increasing proportion of individuals who were leaving active duty. In the Army, the percentage of those separating from active duty who were eligible for further service and were recruited into the National Guard or Reserve rose from 20 percent in FY 1979 to almost 40 percent in FY 1989.

Although the reserve components may still be able to recruit the aggregate numbers of prior-service recruits that will be required in the late 1990s, the need to take a higher proportion of the available pool is likely to reduce the match between prior-service recruits and the skill and grade requirements of reserve component billets. Currently, almost half of Army prior-service recruits must be retrained in a new occupational specialty. In the long run, DoD may need to focus more on policies that will increase the supply of prior-service recruits or that will facilitate the retraining of prior-service personnel into occupational specialties needed by the reserve..

Policies to Improve the Match Between Billets and Skills

The force drawdown will not affect all skills equally, and even in the active component, transitional imbalances between manpower requirements and personnel skills and grades will be experienced. In the reserve forces, where the ability to match skills and grades can be complicated by geographic considerations and the time required to retrain personnel who may be available only on a part-time basis, adjustments to changes in force structure and missions will be even more difficult. Skill mismatches have a direct impact on the readiness of reserve units, and may in some cases limit DoD's ability to give missions to the reserve components. While this should not forestall reorganization of active and reserve missions to deal with changing threats, Congressional and DoD policymakers should recognize that--in the long run--stability in the missions assigned to individual reserve units is itself an important policy that will improve both the match between billets and skills and the overall readiness of reserve units.

Historically, the Air National Guard and the Air Force Reserve, as well as the aviation units of the Naval Reserve, have been relatively successful in matching prior-service personnel to billets requiring the skills already held by those personnel. In part, this may be because--although these components rely heavily on prior-service recruits--they have been able to meet their recruiting goals using only a small proportion of the available pool of prior-service personnel from their services. The ground forces--the Marine Corps Reserve, the National Guard, and particularly the Army Reserve--have been less successful. Lack of MOS qualification is one of the primary reasons for low reported readiness ratings by ground units. It is a problem even for some units with high-priority missions.

The extent to which the Army Reserve has been structured to perform combat support and combat service support (CS/CSS) missions clearly has contributed to the "skill mismatch" problems experienced by this component. There are relatively few CS/CSS units in the active component to produce prior-service personnel with the specific skills required by the Army Reserve. Moreover, the length of initial skill training often makes retraining difficult for part-time personnel. Adjustments in the structure of the Total Force that would provide greater balance in the distribution of CBT/CS/CSS units between the active and reserve components could alleviate this problem somewhat, although DoD cannot rely on this alone to generate the desired mix of prior-service personnel.

The mix of full-time and part-time manning within individual components and units also plays a role in determining the match between personnel and billets. In some reserve component aviation units, for example, high peacetime workloads and maintenance requirements result in as many as 30 percent of positions being filled by full-time personnel. Aviation units seeking skilled maintenance personnel for full-time positions can essentially recruit nationwide.

whereas ground units seeking part-time maintenance personnel must recruit from a limited geographic area. Currently, the proportion of full-time personnel (including active component personnel temporarily assigned to support reserve units, reserve component members, DoD civilians with dual status as drilling members of reserve units, and DoD civilians without dual status) in the different reserve components ranges from approximately 26 percent in the Air National Guard to 10 percent in the Army Reserve. Although it is a relatively expensive policy, one approach to improving the match between personnel and billets would be authorize the assignment of full-time personnel (whether active-duty or reserve) to specific billets in reserve units that prove difficult to fill with part-time personnel from the local area.

There are a number of ongoing efforts to improve the match between the manpower requirements of reserve units and the personnel resources available to them. These initiatives include bonuses targeted toward prior-service personnel in critical skills and locations, enhanced training opportunities during regular monthly drill periods (to make reserve service more rewarding and to reduce personnel turbulence), and training courses designed to provide reservists with initial skill training in short segments that can be worked into the schedules of part-time personnel.

Once the transition to a smaller Total Force is complete and the accompanying temporary improvement in reserve recruiting prospects has passed, DoD will be in a position to assess whether additional policies are needed to improve the match between prior-service personnel and reserve billets as well as to increase the overall size of the prior-service pool and the proportion of those in the pool who choose to enlist in the reserves. If so, increased reliance on joint enlistments (enlistment contracts that involve an initial period of two or three years of active duty followed by two or three years of Selected Reserve service) could increase the supply of reserve personnel with specific skills. Such joint enlistments are already used to some extent by the Navy and the Army. DoD might also increase the size of the prior-service pool by bringing in more NPS recruits for short active-duty commitments. Since the size of the DoD training base is dictated in part by mobilization requirements, the additional training costs associated with such a policy might not be excessive. For units that rely on the kinds of skills that can be maintained through part-time military duty, the range of feasible active and reserve mixes is very wide, given sufficient flexibility in personnel policies. Due to the costs associated with alternative personnel policies, however, the cost advantage of reserve units relative to active units of the same type can be expected to decline as the proportion of the Total Force in the reserve component increases.