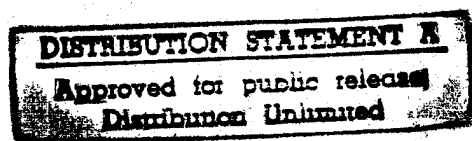

Logistics Management Institute

The Selected Reserve
Health Care Professionals
Bonus Test

HA101R1

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August 1993

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Executive Summary

THE SELECTED RESERVE HEALTH CARE PROFESSIONALS BONUS TEST

The test of offering bonuses to civilian health care professionals in critically needed specialties for up to 3 years' affiliation with the Selected Reserve (SELRES) of DoD has achieved its objectives. This was the first-ever controlled experiment to test the impact of bonus incentives for part-time work. The nationwide test began on 1 August 1989 and is continuing. We have concentrated our analysis on the test results from FY90 and FY91, the two most fruitful and contrasting years of the test. We have been able to account for the impact of the Gulf War in our analysis.

The bonuses offered (\$10,000 per year to anesthesiologists, orthopedic surgeons, general surgeons, and nurse-anesthetists and \$6,000 per year to operating room nurses and other nurses) are powerful stimuli to SELRES affiliation. Even where accession rates have declined, the bonuses have inhibited those trends. The results of the test call for five actions:

- *Stop the test. It has fulfilled its purpose.*
- *Determine the need within the SELRES for health care professionals with critical skills.*
- *Determine whether bonuses are required as an additional recruiting tool to help meet the need.*
- *Implement a national bonus policy to attract the needed specialists to the SELRES, if needed.*
- *Determine the bonus scale to be used on the basis of the intensity of need within the SELRES, using the figures developed in this study*

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CHAPTER 1

THE BONUS TEST

BACKGROUND

Section 613 of the FY89 National Defense Authorization Act directed the Department of Defense to test the effect of recruitment bonuses on accessions to the Selected Reserve (SELRES) of physicians and nurses in specialties projected to be in critically short supply during wartime. The intake period of the test began on 1 August 1989 and is continuing. The test was to involve bonuses of not more than \$10,000 per year for a maximum of 3 years' affiliation as a member of the Selected Reserve in one of the five Reserve Components having health care personnel assigned.¹ Appropriate reports were required, including an implementation plan to be filed with the Chairmen of the Committees on Armed Forces of the Senate and the House of Representatives. On 2 September 1988 that plan was submitted by OSD to Congress. An additional report, covering test preparations and FY89 test results, was sent to Congress by OSD in April 1990. The present report, when forwarded by our sponsor, the Assistant Secretary of Defense (Health Affairs), will complete the bonus test's reporting requirements under the law.

The health care specialists offered bonuses are listed in Table 1-1. The test has been conducted throughout the United States, with approximately 40 percent of the country included in the test's experimental cell for most specialties, and the remainder of the United States assigned to the control cell. To our knowledge, it is the first test in U.S. history involving bonuses for part-time employment. In addition, the onset -- in the last week of August 1990 -- of reserve forces' call to Active Duty as part of Operation Desert Shield/Desert Storm provided an unusual opportunity to compare a lengthy period of generally favorable recruiting conditions with a similar period during which the recruiting of health care professionals for the reserve forces was less successful.

¹These are the Army National Guard of the United States (ARNG), the United States Army Reserve (USAR), the United States Naval Reserve (USNR), the Air National Guard of the United States (ANG), and the United States Air Force Reserve (USAFR).

TABLE 1-1
BONUS SPECIALTIES AND ANNUAL BONUSES

Specialty	Annual bonus (\$000)
Physicians ^a	
Anesthesiologists	10
Orthopedic surgeons	10
General surgeons	10
Nurses ^a	
Nurse-anesthetists	10
Operating room nurses	6
Other nurses ^b	6

^a For precise eligibility criteria, see Appendix E.

^b All other nursing specialties recruited by the armed forces and carrying officer rank.

As with all such "controlled" experiments involving very large numbers of people behaving in traditional patterns, the controls applied to support the test were the result of occasional compromises, and the data we collected required modest levels of adjustment and "smoothing." Our attempts at isolating variables while sealing out or accommodating test contaminants were largely successful.

The bonus test was originally intended to end on 30 September 1990. Two extensions have since been directed by Congress, and the intake period is continuing. The analysis and observations reported here focus on the first two complete years, FY90 and FY91. These years represent contrasting recruiting environments.

ORGANIZATION OF THE REPORT

Chapter 2 presents background about the bonus test, including a review of the research design and test administration arrangements.² Chapter 3 provides the

²Much of the information contained in Chapter 2 was originally provided in Logistics Management Institute *Technical Report for the Fiscal Year 1989 of the Selected Reserve Recruitment Bonus Test Physicians and Nurses*. Bethesda, Maryland: Logistics Management Institute, April 1990.

results of the test for the 1990 and 1991 fiscal years. Finally, Chapter 4 presents our conclusions and recommendations.

Appendix A is a detailed discussion of the conditions and results for each of the Reserve Components for which a sufficient number of test data were available. Appendices B through E are the supporting data required to describe the bonus test completely. Appendix F is an example of how the test results might be applied to determine appropriate bonus amounts.

CHAPTER 2

TEST PREPARATION AND ADMINISTRATION

EARLY CHALLENGES

In August 1988, representatives from the Office of the Assistant Secretary of Defense (Health Affairs) [OASD(HA)], the Office of the Assistant Secretary of Defense (Force Management and Personnel) [OASD(FM&P)], and the Office of the Assistant Secretary of Defense (Reserve Affairs) [OASD(RA)] began meeting with Logistics Management Institute (LMI) representatives to design the bonus test and to prepare for its execution. A number of interesting challenges lay before the test planners. One important example is the variety of recruiting approaches used by the five participating RCs. There are marked differences among recruiting organizations, recruiter assignments, reporting channels, and recruiting area boundaries.

The matter of recruiting area boundaries alone presented several problems to be solved. In a controlled experiment of this type the rules should be drawn so that participants are not free to choose participation or nonparticipation. That challenge was met by basing geographic eligibility on the participant's place of residence rather than on the location of the reserve unit.¹

Ideally, all test cell boundaries would coincide precisely with the normal recruiting boundaries used in all participating RCs. Thus, no component would enjoy a recruiting advantage by offering bonuses throughout an area in which other components were prevented from offering that incentive. In addition, we wished to avoid the condition where any single recruiter would be responsible for an area made up of both bonus and nonbonus areas, because the recruiter's temptation would inevitably draw recruiting effort toward the bonus area, which offered a greater chance of success. Unfortunately, the traditional recruiting boundaries and the

¹This proved to be a wise decision. During the first year of the test we heard a number of anecdotes involving candidates who were attracted over some distance by the bonus. They attempted to join SELRES units within the experimental cell, only to learn that they were ineligible because they lived in nearby states. Two nurses were reported to have relocated in order to become eligible for bonuses offered to Georgia residents.

initial test boundaries were not coincident, and negotiation with the components became necessary. As a final compromise, some original test region boundaries were violated by incorporating 12 "overlap states" into the final design. Those states are listed in Table 2-1. The corresponding maps of the states comprising the experimental cell and the control cell are contained in Appendix B.

TABLE 2-1

TWELVE STATES IN WHICH EXPERIMENTAL-VERSUS-CONTROL TEST STATUS VARIES
AMONG COMPONENTS

States	Reserve Components					
	ARNG	USAR		USNR	ANG	USAFR
		Physician	Nurse			
Alabama	E	E	E	Ea	E	E
Arkansas	C	C	C	E	C	E
Florida	E	E	E	Ea	E	E
Mississippi	E	E	C	Ea	E	E
Nebraska	C	C	E ^b	C	C	C
North Dakota	C	C	E	E	C	C
Ohio	E	E	E	C	E	E
Pennsylvania	C	E	C	C	C	C
South Dakota	C	C	E	E	C	C
Tennessee	E	E	Ea	E	E	E
Virginia	C	C	E	C	C	C
West Virginia	C	E	E	C	C	C

Note: C=control; E=experimental.

^a Most of this state is in the experimental cell; a small portion is not.

^b Half of this state is in the experimental cell; half is not.

Recruiter staffing was another challenge because the final experimental design compared historical recruiter staff activities with analogous activities during the test, especially in the control cell. Those comparisons would help determine the extent to which assigning additional recruiters might become an alternative to using bonuses to increase accessions to the SELRES.

The participating components do not routinely use the same eligibility requirements when recruiting physicians and nurses. In addition, the labeling of the health care specialties themselves varies among the Military Services, and those titles or classifications used within DoD differ often from accepted civilian practice. Compromises on both the qualification standards and specialty labeling were necessary to assure consistency before the test could begin.

The populations of health care professionals that are the primary targets of recruiting efforts differ from component to component. For example, the Naval Reserve traditionally recruits many members for its SELRES from its own Individual Ready Reserve (IRR) pool of trained manpower. Since successful IRR recruiting did not increase the overall number of deployable health care professionals for war, however, we excluded from bonus eligibility new SELRES members coming in from the IRR of all components. Similarly, recruiters normally work extensively within the active forces, persuading nurses and physicians who are leaving active status to accept SELRES positions. Because of the sizable bonuses involved in the test, however, we decided that no active force physician or nurse would be eligible for the bonus unless that person had already left the active forces before final decisions were reached on test design. No appearance of luring active force professionals into reserve military service would be tolerated within the test.

Finally, no comparable test or experimental data were available for any of the test populations. Active forces recruiting had been subjected to several earlier experiments, but the bonus test at hand involved recruiting professionals for *part-time* work, not recruiting for career choices.

Meeting these challenges required negotiations leading to compromises and trade offs acceptable both to test managers and to representatives of the participating components.

EXPERIMENTAL DESIGN PROCESS

Overview

The design of this kind of experiment involves an iterative development process. In this case, the first experimental design was quite broad and resulted in four cells (three experimental and one control) in an attempt to capture as much information as possible about the effect of different bonus amounts on the affiliation

process for physicians and nurses. In this experiment, a "cell" is a group of states that receive the same treatment (e.g., a specific bonus). The information desired from the test includes the impact of bonuses on physician and nurse accessions in relationship to the gradations in the size of the bonus, the length of time over which the bonus is to be paid, and the interaction of obligation time and size of the bonus. The population per cell and the anticipated accessions per cell in this case were small. The effect of the small cell sizes on the robustness of the experiment is always of concern.

To reduce the effect of small-population cells in this case, we revised the bonuses offered and reduced the number of cells, producing a second experimental design. That design contained only three cells (two experimental, with different bonus levels, and one control). The costs of conducting the experiment could then be calculated by estimating the impact of each bonus on the participating populations. We calculated two major kinds of costs: (1) total bonus costs (the budgetary costs of paying the bonus to all appropriate physician and nurse accessions in the experimental cells) and (2) marginal costs (the budgetary cost of obtaining one more accession in the experimental cell over and above the accessions that would have occurred had no bonus been offered). Both costs were substantial.

The cost analysis of early experimental designs in this case led to the final experimental design. The final design represented a reduced-scope experiment with sufficient retained robustness to produce valid conclusions. It also included an enhanced data collection effort.

Elasticity Estimates

It was very difficult to estimate the number of new accessions who would be attracted by the payment of a bonus. The estimation of elasticity — the percentage increase in the number accessions divided by the percentage increase in amount of the bonus — is complicated by several factors:

- Most bonus experiments and elasticity estimates for military personnel have involved active-duty, lower-paid enlisted personnel.
- Elasticity is not really a constant. If the bonus is too small to constitute an inducement, the elasticity could effectively be zero. This is an important problem when dealing with physicians whose civilian incomes average well over \$100,000 per year.

- Elasticity estimates for active force military personnel have ranged from 0.5 to 3.8, and even these estimates are of limited relevance to accessions of well-paid reservists.

Very little research has been performed on the appropriate basis for applying elasticity estimates to reservists, who are part-time employees. However, if the elasticity is applied to the bonus as an increment to total civilian income, since the civilian income of physicians is so large, even an optimistic estimate of elasticity (say, near 2.0) results in an increase (of only about 17 percent) of accessions for highly paid physicians.

Participants

The focus of this experiment is those physicians and nurses whose specialties are projected to be in critically short supply during wartime. Thus, the experiment was developed around those critical specialties within the constraints established by law. The specialties in this case are as follows:

- *Physicians:* Anesthesiologists, orthopedic surgeons, and general surgeons.
- *Nurses:* Nurse-anesthetists, operating room nurses, and other nurses.²

Experimental Parameters and Constraints

The governing legislation established certain parameters and constraints for the conduct of the bonus experiment. The experiment was initially limited to 2 years. A maximum bonus of \$10,000 per participant per year was established. Bonus expenditures were limited to \$4 million throughout DoD for the first year of the program.

Geographic Location

The experiment was conducted throughout the United States. The experimental cell and the control cell consist of geographically separate areas that are related to the recruiting areas of the different RCs. The design of the cells permitted the recruiters to retain their nontest efficiency of operation; that is, no

²"Other nurses" encompasses all specialties except nurse-anesthetist and operating room nurse. Taken collectively, those people qualified in any one of this broad spectrum of nursing specialties are routinely considered qualified for appointment in *military* specialties projected for short supply such as medical-surgical nurse (Army), charge nurse or staff nurse (Navy), and clinical nurse or flight nurse (Air Force).

cross-boundary or extraorganizational requirements were imposed on recruiters during the test.

The final selection of experimental cell and control cell boundaries was based on the matching of physician, nurse, component, and economic data between the experimental cell and the control cell.

Constraining Issues

As in many experiments, a number of issues became especially important in determining the final experimental design and in administering the experiment. These issues, although not part of the experimental design, directly affected the ability of the experiment to produce valid results.

- *Recruiting process.* The recruiting process is important to the determination of the impact of the bonus. Each of the RCs has a recruiting process specific to its organization and its recruiting goals. In the final design each RC was able largely to maintain its own recruiting boundaries. The experimental design recognized this as the most efficient and least contaminating recruiting process.
- *Equity among physicians and nurses.* There was serious initial concern over the well-known and well-established communication networks maintained by physicians and nurses throughout the United States. These networks foster frequent interaction on many issues affecting physician and nurse affairs. Thus, it was argued that providing bonuses to physicians and nurses in one region of the country and not in another might induce a "backlash" effect, so that physicians and nurses not eligible for the bonus might be antagonized to an extent that normal and usual accessions to the RCs might be reduced.
- *Retention.* The offering of bonuses to attract physicians and nurses to join the Selected Reserve may harm the morale of health care professionals in those same specialties who have served faithfully in the SELRES for some time without having ever received such a bonus. It is possible that some of the individuals so affected would leave the SELRES as a result.

FINAL TEST DESIGN

Overview

The experimental design selected after two earlier iterations consisted of bonus offerings for SELRES affiliation [either unit membership or affiliation as an Individual Mobilization Augmentee (IMA)] to selected physicians and nurses who

live within the boundaries of the experimental cell. Three specialties of physicians and three of nurses were offered bonuses. A bonus was offered for each year of SELRES affiliation (available for a maximum of 3 years). Participating physicians and nurses were asked to choose 1, 2, or 3 years of affiliation at the time of recruitment (one could not, for example, elect a 1-year affiliation followed by a second 1-year affiliation chosen as the first year drew to a close). Bonuses offered, by specialty, are listed in Table 1-1. Bonuses are paid annually at the beginning of each year of agreed affiliation.

Geographic Cell Design

An initial group of five large, somewhat standard geographic regions was identified because of the overriding importance of recruiting effort and organization by the participating components in the management of the test itself. The alternative would have been to divide recruiting regions into smaller areas and attempt to estimate how much of each recruiter's effort was devoted to each area in the past and how much would be devoted during the test.

The five geographic regions corresponded generally to the recruiting regions used by the U.S. Army Reserve. This RC overshadowed its compatriots in physician and nurse recruiting. At the time of the test design, USAR SELRES affiliations accounted for about 42 percent of all similar RC accessions for critical-skilled physicians and 63 percent of RC nurses annually. We were able to adjust the recruiting regions for the other components in such a way that they are very similar to those of the Army Reserve. This is important because we wanted a given treatment or control to apply to all Services in a given geographical area, while avoiding asking a particular recruiting group to administer two or more treatments in its area.

The five geographic regions then were combined into one experimental cell and one control cell. There are 10 possible ways in which groups of two and three regions can be assigned to two final cells, and we wanted to pick the particular arrangement that minimized extraneous variation.

In some geographic regions, it is easier to recruit than in others. One of our objectives in this test design was to arrange the experimental and control cell boundaries so that ease of recruiting would be balanced between the cells. For example, if accessions-per-recruiter in a region are high, two possible explanations

are (1) it is easier to recruit in that area or (2) recruiters-per-target population are low. If accessions-per-target population are high, two possible explanations are (1) it is easier to recruit or (2) recruiters-per-target population are high. Note that the second explanations are reversed. Thus, if we assign regions to cells in a way that balances on both variables, we will have balanced on ease of recruiting. (Since accessions-per-recruiter multiplied by recruiters-per-target population equals accessions-per-target population, we need balance only on any two of the three ratios. Note that balancing a ratio or balancing its inverse is equivalent.)

For nurses, the covariates selected for balancing were accessions/recruiter in 1987, and the nurse population-per-recruiter strength in 1989. The use of recruiter strength at different times was needed because accessions occurred in the past, the target population of interest was the one that would confront the recruiters in the future, and dramatic increases occurred in the Army Reserve nurse recruiting strength (by multiples of 1.1 to 2.5 in the regions) during the intervening time. Other covariates that were balanced because of their potential impact on ease of recruiting were the unemployment rate and the average civilian income (as a proxy for nurse income).

For physicians, the covariates selected for balancing were accessions-per-recruiter in 1987, and the critical-specialty physicians under age 45-per-recruiter. Other covariates that were balanced because of their potential impact on ease of recruiting were the critical specialty physicians employed in hospital staff and teaching positions under age 45-per-recruiter (thought to be a better target than physicians in private practice) and average critical-specialty income.

Note that the same variable (say, unemployment) was not used in both the physician and nurse balancing because that would amount to weighting that variable by two. Also, the same number of covariates was used for both physicians and nurses.

Resulting Geographic Test Regions

The result was the assignment of the five geographic regions to two experimental cells in a way that balanced covariates for both physicians and nurses.

Note that, depending on the assignment of the five regions to the two experimental cells, the percent of the target population in the two cells varied. The ideal situation in terms of statistical precision would be to have about half of the

population in each cell, but this was not possible with five geographic regions. Each region made up about 20 percent of the population.

The resulting test design had the following properties:

- The assignment of the five geographic regions to two test cells for physicians and nurses across all components was virtually identical.
- The percentage differences of each covariate across cells were minimized.

Our recommendation was that the two cells consist of NE + SC + W, and SE + NC,³ regions, respectively. This combination has the lowest average percent error for physicians (4.24 percent) on the covariates and the lowest average percent error for nurses (8.02 percent). The first cell contained about 60 percent of population, and the second cell contained 40 percent for the physicians as a group and for the nurses as a group. The details are shown in Appendices C and D.

The statistical precision of the test design would be about the same, regardless of which cell was to receive the bonus. The cost of the bonus test is significantly lower, however, by awarding bonuses to the cell comprising only 40 percent of population.

DETAILS OF TEST IMPLEMENTATION

Dates

The bonus test began on 1 August 1989 and was to continue through 30 September 1990. Successive extensions now mark the conclusion as 30 September 1993. Payment of bonuses was originally authorized through the end of FY93 but is now authorized through the end of FY96. This arrangement ensures the payment of bonuses to individuals who, in FY93, agreed to serve in the SELRES for 3 years.

Participants

To be eligible to receive bonuses during the bonus test, participants had to reside within the test's experimental cell at the time of accession. The time of accession was the date of commissioning (i.e., the date the oath of office was

³Where, NE = Northeast; SC = Southcentral; W = West; SE = Southeast; NC = Northcentral.

administered, not the date the volunteer was assigned into drill pay status). Bonus recipients could come to the SELRES directly from civil life with no prior military service, or they may have had earlier service in the active or reserve forces if discharged⁴ prior to 28 April 1989. Serving members (that is, members appointed to the SELRES after 28 April 1989) from *all categories* of the active and reserve forces were ineligible.

Participants in the bonus test were also eligible to apply for other RC health professional incentive programs such as the stipend program and the loan repayment program. The obligation incurred by participating in those programs, however, would be served after the bonus program obligation was satisfied.

Participant eligibility requirements are detailed by specialty in Appendix E.

Experimental and Test Cells

Each RC was assigned a bonus test map (see Appendix B). The map shows that the experimental cell consisted of about 40 percent of the United States for five of the six groups of health care professionals participating. The experimental cell for "other nurses" consisted of the States of Minnesota and Georgia only, or about 4 percent of the United States.

The remainder of the United States made up the control cell. For five of the tested specialties, about 60 percent of the United States constituted the control cell. No bonuses whatsoever were offered there, and recruiting continued in the control cell as if no bonus test were underway. For "other nurses," the control cell consisted of all the states except Minnesota and Georgia (about 96 percent of the United States). In some of those other states, of course, bonuses were offered to nurse-anesthetists and to operating room nurses, but not to other nurses.⁵

We needed to minimize disruption of recruiting activities during the test, and cell boundaries were chosen to honor existing recruiting boundaries where possible.

⁴The determining date is the date of discharge rather than the date of release from Active Duty if the dates are not the same.

⁵The decision to designate such a small geographic area as the experimental cell for other nurses was based on overall cost. The SELRES requirement for other nurses is so great, and the \$6,000 bonus was sufficiently high, that the bonus costs of the anticipated influx of other nurses receiving bonuses throughout 40 percent of the United States would have exceeded all other bonuses combined several times over.

The components have different recruiting organizations and assignments, however, and 12 states remain as full or partial "overlap" states.

Overlap States

Overlap states are Alabama, Arkansas, Florida, Mississippi, Nebraska, North Dakota, Ohio, Pennsylvania, South Dakota, Tennessee, Virginia, and West Virginia.⁶ "Overlap" refers to the fact that a part or all of each of these states has a different control cell or experimental cell status depending on the component doing the recruiting. Table 2-1 shows the status of each of these states for all participating components. We have treated the Army Reserve as two components because its physicians and nursing recruiting organizations (and boundaries) are different from one another.

Recruiting and Advertising Activities

All recruiting activities, advertising included, were directed to continue at approximately normal levels throughout the test. In the experimental cell, the bonuses were announced and recruiting prospects were given all appropriate information to encourage them to join the SELRES and accept the bonus offered. In the control cell, all activities were to continue as if no bonus test were underway. Recruiting managers were instructed to avoid major diversion of any flexible advertising funds into the experimental cell. (Some localized advertising increases did occur in the experimental cell because new incentives, unrelated to the bonuses, were being offered there.)

Participant Contract

A single contract, properly annotated, was used by all participating components. A copy of the contract was provided in the test administration packet sent by OSD to each participating component.

⁶Louisiana was originally identified as an overlap state because of a misunderstanding of the Naval Reserve's normal recruiting boundaries. Within the first several weeks of the test, this error was corrected by separate correspondence. All of Louisiana was then assigned to the control group for all specialties for all components.

Insufficient Positions for All Applicants

In some areas the bonus test produced more qualified applicants than there were position vacancies available in the SELRES. The components generally continued to absorb and to offer bonuses to those health care professionals. The objective of the test was to determine just how many people would respond positively to the offer of the bonus incentives tested. Most RCs exercised the flexibility available to them by authorizing certain overstrength conditions in SELRES units and among IMA positions. This often made it possible to capture accurate data on the true numbers of test respondents. Moreover, those additional accessions also helped to offset critical DoD-wide shortages of health care professionals.

Data Collection

The study team from LMI collected test data directly from recruiting managers within each participating RC. In several instances, officials on the appropriate Military Service staffs received the same test data that were sent to LMI, although the test reports were necessarily set up somewhat differently from normal accession reports. Once FY91 had ended, we found it necessary to review and adjust some of the data because of minor differences between long-standing practices by the recruiting staffs and the more rigid definitions and data cell boundaries imposed by this test. Data collection and adjustments for FY90 and FY91 continued through the summer of 1992.

CHAPTER 3

RESULTS OF THE BONUS TEST

OVERALL TEST RESULTS

The bonuses offered during the test proved to be powerful stimuli in attracting doctors and nurses to the SELRES. Even in the Naval Reserve, where accessions dwindled early in the conduct of the test, the downward trend was arrested somewhat in the USNR experimental cell. Bonuses are clearly an effective tool in attracting members for the Selected Reserve. They work especially well for nurses, but they also attract more physicians than we were able to predict from the economic factors we reviewed prior to the test. In addition, of course, the unplanned occurrence of the Gulf War – which affected conditions in both the control cell and the experimental cell – provided an opportunity to monitor the effect of test bonuses during good recruiting times (FY90) and bad (FY91).

Our analysis ignores test results data from August and September 1989. The test was officially underway at that time, but the individuals whose accessions occurred during that brief period all had been in the final stages of membership negotiation at the time the test started.

Our analysis relies heavily on the test results of the U.S. Army Reserve. While data on other RCs are displayed and analyzed, the USAR information has proven to be particularly helpful for two reasons:

- The number of USAR manpower spaces or billets (the “requirement”) for tested specialists is much greater than for the other participating components. The statistical significance of the differences between results in the control and experimental cells is therefore much greater.
- USAR physician recruiters and nurse recruiters belong to two separate organizations under different headquarters. Their recruiting boundaries are precise and similar, but separate. They respectively recruit only for a specified group of Areas of Concentration (AOCs) making up the physician population and the nurse population. These recruiters keep current data files covering recruiter staff assignments and files containing the

professional and personal characteristics of prospects. They have shared those files with LMI.

We analyze only limited test data on National Guard accessions. Analysis of National Guard recruiter activity has been almost impossible because ARNG and ANG recruiters spend unpredictable and unrecorded amounts of time and effort recruiting physicians and nurses. In addition, so few bonus-eligible accessions occurred (largely because appropriately designated manpower spaces were quite limited) among ARNG physicians and among ANG physicians and nurses that the reporting cells were simply too small to allow for good analysis. A detailed discussion of ARNG nurse accessions is included in Annex 3 to Appendix A.

Once the test began, the recruiting staffs and recruiting managers of the RCs spoke out in favor of a national policy of offering bonuses for SELRES membership to health care professionals with critically needed skills. Within the experimental cell of the test, the recruiters using the bonus consider it to be another effective tool to help them meet recruiting goals. LMI has long been identified as the designer of the test and the collector of test data, and we have received several calls from recruiters and Military Service staff members asking when a DoD-wide policy of bonuses will begin in the states comprising the control cell of the test.

Finally, the most important test period from an analytical perspective is FY90. Conditions during that period of time most closely resembled those in pretest periods (FY88 and FY89) for which we were able to gather accessions and recruiter data. The FY90 results presented below represent normal or baseline conditions. Only when contrasted with the FY91 data do the FY90 test results appear to be optimistic or favorable. That appearance is not because of unusual conditions existing during FY90, but because of the FY91 conditions, which show the imposing results of the Gulf War on the recruiting of health care professionals for the reserve forces. Side by side, the 2 years' recruiting results provide a good set of boundary conditions for personnel planning in the armed forces.

PHYSICIANS

Fiscal Year 1990 (Favorable Recruiting Environment)

Table 3-1 presents the FY90 test results for critical-skill physicians in the three RCs for which sufficient numbers of test data were produced. Some accessions data from both the experimental and control cells do not appear in Table 3-1. Numbers are

missing for those critical-skill physicians ineligible for the test bonus because of their military service status (such as release from Active Duty after the cutoff date, or transfer from the IRR to the SELRES).

TABLE 3-1
FY90 TEST RESULTS FOR CRITICAL-SKILL PHYSICIANS
(Direct-commission only)

RC	Test cell	Accessions		
		Pretest ^a	Test	Change (%)
USAR	Bonus	25	70	+180
	Control	26	27	+4
USNR	Bonus	26	19	-27
	Control	68	40	-41
USAFR	Bonus	6	10	+67
	Control	7	4	-43

^a Data from FY89.

The bonus increased accessions dramatically in the experimental cell for the USAR and for the USAFR. In the USNR, where informal changes in manpower policies were being implemented by mid-FY90, the effect of the physicians' bonus was to retard somewhat a substantial decline in direct-commission, critical-skills physician accessions. The effect of the bonus in the Air Force Reserve might have been stronger except for a "bonus recipients must drill" policy followed widely by SELRES unit commanders in the USAFR. This policy superseded the widespread practice of allowing drill credit for some continuing professional education seminars and clinics attended by SELRES physicians in the Air Force Reserve and in other RCs.

The effect of the bonus may also be expressed as a multiplier of the accession rates that would have been expected for FY90 had no bonus been offered. These multiplier projections are based on pretest accessions experience. Table 3-2 shows the bonuses' effects in this way. This expression of the test results better reflects the true picture for the USAR because here we have been able to use adjustment factors

for the changes in Army Reserve physician recruiter staffing implemented during the time the data were collected.

TABLE 3-2

FY90 TEST RESULTS FOR CRITICAL-SKILL PHYSICIANS
(As a multiplier of projected accession rates without bonuses)

Reserve Component	Bonus effect (multiplier)
USAR ^a	3.3
USNR	1.2
USAFR	2.9

^a Includes consideration of changes in recruiter staffing levels.

The USAR accessions files¹ produce interesting comparisons in the characteristics of bonus recipients versus the characteristics of critical-skill physicians not receiving the bonus:

- *Age.* On average, bonus recipients were fully 15 years older than critical-skill physicians from the experimental cell who did not receive bonuses.
- *Medical education abroad.* Bonus recipients were more than twice as apt to have received their medical education outside the United States than their nonbonused counterparts. Interestingly, the bonus recipients were not much more likely to have been born abroad.
- *Stipend program participation.* Doctors coded by the USAR as critical-skill physicians – within both the experimental and control cells – who did not receive bonuses were much more likely to participate in STRAP than were doctors receiving bonuses.

¹As discussed in Appendix A, USAR physician recruiters routinely maintain files that code specialists-in-training as having already completed their training. For example, the recruiter's file for Dr. John Doe would list Dr. Doe as a 61M orthopedic surgeon throughout his orthopedic surgery residency, and long before Dr. Doe would become board-certified or even board-eligible in orthopedic surgery. During that training, Dr. Doe would likely be receiving stipend assistance via the New Specialized Training Assistance Program (STRAP), and would be ineligible for the test bonus because of the test's rigid "board-eligible" requirement. As he was sworn into the USAR SELRES during or before the STRAP-assisted training period, he would be *reported* as a 61M orthopedic surgeon even though he would not be fully qualified in that specialty for some time. This practice, reasonable from the recruiting perspective, would confound test analysts for months because all such physicians at first appeared to be bonus-eligible people who simply declined the offer of the test bonus.

Table 3-3 shows the differences in several selected characteristics among critical-skill physicians who joined the USAR Selected Reserve during FY90.

TABLE 3-3
FY90 TEST RESULTS FOR USAR CRITICAL-SKILL PHYSICIANS
(Comparison of selected characteristics)

Characteristics	Accessions		
	Experimental cell		Control cell
	Bonused physicians	Nonbonused physicians	
Age	45 years	30 years	33 years
Medical education abroad	24%	11%	11%
Foreign-born	22%	20%	20%
Stipend program participant	12%	88%	79%

Note: See footnote 1, p. 3-4.

Finally, we have compared the marginal cost-per-accession of each critical-skill physician attracted to the SELRES by the test bonus in the experimental cell with a computed marginal cost-per-accession incurred in the control cell by the addition of recruiting staff as an alternative to bonuses. The result is as follows:

- Marginal cost-per-accession using additional recruiters: \$47,000
- Marginal cost-per-accession using test bonuses: \$34,000.

These computations are based on USAR data. They must be interpreted with some care; they do contain several important assumptions and estimates. A detailed discussion of these cost computations is contained in Annex 1 to Appendix A.

Fiscal Year 1991 (Unfavorable Recruiting Environment)

Table 3-4 presents the FY91 test results for physicians. Obviously, there are large reductions in accessions to the SELRES when compared with the pretest period. On the other hand, the positive (loss-inhibiting) effect of the bonuses is clear in all of the RCs. The calculations that determine the precise effect of the bonuses during this

TABLE 3-4

**FY91 TEST RESULTS FOR CRITICAL-SKILL PHYSICIANS
(Direct-commission only)**

Reserve Component	Test cell	Accessions		
		Pretest ^a	Test	Change (%)
USAR	Bonus	25	8	-68
	Control	26	7	-73
USNR	Bonus	26	1	-96
	Control	68	2	-97
USAFR	Bonus	6	5	-17
	Control	7	4	-43

^a Data from FY89. FY90 data shown in Table 3-1.

difficult year are used to produce the "unfavorable recruiting environment" (FY91) portions of the figures in Chapter 4 that demonstrate use of test results data.

NURSES

Fiscal Year 1990 (Favorable Recruiting Environment)

Table 3-5 presents the FY90 test results for nurse-anesthetists and operating room nurses. As with physicians, the response of these two groups of nurses to the offers of bonuses was quite positive. Table 3-6 contains comparable test data for other nurses.

Test results for nurses can also be expressed as multipliers of the number of accessions expected in the experimental cells for FY90, based on our nonbonus experience. Table 3-7 contains that information for all three groups of nursing professionals. The computations that produce the contents of Table 3-7 are contained in Appendix A.

TABLE 3-5

**FY90 TEST RESULTS FOR NURSE-ANESTHETISTS AND OPERATING ROOM NURSES
(Direct-commission only)**

Reserve Component	Test cell	Accessions		
		Pretest ^a	Test	Change (%)
USAR	Bonus	63	395	+ 527
	Control	82	78	-5
ARNG	Bonus	2	53	+ 2,550
	Control	3	6	+ 100
USNR	Bonus	26	97	+ 273
	Control	36	44	+ 22
USAFR	Bonus	3	42	+ 1,300
	Control	1	10	+ 900

^a Mean accessions for FY88 and FY89.

TABLE 3-6

**FY90 TEST RESULTS FOR OTHER NURSES
(Direct-commission only)**

Reserve Component	Test cell	Accessions		
		Pretest ^a	Test	Change (%)
USAR	Bonus	27	135	+ 400
	Control	892	1,057	+ 18
ARNG	Bonus	7	23	+ 229
	Control	36	31	-14
USNR	Bonus	19 ^b	30	+ 58
	Control	440 ^b	372	-15
USAFR	Bonus	4	23	+ 475
	Control	193	190	-2

^a Mean accessions from FY88 and FY89, except for USNR.

^b These quantities are estimates based on national and regional data.

TABLE 3-7

FY90 TEST RESULTS FOR NURSES
(As a multiplier of projected accession rates without bonuses)

Reserve Component	Bonus effect (multiplier)	National totals ^a
Nurse-anesthetists and operating room nurses		
USAR	6.5	473
ARNG	13.3	59
USNR	3.1	141
USAFR	6.3	52
Other nurses		
USAR	4.3	1,192
ARNG	3.8	54
USNR	1.9	402
USAFR	3.5	154

^a Less those nurses ineligible for bonus due to disqualifying military status.

Fiscal Year 1991 (Unfavorable Recruiting Environment)

Test results for nurses during this difficult recruiting year were unpredictable. Some results ran against expectations due to influences that remain unknown.

There were three principal reasons for test turbulence, confusion, and lack of communication during FY91. First, all recruiting efforts originally anticipated an end to the bonus test on 30 September 1990. Physicians and nurses considering SELRES affiliation were told that they should execute their oaths of office by that date to receive their bonuses. While we have no documentation to support this observation, we believe that some emptying of the bonus-interested pool of candidates occurred in the final months of FY90, before the surprise congressional extension of the test into FY91 and beyond.

In addition, a large number of health care units and individuals from the reserve forces were being activated, were deployed, or were returning to stand down — all in connection with the Gulf War — at one time or another during FY91.

Finally, the Gulf War itself occurred just as American military planners were beginning to anticipate widespread force reductions brought on because of the dissolution of the Warsaw Pact organization, the dismembering of the Soviet Union, and the resulting reduction of the military threat to the United States.

Recruiting to overstrength levels became more selective. Potential SELRES candidates became reluctant to step forward, fearful of some new call to Active Duty. At the same time new volunteers, activated often by patriotism, sought military affiliation in hometown units.

The impact of these contradictory pressures on the FY91 part of the bonus test was impossible to predict and difficult to assess, once the data were collected. Our discussions in Appendix A approach the test results as logically as possible, on a component-by-component basis.

Table 3-8 presents the FY91 test results for nurse-anesthetists and operating room nurses, and Table 3-9 contains the same information for other nurses. The data shown here have been used to produce the "Use of Test Results" curves recommended in Chapter 4.

TABLE 3-8

**FY91 TEST RESULTS FOR NURSE-ANESTHETISTS AND OPERATING ROOM NURSES
(Direct-commission only)**

Reserve Component	Test cell	Accessions		
		Pretest ^a	Test	Change (%)
USAR	Bonus	63	108	+71
	Control	82	49	-40
ARNG	Bonus	2	7	+250
	Control	3	18	+500
USNR	Bonus	26	6	-77
	Control	36	4	-89
USAFR	Bonus	3	16	+433
	Control	1	9	+800

^a Data from FY89. FY90 data are shown in Table 3-5.

TABLE 3-9

**FY91 TEST RESULTS FOR OTHER NURSES
(Direct-commission only)**

Reserve Component	Test cell	Accessions		
		Pretest ^a	Test	Change (%)
USAR	Bonus	27	42	+56
	Control	892	844	-5
ARNG	Bonus	7	5	-29
	Control	36	30	-17
USNR	Bonus	19 ^b	8	-58
	Control	440 ^b	56	-87
USAFR	Bonus	4	6	+50
	Control	193	139	-28

^a Mean accessions from FY88 and FY89, except for USNR.

^b These quantities are estimates and based on national and regional data.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

The chapter has four sections. While all of the major conclusions to be drawn from the test have been discussed from some perspective in the preceding chapters, they deserve a restatement because of their importance. Those conclusions follow this introductory section. The recommendations that form the third section of the chapter proceed directly from the conclusions. The last section of the chapter is devoted to the practical matter of using the numerical outcomes of the test to determine approximate future bonus levels on the basis of the recruiting environment and the severity of need for the health care specialties sought for the SELRES.

CONCLUSIONS

1. **Bonuses are an attractive recruiting tool, sought by recruiters in all RCs.**

The recruiting managers were at first generally skeptical about the ultimate effect of the test bonus on both the accession and retention rates of SELRES health care professionals. Once the test began in earnest, however, they saw firsthand the benefits of the test bonuses. In addition, there occurred none of the measurable, bonus-related increases in attrition that some observers had feared before the test began. Health care recruiters now seek a national bonus policy that will help them do their jobs better.

2. **The \$10,000 bonus offered to anesthesiologists, orthopedic surgeons, general surgeons, and nurse-anesthetists attracted greater numbers of these professionals than expected.**

The economic analyses conducted during test design were inadequate predictors of the responses of the health care practitioners with the highest salaries. This conclusion is most appropriate for the first full year of the test, when service in the Selected Reserve was widely seen only as a part-time job.

3. **The \$6,000 bonus offered to operating room nurses and to other nurses attracted very large numbers of these nursing professionals.**

The large quantities of other nurses continuously needed to fill and refill the reserve force structure of the Military Services can easily be attracted with the aid of reasonable affiliation bonuses. Operating room nurses will respond favorably to similar incentives.

4. **The costs of the bonus program tested and the health care stipend program are similar on a per-recruiter basis.**

Bonuses of these magnitudes did not result in the exorbitant marginal costs we had feared prior to the test. The current wide popularity of the stipend program among professionals preparing for practices in critically needed specialties means that the bonus program, where implemented, has served as an attractive complement.

5. **The impact of such affiliation bonuses may diminish over time.**

This is a difficult conclusion to substantiate empirically, especially with the appearance of several divergent contaminants during the test's second year. But we wish to report the "feel" — among recruiters and within the study team — that about a year's experience in offering bonuses such as these results in at least a partial satisfaction of the demand for this kind of incentive. This is the weakest of our conclusions; it may be disproven by a longer test experience. We would be negligent, however, not to bring it forward at this time.

RECOMMENDATIONS

1. *Stop the test. It has served a useful purpose, and any further prolongation will be wasteful.*
2. *Determine the numbers and types of critical-skill specialists needed for the SELRES.*
3. *Determine whether bonuses are needed as an additional recruiting tool based on the severity of need.*
4. *If needed, implement a national SELRES bonus policy to help attract professionals with critical specialties.*
5. *Using the figures developed in this study, determine any bonus scale to be used on the basis of the intensity of the need within the SELRES.*

USE OF TEST RESULTS

We have constructed four figures to serve as guides in determining appropriate bonus amounts for physicians, for nurse-anesthetists, for operating room nurses, and for other nurses. These figures are, of course, time-sensitive and economy-sensitive, so they will require some modification in the future. Appendix F is a technical analysis paper incorporating a set of costing options based on the four figures that follow.

Figure 4-1 shows how to compute bonuses appropriate for critical-skill physicians. Figure 4-2 shows the use of test results in computing bonuses appropriate for nurse-anesthetists. Figure 4-3 shows how to compute bonuses appropriate for operating room nurses. Figure 4-4 shows the use of test results in computing bonuses appropriate for other nurses. All four figures are based upon U.S. Army Reserve test data.

In order to use any of the figures, one must specify the annual requirement for nonprior-service accessions together with the type of recruiting environment. For example, if the USAR needs 200 operating room nurses nationwide who are nonprior-service, draw a vertical line at the annual requirement of 200 in Figure 4-3. Depending upon the nature of the recruiting environment, the figure suggests that the appropriate annual bonus could be as large as \$10,000 (unfavorable environment) or as low as \$1,000 (favorable environment).

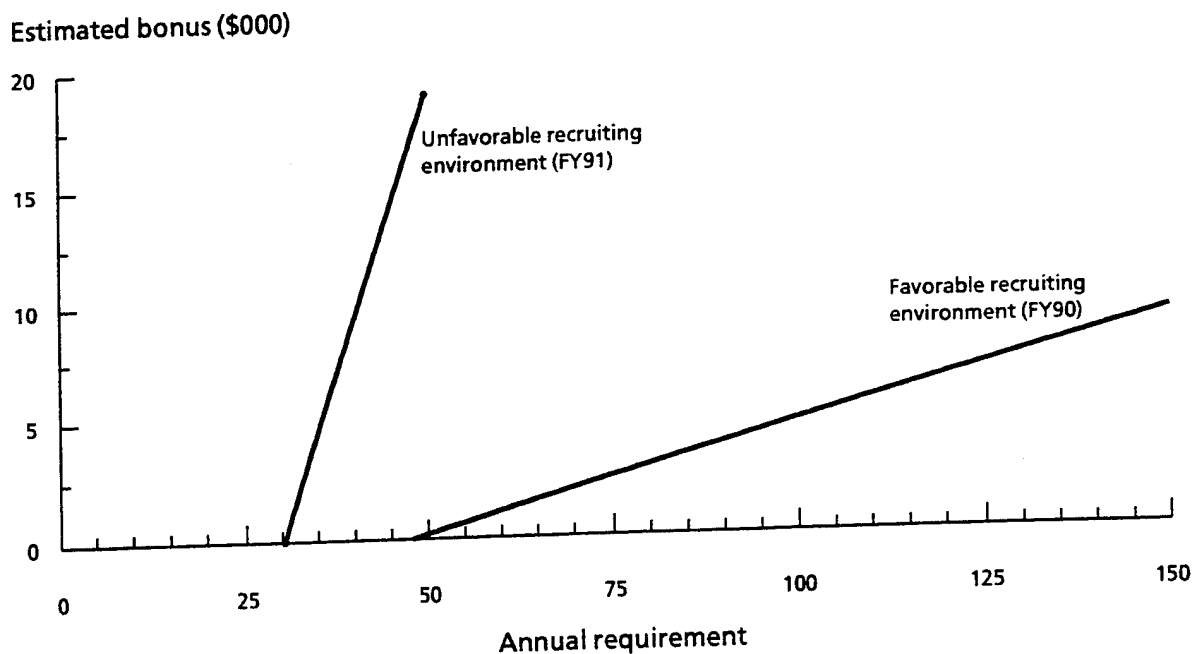


FIG. 4-1. USE OF TEST RESULTS
(Bonus computations: critical-skill physicians)

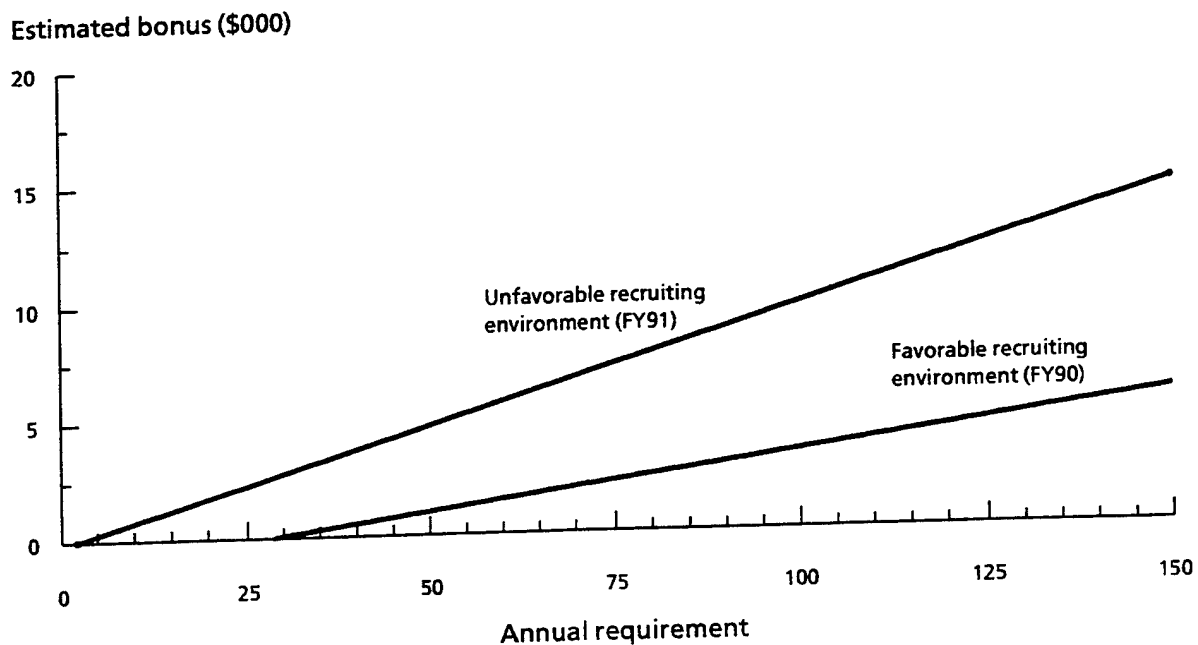


FIG. 4-2. USE OF TEST RESULTS
(Bonus computations: nurse-anesthetists)

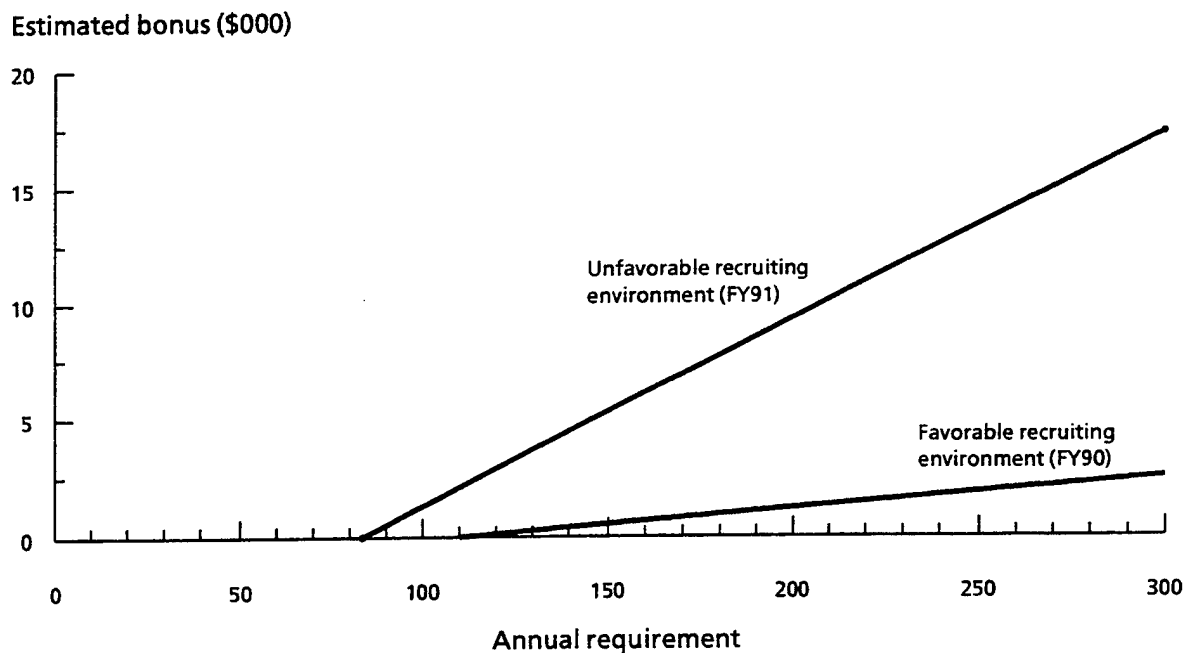


FIG. 4-3. USE OF TEST RESULTS
(Bonus computations: operating room nurses)

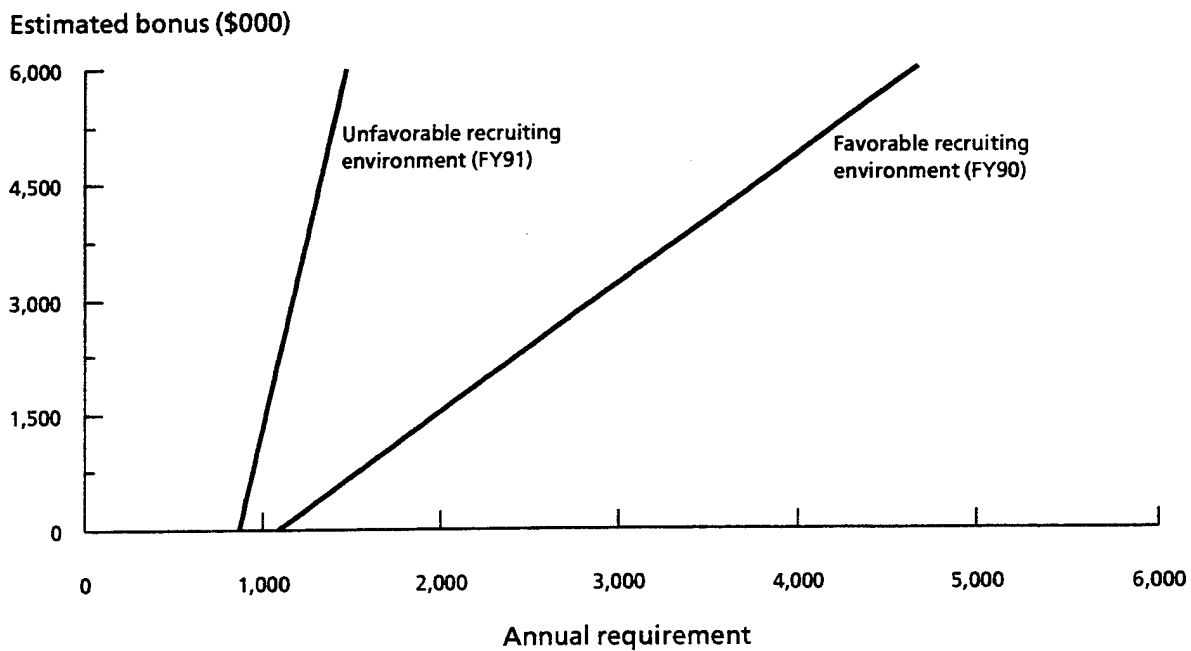


FIG. 4-4. USE OF TEST RESULTS
(Bonus computations: other nurses)

APPENDIX A

DETAILED COMMENTARY, BY RESERVE COMPONENT

DETAILED COMMENTARY, BY RESERVE COMPONENT

ORGANIZATION AND BACKGROUND

This appendix has seven annexes in which we present test data and commentary, first for physicians and then for nurses, separately for each participating Reserve Component. The purpose of this introductory section is to present some information common to all the components and some comparative information that highlights interesting differences among the Reserve Components.

- Annex 1 contains information on USAR physicians.
- Annex 2 contains information on USAR nurses.
- Annex 3 contains information on ARNG nurses.
- Annex 4 contains information on USAFR physicians.
- Annex 5 contains information on USAFR nurses.
- Annex 6 contains information on USNR physicians.
- Annex 7 contains information on USNR nurses.

BONUS ELIGIBILITY

Many Reserve Component accessions are personnel who have been released only recently from Active Duty. An important consideration in the design of the bonus test was that the bonus should not encourage members of the active forces to leave Active Duty for service in the Selected Reserve (SELRES). For this reason, any accession with prior military service in the active or reserve forces was ineligible for the bonus unless discharged prior to 28 April 1989. That date was chosen because the test cell boundaries and bonus levels were established on 29 April 1989, making it theoretically possible for some candidates to react to this "inside" information on the 29th, were they not prohibited from participation.

A physician was required to be board-eligible in one of three critical specialties: anesthesiology, general surgery, or orthopedic surgery. As a practical matter, most physicians accepting the bonus were board-certified in those specialties, as the

recruiting commands would be wary of anyone who had been board-eligible for any significant length of time without becoming board-certified.

The age limits for bonus-eligible accessions varied by Military Service in accordance with their normal recruiting practices. For example, the Naval Reserve required incoming physicians to be no more than 40 years of age, whereas the Army Reserve accepted physicians up to the age of 64. No citizenship requirements accompanied bonus eligibility. No formal restrictions were placed on where medical training had been received, but Naval Reserve staff members reported that they seldom accept graduates of foreign medical schools.

Any accession accepting the bonus for 1, 2, or 3 years incurs the normal military service obligation (MSO) of 8 years, reduced by any years of prior military service. The accession must join the Selected Reserve to qualify for the bonus. Membership in the Individual Ready Reserve (IRR) or transfer from the IRR to the Selected Reserve does not qualify a person to receive a test bonus. Nearly all physicians accepting the bonus have chosen the 3-year SELRES service option, to be served within the 8-year MSO.

The grouping of nurses into professionals specializing in nurse-anesthesia, perioperative nursing, and "other" nursing merits special comment. The first two groups of nurses are identified with persistent shortages in the units of the reserve forces. At the time the test was being considered, however, large wartime shortages were also being forecast in several other nursing specialties, even though most of those positions in the DoD reserve force structure were filled. The bonus test provided a rare opportunity to assess the responsiveness of these other nurses to bonus incentives.

SOURCE OF ACCESSIONS

The impact of the bonus varies widely across the Reserve Components partly because the proportion of those accessions who have had recent military service varies dramatically among the components. In Table A-1 we show representative (but incomplete) information on physician accessions. Table A-2 displays nurse accession data. "Recent prior service" means separation from any Active or Reserve Component after 28 April 1989. All data in these tables represent accessions in FY90, since that was the year for which our information is most complete. The percentages for other years would be somewhat different, but our objective here is to

present only broad comparisons. None of these data affects the analysis of the bonus test presented later.

TABLE A-1
FY90 PHYSICIAN ACCESSIONS, BY COMPONENT

Reserve Component	Critical-skill physician	Other physician^a
USAR		
Recent prior service	55	176
Nonprior service	369	122
Total	424	298
Percent having recent prior service	13%	59%
USNR		
Recent prior service	54	171
Nonprior service	59	126
Total	113	297
Percent having recent prior service	48%	58%
USAFR		
Recent prior service	41	Distribution
Nonprior service	14	unknown
Total	55	88
Percent having recent prior service	75%	Unknown
ANG		
Recent prior service	0	45
Nonprior service	0	14
Total	0	59
Percent having recent prior service	0%	76%

^a Other physicians are simply those with specialties other than the three bonused specialties. "Other physician" is not a bonus category.

No Army National Guard critical-skill physician data are displayed in Table A-1 because the bonus accession quantities of ARNG physicians were so small.

TABLE A-2
FY90 NURSE ACCESSIONS, BY COMPONENT

Reserve Component	Nurse-anesthetist/ operating room nurse	Other nurse
USAR		
Recent prior service	Unknown	Unknown
Nonprior service	473	1,192
Total	Unknown	Unknown
Percent having recent prior service	-	-
ARNG		
Recent prior service	Unknown	Unknown
Nonprior service	59	54
Total	Unknown	Unknown
Percent having recent prior service	-	-
USNR		
Recent prior service	20	229
Nonprior service	141	402
Total	161	631
Percent having recent prior service	12%	36%
USAFR		
Recent prior service	19	Unknown
Nonprior service	52	308
Total	71	Unknown
Percent having recent prior service	27%	-
ANG		
Recent prior service	0	74
Nonprior service	0	69
Total	0	143
Percent having recent prior service	0%	52%

Note: USAR = United States Army Reserve; ARNG = Army National Guard of the United States; USNR = United States Naval Reserve; USAFR = United States Air Force Reserve; ANG = Air National Guard of the United States.

Only two physicians received bonuses by the ARNG in all of FY90: one orthopedic surgeon and one anesthesiologist.

We have information on other physicians joining the SELRES of the Air Force Reserve, but their backgrounds are not categorized as recent prior service and non-prior service. All physician accessions in the Air National Guard were noncritical skills (such as general practice, flight surgeon, emergency physician), and none received a bonus. Very few unfilled billets exist in the Air National Guard for critical-skill physicians.

We have data on other nurse accessions in the Air Force Reserve, but it is not possible to determine whether other USAFR nurses joining the SELRES in most of the United States had had recent prior service. All Air National Guard nurse accessions were other nurses, and none received a bonus. Army National Guard nurse accessions were not separable into groups with and without recent prior service.

While the data are not comprehensive, there appears to be a consistent pattern across the Reserve Components. Most military personnel managers would prefer to attract prior-service personnel because of their military health care experience. The percentages vary dramatically, with the Air Force Reserve having the highest "prior service" percentages and the Army Reserve the lowest. These conditions are also related to the relative number of SELRES billets marked for health care personnel (smaller for the Air Force Reserve, larger for the Army Reserve) and to the differences in the respective active/reserve force mixes of the Military Services. The percentage of success in attracting prior-service people is consistently lower for the critical-skill physician specialties than for other physicians and for the nurse-anesthetist/operating room nurse specialties than for other nurses.

One more observation should be made relating to USAR critical-skill physician accessions who have not had recent prior service. Of the 369 accessions during FY90, only about one-third are truly board-eligible or board-certified. The others are involved in training programs that lead to board certification in a critical specialty. Many of these physicians receive stipend assistance under the New Specialized Training Assistance Program (New STRAP), and they are *counted* as critical-skill accessions in the recruiter databases even though they will not be fully qualified for some time to come. This practice is noteworthy because it tends to lower the USAR

“recent prior service” percentage for critical-skill physicians while increasing the overall number of physician accessions. If these physicians-in-training were excluded from the computation in Table A-1, the recent prior service percentage for Army Reserve critical-skill physicians would be about 31 percent, still significantly lower than for other USAR physicians.

CHARACTERISTICS OF BONUS-ELIGIBLE ACCESSIONS

We have data on the personal characteristics of bonus-eligible accessions only for USAR physicians and nurses. The data are discussed in the sections devoted to those groups. The data may be relevant to the other Reserve Components. In addition, conclusions from a study of recruiting for active force USAF physicians may have general relevance as well. Those conclusions are:

This study has shown that Air Force physicians and physicians who have contacted the Air Force to obtain information about it are very different from a random sample of civilian physicians. They are younger, they are more likely to be female, and they’re earning less.

The primary reason many Air Force doctors have joined the Air Force is because of aid in financing their education.¹

¹The Heller Research Group. *Recruitment of Physicians into the Air Force – Results of Primary Research*. Port Washington, New York. March 1991.

**ANNEX 1
TO
APPENDIX A**

USAR PHYSICIANS

USAR PHYSICIANS

INTRODUCTION

One way the Army Reserve differs from the other components is in the USAR's greater use of the Army's Specialized Training Assistance Program (STRAP), which helps pay for specialty education in critical skills. Physicians in training programs for those critical skills are eligible for stipend assistance that pays \$762 per month or \$9,144 annually. The member earns slightly more when drill pay is added. A typical STRAP-assisted training program lasts about 3 years. An incoming SELRES physician who participates in STRAP incurs a standard military service obligation of 8 years, but must serve 2 years in the Selected Reserve for each year of subsidized training, regardless of any prior service. STRAP began in FY88.

Most critical-skill physicians in the experimental cell are eligible for the test bonus or for STRAP, but not for both. The exception is the board-eligible physician now undergoing further specialty training. Most of our analysis is concerned with critical-skill physicians only. However, recruiters have missions to attract physician volunteers in other skill categories as well, and to recruit SELRES members from among those leaving Active Duty (Release From Active Duty, commonly called REFRAD). Because we are interested in recruiter productivity as well as critical-skill accessions, we analyze all physician accessions [Areas of Concentration (AOCs) from 60A to 62A in the USAR], including some REFRAD data also.

The Army Reserve is the only component in which we were able to catalog major changes in the numbers and assignments of recruiters occurring prior to the test and during the test. With this information, we have been able to perform analysis on a per-recruiter basis for the USAR.

ACCESSIONS PRIOR TO THE BONUS PERIOD

Table A-1-1 shows accessions by recruiting region during FY88 for each of the three critical skills and their sum, and for all AOCs between 60A and 62A. The general surgeon category of 61J has been enlarged to include 61K (thoracic surgeon), 61L (plastic surgeon), and 61Z (neurosurgeon) because personnel with those AOCs

also qualify as bonus-eligible 61J general surgeons. We call this the "61J Group," about 80 percent of whom are 61J physicians.

TABLE A-1-1

FY88 USAR PHYSICIAN ACCESSIONS, BY REGION
(Showing supplemental recruiter information)

Regions	Critical-skill physician accessions				Total physician accessions	Number of physician recruiters ^d	Critical-skill physician accessions-per-recruiter	Other physician accessions-per-recruiter
	60N ^a	61M ^b	61J Group ^c	Total				
Northeast (NE)	7	5	29	41	77	10.00	4.1	3.6
Southeast (SE)	5	2	14	21	47	3.25	6.5	8.0
Northcentral (NC)	5	6	11	22	63	4.83	4.6	8.4
Southcentral (SC)	7	4	21	32	88	5.08	6.3	11.0
West (WE)	3	6	15	24	65	5.33	4.5	7.7
Total	27	23	90	140	340	28.41	4.9	7.0
Future nonbonus regions (NE, SC, WE)	N/A	N/A	N/A	97	230	20.31	4.8	6.5
Future bonus regions (NC, SE)	N/A	N/A	N/A	43	110	8.08	5.3	8.3

Note: N/A = not available.

^a AOC 60N: anesthesiologists.

^b AOC 61M: orthopedic surgeons.

^c Includes general surgeons (61J), thoracic surgeons (61K), plastic surgeons (61L), and neurosurgeons (61Z).

^d Adjusted for tour of duty and productivity (see text).

Column 7 of Table A-1-1 shows the number of recruiters dedicated to recruiting physicians in each region. Army recruiting managers suggested that it may take as long as 1 year for a new recruiter to become fully productive. An analysis of the FY90 bonus-eligible accessions whose files show both the date of initial contact and the date of accession reveals that the interval between those dates averages about 7 months. Most of the accessions require from 4 to 10 months to complete the process, with an absolute minimum of 5 weeks in one case and a maximum of 4.5 years in another.

We also examined data on accessions-per-recruiter and information concerning the tenure of recruiters. Even though recruiters with less than a year of experience often produce significant numbers of accessions, the average pipeline delay of

7 months means that these accessions occur sometime after the first half-year of the recruiter's service. Also, we noted that a large number of recruiters produce relatively few accessions in the last 6 months of their tour.

As a result of these observations, we adjusted the raw number of assigned recruiters by assuming that a recruiter is not productive during the first 6 months of the recruiting tour or during the last 6 months. For example, a recruiter with 4 months of experience at the beginning of the fiscal year can have a maximum of 10 productive months during the year (or 0.83 effective recruiter-years) only if the assignment does not end until at least 6 months after the end of the year. This admittedly crude procedure provides some refinement to our view of the effective recruiting strength for each region.

Our principal interest in Table A-1-1 is the number of critical-skill physician accessions for each recruiter, shown in column 8. We show the number of other physician accessions-per-recruiter in the last column, but this is done primarily to verify by later analysis that these levels of accessions were little affected by the existence of the bonus program. We do know that these noncritical physician accessions were constrained somewhat by the lack of vacancies in some USAR units.

Moving closer to the start of the bonus test, we show all FY89 USAR physician accessions in Table A-1-2. The bonus test began on 1 August 1989; six USAR physicians accepted the bonus in the two bonus regions during August and September 1989. Because of the length of the pipeline delay, it is likely that the appointments of these physicians were already being processed when the test began. It seems quite unlikely that the bonus attracted new physicians, who were then processed, in so short a time. For that reason, and because a total of only six USAR physicians received the bonus during FY89, we have not attempted to assess any impact of the bonus on FY89 physician accessions to the USAR. For the purpose of analysis, then, we consider all of FY89 to be a nonbonus year.

In Table A-1-2, we note that the percentage of incoming critical-skill physicians who received the STRAP stipend is about the same in all regions except the Northeast. We know that STRAP was promoted aggressively in FY89 in the Northeast, where there are many medical schools and teaching hospitals. The Northeast produced the largest number of critical-skill accessions-per-recruiter as well.

TABLE A-1-2

FY89 USAR PHYSICIAN ACCESSIONS, BY REGION
(Showing supplemental recruiter information)

Regions	Critical-skill physician accessions				Total physician accessions	Percentage participation by critical-skill physicians in STRAP ^d	Number of physician recruiters ^e	Critical-skill physician accessions per recruiter	Other physician accessions per recruiter
	60N ^a	61M ^b	61J Group ^c	Total					
Northeast (NE)	36	13	41	90	141	87%	9.42	9.6	6.4
Southeast (SE)	18	6	13	37	71	68%	6.92	5.3	5.0
Northcentral (NC)	15	8	23	46	103	59%	8.33	5.5	6.9
Southcentral (SC)	9	5	20	34	66	59%	6.50	5.2	5.0
West (WE)	14	6	20	40	76	63%	6.42	6.2	5.6
Total	92	38	117	247	457	71%	37.59	6.6	5.6
Future nonbonus regions (NE, SC, WE)	N/A	N/A	N/A	164	283	75%	22.34	7.3	5.4
Future bonus regions (NC, SE)	N/A	N/A	N/A	83	174	63%	15.25	5.4	6.0

Note: N/A = not available.

^a AOC 60N: anesthesiologists.

^b AOC 61M: orthopedic surgeons.

^c Includes general surgeons (61J), thoracic surgeons (61K), plastic surgeons (61L), and neurosurgeons (61Z).

^d The New Specialized Training Assistance Program, commonly called "New STRAP" or "STRAP" in the Army.

^e Adjusted for tour of duty and productivity (see text).

ACCESSIONS DURING THE BONUS PERIOD

Table A-1-3 shows national physician accessions data for the USAR for the entire test year of FY90. In the Southeast and Northcentral regions, where the bonus was offered, the number of physicians who accepted the bonus are shown below the total accessions for the group in the region (e.g., of the 24 accessions in the Southeast who were 60N, four accepted the bonus). A few anomalies occurred: (1) a 61R (diagnostic radiologist) was reported as having received a bonus in the Southeast, though the candidate does not appear to be eligible and (2) two physicians received bonuses in the Southcentral region, though the region itself was not bonus-eligible (we believe that this occurred because their place of residence qualified the physicians, while they were recruited by a counselor reporting in a nonbonus region).

TABLE A-1-3
FY90 USAR PHYSICIAN ACCESSIONS, BY REGION

Regions	Critical-skill physician accessions				Total physician accessions	Percentage participation by critical-skill physicians in STRAP ^d	Number of physician recruiters ^e	Critical-skill physician accessions per recruiter	Other physician accessions per recruiter
	60N ^a	61M ^b	61J Group ^c	Total					
Northeast (NE)	42	11	51	104	131	84%	12.08	8.6	2.2
Southeast (SE)	24	17	50	91	116	59%	7.50	12.1	3.2
[Bonus]	[4]	[6]	[24]	[34]	-	-	-	-	-
Northcentral (NC)	33	13	55	101	127	50%	8.75	11.5	3.0
[Bonus]	[16]	[8]	[25]	[50] ^f	-	-	-	-	-
Southcentral (SC)	14	9	29 ^g	52	78	75%	9.00	5.8	3.2
West (WE)	5	5	11	21	39	52%	7.33	2.9	2.4
Total	118	55	196	369	491	67%	44.66	8.3	2.7
Control regions (NE, SC, WE)	N/A	N/A	N/A	177	248	79%	28.41	6.2	2.5
Bonus regions (NC, SE)	N/A	N/A	N/A	192	243	55%	16.25	11.8	3.2

Note: N/A = not available.

^a AOC 60N: anesthesiologists.

^b AOC 61M: orthopedic surgeons.

^c Includes general surgeons (61J), thoracic surgeons (61K), plastic surgeons (61L), and neurosurgeons (61Z).

^d The New Specialized Training Assistance Program, commonly called "New STRAP" or "STRAP" in the Army.

^e Adjusted for tour of duty and productivity (see text).

^f Includes a 61R diagnostic radiologist.

^g Includes two bonused physicians.

A few critical-skill physicians are eligible for stipend assistance since they are also students in programs that qualify. STRAP pays about \$9,000 to \$10,000 per year and commonly continues for about 3 years. Most STRAP participants are not yet board-eligible or board-certified; thus, they are not yet eligible for the bonus. However, some physicians who are board-eligible or board-certified may take further advanced training in a subspecialty (e.g., as a 61Z neurosurgeon), in which case they become eligible to receive both the bonus and STRAP assistance. The seventh column in Table A-1-3 shows the percentage of critical-skill accessions who participated in STRAP in FY90.

The STRAP participation rates in the Northeast and Southcentral regions are high. Recruiting managers suggest that the somewhat lower participation rates reported in the West may be due to lower (and thus more affordable without help) medical school tuitions. Low STRAP participation rates in the bonus regions are attributable to the fact that most bonus-eligible physicians are not simultaneously eligible for STRAP. This condition is discussed in more detail below.

BONUS AND STRAP ELIGIBILITY

Tables A-1-1 through A-1-3 display data separated by region. Our test analysis concentrates on what happened in the *group* of bonus regions and the *group* of nonbonus regions. Both STRAP and the bonus are powerful inducements for SELRES membership, and the data show both incentives attracting physicians to the USAR. In this report, however, our focus is on the group of physicians who are bonus-eligible (i.e., those who would qualify for the bonus if the bonus were offered).

Tables A-1-4 through A-1-6 show the number of critical-skill accessions by year, for the nonbonus regions combined and the bonus regions combined. The accessions are also separated by STRAP eligibility. Unfortunately, our FY88 data do not provide information about how many STRAP-eligible physicians accepted, and how many declined, the STRAP stipend. We do know that STRAP was a new program in FY88 and that it did not get promoted heavily until FY89. STRAP is widely credited among physician recruiting managers with the improvement in recruiting success in the Northeast between FY88 and FY89 — from 4.1 critical-skill physician accessions for each recruiter to 9.6 per recruiter (see Tables A-1-1 and A-1-2).

TABLE A-1-4

FY88 USAR CRITICAL-SKILL PHYSICIAN ACCESSIONS

Regions	Total critical-skill accessions	Not eligible for STRAP	Eligible for STRAP
Nonbonus regions	970	19	76
Bonus regions	43	9	34

Data in Tables A-1-5 and A-1-6, for FY89 and FY90, do show the STRAP-eligible physicians who accepted or declined STRAP. They also show those eligible physicians who accepted the bonus. Table A-1-5 shows that only 5 of the 25 physicians not eligible for STRAP (but ostensibly eligible for the bonus) received the test bonus. This occurred because the bonus was offered only during the last 2 months of the fiscal year.

TABLE A-1-5

FY89 USAR CRITICAL-SKILL PHYSICIAN ACCESSIONS

Regions	Total critical-skill accessions	Not eligible for STRAP	Eligible for STRAP	Did not receive STRAP assistance	Received STRAP assistance
Nonbonus regions	164	26	138	15	123
Bonus regions	83	25 ^a	58	6 ^b	52

^a Includes five who received bonuses.

^b Includes one who received a bonus.

TABLE A-1-6

FY90 USAR CRITICAL-SKILL PHYSICIAN ACCESSIONS

Regions	Total critical-skill accessions	Not eligible for STRAP	Eligible for STRAP	Did not receive STRAP assistance	Received STRAP assistance
Nonbonus regions	177	27	150	12	138
Bonus regions	192	70 ^a	122	17 ^b	105 ^c

^a Includes 68 who received bonuses.

^b Includes 7 who received bonuses.

^c Includes 9 who received bonuses.

We do not know precisely which physicians were eligible for the bonus, even from the data in Table A-1-6 for FY90. According to recruiting managers, most physicians eligible for the bonus did accept. Thus, for the bonus regions, we know that the 70 physicians not eligible for STRAP were eligible for the bonus and that 68

took the bonus. And we know that the 16 physicians who were STRAP-eligible and got the bonus must have been bonus-eligible. Unfortunately, we do not know how many STRAP-eligible physicians may have refused the bonus.

Quantifying bonus-eligible physicians in the nonbonus regions is even more difficult. We know that the 27 physicians ineligible for STRAP were bonus-eligible, but we do not know how many physicians in the STRAP-eligible group would have been bonus-eligible as well. For these reasons, we assess the impact of the bonus by looking at the critical-skill physicians who were not STRAP-eligible.

We will discuss the personal characteristics of the physicians in more detail below, but it is clear from the average age alone that the three groups reported in Table A-1-6 as accepting the bonus are quite different from one another. The 68 board-eligible (or board-certified) physicians who took the bonus had an average age of 48; the 7 still in training who did not participate in STRAP but did receive the bonus had an average age of 42; and the 9 who received both STRAP assistance and the bonus had an average age of 34.

The accessions and bonus data for FY91, shown in Table A-1-7, are presented in a different way because the Army keeps the data differently now. Two data files are noteworthy: (1) direct-commission accessions for all physician specialties with a notation for each physician who participated in the stipend program and (2) direct-commission physicians who accepted the bonus.

TABLE A-1-7
FY91 USAR CRITICAL-SKILL PHYSICIAN ACCESSIONS
(Bonus-eligible)

Regions	Critical-skill accessions
Nonbonus region	17
Bonus region	18 ^a

^a Includes eight who received bonuses.

These data do not enable us to estimate those who were eligible for STRAP but declined to participate. We do know that there were 59 STRAP accessions nationally in FY91, one of whom also received the bonus. We know there were 35 other direct-

commission, critical-skill accessions in FY91. We have treated them all as bonus-eligible, as shown in Table A-1-7.

Markedly fewer critical-skill physician accessions occurred in FY91 than in FY90. In the nonbonus region, the non-STRAP accessions dropped from 27 in FY90 to 17 in FY91. In the bonus region they dropped from 70 in FY90 to 18 in FY91.

ANALYSIS

We want to demonstrate techniques for estimating the size of the bonus needed to meet requirements for critical-skill physicians. Because the number of accessions is so small in each specialty, we estimate a bonus amount for the group of all three critical specialties taken together. As noted above, we consider only those critical-skill physicians who are eligible for bonuses.

Because the number of USAR physician recruiters changed rather markedly during the FY88 to FY90 time period, we will use accessions-per-recruiter in the calculations. We will use FY88 and FY89 as the pretest period, even though 5 of the 25 bonus area accessions in FY89 joined after 1 August 1989 and received the bonus. The formula used to predict accessions-per-recruiter in FY90 in the bonus region if there had been no bonus is:

$$\left(\begin{array}{c} \text{Predicted} \\ \text{accessions-} \\ \text{per-recruiter w/o} \\ \text{bonus in bonus} \\ \text{region in FY90} \end{array} \right) = \left(\begin{array}{c} \text{Actual accessions-} \\ \text{per-recruiter in} \\ \text{nonbonus region} \\ \text{in FY90} \end{array} \right) \times \left(\left[\begin{array}{c} \text{Actual FY88 \&} \\ \text{FY89 accessions-} \\ \text{per-recruiter in} \\ \text{bonus region} \end{array} \right] \div \left[\begin{array}{c} \text{Actual FY88 \&} \\ \text{FY89 accessions-} \\ \text{per-recruiter in} \\ \text{nonbonus region} \end{array} \right] \right)$$

Table A-1-8 shows that 27 accessions resulted from the efforts of an effective average of 28.41 recruiters in the nonbonus region in FY90. We multiply that number by 17/11.67 (the average number of accessions divided by the average number of recruiters in FY88 through FY89 in the bonus region) and divide that by 22.5/21.33 (the corresponding ratio for the nonbonus regions) to obtain an estimate of 1.31 accessions per recruiter in the bonus regions in FY90 without a bonus, a total of 21.3 accessions. The 70 actual accessions are 3.3 times the predicted value,

indicating that the bonus attracted large numbers of critical-skill physicians.¹

TABLE A-1-8

**FY90 USAR CRITICAL-SKILL PHYSICIAN ACCESSIONS-PER-RECRUITER
(Bonus-eligible)**

Regions	Average for FY88/89 (pretest) ^a	FY90 (test) ^a	Predicted for FY90 without bonus		FY90 actual ÷ FY90 predicted
			Accessions- per-recruiter	Total accessions	
Nonbonus region	22.5 ÷ 21.33	27 ÷ 28.41	—	—	—
Bonus region	17 ÷ 11.67	70 ÷ 16.25	1.31	21.3	3.3

^a Average accessions for the period divided by average recruiter strength for the period.

Repeating the same analysis with the data for FY91 from Table A-1-7 allows us to generate Table A-1-9.

TABLE A-1-9

**FY91 USAR CRITICAL-SKILL PHYSICIAN ACCESSIONS-PER-RECRUITER
(Bonus-eligible)**

Regions	Average for FY88/89 (pretest) ^a	FY91 (test) ^a	Predicted for FY91 without bonus		FY91 actual ÷ FY91 predicted
			Accessions- per-recruiter	Total accessions	
Nonbonus region	22.5 ÷ 21.33	17 ÷ 28.41	—	—	—
Bonus region	17 ÷ 11.67	18 ÷ 16.25	.83	13.4	1.34

^a Average accessions for the period divided by average recruiter strength for the period.

¹We did a sensitivity analysis on these assumptions that lead to the ratio of 3.3. If only FY89 is used as the base year, the ratio is little changed at 3.22. If physician accessions are used without accounting for the number of recruiters, the ratio is 3.43 when FY88 and FY89 are compressed for use as the base year, and 2.69 if only FY89 is used.

The decreased effectiveness of bonuses as incentives in FY91 is probably due to several causes:

- Desert Shield/Desert Storm may have made the SELRES appear less attractive.
- Many of those motivated by the bonus joined during the first year, FY90. No such backlog existed during FY91. Also, the bonus test was originally set to expire at the end of FY90, causing many who were interested in the bonus to apply during FY90.

ESTIMATION OF THE BONUS AMOUNT

The results of the previous section can now be used to estimate the appropriate bonus amount that can be expected to produce the required accessions in future years. The analysis is done for FY90 and FY91 separately, where FY90 is viewed as a favorable recruiting environment and FY91 as unfavorable, because the recruiting environment will play an important role in determining the results of any future campaign to attract health care professionals to the SELRES.

The analysis requires an estimate of the number of accessions who would have been attracted in the absence of the bonus. Secondly, for some larger number of accessions, an estimate of the bonus is required. Then a straight line is drawn between the two points so that the bonus for any accession requirement can be determined. This assumes that accessions are a linear function of the bonus amount. Since only one bonus level was tested for each specialty, there is no basis to estimate a more complicated function. But the linear function should be reasonable, provided that accession targets and the corresponding bonus amounts are not dramatically larger than those used in the bonus test.

Suppose that we need 100 critical-skill physicians nationwide who are direct-commission and bonus-eligible (after considering separately the number of prior-service, ineligible physicians and those who may be attracted by the stipend program). We want to estimate the bonus amount that, if offered nationwide, can be expected to induce those 100 physicians to join the SELRES.

The data we need from Table A-1-8 for FY90 are as follows:

- The number of FY90 estimated accessions not receiving a bonus is 48.3 (27 in the nonbonus region plus 21.3 estimated in the bonus region. This is up

from the FY88/89 average of 39.5, but the number of recruiters is 25 percent larger).

- The 100 required accessions are 2.07 times the 48.3 estimated number of accessions not receiving a bonus. Thus, the bonus must attract the excess of 1.07 times as many critical-skill physicians.
- A bonus of \$10,000 per year for 3 years attracted 3.3 times as many physicians (in Table A-1-8) or an excess of 2.3 over the projected accessions not receiving a bonus.
- To attract an excess of 1.07 times as many physicians, we need a bonus of $(1.07)(\$10,000) \div 2.3 = \$4,652$.

The analogous data we need from Table A-1-9 for FY91 are as follows:

- The number of FY91 estimated accessions not receiving a bonus is 30.4 (17 in the nonbonus region plus 13.4 estimated in the bonus region. This is down from the FY88/89 average of 39.5 and the FY90 estimate of 48.3).
- The 100 required accessions are 3.29 times the 30.4 estimated accessions not receiving a bonus. Thus, the bonus must attract the excess of 2.29 times as many critical-skill physicians.
- A bonus of \$10,000 per year for 3 years attracted only 1.34 times as many physicians (in Table A-1-9) or an excess of 0.34 over the projected accessions not receiving a bonus.
- To attract an excess of 2.29 times as many physicians, we need a bonus of $(2.29)(\$10,000) \div 0.34 = \$67,353$.

Depending on the recruiting environment and the requirement for critical-skill physicians, we have computed a range from \$4,652 to \$67,353 as the appropriate bonus amount for each of 3 years. The latter bonus may appear absurd, but this is largely because our notional example more than triples the number of actual critical-skill accessions in a difficult recruiting environment.

We have assumed that if a bonus of \$10,000 attracts a certain number of extra accessions, a bonus that is half as large will attract half as many extra accessions. There is no basis to assume anything else. It is probably true that any useful bonus must, at a minimum, be large enough to attract attention within the targeted populations. On the other hand, it is unreasonable to use experimental data related to a \$10,000 bonus to project anything connected with a bonus of \$67,000.

CHARACTERISTICS OF BONUS-VERSUS-NONBONUS PHYSICIANS

The bonus program seems to attract a different group of physicians. Most of the critical-skill physician accessions in FY88 and FY89 were eligible for the stipend program. Our data for FY89 indicate that 89 percent of those eligible accepted STRAP. But we now know that these physicians were still in training and were therefore younger on average than the board-certified/-eligible critical-skill physicians who are eligible for the bonus.

Table A-1-10 compares the personal characteristics of USAR critical-skill physicians in more detail. The second column represents those physicians who received bonuses in the bonus region, the third represents those who did not receive bonuses in the bonus region, and the fourth includes only those physicians outside the bonus region. Thus, columns 2 and 3 are the accessions in the bonus region and column 4 is the accessions in the nonbonus region.

TABLE A-1-10

CHARACTERISTICS OF FY90 CRITICAL-SKILL USAR PHYSICIAN ACCESSIONS

Characteristics	Bonus region		Nonbonus regions
	Bonus	No bonus	
Average age	45	30	33
Percentage of foreign born	22.1	20.4	20.0
Percentage of foreign medical graduate	23.5	10.5	10.6
Percentage of foreign trained	17.6	11.2	8.7
Percentage of STRAP	11.8	88.1	78.8
Number in group	84	108	175

If we compare the characteristics of bonused and nonbonused physicians in the bonus region we note the following:

- The average age of bonused physicians was 15 years older (one bonus accession was 64 years old).
- The percentage of foreign medical school graduates among the bonused physicians was more than twice as large. Similarly, the percentage trained

in foreign residency programs was twice as large, though the percentage foreign born was about equal.

- The percentage of bonused physicians participating in STRAP was 11.8 percent versus 88.1 percent among the nonbonused physicians.

If we compare the characteristics of nonbonused physicians in the bonus regions with critical-skill accessions in the nonbonus regions (the last two columns) we note that they are very similar. This strongly supports the notion that the bonus attracted a different group of physicians from the one attracted by the usual recruiting efforts. One of the advantages of this condition is that the bonus seldom had to be paid to physicians who would have joined anyway. A possible disadvantage is that the bonus accessions were older with fewer potential years of service. On the other hand, they are board-eligible upon joining, not at some time in the future.

Differences in the quality of the accessions may be perceived. The percentage of foreign medical school graduates and the percentage trained in foreign residency programs among the physicians receiving bonuses are twice as large as they are among nonbonus physicians. This may be a function of age, given U.S. medical schools' reputation for enforcing age limits. The total group of foreign medical school graduates, of course, makes up less than a quarter of all those physicians who received the bonus. While we think it is important to raise the issues of physician quality and value to the military forces, we leave their evaluation to experts in physician recruiting.

Recruiting managers point out that there is an important advantage to attracting physicians eligible for the stipend program. For each year of stipend, the physician is obligated to spend 2 years in the Selected Reserve after he or she has become board-eligible in a critical skill. By contrast, a physician accepting the bonus (but no stipend) may transfer without penalty from the Selected Reserve to the IRR when his bonus years are completed.

Though there were only six bonus accessions in FY89 in the two bonus regions, a similar pattern emerged. These physicians tended to be older (40 years of age), two of the six for whom data were captured were foreign medical graduates, and none participated in STRAP. The characteristics of the nonbonus accessions were similar to those listed in the last column of Table A-1-10.

SEASONALITY AND DESERT SHIELD

We know that there is pronounced seasonality in physician accessions. This is clearly evident in the data shown in Table A-1-11.

TABLE A-1-11

TOTAL USAR PHYSICIAN ACCESSIONS, BY CALENDAR QUARTER

Fiscal year	Quarters				Total
	1	2	3	4	
1988	32	54	126	128	340
1989	56	77	96	228	457
1990	73	107	153	172	505
[1990 bonus]	[4]	[21]	[25]	[36]	[86]

Note: Total accessions listed here for FY90 differ slightly from the information shown in Table A-1-3, because some regional information was unavailable.

It is interesting to analyze the accessions during the last quarter of FY90, when Desert Shield began. The accessions for July, August, and September 1990 were respectively 102, 51, and 19; bonus accessions for the same period were 12, 13, and 11. Thus, it would appear that Desert Shield, beginning in August 1990, had a large impact, particularly on nonbonus accessions. This belief is supported by anecdotes offered by the managers of physician accessions for the Army Reserve.

Another indication of the importance of Desert Shield lies in the monthly pattern involving the 228 accessions during the last quarter of FY89, a year earlier. The accessions were 78, 46, and 104 for the months of July, August, and September 1989, respectively. During the *previous* year, FY88, the accessions had been 27, 37, and 64 for the months of July, August, and September 1988, respectively. In both cases the number of accessions in September was almost equal to those in the preceding 2 months, in sharp contrast to what happened in 1990.

MARGINAL COST OF CRITICAL-SKILL ACCESSIONS

A natural question is whether the bonus scheme tested allows DoD to attract critical-skill USAR physicians with greater cost-effectiveness than by simply adding recruiting personnel.

We estimated recruiter costs using the *Resource Factor Handbook* of July 1991 from the Army's Training and Doctrine Command (TRADOC)². Assuming that the typical physician recruiter is a major, the annual composite rate (including base pay, retired pay accrual, quarters allowance, and other miscellaneous costs) is \$78,853. A total of 53 field recruiters in FY90 were distributed among 48 offices across the country.

Each office has a GS-7 clerk whose annual pay and benefits are estimated by the same source to be \$32,200. The cost of office space, telephones, utilities, etc., for all 48 offices in FY90 (from recruiting management data) is \$1,900,430. We distributed all these costs across the staff of active physician recruiters. By eliminating the first 6 months and the last 6 months of each recruiter's tour of duty as nonproductive time, we compute that in FY90 there were some 44.66 recruiters among whom the costs were to be distributed. The resulting calculations are shown in Table A-1-12.

The present STRAP stipend of \$762 per month is typically paid to participants for 3 years. Using an annual discount rate of 10 percent to discount the second- and third-year costs in accordance with Government instructions yields an average STRAP cost per accession of \$25,014. Similarly, assuming that the bonus is taken for 3 years at \$10,000 annually, after similarly discounting the second- and third-year costs, the average bonus cost per accession becomes \$27,356.³

² U.S. Army Training and Doctrine Command. *Resource Factor Handbook: Resource Estimating Relationships, and Pay, Benefits, and Permanent-Change-of-Station Cost Factors*. U.S. Army, Fort Monroe, VA. 1991.

³ We do not consider the costs of administering either the stipend program or the bonus test program. Real costs exist for administration, of course, but we believe that they are not significant.

TABLE A-1-12
CALCULATION OF COST-PER-EFFECTIVE USAR PHYSICIAN
RECRUITER, FY90

Type of cost	Calculations and costs
Recruiter (04) cost × number of recruiters	\$78,853 × 53
Clerk (GS-7) cost × number of clerks	32,200 × 48
Office expense (48 offices)	1,900,430
Total cost	\$7,625,239
Cost-per-recruiter (for 44.66 effective recruiters)	\$170,740

The average cost-per-accession in the nonbonus region in FY90 is the STRAP stipend cost of \$25,014 times the acceptance rate of 78.8 percent plus the annual cost of a recruiter divided by 6.2 (the FY90 accessions-per-recruiter), or

$$\text{Average cost-per-accession in the nonbonus region} = \\ \$25,014 (.788) + \$170,740 \div 6.2 = \$47,249.$$

Note that we have not included drill pay or an estimate of retirement pay accrual for the accession in the calculation. This is because our objective is to compute the marginal cost of obtaining an accession, not the annual cost of keeping physicians in the Army Reserve. We have not included advertising costs, even though they add to the average cost of an accession. This is because advertising costs will affect all accessions, and they drop out when we look at the difference in accession costs between the nonbonus and bonus regions.

In the bonus region the situation is more complex. In order to compute the average cost-per-accession here, we must consider more factors than we did for the nonbonus region. Of the 192 bonus-region accessions in FY90

- 50 percent (96 ÷ 192) participated in the stipend program alone (individual cost is \$25,014),
- 39.1 percent (75 ÷ 192) received the bonus alone (individual cost is \$27,356), and

- 4.7 percent ($9 \div 192$) received both bonuses and stipend payments (individual cost is \$52,370).

In addition, we must consider the recruiter cost computed in Table A-1-12 divided by the 11.8 accessions-per-recruiter experienced in the bonus region.

Thus, the average cost-per-accession in the bonus region =

$$\begin{aligned} & \$25,014 (.500) + \$27,356 (.391) + \$52,370 (.047) \\ & \quad + \$170,740 \div 11.8 = \$40,134. \end{aligned}$$

Our final objective in this comparison is to estimate the marginal cost of the very next critical-skill accession, rather than compute the average cost of each accession. First, we note that between FY88 and FY90 the national effective recruiter strength increased by more than 50 percent. At the same time, the accessions-per-recruiter were increasing somewhat in the nonbonus region while they were remaining constant in the bonus region (using data from FY88 and FY89 only). Since the number of accessions-per-recruiter does not seem to decrease when recruiters are added, we will assume that the *marginal* cost of an accession when there is no bonus is similar to the *average* cost in the nonbonus region. This, then, becomes the marginal cost of each accession resulting from additional recruiters.

Marginal cost-per-accession of a recruiter = \$47,249.

The marginal cost-per-accession of the bonus can be estimated by taking the average cost-per-recruiter in the bonus region (consisting of bonus, STRAP, and recruiter cost) multiplied by the average number of accessions (11.8). Then we subtract the average cost-per-recruiter if there had been no bonus *times* the base year productivity of 5.4 in the bonus region.

The result is an estimate of the total cost of attracting the additional 6.4 accessions in the bonus region. By dividing this outcome by 6.4, we obtain an estimate of the average cost-per-accession due to the bonus. As above, we assume that the marginal cost-per-accession is similar to the average cost-per-accession because the number of accessions-per-recruiter does not seem to vary with the number of recruiters.

$$\begin{aligned} & \text{Marginal cost-per-accession due to the bonus} = \\ & \quad [\$40,134 (11.8) - \$47,249 (5.4)] \div 6.4 = \$34,130. \end{aligned}$$

Even though the marginal cost-per-accession of the bonus appears to be 28 percent lower than that attributable to additional recruiters, the results must be interpreted cautiously. We have included only critical-skill accessions in these calculations because we believe this is the most appropriate focus. However, recruiters also have missions and spend time to recruit both noncritical-skill volunteers and REFRADs. Although noncritical-skill volunteer accessions per recruiter (and REFRAD accessions) were similar from one region to another during the test, the cost per accession would decrease if all other accessions are considered. The average cost per accession in the nonbonus region drops to \$33,672 and in the bonus region to \$31,572 when noncritical-skill volunteers are added. Of course, these costs are misleading because critical-skill physicians comprise only 71 percent of accessions among the former group while making up 79 percent of the latter.

ELASTICITY

We had originally planned to estimate bonus elasticities — the percent increase in accessions due to a percent increase in salary. This has not been done for several reasons.

- Elasticities are usually computed for individuals who change from one full-time job to another. In such a case, we can estimate the total income for each individual. In the reserve physician case, the income is for part-time work. We can add the bonus to an estimate of the full-time income for bonus recipients. But, we cannot assume that the same full-time income is appropriate for those who decline to enter the reserves forces. They can earn income in those hours that would have been devoted to military activities, had they volunteered.
- We have estimates of average, full-time civilian earnings by medical specialty and state; those annual figures range from \$120,000 to \$170,000 for FY87. However, within a specialty and state the earnings vary dramatically, depending on factors such as age, location, subspecialty, and type of practice. It is likely that the reserve forces and the bonus have greater appeal to physicians with lower incomes, but we have no specific income data on the physicians who were accessed (or on those who were not accessed). These kinds of data are important if the elasticity estimates are to have much validity for a group in which there is such a large variation in income.
- A major reason for computing elasticities is to determine an appropriate bonus level. The bonus test clearly demonstrates that \$10,000 per year for 3 years is large enough to make a dramatic improvement in accessions in a normal recruiting environment. Furthermore, that incentive level is

attractive because it is comparable to the STRAP stipend. Finally, we believe the method of determining appropriate bonus levels discussed earlier in this annex is a better approach in this case than the computation of elasticities.

SUMMARY

The USAR physician bonus test in FY90 for critical skills had the following major results:

- Accessions-per-recruiter of bonus-eligible physicians in the bonus region in FY90 were 3.3 times as large as the estimated value for FY90 without a bonus. Accessions-per-recruiter in the nonbonus region in FY90 stayed about the same. However, in FY91 the accessions-per-recruiter in the bonus region dropped to only 1.34 times as large as in the pretest years.
- Accessions-per-recruiter of bonus-eligible physicians in the bonus region in FY91 were only 1.34 times as large as the estimated value for FY91 without a bonus. In addition, accessions-per-recruiter in the nonbonus region were only half as great as in FY90. We attribute these declines to the difficult recruiting environment brought about by the Desert Shield/Storm experience of health care professionals in the reserve forces.
- When recruiting costs are taken into account alongside the bonus and STRAP stipend costs, we find the marginal cost-per-critical-skill accession in FY90 was \$34,130 with the bonus and \$47,249 without the bonus. Although 94 percent of the bonus region accessions received the bonus, STRAP stipend, or both, 78 percent of the accessions in the nonbonus region took STRAP. The bonus and STRAP each cost about \$30,000 per enrollee over 3 years, but the effective cost of a field recruiter, including clerical support and office expenses, is about \$170,740 per year.
- We have demonstrated a method for estimating the appropriate bonus for board-eligible/-certified critical-skill physicians depending on the requirement. That method is discussed and displayed graphically in the main body of this report.

**ANNEX 2
TO
APPENDIX A**

USAR NURSES

USAR NURSES

INTRODUCTION

This annex discusses U.S. Army Reserve (USAR) nurse accessions prior to the bonus test and during FY90 and FY91 of the test itself. The annex is divided into three major parts: a section covering the baseline data (from FY88 and FY89) for nurse accessions occurring prior to the start of the test; a larger section analyzing the test data for FY90 and FY91, 2 contrasting years; and a closing group of computations on appropriate bonus levels emerging from the test results.

Throughout this annex we use the term "bonus-eligible" to refer both to those nurses who were bonus-eligible during the test and to those nurses accessed in FY88 and FY89 who *would have been* eligible had the test been conducted during those earlier years. Army Reserve nurses are grouped into the following categories: nurse-anesthetist [Area of Concentration (AOC) 66F], operating room nurse (66E), and other nurse (principally AOCs 66A, 66B, 66C, 66D, 66G, 66H, and 66J).

During the test itself, bonus eligibility was determined not only by specialty but also by place of residence (not location of reserve unit) and military status. Thus, no nurses released from active duty after 28 April 1989 were eligible. In addition, no nurses transferring from the Individual Ready Reserve (IRR) to a USAR unit (called Troop Program Unit or TPU in the Army Reserve) were eligible. Finally, no nurses entering the IRR from civilian life were eligible for the bonus.

ACCESSIONS PRIOR TO THE BONUS PERIOD

Tables A-2-1 and A-2-2 show nurse accessions data for FY88 and FY89, the two years preceding the bonus test. In these tables (as well as in Tables A-2-3 and A-2-4) we have separated all other nurse accessions into two columns, one for the states of Georgia and Minnesota combined, where the bonus was offered, and one for the other 48 states. This enables us to compare the impact of the bonus from the early base period to the test period with greater precision.

TABLE A-2-1
FY88 USAR NURSE ACCESSIONS, BY REGION
(Bonus-eligible)

Regions and region groups	Nurse-anesthetist	Operating room nurse	Other nurses		Total accessions
			Georgia and Minnesota	Remaining 48 states	
Northeast (NE)	19	21	-	258	298
Southeast (SE)	4	19	14	103	140
Northcentral (NC)	9	23	12	140	184
Southcentral (SC)	9	10	-	107	126
West (WE)	1	7	-	89	97
Total	42	80	26	697	845
Bonus regions (NC, SE)	13	42	26	-	81
Nonbonus regions (NE, SC, WE)	29	38	-	697	764

About 60 percent of all U.S. nurses live in the nonbonus regions (NE, SC, and WE), and about 40 percent live in the bonus regions (SE and NC) according to data from the nursing associations. Recruiting activity, however, is concentrated around schools of nursing, and the assignment of recruiters to recruiting regions reflects this concentration. During FY91, the second full year of the bonus test, for example, the average recruiter strength in the bonus regions was 63.9, versus 24.1 in the nonbonus regions. That represents a percentage split of 72.6 to 27.4. We chose not to use either the nurse populations or nurse recruiter populations in our assessment of the effectiveness of the bonus because the recruiter populations remained fairly stable from FY88 to FY91.

Although the bonus test began in August 1989, 2 months before the end of the fiscal year, we treat FY89 as part of our preliminary, pretest period. Only three bonus accessions occurred during FY89.

TABLE A-2-2
FY89 USAR NURSE ACCESSIONS, BY REGION
(Bonus-eligible)

Regions and region groups	Nurse-anesthetist	Operating room nurse	Other nurses		Total accessions
			Georgia and Minnesota	Remaining 48 states	
Northeast (NE)	10	37	–	351	398
Southeast (SE)	7	36	19	181	243
Northcentral (NC)	0	28	8	228	264
Southcentral (SC)	4	17	–	174	195
West (WE)	3	26	–	152	181
Total	24	144	27	1,086	1,281
Bonus regions (NC, SE)	7	64	27	–	98
Nonbonus regions (NE, SC, WE)	17	80	–	1,086	1,183

ACCESSIONS DURING THE BONUS PERIOD

Tables A-2-3 and A-2-4 contain USAR nurse accessions data for the test years of FY90 and FY91, respectively. In the Southeast and Northcentral Regions where the bonus was offered, the number of nurses receiving the bonus is shown on the line following the total number of accessions. Some accessions in the bonus region were obtained by recruiters assigned to another region. For example, three operating room nurses residing in the Northcentral Region (Illinois), who accepted the bonus during FY90, were credited in recruiting command files to recruiters in the Southcentral (nonbonus) Region. In all such cases we have counted these nurses as originating from their regions of residence, even though some recruiting effort may have been expended by another regional office.

We have also reviewed the seasonality of USAR nurse accessions. Table A-2-5 shows the quarterly pattern of bonus-eligible nurse accessions for four consecutive years. A similar display for physicians shows evidence of the impact of Operation Desert Shield/Desert Storm in FY91, but there is little such evidence in the nurse

TABLE A-2-3

**FY90 USAR NURSE ACCESSIONS, BY REGION
(Bonus-eligible)**

Regions and region groups	Nurse-anesthetist	Operating room nurse	Other nurses		Total accessions
			Georgia and Minnesota	Remaining 48 states	
Northeast (NE)	13	24	–	362	399
Southeast (SE)	78	115	74	166	433
[Bonus]	[78]	[114]	[67]	–	[259]
Northcentral (NC)	49	153	55	183	440
[Bonus]	[49]	[148]	[50]	–	[247]
Southcentral (SC)	3	20	–	156	179
West (WE)	4	14	–	196	214
Total	147	326	129	1,063	1,675
Bonus regions (NC, SE)	127	268	129	–	524
Nonbonus regions (NE, SC, WE)	20	58	–	1,063	1,141

accession data. Accessions are actually quite high in the first quarter of FY91, after the troop deployments for Operation Desert Shield began. We will return to this fact below.

How did the recruiting results compare with the recruiting missions over the same 4 years? In Table A-2-6 we show the annual recruiting mission for nonprior-service nurses, followed by the accessions achieved for the same period. The accessions are divided into two groups not eligible for the bonus [those who simply joined the IRR and those who transferred from the IRR to a TPU of the Selected Reserve] and the group of bonus-eligible nurse accessions. Note that the bonus-eligible accessions as a percentage of total accessions (shown in the last column) increased during the test. The behavior is notably different in FY91, where the number of transfers from the IRR into the Selected Reserve was one-tenth the FY90

TABLE A-2-4

**FY91 USAR NURSE ACCESSIONS, BY REGION
(Bonus-eligible)**

Regions and region groups	Nurse-anesthetist	Operating room nurse	Other nurses		Total accessions
			Georgia and Minnesota	Remaining 48 states	
Northeast (NE)	3	25	–	327	355
Southeast (SE)	20	41	30	124	215
[Bonus]	[19]	[22]	[18]	–	[59]
Northcentral (NC)	12	35	12	159	218
[Bonus]	[10]	[24]	[3]	–	[37]
Southcentral (SC)	0	9	–	119	128
West (WE)	2	10	–	113	125
Total	37	120	42	842	1,041
Bonus regions (NC, SE)	32	76	42	–	150
Nonbonus regions (NE, SC, WE)	5	44	–	842	891

TABLE A-2-5

**USAR NURSE ACCESSIONS, BY CALENDAR QUARTER, FY88 THROUGH FY91
(Bonus-eligible)**

Fiscal year	Quarters				Total accessions for year
	1	2	3	4	
1988	324	252	189	80	845
1989	436	327	353	165	1,281
1990	401	432	403	429	1,665
1991	362	189	196	294	1,041

value. This may be due to the impact of Operation Desert Storm, to a reduction in the number of paid drill positions in the units, or to a combination of both factors.

TABLE A-2-6

USAR NONPRIOR-SERVICE NURSE RECRUITING MISSIONS AND RESULTS, FY88 THROUGH FY91

Fiscal year	All nurses		Type of accessions			Bonus-eligible accessions as a percentage of total accessions
	Recruiting mission	Accessions achieved	Civilian life-to-IRR	IRR-to-TPU ^a	Bonus-eligible	
1988	1,150	1,150	24	281	845	73.5
1989	1,250	1,600	33	286	1,281	80.1
1990	1,750	2,001	26	310	1,665	83.2
1991	1,100	1,129	57	31	1,041	92.2

^a Such transfers are commonly considered as successful recruiting events for the reserve forces, since they bring into the Selected Reserve officers who would otherwise remain relatively inactive in their IRR status.

A review of USAR nurse accessions from civilian life to the IRR also tells an interesting story. In FY91, the number of accessions into the IRR were more than double the FY90 figures. In the earlier years, about half of the IRR accessions had occurred in the bonus region, but in FY91 only 5 of the 57 IRR accessions came from the bonus region. This suggests that volunteers from the bonus region, who might have joined the IRR under normal conditions, chose to join units in order to obtain the bonus.

ANALYSIS

Tables A-2-7 through A-2-9 present, for each nurse specialty, the average accessions in the pretest period (FY88 and FY89) for both nonbonus regions and bonus regions, as well as accessions in the FY90 portion of the test for the two regions.

Since the recruiter population stayed approximately constant during the entire period, we have projected the accessions that would have occurred during FY90 in the bonus regions had there been no bonus as

$$\left(\begin{array}{c} \text{Predicted} \\ \text{accessions without} \\ \text{bonus in bonus} \\ \text{region in FY90} \end{array} \right) = \left(\begin{array}{c} \text{Actual} \\ \text{accessions in} \\ \text{nonbonus region} \\ \text{in FY90} \end{array} \right) \times \left(\left[\begin{array}{c} \text{Average FY88} \\ \text{and FY89} \\ \text{accessions in the} \\ \text{bonus region} \end{array} \right] \div \left[\begin{array}{c} \text{Average FY88 and} \\ \text{FY89 accessions in} \\ \text{the nonbonus} \\ \text{region} \end{array} \right] \right)$$

Table A-2-7 shows that 20 accessions occurred in the nonbonus region in FY90. We multiply that number by $10 \div 23$ (the ratio of accessions in the bonus region during FY88/FY89 divided by the number of accessions in the nonbonus region for the same period) to obtain an estimate of 8.7 for the nurses who would have joined the Selected Reserve in the bonus region during FY90 had there been no bonus test. The actual accessions total 127, or 14.6 times the predicted value, indicating that the bonus attracted large numbers of nurse-anesthetists.

TABLE A-2-7

**COMPARATIVE ACCESSIONS OF USAR NURSE-ANESTHETISTS, FY88/89 VERSUS FY90
(Bonus-eligible)**

Regions	Average FY88/89 (pretest) accessions	Actual FY90 (test) accessions	Predicted accessions for FY90 without bonus conditions	FY90 actual $\div$ predicted
Nonbonus region	23	20	—	—
Bonus region	10	127	8.7	14.6

The bonus was less successful in attracting operating room nurses (Table A-2-8) and other nurses (Table A-2-9). This is not too surprising since nurse-anesthetists were offered a \$10,000 bonus per year, compared to \$6,000 for the other two specialties. On the other hand, the bonus as a percentage of annual salary is very similar for all three groups of nurses.

TABLE A-2-8

**COMPARATIVE ACCESSIONS OF USAR OPERATING ROOM NURSES, FY88/89 VERSUS FY90
(Bonus-eligible)**

Regions	Average FY88/89 (pretest) accessions	Actual FY90 (test) accessions	Predicted accessions for FY90 without bonus conditions	FY90 actual ÷ predicted
Nonbonus region	59	58	—	—
Bonus region	53	268	52.1	5.1

TABLE A-2-9

**COMPARATIVE ACCESSIONS OF USAR OTHER NURSES, FY88/89 VERSUS FY90
(Bonus-eligible)**

Regions	Average FY88/89 (pretest) accessions	Actual FY90 (test) accessions	Predicted accessions for FY90 without bonus conditions	FY90 actual ÷ predicted
Nonbonus region	891.5	1,057	—	—
Bonus region (GA, MN)	26.5	135	31.4	4.3

Tables A-2-10 through A-2-12 are the FY91 versions of the comparisons shown in Tables A-2-7 through A-2-9 for FY90. The FY91 accessions are down in every specialty, especially among nurse-anesthetists where only a quarter as many of them entered the SELRES from the entire country as entered during FY90. On the other hand, the impact of the bonus on accessions remained strong for nurse-anesthetists (about 14.5 times as many as predicted in FY91 versus 14.6 times as many as predicted in FY90). But the impact of the bonus on operating room nurses dropped from 5.1 times in FY90 to 1.9 times in FY91, and for other nurses from 4.3 times in FY90 to 1.7 times in FY91.

TABLE A-2-10

**COMPARATIVE ACCESSIONS OF USAR NURSE-ANESTHETISTS, FY88/89 VERSUS FY91
(Bonus-eligible)**

Regions	Average FY88/89 (pretest) accessions	Actual FY91 (test) accessions	Predicted accessions for FY91 without bonus conditions	FY91 actual ÷ predicted
Nonbonus region	23	5	-	-
Bonus region	10	32	2.2	14.5

TABLE A-2-11

**COMPARATIVE ACCESSIONS OF USAR OPERATING ROOM NURSES, FY88/89 VERSUS FY91
(Bonus-eligible)**

Regions	Average FY88/89 (pretest) accessions	Actual FY91 (test) accessions	Predicted accessions for FY91 without bonus conditions	FY91 actual ÷ predicted
Nonbonus region	59	44	-	-
Bonus region	53	76	39.5	1.9

TABLE A-2-12

**COMPARATIVE ACCESSIONS OF USAR OTHER NURSES, FY88/89 VERSUS FY91
(Bonus-eligible)**

Regions	Average FY88/89 (pretest) accessions	Actual FY91 (test) accessions	Predicted accessions for FY91 without bonus conditions	FY91 actual ÷ predicted
Nonbonus region	891.5	842	-	-
Bonus region (GA, MN)	26.5	42	25.0	1.7

The decreased effectiveness in FY91 is probably due to several causes:

- Desert Shield/Desert Storm may have made the Selected Reserve less attractive and resulted in more accessions into the IRR and fewer transfers from the IRR to TPUs than occurred in FY90.
- Many of those motivated by the bonus joined during the first year, FY90. No such backlog existed during FY91. Also, the bonus test was originally announced as expiring at the end of FY90, causing many who were interested in the bonus to apply during FY90.
- A restricted number of unit billets (or positions) was becoming a problem in FY91, particularly for other nurses. To a lesser degree the condition affected operating room nurses. This may be the major explanation for the low "actual/predicted" ratios for FY91 for the bonus regions shown in Tables A-2-11 and A-2-12.

Some evidence suggests that the actual/predicted ratios discussed above may understate the impact of the bonus on FY90 accessions, particularly on nurse-anesthetists and operating room nurses. On the first day of FY91, 28 nurse-anesthetists were accessed, of whom 27 received bonuses (the other was a resident of Maine outside the bonus area). The accessions of these USAR nurses had been delayed because the FY90 recruiting missions had already been met: a tactic that is a somewhat common practice among recruiters. This situation compares to the accession of a single nurse-anesthetist on the first day of FY90. An argument could be made that 27 nurse-anesthetists should be added to the FY90 bonus region accessions and one added to the nonbonus region accessions.

Similarly, on the first day of FY91, 52 operating room nurses joined the USAR Selected Reserve, of whom 45 received bonuses. This compares to 7 accessions (3 receiving bonuses) on the first day of FY90. The numbers for other nurses are much less dramatic: 64 on the first day of FY91, of whom 18 received bonuses, versus 57 on the first day of FY90, (of whom 3 received bonuses). These numbers do illustrate a recruiting practice recounted several times during this study: when more than enough qualified applicants are available, preference is given to recruiting nurse-anesthetists and operating room nurses.

We have not analyzed the effect of stipend programs on the accession of nurses, because only 3.2 percent of all accessions received a stipend. We have also chosen to be somewhat conservative in our projections of bonus impact for FY90 by not

including those health care providers who were attracted during FY90 but not sworn in until the first day of FY91.

ESTIMATION OF THE BONUS AMOUNT – NURSE-ANESTHETISTS

We use the results of the previous section to estimate the appropriate bonus amount for each specialty needed to produce the required accessions in future years. The analysis proceeds by specialty and for FY90 and FY91 separately because FY90 is viewed as a favorable recruiting environment and FY91 as unfavorable.

As in the physician analysis, the number of accessions is estimated under nonbonus conditions. Next, the bonus required for some large number of accessions is computed. Then, a straight line is drawn between the points so that the bonus for any intervening accession target can be estimated.

For example, suppose that there is a requirement for 80 nonprior-service nurse-anesthetists nationwide to join the Selected Reserve (bonus-eligible). We want to estimate the bonus amount that, if offered nationwide, can be expected to induce 80 nurse-anesthetists to join the SELRES.

The data we need from Table A-2-7 for FY90 are as follows:

- The number of FY90 estimated nurse-anesthetist (NA) accessions not receiving a bonus is 28.7 (from Table A-2-7, 20 NAs in the nonbonus region plus 8.7 estimated in the bonus region. This is down from the FY88/89 average of 33 but larger than the FY89 total of 24).
- The required NA accessions of 80 is 2.86 times the 28.7 that would have been accessed without receiving a bonus. The bonus must attract the excess of 1.86 times as many NAs.
- A bonus of \$10,000 per year for 3 years attracted 14.6 times as many NAs (Table A-2-7) or an excess of 13.6 over the projected accessions without bonus.
- To attract an excess of 1.86 times as many NAs, we need a bonus of $(1.86)(\$10,000) \div 13.6 = \$1,367$.

The analogous data we need from Table A-2-10 for FY91 are as follows:

- The number of FY91 estimated NA accessions not receiving a bonus is 7.2 (from Table A-2-10, 5 NAs in the nonbonus region plus 2.2 estimated in the bonus region).

- The required NA accessions of 80 is 11.15 times the 7.2 that would have been accessed without a bonus. The bonus must attract an excess of 10.15 times as many NAs.
- A bonus of \$10,000 per year for 3 years attracted 14.5 times as many NAs (Table A-2-10) or an excess of 13.5 over the projected accessions without bonus.
- To attract an excess of 10.15 times as many NAs, we need a bonus of $(10.15)(\$10,000) \div 13.7 = \$7,519$.

Depending on the recruiting environment and the requirement for NAs, we compute a range from \$1,367 to \$7,519 as the appropriate annual bonus amount for each of 3 years – an average of about \$4,500. We have assumed that if a bonus of \$10,000 attracts a certain number of extra accessions, a bonus that is half as large will attract half as many extra accessions. There is no basis to assume anything else. It is probably true that the bonus must, at a minimum, be large enough to attract attention.

ESTIMATION OF THE BONUS AMOUNT – OPERATING ROOM NURSES

In an example similar to the one used for USAR nurse-anesthetists, suppose that 150 nonprior-service operating room nurses (bonus-eligible) are required nationwide to join the SELRES.

The data we need from Table A-2-8 for FY90 are as follows:

- The number of FY90 estimated operating room nurse (OR) accessions not receiving a bonus is 110.1 (from Table A-2-8, 58 ORs in the nonbonus region plus 52.1 estimated in the bonus region. This is close to the average accessions during FY88/89 of 112, but lower than the FY89 total of 144).
- The required OR accessions of 150 is 1.36 times the 110.1 that would have been accessed without receiving a bonus. The bonus must attract an excess of 0.36 times as many ORs.
- A bonus of \$6,000 per year for 3 years attracted 5.1 times as many ORs (Table A-2-8) or an excess of 4.1 over the projected accessions without bonus.
- To attract an excess of 0.36 times as many ORs, we need a bonus of $(0.36)(\$6,000) \div 4.1 = \$527$.

The analogous data we need from Table A-2-11 for FY91 are as follows:

- The number of FY91 estimated OR accessions not receiving a bonus is 83.5 (from Table A-2-11, 44 ORs in the nonbonus region plus 39.5 estimated in the bonus region).
- The required OR accessions of 150 is 1.8 times the 83.5 that would have been accessed without a bonus. The bonus must attract an excess of 0.8 times as many ORs.
- A bonus of \$6,000 per year for 3 years attracted 1.9 times as many ORs (Table A-2-11) or an excess of 0.9 over the projected accessions without a bonus.
- To attract an excess of 0.8 times as many ORs, we need a bonus of $(0.8)(\$6,000) \div 0.9 = \$5,333$.

Depending on the recruiting environment and the requirement for ORs, we compute a range from \$527 to \$5,333 as the appropriate annual bonus amount – an average of about \$3,000 per year. Again we have assumed that if a bonus of \$10,000 attracts a certain number of extra accessions, a bonus that is half as large will attract half as many extra accessions.

ESTIMATION OF THE BONUS AMOUNT – OTHER NURSES

Suppose that 2,000 nonprior-service other nurses (bonus-eligible) are required nationwide to join the Selected Reserve. We want to estimate the bonus amount that, if offered nationwide, can be expected to induce those 2,000 other nurses to join the SELRES.

The data we need from Table A-2-9 for FY90 are as follows:

- The number of FY90 estimated other nurse (ON) accessions not receiving a bonus is 1,088.4 (from Table A-2-9, 1,057 ONs in the nonbonus region plus 31.4 estimated in the bonus region).
- The required ON accessions of 2000 is 1.84 times the 1,088.4 that would have been accessed without receiving a bonus. The bonus must attract an excess of 0.84 times as many ONs.
- A bonus of \$6,000 per year for 3 years attracted 4.3 times as many ONs (Table A-2-9) or an excess of 3.3 over the projected accessions without bonus.
- To attract an excess of 0.84 times as many ONs, we need a bonus of $(.84)(\$6,000) \div 3.3 = \$1,527$.

The analogous data we need from Table A-2-12 for FY91 are as follows:

- The number of FY91 estimated ON accessions not receiving a bonus is 867 (from Table A-2-12, 842 ONs in the nonbonus region plus 25 estimated in the bonus region).
- The required ON accessions of 2000 is 2.31 times the 867 that would have been accessed without a bonus. The bonus must attract an excess of 1.31 times as many ONs.
- A bonus of \$6,000 per year for 3 years attracted 1.7 times as many ONs (Table A-2-12) or an excess of 0.7 over the projected accessions without bonus.
- To attract an excess of 1.31 times as many ONs, we need a bonus of $(1.31)(\$6,000) \div 0.7 = \$11,229$.

CHARACTERISTICS OF BONUS AND NONBONUS ACCESSIONS

During FY90, almost all eligible nurses accepted the bonus offered as part of the test (see Table A-2-3). In FY91, most of the bonus-eligible nurse-anesthetists accepted the bonus (see Table A-2-4), while only 67 of 118 eligible operating room and other nurses received the bonus. The reasons for these differences are unclear.

To examine the possibility of personal differences between accessions in the bonus region and those from the nonbonus region, we examined two factors available in the recruiting data base: average age and percentage male. Table A-2-13 shows these data for the pretest period of FY88 and FY89. The same characteristics recorded for the test year of FY90 are shown in Table A-2-14. FY90 was selected for this display because such a high population of bonus-eligible nurses received bonuses that year. Our objective, of course, is to obtain evidence of whether the bonus attracted personnel with different characteristics.

Nurse-anesthetists, both before the test and during the test, are somewhat older than their colleagues in other specialties. This is to be expected because they have undergone longer, more specialized training than nurses in other specialties. The bonus itself, however, does not seem to have induced any significant difference in the age of the applicants.

Proportionately, many more male nurse-anesthetists joined the USAR SELRES, both before the test and during the test, than was true for other specialties. Interestingly, the "percentage male" figure for the bonus regions drops from

TABLE A-2-13

**PERSONAL CHARACTERISTICS OF FY88/89, USAR NURSE
ACCESSIONS, BY SPECIALTY**

Specialty and characteristics	Origin of accessions	
	Nonbonus region	Bonus region
Nurse-anesthetist		
Average age	39.7	40.4
Percentage male	56.5	70.0
Operating room nurse		
Average age	37.7	33.3
Percentage male	29.7	17.0
Other nurse		
Average age	35.5 ^a	35.1 ^b
Percentage male	21.0 ^a	28.3 ^b

^a All states except Minnesota and Georgia.

^b Minnesota and Georgia only.

70 percent during the pretest period to 48 percent during the test period for nurse-anesthetists. The percentage male figure in the bonus regions drops from the pretest period to the test period in the two other nurse categories as well, suggesting that the bonus may have had a more positive impact on female accessions, perhaps because they are not as well paid. On the other hand, the percentage of male operating room nurses dropped rather substantially from the pretest to the test period as well.

EFFECTIVENESS OF BONUS VERSUS ADDITIONAL RECRUITERS

According to a U.S. Army Recruiting Command review conducted in June 1991, the average annual cost of an Army Reserve nurse recruiter is \$57,810 including salary, benefits, office space, training, travel, and similar factors, but excluding supervisory costs. Using this figure as a rough guide only, we compare the recruiter costs of USAR nurse accessions with the bonus costs incurred during the test.

TABLE A-2-14

**PERSONAL CHARACTERISTICS OF FY90 USAR NURSE
ACCESSIONS, BY SPECIALTY**

Specialty and characteristics	Origin of accessions	
	Nonbonus region	Bonus region
Nurse-anesthetist		
Average age	43.4	39.7
Percentage male	60.0	48.0
Operating room nurse		
Average age	38.3	37.8
Percentage male	20.9	15.4
Other nurse		
Average age	37.2 ^a	37.3 ^b
Percentage male	16.3 ^a	14.7 ^b

^a All states except Minnesota and Georgia.

^b Minnesota and Georgia.

The main impact of the bonus occurred in FY90. The average annual number of bonus-eligible nurse accessions in FY88 was 1,063. Using the number of 88 recruiters yields an average of 12.1 accessions per recruiter in the absence of the bonus or an average of slightly less than \$4,800 per accession.

While the bonus attracted nurses in large numbers, it must be remembered that each nurse-anesthetist accepting the bonus receives \$30,000 over 3 years, and the operating room nurses and other nurses receive \$18,000. It may be difficult to justify such large bonuses in relation to recruiting costs-per-accession, except in the most critical specialties. The test bonus for USAR nurse-anesthetists attracted over 14.6 times the expected number of accessions, so that even in this most critically short specialty, a smaller bonus is still likely to produce good results.

**ANNEX 3
TO
APPENDIX A**

ARNG NURSES

ARNG NURSES

ACCESSIONS PRIOR TO THE BONUS PERIOD

The population of all nurses in the United States is split about 60/40 between the nonbonus region and the bonus region, according to data from the nursing associations. Even though the bonus began in August 1989, we treat all of FY89 as a nonbonus year because there was so little time for the bonus to affect accessions. Any accessions receiving bonuses during FY89 were probably already being processed at the time the bonus was announced. Table A-3-1 displays the FY89 accessions data.

TABLE A-3-1
FY89 ARNG NURSE ACCESSIONS, BY REGION
(Bonus-eligible)

Regions	Nurse-anesthetist	Operating room nurse	Other nurse		Total bonus-eligible accessions
			Georgia and Minnesota	Remaining 48 states	
Nonbonus region	0	3	-	36	39
Bonus region	1	1	7	-	9
Total	1	4	7	36	48

Note: "Bonus-eligible" refers to nurses who would have been eligible for a bonus, had FY89 been considered a test year.

ACCESSIONS DURING THE BONUS PERIOD

Test data for FY90 are shown in Table A-3-2; FY91 data appear in Table A-3-3. In FY90 it appears that almost all nurses eligible for the bonus accepted it. The bonus had a dramatic impact on all three specialty groups, and especially on nurse-anesthetists and operating room nurses. We will not estimate the percentage improvements by specialty, because the numbers in the FY89 baseline are so low. However, overall nurse accessions in the bonus region in FY90, the first full year of

the test, were more than eight times the accessions in FY89, though in the nonbonus region there was little difference between the 2 years.

TABLE A-3-2
FY90 ARNG NURSE ACCESSIONS, BY REGION
(Bonus-eligible)

Regions	Nurse-anesthetist	Operating room nurse	Other nurse		Total bonus-eligible accessions
			Georgia and Minnesota	Remaining 48 states	
Nonbonus region	0	6	–	31	37
Bonus region	16	37	23	–	76
Total	16	43	23	31	113

TABLE A-3-3
FY91 ARNG NURSE ACCESSIONS, BY REGION
(Bonus-eligible)

Regions	Nurse-anesthetist	Operating room nurse	Other nurse		Total bonus-eligible accessions
			Georgia and Minnesota	Remaining 48 states	
Nonbonus region	8	10	–	30	48
Bonus region	1	6	5	–	12
Total	9	16	5	30	60

The test results for FY91 are difficult to interpret. The number of accessions in the nonbonus region is one-third larger than in each of the two previous years. And the largest increases were in the nurse-anesthetist and operating room nurse specialties. However, the accessions in the bonus region dropped to a level similar to that of FY89. We do not know if the latter is because of billet shortages; most of the applicants motivated by the bonus had already joined in FY90, because of a negative

reaction to the Operation Desert Shield/Desert Storm call-up, or because of a combination of these, and perhaps other, factors.

**ANNEX 4
TO
APPENDIX A**

USAFR PHYSICIANS

USAFR PHYSICIANS

INTRODUCTION

As we have done in other annexes, we discuss the testing of this group, U.S. Air Force Reserve (USAFR) physicians, in three sections. First, we display the base conditions established prior to the test. Then the test data, shown separately for FY90 and FY91, are discussed. Finally, we include observations on the meaning of the test results.

The Air Force Reserve is similar to the Army Reserve in that it will accept graduates of foreign medical schools; in addition, physician accessions do not have to be U.S. citizens. The USAFR will accept physicians in critical specialties up to the age of 57.

ACCESSIONS PRIOR TO THE BONUS PERIOD

Table A-4-1 shows the FY89 accessions by specialty. First, we show the critical-skill physicians who would have been eligible for the bonus had it been offered. Then, we show critical-skill physicians who were not eligible for the bonus because they did not meet all of the test criteria.

The Air Force Reserve had 14 recruiters whose job was to access physicians, including noncritical-skill positions. Recruiter assignments by bonus and nonbonus region are shown in Table A-4-1, as is the approximate distribution of all physicians in the general population.

We are interested in assessing the effectiveness of the bonus in attracting critical-skill physicians versus the effectiveness of additional recruiters. The majority of USAFR physician accessions, however, are not critical-skill physicians. Since obtaining these accessions consumes considerable recruiter time and effort, we show these accessions in Table A-4-1. The last line of Table A-4-1 shows total physician accessions-per-recruiter.

TABLE A-4-1

FY89 USAFR PHYSICIAN ACCESSIONS
(With recruiter assignments)

Specified groups	Nonbonus region	Bonus region
Bonus-eligible accessions ^a		
Anesthesiologist	3	3
Orthopedic surgeon	1	1
General surgeon	3	2
Total bonus-eligible accessions	7	6
Recruiters		
Number of recruiters	9	5
Distribution of recruiters (percent)	64	36
[Percentage of physician population served by recruiters]	[60]	[40]
Nonbonus-eligible accessions		
Critical skills	8	8
Other physicians	77	42
Total physician accessions		
All physicians	92	56
Accessions-per-recruiter	10.22	8.40

^a "Bonus-eligible" refers to physicians who would have been eligible for a bonus, had FY89 been considered a test year, and had there been no geographic limitations on bonus eligibility.

Although the bonus began in August 1989, we treat all of FY89 as being a nonbonus year. This is because the time for bonus test implementation was quite short, enabling USAFR physician recruiters to access only one bonused physician by the end of the fiscal year. That physician's application was probably being processed when the test began.

ACCESSIONS DURING THE BONUS PERIOD

Table A-4-2 shows the FY90 physician accessions for the USAFR, by specialty. Note that 9 of the 10 bonus-eligible physicians accessed in the bonus region accepted the bonus. Almost 75 percent of the critical-skill physician accessions in FY90 are not eligible for the bonus either because of recent prior service or because they are not yet board-certified. We have shown these accessions at the bottom of Table A-4-2 for general information.

Table A-4-3 shows the USAFR physician accessions for the second test year of FY91. The number of accessions is down from FY89 for both the bonus-eligible and nonbonus-eligible groups. Only two of the five bonus-eligible physicians accepted the bonus offered. We were told that the three physicians who declined the bonus did so because they sought to avoid the recurring obligation to drill with their units that accompanied bonus status in USAFR units.

The FY91 annual USAFR recruiting goal for all physicians was 145 at the beginning of the year but was reduced to 129 near the end of FY91. No specific goals were set for each specialty.

Table A-4-4 shows the quarterly pattern of physician accessions for 3 fiscal years. The data are listed separately for bonused critical-skill physicians, bonus-eligible critical skill physicians who did not receive the bonus, and other physician accessions. The quarterly pattern is of interest because it helps us to assess the influence of Desert Shield. In contrast to the Army Reserve physician group, which showed a dramatic drop in critical-skill nonbonus accessions in August 1990, the Air Force accessions for both nonbonused and bonused critical-skill physicians reached its peak for the year in the fourth quarter of FY90. Accessions remained at about the same level for other physicians as well.

Accessions in the first two quarters of FY91, available only in combined quantities, and in the third quarter were substantially below those of FY90, due in large measure to Desert Shield, according to the anecdotes of some recruiters. However, by the fourth quarter of FY91 accessions appeared to be returning to normal. The bonus had almost no impact during FY91. The total FY91 physician accessions of 67 was substantially below the USAFR target, even after the downward adjustment of the goal.

TABLE A-4-2

FY90 USAFR PHYSICIAN ACCESSIONS
(With recruiter assignments)

Specified groups	Nonbonus region	Bonus region
Bonus-eligible accessions ^a		
Anesthesiologist	1	2
Orthopedic surgeon	3	2
General surgeon	0	6
Total bonus-eligible accessions	4	10
Bonus accepts	—	9
Recruiters		
Number of recruiters	9	5
Distribution of recruiters (percent)	64	36
[Percentage of physician population served by recruiters]	[60]	[40]
Nonbonus-eligible accessions		
Critical skills	15	26
Other physicians	57	31
Total physician accessions		
All physicians	76	67
Accessions-per-recruiter	8.44	13.40

^a "Bonus-eligible" refers to physicians who would have been eligible for a bonus, had there been no geographic limitations on bonus eligibility.

TABLE A-4-3

FY91 USAFR PHYSICIAN ACCESSIONS
(With recruiter assignments)

Specified groups	Nonbonus region	Bonus region
Bonus-eligible accessions ^a		
Anesthesiologist	0	4
Orthopedic surgeon	1	0
General surgeon	3	1
Total bonus-eligible accessions	4	5
Bonus accepts	–	2
Recruiters		
Number of recruiters	9	5
Distribution of recruiters (percent)	64	36
[Percentage of physician population served by recruiters]	[60]	[40]
Nonbonus-eligible accessions		
Critical skills	17	7
Other physicians	25	9
Total physician accessions		
All physicians	46	21
Accessions-per-recruiter	5.11	4.20

^a "Bonus-eligible" refers to physicians who would have been eligible for a bonus had there been no geographic limitations on bonus eligibility.

TABLE A-4-4

USAFR PHYSICIAN ACCESSIONS, BY CALENDAR QUARTER, FY89 THROUGH FY91

Physician groups and years	Quarters				Total
	1	2	3	4	
Bonus					
Critical skill					
FY89	0	0	0	1	1
FY90	0	1	2	6	9
FY91	← 2 →		0	0	2
No bonus					
Critical skill					
FY89	6	6	5	11	28
FY90	12	10	8	16	46
FY91	← 16 →		4	11	31
No bonus					
Other physicians					
FY89	25	28	27	39	119
FY90	27	22	21	18	88
FY91	← 9 →		4	21	34

ANALYSIS

We analyze the effect of the bonus only for FY90 because of the dramatic impact of Desert Shield, which dropped physician accessions from 143 in FY90 to 67 in FY91. Since only two physicians accepted the bonus in FY91, the bonus had essentially no impact on the Air Force Reserve in that year. This conclusion is reinforced by the data shown in Table A-4-3: total accessions-per-recruiter were actually slightly higher in the nonbonus region (though the critical-skill accessions-per-recruiter ratio of 2.33 in the nonbonus region was almost identical with 2.4 for the bonus region).

If there had been no bonus in FY90, the expected number of bonus-eligible accessions in the bonus region would have been about 3.43 ($4 \times 6 \div 7$) physicians in the three critical specialties. This is based on the number of accessions in the nonbonus region in FY90 and the numbers of accessions in both regions in FY89. The actual accessions in the bonus region of 10 were 2.9 times the expected value of 3.43, indicating that the bonus was quite effective in attracting new accessions. Of course, the number of accessions in each category is quite small.

We have no data on the personal characteristics of each Air Force Reserve physician accession. Thus, we cannot make any comparisons between the physicians who were bonus-eligible and those who were not eligible. Of course, the number of accessions for the Air Force Reserve was much smaller than in the Army Reserve so that any comparison of personal characteristics would have been less definitive.

**ANNEX 5
TO
APPENDIX A**

USAFR NURSES

USAFR NURSES

INTRODUCTION

This annex discusses U.S. Air Force Reserve (USAFR) nurse accessions prior to the bonus test and during FY90 and FY91 of the test itself. The annex is divided into two major parts: a section covering the baseline data (from FY89) for nurse accessions occurring prior to the onset of the test, and a larger section displaying analysis of the test data for FY90 and FY91, 2 contrasting years.

Throughout this annex we use the term "bonus-eligible" in three different ways. The term refers to

- nurses who meet the bonus criteria during the test years and are offered bonuses;
- nurses accessed in FY89 who would have been eligible for a bonus had that year been considered a test year; and
- nurses, accessed into the USAFR in FY89, FY90, or FY91, who resided in the *nonbonus* region but were otherwise eligible to receive the test bonus.

The meaning of the term is clear within the context of each use. Nevertheless, we provide clarifying comments where they are appropriate. These multiple uses are necessary to aid in our analysis of test results. In this annex, we group Air Force Reserve nurses into the same three categories used elsewhere in the test: nurse-anesthetists, and operating room nurses (together referred to as "critical-skill" nurses), as well as other nurses (all remaining officer nurse specialties in the Air Force).

During the test itself, bonus eligibility was determined not only by specialty but also by place of residence (not location of reserve unit) and military status. Thus, no nurses released from active duty after 28 April 1989 were eligible. In addition, no nurses transferring from the Individual Ready Reserve (IRR) to a USAFR unit were eligible. Finally, no nurses entering the IRR from civilian life were eligible for the bonus.

Accession of other nurses into the USAFR gave us special problems. While the Air Force Reserve recruiting managers have supplied timely and accurate accessions data throughout the entire test, we were together unable to identify bonus-eligible other nurses throughout the base year of FY89 and unable to quantify the accessions of bonus-eligible other nurses in the nonbonus region in any of the 3 years analyzed. We do know the quantity of other nurses from Minnesota and Georgia who joined USAFR units during the test years, and we know the percentage of those qualified nurses who accepted the bonus offered. These limitations do not seriously impair our analysis.

An individual in the USAFR who is training to be a nurse-anesthetist is carried in the other nurse category until certification is received. Nurses in critical specialties may join USAFR units up to age 47; in one case, a waiver was obtained to recruit a 51-year-old nurse. No specific recruiting goals for nurses exist in this Reserve Component.

The Air Force had 184 recruiters in the nonbonus region who recruit not just nurses but all health care specialties other than physicians. 72 recruiters operated in the bonus region. Since all these recruiters access all health care specialties except physicians, we cannot make meaningful comparisons of recruiter productivity based on nurse accessions alone. Nevertheless, it is of some interest to calculate total nurse accessions-per-recruiter and critical-skill accessions-per-recruiter.

ACCESSIONS PRIOR TO THE BONUS PERIOD

Table A-5-1 shows the FY89 accessions by specialty. Although the bonus test officially began on 1 August 1989, we treat all of FY89 as a nonbonus period. The accession of only four bonused other nurses and no bonused critical-skill nurses occurred during August and September 1989. We believe their applications were already being processed when the test began.

ACCESSIONS DURING THE BONUS PERIOD

Table A-5-2 shows the FY90 bonus-eligible accessions by specialty, along with the fact that 41 of the 42 bonus-eligible, critical-skill nurses in the bonus region accepted the bonus. Table A-5-3 contains comparable information for FY91, the test year in which any major impact of Operation Desert Shield might become visible.

TABLE A-5-1

FY89 USAFR NURSE ACCESSIONS
(With recruiter assignments)

Specified groups	Nonbonus region	Bonus region
Bonus-eligible accessions ^a		
Nurse-anesthetist	0	0
Operating room nurse	1	3
Other nurse	Unknown	Unknown
Nonbonus-eligible accessions		
Nurse-anesthetist	} 2	} 3
Operating room nurse	Unknown	Unknown
Other nurse		
Total accessions		
Nurse-anesthetist	} 3	} 6
Operating room nurse	193 ^b	120 ^b
Other nurse		
Total	196	126
Recruiters		
Number of recruiters	184	72
Distribution of recruiters (percent)	72	28
[Percentage of nurse population served by recruiters]	[60]	[40]
Total accessions-per-recruiter	1.07	1.75
Critical-skill accessions-per-recruiter	.02	.08

Note: This table includes information on the accession of four nurses who actually received bonuses during August and September 1989. As noted in the text, however, that information is masked in this table since all of FY89 is considered to be a nontest year.

^a "Bonus-eligible" refers to nurses who would have been eligible for a bonus, had FY89 been considered a test year and had the residency requirements been extended throughout the country.

^b These other nurse accessions are distributed between the large bonus and nonbonus regions that together apply to critical-skill nurses. These other nurse figures are included in this table only to aid in our observations on recruiter productivity.

TABLE A-5-2

FY90 USAFR NURSE ACCESSIONS
(With recruiter assignments)

Specified groups	Nonbonus region	Bonus region
Bonus-eligible, critical-skill accessions ^a		
Nurse-anesthetist	3	16
[Bonus accepts]	-	[15]
Operating room nurse	7	26
[Bonus accepts]	-	[26]
Total	10	42
[Bonus accepts]	-	[41]
Nonbonus-eligible, critical-skill accessions		
Nurse-anesthetist	4	6
Operating room nurse	5	4
Total	9	10
Other nurse accessions		
Total other nurse accessions	190 ^b	118 ^b
[Bonus accepts]	-	[23] ^c
Recruiters		
Number of recruiters	184	72
Distribution of recruiters (percent)	72	28
[Percentage of nurse population served by recruiters]	[60]	[40]
Total accessions-per-recruiter	1.13	2.36
Critical-skill accessions-per-recruiter	.10	0.72

^a "Bonus-eligible" refers both to nurses who meet all eligibility criteria and to those who would have been eligible, had there been no residency restrictions among the bonus qualifications.

^b These data reflect the accessions of other nurses from the two large national regions (bonus and nonbonus) associated with critical-skill nurses. These numbers are included here only to aid in our observations on recruiter productivity.

^c Bonus-qualified residents of Georgia and Minnesota only.

TABLE A-5-3

FY91 USAFR NURSE ACCESSIONS
(With recruiter assignments)

Specified groups	Nonbonus region	Bonus region
Bonus-eligible, critical-skill accessions ^a		
Nurse-anesthetist	4	4
[Bonus accepts]	-	[2]
Operating room nurse	5	12
[Bonus accepts]	-	[11]
Total	9	16
[Bonus accepts]	-	[13]
Nonbonus-eligible, critical-skill accessions		
Nurse-anesthetist	1	1
Operating room nurse	11	7
Total	12	8
Other nurse accessions		
Total other nurse accessions	139 ^b	68 ^b
[Bonus accepts]	-	[6] ^c
Recruiters		
Number of recruiters	184	72
Distribution of recruiters (percent)	72	28
[Percentage of nurse population served by recruiters]	[60]	[40]
Total accessions-per-recruiter	0.87	1.28
Critical-skill accessions-per-recruiter	0.11	0.33

^a "Bonus-eligible" refers both to nurses who meet all eligibility criteria and to those who would have been eligible, had there been no residency restrictions among the bonus qualifications.

^b These data reflect the accessions of other nurses from the two large national regions (bonus and nonbonus) associated with critical-skill nurses. These numbers are included here only to aid in our review of recruiter productivity.

^c Bonus-qualified residents of Georgia and Minnesota only.

The bonus was very attractive, particularly in the other nurse category. There are cases where nurses attempted to qualify by moving their places of residence to Georgia or Minnesota. Many units in the bonus region filled their billets and exhausted their overstrength authorizations during the test, thereby limiting accessions. Recruiting managers indicated that they would have preferred to see the bonus offered in the other areas of the country, many of which have unit vacancies. This condition is especially true for the Air Force Reserve because several of their major medical evacuation units are on the two coasts, neither of which is included in the bonus area.

Table A-5-4 shows the pattern of accessions by quarter for bonused critical-skill nurses, bonused other nurses, and nurses who were not bonused — either because they were ineligible, lived in nonbonus regions, or declined the bonus. Our purpose is to see whether there is any difference in the accession patterns caused by the bonus and to assess the impact of Operation Desert Shield.

ANALYSIS

First, we analyze the impact of the bonus on the critical specialties of nurse-anesthetist and operating room nurse. One possibility is to use the FY89 accessions as a basis for projecting FY90. However, there were only four critical-skill, bonus-eligible nurse accessions nationally in FY89. Any projections based on so few accessions would have very large errors of estimate.

We will use accessions in the nonbonus region during FY90 to project the accessions that would have occurred in the bonus region during FY90 if there had been no bonus. Since the nurse recruiters do not recruit nurses only, we have used the target population of nurses for projecting nurse accessions in the absence of the bonus. The expected number of accessions in the bonus region would have been 6.7 ($10 \times 40 \div 60$) nurses in the two critical specialties. This is based on the number of accessions in the then nonbonus area and the relative size of the national nurse populations. The actual accessions in the bonus region of 42 were more than 6 times the expected value of 6.7, indicating that the bonus was extremely effective in attracting new accessions. Note that the results are even more dramatic if we use number of recruiters instead of nurse populations.

Of the 190 other nurse accessions during FY90 in the three nonbonus regions, we estimate that about 95 would have been bonus-eligible (using the fact that of the

TABLE A-5-4

USAFR NURSE ACCESSIONS, BY CALENDAR QUARTER, FY89 THROUGH FY91

Nurse groups and years	Quarters				Total
	1	2	3	4	
Bonus					
Critical skill					
FY89	0	0	0	0	0
FY90	2	5	6	28	41
FY91	← 10 →		3	0	13
Bonus					
Other nurse					
FY89	0	0	0	4	4
FY90	1	1	7	14	23
FY91	← 1 →		1	4	6
No bonus					
FY89	66	79	73	100	318
FY90	95	68	65	87	315
FY91	← 111 →		49	73	233

nurse-anesthetist and operating room nurse groups combined there were 10 bonus-eligible and 9 nonbonus-eligible in those three regions, or approximately 50 percent).

Using national nurse populations as a basis, our estimate of total bonus-eligible accessions of other nurses is $95/.6 = 158$. The bonus was offered in only Minnesota and Georgia, which contained 4.1 percent of the nurse population; so the expected number of accessions in those two states, had there been no bonus, was 6.5. The actual number of bonused other nurse accessions was 23, or 3.5 times as many.

Comparing the quarterly pattern of nurse accessions in Table A-5-4, we see a fairly even distribution of the nonbonused nurses with some decline in FY91. The bonused nurses were particularly likely to have joined during the fourth quarter of

FY90, probably because there was some uncertainty as to whether the bonus test would continue. We note that the drop in bonused nurses during FY91 is more pronounced than for nonbonused nurses. It is quite likely that the first-year impact of any new program such as a bonus is substantially greater because it depletes any existing pool of candidates motivated by the new program. In later years, the accessions motivated by the bonus are more likely to be newly qualified entrants to the pool.

As in the case of USAFR physician accessions, there is no evidence of a sharp decrease in accessions during the fourth quarter of FY90 due to Operation Desert Shield. Accessions in FY91 of critical-skill nurses stay high until the third quarter. This suggests that Operation Desert Shield had a modest impact on nurse accessions.

**ANNEX 6
TO
APPENDIX A**

USNR PHYSICIANS

USNR PHYSICIANS

INTRODUCTION

The tables below (except for the special case Table A-6-5) concern U.S. Naval Reserve (USNR) physician accessions in the three critical skill categories (anesthesiologist, orthopedic surgeon, and general surgeon) who were offered bonuses or who would have been eligible for the bonus if it had been offered. To be eligible, the physician could not have had prior military service in the active or reserve forces unless discharged prior to 28 April 1989. Additional eligibility requirements for any Navy physician accessions are that they should not be over age 40 and (usually) not graduates of foreign medical schools. As can be inferred from the large numbers of accessions listed in Tables A-6-4 and A-6-5, the overwhelming majority of USNR accessions involve former Active Duty physicians ineligible for the bonus. This practice reflects one traditional pattern of Naval Reserve recruiting over the years.

No recruiter data are shown in the tables because no recruiters are assigned specifically to recruit doctors. The national target population of physicians is split about 60/40 between the control cell and the experimental cell of the test.

ACCESSIONS PRIOR TO THE BONUS PERIOD

The number of bonus-eligible, critical-skill physician accessions for FY89 is shown in Table A-6-1. Although the bonus test began in August 1989, we treat all of FY89 as prebonus because there were no bonus accessions in the USNR during August or September 1989.

TABLE A-6-1

FY89 USNR PHYSICIAN ACCESSIONS, BY REGION
(Bonus-eligible, critical skills only)

Regions	Anesthesiologist	Orthopedic surgeon	General surgeon	Total
Northeast	14	4	15	33
Southeast ^a	8	5	5	18
Northcentral ^a	4	2	2	8
Southcentral	3	2	6	11
West	8	4	12	24
Total	37	17	40	94
Nonbonus region	25	10	33	68
Bonus region	12	7	7	26

^a Together, these recruiting regions comprise the bonus region during the test.

ACCESSIONS DURING THE BONUS PERIOD

The number of direct commission (not prior service) critical-skill physician accessions for FY90 and FY91 are shown in Tables A-6-2 and A-6-3, respectively. In the Southeast and Northcentral regions where the bonus was offered, we show the number of physicians accepting the bonus on the line following the total number of accessions. Two bonus accessions accepted the bonus for only 1 year, whereas the rest accepted it for all of the 3-year maximum allowed.

Naval Reserve recruiting goals are "global" rather than "granular." The Navy does not establish recruiting goals either for medical specialty or for the recruiting source (former Active Duty or direct-commission). The Navy traditionally would prefer to fill its USNR vacancies with former active forces personnel because such individuals have preferable kinds of experience; they are also more likely to stay in the Navy for a longer time. Because most USNR physicians are recruited from Active Duty, the critical-skill physicians who are bonus-eligible are a small percentage of the total accessions shown in Table A-6-5.

TABLE A-6-2

FY90 USNR PHYSICIAN ACCESSIONS, BY REGION
(Bonus-eligible critical skills only)

Regions	Anesthesiologist	Orthopedic surgeon	General surgeon	Total
Northeast	12	1	9	22
Southeast ^a	2	3	3	8
[Bonus]	[1]	[2]	[2]	[5]
Northcentral ^a	3	0	8	11
[Bonus]	[0]	[0]	[4]	[4]
Southcentral	3	3	3	9
West	2	3	4	9
Total	22	10	27	59
Nonbonus region	17	7	16	40
Bonus region	5	3	11	19

^a Together, these recruiting regions comprise the bonus region during the test.

The Naval Reserve exceeded its physicians recruiting goal during both FY89 and FY90 in anticipation of the activation of two new fleet hospitals. This was possible principally because the USNR was below prescribed officer strength levels in other specialties. In December 1990, an official announcement canceled plans for the fleet hospitals and caused a decrease in recruiting goals.

ANALYSIS

Table A-6-4 shows that the accessions of critical-skill physicians dropped dramatically beginning in the third quarter of FY90, just before Operation Desert Shield deployments began. It appears that there was some anticipation among recruiters that the national goals would be decreased, though the official cancellation of the two fleet hospitals did not occur until December. Table A-6-5 shows the dramatic reduction over 3 years in annual recruiting goals for all USNR physicians.

In the nonbonus region, the FY89 accessions of 68 dropped to 40 in FY90, a decrease of 41 percent; in the bonus regions, the FY89 accessions of 26 dropped to 19 in FY90, a decrease of 27 percent. Thus, some evidence indicates that the bonus was

TABLE A-6-3

FY91 USNR PHYSICIAN ACCESSIONS BY REGION
(Bonus-eligible critical skills only)

Regions	Anesthesiologist	Orthopedic surgeon	General surgeon	Total
Northeast	1	0	0	1
Southeast ^a	1	0	0	1
[Bonus]	[0]	[0]	[0]	[0]
Northcentral ^a	1	0	0	1
[Bonus]	[1]	[0]	[0]	[1]
Southcentral	0	0	0	0
West	0	0	0	0
Total	3	0	0	3
Nonbonus region	1	0	0	1
Bonus region	2	0	0	2

^a Together, these recruiting regions comprise the bonus region during the test.

TABLE A-6-4

USNR PHYSICIAN ACCESSIONS, BY QUARTER, FOR THREE FISCAL YEARS
(Bonus-eligible critical skills only)

Fiscal year	Quarter				Total
	1	2	3	4	
1989	27	18	30	19	94
1990	23	21	9	5	59
1991	0	0	2	1	3

effective, but it is difficult to assess this quantitatively because of the decrease in the recruiting goals. Analysis is made even more difficult by virtue of the fact that the Navy continues to prefer to fill USNR vacancies with former active forces personnel. As a result, any decrease in recruiting goals is felt more dramatically among USNR

TABLE A-6-5

**USNR PHYSICIAN ACCESSIONS, ALL SPECIALTIES, FOR THREE FISCAL YEARS
(Direct-commission and former Active Duty)**

Fiscal year	Goal	Attained
1989	411	662
1990	391	447
1991	84	76

candidates without prior military service — the very population from which bonus-qualified physicians come.

**ANNEX 7
TO
APPENDIX A**

USNR NURSES

USNR NURSES

INTRODUCTION

The data in the tables pertain to bonus-eligible accessions in the categories of nurse-anesthetist, operating room nurse, and other nurse. To be bonus-eligible the nurse could not have had prior military service in the active or reserve forces unless discharged prior to 28 April 1989.

The tables contain no recruiter data because no recruiters are assigned specifically to recruit nurses. The national target population of nurses is split about 60/40 between the test's control cell and its experimental cell.

ACCESSIONS PRIOR TO THE BONUS PERIOD

Table A-7-1 shows the number of bonus-eligible nurse accessions for FY89. We consider FY89 to be a base year and not a test year.

ACCESSIONS DURING THE BONUS PERIOD

Tables A-7-2 and A-7-3 show bonus-eligible nurse accessions for FY90 and FY91, respectively. In the Southeast and Northcentral Regions, where the bonus was offered, we show the number of nurses accepting the bonus on the line following the total number of accessions.

ANALYSIS

We evaluate the impact of the bonus in the USNR by looking at FY90 only. This is because the recruiting goals for nurses were dramatically reduced in FY91 (as they were for physicians) and because of the marked impact of Operation Desert Shield.

Accessions of critical-skill nurses (nurse-anesthetists and operating room nurses) in the nonbonus region increased from 36 in FY89 to 44 in FY90; in the bonus region, they increased from 26 in FY89 to 97 in FY90. In the absence of a bonus, we project that in the bonus regions there would have been about 32 accessions in FY90;

TABLE A-7-1

FY89 USNR NURSE ACCESSIONS, BY REGION
(Bonus-eligible)

Regions	Nurse-anesthetist	Operating room nurse	Other nurse	Total
Northeast	7	8	108	123
Southeast ^a	7	8	93	108
Northcentral ^a	6	5	62	73
Southcentral	7	1	73	81
West	5	8	123	136
Total	32	30	459	521
Nonbonus region	19	17	304	340
Bonus region	13	13	155	181

Note: "Bonus-eligible" refers to nurses who would have been qualified to receive the test bonus had there been no residency restrictions and had FY89 been considered a test year.

^a Together these recruiting regions comprise the bonus region during the test.

so that the actual total of 97 is three times as large. The bonus had a dramatic effect. Bonuses were accepted by all but 10 of those 97 accessions.

The number of other nurse accessions declined from FY89 to FY90 by a comparable percentage in both the bonus regions and the nonbonus regions. We want to compare the actual other nurse accessions for the bonus states of Georgia and Minnesota during FY90 to the expected number who would have been accessed without a bonus. Georgia and Minnesota comprise about 4.1 percent of the national population. There were 372 other nurse accessions during the bonus year of FY90 in the other states. If the bonus in those two states had no effect, we would expect about 16 $[(372 \div .959) - 372]$ other nurse accessions in Georgia and Minnesota. The actual accessions of 30 are almost double that expected number.

Table A-7-4 shows the quarterly distribution of USNR nurse accessions over the period FY89 – FY91.

TABLE A-7-2

**FY90 USNR NURSE ACCESSIONS, BY REGION
(Bonus-eligible)**

Regions	Nurse-anesthetist	Operating room nurse	Other nurse	Total
Northeast	9	11	121	141
Southeast ^a	10	39	75	124
[Bonus]	[9]	[36]	[16] ^b	[61]
Northcentral ^a	19	29	59	107
[Bonus]	[17]	[25]	[14] ^c	[56]
Southcentral	4	7	56	67
West	3	10	91	104
Total	45	96	402	543
Nonbonus region	16	28	273	317
Bonus region	29	68	129	226

Note: "Bonus-eligible" refers both to nurses who are truly eligible for the test bonus and to those who would have been eligible had there been no residency restrictions on eligibility.

^a Together, these recruiting regions comprise the bonus region during the test.

^b Other nurses from Georgia only.

^c Other nurses from Minnesota only.

TABLE A-7-3
FY91 USNR NURSE ACCESSIONS, BY REGION
(Bonus-eligible)

Regions	Nurse-anesthetist	Operating room nurse	Other nurse	Total
Northeast	3	1	17	21
Southeast ^a	1	3	15	19
[Bonus]	[1]	[3]	[5] ^b	[9]
Northcentral ^a	0	2	9	11
[Bonus]	[0]	[2]	[3] ^c	[5]
Southcentral	0	0	0	0
West	0	0	13	13
Total	4	6	54	64
Nonbonus region	3	1	17	21
Bonus region	1	5	37	43

Note: "Bonus-eligible" refers both to nurses who are truly eligible for the test bonus and to those who would have been eligible had there been no residency restrictions on eligibility.

^a Together, these recruiting regions comprise the bonus region during the test.

^b Other nurses from Georgia only.

^c Other nurses from Minnesota only.

TABLE A-7-4
USNR NURSE ACCESSIONS, BY QUARTER, FOR THREE FISCAL YEARS
(Bonus-eligible)

Fiscal year	Quarter				Total
	1	2	3	4	
1989	101	146	122	152	521
1990	106	140	166	131	543
1991	35	8	6	15	64

Note: "Bonus-eligible" refers both to nurses who are truly eligible for the test bonus and to those who would have been eligible had there been no residency restrictions on eligibility.

APPENDIX B

**BONUS TEST MAPS: EXPERIMENTAL CELL
AND CONTROL CELL**

by Reserve Component

BONUS TEST MAPS: EXPERIMENTAL CELL AND CONTROL CELL

by Reserve Component

These maps portray the national experimental cell and control cell for the bonus test for each of the five participating Reserve Components.¹ Two U.S. Army Reserve (USAR) maps are shown, one for physicians and one for nurses, because the USAR recruits physicians and nurses by using two separate, dissimilar recruiting organizations with boundaries that do not coincide.

The maps in this appendix are those used by the Military Services during the test itself. They are taken from Logistics Management Institute *Technical Report for the Fiscal Year 1989 of the Selected Reserve Recruitment Bonus Test Physicians and Nurses*, Bethesda, Maryland: Logistics Management Institute, April 1990.

¹ The U.S. Air Force Reserve (USAFR) map on page B-15 shows Pennsylvania, Virginia, and West Virginia as part of the experimental cell. Those states all lie within the control cell for the USAFR. This error was corrected prior to the start of the test.

1

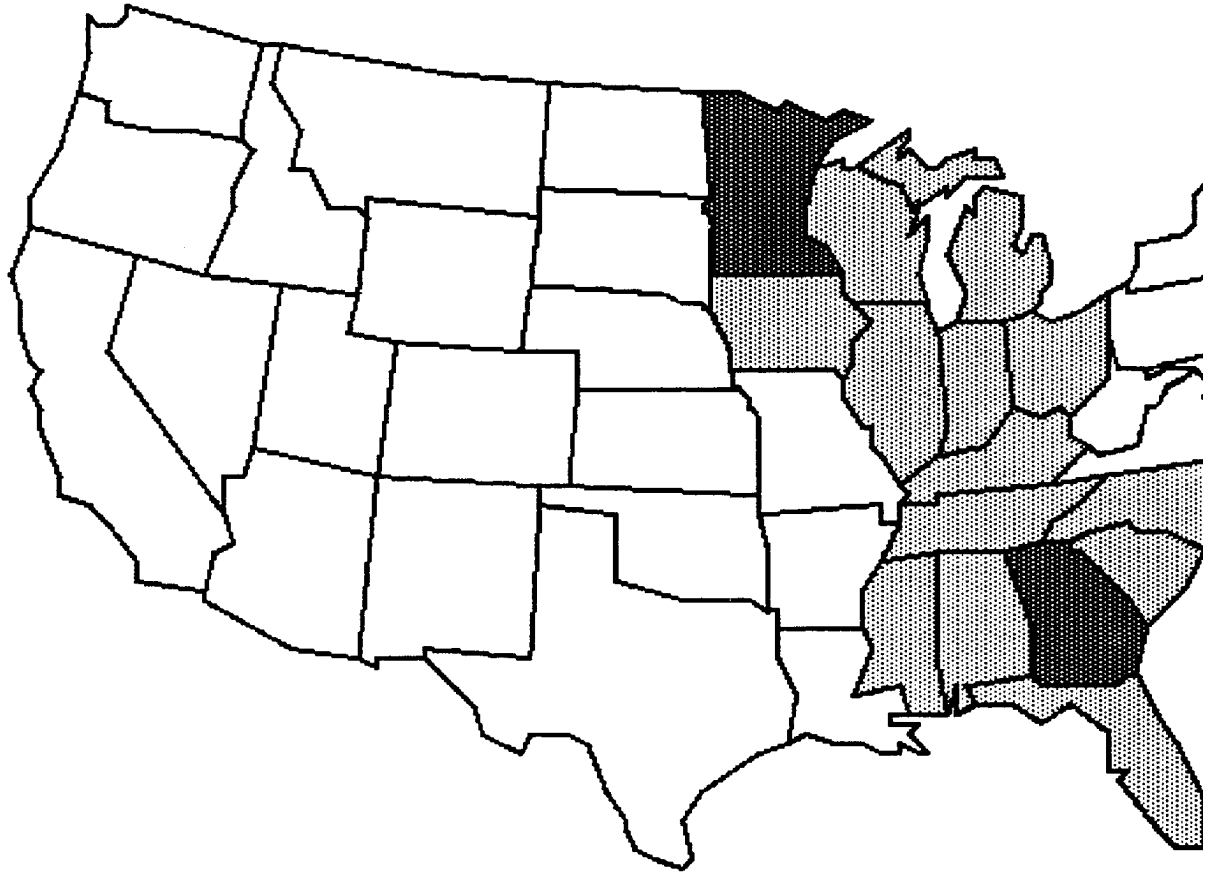
ARMY NATIONAL GUARD



EXPERIMENTAL CELL



CONTROL CELL



Note: Alaska and Hawaii in Control Cell. Puerto Rico and U.S. Virgin Islands in Experimental Cell (except for Other Nurses).



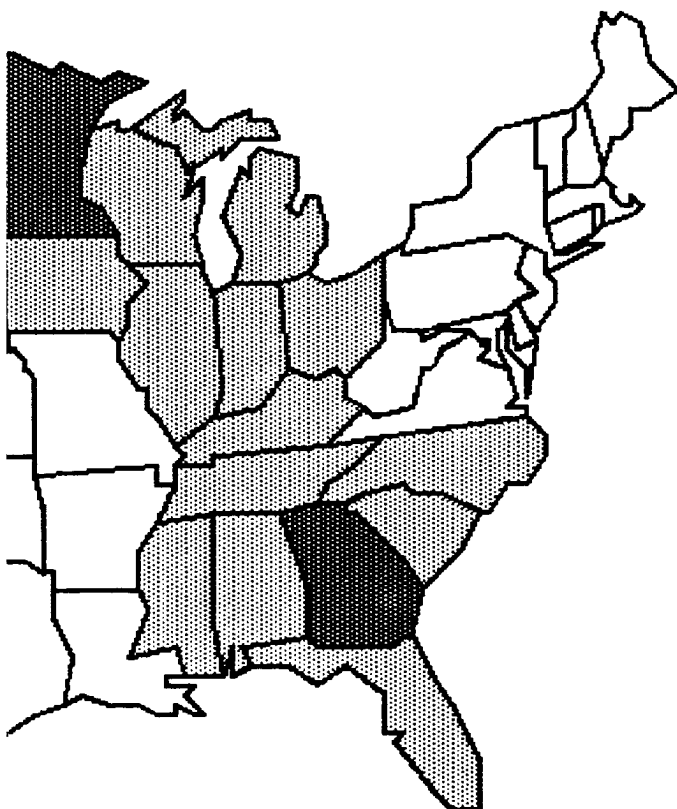
Experimental Cell for Other Nurses. The remaining 48 states are the control cell for Other Nurses). MN and GA are in the experimental cell for all other specialties.

**Reserve Components
Health Care Professionals
Bonus Test**

2

NAL GUARD

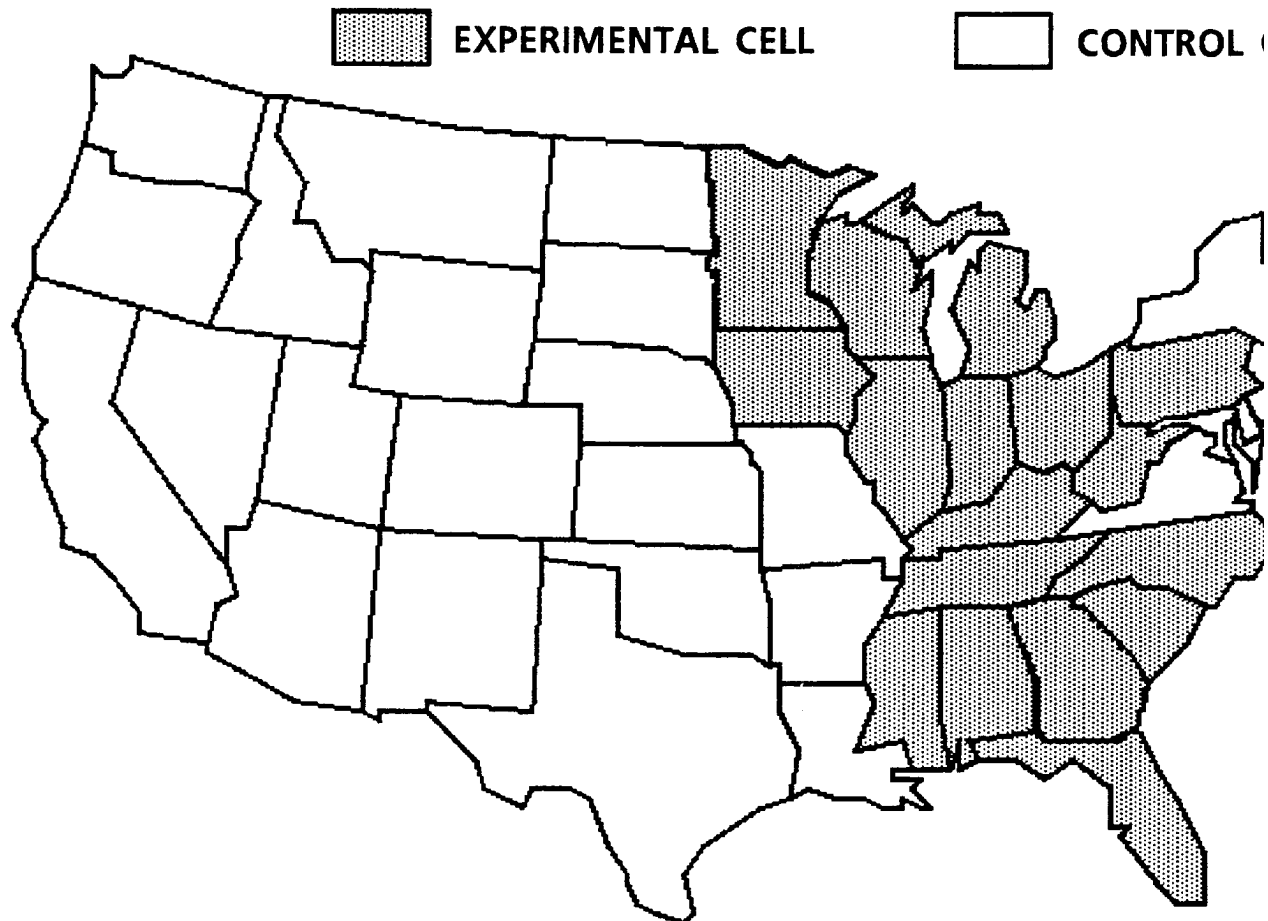
CELL  CONTROL CELL



Islands in Experimental Cell (except for Other Nurses).

Experimental Cell for Other Nurses (all remaining 48 states are the control cell for Other Nurses). MN and GA are also in experimental cell for all other specialties.

ARMY RESERVE PHYSICIANS



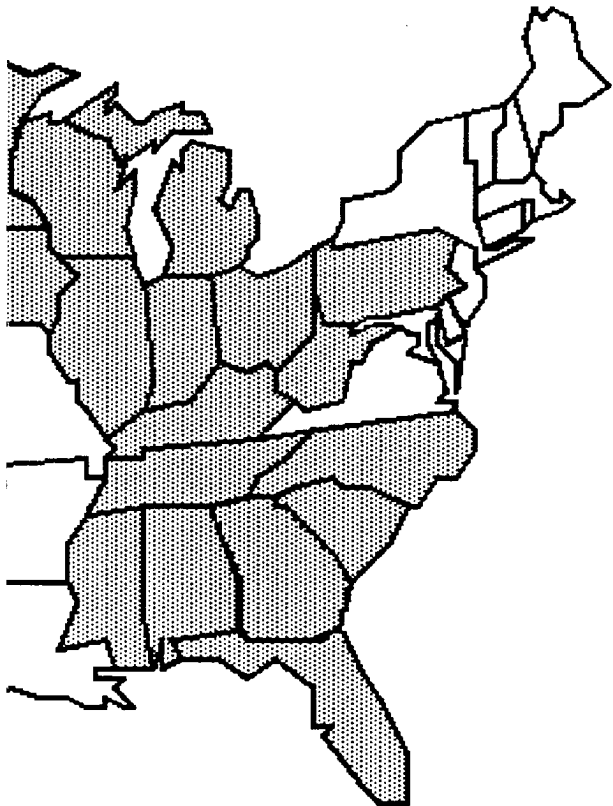
Note: Alaska and Hawaii in Control Cell. Puerto Rico and U.S. Virgin Islands in Experimental Cell (except

Reserve Components Health Care Professionals Bonus Test

2

E PHYSICIANS

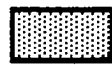
 CONTROL CELL



gin Islands in Experimental Cell (except for Other Nurses).

①

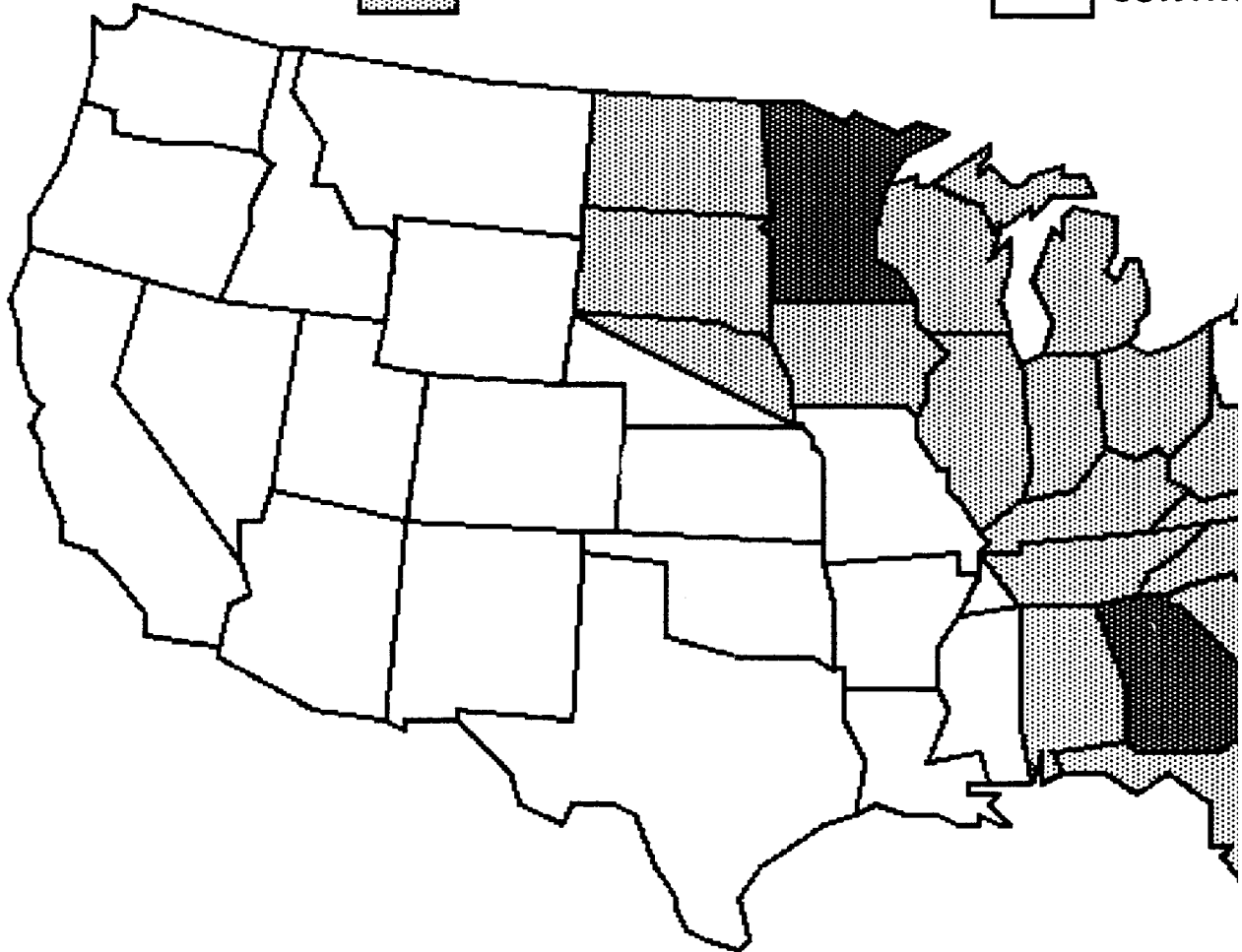
ARMY RESERVE NURSES



EXPERIMENTAL CELL

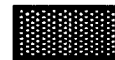


CONTROL CELL



Note: Alaska and Hawaii in Control Cell. Puerto Rico and U.S. Virgin Islands in Experimental Cell (except for O

1989
Reserve Components
Health Care Professionals
Bonus Test

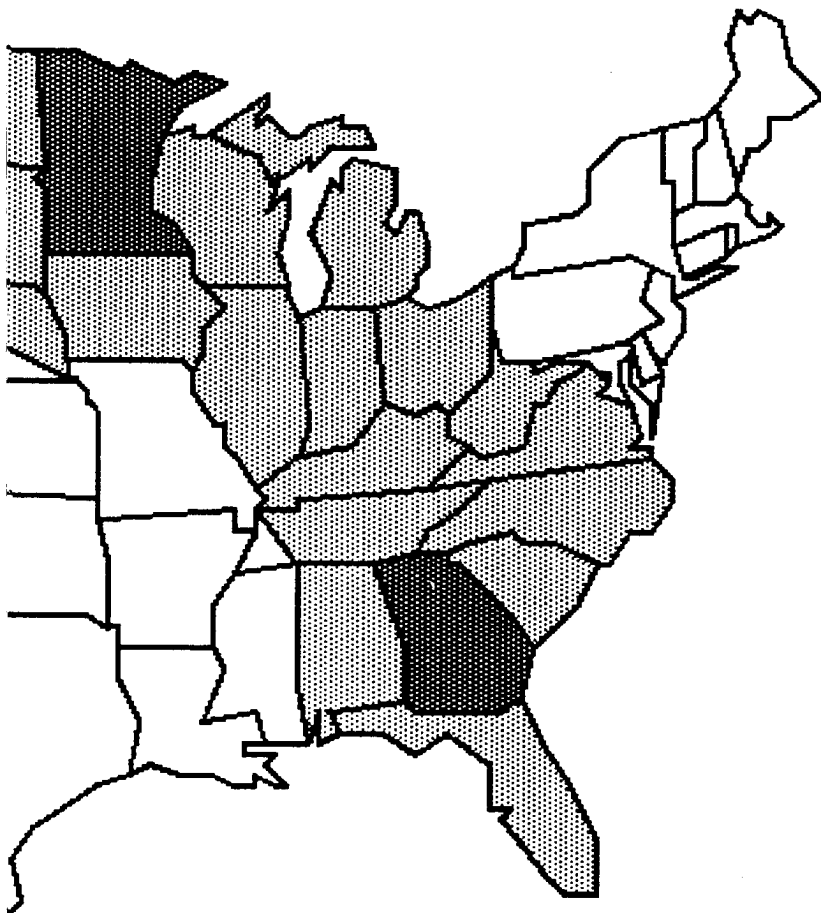


Experimental Cell for Other Nu
48 states are the control cell fo
MN and GA are also in experin
other specialties.

2

IVE NURSES

CELL  CONTROL CELL



Islands in Experimental Cell (except for Other Nurses).

 Experimental Cell for Other Nurses (all remaining 48 states are the control cell for Other Nurses).
MN and GA are also in experimental cell for all other specialties.

1

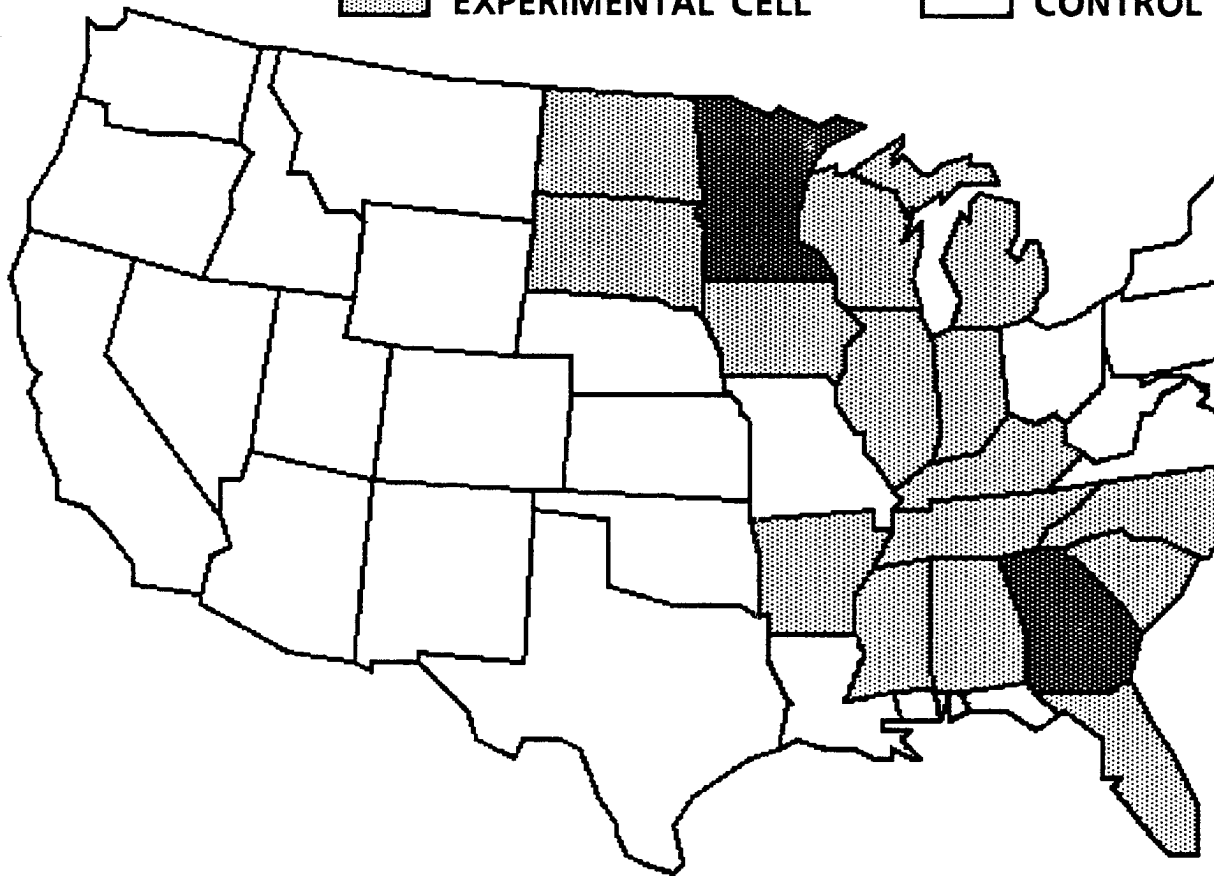
NAVAL RESERVE



EXPERIMENTAL CELL



CONTROL



Note: Alaska and Hawaii in Control Cell. Puerto Rico and U.S. Virgin Islands in Experimental Cell (except for other specialties).



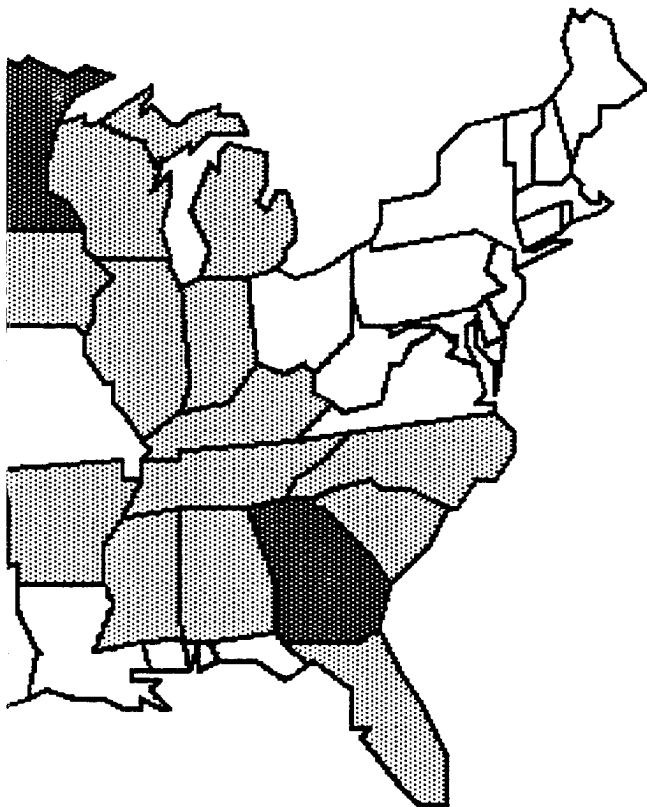
Experimental Cell for Other Nurses
48 states are the control cell for C
MN and GA are also in experimen
other specialties.

**Reserve Components
Health Care Professionals
Bonus Test**

2

RESERVE

CELL  CONTROL CELL



Islands in Experimental Cell (except for Other Nurses).

Experimental Cell for Other Nurses (all remaining

states are the control cell for Other Nurses).

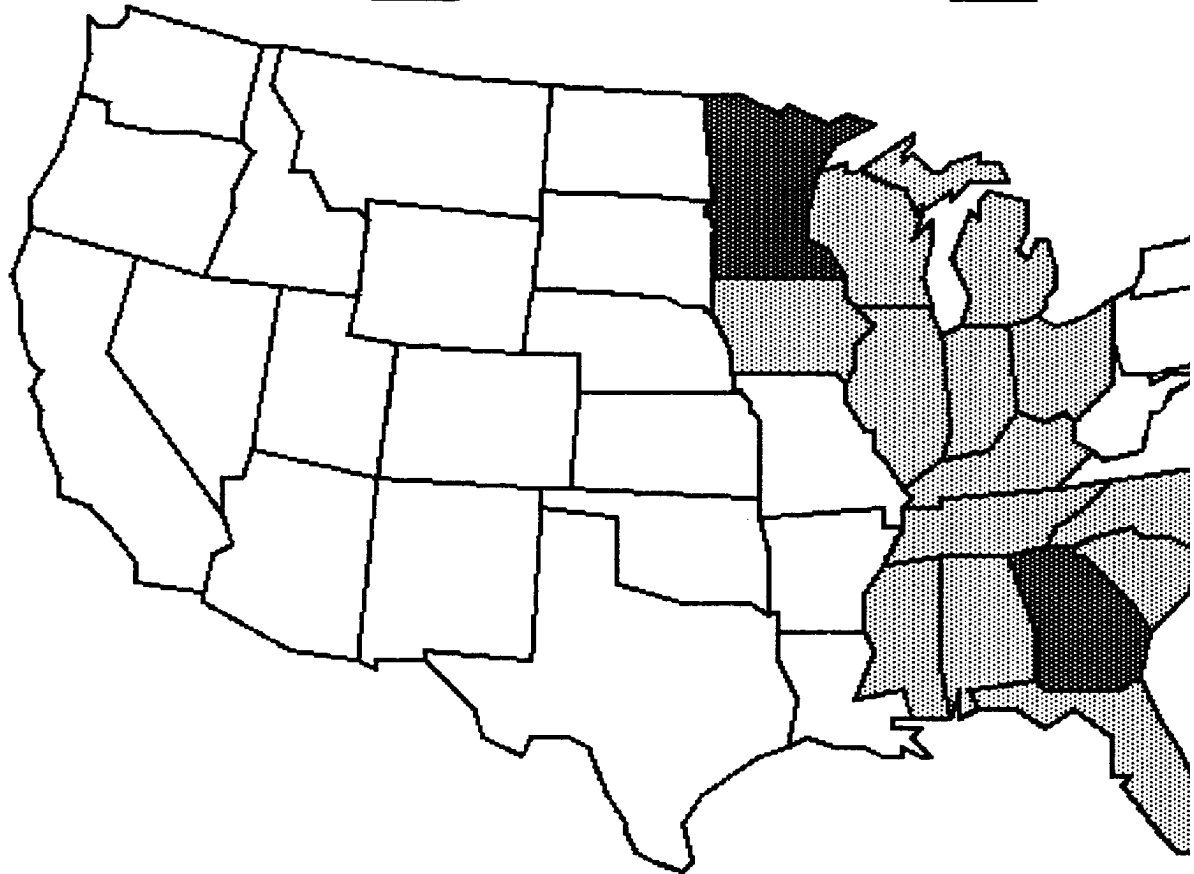
IN and GA are also in experimental cell for all

other specialties.

AIR NATIONAL GUARD



EXPERIMENTAL CELL

**CONTRC**

Note: Alaska and Hawaii in Control Cell. Puerto Rico and U.S. Virgin Islands in Experimental Cell (except



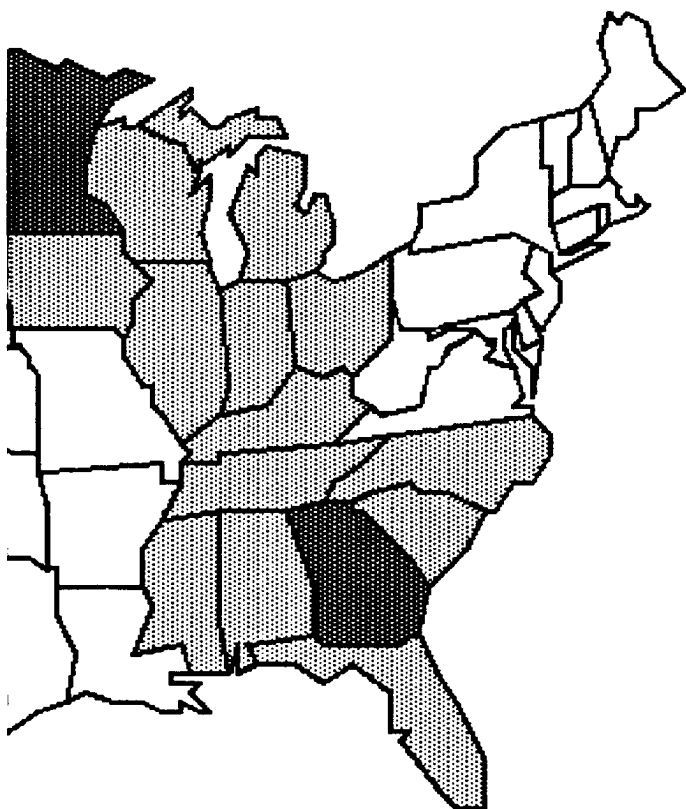
Experimental Cell for Other Nurses (the remaining 48 states are the control group for Other Nurses). MN and GA are the experimental cell for all other states.

1989 Reserve Components Health Care Professionals Bonus Test

2

AL GUARD

CELL CONTROL CELL



In Islands in Experimental Cell (except for Other Nurses).

Experimental Cell for Other Nurses (all remaining 48 states are the control cell for Other Nurses). MN and GA are also in experimental cell for all other specialties.

1

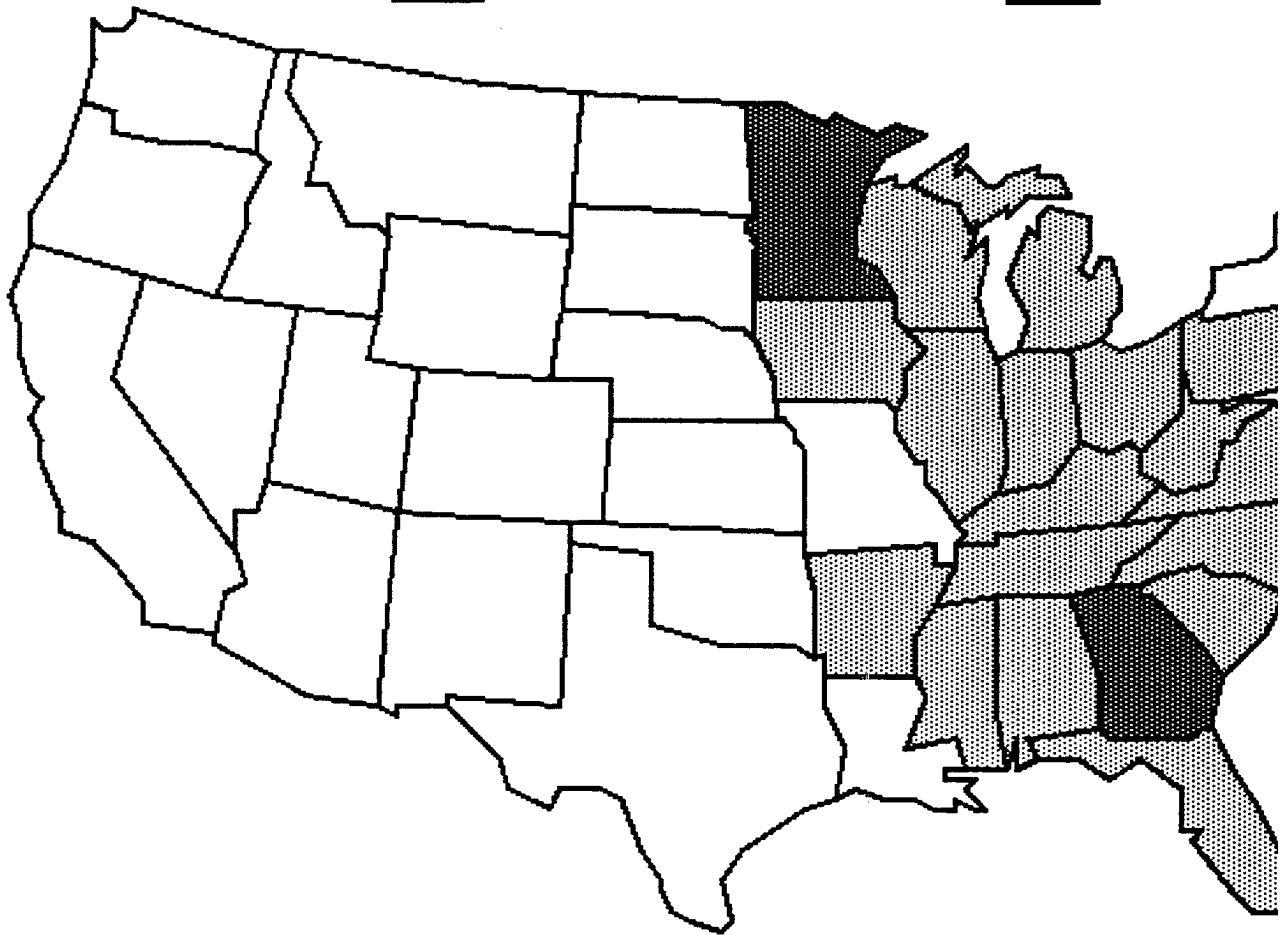
AIR FORCE RESERVE



EXPERIMENTAL CELL



CONTROL CELL



Note: Alaska and Hawaii in Control Cell. Puerto Rico and U.S. Virgin Islands in Experimental Cell (except

1989

**Reserve Components
Health Care Professionals
Bonus Test**

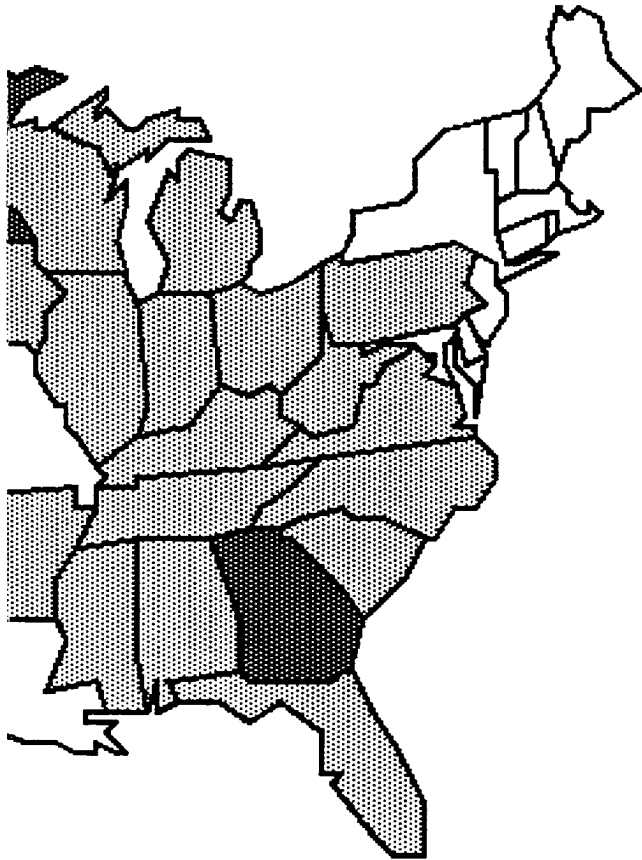


**Experimental Cell
(all remaining 48
for Other Nurses,
experimental cel**

2

RESERVE

 CONTROL



lands in Experimental Cell (except for Other Nurses).

 **Experimental Cell for Other Nurses**
(all remaining 48 states are the control cell
for Other Nurses). MN and GA are also in
experimental cell for all other specialties.

APPENDIX C

ASSIGNMENT OF REGIONS TO EXPERIMENTAL CELLS - PHYSICIANS

ASSIGNMENT OF REGIONS TO EXPERIMENTAL CELLS - PHYSICIANS

The table in this appendix is the one used to display to the Military Services the computations leading to the construction of the bonus test's experimental cells for physicians. Our objective was to construct the cells so that the experimental cell and control cell were most nearly in balance when four major variables (called covariates in the table) were considered.

A combination of the nation's five major recruiting regions was required to produce the two test cells. In the table, the most attractive - best balanced - combination (the one used for the test) is shown as the top horizontal row above the double line. The other nine combinations we considered are included in descending order of attractiveness, beginning at the top of the table.

The impact of four additional variables was observed and considered informally during test cell construction, but these variables were not included in the numerical computations. The consideration of these four is shown in columns 7 through 10 of the table.

The table is taken from Logistics Management Institute *Technical Report for the Fiscal Year 1989 of the Selected Reserve Recruitment Bonus Test Physicians and Nurses*, Bethesda, Maryland: Logistics Management Institute, April 1990.

①

TABLE C-1

ASSIGNMENT OF REGIONS TO EXPERIMENTAL CELLS - CRITICAL SPECIALTY PI

Avg. abs % error ^a	Cell ^b	Balanced Covariates ^c				% Natl Physich	AFCrA/ Recrt ⁱ	NavAcc/ Recrt ^j	A
		Access/ Recrt ^d	Phy < 45/ Recrt ^e	Stff < 45/ Recrt ^f	Income ^g (\$000)				
4.24	1	8.9	721	43.5	151	60.1	4.9	9.0	
	2	8.8	831	43.9	151	39.9	4.3	8.6	
12.46	1	8.0	813	41.4	151	59.6	4.6	8.5	
	2	10.0	696	46.5	152	40.5	5.0	9.4	
12.92	1	9.4	683	42.1	151	55.2	4.9	9.2	
	2	8.1	887	46.3	151	44.8	4.5	8.4	
13.40	1	9.7	797	40.1	153	58.4	5.0	8.6	
	2	7.8	716	48.2	149	41.6	4.0	9.8	
16.05	1	7.4	735	44.7	150	61.3	4.4	8.9	
	2	11.4	807	41.9	154	38.8	5.3	8.9	
16.33	1	10.3	756	38.3	153	53.5	5.1	8.8	
	2	7.2	767	50.0	149	46.5	4.4	9.0	
18.99	1	9.8	787	49.3	152	65.6	4.7	9.1	
	2	7.2	717	33.8	150	34.4	4.7	8.5	
19.02	1	8.3	801	50.5	150	66.8	4.0	9.0	
	2	9.8	693	31.8	154	33.3	5.3	8.7	
23.49	1	9.2	679	31.5	153	48.0	5.1	8.7	
	2	8.5	858	57.9	150	52.0	3.7	9.1	
28.69	1	7.9	834	51.7	150	71.7	4.3	8.8	
	2	10.7	623	28.6	154	28.4	5.7	8.9	

Note: Physician data is for 31 December 1986. The definition of staff physician is physicians in hospitals not including residents used in balancing is that for the Army Reserve. It contributes about half the doctors and two-thirds of the nurses. It is the only component and nurses, and therefore recruiting effort can be estimated more precisely. Physician recruiters are concerned with *all* doctor accessions of the balancing variables are based on all accessions and some on the critical specialties of interest.

- ^a Average absolute percentage error resulting from the regional combination indicated, listing in ascending order of error.
- ^b Cell 1 is the control, comprised of three regions; Cell 2 is the experimental, comprised of two regions.
- ^c The variables used for balancing physician cells.
- ^d Physician accessions per recruiter in 1987.
- ^e Critical specialty (anesthesiologist, orthopedic surgeon, general surgeon) physicians under age 45 per recruiter.
- ^f Critical specialty hospital staff physicians under age 45 per recruiter.
- ^g Critical specialty physician annual income, in thousands of dollars.
- ^h Critical specialty physicians under age 45 in each cell as a percent of the national total of critical specialty physicians under age 45.
- ⁱ Air Force Reserve critical physician accessions per recruiter.
- ^j Navy physician accessions per recruiter.
- ^k Army National Guard physicians accessions per recruiter.

2

C-1
CELLS - CRITICAL SPECIALTY PHYSICIANS

% Natl Physich	AFCrA/ Recrti	NavAcc/ Recrtj	ArGAcc/ Recrtk	Regions				
				NE	SE	NC	SC	W
60.1	4.9	9.0	5.0	•			•	•
39.9	4.3	8.6	4.5		•	•		
59.6	4.6	8.5	4.6		•	•		•
40.5	5.0	9.4	5.1	•			•	
55.2	4.9	9.2	4.9	•	•		•	
44.8	4.5	8.4	4.6			•		•
58.4	5.0	8.6	4.9			•	•	•
41.6	4.0	9.8	4.7	•	•			
61.3	4.4	8.9	4.7	•	•			•
38.8	5.3	8.9	4.9			•	•	
53.5	5.1	8.8	4.8		•	•	•	
46.5	4.4	9.0	4.7	•				•
65.6	4.7	9.1	4.9	•		•	•	
34.4	4.7	8.5	4.6		•			•
66.8	4.0	9.0	4.6	•	•	•		
33.3	5.3	8.7	5.1				•	•
48.0	5.1	8.7	4.9		•		•	•
52.0	3.7	9.1	4.6	•		•		
71.7	4.3	8.8	4.5	•		•		•
28.4	5.7	8.9	5.0		•		•	

physicians in hospitals not including residents or clinical fellows. The recruiter strength
two-thirds of the nurses. It is the only component with separate recruiters for physicians
recruiters are concerned with *all* doctor accessions, not just critical specialties. Thus, some
interest.
d, listing in ascending order of error.
of two regions.

under age 45 per recruiter.

of critical specialty physicians under age 45.

APPENDIX D

**ASSIGNMENT OF REGIONS TO EXPERIMENTAL
CELLS - NURSES**

ASSIGNMENT OF REGIONS TO EXPERIMENTAL CELLS - NURSES

The table in this appendix is the one used to display to the Military Services the computations leading to the construction of the bonus test's experimental cells for nurses. Our objective was to construct the cells so that the experimental cell and control cell were most nearly in balance when four major variables (called covariates in the table) were considered.

A combination of the nation's five major recruiting regions was required to produce the two test cells. In the table, the most attractive - best balanced - combination (the one used for the test) is shown as the top horizontal row above the double line. The other nine combinations we considered are included in descending order of attractiveness, beginning at the top of the table.

The impact of five additional variables was observed and considered informally during test cell construction, but they were not included in the numerical computations. The consideration of these five is shown in columns 7 through 11 of the table.

The table is taken from Logistics Management Institute *Technical Report for the Fiscal Year 1989 of the Selected Reserve Recruitment Bonus Test Physicians and Nurses*, Bethesda, Maryland: Logistics Management Institute, April 1990.

①

TABLE D-1

ASSIGNMENT OF REGIONS TO EXPERIMENTAL CELLS - NURSES

Avg. abs % error ^a	Cell ^b	Balanced covariates ^c				% Natl Nurses ^h	Nurse/ Rec 87 ⁱ	AFCrA/ Recr ^j	NavAcc/ Recr ^k
		Unempl rated ^d	Access/ Rec 87 ^e	Nurses/ Rec 89 ^f	Income ^g				
8.02	1	6.1	13.0	15,830	20,566	59.7	24,625	9.4	8.6
	2	6.3	22.6	16,195	18,973	40.3	35,249	12.7	8.0
8.84	1	6.0	19.7	15,077	19,587	59.9	24,042	13.3	8.6
	2	6.5	21.3	17,534	20,393	40.1	37,260	8.0	8.1
12.66	1	6.3	23.4	17,148	19,543	56.6	38,194	9.7	8.4
	2	6.1	17.9	14,659	20,448	43.3	20,821	12.0	8.3
13.93	1	5.4	19.7	15,206	20,155	62.4	28,108	10.7	9.5
	2	7.4	21.0	17,442	19,521	37.6	27,907	9.7	6.8
18.46	1	7.0	22.0	18,164	19,939	53.8	31,968	8.4	7.6
	2	5.1	18.6	14,011	19,869	46.2	24,519	15.0	9.5
18.67	1	6.3	18.2	15,160	20,301	67.3	23,823	11.1	7.9
	2	6.0	27.6	17,969	19,266	32.7	44,106	9.8	9.2
19.52	1	6.9	22.8	17,070	18,946	54.0	30,856	11.8	7.5
	2	5.2	17.7	14,858	21,258	46.0	25,313	9.3	9.6
21.27	1	5.7	18.1	15,273	20,839	69.9	27,331	9.3	8.7
	2	7.0	25.5	17,886	18,309	30.1	29,811	13.0	7.9
21.35	1	5.7	18.8	14,671	19,922	70.1	26,709	13.1	8.7
	2	7.2	24.1	20,186	19,885	29.9	31,720	8.2	7.9
24.15	1	6.7	25.6	18,600	19,145	46.3	34,410	9.9	8.3
	2	5.6	16.9	14,241	20,842	53.7	24,167	11.7	8.5

^a Average absolute percentage error resulting from regional combination indicated, listing in ascending order of error.

^b Cell 1 is the control, comprised of three regions; cell 2 is the experimental, comprised of two regions.

^c The variables used for balancing nurse cell Regions.

^d Civilian unemployment rate.

^e Nurse accessions per recruiter in 1987.

^f Nurse population per recruiter in 1989.

^g Civilian annual income, in dollars.

^h Nurses in this cell as a percent of the national total (the two cell percentages total 100 percent).

ⁱ Nurse population per recruiter in 1987.

^j Air Force Reserve critical nurse accessions per recruiter.

^k Navy nurse accessions per recruiter.

^l Army National Guard nurse accessions per recruiter.

2

D-1

PERIMENTAL CELLS – NURSES

Nurse/ Rec 87 ⁱ	AFCrA/ Recrt ^j	NavAcc/ Recrt ^k	ArGAcc/ Recrt ^l	Regions				
				NE	SE	NC	SC	W
24,625	9.4	8.6	5.3	•			•	•
35,249	12.7	8.0	3.6		•	•		
24,042	13.3	8.6	4.8	•	•		•	
37,260	8.0	8.1	4.2			•		•
38,194	9.7	8.4	4.2		•	•		•
20,821	12.0	8.3	5.2	•			•	
28,108	10.7	9.5	5.1	•	•			•
27,907	9.7	6.8	3.8			•	•	
31,968	8.4	7.6	4.3			•	•	•
24,519	15.0	9.5	5.0	•	•			
23,823	11.1	7.9	4.5	•		•	•	
44,106	9.8	9.2	4.7		•			•
30,856	11.8	7.5	3.9		•	•	•	
25,313	9.3	9.6	5.7	•				•
27,331	9.3	8.7	4.8	•		•		•
29,811	13.0	7.9	4.3		•		•	
26,709	13.1	8.7	4.4	•	•	•		
31,720	8.2	7.9	4.9				•	•
34,410	9.9	8.3	4.6		•		•	•
24,167	11.7	8.5	4.6	•		•		

g in ascending order of error.
two regions.

percent).

APPENDIX F

**TECHNICAL ANALYSIS PAPER
ON
BONUS COSTING OPTIONS**

TECHNICAL ANALYSIS PAPER ON BONUS COSTING OPTIONS

This paper was completed and provided to the staff of the Office of the Assistant Secretary of Defense (Health Affairs) in September 1992. It is useful as an example of specific application of the recommendations embodied in this report.

SEVERAL COSTING OPTIONS
FOR A
TENTATIVE BONUS PROGRAM
FOR RECRUITING
SELECTED SPECIALTIES OF HEALTH CARE PROFESSIONALS
FOR THE
SELECTED RESERVE

A TECHNICAL ANALYSIS PAPER

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23 September 1992

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SEVERAL COSTING OPTIONS FOR A TENTATIVE BONUS PROGRAM FOR RECRUITING SELECTED SPECIALTIES OF HEALTH CARE PROFESSIONALS FOR THE SELECTED RESERVE

A Technical Analysis Paper

INTRODUCTION

This paper presents several sets of cost computations flowing from the conduct of the Selected Reserve Health Care Professionals Bonus Test, LMI Project HA101. While our final report of this national test is not yet complete, we have for some time known and discussed the recommendations that are among the test outcomes.

Specifically, our final report will formally recommend that the Secretary of Defense:

- Cause the test now being conducted to end
- Determine the DoD need for health care professionals in critical specialties
- Determine if bonuses are appropriate as an additional recruiting tool to help satisfy the Services' need
- Implement a national Selected Reserve (SELRES) bonus policy, if bonuses are called for
- Determine the bonus scale based on the intensity of need and the recruiting climate.

Staff members of the Office of the Assistant Secretary of Defense (Health Affairs) are now preparing a legislative initiative whose provisions, if and when enacted into law, would authorize the Secretary of Defense to award SELRES

affiliation bonuses to men and women in the health care specialties that are the subject of the current bonus test:¹

- Physicians
 - ▶ Anesthesiologists
 - ▶ Orthopedic Surgeons
 - ▶ General Surgeons
- Nurses
 - ▶ Nurse-anesthetists
 - ▶ Operating Room Nurses
 - ▶ Other Nurses (all other officer nursing specialties).

This paper provides a background of cost computations supporting provisions of the legislative package now being developed.

The data that form the basis for our cost analysis represent conditions selected from the period FY90 through FY92, and we will assume that some of these conditions will also prevail at the beginning of FY94, when the proposed national bonus policy is to take effect. We also assume a DoD-wide annual attrition rate from the SELRES of 20 percent for both physicians and nurses, based on our May 1990 study of Reserve Component nurse accession and retention rates (LMI Project RA802). Finally, although the five Reserve Components differ in their ability to recruit and retain these specialists, we recognize the need to establish a single bonus policy applicable to all Military Services; accordingly, our computations and suggestions are component-blind.

¹It is likely that the Military Services' needs for specific specialties will change from time to time. The estimates and suggestions contained here can be used as support for a more broad policy of awarding bonuses to specialties that are not part of the current test.

NEED OR SHORTFALL

Computation of the need for these specialists begins with the differences between the total of specialty-specific spaces (or billets) called for in all the appropriate SELRES manning documents minus the current inventory of qualified specialists assigned to those billets. The current picture is shown in Table 1.

TABLE 1
DETERMINATION OF NEED

Computation category	Physicians (three specialties)	Nurse-anesthetists	OR nurses	Other nurses	Total
Billet total	2,137	1,549	1,810	14,723	20,219
Inventory	<u>- 1,815</u>	<u>- 738</u>	<u>- 1,746</u>	<u>- 12,808</u>	<u>- 17,107</u>
Shortfall	322	811	64	1,915	3,112
Annual attrition (20 percent)	363	148	349	2,562	3,421
Total need FY94	685	959	413	4,477	6,533

INELIGIBILITY DUE TO MILITARY SERVICE STATUS

With the need determined, we must analyze the composition of the annual accessions in all these specialties. This is advisable because not all physicians and nurses entering the SELRES in these specialties are bonus-eligible.

Generally, two groups of men and women who otherwise meet all the professional criteria for bonuses are ineligible due to their military service status:

- Those members leaving the active forces to join the SELRES. All the Military Services have long sought to avoid offering any kind of enticement to separate from active duty in order to join the reserve forces.
- Those members of the Individual Ready Reserve (IRR) moving directly to SELRES affiliation. While the IRR is a common supply source of SELRES doctors and nurses, the intent of the originating legislation was the testing of a recruiting tool to produce more deployable assets among health care professionals in critically needed specialties. IRR members already are deployable assets and may be called forward to serve in emergencies.

RECRUITING ENVIRONMENT

In addition to the severity of need, the recruiting climate (favorable versus unfavorable, as exemplified by the conditions existing during FY90 and FY91, respectively) is of great importance. Because it is impossible now to predict the recruiting environment during FY94 and later years, we have chosen a set of conditions midway between the curves shown in Figures 1 through 3 for our computations.²

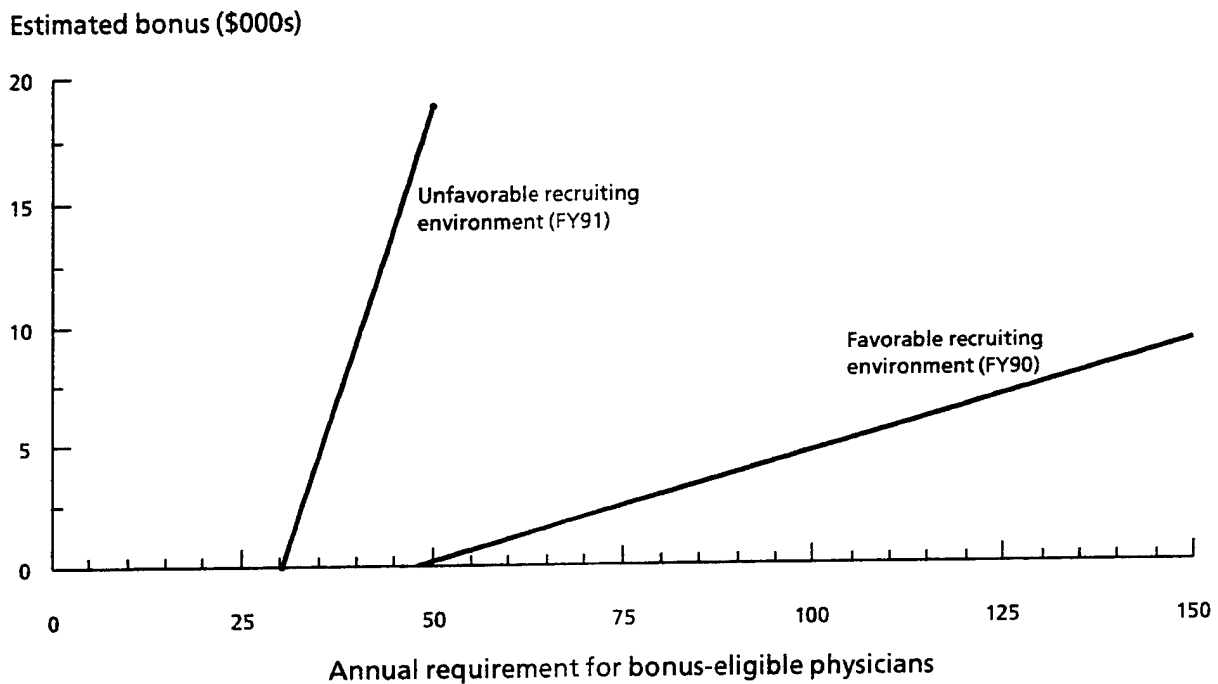


FIG. 1. BONUS COMPUTATION CURVES: CRITICAL-SKILL PHYSICIANS

The rate of flow of health care professionals from active service and the IRR to the SELRES is also affected by the recruiting environment. Even though these ineligible physicians and nurses join the SELRES for reasons other than the affiliation bonus, fewer will join in times of unfavorable recruiting environment. The numbers of these accessions used in the following computations are reduced 20 percent from test data to reflect a somewhat less favorable recruiting environment.

²No similar figure now exists for Other Nurses, but the computations use interpolations among data points produced for Other Nurses during the bonus test.

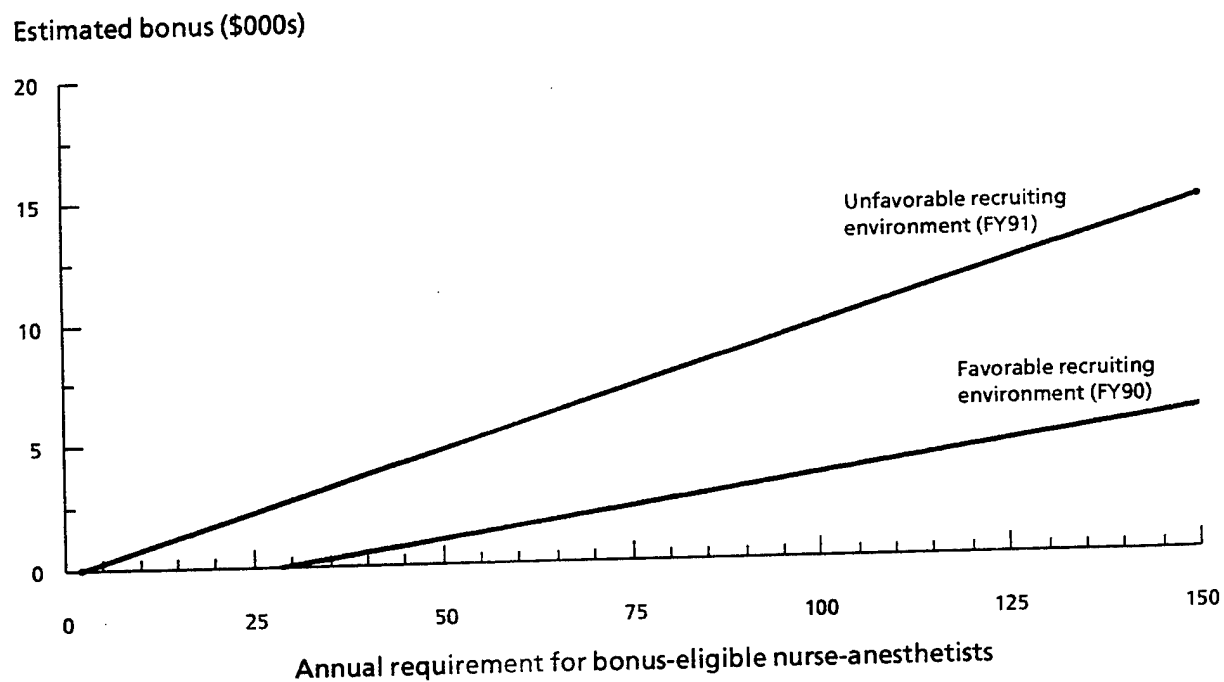


FIG. 2. BONUS COMPUTATION CURVES: NURSE-ANESTHETISTS

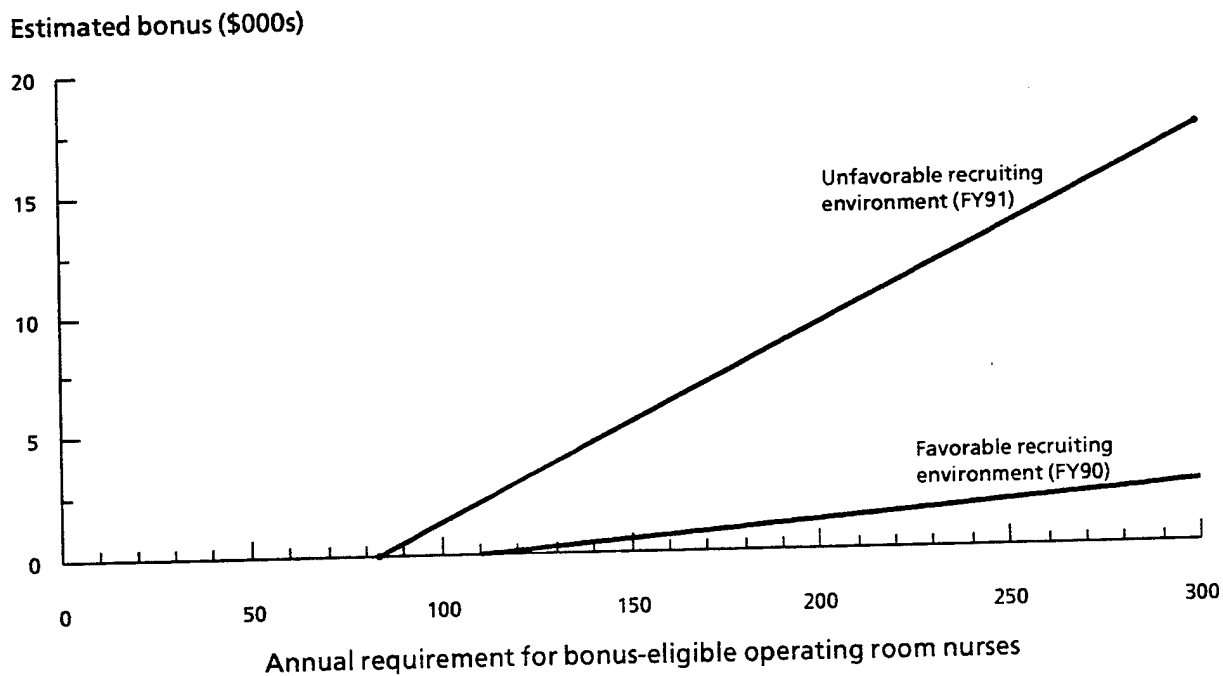


FIG. 3. BONUS COMPUTATION CURVES: OPERATING ROOM NURSES

MEETING THE NEED: RAPIDLY OR SLOWLY?

A last major consideration of importance relates to the “velocity” of closing the gap between the desired numbers of specialists and the inventory of those available. If the shortfalls are to be erased in a single year, bonus levels must be high. If the need can be satisfied over a longer period, bonuses may be smaller. Our bonus computations are presented in two scenarios: a 1-year closing of the gap and a 3-year closing of the same shortfall.

BONUS COMPUTATIONS

Meeting the Need in 1 Year (Intermediate Recruiting Environment)

These computations are based on information to be found in the earlier section on need or shortfall. We also use a degraded set of test-based accessions data for specialists ineligible for the bonus because of their military service status.

TABLE 2

BONUS AND COST COMPUTATIONS, 1-YEAR CLOSURE

Computation category	Physicians (three specialties)	Nurse-anesthetists	OR nurses	Other nurses	Total
Total need FY94 (includes attrition replacement)	685	959	413	4,477	6,533
Less ineligible accessions	- 112	- 16	- 43	- 410	- 582
Bonus accession need	573	943	370	4,066	5,952
Bonus required per accession	\$29,400	\$25,000	\$3,500	\$4,000	
Bonus costs (\$M)	16.8	23.6	1.3	16.3	58.0

Note: Over 3 years of annual bonuses, the total bonus cost for this option is \$173.9 million.

Meeting the Need Over 3 Years (Intermediate Recruiting Environment)

This course of action accomplishes two things: it replaces attrition losses annually and it satisfies one-third of the initial (FY94) need or shortfall in each of 3 years. Because the annual target for accessions is smaller, the bonus levels can be reduced.

TABLE 3
BONUS AND COST COMPUTATIONS, 3-YEAR CLOSURE

Computation category	Physicians (three specialties)	Nurse-anesthetists	OR nurses	Other nurses	Total
Total need FY94 (attrition plus one-third of inventory shortfall)	470	418	371	3,200	4,459
Less ineligible accessions	- 112	- 16	- 43	- 410	- 582
Bonus accession need	358	402	327	2,790	3,877
Bonus required per accession	\$16,000	\$10,000	\$2,800	\$1,800	
Bonus costs (\$M)	5.7	4.0	0.9	5.0	15.7

Note: Over 3 years of annual bonuses, the total bonus cost for this option is \$141.3 million. Annual costs are: year 1 \$15.7M; year 2 \$31.4M; year 3 \$47.1M; year 4 \$31.4; year 5 \$15.7M.

GRANDFATHERING

There are a number of critical-skill physicians and nurses, already serving in the SELRES, who have not received any affiliation bonus. Throughout the conduct of the bonus test the desirability of "grandfathering" these people – granting them appropriate bonuses on the basis of equity – has been suggested by recruiting managers and by military health care professionals. The effect of this action would be seen in increased retention, say its advocates.

Our purpose here is to display the costs involved, should any such grandfathering provisions appear in the law. Two sets of bonus levels should be considered:

- The bonus levels of the bonus test
- The bonus levels of the proposed new bonus policy.

In addition, any grandfathering provisions of the new policy could award bonuses to already-serving specialists only once (as a surrogate for a single year's bonus) or for three consecutive years (the obligation bonus period chosen by almost all bonus recipients during the test).

Table 4 displays the costs involved in these options.

TABLE 4
GRANDFATHERING COSTS

Bonus levels	Physicians		Nurse-Anesthetists		OR Nurses		Other Nurses		Total (\$M)
	Number	Cost	Number	Cost	Number	Cost	Number	Cost	
Test-level bonuses									
\$10K	1,173	11.7	355	3.6					} 78.8a
\$6K					930	5.6	9,659	58.0	
Bonuses from "3-year-solution"									
\$16K	1,173	18.8							} 42.4b
\$10K			355	3.6					
\$2.8K					930	2.6			
\$1.8K							9,659	17.4	

^a If this annual equity bonus is repeated for a total of 3 years, the cost is \$236.4M.

^b If this annual equity bonus is repeated for a total of 3 years, the cost is \$127.2M.

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