STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS

Experience Review for the Seven-Year Period Ending June 30, 1997

November 1997

Watson Wyatt
Worldwide

**Experience Review for the Seven-Year Period
Ending June 30, 1997**

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State Employees' Retirement System of Illinois

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Executive Summary

Watson Wyatt Worldwide has been retained by the State Employees' Retirement System of Illinois to review the experience of the System for the seven-year period beginning July 1, 1990 and ending June 30, 1997. This report discusses our findings and our recommendations for changes in assumptions.

Pursuant to Section 14-138(a) of the law establishing the System, the actuary shall
  a) make a general investigation at least once every five years* of the mortality, retirement, disability, employment, turnover, interest and earnable compensation; and,
  b) recommend tables to be used for all required actuarial calculations.

  * *Senate Bill 114 amended the Pension Code to provide that the next five-year review period would begin June 30, 1997 instead of June 30, 1995.*

A periodic experience review is essential to assessing the adequacy of the assumptions being used to evaluate the liabilities of the System as well as determining the appropriate level of contributions to satisfy the statutory funding policy. In setting the assumptions for the actuarial valuation, it is important to distinguish between recent trends which can be assumed to be representative of the long range future and those which may have little relevance to the future. While these trends influence both economic and demographic assumptions, the contrast is most apparent in the economic assumption area, particularly in investment return and the underlying inflation rate.

In our experience review, we have examined each assumption necessary for the valuation of the expected liabilities of the System. Where sufficient detail is available in the census data, we have reviewed the relevant System experience over the seven-year period for each assumption. In many cases, we dropped the initial two-year period from the analysis to eliminate the distortions due to the Early Retirement Window. In selecting our recommendations, it is our intent that each assumption would, by itself, be realistic and represent our best estimate of the long range expectations for that element of experience.

Overall, the experience during the last seven years when viewed net of investment experience has been close to expectations. The following table summarizes the experience (in millions).

Fiscal Year	Investment Gains (Losses)	Other Experience Gains (Losses)	Total Gains (Losses)
1991	$(43.3)	$(60.8)	$(104.1)
1992	107.6	(61.7)	45.9
1993	51.8	(86.1)	(34.3)
1994	35.8	(84.6)	(48.8)
1995	(3.5)	(105.0)	(108.5)
1996	251.4	16.7	268.1
1997	541.6	(87.8)	453.8
Average	$134.5	$(67.0)	$67.5

The average experience gain or loss is about 1.1% of the average total liabilities during the period. However, changes are recommended for specific demographic and economic assumptions to bring them more in line with past experience and expected future experience.

- *Mortality Rates* - Adopt the 1983 Group Annuity Mortality table as the basis of healthy mortality.
- *Withdrawal Rates* - Lower the number of expected terminations by adopting 85% of current male rates and 90% of current female rates.
- *Retirement Rates* - Reduce the expected number of retirements for ages 50 through 60 and use escalating rates from ages 61 through 65.
- *Salary Increases* - Reduce the inflation component of the total salary increase assumption by 100 basis points to 3.5%.
- *Investment Return* - Adopt an interest rate assumption of 8.5% for determining the liabilities of the System.

Section I
Demographic Assumptions

A. Mortality

The mortality table currently in use is the 1986 Projected Experience Table. This table is based on the experience underlying the 1971 Group Annuity Mortality Table, without margins, with a projection for mortality improvements to 1986. Our analysis of mortality experience entails a review of the ratios of actual mortality rates to the assumed rates based on this table. We focused on the experience among the annuitants for ages 50 and above, since the length of time a member or beneficiary is expected to receive a benefit is very important in determining the System obligations. The experience is studied separately for males and females. The actual rates for ages prior to 60 may be inflated due to the lack of data necessary to separate refunds from deaths on our system.

An actual to expected ratio in excess of 1.00 means that deaths have been greater than anticipated, resulting in fewer benefit payments and a savings to the System. A ratio of less than 1.00 means that annuitants are living longer than expected, resulting in additional costs to the System. Generally, a ratio of 1.05 to 1.10 is desirable to allow for future improvements in life expectancies, since the mortality rates proposed are not only applicable to member mortality during 1997, but also to the mortality experienced by the System as many as eighty years into the future.

The graphs on the following page show the actual mortality experience over the five-year period 1992 - 1997, as well as the expected mortality under the current assumptions and under the proposed assumptions. The proposed mortality basis is the 1983 Group Annuity Mortality Table which was developed from a 1983 study of mortality. As can be seen from the graphs, as well as the table of actual to expected ratios shown below, the proposed mortality assumption produces a closer fit to actual experience at older ages and allows for future mortality improvements.

We recommend adopting the 1983 Group Annuity Mortality Table as the basis for projecting the members' lifetime. Specifically, for male members, we recommend using the male table with a one-year setback. For female members, we recommend using the female table without adjustment.

Age	Actual to Expected Ratios—Mortality			
	Current–M	Current–F	Proposed–M	Proposed–F
60-64	1.37	2.98	1.99	4.11
65-69	0.96	1.24	1.37	1.84
70-74	0.94	1.05	1.23	1.42
75-79	0.99	1.02	1.19	1.11
80-84	0.99	1.08	1.05	1.06
85-89	0.81	0.78	0.74	0.80
90 & Over	1.17	1.14	1.05	1.02
Weighted Avg.	0.97	1.04	1.08	1.10

B. Withdrawal

Unlike mortality, rates of withdrawal are affected to a great extent by various external factors. Examples of such factors are the economy, changes in the competitive group of employers drawing from the same workforce pool, changes in staffing decisions, etc. The accompanying graphs show the results of our study, and compare the current turnover assumptions used for the valuation with the actual results from the five-year period beginning July 1, 1992 and ending June 30, 1997.
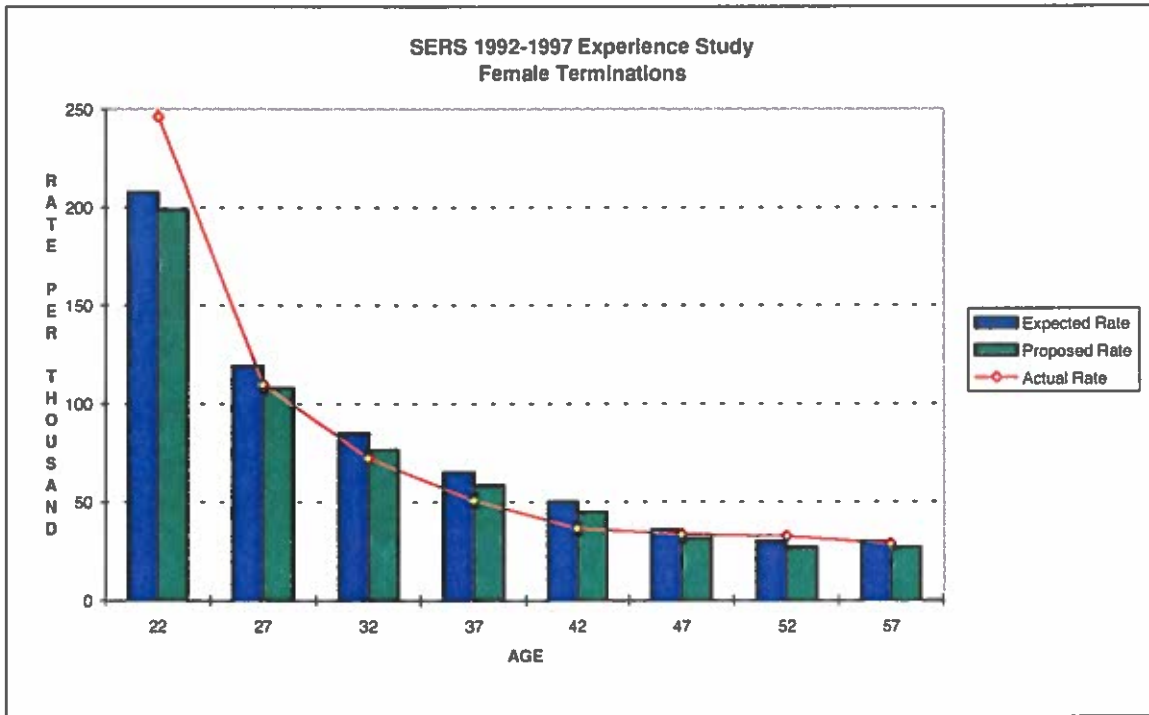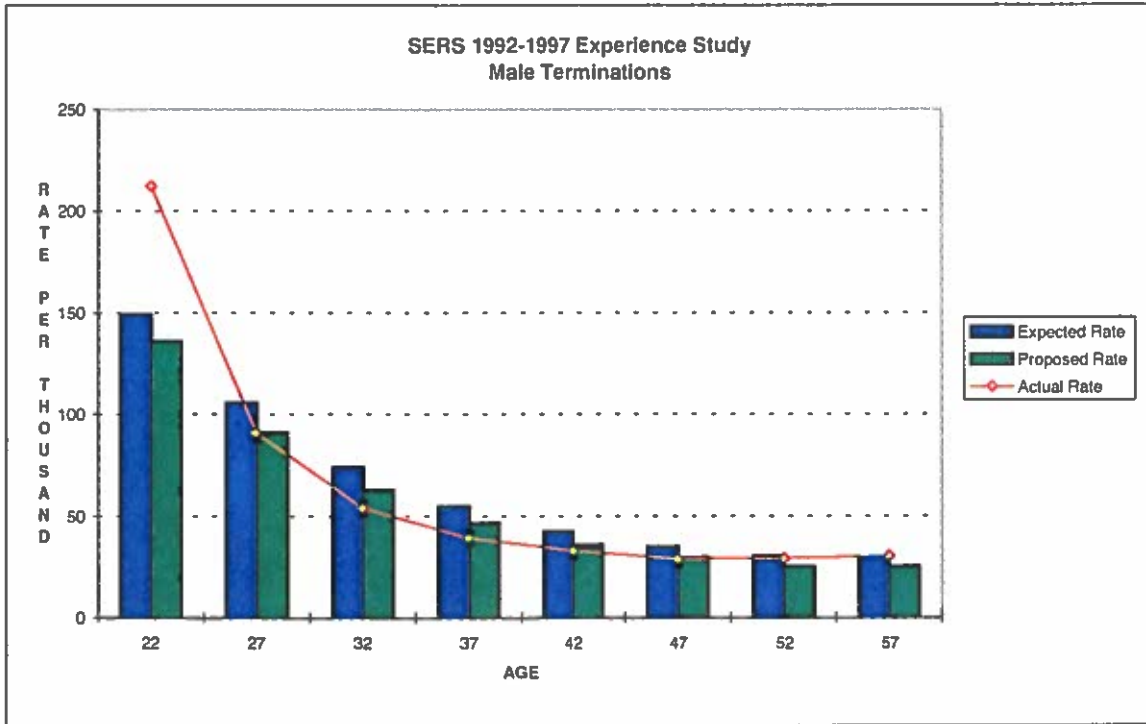
We analyzed the ratios of the actual terminations of employment to the expected terminations, separately for males and females. A ratio greater than 1.00 indicates that more members have terminated than expected. As this would imply that fewer members stay until retirement, it generally results in a savings to the System, although there might be a cash drain for refund payments. A ratio less than 1.00 would indicate fewer terminations than expected and a loss to the System. Generally, a ratio of about 1.00 would be desirable. As can be seen from the graphs, the proposed rates are a closer fit to the actual experience than the current rates.

Sizable losses due to fewer than expected terminations have occurred in each year of the review period. Overall, the terminations during the period were 86% of the expected number for males and 89% of the expected number for females. We also analyzed the termination patterns based on the years of service at termination, but found no significant differences in such patterns. In our opinion, service-related termination rates would not materially improve the accuracy of the current age and sex-related rate tables.

We recommend revising the withdrawal rates for males to be 85% of the rates currently in use and revising the withdrawal rates for females to be 90% of the rates currently in use.

Age	Actual to Expected Ratios—Withdrawal			
	Current–M	Current–F	Proposed–M	Proposed–F
20-24	1.32	1.11	1.56	1.24
25-29	0.85	0.92	1.00	1.02
30-34	0.73	0.85	0.86	0.95
35-39	0.71	0.78	0.84	0.87
40-44	0.78	0.73	0.91	0.81
45-49	0.82	0.96	0.97	1.07
50-54	0.98	1.09	1.15	1.21
55-59	1.01	0.95	1.19	1.06
60 & Over	1.56	1.03	1.83	1.15
Weighted Avg.	0.86	0.89	1.01	1.00

SERS 1992-1997 Experience Study
Male Terminations

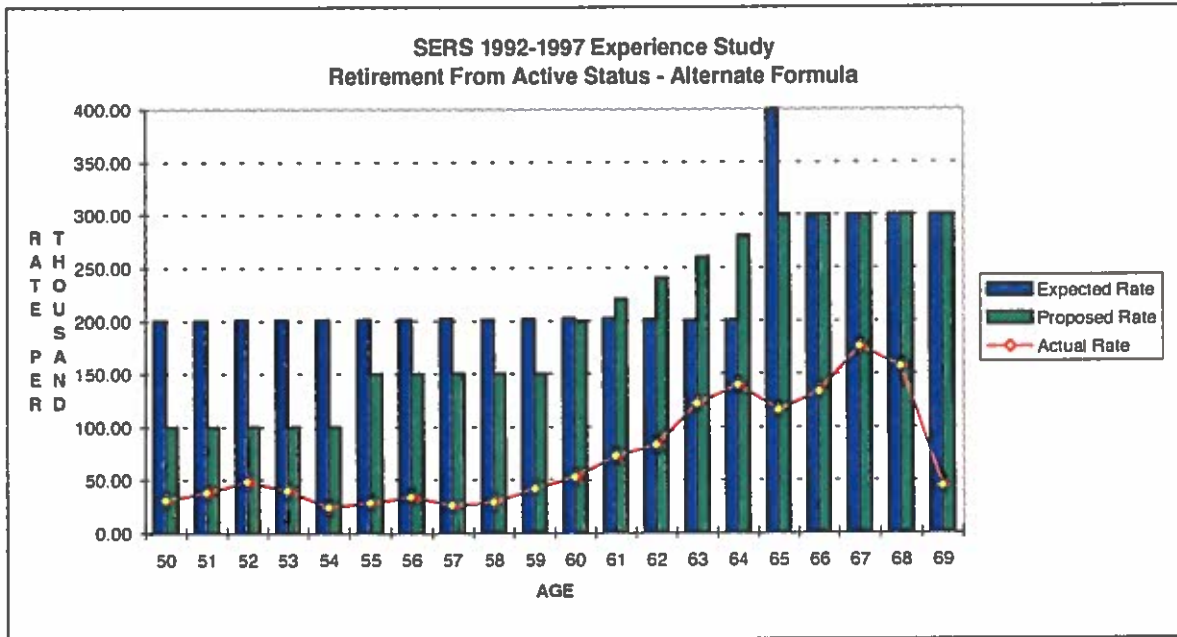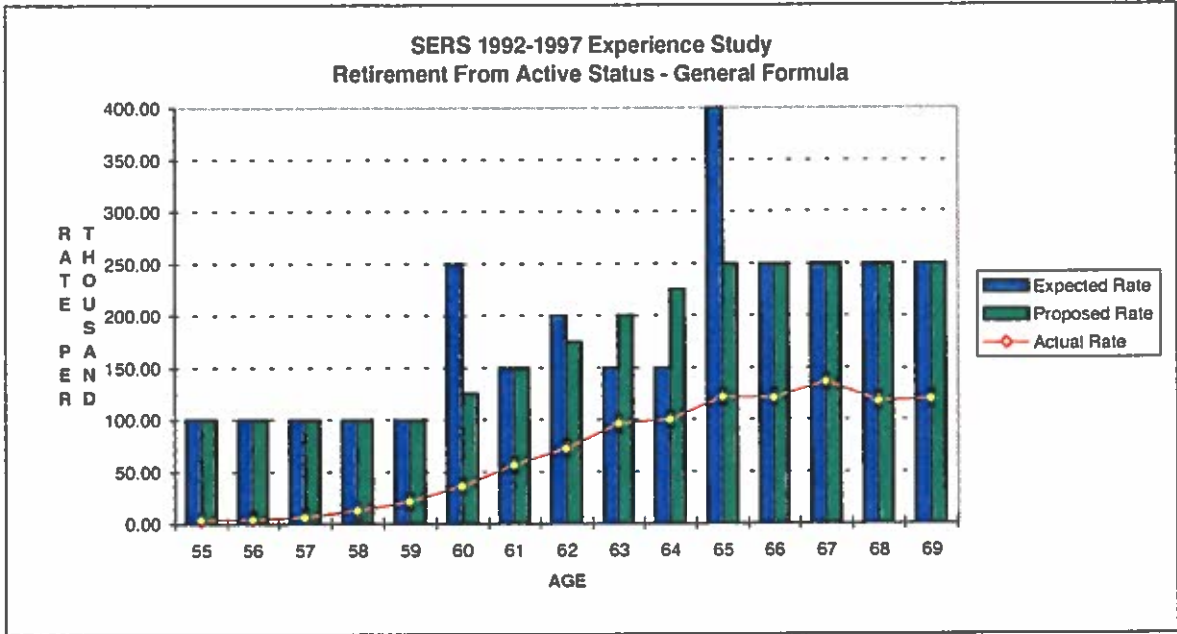SERS 1992-1997 Experience Study
Female Terminations

C. Retirement

The rates of retirement selected for the valuation can have a major impact on the value of the liabilities, particularly in cases where there are several unreduced retirement ages as well as early retirement subsidies. As we discussed in the previous section on withdrawal rates, retirement rates will also be affected by outside economic and business events. For general members, the current plan allows for unreduced retirement at age 60 with at least 8 years of service or at any age with 35 years of service. Reduced early retirement is provided between the ages of 55 and 60 for members with at least 30 but less than 35 years of service. For alternative formula members, an unreduced retirement annuity is available at age 50 with 25 years of service or at age 55 with 20 years of service.

The current assumed retirement rates are age-related, but are fairly flat with spikes at certain "key" ages, such as ages 60, 62 and 65. Rates are applicable from ages 55 (50 for alternative formula members) through age 70. The graphs on the following page illustrate that actual retirement experience is relatively flat until about age 60 when it starts to increase with each additional age. No significant increases in retirement occurred for any particular age. In general, the current assumptions have resulted in losses to the System each year.

We recommend reducing the assumed retirement rates for member ages 50 through 60, with escalating rates from ages 60 through 65. Rates for ages over age 65 would be unchanged.

	Rates of Retirement			
	General Formula		Alternative Formula	
Age	Current	Proposed	Current	Proposed
50-54	N/A	N/A	20%	10%
55-59	10.0%	10.0%	20	15
60	25.0	12.5	20	20
61	15.0	15.0	20	22
62	20.0	17.5	20	24
63	15.0	20.0	20	26
64	15.0	22.5	20	28
65	40.0	25.0	40	30
66-69	25.0	25.0	30	30
70	100.0	100.0	100	100

SERS 1992-1997 Experience Study
Retirement From Active Status - General Formula

SERS 1992-1997 Experience Study
Retirement From Active Status - Alternate Formula

D. Disability

The disability experience under the System was studied separately for males and females, and covered the three major assumptions with regard to disability:

1. Incidence of disability,
2. Disabled mortality, and
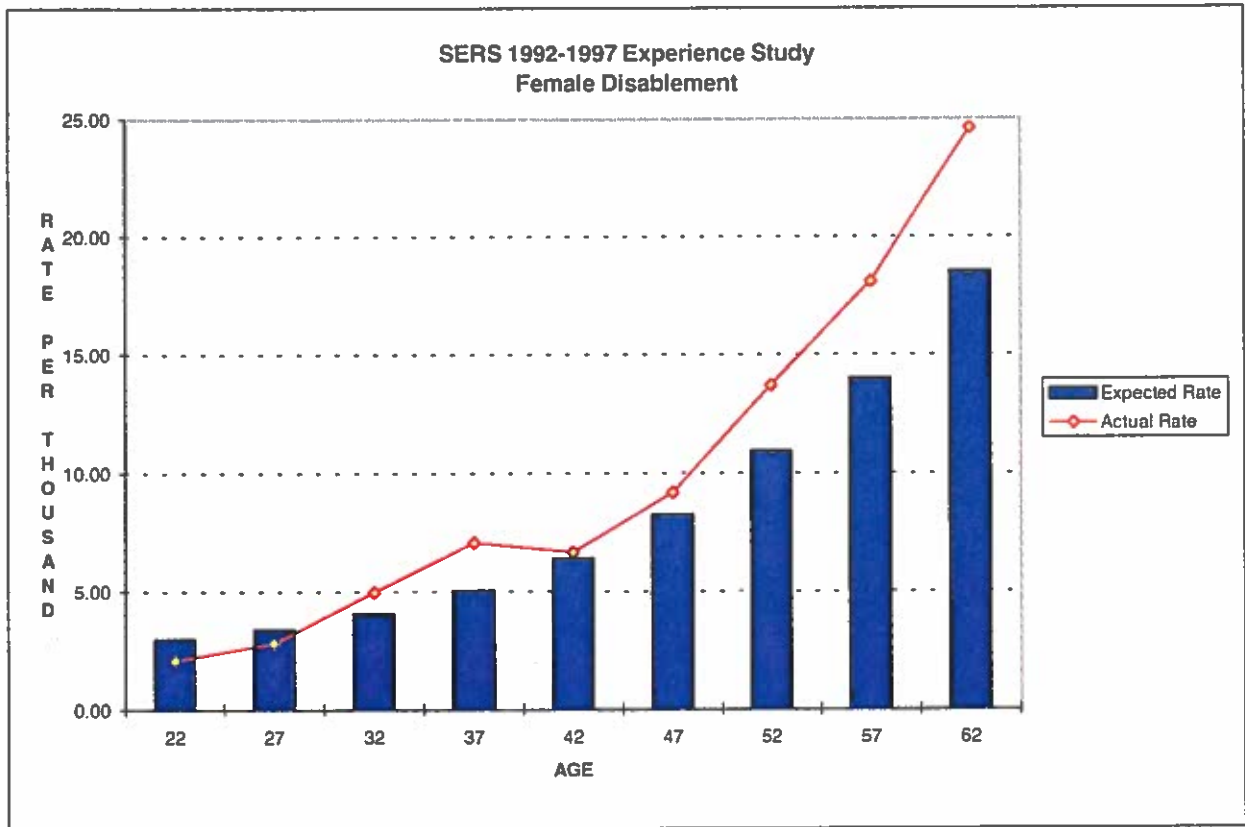3. Recovery from disability.

Incidence of Disability

In general, the actual incidence of disability, or the number of members becoming disabled was 109% of the expected based on the valuation assumptions. In addition, the pattern of disability closely resembles the expected pattern, for both sexes, as seen from the graphs on the next page.

We recommend that no changes be made to the assumed incidence of disability rates at this time.

Age	Actual to Expected Ratios—Incidence of Disability	
	Male	Female
20-24	0.88	0.72
25-29	0.78	0.83
30-34	1.03	1.23
35-39	1.11	1.40
40-44	1.16	1.05
45-49	0.96	1.12
50-54	0.93	1.26
55-59	1.09	1.30
60-64	1.23	1.34
65 & Over	0.56	0.67
Weighted Average	1.01	1.16

SERS 1992-1997 Experience Study
Male Disablement

SERS 1992-1997 Experience Study
Female Disablement
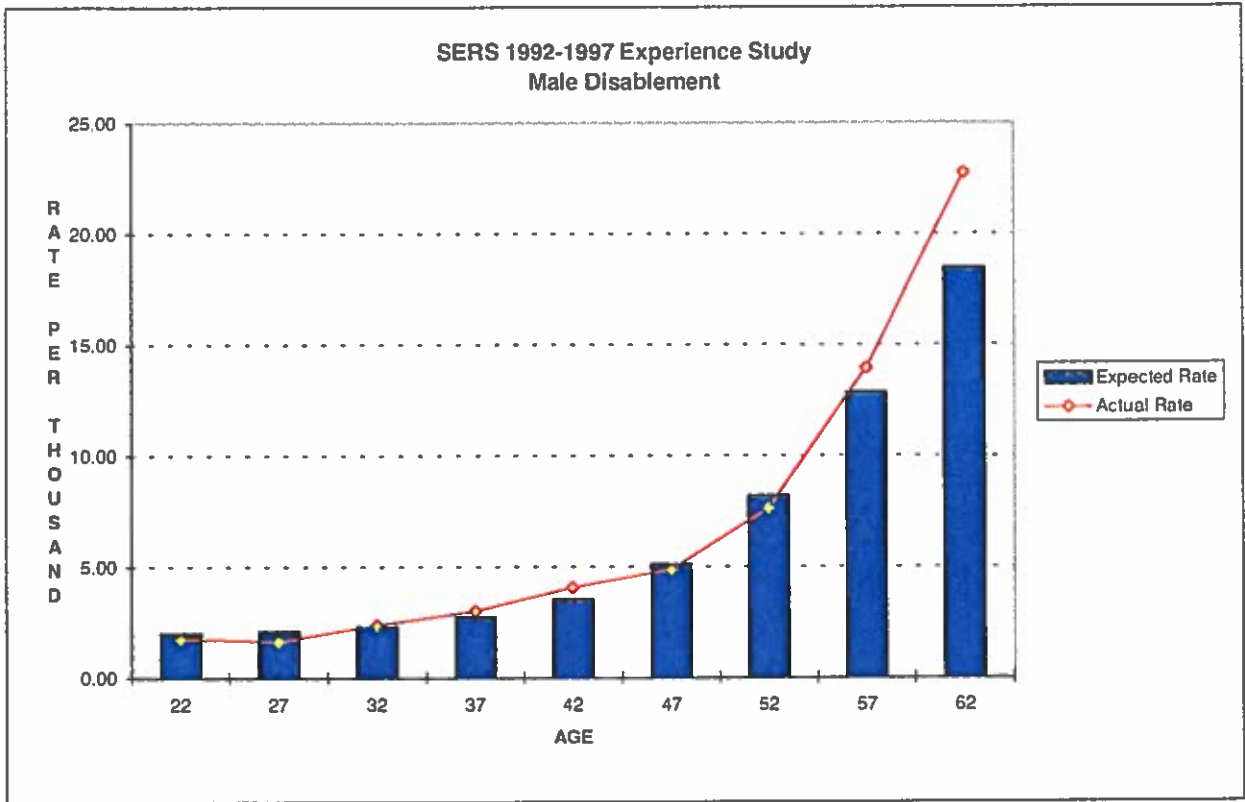
Disabled Mortality

The actual deaths among disabled members have exceeded the expected deaths and have produced small gains for the System. We believe that the margin for conservatism and mortality improvements is appropriate for the materiality of this assumption to the valuation results.

We recommend that no changes be made to the assumed disability mortality rates at this time.

Age	Actual to Expected Ratios—Disabled Mortality	
	Male	Female
30-34	5.13	5.52
35-39	4.15	4.63
40-44	3.07	3.62
45-49	1.74	2.65
50-54	1.72	1.81
55-59	1.46	1.37
60-64	1.14	1.29
65-69	1.34	0.93
70 & Over	1.40	1.36
Weighted Average	1.65	2.00

SERS 1992-1997 Experience Study
Male Disabled Mortality

SERS 1992-1997 Experience Study
Female Disabled Mortality
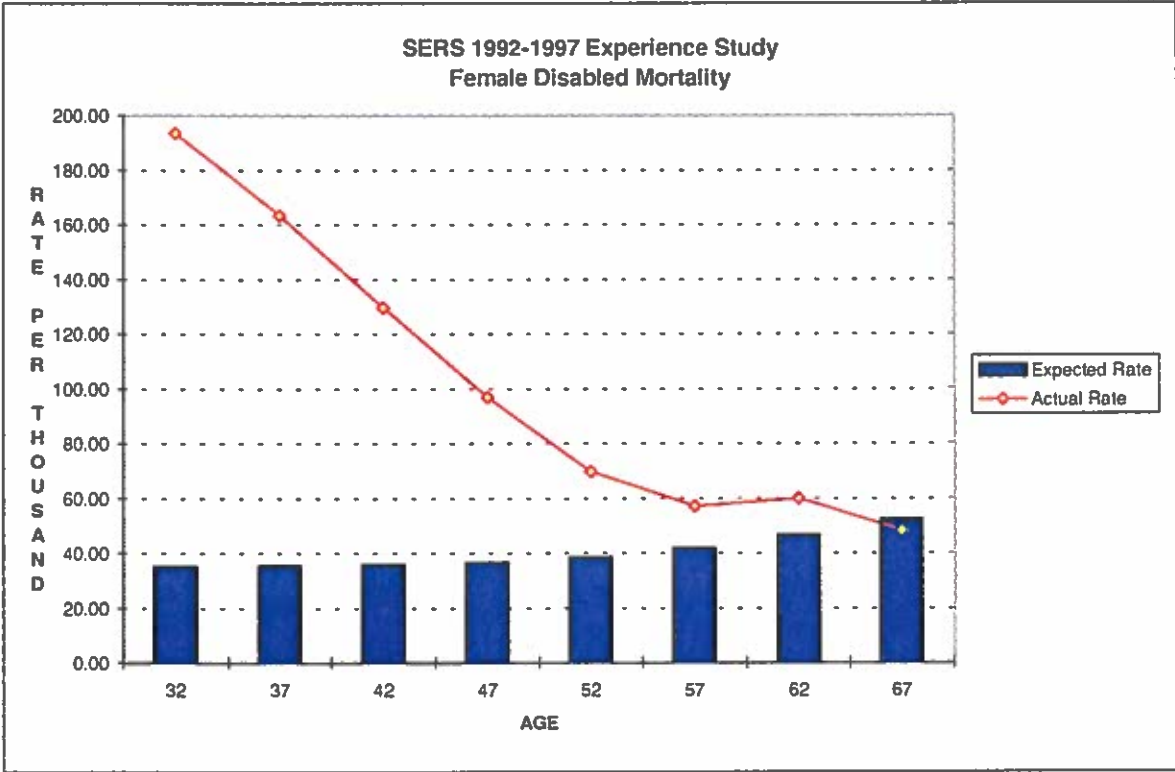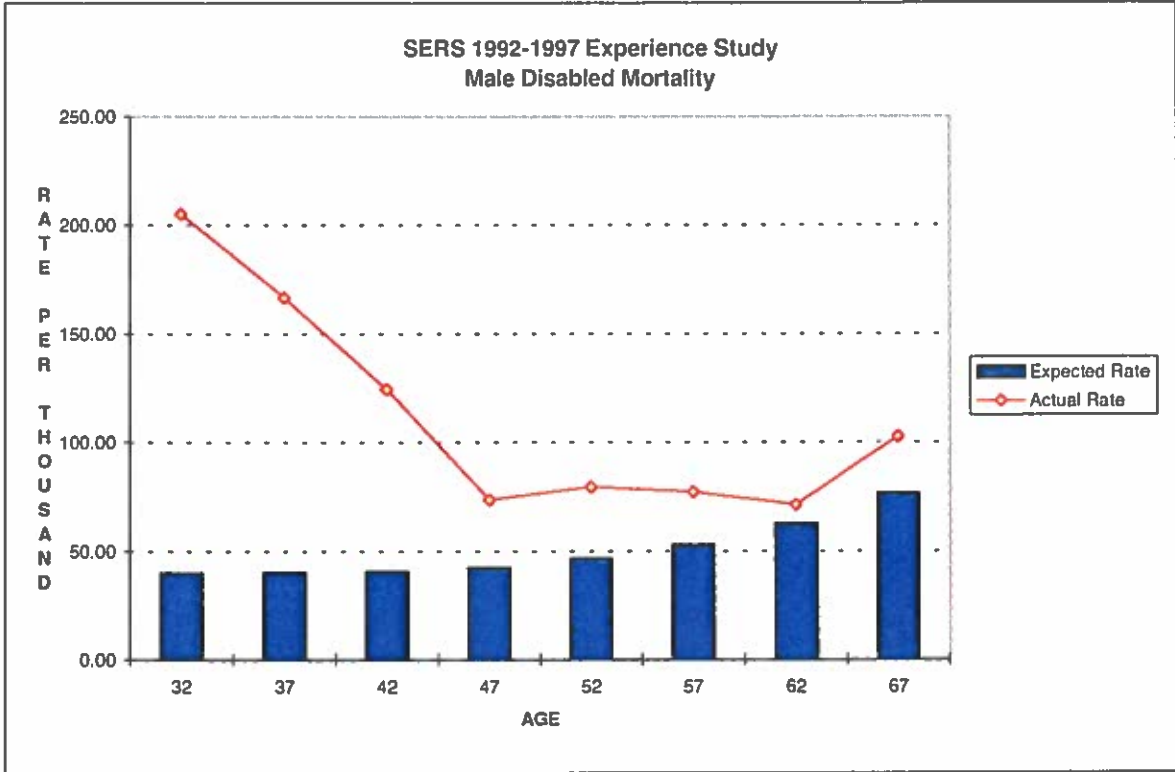
Recovery from Disability

The number of recoveries from disability was very close to the number expected over the period of the study, and the pattern of actual recoveries closely resembles the expected pattern.

We recommend that no changes be made to the assumptions for recovery from disability at this time.

Age	Actual to Expected Ratio—Recovery From Disability
30-34	0.83
35-39	0.91
40-44	1.01
45-49	0.98
50-54	1.21
55-59	1.56
60-64	2.40
65-69	5.76
Weighted Average	1.25

SERS 1992-1997 Experience Study
Recovery From Disablement
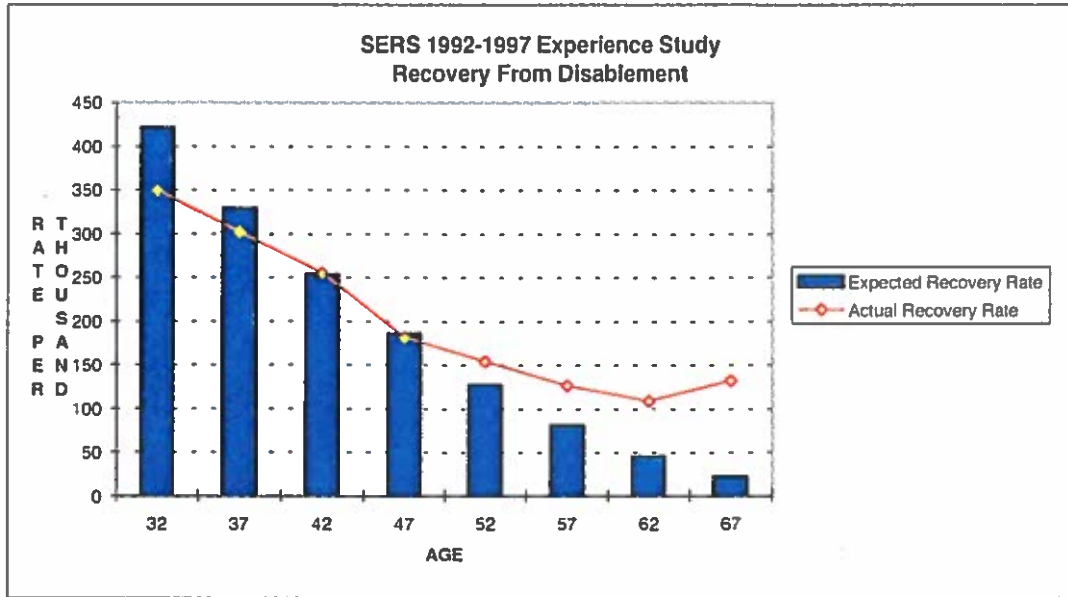
E. Salary Growth

Salary increases are primarily affected by two factors: the rate of inflation as well as some measure of the individual member's increasing skills and productivity. For this reason, we have split the salary growth assumption into two separate components: one component that is dependent on the rate of inflation, and another component that is a function of increasing productivity and skills (or merit). This section of the report focuses on the productivity and merit component. The inflation component is discussed under the economic assumptions in Section II of the report.
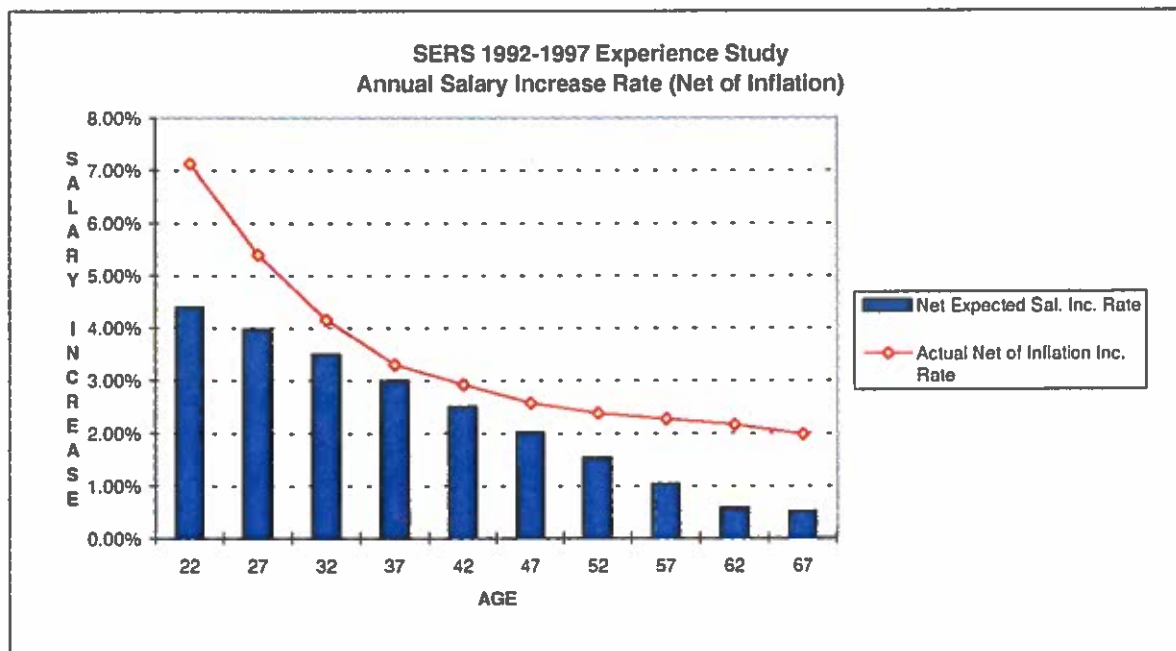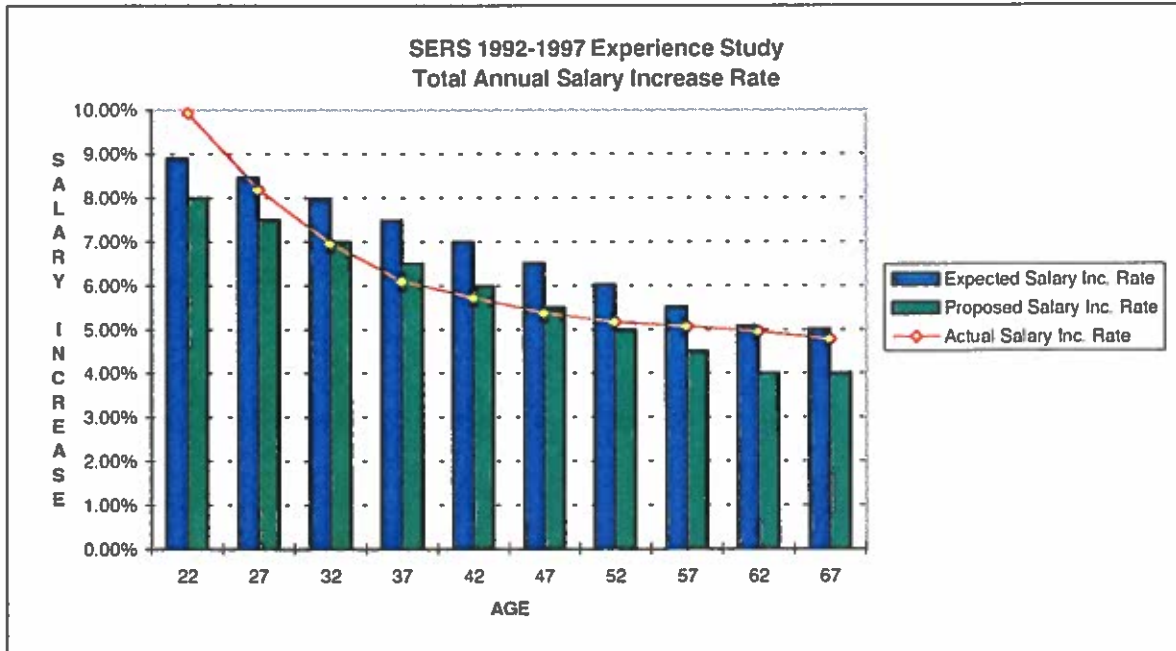
The first graph on the following page illustrates the actual average total annual increase rate compared to the expected and proposed annual increase rate. The proposed rates are a closer fit to the actual rates, especially for ages 30 through 60. The difference between the current assumptions and the proposed assumptions is the assumed inflation rate. This change is discussed in Section II.

The second graph on the following page compares actual and expected merit and productivity rates. To estimate the actual merit and productivity components, we have reduced the actual average annual total increase rate by by the average annual inflation rate over the period (2.8%). The pattern of salary increases by age is close to the assumed merit and productivity components. We believe that the current age-related merit rates in addition to the productivity increase of 0.5% for all ages continues to be an appropriate assumption for valuing the System liabilities. We will continue to monitor the rates at the younger ages and older ages. If the merit and productivity increases over the next five year study period are consistent with this study's results, we may recommend a change at that time.

We recommend that no change be made to the age-related merit increases nor to the flat productivity increase of 0.5% at this time.

Age	Illustrative Productivity and Merit Increases		
	Productivity	Merit	Total
22	0.5%	4.0%	4.5%
27	0.5	3.5%	4.0%
32	0.5	3.0%	3.5%
37	0.5	2.5%	3.0%
42	0.5	2.0%	2.5%
47	0.5	1.5%	2.0%
52	0.5	1.0%	1.5%
57	0.5	0.5%	1.0%
62	0.5	0.0%	0.5%

SERS 1992-1997 Experience Study
Total Annual Salary Increase Rate

SERS 1992-1997 Experience Study
Annual Salary Increase Rate (Net of Inflation)

Section II
Economic Assumptions

A. Investment Return

We obtained the target allocations of assets for the State Employees' Retirement System of Illinois from the Illinois State Board of Investment Policy as of September 30, 1996. We used these target allocations along with the Watson Wyatt 1997 Asset Model Assumptions and Asset Model Simulation Sets to determine a probability distribution of the long term range of returns expected during future fiscal years.

The target allocations from the Strategic Investment Policy are shown below. Two of the qualified asset classes in the Policy were subdivided into asset classes that are explicitly modeled in our Asset Model:

- The 35% in U. S. Equities was split 20% in the **S&P500** and 15% in the **Russell 2000**
- **Global Equities** were split evenly between **EAFE Unhedged** and the **S&P500**.

Qualified Asset Class	Target Allocation	Watson Wyatt Worldwide Model Class	Average Allocation
U.S. Equities	35%	S&P 500	25%
Global Equities	10%	Russell 2000	15%
Non-$ Equities	10%	EAFE Unhedged	15%
Fixed Income	35%	LB Aggregate	35%
Real Estate	5%	Real Estate	5%
Alternative Investments	5%	Alternative Investments	5%
Total	100%	Total	100%

Our analysis of the target allocations based on our 1997 asset model shows that the median 20 year compound return is 9.2% and there is a 50% probability that the 20 year compound average return will be between 7.8% and 10.9%. These results support an increase in the expected investment return to be used in valuing the liabilities of the System.

We recommend an increase in the investment return assumption from 8.00% to 8.50%.

B. Inflation

An inflation assumption underlies all economic assumptions, including investment return, salary growth, increases in governmental limits and Social Security benefits. The current inflation assumption is 4.50%. We believe that this assumption overstates expected future inflation levels by about 100 basis points. Over the last five years, inflation, as measured by the Consumer Price Index (CPI), has averaged 2.8%.

Smaller than expected salary increases have generated experience gains for the System in five of the past seven years. They have been fairly substantial in the past three years. For example, during the 12-month period ending June 30, 1997, the average increase for members active on both June 30, 1996 and June 30, 1997, was 4.08% compared to the 6.80% expected. For the previous 12-month period, the comparable rates were 4.24% and 6.84%, respectively.

As can be seen from the top graph on page 16 of Section I, the proposed total rates, which reflect a 100 basis point reduction in the assumed inflation rate, are a better fit to the actual rates experienced over the period of the study. We believe that proposed rates will also be a better match for future expected salary increases.

We recommend the inflation assumption be reduced by 100 basis points from 4.50% to 3.50%.

Appendix A

**Statement of
Actuarial Assumptions
Adopted June 30, 1997**

Actuarial Assumptions Adopted June 30, 1997

Mortality

1983 Group Annuity Mortality Table for males (with a one-year setback) and for females (with no setback). Five percent of deaths among active employees are assumed to be in the performance of their duty.

Interest

8.50% per annum, compounded annually.

Termination

Illustrative rates of withdrawal from the plan are as follows:

Age	Males	Females
20	.159	.339
25	.107	.129
30	.073	.086
35	.052	.065
40	.040	.050
45	.031	.037
50	.027	.027
55+	.026	.027

It is assumed that terminated employees will not be rehired.

The rates apply only to employees who have not fulfilled the service requirement necessary for retirement at any give age.

Salary Increases

Illustrative rates of increase per individual employee per annum, compounded annually:

Age	Annual Increase	Age	Annual Increase
20	8.2%	45	5.7%
25	7.7	50	5.2
30	7.2	55	4.7
35	6.7	60	4.2
40	6.2	65	4.0

These increases include a component for inflation of 3.5% per annum. In addition, for purposes of determining annual appropriation as a percent of total covered payroll, the size of the active group is assumed to remain constant, and new entrants are assumed to enter with an average age of 33.15 years and average pay of $23,800 (1997 dollars).

The average increase in payroll for the 50-year projection period is 3.4% per annum.

Disability

Incidence of disability amongst employees eligible for disability benefits:

Age	Males	Females	Age	Males	Females
20	.0020	.0026	45	.0043	.0074
25	.0021	.0031	50	.0068	.0098
30	.0022	.0037	55	.0109	.0128
35	.0025	.0045	60	.0162	.0164
40	.0031	.0057	65	.0226	.0226

Amongst active employees, 15% of disabilities are assumed to be in the performance of their duty.

Employees receiving a disability allowance are assumed to recover or die in accordance with the following tables:

Age	Rate of Recovery Male/Female	Rate of Mortality Male	Rate of Mortality Female
20	0.689	0.040	0.035
25	0.572	0.040	0.035
30	0.466	0.040	0.035
35	0.370	0.040	0.035
40	0.286	0.040	0.036
50	0.150	0.044	0.038
60	0.058	0.059	0.045
70	--	0.094	0.059
80	--	0.174	0.091

Retirement

Employees are assumed to retire in accordance with the following rates:

Age	General Employees	Alternative Formula Employees*
50-54	--	10.0%
55-59	10.0%	15.0
60	12.5	20.0
61	15.0	22.0
62	17.5	24.0
63	20.0	26.0
64	22.5	28.0
65	25.0	30.0
66-69	25.0	30.0
70	100.0	100.0

* An additional 10% are assumed to retire in the year in which the employee completes 30 years of service. The rates apply only to employees who have fulfilled the service requirement necessary for retirement at any given age.

Assets

Assets available for benefits are used at market value.

Expenses

As estimated and advised by SERS staff, based on current expenses with an allowance for expected increases.

Marital Status

85% of employees are assumed to be married.

Spouse's Age

The female spouse is assumed to be 3 years younger than the male spouse.

Remarriage

The surviving spouses of deceased employees are assumed to remarry in accordance with the following table:

Age	Rate of Remarriage	Age	Rate of Remarriage
20	0.144	40	0.028
25	0.094	45	0.018
30	0.059	50	0.010
35	0.040	55	0.004

Children

It is assumed that married members have 2.2 children one year apart in age.

The age of the youngest child of a deceased employee at his date of death is assumed to be as follows:

Age at Death of Employee	Age of Youngest Child	Age at Death of Employee	Age of Youngest Child
20	2	40	6
25	3	45	8
30	4	50	10
35	5	55	12
		60	14

Social Security Benefits

Social Security Disability and Survivor benefits payable in future years are assumed to bear the same relationship to future compensation levels at time of entitlement as current Social Security benefits bear to current compensation levels.

Overtime and Shift Differentials

Reported earnings include base pay alone. It is assumed that overtime and shift differentials will increase total payroll by 3.5% over reported earnings.

Missing Data

If earnings were not available, the annual rate of pay was assumed to be $32,260. If a birth date was not available, the member was assumed to be age 40.

Appendix B

**Statement of
Actuarial Assumptions
Adopted June 30, 1990**

Actuarial Assumptions Adopted June 30, 1990

Mortality

1986 Projected Experience Table, a table based on experience underlying the 1971 Group Annuity Mortality Table, without margins, with a projection for mortality improvements to 1986. Five percent of deaths amongst active employees are assumed to be in the performance of their duty.

Interest

8% per annum, compounded annually.

Termination

Illustrative rates of withdrawal from the plan are as follows:

Age	Males	Females
20	.188	.377
25	.126	.144
30	.085	.096
35	.062	.072
40	.047	.056
45	.038	.041
50	.032	.030
55+	.030	.030

It is assumed that terminated employees will not be rehired.

The rates apply only to employees who have not fulfilled the service requirement necessary for retirement at any give age.

Salary Increases

Illustrative rates of increase per individual employee per annum, compounded annually:

Age	Annual Increase	Age	Annual Increase
20	9.2%	45	6.7%
25	8.7	50	6.2
30	8.2	55	5.7
35	7.7	60	5.2
40	7.2	65	5.0

These increases include a component for inflation of 4.5% per annum.

Disability

Incidence of disability amongst employees eligible for disability benefits:

Age	Males	Females	Age	Males	Females
20	.0020	.0026	45	.0043	.0074
25	.0021	.0031	50	.0068	.0098
30	.0022	.0037	55	.0109	.0128
35	.0025	.0045	60	.0162	.0164
40	.0031	.0057	65	.0226	.0226

Amongst active employees, 15% of disabilities are assumed to be in the performance of their duty.

Employees receiving a disability allowance are assumed to recover or die in accordance with the following tables:

Age	Rate of Recovery Male/Female	Rate of Mortality Male	Rate of Mortality Female
20	0.689	0.040	0.035
25	0.572	0.040	0.035
30	0.466	0.040	0.035
35	0.370	0.040	0.035
40	0.286	0.040	0.036
50	0.150	0.044	0.038
60	0.058	0.059	0.045
70	--	0.094	0.059
80	--	0.174	0.091

Retirement

Employees are assumed to retire in accordance with the following rates:

Age	General Employees	Alternative Formula Employees*
50-54	--	20%
55-59	10%	20
60	25	20
61	15	20
62	20	20
63-64	15	20
65	40	40
66-69	25	30
70	100	100

* An additional 10% are assumed to retire in the year in which the employee completes 30 years of service. The rates apply only to employees who have fulfilled the service requirement necessary for retirement at any given age.

Assets

Assets available for benefits are used at book value.

Expenses

As estimated and advised by SERS staff, based on current expenses with an allowance for expected increases.

Marital Status

85% of employees are assumed to be married.

Spouse's Age

The female spouse is assumed to be 3 years younger than the male spouse.

Remarriage

The surviving spouses of deceased employees are assumed to remarry in accordance with the following table:

Age	Rate of Remarriage	Age	Rate of Remarriage
20	0.144	40	0.028
25	0.094	45	0.018
30	0.059	50	0.010
35	0.040	55	0.004

Children

It is assumed that married members have 2.2 children one year apart in age.

The age of the youngest child of a deceased employee at his date of death is assumed to be as follows:

Age at Death of Employee	Age of Youngest Child	Age at Death of Employee	Age of Youngest Child
20	2	40	6
25	3	45	8
30	4	50	10
35	5	55	12
		60	14

Social Security Benefits

Social Security Disability and Survivor benefits payable in future years are assumed to bear the same relationship to future compensation levels at time of entitlement as current Social Security benefits bear to current compensation levels.

Overtime and Shift Differentials

Reported earnings include base pay alone. It is assumed that overtime and shift differentials will increase total payroll by 3.5% over reported earnings.

Missing Data

If earnings were not available, the annual rate of pay was assumed to be $32,260. If a birth date was not available, the member was assumed to be age 40.