CONNECTICUT STATE EMPLOYEES

RETIREMENT SYSTEM

STUDY OF EXPERIENCE

State of Connecticut

**STATE EMPLOYEES
RETIREMENT COMMISSION
OFFICE OF THE STATE COMPTROLLER**
55 ELM STREET
HARTFORD, CONNECTICUT 06106
(203) 566-2126

November 23, 1993

Honorable John B. Larson
President Pro Tempore, State Senate
Honorable Thomas D. Ritter
Speaker, House of Representatives
State Capitol
Hartford, CT 06106

Dear Senator Larson and Representative Ritter:

In accordance with Section 5-165(a) of the Connecticut General Statutes, the
Connecticut State Employees Retirement Commission is required to certify annually
to the General Assembly the amount necessary, on the basis of an actuarial
determination, to gradually establish and maintain the State Employees Retirement
Fund.

In that connection, the Commission's consulting actuary, Milliman & Robertson,
Inc., has determined that the 1994-1995 funding requirement is $535,324,809;
however, pursuant to the provisions of a collective bargaining agreement
negotiated between the State of Connecticut and the State Employees Bargaining
Agent Coalition (SEBAC III), $173,318,883 of this amount will not be paid.

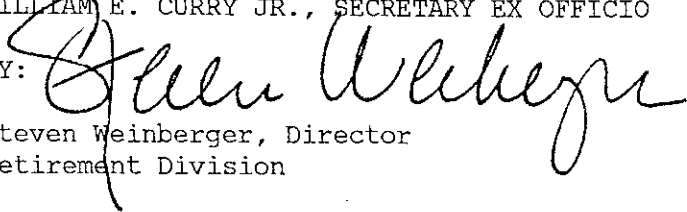Accordingly, the Commission, at its November 18, 1993 meeting, took the following
action:

1. To accept the certification amount from Milliman & Robertson, Inc.,
which indicated a full funding cost for fiscal year 1994-1995 of
$535,324,809. It is understood that the state will be reimbursed for a
portion of this funding cost by the federal government and state funds
other than the General Fund;

2. To note that pursuant to the terms of a collective bargaining agreement
(SEBAC III), $173,318,883 of such full funding cost will not be paid; and

3. To recognize that the State Employees Retirement Fund will receive from
the state during fiscal year 1994-1995 a contribution of $362,005,926.

Enclosed is a summary of the June 30, 1993 actuarial valuation.

Very truly yours,

STATE EMPLOYEES RETIREMENT COMMISSION
WILLIAM E. CURRY JR., SECRETARY EX OFFICIO

BY:

Steven Weinberger, Director
Retirement Division

SW/md
Enclosure
CC: Hon. J. H. Harper, Jr.
     Hon. W. R. Dyson
     Hon. W. J. Cibes, Jr.

MILLIMAN & ROBERTSON, INC.

Actuaries and Consultants

Three Corporate Place
Bloomfield, Connecticut 06002-2413
Telephone: 203/243-1138
Fax: 203/286-0564

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

June 30, 1993 Actuarial Valuation

This is to certify that we have prepared an actuarial valuation of the Connecticut State Employees Retirement System as of June 30, 1993.

The valuation was made with respect to the following Members:

a.   26,399 Retired Members and Beneficiaries.

b.   53,537 Active Members with total annual payroll as of July 1, 1993 of $2,144.8 million.

c.   660 inactive employees with vested rights.

Based on the above data and the attached actuarial method and assumptions, we determined the following assets and liabilities as of the valuation date:

1.   Actuarial Liability:

a. Active Members	$3,281,055,492
b. Retired Members and Beneficiaries	3,874,194,605
c. Vested Former Members	34,490,397
d. Total	7,189,740,494

2.   Assets in Fund (at adjusted cost value)   3,696,176,885

3.   Unfunded Liability: (1d)-(2)   3,493,563,609

4.   Present Value of Vested Benefits   6,154,635,174

Albany • Atlanta • Boston • Chicago • Cincinnati • Dallas • Denver • Hartford • Houston
Indianapolis • Irvine • Los Angeles • Milwaukee • Minneapolis • New York • Omaha • Philadelphia • Phoenix
Portland • St. Louis • Salt Lake City • San Diego • San Francisco • Seattle • Tokyo • Washington, D.C.

Internationally WOODROW MILLIMAN
Australia • Austria • Belgium • Bermuda • Canada • Channel Islands • Denmark
France • Germany • Ireland • Italy • Japan • Mexico • Netherlands • New Zealand
Philippines • Spain • Sweden • United Kingdom • United States • West Indies

Based on the valuation as of June 30, 1993, projected costs were developed for the Fiscal Year beginning July 1, 1994 as follows:

1.	Employer Normal Cost		$221,273,796
2.	Payment on Unfunded Liability	- SEBAC III	130,500,000
		- ERIP	10,232,130
3.	Total Employer Contribution for Fiscal Year beginning July 1, 1994		$362,005,926

Actuarially determined payment on unfunded liability is $314,051,013.

MILLIMAN & ROBERTSON, INC.

[signature]

Althea A. Schwartz, F.S.A.
Consulting Actuary

November 17, 1993

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM
STUDY OF EXPERIENCE

TABLE OF CONTENTS

<table>
<tr><td>*Section*</td><td></td><td>*Page*</td></tr>
<tr><td></td><td>Letter</td><td></td></tr>
<tr><td>1</td><td>Introduction</td><td>1</td></tr>
<tr><td>2</td><td>Investment Income</td><td>5</td></tr>
<tr><td>3</td><td>Salary Growth Assumption</td><td>16</td></tr>
<tr><td>4</td><td>Demographic Assumptions for Active Members</td><td>20</td></tr>
<tr><td>5</td><td>Retired Mortality</td><td>46</td></tr>
</table>
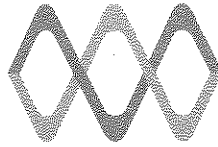
MILLIMAN & ROBERTSON, INC.

Actuaries and Consultants

Three Corporate Place
Bloomfield, Connecticut 06002-2413
Telephone: 203/243-1138
Fax: 203/286-0564

November 16, 1993

State of Connecticut
State Employees Retirement Commission
55 Elm Street
Hartford, CT 06106

Re: Experience Study for the State Employees Retirement System

Members of the Commission:

We are pleased to present the results of an Experience Study for the State Employees
Retirement System. This experience investigation was conducted in accordance with the
requirements of Section 5-156b of the General Statutes of the State of Connecticut.

The results of this investigation are discussed in this report and are the basis for the
recommended changes in actuarial assumptions for the actuarial valuation performed as of
June 30, 1993.

Respectfully submitted,

Althea A. Schwartz, FSA
Consulting Actuary

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SECTION 1 - INTRODUCTION

Purpose of the Report

This report presents the results of an investigation of recent actuarial experience of the Connecticut State Employees Retirement System (SERS). This study was undertaken at the direction of the Commission and is intended to comply with Section 5-156b of the General Statutes of the State of Connecticut, which provides in part:

> At least once in each five-year period, the actuary shall make actuarial investigations into the mortality, service and compensation experience of the members and beneficiaries of the system.

If a retirement system is to operate on a sound actuarial basis, the funds on hand together with the value of expected future employee and state contributions must be adequate to cover the value of future promised benefit payments.

The determination of the value of expected future contributions and the value of future promised benefit payments involves projections based on anticipated future rates of mortality, withdrawal, disability, and retirement as well as rates of investment income and salary growth. In these projections, it is assumed that a certain proportion of the members of SERS will terminate, die, retire, or become disabled at each age. Moreover, benefits are determined for each of these occurrences based on assumptions regarding the rate at which salaries will increase in the future. The value of these benefits are then calculated based on an assumed life expectancy for retirees and other beneficiaries and the assumed long-term yield on plan assets.

Section 5-156b of the Statute requires that the actuary perform an evaluation of the System's actual experience before recommending actuarial assumptions for use in the annual actuarial valuation.

SECTION 1 - INTRODUCTION

Organization of the Report

In addition to this Introduction, this report contains the following sections:

   Section 2 of this report discusses the choice of assumed investment return.

   Section 3 of this report discusses the choice of assumed rates of salary increase.

   Section 4 of this report contains the recommended demographic assumptions for active members (rates of active mortality, retirement, disablement, and other terminations of employment).

   Section 5 of this report shows the results of our study of inactive mortality, for both healthy and disabled retirees.

Throughout this report, we make reference to current and proposed actuarial assumptions. The current assumptions are those used for the SERS actuarial valuations for years 1987 through 1992. The proposed assumptions are those we recommend for use in the June 30, 1993 valuation and for subsequent valuations until another experience study is performed.

SECTION 1 - INTRODUCTION

Summary of Recommendations

As a result of our study, we recommend the following changes to the assumptions:

	Current Assumptions	Proposed Assumptions
Interest Rate	8¾%	8½%
Salary Scale	Varies by age as follows: **Age** **Rate** 20 10.2 25 9.2 30 8.1 35 7.1 40 6.5 45 6.0 50 6.0	Varies by service as follows: **Years** **Rate** 0 14.00 1 12.00 2 10.00 3 9.00 4 8.20 5 7.50 10 5.45 15 4.45 20 3.75 25 3.25
Mortality	1983 Group Annuitant Mortality Male Table with ages set back 4 years for females.	1983 Group Annuitant Mortality Male and Female Tables.
Disability	Varies by age, from 0.75 per 1000 lives at age 20 to 14.42 per 1000 lives at age 60.	The current rates increased by 1.2 for hazardous duty employees and decreased by .5 for non-hazardous duty employees.
Disabled Mortality	1965 Railroad Retirement Board Disabled Mortality Table.	50% of 1965 Railroad Retirement Board Disabled Mortality Table.

	Current Assumptions	Proposed Assumptions
Retirement	One year select and ultimate rates separately for hazardous and non-hazardous duty employees.	One year select and ultimate rates separately for hazardous and non-hazardous duty employees.

Current Assumptions

	Hazardous		Non-Haz.	
Age	0	1+	0	1+
47	50	10	0	0
50	50	10	0	0
55	40	10	20	5
60	50	30	20	5
62	100	100	40	30
65	100	100	80	60
70	100	100	100	100

Proposed Assumptions

	Hazardous		Non-Haz.	
Age	0	1+	0	1+
47	40	30	0	0
50	40	30	0	0
55	60	30	20	0
60	80	50	20	15
62	100	100	40	40
65	100	100	80	60
70	100	100	100	100

Turnover

Current Assumptions: Five year select and ultimate rates as shown below for non-hazardous duty males; the same table with rates increased by a factor of 10% for females and decreased by a factor of 50% for hazardous duty employees.

Proposed Assumptions: Three year select and ultimate rates as shown below for non-hazardous duty males; the same table with rates increased by a factor of 10% for females and decreased by a factor of 60% for hazardous duty employees.

Current Assumptions — Years of Participation

Age	0	1	2	3	4	5+
20	50	45	30	25	20	15
25	45	35	30	25	20	10
30	40	30	25	20	15	8
35	35	28	20	15	10	6
40	30	20	10	8	6	4
45	20	10	8	6	4	2
50	10	8	6	4	2	0
55	10	7	5	2	0	0
60	10	0	0	0	0	0

Proposed Assumptions — Years of Participation

Age	0	1	2	3+
20	30	30	20	10
25	17	15	10	8
30	15	11	8	5
35	13	10	8	3
40	10	9	7	3
45	5	8	6	2
50	3	6	4	2
55	2	4	2	0
60	0	0	0	0

Page 4

SECTION 2 - INVESTMENT INCOME

Assumption Studied

In this section of the report, we examine the assumed long-term return on plan assets. Our assumed rate consists of two components - the assumed rate of inflation, and the assumed real rate of return on investment. The rate of inflation is a function of the economic climate of the entire country, while the real rate of return represents the reward for investing in instruments that bear some risk. The real rate of return therefore depends not only on external market and economic conditions, but also on the risk characteristics of the SERS investments.

Study Period

We used information on SERS investments from July 1, 1976 through June 30, 1992.

Methodology

This assumption is the most difficult one to study, for the following reasons:

- investment returns are volatile;

- the only aspect of the investment performance that is completely under the control of the State (through the Treasurer's office) is the decision of how to allocate the assets among different asset classes; and

- future investment returns cannot be predicted with any degree of accuracy.

SECTION 2 - INVESTMENT INCOME

Study Results

Inflation was high in the 1970s. The stock market boomed in the 1980s. Real Estate is in trouble in the 1990s. It is tempting to look just at the most recent five or ten years when analyzing investment performance. The last ten years in particular are tempting, since the combined Connecticut investment funds earned an annualized rate of 12.67%[a]. However, the past several years have seen much more modest returns - 7.15% for the last 3 years, and 7.72% for the last five years.

Although we have no way of knowing whether rates will continue at the present level, a long-term historical view would suggest that the high rate of volatility of the 1980s is anomalous. The following graphs show the actual SERS investment returns over the past 15 years:

Graph	Description
2.1	Market Value of Assets
2.2	Actuarial Value of Assets
2.3	Five-Year Average of Market Value

[a]   Connecticut State Treasurer's 1992 Annual Report, p.27
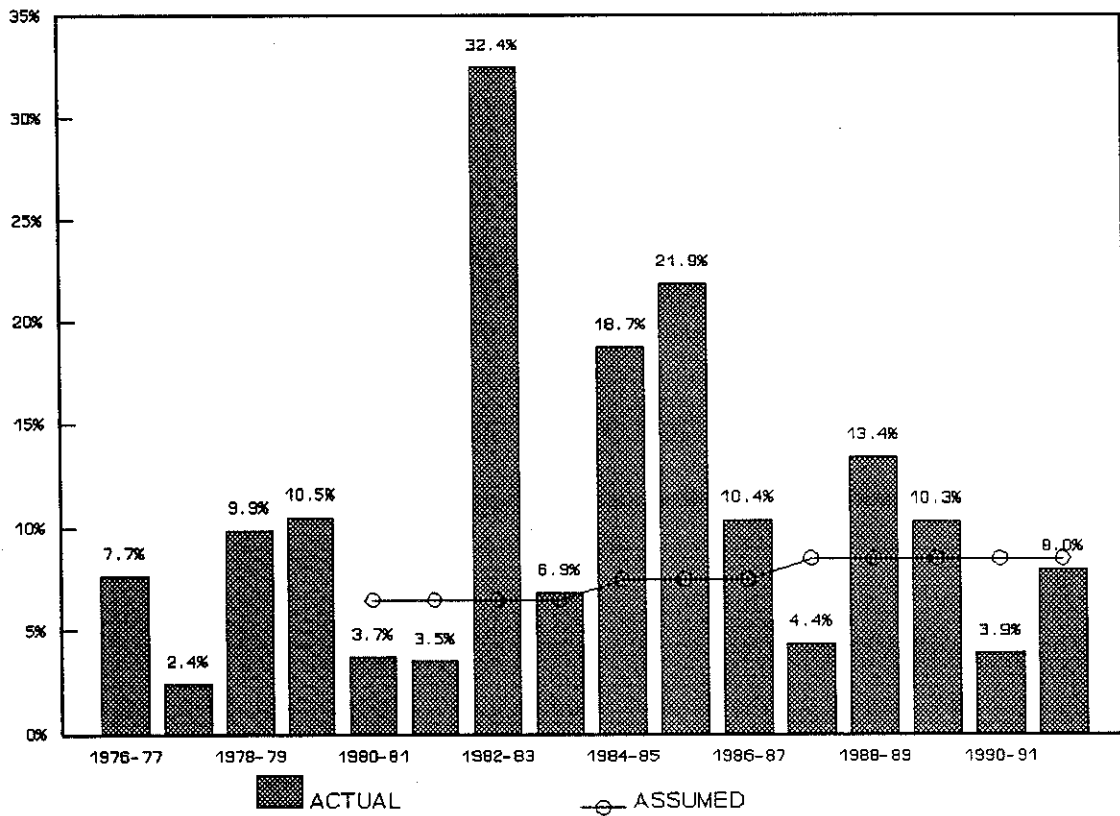
SECTION 2 - INVESTMENT INCOME

Study Results

GRAPH 2.1
MARKET VALUE OF ASSETS
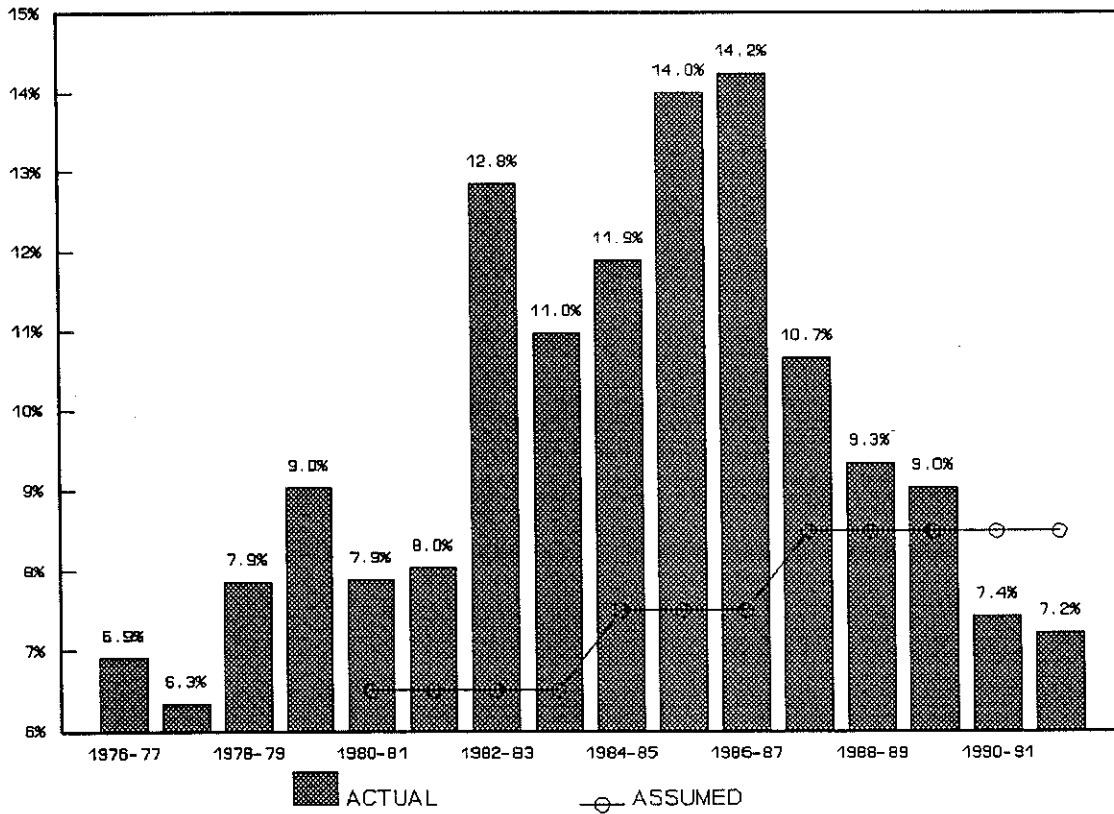
SECTION 2 - INVESTMENT INCOME

Study Results

GRAPH 2.2
ACTUARIAL VALUE OF ASSETS
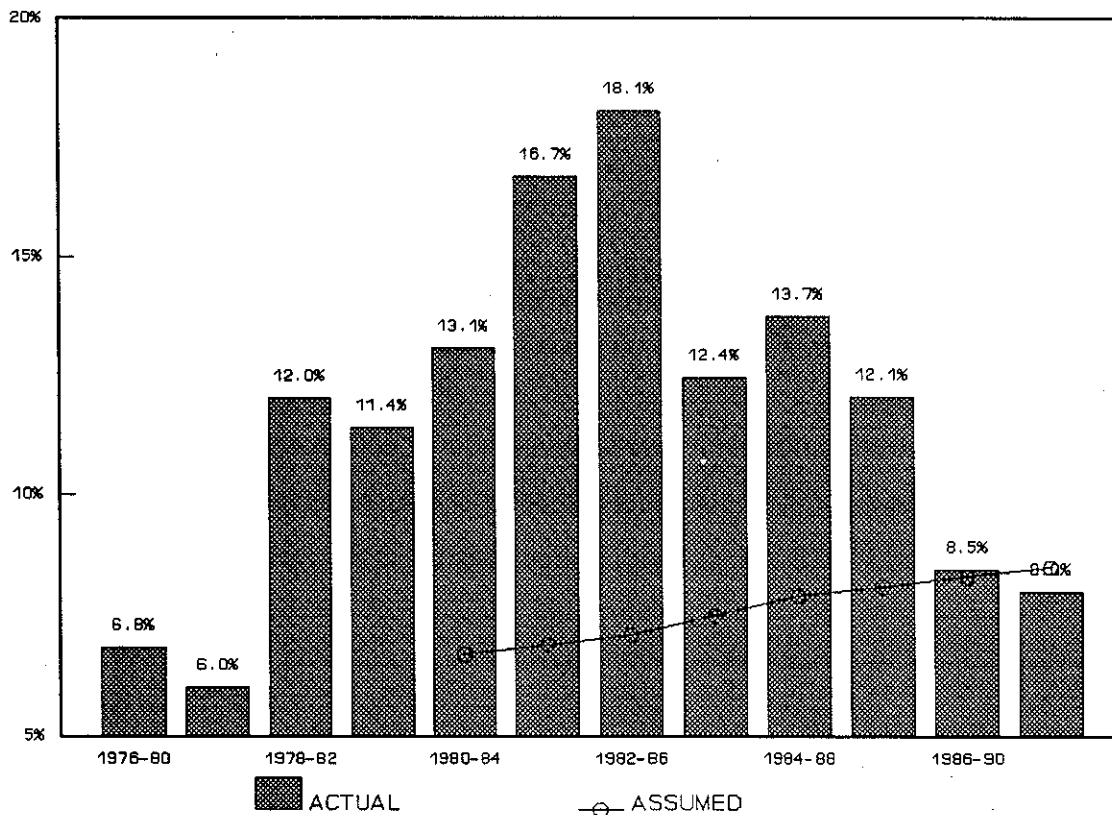
SECTION 2 - INVESTMENT INCOME

Study Results

GRAPH 2.3
FIVE YEAR AVERAGE OF MARKET VALUE

SECTION 2 - INVESTMENT INCOME

Study Results

These SERS investment results reflect two components: the movement of the market over the past 15 years, and changes in the allocation of SERS investments.

As the following chart shows, the SERS investments have been diversifying into real estate, venture capital, mortgages, and international bonds and equities. These investments have largely displaced the fixed income component of the investment portfolio - the equity component has remained a relatively constant proportion of the total portfolio.
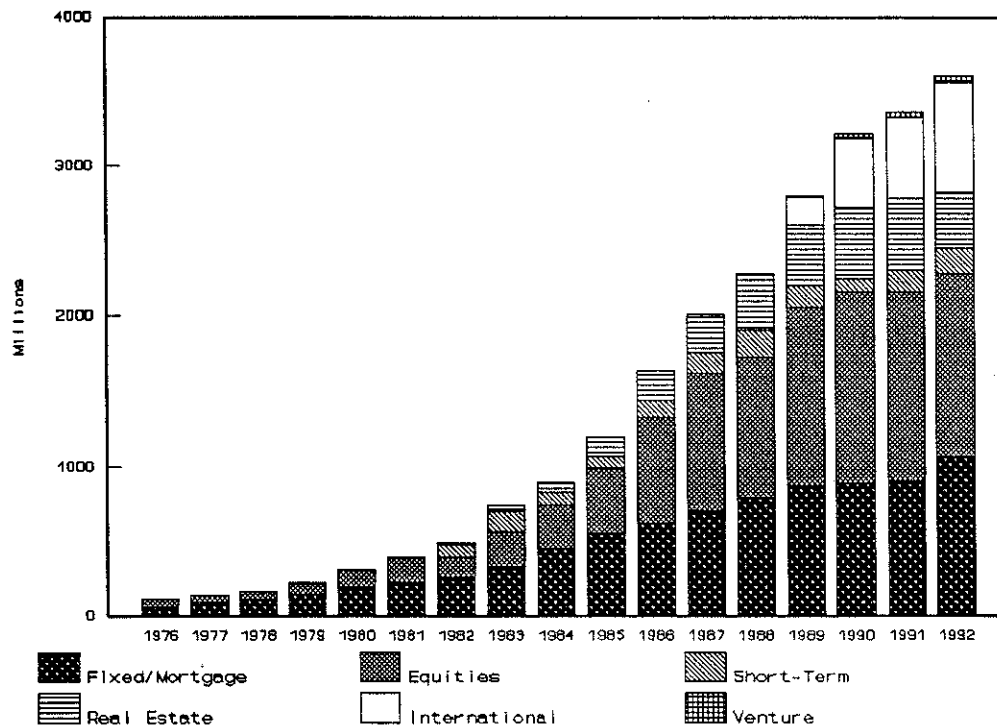
GRAPH 2.4
HISTORICAL SERS ALLOCATION

SECTION 2 - INVESTMENT INCOME

Study Results

The current long range asset allocation policy (per Connecticut State Treasurer's 1992 Annual Report, p.25) is:

Asset Class	Percent
U.S. Equities, including venture capital	35%
International Equities	15
Commercial Equity Real Estate	13
U.S. Fixed Income	29
International Bonds	6
Cash Reserves	2

The following graphs show the historical real rates of return from 1927 to 1991, as tracked by standard Wall Street indices for seven classes of investments. Also shown are historical rates of inflation for the same period.

Graph	Description	Index
2.5	Risk Free Investments	3-month Treasury Bills
2.6	Equities	Standard & Poor's 500 Stock Composite Price Index
2.7	Fixed Income	Shearson Lehman Hutton Composite Government/Corporate Bond Index
2.8	Real Estate	PRISA/FRC Real Estate Index
2.9	Venture Capital	Brinson Partners Venture Capital Index
2.10	International	Morgan Stanley Capital International EAFE Index
2.11	Mortgages	Shearson Lehman Hutton Mortgage Backed Securities Index
2.12	• Inflation	Consumer Price Index for All Urban Consumers

Page 11

SECTION 2 - INVESTMENT INCOME
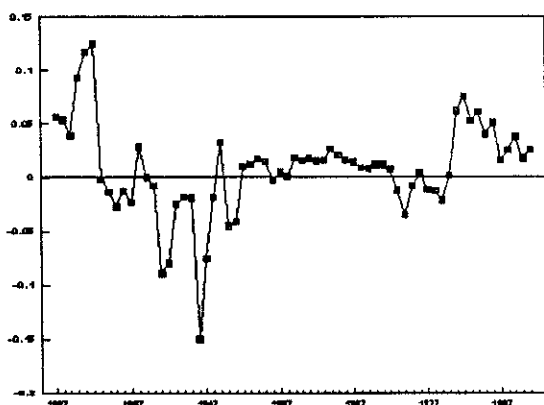
Study Results

GRAPH 2.5
RISK FREE
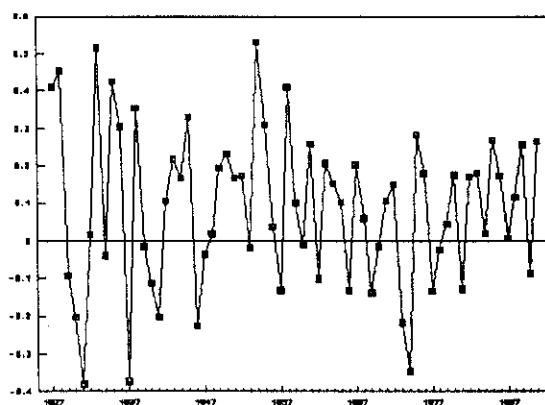
GRAPH 2.6
EQUITIES
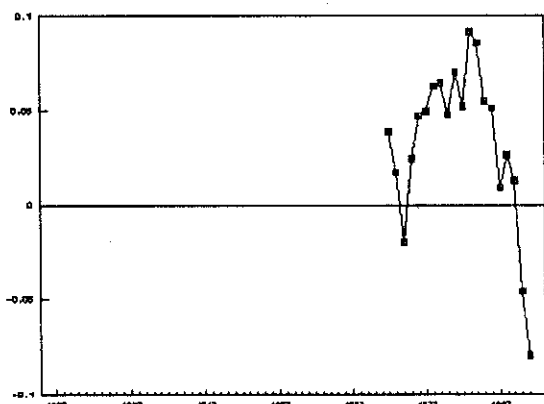
GRAPH 2.7
FIXED INCOME
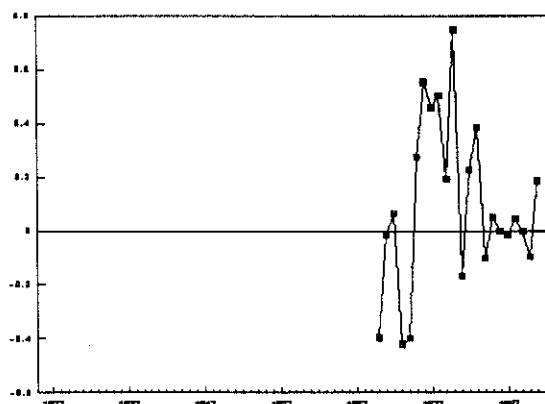
GRAPH 2.8
REAL ESTATE

SECTION 2 - INVESTMENT INCOME
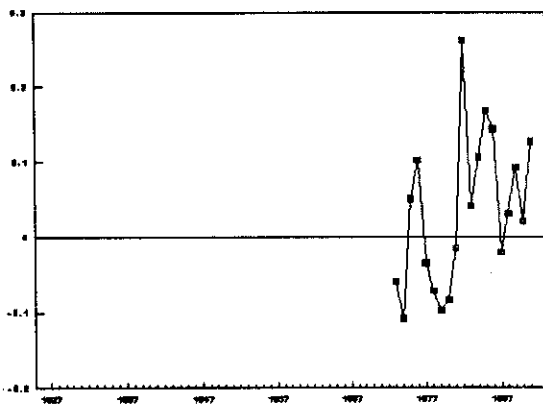
Study Results

GRAPH 2.9
VENTURE CAPITAL
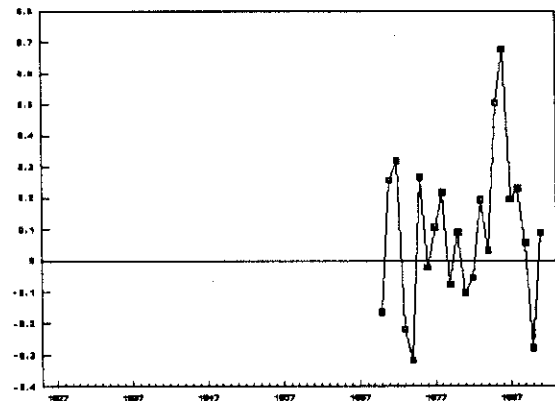
GRAPH 2.10
INTERNATIONAL
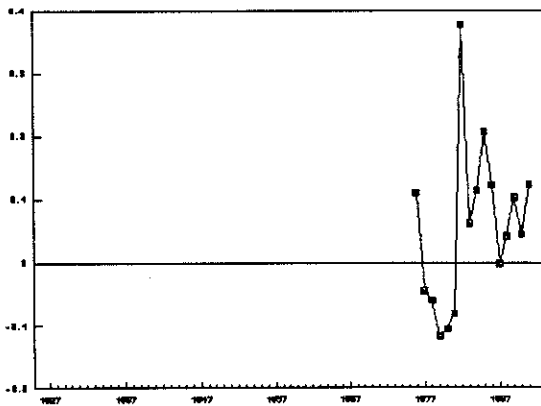
GRAPH 2.11
MORTGAGES
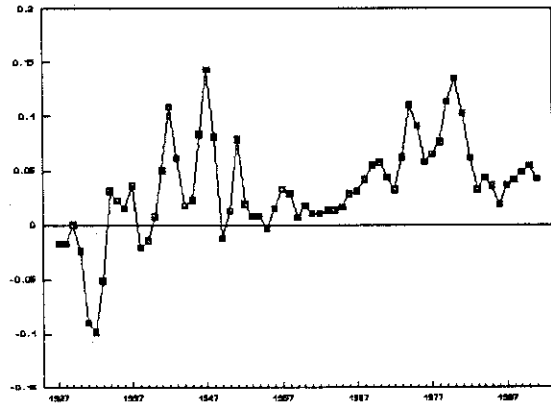
GRAPH 2.12
INFLATION

Page 13

SECTION 2 - INVESTMENT INCOME

Study Results

We can combine the historical returns for the above market indices with the current SERS asset allocation to derive a hypothetical real rate of return for the SERS investments:

Asset Category	Percent of SERS assets in category	1926-91 Real Return
Risk Free Investments	4.83%	0.74%
Equities	33.32	6.64
Fixed Income	25.16	3.23
Real Estate	10.57	5.03
Venture Capital	1.24	2.97
International	20.46	6.48
Mortgages	4.42	4.87
	100.00	
Hypothetical Real Return		5.17%
Hypothetical Rate of Inflation		+ 3.19
Hypothetical Nominal Return		8.36

This result of 8.36% suggests that:

if the SERS investment allocation remains unchanged from June 30, 1992, and

if future real returns for the various investment classes follow the pattern of the last 65 years, and

if the actual SERS investments perform at the same level as the assets and markets tracked by the various indices, and

if inflation continues at 3.19%,

then the SERS assets will earn 8.36%.

SECTION 2 - INVESTMENT INCOME

Study Results

Of course, this result is based on a 65 year period. Using different periods would result in different answers. For instance, using just the last 10 years would result in a figure of 13.32% (9.19% real return + 4.13% inflation). This result also has a lot of *ifs* associated with it. It is therefore not intended to be predictive. However, it illustrates that, based on historical return relationships, the current assumption of 8½% is not unreasonable.

Recommendation

We recommend making no change in the current assumption of 8½%.

SECTION 3 - SALARY GROWTH ASSUMPTION

Assumption Studied

In this section of the report, we study the expected salary increase for active members. As with the investment return assumption, salary growth contains an element of inflation. Salary growth also reflects the impact of merit raises, promotions, and longevity increases. While many actuarial valuations are performed using a single salary growth rate, such as 5%, we find that salary increases in fact are related to age and length of service. That is, salaries tend to increase more quickly in the early portion of careers where promotions occur more quickly, but salaries tend to level off in later years.

Our current assumption varies salary growth by age, starting with 10.2% at age 20 and leveling off to 6% for ages 45 and over.

Study Period

We used salary data provided to us for the valuations on July 1, 1989, 1990, 1991, and 1992.

Methodology

We matched the valuation data files against one another so that we could look at the compensation for each person as of two consecutive valuation dates. This resulted in three sets of salary increase data - 1989/1990, 1990/1991, and 1991/1992. Each of these three sets of data consisted of approximately 50,000 participants.

We then combined the three sets of data, and examined the patterns of salary increase by age and by length of service.

SECTION 3 - SALARY GROWTH ASSUMPTION

Study Results

There were consistently high salary increases during 1989/1990 and 1991/1992. This supports the conclusions of our valuations, that there have been salary losses in the last few years.

The results suggest that length of service is a more important influence on salary growth than age is.

The following graph shows the actual salary growth rate by length of service and the expected salary growth rate under the proposed assumptions.

Graph	Description
3.1	Salary Growth Rate

SECTION 3 - SALARY GROWTH ASSUMPTION

Study Results
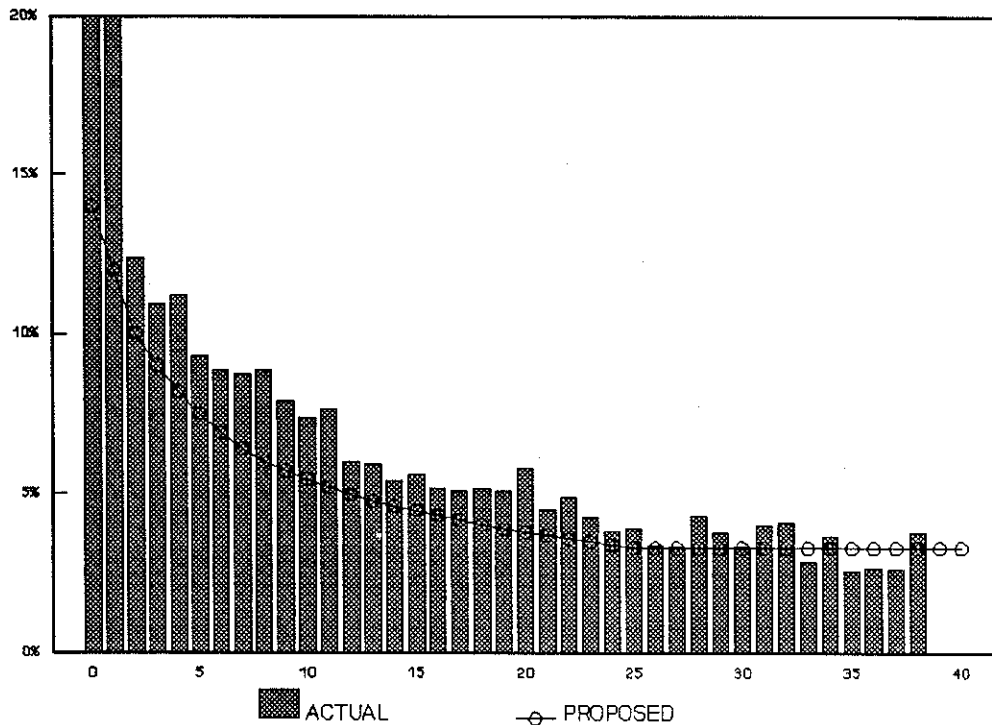
GRAPH 3.1
SALARY GROWTH RATES
COMPOSITE RATE: CURRENT - 6.54%   PROPOSED - 6.85%

Note that the proposed assumption somewhat understates the actual salary growth rates for the study period. We feel that the overall level of salary growth during the study period is not representative of what can be expected in future years. There have been unusual salary movements due to extra overtime and promotions in the wake of the Early Retirement Incentive Programs. We do not anticipate that these will continue in the future.

Page 18

SECTION 3 - SALARY GROWTH ASSUMPTION

Study Results

We recommend changing to a salary scale that varies by years of service:

Years of Service	Percent
0	14.00
1	12.00
2	10.00
3	9.00
4	8.20
5	7.50
10	5.45
15	4.45
20	3.75
25	3.25

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

Assumptions Studied

In this section of the report, we are concerned with the patterns whereby active members of the System leave active status. There are four paths, or "sources of decrement", by which an active member can leave: death, retirement, disability, and termination.

Study Period

The study period was from July 1, 1988 through June 30, 1992.

Methodology

The study of active decrements involves several steps:

First, we tabulate the observed number of active members who leave active status during the study period. We break down these observations by cause of decrement, age, length of service, sex, service group, and any other groupings that appear to affect the patterns of decrement.

Second, we determine the total number of participants who *could* have left active status. For example, a 25 year old is not eligible to retire, so he or she could not have left active status by retiring. However, that same employee *could* have left because of termination, death, or disability. In actuarial terms, we say that the employee was "exposed" to the risks of termination, mortality, and disability but not to the risk of retirement.

Third, we compare the observed number of members who leave with the total number of members "exposed" to the corresponding risk. The result is the observed, actual rates of death, retirement, disability, and turnover.

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

Methodology

Fourth, we apply our current assumed rates of death, retirement, etc. to the number of members "exposed" to the corresponding risk to determine the number of members we *expected* to leave. When we compare the *actual* number to the *expected* number, we can determine how well the current assumptions match the actual patterns of decrement.

Finally, we establish new assumed rates of decrement that best reflect recent experience and anticipated future patterns of decrement.

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE MORTALITY

Study Results

The number of observed deaths was significantly lower than expected:

	Male	Female	Total
Actual	159	55	214
Expected	300	219	519

We performed further investigation in order to verify the accuracy of the data. The Retirement Division reported that 382 active death claims were made through the State's group life insurance program during the study period. We have concluded that the Retirement Division database may not be able to adequately track active deaths that result in the return of employee contributions. This would account for the understatement of active deaths.

Although the 382 insured deaths were higher than the 214 deaths reported for this study, it was also significantly lower than the 519 expected deaths. Despite this disparity, we nevertheless recommend continuing to assume that deaths among active members will occur according to the rates from the corresponding mortality table used for retired members of the same group. This leaves a margin to account for active member deaths that are reported as terminations rather than as deaths.

The graphs on the following pages show the number of actual reported deaths and the number of expected deaths. For clarity, we have shown the results in five year age groups.

Graph	Description
4.1	Male Non-Hazardous Duty
4.2	Female Non-Hazardous Duty
4.3	-Male Hazardous Duty
4.4	Female Hazardous Duty

Page 22

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE MORTALITY
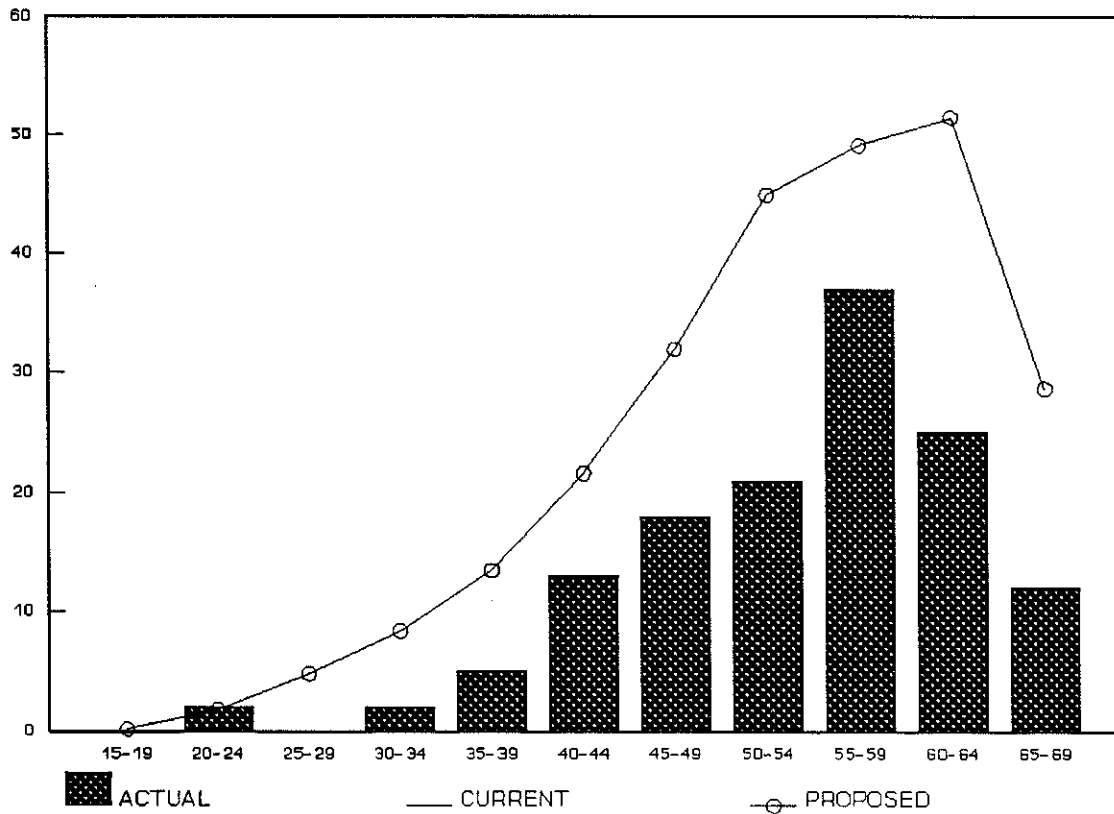
Study Results

GRAPH 4.1
MALE NON-HAZARDOUS DUTY
ACTUAL - 143 CURRENT - 271 PROPOSED - 271

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE MORTALITY
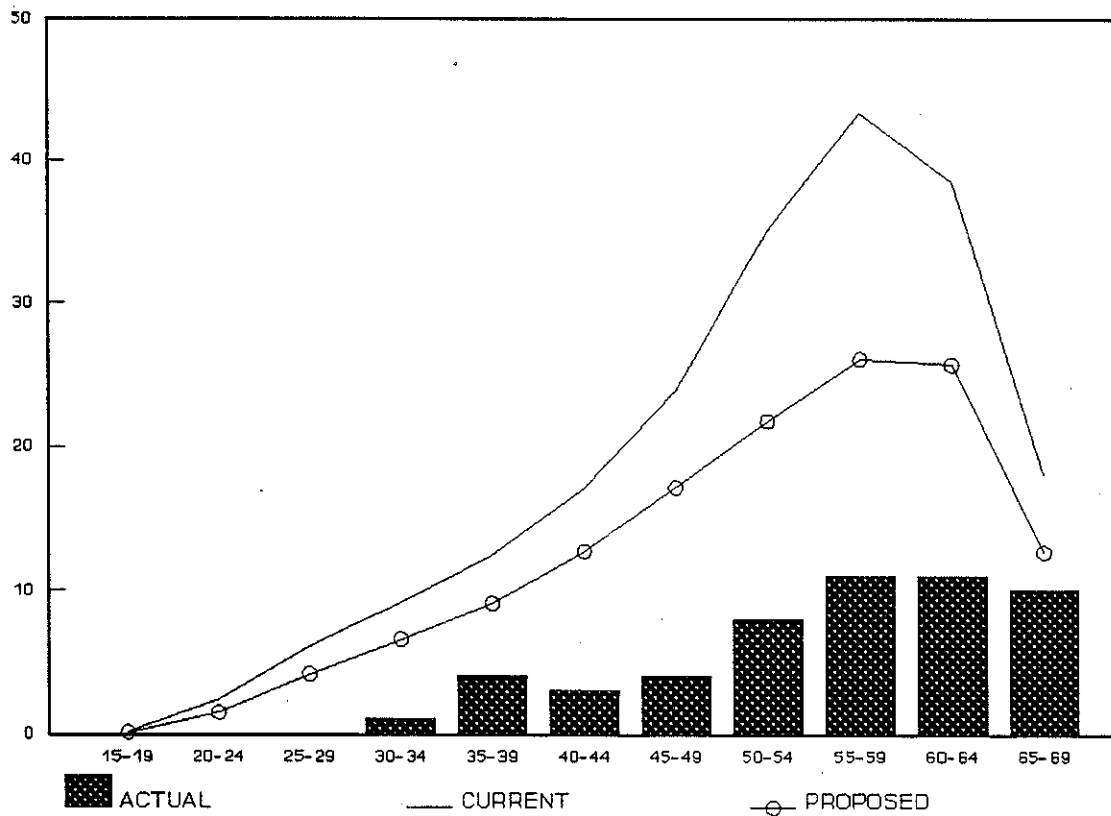
Study Results

GRAPH 4.2
FEMALE NON-HAZARDOUS DUTY
ACTUAL - 54 CURRENT - 213 PROPOSED - 143

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE MORTALITY
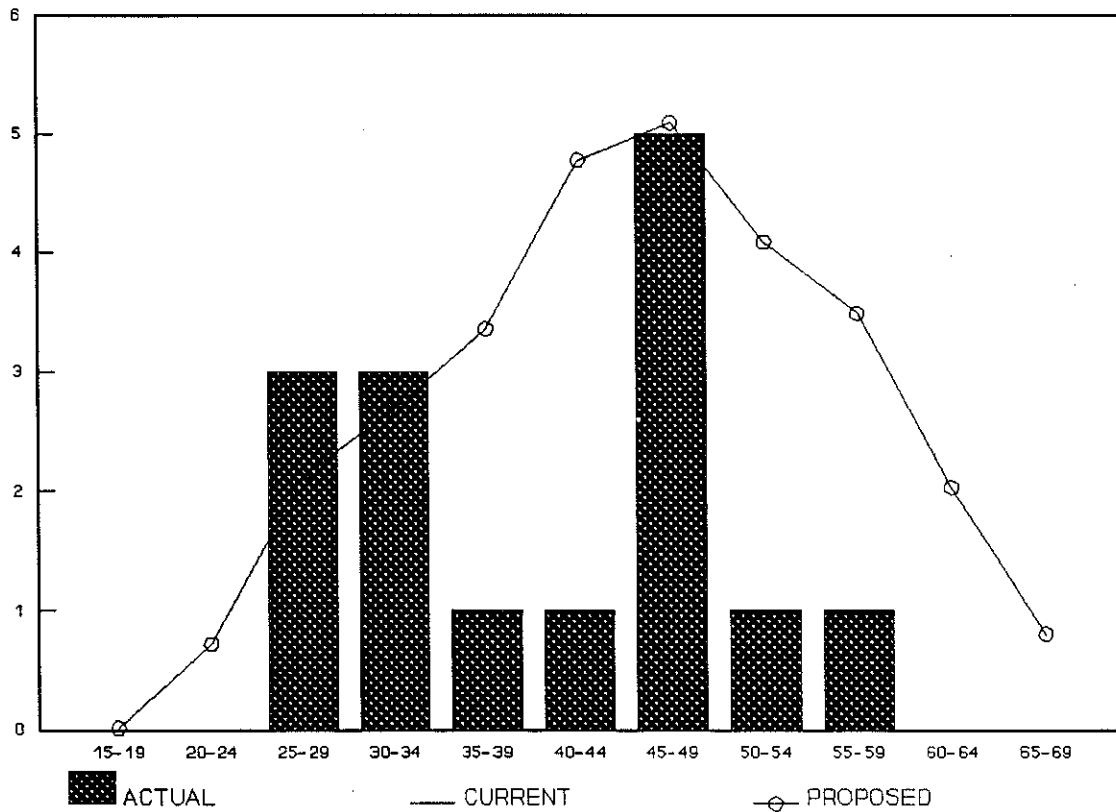
Study Results

GRAPH 4.3
MALE HAZARDOUS DUTY
ACTUAL - 16   CURRENT - 29   PROPOSED - 29

Page 25

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE MORTALITY

Study Results
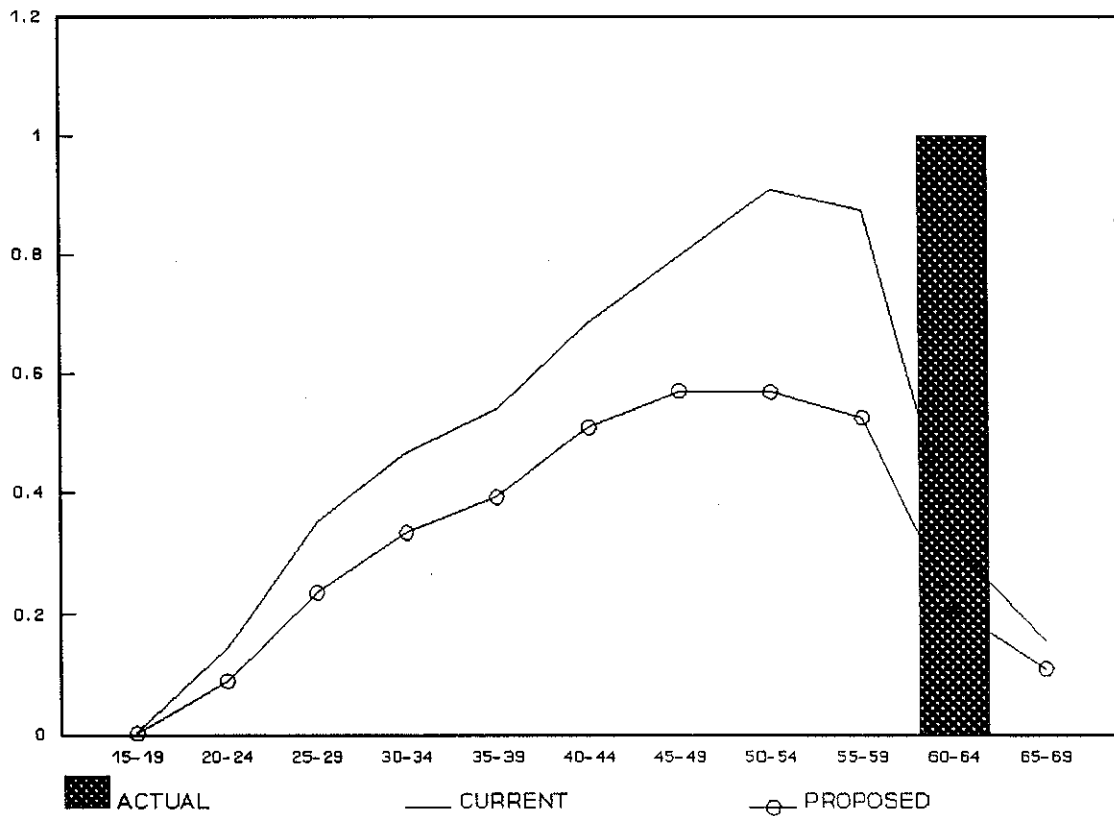
GRAPH 4.4
FEMALE HAZARDOUS DUTY
ACTUAL - 1 CURRENT - 5 PROPOSED - 4

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE MORTALITY

Recommendation

We recommend retaining the 1983 Group Annuitant Mortality Table, but changing the assumption for females from using a four year setback of the Male table to using the Female table.

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

RATES OF RETIREMENT

Methodology

It is often the case that a significant proportion of active members retire immediately upon meeting the eligibility requirements for retirement. The remaining members then tend to retire at certain key ages - age 62, when Social Security benefits are available, and age 65, a culturally defined "normal" retirement age.

Our retirement assumption is therefore structured in two parts:

> An assumption regarding the pattern of retirements among those who have just become eligible to retire - this is referred to in our analysis as the "Year 0" group.

> An assumption regarding the pattern of retirements among those who do *not* retire when first eligible - this is referred to in our analysis as the "Year 1+" group.

In both cases, we have found from past studies that the patterns vary by age and by Hazardous Duty versus Non-Hazardous Duty members (because there are different retirement eligibility provisions for the two groups).

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

RATES OF RETIREMENT

Study Results

Hazardous Duty: Male and female data were combined due to the small number of females in this group. The current "Year 0" rates generally match the experience at the young ages (under age 55), but understate the number of retirements beyond age 55. The current "Year 1+" rates understate the actual experience for most ages. This is in large part due to the two early retirement incentive programs that were offered during the study period.

Non-Hazardous Duty: The actual number of retirements in "Year 0" was greater than expected for males and less than expected for females. For "Year 1+", the actual number of retirements was much larger than the expected number. Again, the reason for this is the effect of the two retirement incentive programs.

The graphs on the following pages show the number of actual retirements separately for "Year 0" and "Year 1+" and the number of expected retirements for the corresponding group:

Graph	Description
4.5A	Male Non-Hazardous Duty - Year 0
4.5B	Male Non-Hazardous Duty - Year 1+
4.6A	Female Non-Hazardous Duty - Year 0
4.6B	Female Non-Hazardous Duty - Year 1+
4.7A	Male Hazardous Duty - Year 0
4.7B	Male Hazardous Duty - Year 1+
4.8A	Female Hazardous Duty - Year 0
4.8B	Female Hazardous Duty - Year 1+

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

RATES OF RETIREMENT

Study Results
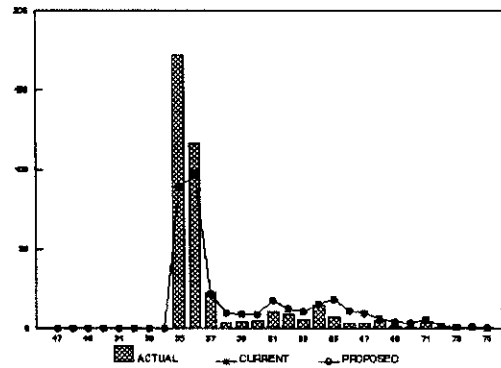
GRAPH 4.5A
MALE NON-HAZ. DUTY - YEAR 0
ACTUAL - 392 CURRENT - 358 PROPOSED - 358

GRAPH 4.5B
MALE NON-HAZ. DUTY - YEAR 1+
ACTUAL - 2,514 CURRENT - 1,284 PROPOSED - 1,839

Page 30

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

RATES OF RETIREMENT

Study Results

GRAPH 4.6A
FEM. NON-HAZ. DUTY - YEAR 0
ACTUAL - 356 CURRENT - 439 PROPOSED - 439

GRAPH 4.6B
FEM. NON-HAZ. DUTY - YEAR 1+
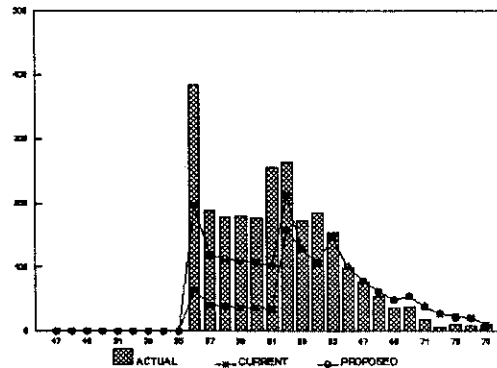ACTUAL - 2,589 CURRENT - 1,478 PROPOSED - 2,093

Page 31

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

RATES OF RETIREMENT

Study Results

GRAPH 4.7A
MALE HAZ. DUTY - YEAR 0
ACTUAL - 47 CURRENT - 43 PROPOSED - 43

GRAPH 4.7B
MALE HAZ. DUTY - YEAR 1+
ACTUAL - 316 CURRENT - 83 PROPOSED - 204

Page 32

MILLIMAN & ROBERTSON, INC.

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

RATES OF RETIREMENT

Study Results

GRAPH 4.8A
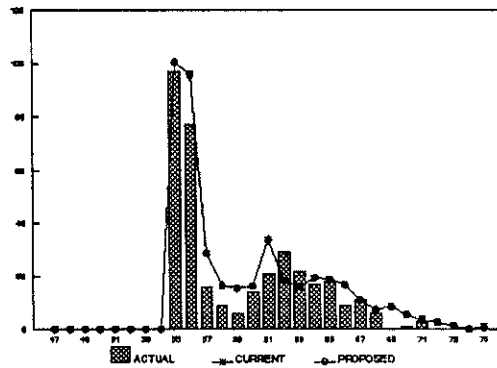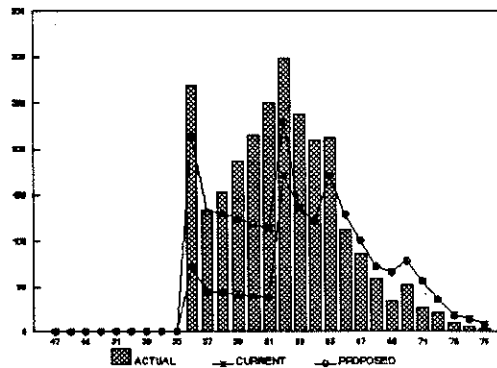FEMALE HAZ. DUTY - YEAR 0
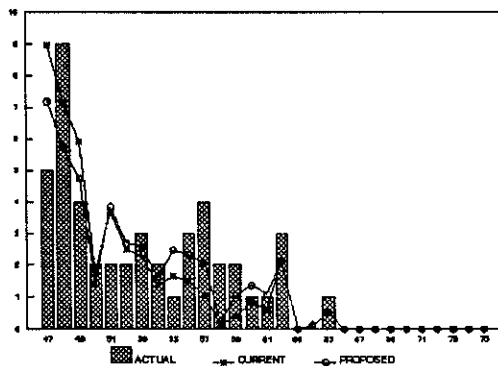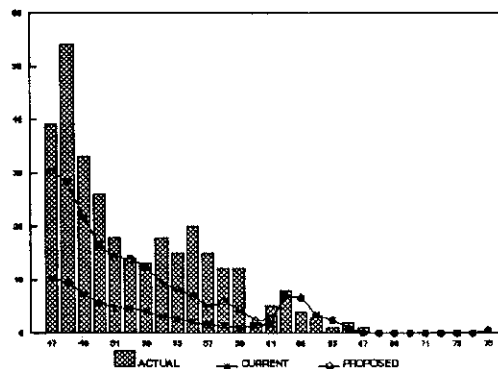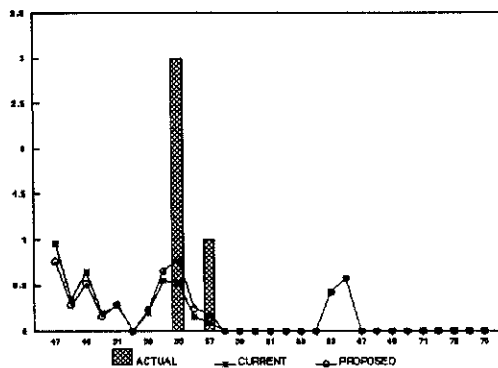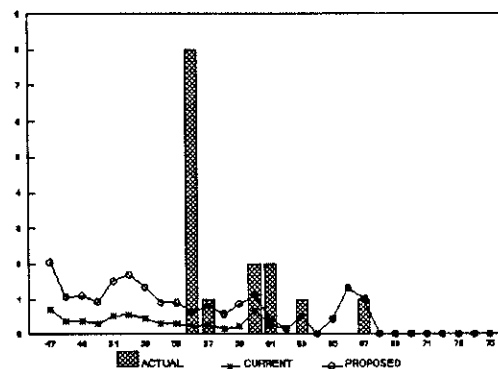ACTUAL - 4   CURRENT - 5   PROPOSED - 5

GRAPH 4.8B
FEMALE HAZ. DUTY - YEAR 1+
ACTUAL - 15   CURRENT - 9   PROPOSED - 19

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

RATES OF RETIREMENT

Recommendation

The two early retirement incentive programs complicate the study of retirement rates. The most obvious complication is that the actual number of retirements is presumably higher than we would have observed had the incentive programs not been offered. More subtle, however, is that the incentive programs will continue to have an impact on retirement patterns for several years in two ways. First, the two programs have raised expectations that there will be a third program, so employees may be delaying retirement in anticipation of the next program. And second, the two programs have depleted the pool of members eligible for retirement. This suggests that there will be lower numbers of employees retiring in the future.

Because of these issues, we should continue to carefully monitor the retirement rates. We believe that less weight should be put on the observed rates of the recent past and more weight should be placed on the actuary's judgment as to probable future rates. As a result, we do not recommend a significant departure from the current assumption. Generally, our proposed rates are a fine-tuning of the current assumptions to reflect the most recent experience (other than the effect of the retirement incentive programs).

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

RATES OF RETIREMENT

Recommendation

We recommend changing to the following one year select and ultimate rates:

	Hazardous Duty		Non-Hazardous Duty	
Age	Year 0	Year 1+	Year 0	Year 1+
47	40	30	0	0
50	40	30	0	0
55	60	30	20	0
60	80	50	20	15
62	100	100	40	40
65	100	100	80	60
70	100	100	100	100

Page 35

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE DISABLEMENT

Methodology

We studied the rates of disablement for all groups. For all ages combined, the following table summarizes our results:

	Haz. Male	Haz. Female	Non-Haz. Male	Non-Haz. Female	Total
Actual	59	6	158	213	436
Expected	41	11	339	403	794
Actual/Expected	144%	55%	47%	53%	55%

Study Results

The graphs on the following pages show, in five year age groups, the number of actual reported disablements and the number of expected disablements by employee group:
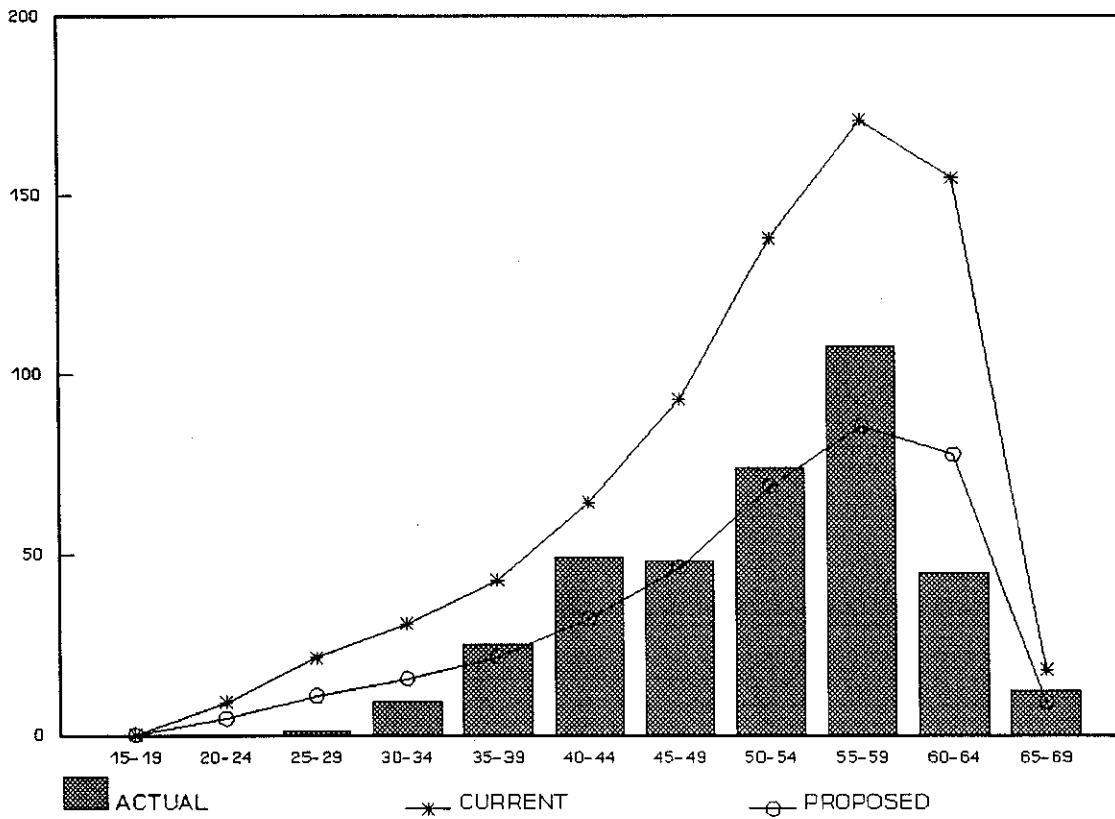
Graph	Description
4.9	Non-Hazardous Duty
4.10	Hazardous Duty

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE DISABLEMENT

Study Results

GRAPH 4.9
NON-HAZARDOUS DUTY
ACTUAL - 371 CURRENT - 742 PROPOSED - 371

Page 37

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE DISABLEMENT

Study Results
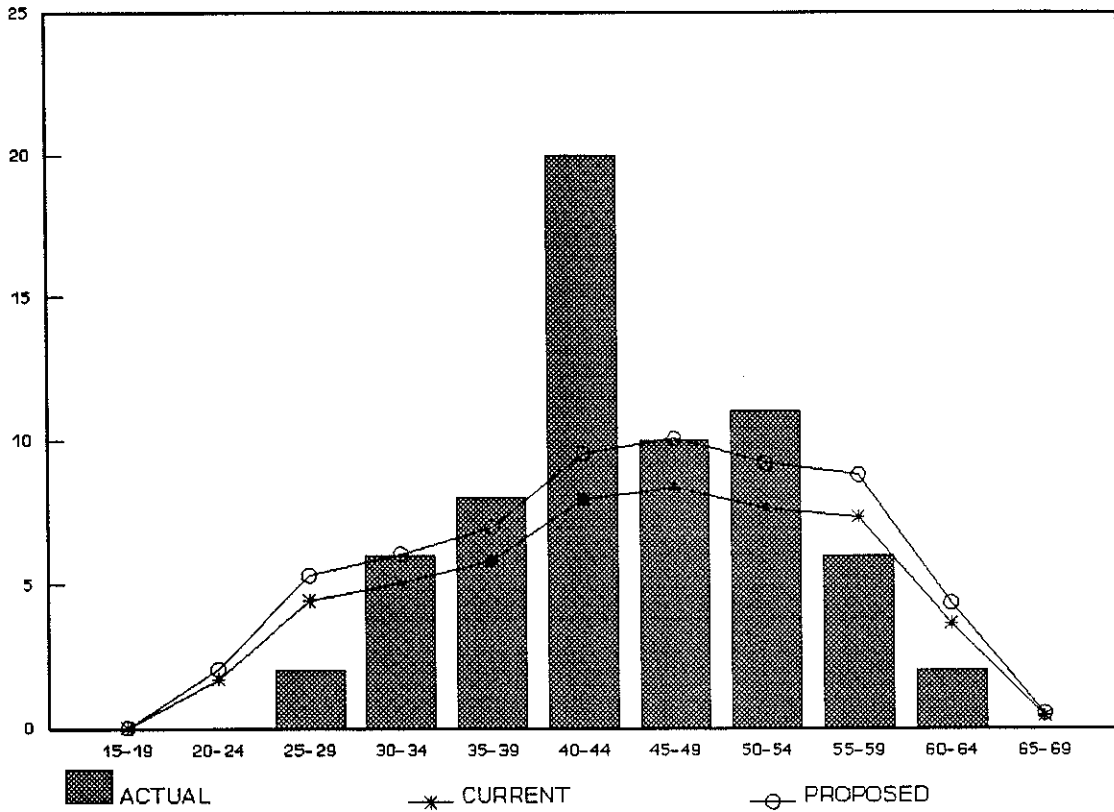
GRAPH 4.10
HAZARDOUS DUTY
ACTUAL - 65 CURRENT - 52 PROPOSED - 63

Page 38

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE DISABLEMENT

Recommendation

We recommend continuing to use unisex disability rates. The Hazardous Duty - Females group is too small to be considered independently and the differences by sex for the Non-Hazardous Duty group are minor.

With a total of 436 reported active disabilities, the data is not sufficiently large to enable us to draw firm conclusions from the study alone. We therefore recommend using new rates of disablement based on the current rates, adjusted by 120% for Hazardous Duty members and by 50% for Non-Hazardous Duty members.

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

TURNOVER

Methodology

The current assumption is that turnover experience during the first five years is affected by length of service, with the highest turnover rates in the earliest years. This five year period is termed the "select period". Beyond the first five years, it is assumed that length of service no longer has an impact on the rate of turnover - this is the "ultimate period".

Study Results

The graphs on the following pages show, by group, the actual number terminating during the study period, along with the expected number based on the current and the proposed assumptions. Results are shown separately for each year in the select period.
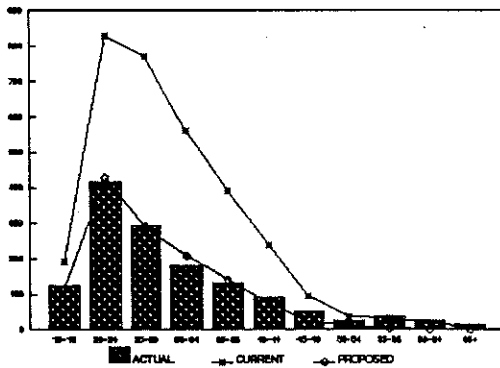
Graph	Description
4.11	Male Non-Hazardous Duty
4.12	Female Non-Hazardous Duty
4.13	Male Hazardous Duty
4.14	Female Hazardous Duty

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS
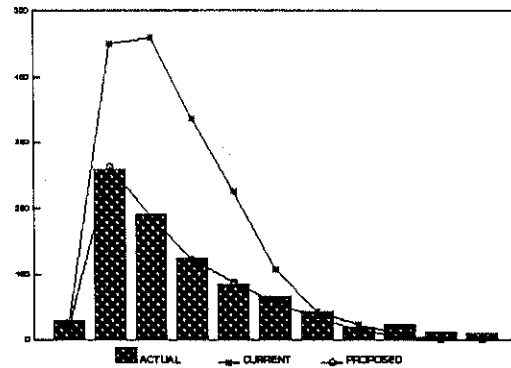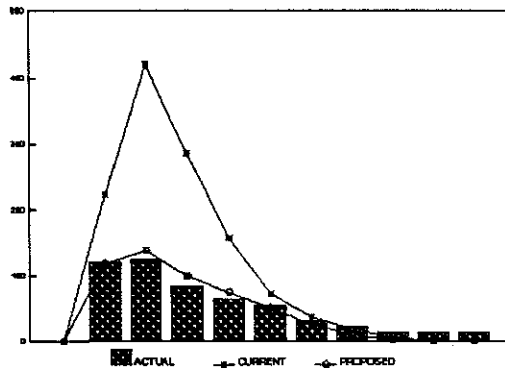
ACTIVE TURNOVER

Study Results

GRAPH 4.11A
MALE NON-HAZ. DUTY - YEAR 0
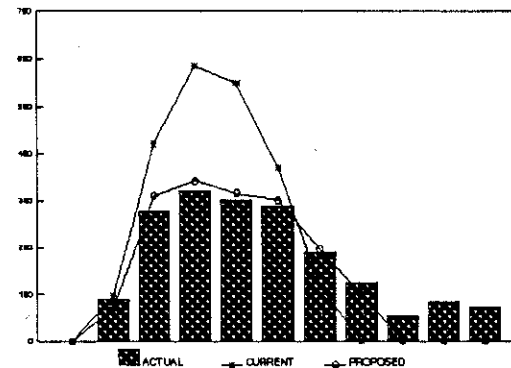ACTUAL - 1,398 CURRENT - 3,176 PROPOSED - 1,295

GRAPH 4.11B
MALE NON-HAZ. DUTY - YEAR 1
ACTUAL - 858 CURRENT - 1,677 PROPOSED - 788

GRAPH 4.11C
MALE NON-HAZ. DUTY - YEAR 2
ACTUAL - 541 CURRENT - 1,219 PROPOSED - 522
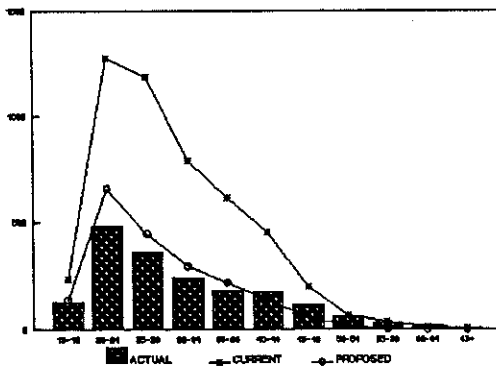

GRAPH 4.11D
MALE NON-HAZ. DUTY - YEAR 3+
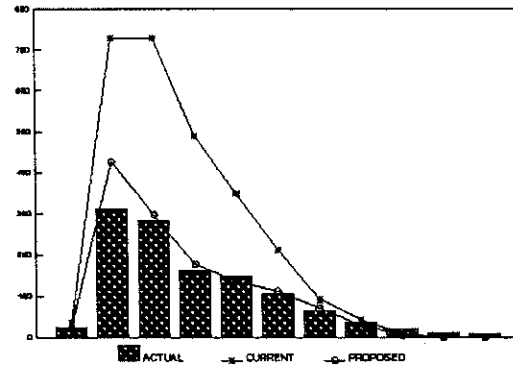ACTUAL - 1,810 CURRENT - 2,146 PROPOSED - 1,641

Page 41

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS
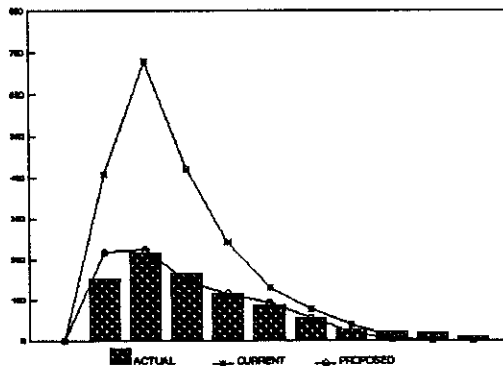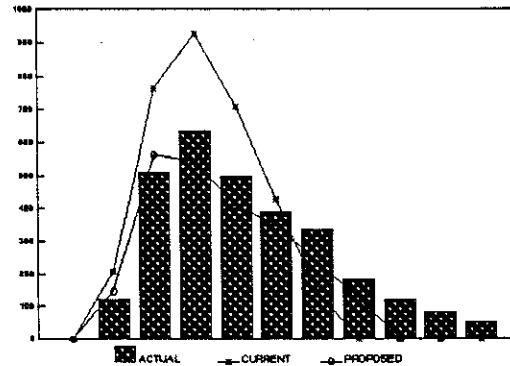
ACTIVE TURNOVER

Study Results

GRAPH 4.12A
FEM. NON-HAZ. DUTY - YEAR 0
ACTUAL - 1,812 CURRENT - 4,878 PROPOSED - 1,975

GRAPH 4.12B
FEM. NON-HAZ. DUTY - YEAR 1
ACTUAL - 1,178 CURRENT - 2,691 PROPOSED - 1,281

GRAPH 4.12C
FEM. NON-HAZ. DUTY - YEAR 2
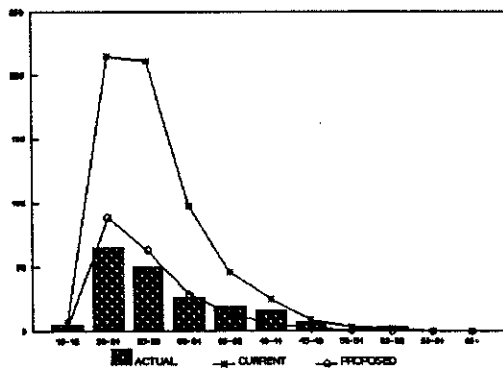ACTUAL - 867 CURRENT - 2,006 PROPOSED - 878

GRAPH 4.12D
FEM. NON-HAZ. DUTY - YEAR 3+
ACTUAL - 2,924 CURRENT - 3,177 PROPOSED - 2,370

Page 42

MILLIMAN & ROBERTSON, INC.

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE TURNOVER

Study Results

GRAPH 4.13A
MALE HAZ. DUTY - YEAR 0
ACTUAL - 193 CURRENT - 619 PROPOSED - 208
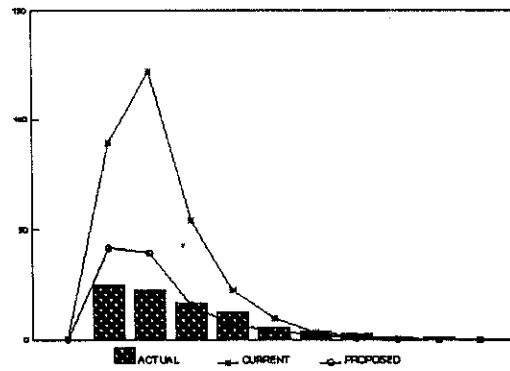
GRAPH 4.13B
MALE HAZ. DUTY - YEAR 1
ACTUAL - 93 CURRENT - 305 PROPOSED - 112

GRAPH 4.13C
MALE HAZ. DUTY - YEAR 2
ACTUAL - 54 CURRENT - 208 PROPOSED - 66

GRAPH 4.13D
MALE HAZ. DUTY - YEAR 3+
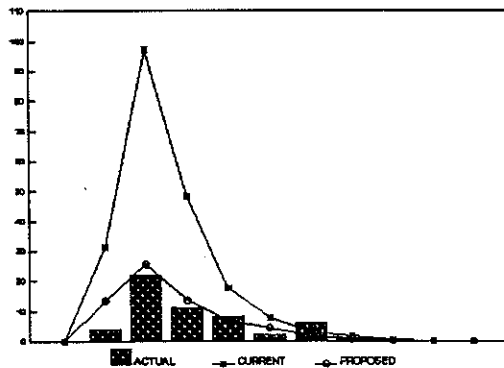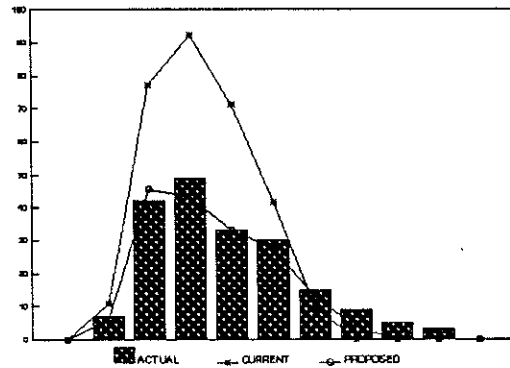ACTUAL - 193 CURRENT - 303 PROPOSED - 171

Page 43

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

ACTIVE TURNOVER

Study Results
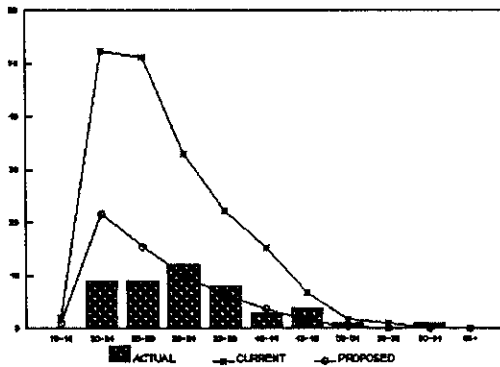
GRAPH 4.14A
FEM. HAZ. DUTY - YEAR 0
ACTUAL - 47 CURRENT - 186 PROPOSED - 60
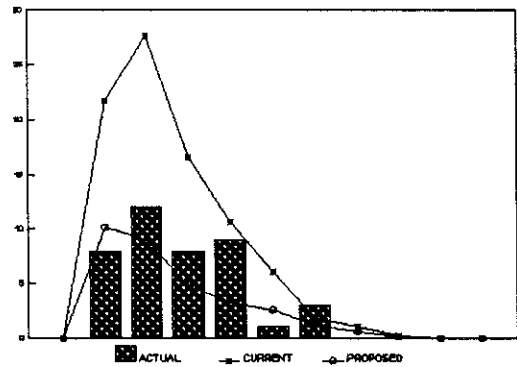
GRAPH 4.14B
FEM. HAZ. DUTY - YEAR 1
ACTUAL - 41 CURRENT - 86 PROPOSED - 32

GRAPH 4.14C
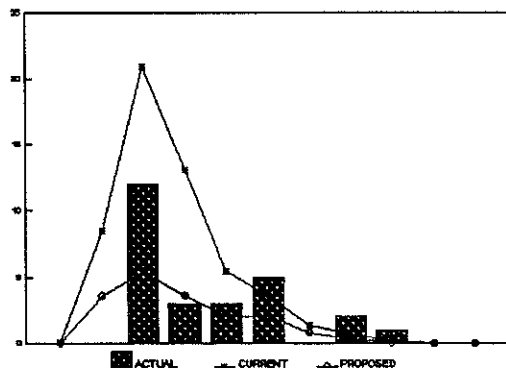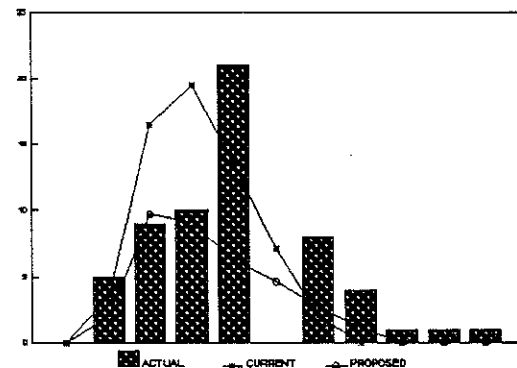**FEM. HAZ. DUTY - YEAR 2**
ACTUAL - 26 CURRENT - 54 PROPOSED - 18

GRAPH 4.14D
FEM. HAZ. DUTY - YEAR 3+
ACTUAL - 60 CURRENT - 62 PROPOSED - 36

SECTION 4 - DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

TURNOVER

Recommendation

We did not find a significant difference in the pattern of turnover for members with 3 or 4 years of service versus those with five or more years of service. We therefore recommend shortening the select period from five years to three years.

The current turnover rates understate turnover for Hazardous Duty and overstate turnover for Non-Hazardous Duty members.

The recommended turnover assumption is similar to the current approach in that we have developed a table of turnover rates for male, Non-Hazardous Duty members. The rates for all other groups are by reference to this table, with adjustments to the rates for female members and for Hazardous Duty members.

The recommended table is shown below:

	Age	Yr 0	Yr 1	Yr 2	Yrs 3+
Male Non-Hazardous Rates are in Table	20	30%	30%	20%	10%
	25	17%	15%	10%	8%
Increase for Females - 10%	30	15%	11%	8%	5%
	35	13%	10%	8%	3%
Decrease for Hazardous Duty - 60%	40	10%	9%	7%	3%
	45	5%	8%	6%	2%
	50	3%	6%	4%	2%
	55	2%	4%	2%	0%
	60	0%	0%	0%	0%

SECTION 5 - RETIRED MORTALITY

Assumptions Studied

In this section of the report, we are concerned with the patterns of mortality experienced by retired members of the System. We separate the mortality into that assumed to apply to healthy retirees and that assumed to apply to members who retired with a disability benefit.

Study Period

The study period was from July 1, 1988 through June 30, 1992.

Methodology

The study of retired decrements involves the same steps as the study of active decrements: observation of the actual number of deaths, determination of the "exposed" population, calculation of the expected number of deaths, and comparison of the expected number of deaths under the current assumption with that under alternative assumptions.
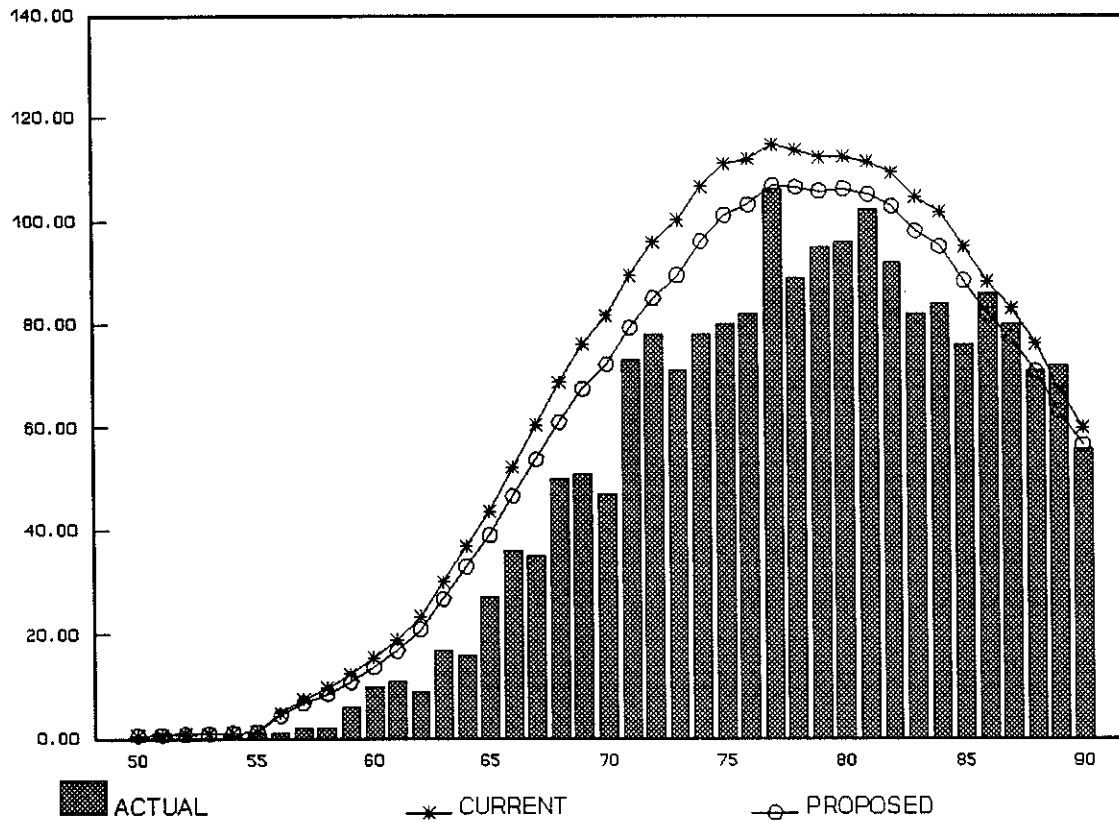
Study Results

The following graphs show the number of actual reported deaths and the number of expected deaths among retirees:

Graph	Description
5.1	Healthy Retirees
5.2	Disabled Retirees

SECTION 5 - RETIRED MORTALITY

Study Results

GRAPH 5.1
HEALTHY RETIREES
ACTUAL - 2,167 CURRENT - 2,758 PROPOSED - 2,551

SECTION 5 - RETIRED MORTALITY

Study Results
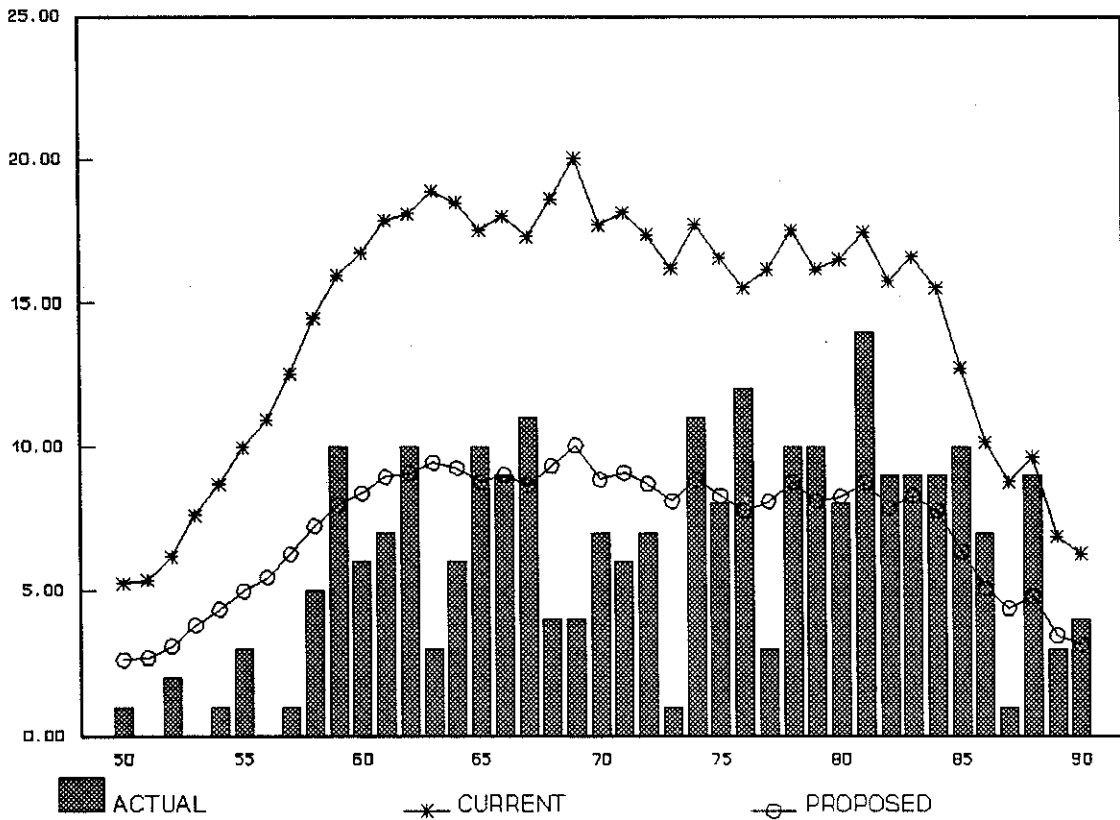
GRAPH 5.2
DISABLED RETIREES
ACTUAL - 263 CURRENT - 611 PROPOSED - 305

SECTION 5 - RETIRED MORTALITY

Recommendations

Healthy Retirees

There were fewer deaths than expected at ages below 70, and more deaths than expected at ages above 70. The results were sufficiently consistent with our current assumption, however, that the only change we recommend is for females. The current female assumption is the 1983 GAM male table with ages setback 4 years. We recommend changing to the 1983 GAM female table.

Disabled Retirees

Actual deaths among disabled retirees were substantially less than the number expected under the current assumption. The data for this portion of our study is not sufficiently large to enable us to draw firm conclusions from the study alone. We therefore recommend using new rates of disabled mortality of 50% of the current rate.

Page 49

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