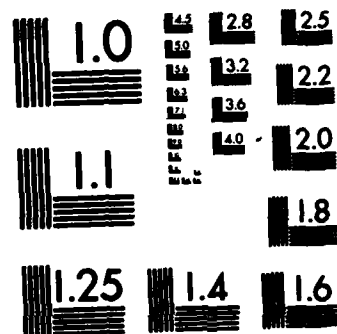


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A SENSITIVITY ANALYSIS OF ENTRY AGE NORMAL
MILITARY RETIREMENT COSTS

by

Donald F. Smith, Jr.

September 1983

Thesis Advisors:

K. J. Euske
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A Sensitivity Analysis of Entry Age Normal
Military Retirement Costs

by

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Submitted in partial fulfillment of the
requirements for the degree of

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from the

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ABSTRACT

The purpose of the study is to develop an interactive computer model of the entry age normal cost models and perform a sensitivity analysis of both the individual and aggregate entry age normal actuarial cost models under differing economic, managerial and legal assumptions. In addition to the above, a set of simple estimating equations under a probable set of managerial and legal assumptions is provided.

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I. BACKGROUND AND INTRODUCTION

A. BACKGROUND

The present non-disability retirement for uniformed members of the Department of Defense is an unfunded, defined benefit plan. The uniformed employee is (subject to approval from the Service Secretary) eligible for voluntary retirement after completion of 20 years active duty service. At the time of retirement, the service member receives an annual pension of 2.5 percent of final base pay for each year of active duty, up to a maximum of 75 percent of base pay for 30 years or more service. Uniformed employees entering military service after 8 September, 1980, must average their final three years base pay to determine their retirement basis. In addition to this direct monetary pension, the retired service member also receives free medical and dental care, as well as use of military exchanges and commissaries. The current annual cost for nondisability retiree annuitants was \$13.9 billion in fiscal year 1982. (Department of Defense, 1983)

Currently, there is no formal accounting of the military retirement liability as it accrues during a service member's active duty employment. However, in response to Public Law 95-595, the Department of Defense is required to file an annual valuation of the military retirement system. The

Department of Defense Actuary has chosen the entry age normal cost method as the basis of its valuation (Department of Defense, 1983). This annual valuation constitutes neither the formal accrual of retirement liability nor official adoption of the entry age normal method by the military in the event actual accrual of retirement benefits were to be directed by Congress. Waterman (1983), investigated several actuarial methods for evaluating the military retirement liability and concurred in the adoption of the entry age normal method for estimating the cost of retirement benefits. Furthermore, he considered either the individual or aggregate methods of the entry age normal actuarial technique to be acceptable.

Given the academic and professional consensus that entry age normal actuarial methods are most appropriate to the particular needs of the Department of Defense in accounting for retirement costs, an analysis of the sensitivity of both the individual entry age normal and aggregate entry age normal methods to varying economic conditions is appropriate. This study is a sensitivity analysis, using actual historic Department of the Navy information, examining the range of results which occur with entry age normal actuarial calculations when selected input variables are varied to reflect differing economic assumptions. For example, current manpower costs and personnel statistics are combined with projected rates of military salary increases ranging from 2.5 to 7.5 percent to determine the effect of expected future pay

increases upon expected retirement costs. In addition to the sensitivity analysis, estimating equations under a probable set of managerial/legal assumptions are derived through regression analysis of the input/output relationships. Changing values of non-monetary retirement benefits are not addressed in this study.

B. INTRODUCTION TO ENTRY AGE NORMAL

The entry age normal methods of retirement costing are the most frequently used actuarial techniques in both the public and private sectors. The entry age normal technique attempts to levy a constant amount or percentage of regularly earned pay against each year's employment. Differences between actuarial assumptions and actual outcomes can cause gains and losses to the fund, and therefore impact the flat rate assessment. This flat rate assessment, called the normal cost, is adjusted by the value of these minor gains and losses by amortizing them over the remaining working life of the participants. (Dreher, 1967)

The following subsections briefly address both the individual entry age normal and aggregate entry age normal mathematical computational models. Tables (I through VI) of entry age normal input/output variables and equations adopt the same variable assignments as Waterman (1983). An indepth discussion of these variables and equation derivations can be found in that study.

1. Individual Entry Age Normal Calculations

General individual entry age normal calculations use the variables listed in Table I. Variables marked by an asterisk (*) in Table I and Table III are considered to be prime exogenous variables. They are important because of their potential impact upon retirement costs and are used in the sensitivity analysis. The unmarked variables in Table I and Table III are functions of the exogenous variables.

TABLE 1

GENERAL INDIVIDUAL ENTRY AGE NORMAL VARIABLES

<u>Description</u>	<u>Variable</u>
Annual Retired Annuity	A
Actuarial Normal Cost	AC
*Annual Discount Rate	i
Current Year Gains/Losses	F
Current Year Applied Gains/Losses	Fa
Deferred Gains/Losses	Fd
*Life Expectancy at Retirement	L
Number of Contribution Years	n
Annual Normal Cost	NC
Present Value of Retirement Benefits	P
Current Year's Retirement Cost	RC
Remaining Working-Life of Employee	RWL

The general individual entry age normal variables listed in Table I are applied to the following equations in Table II, which are used in all entry age computations.

(Waterman, 1983)

TABLE II
GENERAL INDIVIDUAL ENTRY AGE NORMAL EQUATIONS

$$P = A \times \frac{1}{1 - \frac{(1+i)^L}{i}}$$

$$NC = P \times \frac{i}{(1-i)^N - 1}$$

$$F = NC - AC$$

$$Fa = (F - Fd) \times \frac{i}{1 - \frac{1}{(1-i)^{RWL}}}$$

$$RC = NC + Fa$$

In addition to the above general form age entry normal variables and equations, the following military retirement specific variables shown in Table II, are required input/outputs in the valuation of military retirement.

TABLE III
MILITARY INDIVIDUAL ENTRY AGE NORMAL VARIABLES

<u>Description</u>	<u>Variable</u>
Final Monthly Base Pay	BP
Current Base Pay at Retirement Grade	PBc
Paygrade of Retiree	G
Number of Entrants for a Given Year	I
*Length of Service at Retirement	LOS
Expected Number of Retirees	N
*Probability of an Entrant Retiring at a Given Paygrade, G	Pr(G)
*Probability of an Entrant Reaching Retirement, R	Pr(R)
*Retirement Percentage Rate	RR
*Retirement Percentage Ceiling	RT
*Estimated Rate of Salary Increase	S
Current Total Retirement Cost	TRC

The specific variables listed in Table III (and several of the general variables in Table I) apply to the

specific military retirement calculations in Table IV.

(Waterman, 1983)

TABLE IV

MILITARY INDIVIDUAL ENTRY AGE NORMAL EQUATIONS

$BP = BPC$ compounded at rate S over time RWL

$A(G, LOS) = \min RR \times LOS, RT \times BP \times 12$

$N = I \times Pr(R) \times Pr(G)$

$TRC = RC \times N$

2. Aggregate Entry Age Normal Calculations

Aggregate entry age normal calculations use the following variables listed in Table V. As in the previous section, variables marked by an asterisk (*) are considered to be important exogenous variables and are used in the sensitivity analysis.

TABLE V

AGGREGATE ENTRY AGE NORMAL VARIABLES

<u>Description</u>	<u>Variable</u>
Actuarial Normal Cost	AC
Current Year Gain/Losses	F
Current Year Applied Gains/Losses	Fd
Annual Discount Rate	i
Normal Cost	NC
*Present Value of Future Benefits	PBe
*Present Value of Future Compensation	PCe
Normal Cost Percentage Factor	PF
Total Base Pay for Current Year	TBF
Current Total Retirement Cost	TRC

The aggregate entry age normal variable listed above in Table V are applied to the equations listed below in Table VI.

TABLE VI

AGGREGATE ENTRY AGE NORMAL EQUATIONS

$$PF = \frac{PBe}{PCE}$$

$$NC = PF \times TBP$$

$$F = NC - AC$$

$$Fa = (F + Fd) \times \frac{1}{1 - \frac{1}{(1 + i)^{20}}}$$

$$TRC = NC + Fa$$

II. VALUATION OF ENTRY AGE NORMAL CALCULATIONS UNDER CHANGING ECONOMIC AND MANAGERIAL CRITERIA

A. COMPUTER MODEL

A computer model using the entry age normal variables and equations cited in Chapter I was developed to facilitate the repetitive calculations required for sensitivity analysis. This computer model, named "Entryage", is an interactive computer program written in the BASIC computer programming language. The program is user friendly and once loaded requires minimal computer expertise for operation. All internal program data has been derived from Department of Defense sources and uses 1983 as the "current" year. A printout of Entryage, along with user directions and updating instructions, is found in Appendix A of this study.

Processing was performed on the Naval Postgraduate School's IBM 3033 computer. Entryage output was analyzed by the copyrighted "Minitab" statistical computing system (University of Pennsylvania, 1981). Minitab analysis was also performed on the IBM 3033.

B. INDIVIDUAL ENTRY AGE NORMAL SENSITIVITY ANALYSIS

This section addresses the individual entry age exogenous variable assumptions, baseline value, and sensitivity methodology. Eight exogenous variables are analyzed for input/output relationships.

1. Exogenous Variable Assumptions and Baseline Value

- a. Exogenous Variables

A sensitivity analysis is a study of output variation resulting from changes in the value of input variables. An orderly analysis of a multiple input system must select reasonable initial values for each of the input variables. These input variables are then individually varied over feasible ranges while holding all other inputs constant. When the selected initial values are used for all input variables, the output value of the model is known as the baseline value. The baseline value is the result of multiple decisions regarding initial input variable values. The cumulative effect of minor differences in these input variables may have a major impact upon the baseline value.

Eight exogenous input variables are applicable to individual entry age normal calculations for military retirement and are shown in Table VII. These exogenous variables may be divided into two types: those that are essentially uncontrollable by the Department of Defense (e.g. the government discount rate) and those that are controllable (e.g. the probability that a new service entrant will be retained until retirement eligibility). Table VII lists these exogenous variables as to their controllability vice uncontrollability and the abbreviations used to identify the variables in the simulation.

TABLE VII

EXOGENOUS INDIVIDUAL ENTRY AGE NORMAL VARIABLES

<u>Description</u>	<u>Abbreviation</u>	<u>Type</u>
Annual Discount Rate	DIS%	Uncontrollable
Estimated Rate of Salary Increase	SAL%	Uncontrollable
Length of Service at Retirement	LOSD	Controllable
Length of Service Required to Retire	MLOS	Controllable
Life Expectancy at Retirement	LEXP	Uncontrollable
Entrant Retirement Probability	ERP	Controllable
Percent of Base Pay at Retirement	PAY%	Uncontrollable
Maximum Allowed Percent of Base Pay	MAX%	Uncontrollable

The "controllability" of a variable is dependent upon the managerial level which can influence it. For instance, the annual discount rate (DIS%), is relatively uncontrollable at all levels throughout the government because its value is determined by the external market forces which affect not only the cost of government borrowing but also the cost of private debt. The estimated rate of salary increase (SAL%), is tied to both the projected inflation rate and Congressional perception of military retention. The length of service at retirement (LOSD), and length of service required to retire (MLOS), can be controlled by stretching time-in-service requirements for advancements and by adjusting the current acceptable time-in-service for retirement (currently 20 years), up to the legal maximum of 30 years with no Congressional action. Life expectancy at retirement (LEXP), is a function of multiple environmental effects. The entrant retirement probability is controllable by the military services by adjusting advancement opportunities and reduction-in-force actions. Both the percent of base pay at retirement

(PAY%), and the maximum allowed percent of base pay (MAX%), are legislated by the Congress and therefore though controllable at a higher level, uncontrollable by the Department of Defense.

b. Baseline Configuration

The initial input values selected to establish the baseline are those used by the Defense Actuary in the FY 82 Valuation of Military Pay, with the single exception of the recommended discount rate. (Department of Defense, 1982) The Department of Defense Actuary recommends a rate of 6 percent which is approximately the average yield on long term U.S. securities for the period 1960 through 1978. However, for purposes of this analysis the 6 percent rate was felt to be an excessively conservative figure and would result in the overstatement of current retirement costs. (Note that the lower the discount rate, the larger the value of funds required to meet probable retirement obligations, since the entry age model assumes reinvestment at the discount rate.) After review of recent trends in long term U.S. government securities, a discount rate of 9 percent was selected because the average interest rate has been 9.09 percent for 20 year U.S. government treasury securities for the period 1973 to present (Department of Commerce, 1982). The 9 percent value also compares more favorably with the interest rates promulgated by the Department of the Treasury pursuant to Public Law 92-41. This is the interest rate used by government

estimators when performing cost calculations which require a government cost of money. It is currently (fall 1983), 11.5 percent. This figure is actually a complex average of both government and low risk private securities with 5 year maturities. Since it is a medium term number, the 9 percent long term number was considered a better estimator.

c. Baseline Value

Table VIII lists the input variable values and their resulting total retirement costs (TRC), (in millions of dollars) when calculated by the Entryage model, for both the Selected Baseline and Department of Defense variable configurations. The input values for those variables ending in "%" are the percentages used in computation (e.g. a SAL% of 5.5 percent means a salary increase rate of 5.5 percent was used in computation). Input values ending in "D" are the incremental difference between the Department of Defense Actuary's specific estimates and the amounts used in computation (e.g. an LEXPD of +1 means the actuarially computed life expectancies at retirement were all extended by one (1) year). The incremental difference values for these actuarially computed variables are listed since the model uses each pay-grade's individual actuarial data (e.g. the life expectancy of a retiring 44 year old E8 is 30.24 years vice 33.54 for a 44 year old 05) to provide greater accuracy. The length of service required to retire (MLOS), is shown at its absolute input value and is neither a percentage nor delta.

The manpower figures used in the calculations include only regular Navy (USN), enlisted and officer personnel for the years 1953 through 1982. The calculated TRC includes neither disability nor survivor benefits, which are not retirement costs in the strict sense, but the result of military self-insurance and therefore not included in the individual entry age normal computations.

TABLE VIII
ALTERNATIVE CONFIGURATIONS

<u>Variable</u>	<u>Selected Baseline</u>	<u>DOD Actuary</u>
DIS%	9%	6%
SAL%	5.5%	5.5%
LOSD	0	0
MLOS	20 yrs	20 yrs
LEXP	0	0
ERPD	0	0
PAY%	2.5%	2.5%
MAX%	75%	75%
TRC	\$1,210 M	\$2,470 M

Table VIII may be interpreted as follows for the selected baseline: If one assumes a discount rate of 9 percent, salary growth of 5.5 percent, a minimum of 20 years of active service for retirement with retirement pay equal to 2.5 percent of the retirement basis per year served and a maximum rate of retirement pay not exceeding 75 percent of the basis, and retention and longevity statistics as computed by the Department of Defense Actuary, the amount of money which should be accrued in 1983 to cover year groups 1953 through 1982 regular Navy personnel (excluding disability and survivor benefits) is \$1,210 million. Appendix B

includes yearly breakdowns of Total Retirement Costs for the selected baseline and Department of Defense Actuary assumptions. Appendix C is a detailed display by paygrade by year of both normal costs and total retirement costs for the selected baseline.

2. Sensitivity Methodology

The sensitivity analysis of the individual entryage exogenous variables involved first determining a feasible ranging of the input variable to be investigated. The magnitude of the variable ranging was based upon past values of the variable, possible future economic trends, or changes in managerial and legal decisions. For example, the discount rate (the government borrowing rate) was explored for values of 5 percent to 15 percent. This range encompasses the historical performance of the 1960's (5 percent) and the possible interest rates of a high inflationary period like the early 1980's (15 percent). The variable ranging was then divided into increments and these incremental values were then processed through the Entryage computer model. The increments were chosen on the basis of being small enough to capture likely deviations, but yet large enough to minimize excessive iterations. The resulting output was then graphically analyzed to determine if any predictable relationship appeared to exist between the value of the input variable and the output value. Two types of output were investigated. The first type of output was the annual retirement costs for years

of service entry 1982 (a "close" year) and 1963 (a "far" year) to discern the effect of changes in the input variable upon not only new entrant's retirement costs but also personnel on active duty eligible for retirement.

After graphical analysis, the total retirement cost data was subjected to further review in the "MINITAB" statistical computer model. Using least squares regression, functional relationships between the independent input values and the dependent total retirement costs were explored in the following sequence: linear, logarithmic, and parabolic. A coefficient of determination (R^2), of .95 was established as indicating an acceptable predictive relationship, within the bounds of the input variable range. Using the simulation in this manner produces a set of simplified output relationships. Formal analytical methods could also be used to achieve the same end. In seven out of the eight exogenous variable investigations, a relationship meeting the R^2 criteria was found.

3. Discount Rate Sensitivity

The discount rate (DIS%) was examined over a range of 5 percent through 15 percent in 1 percent increments. Table IX lists the discount rate value (DIS%), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of \$1,120M is the DIS% value of 9 percent.

TABLE IX
DISCOUNT RATE EFFECTS

<u>DIS%</u>	<u>1963</u>	<u>1982</u>	<u>TRC</u>
5%	\$90.2M	\$168 M	\$3,160 M
6	70.4	131	2,470
7	55.3	103	1,990
8	43.6	81.2	1,530
9	34.5	64.4	1,210
10	27.5	51.2	965
11	21.9	41.0	771
12	17.6	32.9	619
13	14.1	26.5	499
14	11.4	21.4	403
15	9.2	17.3	327

Figure 1 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing discount rates. It can be seen that this is an inverse relationship with a more pronounced effect upon close year groups than far year groups. 1963 annual retirement cost varied by \$81M over the selected range, while 1982 annual retirement cost varied by \$151M over the selected range. Both data sets appear to present a smooth curve over the range of discount rates.

Figure 1

1963(A) and 1982(B) Year Group Retirement Costs

vs

Discount Rate

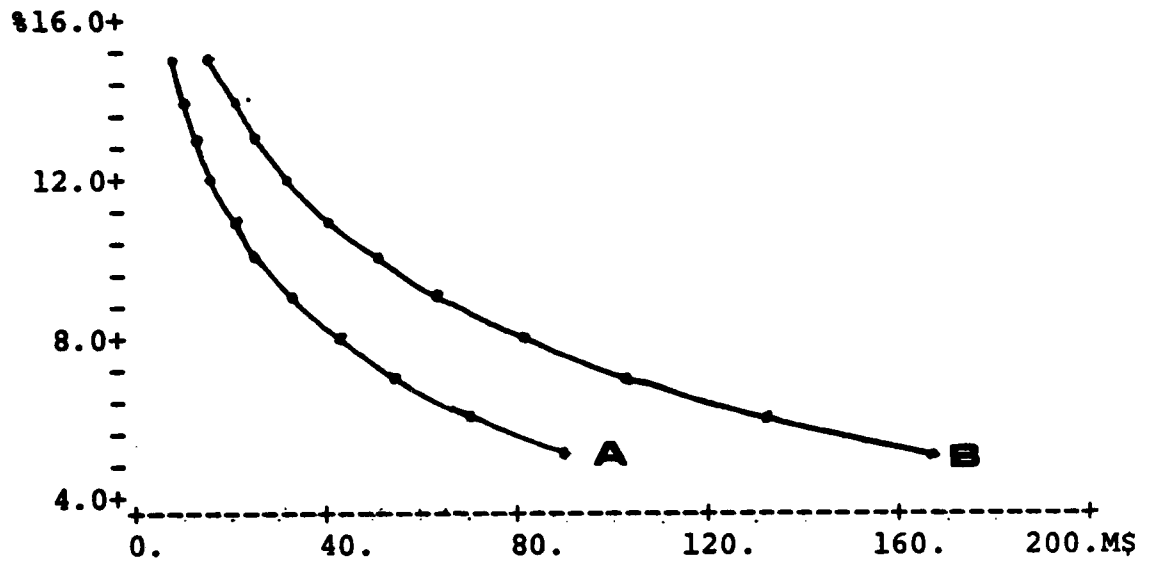


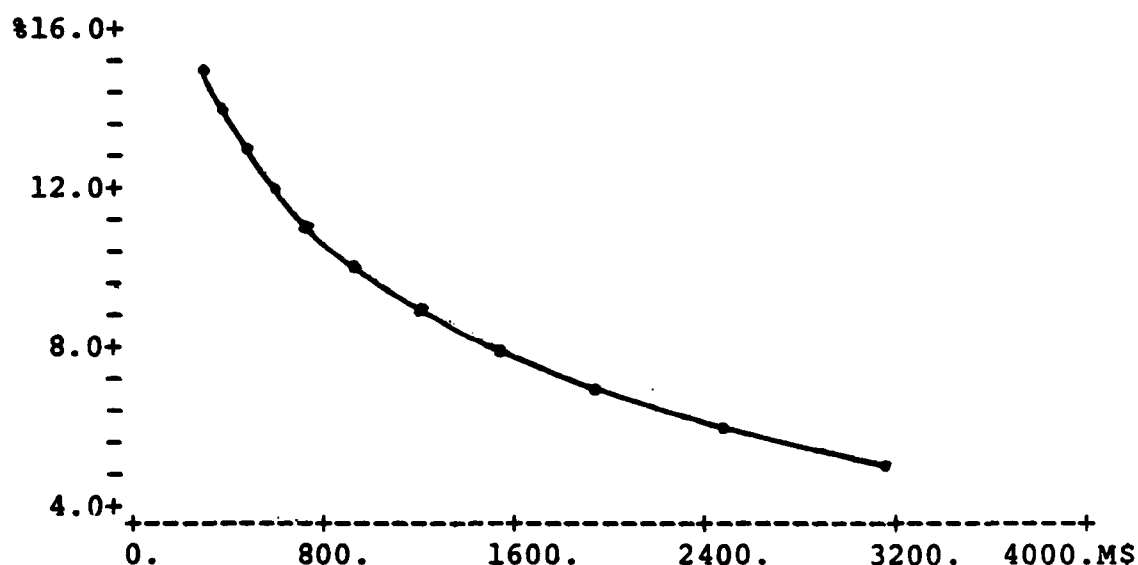
Figure 2 is a graph of total retirement costs for years 1953 through 1982 plotted against the changing discount rates. The graph in Figure 2 displays the same inverse relationship found in Figure 1 and presents a smooth curve. When the input/output relationships were examined to determine the function which gave the highest coefficient of determination; an R^2 of 99.9 (with a standard deviation of .01953) resulted from the logarithmic function $\ln TRC = \$9.15M - ($.226M \times DIS\%)$.

Figure 2

Total Retirement Cost

vs

Discount Rate



Appendix D is a listing of the annual retirement costs for all years 1953 through 1982 for each of the discount rates.

4. Salary Increase Sensitivity

The salary increase rate (SAL%) was examined over a range of average annual increase from 2.5 percent through 7.5

percent in .5 percent increments. Table X lists the salary increase rate value (SAL%), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of \$1,210M is the SAL% value of 5.5 percent.

TABLE X
SALARY INCREASE EFFECTS

<u>SAL%</u>	<u>1963</u>	<u>1982</u>	<u>TRC</u>
2.5%	\$31.4M	\$35.0M	\$ 866 M
3.0	31.9	38.7	915
3.5	32.4	43.0	966
4.0	32.9	47.5	1,020
4.5	33.4	52.6	1,080
5.0	34.0	58.2	1,140
5.5	34.5	64.4	1,210
6.0	35.1	71.2	1,280
6.5	35.6	78.7	1,360
7.0	36.2	87.0	1,450
7.5	36.8	96.1	1,540

Figure 3 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing average annual salary increase rates. It appears that this is a positive relationship with a more pronounced effect upon close year groups than far year groups. 1963 annual retirement cost varied by only \$5.4M over the selected range, while 1982 annual retirement cost varied by \$61M over the selected range. This is a predictable response since the salary increases have a longer period of time to effect the close vice far year groups. Both data sets appear to

present a linear relationship over the range of average salary increases.

Figure 3

1963(A) and 1982(B) Year Group Retirement Costs

vs

Salary Increase

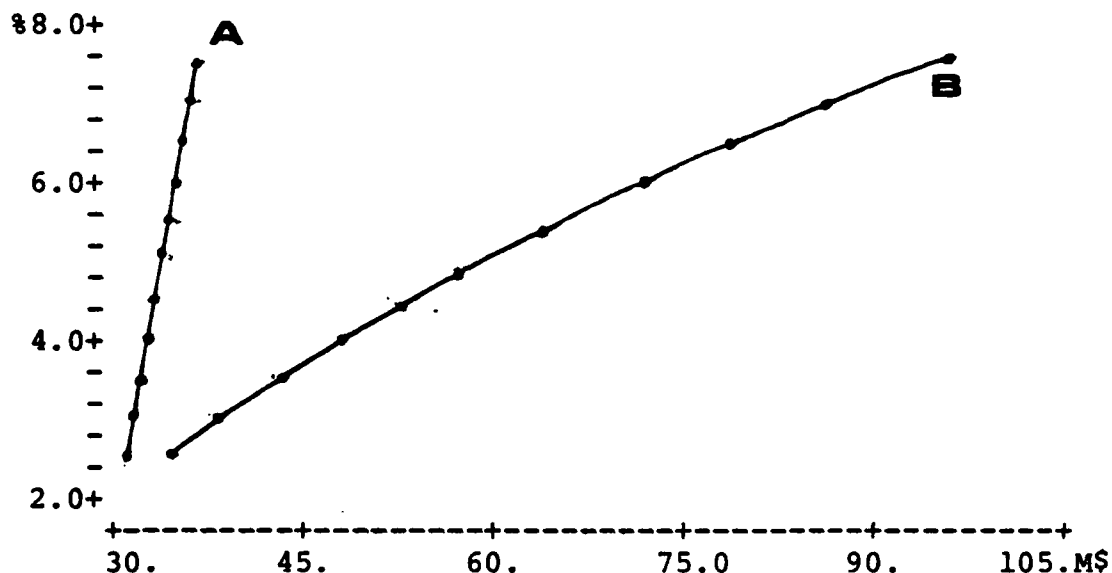
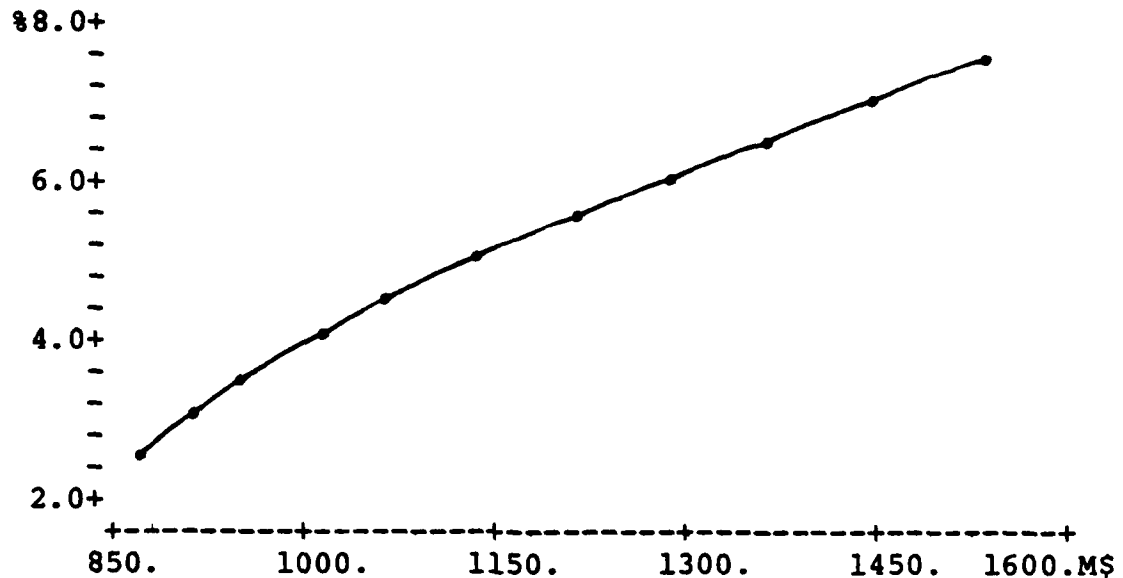


Figure 4 is a graph of total retirement costs for years 1953 through 1982 plotted against the changing average annual salary increase rates. It can be seen that it displays a positive relationship similar to Figure 3. The slope of the curve is intermediate between that of the close and far years. An R^2 of 99.1 (with a standard deviation of 22.49) was calculated from the linear function

$$TRC = \$501.3M + (\$133.3M \times SAL\%).$$

Figure 4
Total Retirement Cost
 vs
Salary Increase



Appendix E is a listing of the annual retirement costs for all years 1953 through 1982 for each of the salary increases.

5. Length of Service at Retirement Sensitivity

The sensitivity analysis of the length of service at retirement variable (LOSD) was performed in accordance with the sensitivity methodology. However, this was an incremental ranging vice a total value ranging as were the two previous cases. In the two previous cases the variable values represented the actual variable input value into the Entryage model. In this case, the variable value represents the value of the adjustment to the Department of Defense Actuary's estimates. The average length of service at retirement for each pay grade was examined over a range of 3 years less than

the current average to 3 years more than the current average, in 1 year increments. An important feature of the length of service at retirement computation is that if the input of a negative LOSD would reduce a pay grade's average length of service to less than the minimum required for retirement (currently 20 years), the input is disallowed, and the length of service is reduced only to the minimum required for retirement. A corresponding approach has been taken to the problem of age at retirement. The model will not allow any retirement at less than age 37, since the minimum acceptable age for entry into the armed forces is 17 years and 20 years of service are required to retire ($17 + 20 = 37$). Table XI lists the value of the adjustment to the average length of service at retirement (LOSD), the 1963 annual retirement cost (1963), the 1983 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of \$1,120M is the LOSD value of 0 (meaning no adjustment to the average length of service at retirement).

TABLE XI
LENGTH OF SERVICE EFFECTS

<u>LOSD</u>	<u>1963</u>	<u>1982</u>	<u>TRC</u>
-3yrs	\$34.9M	\$65.2M	\$1,160M
-2	35.2	65.7	1,190
-1	34.7	64.6	1,190
0	34.5	64.4	1,210
+1	34.7	64.7	1,250
+2	34.5	64.4	1,270
+3	33.9	63.4	1,270

Figure 5 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing average length of service at retirement adjustments. The 1963 annual retirement cost varies by only \$1M over the entire range and the 1982 retirement cost varies by only \$2.3M over the range. It appears that the potential for increased cost caused by an increase in the percentage of base pay which is awarded to a retiree in an increased length of service environment is largely offset by the decreased life expectancy of the late retirement.

Figure 5

1963(A) and 1982(B) Year Group Retirement Costs

vs

Length of Service

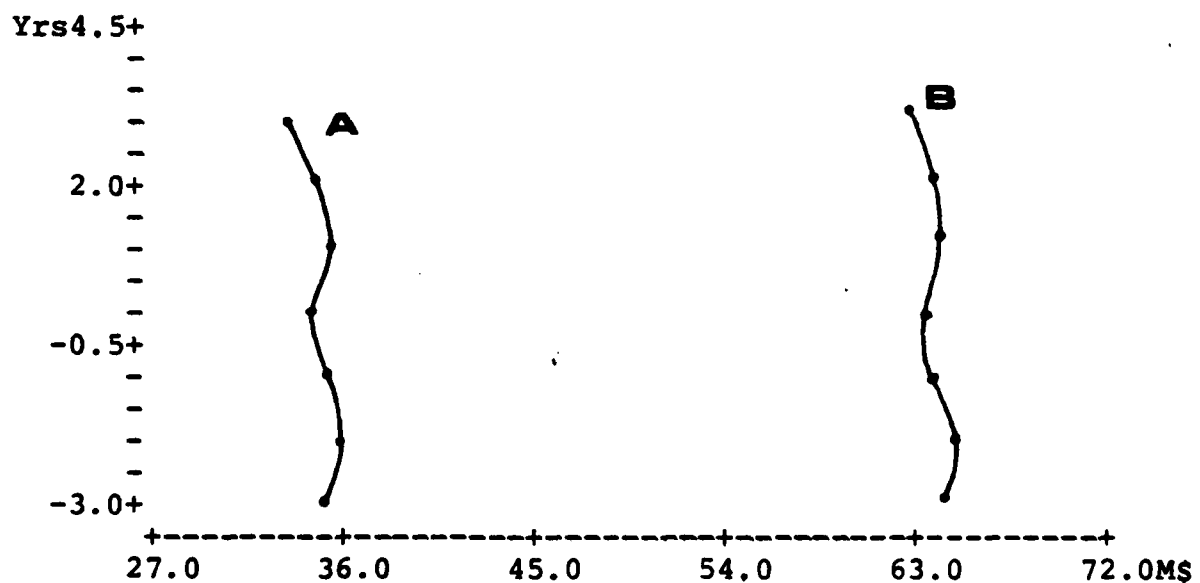


Figure 6 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing average length of service at retirement adjustments. The graph of

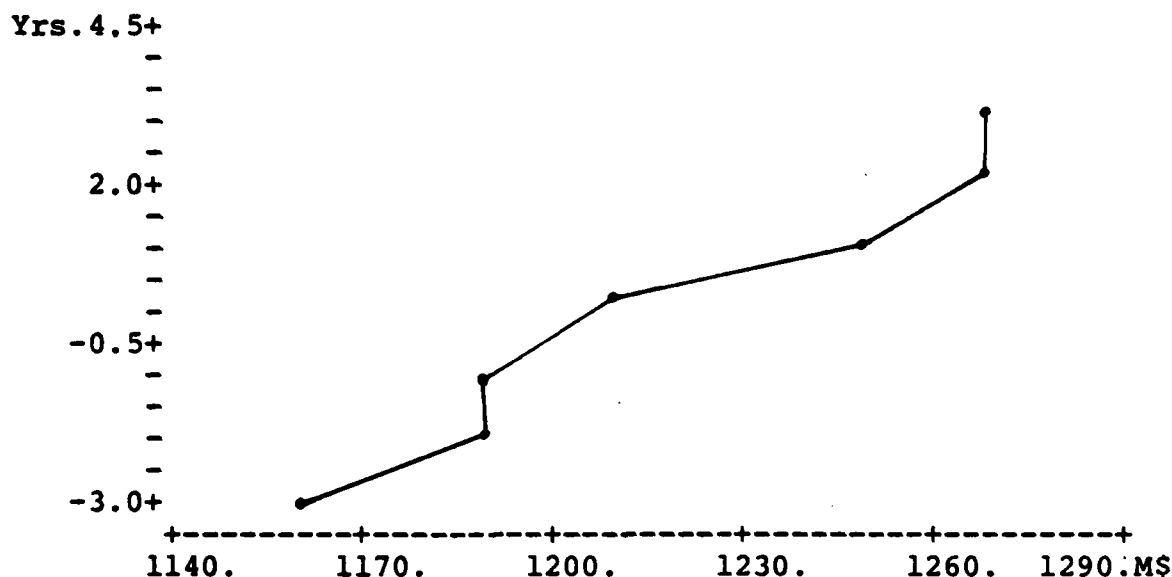
the input/output relationship tends in a positive direction. Total retirement costs varied by only \$110M over the entire -3 to +3 range of average length of service adjustments. An increased liability of only \$60M was incurred when the average length of service was increased by 2 years, and a further increase to 3 years resulted in virtually no increase in total retirement cost beyond that of the 2 year extension. An R^2 of 95.2 (with a standard deviation of 10.52) was calculated from the linear function $TRC = \$1219M + (\$19.7M \times LOSD)$.

Figure 6

Total Retirement Cost

vs

Length of Service



Appendix F is a listing of the annual retirement costs for all years 1953 through 1982 for each of the average length of service adjustments.

6. Life Expectancy at Retirement Sensitivity

Sensitivity analysis of the life expectancy at retirement was an incremental analysis done in a manner similar to the length of service at retirement analysis. However, only increases to life expectancy were analyzed, since in the United States, life expectancies have shown a strong tendency to increase. Appendix G, Mortality Tables, is taken from the 1982 Life Insurance Fact Book and illustrates this trend toward increased life expectancies. Therefore, life expectancy at retirement adjustments (LEXPDP) ranging from increases of 0 to 5 years were explored. Table XII lists the value of the adjustment to life expectancy at retirement (LEXPDP), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of \$1,120M is the LEXPDP value of 0 (meaning no adjustment to life expectancy at retirement).

TABLE XII
LIFE EXPECTANCY EFFECTS

<u>LEXPDP</u>	<u>1963</u>	<u>1982</u>	<u>TRC</u>
0yrs	\$34.5M	\$64.4M	\$1,210 M
+1	34.7	64.7	1,210
+2	34.9	65.0	1,230
+3	35.0	65.3	1,230
+4	35.2	65.6	1,240
+5	35.3	65.9	1,240

Figure 7 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the increasing life expectancy at retirement. Both sets of data show linear

increases in annual retirement costs. 1963 increased by \$.8M and 1982 increases by \$1.5M for the selected range. The minor increase in annual retirement cost was anticipated since the annuity lengths supported by the life expectancy average approximately 32 years. At that distance from initial funding, adjustments to the annuity lengths do not require equal increases in funding value.

Figure 7

1963(A) and 1982(B) Year Group Retirement Costs

vs

Life Expectancy

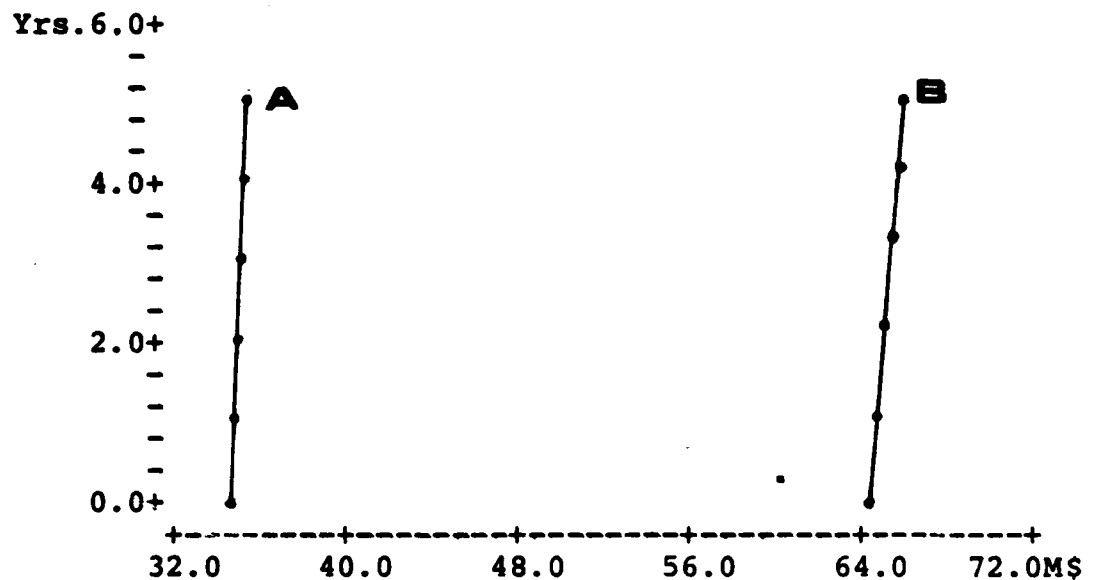
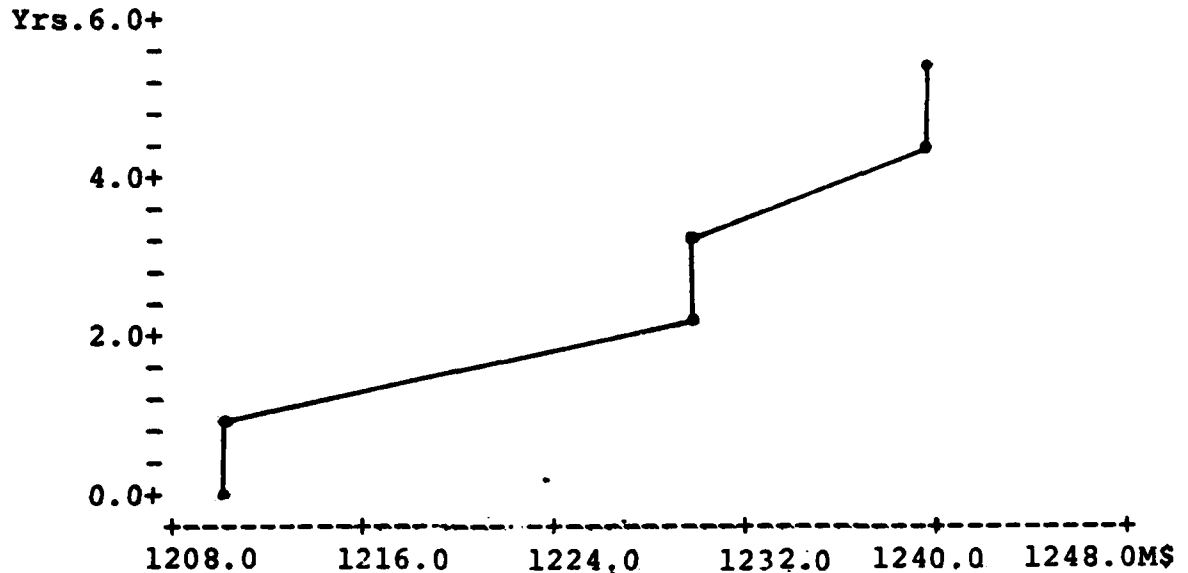


Figure 8 is a graph of the total retirement costs of years 1953 through 1982 plotted against increasing life expectancy at retirement. The input/output relationship is linear, with a variance of only \$30M over the entire range of life expectancy adjustments. An R^2 of 99.4 (with a standard

deviation of .9303) was calculated from the linear function
 $TRC = \$1214M + (\$5.54M \times LEXPD)$.

Figure 8
Total Retirement Cost
vs
Life Expectancy



Appendix H is a listing of the annual retirement costs for all years 1953 through 1982 for each of the life expectancy adjustments.

7. Entrant Retirement Probability Sensitivity

Sensitivity analysis of the entrant retirement probability was an incremental analysis done in a manner similar to the length of service at retirement analysis. In this case, the adjustments are increments of change in probability. Entrant retirement probability (ERPD) adjustments of .03 less than the current average probability to .03 more than

the current average probability were examined in .01 increments. Table XIII lists the value of the adjustment to entrant retirement probability (ERPD), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of \$1,120M is the ERPD of 0 (meaning no adjustment to entrant retirement probability).

TABLE XII
RETIREMENT PROBABILITY EFFECTS

<u>ERPD</u>	<u>1963</u>	<u>1982</u>	<u>TRC</u>
-.03	\$28.7M	\$53.2M	\$ 997 M
-.02	30.6	56.9	1,070
-.01	32.6	60.6	1,140
0	34.5	64.4	1,210
+.01	36.5	68.1	1,280
+.02	38.4	71.8	1,360
+.03	40.3	75.6	1,430

Figure 9 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing entrant retirement probability adjustments. Both sets of data are linear, with a more pronounced effect upon close year groups than far year groups. 1963 costs varied by \$11.6M from \$28.7M to \$40.3M and 1982 costs varied by \$22.4M from \$53.2M to \$75.6M. It appears as though the model is highly sensitive to small changes in retirement rates.

Figure 9

1963(A) and 1982(B) Year Group Retirement Costs

vs

Retirement Probability

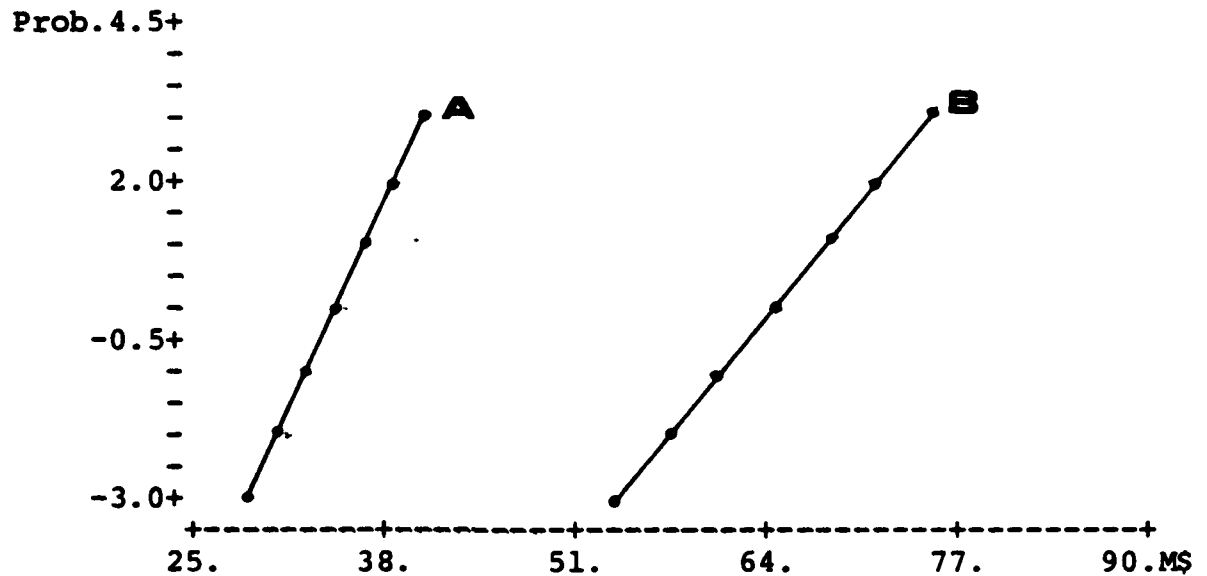


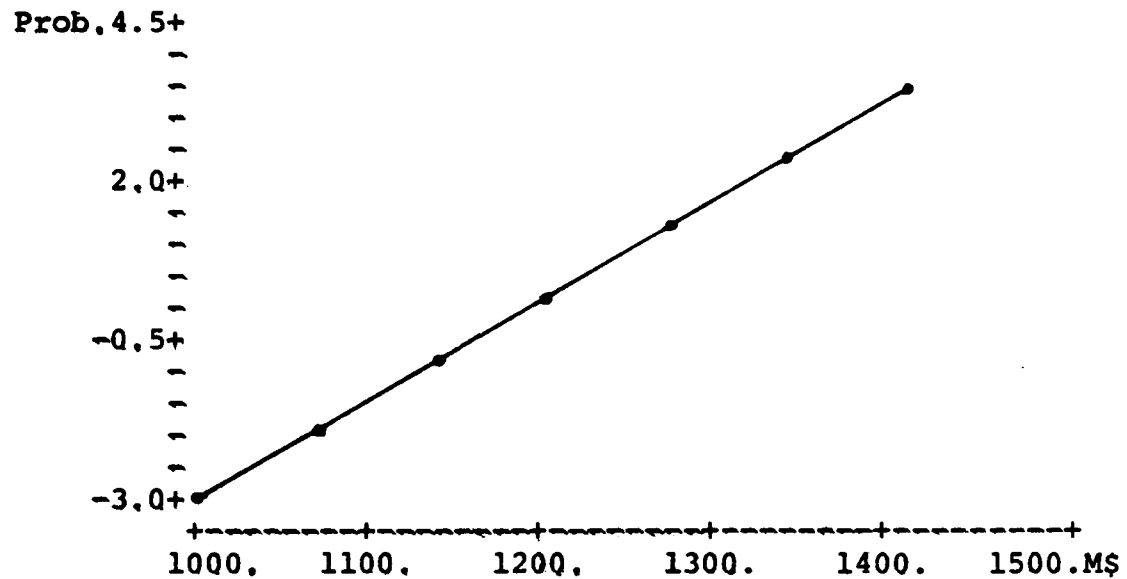
Figure 10 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing entrant retirement probability adjustments. As in the previous Figure, the data appears to be linear, and when the input/output relationships are examined, the linear function $TRC = \$1212M + (\$71.7M \times ERPD)$ provides an R^2 of 99.9 with a standard deviation of .06554.

Figure 10

Total Retirement Cost

vs

Retirement Probability



Appendix I is a listing of the annual retirement costs for all years 1953 through 1982 for each of the entrant retirement probability adjustments.

8. Percent of Base Pay at Retirement Sensitivity

Sensitivity analysis of the percent of base pay to which the member is entitled to receive per year of active duty was conducted in the same manner as the discount rate analysis (i.e. various total value inputs were considered vice incremental adjustments). The percent of base pay (PAY%), is currently set at 2.5 percent per year of active duty completed, with a minimum of 20 years duty required for retirement. The total retirement amount cannot exceed 75 percent of the final active duty base pay. The percent of

base pay (PAY%) was examined over a range of 2 percent through 2.5 percent in .125 percent increments. Table XIII lists the percent of base pay value (PAY%), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of \$1,210M is the PAY% value of 2.5 percent.

TABLE XIII
PERCENT OF BASE PAY EFFECTS

<u>PAY%</u>	<u>1963</u>	<u>1982</u>	<u>TRC</u>
2.000%	\$27.6M	\$51.5M	\$ 970 M
2.125	29.3	54.7	1,030
2.250	31.1	57.9	1,090
2.375	32.8	61.3	1,150
2.500	34.5	64.4	1,210

Figure 11 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing percent of base pay. Both years display a positive relationship to changes in the percent of base pay. 1963 varies \$6.9M over the selected range, and 1982 varies \$12.8M over the selected range. In both years there is a clear relationship between reductions in percent of base pay and resulting annual retirement costs: a given percentage reduction in the first results in an equal percentage reduction in the latter.

Figure 11

1963(A) and 1982(B) Year Group Retirement Costs

vs

Percent of Base Pay

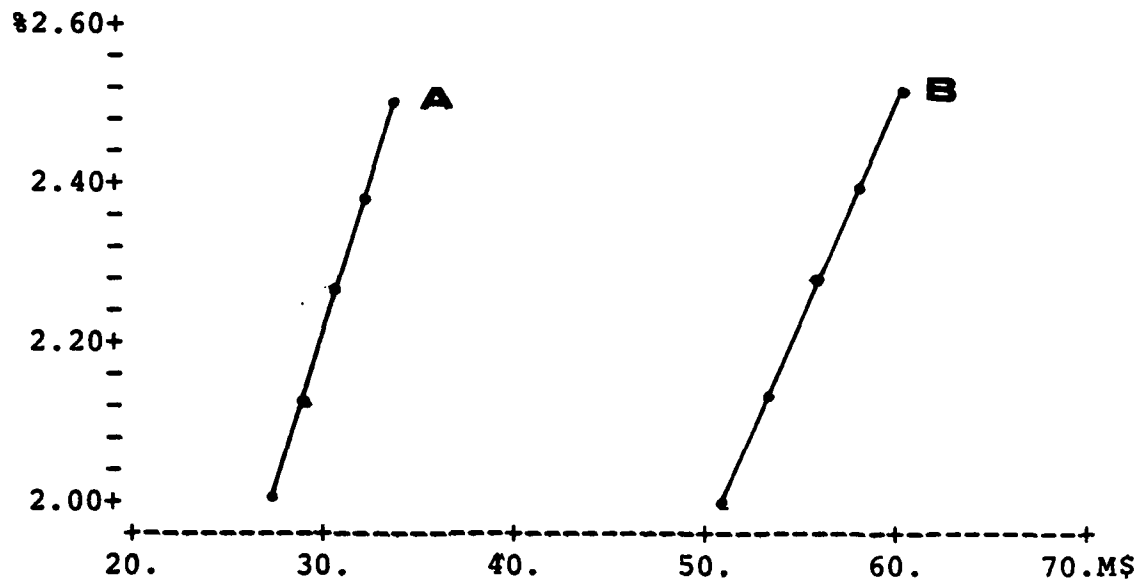
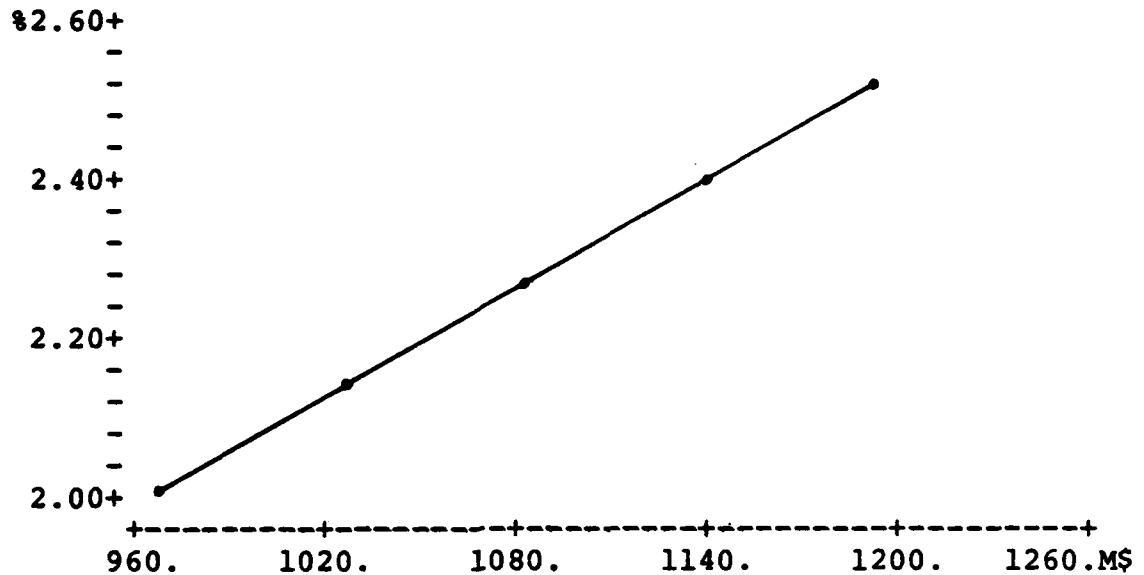


Figure 12 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing percent of base pay. As in Figure 11, there is a constant positive input/output relationship. The linear function $TRC = \$.406M + (\$484.6M \times PAY\%)$ provided an R^2 of 99.9 with a standard deviation of .09667.

Figure 12
Total Retirement Cost
vs
Percent of Base Pay



Appendix J is a listing of the annual retirement costs for all years 1953 through 1982 for each of the percent of base pay values.

9. Maximum Allowed Percent of Base Pay Sensitivity

Sensitivity analysis of the maximum allowed percent of base pay to which the member is entitled at retirement (MAX%), was conducted in the same manner as the discount rate analysis. The maximum percent of base pay (MAX%) is currently set by law at 75 percent of the final active base pay and is the upper bound. The maximum percent of base pay (MAX%), was examined over a range of 50 percent to 75 percent in 5 percent increments. Table XIV lists the maximum percent of base pay value (MAX%), the 1963 annual retirement cost

(1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC), for the selected range. The base-line configuration with a TRC of \$1,1210M is the MAX% value of 75 percent.

TABLE XIV
MAXIMUM PERCENT OF BASE PAY EFFECTS

<u>MAX%</u>	<u>1963</u>	<u>1982</u>	<u>TRC</u>
50%	\$29.3M	\$54.9M	\$1,040 M
55	31.9	59.8	1,130
60	33.4	62.5	1,180
65	34.1	63.6	1,200
70	34.4	64.3	1,210
75	34.5	64.4	1,210

Figure 13 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing maximum percent of base pay. Both years display an initially strong positive relationship, tapering to almost no effect at the higher end of the selected range. 1963 varies by \$5.2M and 1982 varies by \$9.5M over the selected range. Savings from a reduction of 75 to 70 percent in either year group amount to \$100K.

Figure 13

1963(A) and 1982(B) Year Group Retirement Costs

vs

Maximum Percent of Base Pay

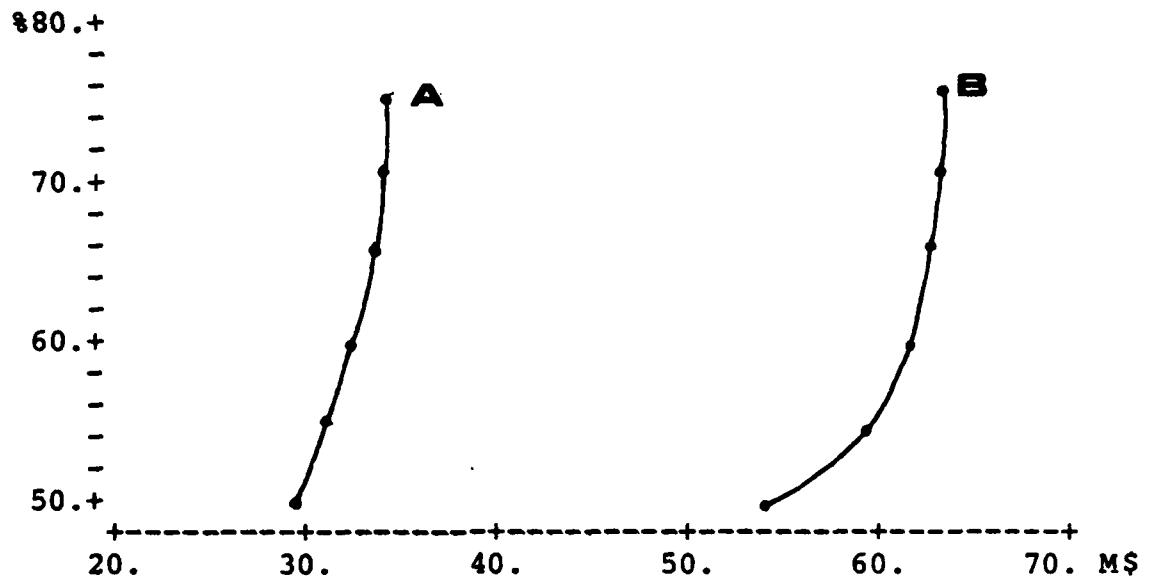
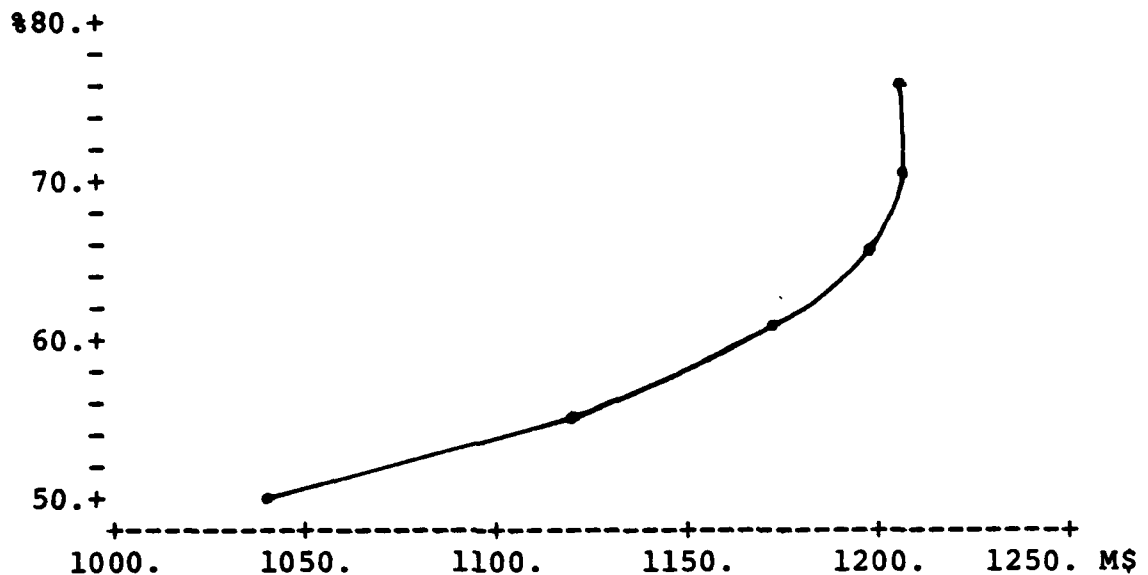


Figure 14 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing maximum percent of base pay. The initial positive input/output relationship at the low 50 percent through 60 percent range deteriorates into almost no effect at the high 70 percent through 75 percent maximum percent of base pay levels. This unique response pattern is caused by the relatively few service members who remain for a full 30 year retirement and thereby encounter the 75 percent restriction. An R^2 of 98.9 (with a standard deviation of 9.308), was provided by the parabolic function $TRC = \$895M + (\$60.2M \times MAX\%) - (\$.429M \times MAX^2)$.

Figure 14
Total Retirement Cost
 vs
Maximum Percent of Base Pay



Appendix K is a listing of the annual retirement costs for all years 1953 through 1982 for each of the maximum percent of base pay values.

10. Minimum Length of Service to Retire Sensitivity

Sensitivity analysis of the minimum length of service required for retirement eligibility (MLOS), was conducted in a manner similar to the discount rate analysis. The current minimum length of service for retirement is 20 years. The analysis attempted to examine the impact of adjusting the minimum retirement upward to 30 years in 1 year increments. An assumption was made that if a paygrade's average length of service was less than the trial MLOS value, then the population of that paygrade was retained until the minimum

retirement point with the condition that the population was decremented by 2 percent for each year of extension. For example, paygrade E6 normally retires at 21.0 years of service. If the trial MLOS value was 23.0 years of service, the population of retiring E6's would be reduced by $(.98)^2$ for 2 years to a level of 96.04 percent of its previous retirement population. This is an arbitrary decrement which yielded mixed results as displayed in Table XV which lists the minimum length of service (MLOS), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC), for the selected range. The baseline configuration with a TRC of \$1,120M is the MLOS value of 20 years.

TABLE XV
MINIMUM LENGTH OF SERVICE EFFECTS

<u>MLOS</u>	<u>1963</u>	<u>1982</u>	<u>TRC</u>
20yrs	\$34.5M	\$64.4M	\$1,210 M
21	34.5	64.4	1,210
22	35.2	65.6	1,250
23	34.9	65.1	1,250
24	34.4	64.1	1,250
25	34.1	63.5	1,250
26	34.5	64.4	1,290
27	33.6	62.8	1,270
28	32.7	61.1	1,260
29	31.7	59.1	1,230
30	30.6	57.1	1,210

Figure 15 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing minimum length of service. It is an unusual pattern for both 1963 and 1982 year groups. The data can be addressed as 3 clusters.

There is no effect for an addition of 1 year, raising the minimum length of service to 21 years. Between the years 22 and 25, there appears to be no discernible pattern in either year. Years 26 through 30 show a decreasing trend. 1963 annual retirement cost varied by \$4.6M and 1982 annual retirement cost varied by \$8.5M over the selected range.

Figure 15

1963(A) and 1982(B) Year Group Retirement Costs

vs

Minimum Length of Service

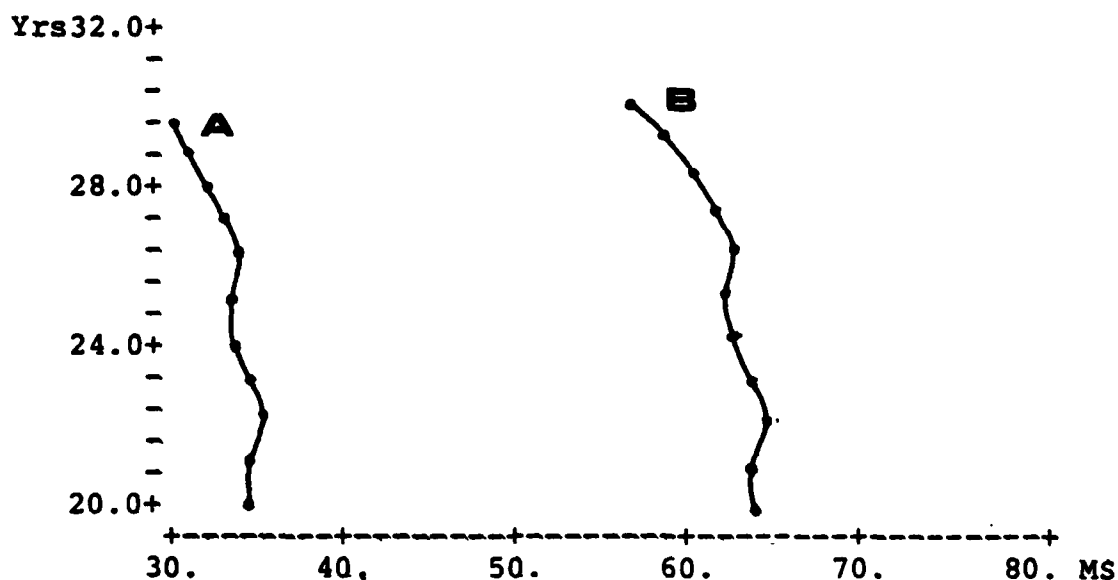
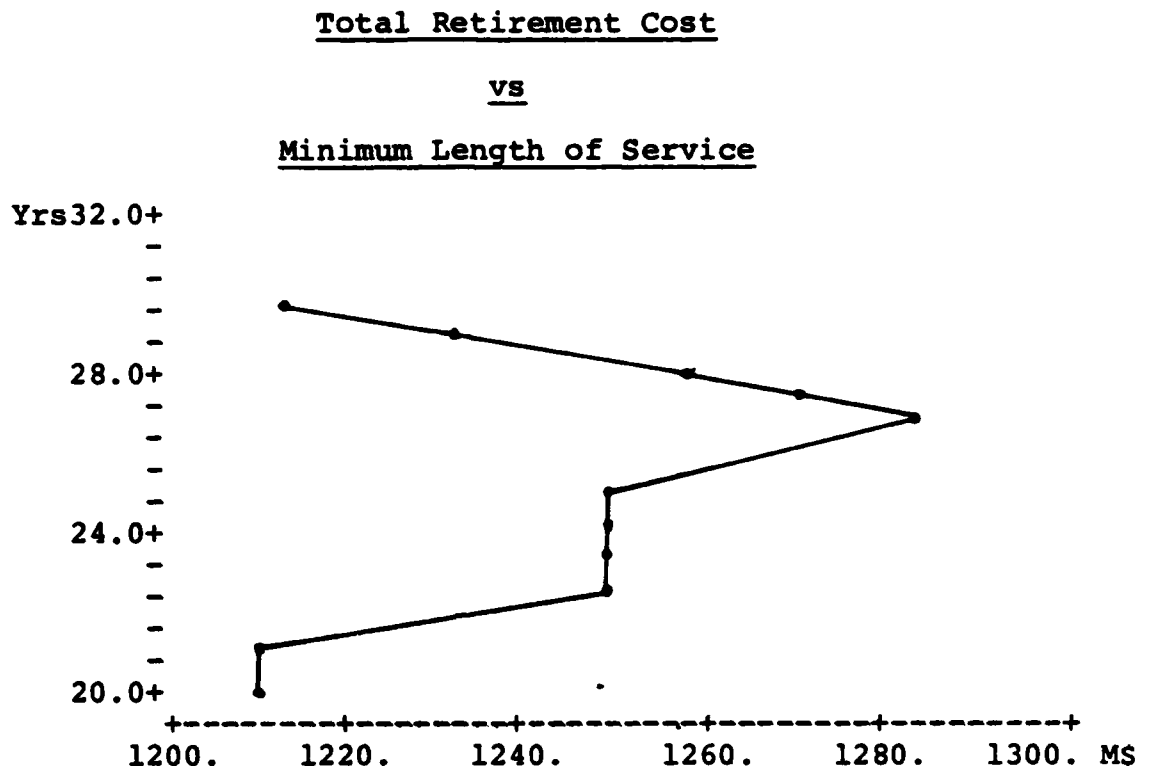


Figure 16 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing minimum length of service. The same clustering effect as discussed for years 1963 and 1982 was found. No functional relationship meeting the R^2 criteria of .95 was found. It does appear, however, that mandatory retention to the 30 year

point allows the decrease in life expectancy to balance the increase in retirement annuity costs.

Figure 16



Appendix L is a listing of the annual retirement costs for all years 1953 through 1982 for each of the maximum percent of base pay values.

C. AGGREGATE ENTRY AGE NORMAL SENSITIVITY ANALYSIS

Currently, the aggregate entry age normal cost method is the actuarial model used by the Department of Defense in computing the annual valuation of military retirement. The method used by the Department of Defense is a modified form of the aggregate entry age normal method described by Waterman (1983). In addition to ordinary retirement costs (pension costs), the Department of Defense also includes the costs

of some items like disability, and survivor benefit costs, which are usually considered as self insurance and separate from retirement costs. The Department of Defense places the costs associated with the Survivor Benefit Plan (which extends limited annuity amounts to surviving spouses after the death of the retiree) in the retirement cost pool. However, U.S. government Cost Accounting Standard 416, Accounting for Insurance Costs, uses survivor death benefits as an illustrative case in insurance costing. Although the Cost Accounting Standards apply only to firms doing business with the U.S. government and not the government itself, it is interesting to note this deviation from accepted accounting technique. The Department of Defense model produces significantly larger total retirement cost estimates than the previously discussed individual entry age normal computations because in addition to including disability and survivor benefit annuities, the Department of Defense model also includes both regular and reserve personnel.

In addition to this mixture of both conventional retirement and self insurance costs, the Department of Defense also includes the present value of future normal benefits of both active duty and retired personnel. While this grouping of all costs together (hence the term aggregate) is useful in a macro-managerial sense, it hinders any attempt at conventional sensitivity analysis which attempts to isolate input/output relationships.

In spite of the obstacles in the aggregate entry age normal model to sensitivity analysis discussed above, a limited incremental analysis was attempted by varying the present value of future normal benefits over a range of minus 5 percent to plus 5 percent of the Department of Defense estimate (PVB%), while holding the present value of future base pay constant. The baseline total retirement cost for fiscal year 1983 of \$15.0 billion is associated with a PVB% value of 0 (meaning no adjustment to the present value of future benefits). Note that the data in Table XVI applies to the Department of Defense as a whole and is not isolated to reflect only regular Navy costs as in the individual model. As in the individual sensitivity analysis, an R^2 acceptability criterion of .95 was established.

TABLE XVI
1983 AGGREGATE TOTAL RETIREMENT COST I

<u>PVB%</u>	<u>PV Future Benefits</u>	<u>PV Future Pay</u>	<u>TRC</u>
-5%	\$128.5B	\$266.7B	\$14.3B
-4	129.9	266.7	14.4
-3	131.2	266.7	14.6
-2	132.6	266.7	14.7
-1	133.9	266.7	14.9
0	135.3	266.7	15.0
+1	136.7	266.7	15.2
+2	138.0	266.7	15.3
+3	139.4	266.7	15.5
+4	140.7	266.7	15.6
+5	142.1	266.7	15.8

Figure 17 is the graph of the data in Table XVI. The input/output relationship is a positive linear function. An R^2 of 99.7 with a standard deviation of .02752 was provided

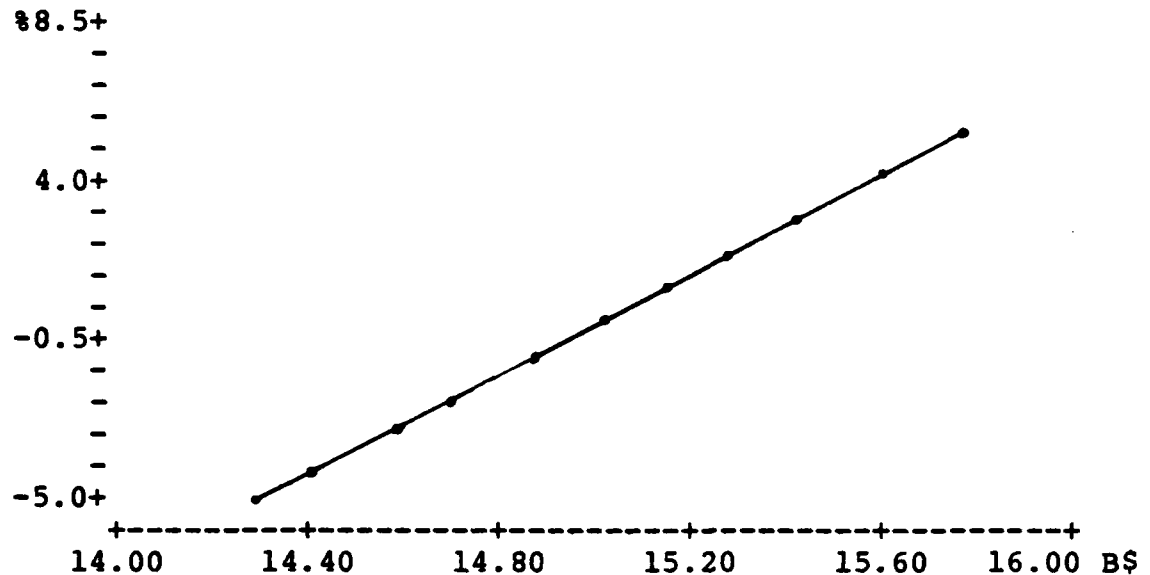
by the linear equation $TRC = \$15.0B + ($.15B \times PVB\%)$. The total retirement cost varies by \$1.5B over the selected range.

Figure 17

Total Retirement Cost

vs

PV Future Benefits



The inverse of the previous analysis, holding future benefits constant by varying the present value of future pay (PVP%), provides the results in Table XVII. Note that zero (0) is the baseline TRC of \$15.0 billion.

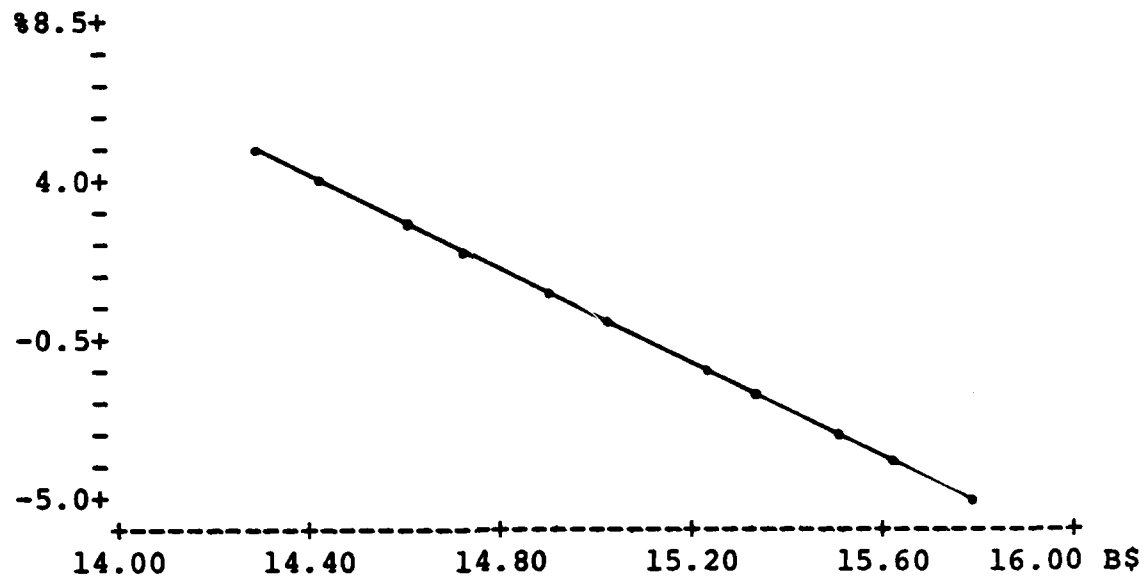
TABLE XVII

1983 AGGREGATE TOTAL RETIREMENT COST II

<u>PVP%</u>	<u>PV Future Benefits</u>	<u>PV Future Pay</u>	<u>TRC</u>
-5%	\$135.3B	\$253.4B	\$15.8B
-4	135.3	256.0	15.6
-3	135.3	258.7	15.5
-2	135.3	261.4	15.3
-1	135.3	264.0	15.2
0	135.3	266.7	15.0
+1	135.3	269.4	14.9
+2	135.3	272.0	14.7
+3	135.3	274.7	14.6
+4	135.3	277.4	14.4
+5	135.3	280.0	14.3

Figure 18 is the graph of the data in Table XVII. The input/output relationship is an inverse linear function. An R^2 of 99.7 with a standard deviation of .02752 was provided by the linear equation $TRC = \$15B - ($.15B \times PVP\%)$. Note that this is the exact inverse of the Future Benefit functions addressed in Figure 17. The total retirement cost varies by \$1.5B over the selected range.

Figure 18
Total Retirement Cost
vs
PV Future Pay



III. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

A. DISCUSSION AND CONCLUSIONS

1. Individual Entry Age Normal Conclusions

The Chapter II individual entry age normal data valuations result in the sensitivity ranking displayed in Table XVIII. The variables are listed in order of most sensitive to least sensitive. The sensitivity rankings were determined from the baseline case by examining the effect a 10 percent change in input value had upon the percent based variables; the effect a 2 year (i.e. 10 percent of 20 years) change in value had upon the time based variables; and the effect a .016 change in value (i.e. 10 percent of the average new Navy entrant retirement probability of .158) had upon entrant retirement probability. These input change values are listed under the heading "Inc Value" in Table XVIII. Listings under the "DIFF" heading show the difference in millions of dollars of total retirement cost resulting from the incremental changes. The listing "DIFF%" shows the percentage variation in total retirement cost caused by the incremental change (i.e. $\text{DIFF\%} + \text{DIFF}/\$1,210\text{M}$). The heading "Controllability" refers to the previously discussed controllability (C) or uncontrollability (U) of the variable. The minimum length of service (MLOS) variable was included but not ranked in the sensitivity ranking because of its disorderly input/output relationship and a

2 year increase in value (i.e. 10 percent of 20 years) would have placed the output in the unpredictable second data cluster.

TABLE XVIII

INDIVIDUAL ENTRY AGE NORMAL SENSITIVITY RANKING

<u>Variable</u>	<u>Inc Value</u>	<u>DIFF</u>	<u>DIFF%</u>	<u>Controllability</u>
DIS%	.9%	\$297.4M	24.5%	U
PAY%	.25%	121.1	10.0	U
ERPD	.016	114.9	9.5	C
SAL%	5.5%	95.9	7.9	U
LOSD	2yrs	46.5	3.8	C
LEXP	2yrs	12.2	1.0	U
MAX%	7.5%	2.0	.1	U
MLOS	N/A	N/A	N/A	C

Table XVIII shows the domination of the uncontrollable discount rate (DIS%) in the individual entry age normal computation of current retirement costs. As in any annuity calculation, the reinvestment rate is a highly critical input. Under the baseline assumptions, a 10 percent change in the discount rate yields a 24.5 percent change in total retirement costs. The legislated percent of base pay per year of active duty (PAY%) delivers a response in total retirement cost corresponding to adjustments in its current rate. Of the variables controllable at the service level, adjustments to the overall retention until retirement (ERPD) seem to offer the most promise in managing retirement costs. Adjustments to the expected rate of salary increase, the domain of Congress, while effective in controlling active duty base pay, do not impact retirement costs to a like degree. It is interesting to note that an increase in average length of

service (LOSD) of two years has a surprisingly low corresponding retirement cost increase. Efforts to increase retention after retirement eligibility is reached would increase the overall experience level of the service and (assuming experienced personnel perform better than inexperienced) may produce a superior performance/product to cost ratio. Adjustments to life expectancy (LEXP) and the maximum allowed percentage of base pay (MAX%) have little effect. The disorderly nature of output resulting from adjustments to the minimum length of service (MLOS) infers that although this variable is controllable at the service level, further research is required as to probable retirement cost effects.

The sensitivity results in Table XVIII must be approached with caution. Each of the variable values which comprise the baseline configuration differ in their inherent accuracy. The discount rate (DIS%) and rate of salary increase (SAL%), being functions of future economic performance, can each be legitimately estimated at several different values. For this reason, they are both "soft" numbers in which excessive confidence should not be placed. At the opposite end of the reliability spectrum are variable values for percent of base pay at retirement (PAY%), maximum allowed percentage of base pay (MAX%), and minimum length of service to retire (MLOS). Each of these values is fixed in law and therefore will probably remain constant for the long term. Confidence in variable values for retention until retirement (ERPD),

average length of service at retirement (LOSD), and life expectancy at retirement (LEXPDP) lies in-between the two poles discussed above, since although only estimates, they have been subject to actuarial review.

The estimating equations for each of the input variables are listed in Table XIX. This table displays the variable, its TRC estimating equation (TRC Value), and the associated coefficient of determination (R^2).

TABLE XIX
SELECTED BASELINE ESTIMATING EQUATIONS

<u>Variable</u>	<u>TRC Value</u>	<u>R²</u>
DIS%	Antilog (\$9.15M - (\$.226M x DIS%))	99.9
PAY%	\$.406M + (\$484.6M x PAY%)	99.9
ERPD	\$1212M + (\$71.7M x ERPDP)	99.9
SAL%	\$501.3M + (\$133.3M x SAL%)	99.1
LOSD	\$1219M + (\$19.7M x LOSD)	95.2
LEXPDP	\$1214M + (5.54M x LEXPDP)	99.4
MAX%	-\$895M + (\$60.2M x MAX%) - (\$42.9M x MAX% ²)	98.9
MLOS	N/A	N/A

Usually, such small samples as used in the regression analysis of the sensitivity results are of limited value. However, coefficient of determination's as large as 99.9 imply that the regression line is a good approximation of the analytical relationship between TRC and the associated variable in the range of sensitivity analysis. This method has fortunately generated apparently reliable approximations to

relationships that would have been very difficult (untractable) to solve analytically. These equations can be used by manpower managers to estimate the effects of a change in one of the variables in Table XIX without generating a new TRC value from the computer program. They serve as a useful method for quickly estimating the impact of such changes when the computer program is not easily available.

In addition, the same methodology which produced the above estimating equations can be applied to any given set of economic, managerial or legal input variable assumptions to provide manpower managers with easy to use retirement cost estimators.

2. Aggregate Entry Age Normal Conclusions

As mentioned in Chapter II, the grouping of all costs together in the aggregate entry age normal cost model severely hampers meaningful sensitivity investigation. The data analysis performed in Chapter II with the aggregate model illustrates that the aggregate model readily provides answers to large scale questions. For example, a decrease in retirement benefits of one (1) percent would save the Department of Defense one hundred (100) million dollars in 1983. However, as a service management tool, its very broadness minimizes its usefulness at any level below that of the Department of Defense.

B. RECOMMENDATIONS

1. Further study be performed examining the effects of increasing the required length of service before retirement eligibility.

2. The Department of Defense Actuary consider publishing an annual report, for internal Department of Defense and service level management use, which provides current retirement costing by paygrade by year group. And, that the Department of Defense Actuary include, in that same report, the value of retirement costs under a reasonable range of differing economic assumptions.

APPENDIX A

THE ENTRYAGE MODEL

I. OVERVIEW

The Entryage computer model is an interactive computer program written in the standard BASIC computer programming language. It is designed to calculate normal and total retirement costs under both individual and aggregate entry age normal retirement costing methods. The only deviations from standard, required by the IBM 3033 system on which the program was developed, are the use of apostrophes (') vice quotations marks (") in Print Commands, and the FORTRAND convention of double asterisks (**) vice the up arrow (↑) for exponentiation. In addition to the two above required deviations, the author has taken advantage of the capability of the System 3033 to use numeric variable names with lengths in excess of two (2) characters, which is prohibited on some micro/mini computers.

Entryage can be logically broken into five (5) subsections:

1. Introduction/Subprogram Selection. Lines 5-55 and 951-953.
2. Matrix Descriptions/Data Load. Lines 75-950.
3. Detailed Individual Subprogram. Lines 955-2355.

4. Aggregate Subprogram. Lines 2365-2655.
5. Summary Individual Subprogram. Lines 2700-3890.

II. DETAILED PROGRAM DESCRIPTION

A. INTRODUCTION/SUBPROGRAM SELECTION

This section introduces the model, states the current year for processing purposes, and requests subprogram selection or program termination (lines 5-55). The program automatically enters the next subsection, Matrix Descriptions/Data Load, and then processes the subprogram or termination command (lines 951-953). Advancement to the Detailed Individual Subprogram is done by default. All three computation subprograms, after completion of calculations and output display, loop back to line 5.

B. MATRIX DESCRIPTIONS/DATA LOAD

This section stores the data required for computation in nine (9) matrices. A description of each and its data site follows:

1. Current Year Pay

The Current Year Pay matrix, "P", is dimensioned in line 80. Lines 125-255 assign coordinates in a 26 column by 6 row field. Lines 415-455 contain pay amounts for pay grades E1-E9; lines 460-475 contain pay amounts for pay grades W1-W4; lines 480-505 contain pay amounts for pay grades 01, 01E, 02, 02E, 03, and 03E; and lines 510-540 contain pay amounts for pay grades 04-010. There are six (6) pay amounts

per line. These correspond to pay entitlements for 20, 22, 24, 26, 28 and 30 years. It is mandatory that each row be filled, even though at present (1983) there are no pay increases at the 24, 28, or 30 year points. The program has been designed to absorb pay increases at these points with no structural modification. Current pay rates, for FY 1983, were received from the Disbursing Office, Naval Postgraduate School.

2. Enlisted Life Expectancy

The Enlisted Life Expectancy matrix, "E", is dimensioned in line 85. Lines 260-275 assign coordinates in a simple 31 unit column. Lines 550-560 correspond to remaining enlisted life expectancies at retirement for ages 36-66 years. Navy enlisted life expectancies at retirement, entered in the program, are from the FY82 DOD Statistical Report on the Military Retirement System, page 242 (U.S. Government Printing Office, 1983).

3. Officer Life Expectancy

The Officer Life Expectancy matrix, "OZ", is dimensioned in line 90. Lines 280-295 assign coordinates in a simple 31 unit column. Lines 565-580 correspond to remaining officer life expectancies at retirement for ages 36-66 years. Navy officer life expectancies at retirement, entered in the program, are from the FY82 Statistical Report, page 242.

4. Average Length of Service

The Average Length of Service matrix, "D" is dimensioned in line 95. Lines 300-315 assign coordinates in a

simple 26 unit column. Lines 585-600 correspond to the average length of service which a paygrade has completed at retirement. The linear sequence is that of the Current Year Pay matrix, with E1-E9, W1-W4, 01, 01E, 02, 02E, 03, 03E, and 04-010. Navy average length of service data, entered in the program, is from the FY82 Statistical Report, page 97.

5. Average Age at Retirement.

The Average Age at Retirement matrix, "F", is dimensioned in line 100. Lines 320-335 assign coordinates in a simple 26 unit column. Lines 605-620 correspond to the average age at retirement for retirees in each paygrade. The linear sequence is identical to the Current Year Pay and Average Length of Service matrices. Navy average age at retirement data, entered in the program, is from the FY82 Statistical Report, page 76.

6. Target Retirement Grade Probability

The Target Retirement Grade Probability Matrix, "F2", is dimensioned in line 105. Lines 340-355 assign coordinates in a simple 26 unit column. Lines 625-640 correspond to the probability that a retiring service member will retire at a given pay grade. These probabilities are separately computed for enlisted and officer members. Officers retiring at grades W1-03E are assumed to have originally entered military service as enlistees, since the "up or out" officer personnel management system prohibits retirement by service members, who have exclusively served as officers, at less than

04 rank. Navy retirement grade probabilities were derived from information listed in FY82 Statistical Report, pages 76 and 97.

7. Enlisted Accession

The Enlisted Accession matrix, "ED", is dimensioned in line 115. Lines 360-380 assign coordinates in a simple 32 unit column. Lines 650-660 correspond to the number of regular enlisted entrants for the years 1951 through 1982, in thousands (e.g. 63.9 equals 63,900). Number of regular Navy enlisted entrants data was received from the Defense Manpower Data Center, Monterey, Ca., at the request of the program developer.

8. Officer Accession

The Officer Accession matrix, "OD", is dimensioned in line 120. Lines 385-400 assign coordinates in a simple 32 unit column. Lines 665-680 correspond to the number of regular officer entrants for the years 1951 through 1982, in thousands. Number of regular Navy officer entrants data was received from the Defense Manpower Data Center, Washington, D.D., at the request of the program developer.

9. Previous Year Pay

The Previous Year Pay matrix, "R", is dimensioned in line 110. Lines 685-815 assign coordinates in a 26 column by 6 row field. This matrix and its associated data are designed exactly like the Current Year Pay matrix. Lines 820-950 contain pay amounts for the previous year (1982).

Previous pay rates, for FY 1982, were received from the Disbursing Office, Naval Postgraduate School.

C. DETAILED INDIVIDUAL SUBPROGRAM

This section is an interactive model which produces detailed information at the individual pay grade and year of service entry level. All program volunteered information is either derived or computed from matrix loaded information, with the user option to modify any input at will. Retired pay computations for post 1980 entrants are subject to the required three year averaging, with the assumption that the pay grade at retirement was held for the two (2) years prior to retirement (lines 2265-2300). The subprogram also assumes a .12 probability of retirement for enlisted entrants and a .40 probability of retirement for officer entrants (lines 1860-1865). These probabilities were found in the Valuation of the Military Retirement System, FY 1982, page 10 (U.S. Government Printing Office, 1083).

D. AGGREGATE SUBPROGRAM

The aggregate subprogram is an interactive subprogram which requires real time input of data. The information stored in the matrices is not available to this subprogram. It is straight forward, and has no "hardwired" probability assumptions.

E. SUMMARY INDIVIDUAL SUBPROGRAM

The summary individual subprogram utilizes the matrices data and provides both normal costs and total retirement

costs for years 1953 through 1982. It is computationally the same as the detailed individual subprogram, except that when the minimum length of service to retire is adjusted, an attrition factor (DELT) is applied against the retiring population (line 3707) which assumes a 98 percent retention rate per year of service extension beyond the normal length of service to retire for a particular pay grade. Two different print formats, "Summary" and "Detail" are available (lines 3066-3067).

III. UPDATING INSTRUCTIONS

A. INTRODUCTION

These updating instructions are designed to enable a potential user to load current data into the model, not perform major computational logic modifications. Updating requirements may be divided into two areas: minor program modification and data changes. Instructions are given for an update to 1984.

B. MINOR PROGRAM MODIFICATION

1. Lines 45, 125, 410, 1190, 1920, 3280, and 3570.
Change "1983" to "1984".
2. Lines 820 and 3855. Change "1982" to "1983".
3. Lines 1920 and 3570. Change "1950" to "1951".
4. Line 3080. Change "1953" to "1954".

C. DATA CHANGES

All data changes must be input in format identical to that already used in Entryage Wbasic. Please review the program data itself (lines 410-95) and refer to the Matrix Descriptions section of this appendix before following the following instructions:

1. Lines 415-540. Load current pay amounts, for 1984, in ascending order, E1 through 010, for 20-30 years of service in two year increments.
2. Line 650. Delete first enlisted accession number for 1951, "202.4".
3. Line 660. Add additional enlisted accession number for 1983 in last position.
4. Line 670. Delete first officer accession number for 1951, "8".
5. Line 680. Add additional officer accession number for 1983 in last position.
6. Lines 825-950. Replace 1982 pay data with 1983 pay data. May be gang loaded by renumbering information previously stored in lines 415-540 before current update processing.
7. Other data sites may be update as desired. Consult Matrix Descriptions for specific sequence logic.

[illegible]


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012005 PRINT USING 'PROJECTED RETIREMENT YEAR = ###':RF
012010 N=RF-CF
012015 PRINT 'SALARY SCALE INCREASE IS LOADED AS .055.'
012020 PRINT 'IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N.'
012025 INPUT SC$
012030 IF (SC$='N') THEN GOTO 2000
012035 IF (SC$='Y') THEN IN=.055
012040 PP=BP
012045 FOR I=1 TO N
012050 TP=PP*IN
012055 PP=TP+PP
012060 NEXT I
012065 PRINT USING 'CURRENT MONTHLY BASEPAY AT RETIREMENT GRADE = $###':BP
012070 PRINT 'PROJECTED MONTHLY BASEPAY AT RETIREMENT GRADE = $###'
012075 PRINT 'RETIREMENT IS CURRENTLY COMPUTED AT .025 OF BASEPAY.'
012080 PRINT 'IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N.'
012085 INPUT DL$
012090 IF (DL$='Y') THEN DL=.025
012095 IF (DL$='N') THEN GOTO 2220
012100 FAC=LUS*CL
012105 PRINT 'RETIREMENT CEILING IS CURRENTLY SET AT .75 OF BASE PAY.'
012110 PRINT 'IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N.'
012115 INPUT DM$
012120 IF (DM$='Y') THEN DM=.75
012125 IF (DM$='N') THEN GOTO 2250
012130 IF (DM$>DM) THEN FAC=DM
012135 IF (YS>1980) THEN GOTO 2030
012140 ANN=FAC*PP*12
012145 PRINT 'PROJECTED ANNUAL RETIREMENT PAY = $#####':ANN
012150 PRINT 'ANNUAL DISCOUNT RATE IS LOADED AS .09.'
012155 PRINT 'IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N.'
012160 INPUT DX$
012165 IF (DX$='N') THEN GOTO 2095
012170 IF (DX$='Y') THEN DI=.09
012175 PRINT 'AVERAGE AGE AT RETIREMENT FOR THIS PAYGRADE = ###':F(G)
012180 PRINT 'IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N.'
012185 INPUT GO$
012190 IF (GO$='Y') THEN AG=F(G)
012195 IF (GO$='N') THEN GOTO 2110
012200 IF (AG<36) THEN GOTO 2110
012205 IF (AG<37) AND (AG>=36) THEN Z=1
012210 IF (AG<38) AND (AG>=37) THEN Z=2
012215 IF (AG<39) AND (AG>=38) THEN Z=3
012220 IF (AG<40) AND (AG>=39) THEN Z=4
012225 IF (AG<41) AND (AG>=40) THEN Z=5
012230 IF (AG<42) AND (AG>=41) THEN Z=6
012235 IF (AG<43) AND (AG>=42) THEN Z=7
012240 IF (AG<44) AND (AG>=43) THEN Z=8

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01680 O=N+1
01690 XP=QP
01695 FOR J=1 TO C
01700 UP=XP*JA
01705 XP=UP+XP
01710 NEXT J
01715 IF (YS>1980) THEN GOTO 2265
01720 BNN=FAC*XP*12
01725 PRINT USING "DISCOUNT RATE USED IN CURRENT YEAR NORMAL COST = ###:D1"
01730 PRINT "HAS THIS YOUR PRIOR YEAR ESTIMATOR? IF YES TYPE Y IF NO TYPE N."
01735 INPUT DR$
01740 IF (DR$="Y") THEN EI=D1
01745 IF (DR$="N") THEN GOTO 2325
01750 PRINT "REMAINING LIFE EXPECTANCY USED IN CURRENT YEAR NORMAL COST =:L1"
01755 PRINT "HAS THIS YOUR PREVIOUS ESTIMATOR? IF YES TYPE Y IF NO TYPE N."
01760 INPUT DH$
01765 IF (DH$="Y") THEN MI=L1
01770 IF (DH$="N") THEN GOTO 2205
01775 S=(1+EI)*MI
01780 RE=BNN*((1-(1/S))/EI)
01785 UC=(1+EI)*LOS-1
01790 UC=RE*(EI/UC)
01795 PRINT USING "PREVIOUS YEAR INDIVIDUAL NORMAL COST=$###:###:OC"
01800 FC=NC-OC
01805 PRINT
01810 PRINT "CURRENT YEAR GAINS OR LOSSES = $###:###:FC"
01815 PRINT "ANY DEFERRED GAINS OR LOSSES? IF YES TYPE Y IF NO TYPE N."
01820 INPUT DG$
01825 IF (DG$="Y") THEN GOTO 2235
01830 IF (DG$="N") THEN GOSUB 2145
01835 V=N+1
01840 X=1/((1+DI)*V)
01845 AP=(FC+GL)*DI/(1-X)
01850 PRINT USING "APPLIED GAIN OR LOSS = $###:###:AP"
01855 RC=NC+AP
01860 IF (G<20) THEN PRO=.12
01865 IF (G>20) THEN PRO=.4
01870 PRINT USING "CURRENT YEAR INDIVIDUAL RETIREMENT COST = $###:###:RC"
01875 PRINT "PROBABILITY OF NEW ENTRANT RETIRING = ###:###:PRO"
01880 PRINT "IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N."
01885 INPUT PR$
01890 IF (PR$="N") THEN GOTO 1970
01895 PRINT "PROBABILITY OF ENTRANT RETIRING AT TARGET GRADE = ###:###:FZ(G)"
01900 PRINT "IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N."
01905 INPUT FZ$
01910 IF (FZ$="Y") THEN TGT=FZ(G)
01915 IF (FZ$="N") THEN GOTO 2125
01920 IF (YS>1950) AND (YS<1983) THEN GOTC 2340

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01925 PRINT INPUT NUMBER OF ENTRANTS IN INITIAL YEAR OF SERVICE (E.G. 230000).
01930 NEW = GT + NEW
01935 PEC = PRD + NEW
01940 PRINT USING TARGET POPULATION RETIRING #####; PEC
01945 TRC = PEC + RC
01950 PRINT PAYGRADE AT RETIREMENT = ; PG$
01955 PRINT YEAR OF SERVICE ENTRY = ; Y$
01960 PRINT USING CURRENT TARGET GROUP RETIREMENT COST = $#####.##; TRC
01965 GO TO 5
01970 PRINT YOUR ESTIMATE OF RETIREMENT PROBABILITY (E.G. .3456).
01975 INPUT PRD
01980 GO TO 1855
01985 PRINT YOUR ESTIMATE OF REMAINING LIFE EXPECTANCY (E.G. 39.41).
01990 INPUT L1
01995 GO TO 1855
02000 PRINT INPUT SALARY SCALE INCREASE AS DECIMAL (E.G. .065).
02005 INPUT IN
02010 GO TO 1235
02015 PRINT INPUT PREVIOUS YEAR NORMAL COST (E.G. 1389.24).
02020 INPUT OC
02025 GO TO 1800
02030 A = N - 2
02035 RP = BP
02040 FOR K = 1 TO A
02045 VP = RP + IN
02050 RP = VP + RP
02055 NEXT K
02060 SP = (IN + RP) + RP
02065 PP = (SP + RP + PF) / 3
02070 PRINT USING RETIREMENT BASIS FOR POST 1980 ENTRANT = $#####.##; PP
02075 GO TO 1335
02080 PRINT YOUR ESTIMATE LENGTH OF SERVICE AT RETIREMENT (E.G. 24.8).
02085 INPUT LCS
02090 GO TO 1150
02095 PRINT INPUT DISCOUNT RATE ESTIMATE AS DECIMAL (E.G. .11).
02100 INPUT D1
02105 GO TO 1375
02110 PRINT YOUR ESTIMATE OF AGE AT RETIREMENT (E.G. 47.86).
02115 INPUT AG
02120 GO TO 1400
02125 PRINT INPUT YOUR PROBABILITY THAT ENTRANT RETIRES AT SELECTED TARGET
02130 PRINT RANK / GRADE (E.G. .235).
02135 INPUT TGT
02140 GO TO 1520
02145 PRINT
02150 PRINT DEFERRED GAINS AND LOSSES ARE THE AMORTIZED VALUE OF DIFFERENCES
02155 PRINT CAUSED BY FLUCTUATIONS IN THE ESTIMATING VARIABLES OVER TIME. THE
02160 PRINT ACTUARIAL MODEL DAMPENS THE IMPACT OF THESE FLUCTUATIONS TO A ZERO

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021650 PRINT 'AVERAGE OVER THE WORKING LIFE OF THE INDIVIDUAL, THEREFORE AN
021700 PRINT 'ENTRY OF ZERO FOR THIS VARIABLE DOES NOT INVALIDATE THE MODEL.'
021750 GL=0
021800 FD=0
021850 RETURN
021900 AP=0
021950 GO TO 1855
022000 PRINT 'INPUT YOUR ESTIMATE OF REMAINING LIFE EXPECTANCY (E.G. 42.1)..'
022050 INPUT M1
022100 GO TO 1775
022150 PRINT 'INPUT DESIRED RETIREMENT RATE AS DECIMAL (E.G. .025)..'
022200 INPUT DL
022250 GO TO 1255
022300 PRINT 'AMOUNT OF DEFERRED GAIN OR LOSS (E.G. 11.34)..'
022350 INPUT GL
022400 GO TO 1835
022450 PRINT 'INPUT DESIRED RETIREMENT CEILING AS DECIMAL (E.G. .75)..'
022500 INPUT DM
022550 GO TO 1325
022600 B=0-2
022650 YP=QP
022700 FOR C=1 TO B
022750 MP=Y*P*JA
022800 YP=MP+YP
022850 NEXT C
022900 ZP=(JN*Y*P1+YP
022950 XP=(YP+ZP+XP)/3
023000 GO TO 1720
023050 PRINT 'INPUT PRIOR YEAR SALARY SCALE & ESTIMATOR AS A DECIMAL (E.G. .06)..'
023100 INPUT JN
023150 GO TO 1670
023200 PRINT 'INPUT PRIOR YEAR DISCOUNT RATE ESTIMATOR AS A DECIMAL (E.G. .09)..'
023250 INPUT EI
023300 GO TO 1750
023350 IF (G>=20) THEN NEW=1000*DD(Y5-1950)
023400 IF (G<20) THEN NEW=1000*ED(Y5-1950)
023450 PRINT 'NUMBER OF REGULAR ENTRANTS IN INITIAL YEAR OF SERVICE =';NEW
023500 GO TO 1935
023550 PRINT 'YOU ARE NOW IN THE AGGREGATE METHOD PORTION OF THIS PROGRAM..'
023600 REM BEGIN AGGREGATE SUBPROGRAM
023650 PRINT 'ALL DOLLAR AMOUNTS SHOULD BE INPUT AS MILLIONS (E.G. $12,332,223.24'
023700 PRINT 'SHOULD BE TYPED AS 12.332)..'
023750 PRINT 'WHAT IS THE PRESENT VALUE OF FUTURE BENEFITS? (E.G. 4334.765)..'
023800 INPUT PBE
023850 PRINT 'WHAT IS THE PRESENT VALUE OF FUTURE COMPENSATION? (E.G. 9127.585)..'
023900 INPUT PCE
023950 PRINT
024000 INPUT

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02405 PF=PB/E/PCE
02410 USING 'NORMAL COST PERCENTAGE FACTOR AS DECIMAL =###.###';PF
02415 PRINT 'IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N.'
02420 INPUT PF$
02425 IF (PF$='Y') THEN GOTO 2435
02430 IF (PF$='N') THEN GOTO 2605
02435 INPUT CURRENT FISCAL YEAR TOTAL BASE PAY (E.G. 27485.552).
02440 MC=PF*TRF
02445 INPUT TBF
02450 USING 'CURRENT YEAR ACTIVE FORCE NORMAL COST =###.###';MC
02455 PRINT 'FIRST YEAR OF NORMAL COSTING? IF YES TYPE Y IF NO TYPE N.'
02460 INPUT AN$
02465 IF (AN$='Y') THEN GOTO 2650
02470 INPUT CO YCU KNOW PREVIOUS YEAR NORMAL COST? IF YES TYPE Y IF NO TYPE N.'
02475 INPUT SE$
02480 IF (SE$='N') THEN GOTO 2490
02485 IF (SE$='Y') THEN GOTO 2620
02490 INPUT PREVIOUS YEAR NORMAL COST & FACTOR AS A DECIMAL (E.G. .432).
02495 INPUT QF
02500 INPUT PREVIOUS YEAR TOTAL BASE PAY (E.G. 22432.518).
02505 INPUT UBF
02510 VC=QF*UBF
02515 PRINT 'PREVIOUS YEAR NORMAL COST =###.###';VC
02520 MC=MC-VC
02525 USING 'CURRENT YEARS ACTUARIAL GAIN OR LOSS =###.###';MC
02530 PRINT 'ANY DEFERRED GAIN OR LOSS? IF YES TYPE Y IF NO TYPE N.'
02535 INPUT DG$
02540 IF (DG$='Y') THEN GOTO 2635
02545 IF (DG$='N') THEN GOSUB 2145
02550 PRINT 'INPUT DISCOUNT RATE AS DECIMAL (E.G. .112).
02555 INPUT GI1
02560 GI1=1/GI1*20
02565 GI1=1/GI1
02570 HI1=GI1/HI1
02575 BLIP=GI1/HI1
02580 FA=(WC+FC)*BLIP
02585 PRINT 'CURRENT YEAR GAINS/LOSSES APPLIED =###.###';FA
02590 TRC=MC+FA
02595 PRINT 'CURRENT YEAR TOTAL RETIREMENT COST =###.###';TRC
02600 GOTO 5
02605 INPUT OVERRIDE NORMAL COST & FACTOR AS DECIMAL (E.G. .553).
02610 INPUT PF
02615 INPUT PREVIOUS YEAR NORMAL COST (E.G. 4123.237).
02620 INPUT VC
02625 GOTO 2435
02630 INPUT 2520
02635 PRINT 'INPUT AMOUNT OF DEFERRED GAIN OR LOSS (E.G. 1213.456).
02640 INPUT FD

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CALCULATE RETIREMENT PAY BASIS PER YEAR OF SERVICE = ;DL
ADJUSTMENT TO LOSS AND EXPECTANCY AT RETIREMENT = ;LONG
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = ;ADJ
ADJUSTMENT TO PROBABILITY = ;PROP

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03637 PRINT 'RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = ' ; DM
03640 PRINT 'MINIMUM LOS FOR RETIREMENT = ' ; MRT
03645 GO TO 3345
03650 A=N-2
03655 FOR K=1 TO A
03660 RP=RP+IN
03665 VP=VP+RP
03670 NEXT K
03675 SP=(IN*FP)+RP
03680 PP=(SP+RP+PF)/3
03685 GO TO 3335
03690 IF (G>=20) THEN NEW=1000*OD(YS-1950)
03695 IF (G<20) THEN NEW=1000*ED(YS-1950)
03700 GO TO 3375
03705 AG=F(G)+MRT-D(G)-ADJ
03710 DELT=580** (MRT-D(G)-ADJ)
03715 GO TO 3355
03720 NC=0
03725 TRC=0
03730 GO TO 3585
03735 IF (PG$=.01C) THEN GO TO 3845
03740 IF (PG$=.09) THEN PG$=.010
03745 IF (PG$=.08) THEN PG$=.009
03750 IF (PG$=.07) THEN PG$=.008
03755 IF (PG$=.06) THEN PG$=.007
03760 IF (PG$=.05) THEN PG$=.006
03765 IF (PG$=.04) THEN PG$=.005
03770 IF (PG$=.03E) THEN PG$=.004
03775 IF (PG$=.02E) THEN PG$=.003E
03780 IF (PG$=.01E) THEN PG$=.002E
03785 IF (PG$=.W4) THEN PG$=.01E
03790 IF (PG$=.W3) THEN PG$=.W4
03795 IF (PG$=.W2) THEN PG$=.W3
03800 IF (PG$=.W1) THEN PG$=.W2
03805 IF (PG$=.E9) THEN PG$=.W1
03810 IF (PG$=.E8) THEN PG$=.E9
03815 IF (PG$=.E7) THEN PG$=.E8
03820 IF (PG$=.E6) THEN PG$=.E7
03825 IF (PG$=.E5) THEN PG$=.E6
03830 IF (PG$=.E4) THEN PG$=.E5
03835 IF (PG$=.E3) THEN PG$=.E4
03840 IF (PG$=.E2) THEN PG$=.E3
03845 IF (PG$=.E1) THEN PG$=.E2
03850 GO TO 100
03855 PRINT 'TOTAL YEAR GROUP COST = $###' ; TTRC
03860 TTTRC=TTTRC+TTRC

```

```

03855 IF YS=1982 THEN GOTO 3870
03860 YS=YS+1
03865 GOTO 3085
03870 PRINT USING 'REGULAR NAVY COST = $'
03875 PRINT USING 'REGULAR NAVY COST = $'
03880 PRINT USING 'REGULAR NAVY COST = $'
03885 GOTO 10
03890 END

```

APPENDIX B

ALTERNATIVE BASELINE LISTING

Annual Retirement Costs

<u>Yr.</u>	<u>Selected Baseline</u>	<u>DOD Actuary</u>
1953	\$.2M	\$.5M
1954	.3	.6
1955	3.3	7.2
1956	3.1	6.9
1957	5.0	11.0
1958	3.5	7.7
1959	12.7	26.7
1960	16.5	34.5
1961	17.2	35.9
1962	39.3	80.0
1963	34.5	70.4
1964	37.5	76.3
1965	41.3	84.1
1966	56.8	114.9
1967	51.7	105.6
1968	60.9	124.0
1969	72.6	147.4
1970	39.3	78.8
1971	48.4	98.8
1972	58.7	119.9
1973	56.5	114.3
1974	49.1	99.4
1975	55.8	112.9
1976	63.3	127.9
1977	69.3	139.9
1978	54.7	111.0
1979	58.7	119.4
1980	66.2	134.4
1981	71.1	144.4
1982	64.4	131.1
TRC	<u>\$1,211.9M</u>	<u>\$2,466.3M</u>

APPENDIX C

DETAILED SELECTED BASELINE

BEGIN RECORDING OF TERMINAL SESSION

R; T=0.01/0.02 15:11:34

WBASIC

YOU WILL BE LINKED TO THE BASIC VIRTUAL MACHINE AT VIRTUAL A 120 AND AT MODE B FOR THE DURATION OF YOUR BASIC SESSION.

*** WATERLOO BASIC *** V2.0

READY

OLD 'ENTRYAGE'

READY

RUN

EX-00 EXECUTION BEGINS...

THIS IS A THREE PART INTERACTIVE PROGRAM. IT CALCULATES INDIVIDUAL AND AGGREGATE MILITARY RETIREMENT COSTS. AT THIS POINT PLEASE TYPE IN IND FOR THE INDIVIDUAL METHOD COST CALCULATION AGG FOR AGGREGATE METHOD COST CALCULATIONS, OR GANG FOR EXP MULTI YEAR INDIVIDUAL COST CALCULATIONS. IF YOU WISH TO EXIT THE PROGRAM TYPE HALT. PROGRAM LOADED DATA HAS BEEN DERIVED DEPARTMENT OF DEFENSE SOURCES AND CONSIDERS 1983 TO BE THE C YEAR. PLEASE ENTER YOUR PROGRAM CHOICE AT THIS TIME.

?

GANG

YOU ARE NOW IN THE MULTIYEAR EXPANDED INDIVIDUAL NORMAL COST PORTION OF THE PROGRAM. NOTE THAT IN THIS SECTION AN ANSWER AN ADJUSTMENT QUESTION OF 0 MEANS NO CHANGE.

INPUT DESIRED DISCOUNT RATE AS DECIMAL (E.G. .08).

?

.09
INPUT DESIRED RATE OF SALARY INCREASE AS DECIMAL (E.G. .055)

?

.055
INPUT DESIRED % RATE OF RETIRED PAY PER YEAR OF DUTY (E.G. .

?

.025
INPUT DESIRED MAXIMUM % OF PAY BASIS AT RETIREMENT (E.G. .75

?

.75
INPUT MINIMUM LCS REQUIRED TO RETIRE (E.G. 20).

?

.20
INPUT ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY (E.G. -.0

?

0
INPUT ADJUSTMENT TO LOS AND AGE AT RETIREMENT (E.G. -2).

?

0
INPUT ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT (E.G. +3).

?

0
IF YOU WISH TO SEE ONLY SUMMARY TOTALS, TYPE SUM.

IF YOU WISH TO SEE FULL DETAIL, TYPE DETAIL.

?

DETAIL

YEAR OF ENTRY = 1953

DISCOUNT RATE = .09

SALARY SCALE ESTIMATOR = .055

ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0

ADJUSTMENT TO LOS AND AGE AT RETIREMENT = 0

ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0

RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025

RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75

MINIMUM LOS FOR RETIREMENT = 20

PAYGRADE NORMAL COST TOTAL COST

E1

C

0

E2

C

0

PAYGRADE	NORMAL COST	TOTAL COST
----------	-------------	------------

E1	C	0
E2	C	0
E3	C	0
E4	C	0
E5	C	0
E6	C	0
E7	C	0
E8	C	0
E9	C	0
E10	C	0
E11	C	0
E12	C	0
E13	C	0
E14	C	0
E15	C	0
E16	C	0
E17	C	0
E18	C	0
E19	C	0
E20	C	0
E21	C	0
E22	C	0
E23	C	0
E24	C	0
E25	C	0
E26	C	0
E27	C	0
E28	C	0
E29	C	0
E30	C	0
E31	C	0
E32	C	0
E33	C	0
E34	C	0
E35	C	0
E36	C	0
E37	C	0
E38	C	0
E39	C	0
E40	C	0
E41	C	0
E42	C	0
E43	C	0
E44	C	0
E45	C	0
E46	C	0
E47	C	0
E48	C	0
E49	C	0
E50	C	0
E51	C	0
E52	C	0
E53	C	0
E54	C	0
E55	C	0
E56	C	0
E57	C	0
E58	C	0
E59	C	0
E60	C	0
E61	C	0
E62	C	0
E63	C	0
E64	C	0
E65	C	0
E66	C	0
E67	C	0
E68	C	0
E69	C	0
E70	C	0
E71	C	0
E72	C	0
E73	C	0
E74	C	0
E75	C	0
E76	C	0
E77	C	0
E78	C	0
E79	C	0
E80	C	0
E81	C	0
E82	C	0
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E84	C	0
E85	C	0
E86	C	0
E87	C	0
E88	C	0
E89	C	0
E90	C	0
E91	C	0
E92	C	0
E93	C	0
E94	C	0
E95	C	0
E96	C	0
E97	C	0
E98	C	0
E99	C	0
E100	C	0
E101	C	0
E102	C	0
E103	C	0
E104	C	0
E105	C	0
E106	C	0
E107	C	0
E108	C	0
E109	C	0
E110	C	0
E111	C	0
E112	C	0
E113	C	0
E114	C	0
E115	C	0
E116	C	0
E117	C	0
E118	C	0
E119	C	0
E120	C	0
E121	C	0
E122	C	0
E123	C	0
E124	C	0
E125	C	0
E126	C	0
E127	C	0
E128	C	0
E129	C	0
E130	C	0
E131	C	0
E132	C	0
E133	C	0
E134	C	0
E135	C	0
E136	C	0
E137	C	0
E138	C	0
E139	C	0
E140	C	0
E141	C	0
E142	C	0
E143	C	0
E144	C	0
E145	C	0
E146	C	0
E147	C	0
E148	C	0
E149	C	0
E150	C	0
E151	C	0
E152	C	0
E153	C	0
E154	C	0
E155	C	0
E156	C	0
E157	C	0
E158	C	0
E159	C	0
E160	C	0
E161	C	0
E162	C	0
E163	C	0
E164	C	0
E165	C	0
E166	C	0
E167	C	0
E168	C	0
E169	C	0
E170	C	0
E171	C	0
E172	C	0
E173	C	0
E174	C	0
E175	C	0
E176	C	0
E177	C	0
E178	C	0
E179	C	0
E180	C	0
E181	C	0
E182	C	0
E183	C	0
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E187	C	0
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E192	C	0
E193	C	0
E194	C	0
E195	C	0
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E197	C	0
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E199	C	0
E200	C	0
E201	C	0
E202	C	0
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E207	C	0
E208	C	0
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E214	C	0
E215	C	0
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E222	C	0
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E225	C	0
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E227	C	0
E228	C	0
E229	C	0
E230	C	0
E231	C	0
E232	C	0
E233	C	0
E234	C	0
E235	C	0
E236	C	0
E237	C	0
E238	C	0
E239	C	0
E240	C	0
E241	C	0
E242	C	0
E243	C	0
E244	C	0
E245	C	0
E246	C	0
E247	C	0
E248	C	0
E249	C	0
E250	C	0
E251	C	0
E252	C	0
E253	C	0
E254	C	0
E255	C	0
E256	C	0
E257	C	0
E258	C	0
E259	C	0
E260	C	0
E261	C	0
E262	C	0
E263	C	0
E264	C	0
E265	C	0
E266	C	0
E267	C	0
E268	C	0
E269	C	0
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E273	C	0
E274	C	0
E275	C	0
E276	C	0
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E278	C	0
E279	C	0
E280	C	0
E281	C	0
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E289	C	0
E290	C	0
E291	C	0
E292	C	0
E293	C	0
E294	C	0
E295	C	0
E296	C	0
E297	C	0
E298	C	0
E299	C	0
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E301	C	0
E302	C	0
E303	C	0
E304	C	0
E305	C	0
E306	C	0
E307	C	0
E308	C	0
E309	C	0
E310	C	0
E311	C	0
E312	C	0
E313	C	0
E314	C	0
E315	C	0
E316	C	0
E317	C	0
E318	C	0
E319	C	0
E320	C	0
E321	C	0
E322	C	0
E323	C	0
E324	C	0
E325	C	0
E326	C	0
E327	C	0
E328	C	0
E329	C	0
E330	C	0
E331	C	0
E332	C	0
E333	C	0
E334	C	0
E335	C	0
E336	C	0
E337	C	0
E338	C	0
E339	C	0
E340	C	0
E341	C	0
E342	C	0
E343	C	0
E344	C	0
E345	C	0
E346	C	0
E347	C	0
E348	C	0
E349	C	0
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E351	C	0
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E377	C	0
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E385	C	0
E386	C	0
E387	C	0
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E389	C	0
E390	C	0
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E393	C	0
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E463	C	0
E464	C	0
E465	C	0
E466	C	0
E467	C	0
E468	C	0
E469	C	0
E470	C	0
E471	C	0
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E473	C	0
E474	C	0
E475	C	0
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E488	C	0
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E492	C	0
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E495	C	0
E496	C	0
E497	C	0
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E506	C	0
E507	C	0
E508	C	0
E509	C	0
E510	C	0
E511	C	0
E512	C	0
E513	C	0
E514	C	0
E515	C	0
E516	C	0

RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

PAYGRADE	NORMAL COST	TOTAL COST
E1		0
E2		0
E3		0
E4		0
E5		0
E6		0
E7		0
E8		0
E9		0
E10		0
E11		0
E12		0
E13		0
E14		0
E15		0
O1		0
O2		0
O3		0
O4		0
O5		0
O6	33	4652296
O7	35	37664
O8	36	267916
O9	35	56852
O10	34	11217
TOTAL YEAR GROUP COST		\$ 5025944

YEAR OF ENTRY = 1958
 DISCOUNT RATE = .09
 SALARY SCALE ESTIMATOR = .055
 ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
 ADJUSTMENT TO LOS AND AGE AT RETIREMENT = 0
 ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
 RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

PAYGRADE	NORMAL COST	TOTAL COST
E1		0
E2		0
E3		0
E4		0
E5		0
E6		0
E7		0
E8		0
E9		0
E10		0
E11		0
E12		0
E13		0
E14		0
E15		0
O1		0
O2		0
O3		0
O4		0
O5		0
O6	35	3259905
O7	37	26391
O8	38	187731
O9	37	39836
O10	36	7860
TOTAL YEAR GROUP COST		\$ 3521724

YEAR OF ENTRY = 1959
 DISCOUNT RATE = .09
 SALARY SCALE ESTIMATOR = .055

ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
 ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0
 ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
 RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

PAYGRADE	NORMAL COST	TOTAL COST
E1	0	0
E2	0	0
E3	0	0
E4	0	0
E5	0	0
E6	0	0
E7	0	0
E8	0	0
E9	1937	1096514
W1	0	0
W2	0	0
W3	0	0
W4	0	0
O1	0	0
O2	0	0
O3	2356	615500
O4	2657	3713331
O5	3022	3549206
O6	3736	3439200
O7	3911	27843
O8	4031	198057
O9	3935	42027
O10	3882	8292
TOTAL YEAR GROUP COST	= \$	12689970

YEAR OF ENTRY = 1960
 DISCOUNT RATE = .09
 SALARY SCALE ESTIMATOR = .055
 ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
 ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0
 ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
 RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

PAYGRADE	NORMAL COST	TOTAL COST
E1	0	0
E2	0	0
E3	0	0
E4	0	0
E5	0	0
E6	0	0
E7	0	0
E8	0	0
E9	2044	1223768
W1	0	0
W2	0	0
W3	2158	241434
W4	0	0
O1	0	0
O2	0	0
O3	2485	686931
O4	2803	4841933
O5	3188	4627925
O6	3941	4484485
O7	4126	36305
O8	4253	258252
O9	4152	54801
O10	4056	10812
TOTAL YEAR GROUP COST	= \$	16466648

YEAR OF ENTRY = 1961
 DISCOUNT RATE = .09
 SALARY SCALE ESTIMATOR = .055
 ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
 ADJUSTMENT TO LOS AND AGE AT RETIREMENT = 0
 ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
 RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

PAYGRADE	NORMAL COST	TOTAL COST
E1	0	0
E2	0	0
E3	0	0
E4	0	0
E5	0	0
E6	0	0
E7	0	0
E8	18 79	21456 62
E9	21 56	13306 27
W1	18 27	10328 2
W2	19 73	37905 4
W3	22 77	26251 6
W4	23 39	34114 7
O1	0	0
O2	21 73	10810 4
O3	26 22	74691 4
O4	29 57	39937 15
O5	33 64	38171 97
O6	41 58	36988 85
O7	43 53	2994 5
O8	44 67	21301 1
O9	43 60	4520 1
O10	43 21	8918

TOTAL YEAR GROUP COST = \$ 17224177

YEAR OF ENTRY = 1962
 DISCOUNT RATE = .09
 SALARY SCALE ESTIMATOR = .055
 ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
 ADJUSTMENT TO LOS AND AGE AT RETIREMENT = 0
 ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
 RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

PAYGRADE	NORMAL COST	TOTAL COST
E1	0	0
E2	0	0
E3	0	0
E4	10 37	17099 9
E5	12 66	95830 2
E6	15 16	53405 49
E7	16 55	90213 71
E8	19 53	25808 76
E9	22 74	16005 23
W1	19 28	12423 1
W2	20 61	45593 9
W3	24 02	31576 4
W4	24 68	41034 3
O1	19 10	738 5
O2	22 53	13003 2
O3	27 66	89841 3
O4	31 20	58301 27
O5	35 49	55724 42
O6	43 67	53997 27
O7	45 52	4371 5
O8	47 34	31095 9
O9	46 21	6598 5

010	4558	13019
TOTAL YEAR GROUP COST = \$ 39250701		

YEAR OF ENTRY = 1963		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	682	698
E2	779	797
E3	859	21168
E4	1054	143282
E5	1357	802971
E6	1559	4474898
E7	1746	7559094
E8	2092	2162541
E9	2400	1341094
W1	2034	104094
W2	2155	382036
W3	2534	264581
W4	2604	343830
O1	2015	6188
O2	2419	108955
O3	2918	752789
O4	3251	5427162
O5	3744	5187288
O6	4628	5026510
O7	4844	40693
O8	4954	289467
O9	4875	61425
O10	4809	12119
TOTAL YEAR GROUP COST = \$ 34513680		

YEAR OF ENTRY = 1964		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	720	820
E2	821	936
E3	949	24872
E4	1154	168352
E5	1432	943467
E6	1687	5257874
E7	1842	8881714
E8	2207	2540923
E9	2532	1575746
W1	2146	122307
W2	2316	448881
W3	2677	310875
W4	2747	403991
O1	2126	7270
O2	2552	128019
O3	3079	884505
O4	3472	5343946
O5	3950	5107749
O6	4882	4949437

07	5111	40070
08	5249	285028
09	5143	60483
010	5074	11933
TOTAL YEAR GROUP COST = \$ 37499199		

YEAR OF ENTRY = 1965		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	759	859
E2	867	981
E3	1001	26047
E4	1217	176303
E5	1511	988024
E6	1780	5506184
E7	1944	9301105
E8	2328	2660921
E9	2671	1650163
E1	2264	128084
E2	2444	470080
E3	2821	325557
E4	2858	423070
E001E	2243	7614
E002E	2643	134065
E003E	3248	926277
E004	3663	6270684
E005	4167	5993527
E006	5151	5807760
E007	5362	47018
E008	5559	334457
E009	5426	70972
E010	5353	14003
TOTAL YEAR GROUP COST = \$ 41263811		

YEAR OF ENTRY = 1966		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	801	1400
E2	914	1598
E3	1056	42457
E4	1284	287382
E5	1564	1610526
E6	1878	8975342
E7	2050	15161343
E8	2456	4337428
E9	2818	2689844
E1	2358	208782
E2	2578	766252
E3	2976	530673
E4	3058	689624
E001E	2366	12411
E002E	2841	218532
E003E	3427	1509876

04	3865	6676265
05	4356	6381181
06	5434	6183400
07	56E9	50059
08	5864	356090
09	5724	75562
010	5647	14908
TOTAL YEAR GROUP COST = \$		56780937

YEAR OF ENTRY = 1967		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LGS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	845	1025
E2	965	1170
E3	1114	31081
E4	13E5	210379
E5	16E1	1178994
E6	19E1	6570449
E7	21E3	11098946
E8	25E1	3175239
E9	29E3	1969116
W1	25E0	152840
W2	27E0	560939
W3	31E9	388482
W4	32E6	504843
O1	24E6	5085
O2	29E7	159977
O3	36E5	1105313
O4	40E7	8324088
O5	46E8	7956173
O6	57E3	7709575
O7	60E1	62415
O8	61E7	443979
O9	60E9	94212
O10	59E8	18588
TOTAL YEAR GROUP COST = \$		51726911

YEAR OF ENTRY = 1968		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LGS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	852	1314
E2	1018	1500
E3	1175	39829
E4	1429	269590
E5	1774	1510815
E6	2050	8419664
E7	2282	14222679
E8	2734	4068891
E9	31E6	2523312
W1	26E8	195856
W2	28E9	718812
W3	33E2	497818
W4	34E3	646928

01E	2634	11643
002E	3142	205002
003E	3814	1416397
004E	43C2	8849466
005E	4853	8458330
006E	6049	8196168
007E	6332	66354
008E	6547	472001
009E	6371	100158
010E	62E5	19761
TOTAL YEAR GROUP COST = \$ 60912287		

YEAR OF ENTRY = 1949		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	941	1660
E2	1074	1895
E3	1240	50334
E4	15C8	340698
E5	1871	1909318
E6	22C5	10640487
E7	24C8	17974142
E8	28E4	5142127
E9	33C9	3188876
W1	28C4	247517
W2	3027	908411
W3	3454	629126
W4	3550	817566
01E	2778	14713
002E	3326	229075
003E	4024	1789995
004E	4538	9692530
005E	5162	9264131
006E	6381	8976994
007E	66E0	72676
008E	68E6	516967
009E	6722	109700
010E	6621	21644
TOTAL YEAR GROUP COST = \$ 72570581		

YEAR OF ENTRY = 1970		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	952	1193
E2	1133	1362
E3	13C8	36172
E4	1551	244837
E5	1974	1372100
E6	2326	7646611
E7	2540	12916822
E8	3043	3695305
E9	3451	2291634
W1	2959	177874

W2	3154	652814
W3	3686	452111
W4	3788	587530
01E	2931	10574
002E	3519	186180
003E	4245	1286350
004	4788	2631593
005	5446	2515280
006	6732	2437320
007	7047	19732
008	7265	140360
009	7052	29784
010	6956	5876
TOTAL YEAR GROUP COST = \$		39339415

YEAR OF ENTRY = 1971		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LGS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	1047	989
E2	1155	1128
E3	1380	29973
E4	1678	202879
E5	2083	1136960
E6	2454	6336194
E7	2660	10703237
E8	3210	3062033
E9	3683	1898911
E10	3121	147391
E11	3369	540940
E12	3889	374632
E13	3956	486844
E14	3052	8762
0000E	3713	154274
0000E	4479	1065906
0000E	5051	7535755
0000E	5746	7202683
0000E	7102	6979440
0000E	7435	56504
0000E	7665	401932
0000E	7482	85290
0000E	7381	16828
TOTAL YEAR GROUP COST = \$		48429482

YEAR OF ENTRY = 1972		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LGS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	1104	1182
E2	1261	1349
E3	1456	35841
E4	1771	242594
E5	2167	1359527
E6	2589	7576543
E7	2827	12798460

E8	33E7	3661444
E9	38E5	2270634
W1	32E3	176244
W2	35E5	646832
W3	41C3	447968
W4	4216	582146
O1	32E3	10477
O2	3917	184474
O3	47E5	1274563
O4	53E9	9289206
O5	60E2	8878634
O6	74E3	8603445
O7	7844	69652
O8	80E6	495455
O9	78E3	105135
O10	77E6	20743
TOTAL YEAR GROUP COST = \$		58732548

YEAR OF ENTRY = 1973		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	11E5	1384
E2	13E0	1580
E3	15E6	41966
E4	18E8	284055
E5	2318	1591881
E6	27E1	8871435
E7	29E3	14985820
E8	35E3	4287214
E9	40E9	2658704
W1	34E4	206365
W2	37E0	757381
W3	43E9	524530
W4	44E8	681640
O1	34E2	12267
O2	41E2	216002
O3	49E5	1492396
O4	56E2	6709987
O5	63E5	6413413
O6	79E5	6214633
O7	82E5	50312
O8	85E1	357888
O9	83E7	75944
O10	82E5	14984
TOTAL YEAR GROUP COST = \$		56451781

YEAR OF ENTRY = 1974		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE	NORMAL COST	TOTAL COST
E1	12E9	1233
E2	14E3	1408
E3	16E0	37387
E4	19E1	253061

PAYGRADE	YEAR OF ENTRY	DISCOUNT RATE	SALARY SCALE ESTIMATOR	ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY	ADJUSTMENT TO LCS AND AGE AT RETIREMENT	ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT	RETIREMENT PAY BASIS PER YEAR OF SERVICE	RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC	MINIMUM LOS FOR RETIREMENT	TOTAL YEAR GROUP COST	TOTAL COST
E1	1975	.09	.055	0	0	0	.025	.75	20	1297	1396
E2	1975	.09	.055	0	0	0	.025	.75	20	1460	1593
E3	1975	.09	.055	0	0	0	.025	.75	20	1709	42321
E4	1975	.09	.055	0	0	0	.025	.75	20	2079	286460
E5	1975	.09	.055	0	0	0	.025	.75	20	2560	1605361
E6	1975	.09	.055	0	0	0	.025	.75	20	3040	8946559
E7	1975	.09	.055	0	0	0	.025	.75	20	3320	15112722
E8	1975	.09	.055	0	0	0	.025	.75	20	3977	4323519
E9	1975	.09	.055	0	0	0	.025	.75	20	4562	2681218
E10	1975	.09	.055	0	0	0	.025	.75	20	3867	208113
E11	1975	.09	.055	0	0	0	.025	.75	20	4174	763795
E12	1975	.09	.055	0	0	0	.025	.75	20	4818	528971
E13	1975	.09	.055	0	0	0	.025	.75	20	4951	687412
E14	1975	.09	.055	0	0	0	.025	.75	20	3831	12371
E15	1975	.09	.055	0	0	0	.025	.75	20	4559	217831
E16	1975	.09	.055	0	0	0	.025	.75	20	5548	1505034
E17	1975	.09	.055	0	0	0	.025	.75	20	6258	6387433
E18	1975	.09	.055	0	0	0	.025	.75	20	7118	6105116
E19	1975	.09	.055	0	0	0	.025	.75	20	8759	5915891
E20	1975	.09	.055	0	0	0	.025	.75	20	9210	47894
E21	1975	.09	.055	0	0	0	.025	.75	20	9455	340684
E22	1975	.09	.055	0	0	0	.025	.75	20	9268	72293
E23	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E24	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E25	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E26	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E27	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E28	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E29	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E30	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E31	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E32	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E33	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E34	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E35	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E36	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E37	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E38	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E39	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E40	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E41	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E42	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E43	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E44	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E45	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E46	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E47	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E48	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E49	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E50	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E51	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E52	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E53	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E54	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E55	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E56	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E57	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E58	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E59	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E60	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E61	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E62	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E63	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E64	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E65	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E66	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E67	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E68	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E69	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E70	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E71	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E72	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E73	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E74	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E75	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E76	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E77	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E78	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E79	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E80	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E81	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E82	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E83	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E84	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E85	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E86	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E87	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E88	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E89	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E90	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E91	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E92	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E93	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E94	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E95	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E96	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E97	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E98	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E99	1975	.09	.055	0	0	0	.025	.75	20	9143	14263
E100	1975	.09	.055	0	0	0	.025	.75	20	9143	14263

2	1562	1859
3	1803	49378
4	2193	334223
5	2722	1873028
6	32C7	10438251
7	35C3	17632520
8	4196	5044394
9	4813	3128267
W1	40E0	242812
W2	44C4	891145
W3	50E3	617169
W4	5223	802027
01	4042	14434
02	4852	254151
03	5854	1755974
04	66C2	6842415
05	75C9	6539988
06	92E3	6337284
07	9717	51305
08	10C17	364951
09	9778	77442
010	9646	15279
TOTAL YEAR GROUP COST = \$		63309925

YEAR OF ENTRY = 1977		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		
MINIMUM LOS FOR RETIREMENT = 20		
PAYGRADE NORMAL COST		TOTAL COST
E1	1443	1814
E2	1648	2070
E3	1903	54982
E4	2314	372155
E5	2872	2085604
E6	3384	11622919
E7	3655	19633686
E8	4426	5616898
E9	5078	3483304
W1	43C4	270370
W2	4646	992284
W3	5362	687213
W4	5510	893051
01	4264	16072
02	5119	282995
03	6176	1955264
04	6965	7218748
05	7922	6899687
06	9793	6685835
07	10251	54127
08	10568	385024
09	10316	81702
010	10177	16120
TOTAL YEAR GROUP COST = \$		69311921

YEAR OF ENTRY = 1978		
DISCOUNT RATE = .09		
SALARY SCALE ESTIMATOR = .055		
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0		
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0		
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0		
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025		
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75		

MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

E1	1523	1281
E2	1738	1462
E3	20C7	38837
E4	2441	262874
E5	3030	1473179
E6	3570	8209921
E7	3898	13868377
E8	4670	3967531
E9	5357	2460453
E10	4541	190977
E11	49C1	700906
E12	5657	485417
E13	5813	630812
E14	44C9	11353
E15	54C1	199895
E16	6515	1381113
E17	7348	7038826
E18	8358	6727718
E19	10332	6519195
E20	10E15	52778
E21	11150	375427
E22	10E83	79665
E23	10736	15718

TOTAL YEAR GROUP COST = \$ 54693717

YEAR OF ENTRY = 1979

DISCOUNT RATE = .09

SALARY SCALE ESTIMATOR = .055

ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0

ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0

ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0

RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025

RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75

MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

E1	16C7	1265
E2	1834	1444
E3	2118	38342
E4	2576	259529
E5	3157	1454434
E6	3766	8105453
E7	4113	13691907
E8	4927	3917045
E9	5652	2429145
E10	4750	188547
E11	5171	691987
E12	5969	479240
E13	6133	622785
E14	4746	11208
E15	5658	197352
E16	6874	1363539
E17	7752	8521595
E18	8818	8144950
E19	10500	7892501
E20	11410	63896
E21	11763	454513
E22	11482	96447
E23	11327	19029

TOTAL YEAR GROUP COST = \$ 58646153

YEAR OF ENTRY = 1980

DISCOUNT RATE = .09

SALARY SCALE ESTIMATOR = .055

ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0

ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0

AD-A138 210

A SENSITIVITY ANALYSIS OF ENTRY AGE NORMAL MILITARY
RETIREMENT COSTS(U) NAVAL POSTGRADUATE SCHOOL MONTEREY
CA D F SMITH SEP 83

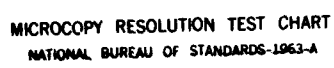
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
 RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

E1	1655	1528
E2	1935	1743
E3	2234	46309
E4	2717	313454
E5	3312	1756639
E6	3973	9789620
E7	4339	16536838
E8	5158	4730937
E9	5962	2933878
W1	5054	227724
W2	5455	835770
W3	6257	578818
W4	6470	752189
O1	50C7	13537
O2	6011	238358
O3	7252	1646858
O4	8178	8733417
O5	93C3	8347410
O6	11500	8088686
O7	12038	65484
O8	12410	465811
O9	12113	98845
O10	11550	19502

TOTAL YEAR GROUP COST = \$ 66223355

 YEAR OF ENTRY = 1981
 DISCOUNT RATE = .09
 SALARY SCALE ESTIMATOR = .055
 ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
 ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0
 ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
 RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20
 PAYGRADE NORMAL COST TOTAL COST

E1	1657	1610
E2	1936	1838
E3	2236	48823
E4	2720	330465
E5	3376	1851970
E6	3977	10320893
E7	4343	17434276
E8	52C3	4987680
E9	5968	3093096
W1	5059	240082
W2	5460	881126
W3	63C3	610230
W4	6476	793010
O1	5012	14272
O2	6017	251293
O3	7259	1736231
O4	81E6	9641652
O5	9311	9215502
O6	11511	8929872
O7	12C49	72294
O8	12422	514253
O9	12125	109124
O10	11561	21530

TOTAL YEAR GROUP COST = \$ 71101122

 YEAR OF ENTRY = 1982
 DISCOUNT RATE = .09

SALARY SCALE ESTIMATOR = .055
 ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
 ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0
 ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
 RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
 RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
 MINIMUM LOS FOR RETIREMENT = 20

PAYGRADE	NORMAL COST	TOTAL COST
E1	1750	1373
E2	2043	1567
E3	2349	41610
E4	2870	281645
E5	3561	1578377
E6	4156	8796180
E7	4582	14858698
E8	5489	4250846
E9	6256	2636151
E10	5337	204615
E11	5761	750957
E12	6649	520080
E13	6833	675858
E14	5267	12163
O01E	6348	214169
O02E	7658	1479736
O03E	8636	9493813
O04	9824	9074197
O05	12144	8792947
O06	12712	71186
O07	13105	506368
O08	12792	107451
O09	12619	21200
O10		

TOTAL YEAR GROUP COST = \$ 64371187

 REGULAR NAVY COST = \$ 1211916102

THIS IS A THREE PART INTERACTIVE PROGRAM. IT CALCULATES INDIVIDUAL AND AGGREGATE MILITARY RETIREMENT COSTS. AT THIS POINT PLEASE TYPE IN IND FOR THE INDIVIDUAL METHOD COST CALCULATION, AGG FOR AGGREGATE METHOD COST CALCULATIONS, OR GANG FOR EXP MULTI YEAR INDIVIDUAL COST CALCULATIONS. IF YOU WISH TO EXIT THE PROGRAM TYPE HALT. PROGRAM LOADED DATA HAS BEEN DERIVED DEPARTMENT OF DEFENSE SOURCES AND CONSIDERS 1983 TO BE THE CURRENT YEAR. PLEASE ENTER YOUR PROGRAM CHOICE AT THIS TIME.

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 HALT
 EX-01 ...EXECUTION ENDS
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 END RECORDING OF TERMINAL SESSION

APPENDIX D

DISCOUNT RATE LISTING

Annual Retirement Costs

(Baseline = 9%)

<u>Yr</u>	<u>5%</u>	<u>0%</u>	<u>7%</u>	<u>8%</u>	<u>9%</u>	<u>10%</u>
1953	\$.7M	\$.5M	\$.4M	\$.3M	\$.2M	\$.2M
1954	.8	.6	.5	.4	.3	.2
1955	9.3	7.2	5.5	4.2	3.3	2.5
1956	8.9	6.9	5.3	4.1	3.1	2.4
1957	14.4	11.0	8.5	6.5	5.0	3.9
1958	10.1	7.7	5.9	4.6	3.5	2.7
1959	34.6	26.7	20.8	16.2	12.7	10.0
1960	44.9	34.5	27.0	21.0	16.5	12.9
1961	46.3	35.9	28.0	21.9	17.2	13.6
1962	102.4	80.0	62.8	49.5	39.3	31.2
1963	90.2	70.4	55.3	43.6	34.5	27.5
1964	97.7	76.3	59.9	47.3	37.5	29.9
1965	107.7	84.1	66.0	52.1	41.3	32.8
1966	146.9	114.9	90.4	71.5	56.8	45.3
1967	135.3	105.6	82.9	65.3	51.7	41.1
1968	158.7	124.0	97.4	76.8	60.9	48.5
1969	188.5	147.4	115.8	91.5	72.6	57.8
1970	100.5	78.8	62.2	49.3	39.3	31.5
1971	126.5	98.8	77.5	61.1	48.4	38.5
1972	153.6	119.9	94.1	74.1	58.7	46.7
1973	146.1	114.3	89.9	71.1	56.5	45.0
1974	127.0	99.4	78.2	61.9	49.1	39.2
1975	144.3	112.9	88.8	70.2	55.8	44.5
1976	163.4	127.9	100.7	79.7	63.3	50.5
1977	178.7	139.9	110.2	87.2	69.3	55.4
1978	141.9	111.0	87.2	68.9	54.7	43.6
1979	152.8	119.4	93.7	74.0	58.7	46.7
1980	172.0	134.4	105.7	83.5	66.2	52.8
1981	184.8	144.4	113.5	89.6	71.1	56.6
1982	167.8	131.1	102.9	81.2	64.4	51.2
TTC	<u>\$3,156.9M</u>	<u>\$2,466.3M</u>	<u>\$1,936.6M</u>	<u>\$1,528.6M</u>	<u>\$1,211.9M</u>	<u>\$965.0M</u>

APPENDIX D (Continued)

DISCOUNT RATE LISTING

Annual Retirement Costs

(Baseline = 9%)

<u>Yr.</u>	<u>11%</u>	<u>12%</u>	<u>13%</u>	<u>14%</u>	<u>15%</u>
1953	\$.1M	\$.1M	\$.1M	\$.1M	\$.1M
1954	.2	.1	.1	.1	.1
1955	2.0	1.5	1.2	.9	.7
1956	1.9	1.5	1.1	.9	.7
1957	3.0	2.3	1.8	1.4	1.1
1958	2.1	1.6	1.3	1.0	.7
1959	7.9	6.2	4.9	3.9	3.1
1960	10.2	8.1	6.4	5.1	4.1
1961	10.8	8.5	6.8	5.4	4.4
1962	25.0	20.0	16.1	13.0	1.1
1963	21.9	17.6	14.1	11.4	9.2
1964	23.9	19.2	15.4	12.5	10.1
1965	26.2	21.0	16.9	13.7	11.1
1966	36.3	29.2	23.5	19.1	15.5
1967	32.8	26.3	21.1	17.1	13.8
1968	38.8	31.1	25.0	20.2	16.4
1969	46.3	37.2	30.0	24.2	19.6
1970	25.3	20.4	16.6	13.5	11.0
1971	30.8	24.7	19.9	16.0	13.0
1972	37.3	29.9	24.1	19.4	15.7
1973	36.1	29.0	23.4	18.9	15.4
1974	31.4	25.3	20.4	16.5	13.4
1975	35.7	28.7	23.2	18.8	15.2
1976	40.5	32.6	26.3	21.3	17.3
1977	44.4	35.7	28.9	23.4	19.0
1978	34.9	28.0	22.6	18.3	14.8
1979	37.3	30.0	24.1	19.5	15.8
1980	42.2	33.9	27.3	22.1	17.9
1981	45.3	36.4	29.3	23.7	19.2
1982	<u>41.0</u>	<u>32.9</u>	<u>26.5</u>	<u>21.4</u>	<u>17.3</u>
TRC	<u>\$771.5M</u>	<u>\$619.1M</u>	<u>\$498.6M</u>	<u>\$402.9M</u>	<u>\$326.6M</u>

APPENDIX E

SALARY INCREASE LISTING

Annual Retirement Costs

(Baseline = 5.5%)

<u>Yr</u>	<u>2.5%</u>	<u>3.0%</u>	<u>3.5%</u>	<u>4.0%</u>	<u>4.5%</u>	<u>5.0%</u>
1953	\$.2M	\$.2M	\$.2M	\$.2M	\$.2M	\$.2M
1954	.3	.3	.3	.3	.3	.3
1955	3.3	3.3	3.3	3.3	3.3	3.3
1956	3.0	3.0	3.1	3.1	3.1	3.1
1957	4.7	4.8	4.8	4.9	4.9	5.0
1958	3.2	3.3	3.3	3.4	3.4	34.7
1959	12.3	12.3	12.4	12.5	12.5	12.6
1960	15.5	15.6	15.8	16.0	16.1	16.3
1961	16.0	16.2	16.4	16.6	16.8	17.0
1962	36.9	37.3	37.6	38.0	38.4	38.8
1963	31.4	31.9	32.4	32.9	33.4	34.0
1964	33.3	34.0	34.7	35.3	36.1	36.8
1965	35.5	36.4	37.3	38.3	39.3	40.2
1966	48.0	49.4	50.8	52.2	53.7	55.2
1967	41.9	43.4	45.0	46.6	48.2	49.9
1968	48.2	50.1	52.1	54.2	56.4	58.6
1969	56.0	58.5	61.1	63.8	66.6	69.5
1970	30.1	31.5	32.9	34.4	36.0	37.6
1971	35.0	37.0	39.0	41.2	43.5	45.9
1972	41.2	43.8	46.4	49.2	52.2	55.4
1973	39.0	41.5	44.1	47.0	49.9	53.1
1974	33.0	35.3	37.7	40.3	43.1	46.0
1975	36.4	39.2	42.0	45.1	48.5	52.0
1976	40.3	43.4	46.9	50.5	54.5	58.7
1977	42.9	46.5	50.4	54.6	59.1	64.0
1978	32.6	35.6	38.8	42.3	46.1	50.2
1979	33.8	37.1	40.7	44.6	48.9	53.5
1980	37.2	41.0	45.2	49.7	54.7	60.2
1981	39.9	44.0	48.4	53.3	58.7	64.6
1982	35.0	38.7	43.0	47.5	52.6	58.2
TRC	<u>\$866.3M</u>	<u>\$914.5M</u>	<u>\$966.1M</u>	<u>\$1,021.3M</u>	<u>\$1,080.6M</u>	<u>\$1,143.9M</u>

APPENDIX E (Continued)

SALARY INCREASE LISTING

Annual Retirement Costs

(Baseline - 5.5%)

<u>Yr</u>	<u>5.5%</u>	<u>6.0%</u>	<u>6.5%</u>	<u>7.0%</u>	<u>7.5%</u>
1953	\$.2M	\$.2M	\$.2M	\$.2M	\$.2M
1954	.3	.3	.3	.3	.3
1955	3.3	3.3	3.3	3.3	3.3
1956	3.1	3.1	3.2	3.2	3.2
1957	5.0	5.1	5.1	5.2	5.2
1958	3.5	3.6	3.6	3.7	3.7
1959	12.7	12.8	12.8	12.9	13.0
1960	16.5	16.6	16.8	17.0	17.2
1961	17.2	17.4	17.7	17.9	18.1
1962	39.3	39.7	40.1	40.5	41.0
1963	34.5	35.1	35.6	36.2	36.8
1964	37.5	38.2	39.0	39.8	40.6
1965	41.3	42.3	43.4	44.5	45.6
1966	56.8	58.4	60.0	61.8	63.5
1967	51.7	53.6	55.5	57.4	59.5
1968	60.9	63.3	65.8	68.4	71.1
1969	72.6	75.8	79.1	82.5	86.1
1970	39.3	41.1	43.0	44.9	46.9
1971	48.4	51.1	53.9	56.9	60.0
1972	58.7	62.3	66.0	70.0	74.1
1973	56.5	60.0	63.8	67.8	72.0
1974	49.1	52.5	56.0	59.8	63.8
1975	55.8	59.9	64.2	68.9	73.8
1976	63.3	68.2	73.5	79.1	85.2
1977	69.3	75.0	81.2	87.9	95.0
1978	54.7	59.6	64.8	70.6	76.8
1979	58.7	64.2	70.3	76.9	84.2
1980	66.2	72.8	80.0	87.9	96.6
1981	71.1	78.2	86.0	94.5	103.9
1982	64.4	71.2	78.7	87.0	96.1
TRC	<u>\$1,211.9M</u>	<u>\$1,284.9M</u>	<u>\$1,362.9M</u>	<u>\$1,446.7M</u>	<u>\$1,536.6M</u>

APPENDIX F

LENGTH OF SERVICE LISTING

Annual Retirement Costs

(Baseline = 0)

<u>Yr</u>	<u>-3 Yrs</u>	<u>-2 Yrs</u>	<u>-1 Yr</u>	<u>0</u>	<u>+1 Yr</u>	<u>+2 Yrs</u>	<u>+3 Yrs</u>
1953 \$	0.0M \$	0.0M \$	0.0M \$	.2M \$	.3M \$	3.5M \$	3.3M
1954	0.0	0.0	.3	.3	3.6	3.5	3.4
1955	0.0	.2	.3	3.3	3.3	3.2	3.0
1956	.2	.2	3.2	3.1	3.1	3.0	10.2
1957	.4	5.2	5.1	5.0	4.9	14.5	14.2
1958	3.4	3.6	3.6	3.5	12.0	12.1	14.3
1959	3.6	3.8	3.8	12.7	12.8	15.2	25.7
1960	4.7	5.0	16.4	16.5	19.1	31.1	30.7
1961	3.8	14.1	14.2	17.2	30.3	30.2	29.8
1962	19.5	20.4	23.8	39.3	39.5	39.3	38.7
1963	34.9	35.2	34.7	34.5	34.7	34.5	33.9
1964	38.0	38.3	37.6	37.5	37.8	37.5	37.0
1965	41.7	42.1	41.4	41.3	41.5	41.2	40.6
1966	57.7	58.0	57.0	56.8	57.3	57.0	56.2
1967	52.3	52.8	52.0	51.7	52.0	51.6	50.8
1968	61.7	62.2	61.2	60.9	61.3	60.9	60.0
1969	73.6	74.1	72.8	72.6	73.1	72.7	71.7
1970	40.2	40.2	39.4	39.3	39.9	39.7	39.3
1971	49.0	49.4	48.6	48.4	48.7	48.4	47.6
1972	59.4	60.0	59.0	58.7	59.0	58.7	57.8
1973	57.3	57.6	56.6	56.5	57.0	56.7	55.9
1974	49.9	50.2	49.3	49.1	49.6	49.3	48.7
1975	56.7	57.0	56.0	55.8	56.3	56.0	55.3
1976	64.4	64.7	63.5	63.3	63.9	63.6	62.8
1977	70.5	70.8	69.5	69.3	70.0	69.7	68.8
1978	55.5	55.8	54.9	54.7	55.2	54.8	54.1
1979	59.4	59.9	58.9	58.7	59.0	58.7	57.8
1980	67.1	67.6	66.5	66.2	66.7	66.4	65.4
1981	72.1	72.6	71.4	71.1	71.6	71.2	70.2
1982	65.2	65.7	64.6	64.4	64.7	64.4	63.4
TTC	<u>\$1,162.0M</u>	<u>\$1,186.8M</u>	<u>\$1,185.4M</u>	<u>\$1,211.9M</u>	<u>\$1,248.1M</u>	<u>\$1,268.6M</u>	<u>\$1,270.4M</u>

APPENDIX G

MORTALITY TABLES

Age	American Experience (1949-1959)		Commissioners 1958 Standard Ordinary (1959-1964)		Individual Annuity Table for 1971—Male (1969-1967)		Individual Annuity Table for 1971—Female (1969-1967)		United States Total Population (1969-1971)	
	Deaths Per 1,000	Expec- tation of Life (Years)	Deaths Per 1,000	Expec- tation of Life (Years)	Deaths Per 1,000	Expec- tation of Life (Years)	Deaths Per 1,000	Expec- tation of Life (Years)	Deaths Per 1,000	Expec- tation of Life (Years)
0	154.70	41.46	7.08	68.30	—	—	—	—	20.02	70.75
1	63.49	47.94	1.78	67.78	—	—	—	—	1.25	71.19
2	35.50	50.16	1.52	66.90	—	—	—	—	.86	70.26
3	23.91	50.98	1.46	66.00	—	—	—	—	.68	69.34
4	17.70	51.22	1.40	65.10	—	—	—	—	.57	68.39
5	13.60	51.13	1.35	64.19	.46	71.69	.23	78.99	.51	67.43
6	11.37	50.63	1.30	63.27	.42	70.73	.19	78.01	.46	66.46
7	9.75	50.41	1.26	62.36	.40	69.75	.16	75.02	.43	65.49
8	8.63	49.99	1.23	61.43	.39	68.78	.14	74.03	.39	64.52
9	7.90	49.33	1.21	60.51	.39	67.81	.13	73.04	.34	63.54
10	7.49	48.72	1.21	59.59	.39	66.84	.13	72.05	.31	62.57
11	7.52	48.08	1.23	58.66	.40	65.86	.14	71.06	.30	61.58
12	7.54	47.45	1.26	57.72	.41	64.89	.16	70.07	.35	60.60
13	7.57	46.80	1.32	56.80	.41	63.91	.17	69.08	.46	59.62
14	7.60	46.16	1.39	55.87	.42	62.94	.18	68.10	.63	58.65
15	7.63	45.50	1.46	54.95	.43	61.97	.19	67.11	.82	57.69
16	7.66	44.85	1.54	54.03	.44	60.99	.21	66.12	1.01	56.73
17	7.69	44.19	1.62	53.11	.46	60.02	.22	65.13	1.17	55.79
18	7.73	43.53	1.69	52.19	.47	59.05	.23	64.15	1.28	54.86
19	7.77	42.87	1.74	51.28	.49	58.07	.25	63.16	1.34	53.93
20	7.80	42.20	1.79	50.37	.50	57.10	.26	62.18	1.40	53.00
21	7.86	41.53	1.83	49.46	.52	56.13	.28	61.19	1.47	52.07
22	7.91	40.86	1.88	48.56	.54	55.16	.29	60.21	1.52	51.15
23	7.96	40.17	1.99	47.64	.57	54.19	.31	59.23	1.53	50.22
24	8.01	39.48	1.91	46.73	.59	53.22	.33	58.25	1.51	49.30
25	8.06	38.81	1.93	45.82	.62	52.25	.35	57.27	1.47	48.37
26	8.13	38.12	1.98	44.90	.65	51.28	.37	56.29	1.43	47.44
27	8.20	37.43	1.99	43.99	.68	50.32	.39	55.31	1.42	46.51
28	8.26	36.73	2.03	43.08	.72	49.35	.41	54.33	1.44	45.58
29	8.34	36.03	2.08	42.16	.76	48.39	.44	53.35	1.49	44.64
30	8.43	35.33	2.13	41.25	.81	47.42	.47	52.37	1.55	43.71
31	8.51	34.63	2.19	40.34	.86	46.46	.50	51.40	1.63	42.77
32	8.61	33.92	2.25	39.43	.92	45.50	.53	50.42	1.72	41.84
33	8.72	33.21	2.32	38.51	.98	44.54	.57	49.45	1.83	40.92
34	8.83	32.50	2.40	37.60	1.06	43.58	.61	48.48	1.95	39.99
35	8.95	31.78	2.51	36.69	1.12	42.63	.65	47.51	2.09	39.07
36	9.09	31.07	2.64	35.78	1.20	41.68	.70	46.54	2.25	38.15
37	9.23	30.36	2.80	34.86	1.30	40.73	.75	45.57	2.44	37.23
38	9.41	29.62	3.01	33.97	1.40	39.78	.81	44.60	2.66	36.32
39	9.59	28.90	3.25	33.07	1.51	38.83	.87	43.64	2.90	35.42
40	9.79	28.18	3.53	32.16	1.63	37.89	.94	42.68	3.14	34.52
41	10.01	27.46	3.84	31.29	1.79	36.95	1.01	41.72	3.41	33.63
42	10.25	26.72	4.17	30.41	2.00	36.02	1.09	40.76	3.70	32.74
43	10.52	25.99	4.53	29.54	2.26	35.09	1.19	39.80	4.04	31.86
44	10.83	25.27	4.92	28.67	2.57	34.17	1.29	38.85	4.43	30.99
45	11.16	24.54	5.36	27.81	2.92	33.25	1.40	37.90	4.84	30.12
46	11.50	23.81	5.83	26.95	3.32	32.35	1.52	36.95	5.28	29.27
47	12.00	23.08	6.36	26.11	3.75	31.46	1.66	36.01	5.74	28.42
48	12.51	22.36	6.95	25.27	4.23	30.57	1.80	35.06	6.24	27.58
49	13.11	21.63	7.60	24.46	4.74	29.70	1.97	34.13	6.78	26.75
50	13.78	20.91	8.32	23.63	5.29	28.84	2.15	33.19	7.38	25.93
51	14.54	20.20	9.11	22.82	5.89	27.99	2.37	32.26	8.04	25.12
52	15.39	19.49	9.98	22.03	6.46	27.15	2.64	31.34	8.76	24.32
53	16.33	18.79	10.99	21.25	7.09	26.33	2.97	30.42	9.57	23.53
54	17.40	18.09	11.90	20.47	7.74	25.51	3.35	29.51	10.43	22.75
55	18.57	17.40	13.00	19.71	8.42	24.71	3.79	28.61	11.36	21.99
56	19.89	16.72	14.21	18.97	9.12	23.91	4.28	27.71	12.36	21.23

APPENDIX G (Continued)

MORTALITY TABLES

Age	American Experience (1943-1954)		Commissioners 1958 Standard Ordinary (1958-1964)		Individual Annuity Table for 1971—Male (1966-1967)		Individual Annuity Table for 1971—Female (1966-1967)		United States Total Population (1966-1971)	
	Deaths Per 1,000	Expectation of Life (Years)	Deaths Per 1,000	Expectation of Life (Years)	Deaths Per 1,000	Expectation of Life (Years)	Deaths Per 1,000	Expectation of Life (Years)	Deaths Per 1,000	Expectation of Life (Years)
57	21.34	16.05	15.54	18.23	9.85	23.13	4.83	26.83	13.41	20.46
58	22.94	15.39	17.00	17.51	10.81	22.35	5.41	25.96	14.52	19.76
59	24.72	14.74	18.59	16.81	11.41	21.59	6.02	25.10	15.70	19.05
60	26.69	14.10	20.34	16.12	12.25	20.83	6.63	24.25	16.95	18.34
61	28.86	13.47	22.24	15.44	13.13	20.08	7.22	23.41	18.29	17.65
62	31.29	12.86	24.31	14.78	14.07	19.34	7.77	22.57	19.74	16.97
63	33.94	12.26	26.57	14.14	15.08	18.61	8.29	21.74	21.33	16.30
64	36.87	11.67	29.04	13.51	16.19	17.89	8.78	20.92	23.08	15.65
65	40.13	11.10	31.75	12.90	17.41	17.17	9.29	20.10	24.95	15.00
66	43.71	10.54	34.74	12.31	18.77	16.47	9.89	19.29	26.99	14.38
67	47.65	10.00	38.04	11.73	20.29	15.77	10.62	18.47	29.18	13.76
68	52.00	9.47	41.66	11.17	21.99	15.09	11.54	17.67	31.52	13.16
69	56.76	8.97	45.61	10.64	23.89	14.42	12.66	16.87	34.00	12.57
70	61.99	8.48	49.79	10.12	26.00	13.78	14.03	16.08	36.61	12.00
71	67.67	8.00	54.15	9.63	28.34	13.11	15.65	15.30	39.43	11.43
72	73.73	7.55	58.85	9.15	30.93	12.48	17.55	14.53	42.66	10.88
73	80.18	7.11	63.26	8.69	33.80	11.86	19.74	13.79	46.44	10.34
74	87.03	6.68	68.12	8.24	36.98	11.26	22.26	13.05	50.75	9.82
75	94.37	6.27	73.37	7.81	40.49	10.67	25.12	12.34	55.52	9.32
76	102.31	5.88	79.18	7.39	44.36	10.10	28.37	11.64	60.80	8.84
77	111.06	5.49	85.70	6.98	48.72	9.55	32.06	10.97	65.96	8.38
78	120.83	5.11	93.06	6.59	53.50	9.01	36.23	10.32	71.53	7.93
79	131.73	4.74	101.19	6.21	58.79	8.50	40.98	9.68	77.41	7.51
80	144.47	4.38	109.98	5.85	64.60	7.99	46.39	9.08	83.94	7.10
81	158.80	4.05	119.35	5.51	70.90	7.51	52.51	8.49	91.22	6.70
82	174.30	3.71	129.17	5.19	77.67	7.05	59.41	7.94	99.92	6.32
83	191.56	3.39	139.38	4.89	84.94	6.60	67.16	7.41	109.95	5.96
84	211.38	3.08	150.01	4.60	92.87	6.16	75.90	6.90	115.48	5.62
85	235.55	2.77	161.14	4.32	101.69	5.74	85.77	6.43	125.61	5.28
86	265.68	2.47	172.82	4.06	111.65	5.34	96.90	5.99	137.48	4.97
87	303.02	2.18	185.13	3.80	123.05	4.95	109.34	5.57	149.79	4.68
88	348.69	1.91	198.25	3.55	136.12	4.57	122.98	5.20	161.58	4.42
89	395.86	1.66	212.46	3.31	151.07	4.21	137.51	4.86	172.92	4.18
90	454.55	1.42	228.14	3.08	168.04	3.87	152.47	4.55	185.02	3.94
91	532.47	1.19	245.77	2.82	187.15	3.55	167.37	4.28	198.88	3.73
92	634.26	.98	265.93	2.58	208.46	3.26	181.78	4.04	213.63	3.53
93	734.18	.80	289.30	2.33	231.89	2.98	195.39	3.83	228.70	3.35
94	857.14	.64	316.68	2.07	257.15	2.73	208.07	3.63	243.36	3.19
95	1,000.00	.50	351.24	1.80	283.84	2.50	219.90	3.46	257.45	3.06
96			400.56	1.51	311.57	2.30	231.10	3.29	269.59	2.95
97			468.42	1.18	340.21	2.11	242.21	3.13	280.24	2.86
98			668.15	.83	369.77	1.94	253.82	2.97	289.77	2.78
99			1,000.00	.50	400.19	1.79	266.45	2.81	298.69	2.69
100					431.41	1.65	280.54	2.65	306.98	2.62
101					463.31	1.53	295.45	2.49	314.61	2.56
102					495.76	1.41	314.54	2.33	321.67	2.51
103					529.60	1.31	335.12	2.17	328.17	2.46
104					561.69	1.21	358.54	2.01	334.14	2.41
105					594.88	1.13	385.12	1.85	339.80	2.37
106					629.02	1.05	415.24	1.70	344.80	2.34
107					665.95	.98	449.27	1.55	349.17	2.30
108					693.50	.92	487.85	1.41	353.33	2.27
109					725.52	.86	530.79	1.27	357.12	2.24

Note: Mortality rates contained in the 1958 Commissioners Standard Ordinary Table were obtained from experience of 1950-1954, but contain an added element designed to generate life insurance reserves of a conservative nature in keeping with the long-term guarantees inherent in life insurance contracts. Premiums for life insurance policies, on the other hand, are based on assumptions that include expected mortality experience.

Mortality rates for the 1971 Annuity Tables are, again, conservative as related to the actual experience upon which they are based.

APPENDIX H

LIFE EXPECTANCY LISTING

Annual Retirement Costs

(Baseline = 0)

Yr	<u>0</u>	<u>+1 Yr</u>	<u>+2 Yrs</u>	<u>+3 Yrs</u>	<u>+4 Yrs</u>	<u>+5 Yrs</u>
1953 \$	.2M \$	.2M \$	.2M \$	.2M \$	.3M \$	.3M
1954	.3	.3	.3	.3	.3	.3
1955	3.3	3.3	3.3	3.3	3.4	3.4
1956	3.1	3.6	3.2	3.2	3.2	3.2
1957	5.0	5.1	5.1	5.1	5.2	5.2
1958	3.5	3.6	3.6	3.6	3.6	3.6
1959	12.7	12.8	12.8	12.9	13.0	13.0
1960	16.5	16.6	16.7	16.7	16.8	16.9
1961	17.2	17.3	17.4	17.5	17.6	17.7
1962	39.3	39.4	39.7	39.8	40.0	40.2
1963	34.5	34.7	34.9	35.0	35.2	35.3
1964	37.5	37.7	37.9	38.1	38.2	38.4
1965	41.3	41.5	41.7	41.9	42.1	42.2
1966	56.8	57.1	57.4	57.6	57.9	58.1
1967	51.7	52.0	52.3	52.5	52.7	52.9
1968	60.9	61.2	61.6	61.8	62.1	62.3
1969	72.6	73.0	73.3	73.7	74.0	74.2
1970	39.3	39.5	39.7	39.9	40.1	40.2
1971	48.4	48.7	48.9	49.2	49.4	49.6
1972	58.7	59.1	59.4	59.6	59.9	60.1
1973	56.5	56.8	57.0	57.3	57.5	57.8
1974	49.1	49.4	49.6	49.9	50.1	50.3
1975	55.8	56.1	56.4	56.6	56.9	57.1
1976	63.3	63.6	64.0	64.2	64.5	64.7
1977	69.3	69.7	70.0	70.3	70.6	70.9
1978	54.7	55.0	55.3	55.5	55.7	55.9
1979	58.7	59.0	59.3	59.5	59.8	60.0
1980	66.2	66.6	66.9	67.2	67.5	67.7
1981	71.1	71.5	71.8	72.1	72.5	72.7
1982	64.4	64.7	65.0	65.3	65.6	65.9
TRC	<u>\$1,211.9M</u>	<u>\$1,218.6M</u>	<u>\$1,224.7M</u>	<u>\$1,230.3M</u>	<u>\$1,235.4M</u>	<u>\$1,240.1M</u>

APPENDIX I

RETIREMENT PROBABILITY LISTING

Annual Retirement Costs

(Baseline = 0)

<u>Yr</u>	<u>-.03</u>	<u>-.02</u>	<u>-.01</u>	<u>0</u>	<u>+.01</u>	<u>+.02</u>	<u>+.03</u>
1953	\$.2M \$	.2M \$	.2M \$	.2M \$	.2M \$	.3M \$	.3M
1954	.3	.3	.3	.3	.3	.3	.3
1955	3.0	3.1	3.2	3.3	3.4	3.4	3.5
1956	2.9	3.0	3.1	3.1	3.2	3.3	3.4
1957	4.6	4.8	4.9	5.0	5.2	5.3	5.4
1958	3.3	3.3	3.4	3.5	3.6	3.7	3.8
1959	11.4	11.9	12.3	12.7	13.1	13.5	13.9
1960	14.9	15.4	15.9	16.5	17.0	17.5	18.1
1961	15.0	15.7	16.5	17.2	18.0	18.7	19.5
1962	32.5	34.7	37.0	39.3	41.5	43.8	46.0
1963	28.7	30.6	32.6	34.5	36.5	38.4	40.3
1964	30.9	33.1	35.3	37.5	39.7	41.9	44.1
1965	34.2	36.5	38.9	41.3	43.6	46.0	48.3
1966	46.0	49.6	53.2	56.8	60.4	63.9	67.5
1967	43.1	46.0	48.9	51.7	54.6	57.5	60.4
1968	50.3	53.8	57.4	60.9	64.4	68.0	71.6
1969	59.4	63.8	68.2	72.6	76.9	81.3	86.7
1970	30.9	33.7	36.5	39.3	42.2	45.0	47.8
1971	40.2	43.0	45.7	48.4	51.2	53.9	56.6
1972	48.9	52.1	55.4	58.7	62.0	65.3	68.6
1973	45.8	49.4	52.9	56.5	60.0	63.6	67.1
1974	39.7	42.9	46.0	49.1	52.3	55.4	58.5
1975	45.2	48.7	52.3	55.8	59.4	62.9	66.5
1976	51.0	55.1	59.2	63.3	67.4	71.5	75.6
1977	55.7	60.2	64.8	69.3	73.8	78.4	82.9
1978	44.7	48.0	51.3	54.7	58.0	61.4	64.7
1979	48.4	51.8	55.2	58.7	62.1	65.5	68.9
1980	54.2	58.2	62.2	66.2	70.2	74.3	78.3
1981	58.3	62.6	66.8	71.1	75.4	79.6	83.9
1982	53.2	56.9	60.6	64.4	68.1	71.8	75.6
TRC	<u>\$996.8M</u>	<u>\$1,068.5M</u>	<u>\$1,140.2M</u>	<u>\$1,211.9M</u>	<u>\$1,283.6M</u>	<u>\$1,355.5M</u>	<u>\$1,427.0M</u>

APPENDIX J

PERCENT OF BASE PAY LISTING

Annual Retirement Costs

(Baseline = 2.5%)

<u>Yr.</u>	<u>2.0%</u>	<u>2.125%</u>	<u>2.25%</u>	<u>2.375%</u>	<u>2.5%</u>
1953	\$.2M	\$.2M	\$.2M	\$.2M	\$.2M
1954	.2	.2	.2	.3	.3
1955	2.6	2.8	2.9	3.1	3.3
1956	2.5	2.7	2.8	3.0	3.1
1957	4.0	4.3	4.5	4.8	5.0
1958	2.8	3.0	3.2	3.3	3.5
1959	10.2	10.8	11.4	12.1	12.7
1960	13.2	14.0	14.8	15.6	16.5
1961	13.8	14.6	15.5	16.4	17.2
1962	31.4	33.4	35.3	37.3	39.3
1963	27.6	29.3	31.1	32.8	34.5
1964	30.0	31.9	33.8	35.6	37.5
1965	33.0	35.1	37.1	39.2	41.3
1966	45.4	48.3	51.1	53.9	56.8
1967	41.4	44.0	46.6	49.1	51.7
1968	48.7	51.8	54.8	57.9	60.9
1969	58.1	61.7	65.3	69.0	72.6
1970	31.5	33.4	35.4	37.4	39.3
1971	38.7	41.2	43.6	46.0	48.4
1972	47.0	49.9	52.9	55.8	58.7
1973	45.2	48.0	50.8	53.6	56.5
1974	39.3	41.8	44.2	46.7	49.1
1975	44.7	47.4	50.2	53.0	55.8
1976	50.7	53.8	57.0	60.2	63.3
1977	55.5	58.9	67.4	65.9	69.3
1978	43.8	46.5	49.2	52.0	54.7
1979	46.9	49.9	52.8	55.7	58.7
1980	53.0	56.3	59.6	62.9	66.2
1981	56.9	60.4	64.0	67.6	71.1
1982	51.5	54.7	57.9	61.2	64.4
TRC	<u>\$969.7M</u>	<u>\$1,030.3M</u>	<u>\$1,090.9M</u>	<u>\$1,151.4M</u>	<u>\$1,211.9M</u>

APPENDIX K

MAXIMUM PERCENT OF BASE PAY LISTING

Annual Retirement Costs

(Baseline = 75%)

<u>Yr</u>	<u>50%</u>	<u>55%</u>	<u>60%</u>	<u>65%</u>	<u>70%</u>	<u>75%</u>
1953 \$	.2M \$	.2M \$	.2M \$	.2M \$	.2M \$	.2M
1954	.2	.2	.2	.2	.3	.3
1955	2.3	2.6	2.8	3.0	3.3	3.3
1956	2.2	2.4	2.7	2.9	3.1	3.1
1957	3.6	3.9	4.3	4.6	5.0	5.0
1958	2.5	2.8	3.0	3.3	3.5	3.5
1959	10.0	11.0	12.0	12.4	12.7	12.7
1960	12.9	14.2	15.5	16.1	16.4	16.5
1961	13.9	15.3	16.4	16.9	17.2	17.2
1962	33.5	36.4	38.1	38.8	39.2	39.3
1963	29.3	31.9	33.4	34.1	34.4	34.5
1964	32.1	43.9	36.5	37.1	37.5	37.5
1965	35.2	38.3	40.0	40.8	41.2	41.3
1966	49.1	53.4	55.5	56.3	56.7	56.8
1967	43.9	47.8	50.1	51.1	51.7	51.7
1968	52.0	56.7	59.2	60.2	60.9	60.9
1969	62.3	67.8	70.7	71.8	72.5	72.6
1970	34.8	37.7	38.8	39.1	39.3	39.3
1971	41.2	44.8	47.0	47.9	48.4	48.4
1972	49.9	54.3	56.9	58.0	58.7	58.7
1973	48.8	53.0	55.1	55.9	56.4	56.5
1974	42.6	46.3	48.0	48.7	49.1	49.1
1975	48.4	52.5	54.6	55.3	55.8	55.8
1976	55.0	59.7	62.0	62.8	63.3	63.3
1977	60.3	65.5	67.9	68.8	69.3	69.3
1978	47.1	51.2	53.3	54.2	54.7	54.7
1979	50.1	54.5	57.0	58.0	58.6	58.7
1980	56.9	61.9	64.5	65.6	66.2	66.2
1981	61.0	66.4	69.2	70.4	71.1	71.1
1982	54.9	59.8	62.5	63.6	64.3	64.4
TRC	<u>\$1,036.2M</u>	<u>\$1,127.4M</u>	<u>\$1,177.5M</u>	<u>\$1,198.2M</u>	<u>\$1,211.0M</u>	<u>\$1,211.9M</u>

APPENDIX L

MINIMUM LENGTH OF SERVICE LISTING

Annual Retirement Costs

(Baseline = 20 yrs)

<u>Yr</u>	<u>20 Yrs</u>	<u>21 Yrs</u>	<u>22 Yrs</u>	<u>23 Yrs</u>	<u>24 Yrs</u>	<u>25 Yrs</u>
1953	\$.2M	\$.2M	\$.2M	\$.2M	\$.2M	\$.2M
1954	.3	.3	.3	.3	.3	.3
1955	3.3	3.3	3.3	3.3	3.3	3.3
1956	3.1	3.1	3.1	3.2	3.1	3.1
1957	5.0	5.0	5.0	5.0	5.0	5.0
1958	3.5	3.5	3.5	3.5	3.5	24.9
1959	12.7	12.7	12.7	12.7	26.0	25.7
1960	16.5	16.5	16.5	31.5	31.1	30.8
1961	17.2	17.2	30.8	30.5	30.0	29.6
1962	39.3	39.3	40.0	39.7	39.1	38.7
1963	34.5	34.5	35.2	34.9	34.4	34.1
1964	37.5	37.5	38.3	37.9	37.4	36.9
1965	41.3	41.3	42.1	41.7	41.1	40.7
1966	56.8	56.8	58.1	57.5	56.5	55.8
1967	51.7	51.7	52.7	52.2	51.6	51.1
1968	60.9	60.9	62.1	61.6	60.7	60.0
1969	72.6	72.6	74.1	73.4	72.3	71.4
1970	39.3	39.3	40.4	39.9	39.1	38.4
1971	48.4	48.4	49.3	48.9	48.3	47.8
1972	58.7	58.7	59.8	59.3	58.5	58.0
1973	56.5	56.5	57.7	57.2	56.2	55.4
1974	49.1	49.1	50.3	49.8	48.9	48.2
1975	55.8	55.8	57.1	56.5	55.6	54.8
1976	63.3	63.3	64.8	64.1	63.0	62.1
1977	69.3	69.3	71.0	70.2	69.0	67.9
1978	54.7	54.7	55.9	55.3	54.5	53.8
1979	58.7	58.6	59.8	59.3	58.4	57.8
1980	66.2	66.2	67.6	67.0	66.0	65.1
1981	71.1	71.1	72.6	71.9	70.8	70.0
1982	64.4	64.4	65.6	65.1	64.1	63.5
TRC	<u>\$1,211.9M</u>	<u>\$1,212.0M</u>	<u>\$1,249.7M</u>	<u>\$1,253.6M</u>	<u>\$1,248.1M</u>	<u>\$1,254.3M</u>

APPENDIX L (Continued)

MINIMUM LENGTH OF SERVICE LISTING

Annual Retirement Costs

(Baseline = 20 Yrs)

<u>Yr</u>	<u>26 Yrs</u>	<u>27 Yrs</u>	<u>28 Yrs</u>	<u>29 Yrs</u>	<u>30 Yrs</u>
1953	\$.2M	\$.2M	\$.2M	\$.2M	\$ 19.3M
1954	.3	.3	.3	16.6	16.1
1955	3.3	3.3	25.4	24.6	23.8
1956	3.2	20.7	20.1	19.5	18.8
1957	14.7	14.4	14.1	13.7	13.2
1958	25.3	24.6	24.0	23.2	22.4
1959	26.1	25.4	24.7	23.9	23.1
1960	31.2	30.4	29.6	28.6	27.7
1961	30.2	29.4	28.6	27.7	26.7
1962	39.3	38.3	37.3	36.1	34.9
1963	34.5	33.6	32.7	31.7	30.6
1964	37.6	36.6	35.6	34.4	33.3
1965	41.3	40.2	39.1	37.9	36.6
1966	56.9	55.4	53.8	52.1	50.4
1967	51.8	50.4	49.1	47.5	45.9
1968	61.0	59.4	57.8	55.9	54.1
1969	72.7	70.8	68.8	66.6	64.4
1970	39.6	38.4	37.3	36.1	34.8
1971	48.5	47.2	45.9	44.5	43.0
1972	58.8	57.2	55.7	53.9	52.1
1973	56.7	55.1	53.5	51.8	50.1
1974	49.3	47.9	46.6	45.1	43.6
1975	56.0	54.4	52.9	51.2	49.5
1976	63.5	61.8	60.0	58.1	56.1
1977	69.6	67.6	65.8	63.6	61.4
1978	54.8	53.3	51.9	50.2	48.5
1979	58.7	57.2	55.7	53.0	52.0
1980	66.4	64.6	62.8	60.8	58.8
1981	71.2	69.3	67.4	65.3	63.1
1982	64.4	62.8	61.1	59.1	57.1
TRC	<u>\$1,286.8M</u>	<u>\$1,270.3M</u>	<u>\$1,257.8M</u>	<u>\$1,233.5M</u>	<u>\$1,211.6M</u>

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