Connecticut State Teachers' Retirement System

5 Year Experience Study
Covering the Period
July 1, 1996 through June 30, 2001

GABRIEL, ROEDER, SMITH & COMPANY

September 12, 2002

The Board of Trustees
Connecticut State Teachers' Retirement System
21 Grand Street
Hartford, Connecticut 06106

Re: 1996-2001 Experience Study and Assumption Review

Dear Members of the Board:

The results of the 5-year *actuarial investigation of experience* of the Connecticut State Teachers' Retirement System are presented in this report. The investigation was conducted for the purpose of reviewing the actuarial assumptions used to value the actuarial liabilities of the Connecticut State Teachers' Retirement System and to determine the annual State contribution amount.

The investigation was based upon the member census data and the asset information furnished by your Administrator and his Staff annually to enable us to prepare the regular biennial actuarial valuations of the System as well as supplemental valuations to determine the impact of proposed plan changes. From these annual data submissions we were able to extract information concerning members who died, withdrew, became disabled or retired during the last 5 years.

The investigation covered the 5-year period from *July 1, 1996 to June 30, 2001*, and was carried out using generally accepted actuarial principles and techniques.

We believe that the proposed actuarial assumptions that are the result of this investigation represent reasonable estimates of future experience of the Connecticut State Teachers' Retirement System.

Respectfully submitted,

Brian F. Dunn, ASA, EA, MAAA   Mark K. Johnson

MKJ/lr

REPORT ON AN EXPERIENCE STUDY AND ASSUMPTION REVIEW FOR THE PERIOD 1996-2001

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SECTION A

Introduction and Overview

1996-2001 EXPERIENCE STUDY
INTRODUCTION AND OVERVIEW

Each year, member census data and asset information regarding the Connecticut State Teachers' Retirement System (CSTRS) is provided to Gabriel, Roeder, Smith & Company in order to perform biennial valuations to determine the State's annual contribution amount and supplemental valuations, as needed, to determine the impact of proposed changes to the Retirement System. A critical element in preparing these actuarial valuations are the assumptions that must be made regarding the future experience of the System with regard to the following risk areas:

- Rates of **withdrawal** of active members.

- Rates of **disability** among active members.

- Rates of **retirement** among active members.

- Rates of **mortality** among active members, retirants, and beneficiaries.

- Patterns of **salary increases** to active members.

- Long-term rates of **investment return** to be generated by the assets of the System.

Assumptions should be carefully chosen and continually monitored. An unrealistic set of assumptions can lead to:

- Understated costs resulting in either an inability to pay benefits when due, or sharp increases in required contributions at some point in the future;

- Overstated costs resulting in either benefit levels that are kept below the level that could be supported by the computed rate, or an unnecessarily large burden on the current generation of members and taxpayers.

A single set of assumptions will not be suitable indefinitely. Relevant circumstances change, and our understanding of these circumstances (whether or not they are changing) also changes. The set of assumptions is then adjusted to reflect basic experience trends -- but not random year-to-year fluctuations. Actuarial assumptions were last revised with the Retirement Board's approval preceding the June 30, 1996 regular actuarial valuation.

Rates of Withdrawal. Turnover during the period studied was less than assumed. The proposed rates were created to bring them very close to actual experience during the period. The length of the period for the service-based withdrawal assumption was changed from 5 years to 10 years to be consistent with the vesting requirement. This allows for more accurate modeling of withdrawals. Details are reported in Section C.

Disability Experience was very close to the assumed rates. No adjustment in the rates of disability is recommended at this time. Details are reported in section D.

Retirement Experience was studied separately for early, proratable and unreduced retirement. The number of unreduced and early retirements was higher than assumed during the period. The number of proratable retirements was less than assumed. The proposed rates were created to bring them closer to recent experience. Details are reported in Section E.

Active Member Mortality Rates were not explicitly studied. It is often very difficult to differentiate, in the data, between deaths and other terminations. This may be due to the fact that members with impaired health often leave active employment before death occurs (e.g. some become non-vested terminations or disability retirees). The proposed mortality rates are based on the same mortality table as is recommended for retired life mortality. In aggregate, the tables include a small margin for future increases in life expectancy. Details are reported in Section F.

Retired Life Mortality was found to be less than expected. There was a significant disparity for males and somewhat less of one for females. A change is recommended in retired life mortality rates at this time. These changes have the effect of lengthening life expectancies. Details are reported in Section F.

SUMMARY OF DECREMENT EXPERIENCE
1996 - 2001

Decrement Risk Area	Actual	Expected		Change
		Current	Proposed	
Withdrawal - Total	5,316	7,095	5,378	(1,717)
Disability	225	232	232	0
Unreduced Retirement	3,153	2,380	2,800	420
Proratable Retirement	251	314	249	(65)
Early Retirement	2,388	1,981	2,395	414
Mortality - Retired Members and Beneficiaries Male Female	478 1,595	844 2,135	509 1,641	(335) (494)

The table above shows the number of people who left the active or retired population for various reasons during the study period. Results are shown for both the actual number in each risk area and the expected number. The actual numbers are the result of a year-to-year comparative analysis of the valuation data. The expected numbers are shown for both the current assumptions and the proposed assumptions. The change column is the difference between what was expected based on the current assumptions during the study period and what the expected number would have been had the proposed assumptions been in place during that period.

1996-2001 EXPERIENCE STUDY
SUMMARY OF FINDINGS – ECONOMIC ASSUMPTIONS

Economic assumptions include long-term rates of investment return and wage inflation (the across-the-board portion of salary increases). Unlike demographic activities, economic activities do not lend themselves to analysis solely on the basis of internal historical patterns because both salary increases and investment return are more affected by external forces: namely inflation, general productivity changes and changes in financial markets. Estimates of economic activities are generally selected on the basis of the long-term expectations in an inflation-free environment and then both are increased by some provision for long-term inflation.

If inflation and/or productivity increases are higher than expected, actual rates of salary increase and investment return are likely to exceed the assumed rates. Salaries increasing faster than expected produce unexpected liabilities. Investment return exceeding the assumed rates (whether due to manager performance, change in the mix of assets, or general inflation) results in unanticipated assets. To the extent that inflation, productivity, and other factors have about the same effect on both sides of the balance sheet, these additional assets and liabilities can offset one another over the long-term.

Current economic assumptions for CSTRS are as follows:

Investment Return	8.50%
Wage Inflation	5.00
Spread	3.50%

Wage Inflation. The long-term rate of increase in National Average Earnings since 1950 is higher than the current CSTRS assumption (see schedule on page A-7. It is expected that, in the long run, salary increases in all parts of the country will be close to the national averages. However, few economists are forecasting a repeat of the high inflation rates experienced in the 1970s. No specific **price inflation** assumption is used in the valuation. However, the data on page A-7 suggests that wages have risen faster than prices in recent times.

Pay Increase Rates (merit and longevity portion) were slightly lower than assumed. The recommended adjustments that were made are small in aggregate. Details are reported in section G.

Investment Return and Spread. The CSTRS target asset mix is about 70% in equities and similar risk level investments. The investment policy target asset allocation is shown below. Gross real market returns (the difference between recognized investment return and wage inflation without provision for expenses) for balanced portfolios have averaged approximately 5% over the last 52 years ending in 2001 (see schedule on page A-7). Very recent experience has, of course, been unfavorable. In particular, the period beginning in March of 2000 through the time of this report is being written has been a period of very noticeable retrenchment in the investment markets. Only hindsight will tell whether that experience represents a return to much lower earnings levels, or whether it is a temporary effect that will be reversed in due time.

Investment Policy Target Asset Allocation

U.S. Equity	36%
International Equity	18%
Equity Commercial Real Estate	5%
U.S. Fixed Income	30%
Alternative Investments (Venture Capital)	11%
Total	100%

The current net real return assumption is 3.50% (8.50% nominal less 5.00% assumed wage inflation). This 3.50% spread is reasonable. It would also be reasonable to set the spread at 4.0% in conjunction with this experience study. We tested a net real return assumption of 4.0% for the ensuing five year period. Adding a 4.0% spread to an underlying wage inflation rate of 4.0% would produce a nominal rate of net investment return of 8.0%. To assist the Board in considering these alternatives, we have shown the related contribution rates on page B-1.

The relationship between economic assumptions based on the current 3.5% spread is illustrated below:
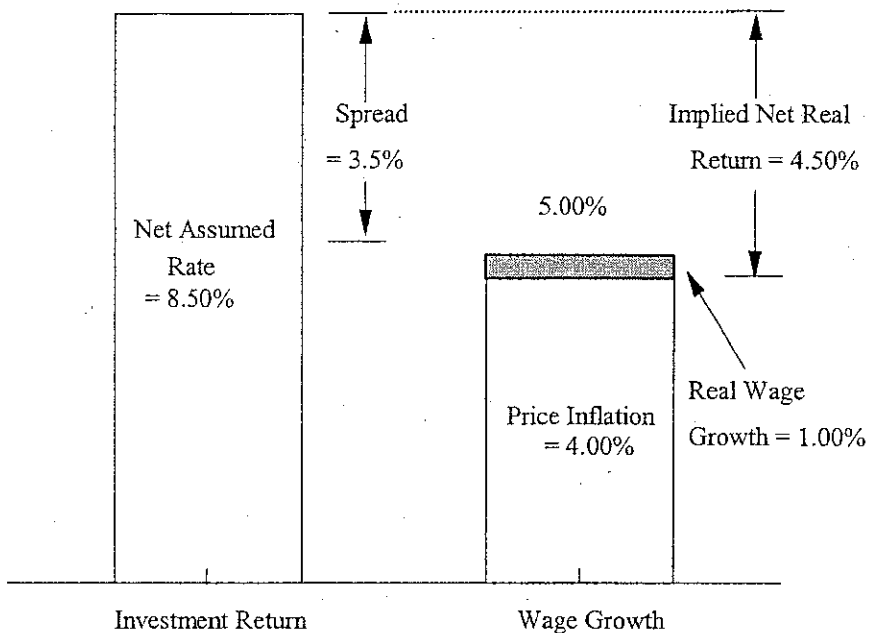
The Retirement Board may find it helpful to review the following results of the 2001 Survey of State and Local Government Retirement Systems conducted by the Public Pension Coordinating Council:

	Average Actuarial Assumptions
Investment Return	7.95%
Total* Salary Increase	5.62%
Wage Inflation	4.14%

*Wage inflation of 4.14% merit and seniority of 1.48%.

The 2001 Survey obtained results from 263 public retirement systems, covering 67% of the 13.9 million active plan members reported by the U.S. Bureau of the Census.

HISTORICAL PATTERNS OF INVESTMENT RETURN, PAY INCREASES & INFLATION

Calendar Year Period	Gross Market Returns				Price Inflation (CPI)	National Average Earnings	Sample Balanced Fund*	
	Bonds (Long)		Cash Equiv. (T Bills)	Stocks (S&P 500)			Total Return (I)	Spread: I - NAE
	U.S. Treasury	Corp. (S&P AA)						
1950-1959	(0.1)%	1.0%	1.9%	19.4%	2.2%	4.5%	14.0%	9.5%
1960-1969	1.4%	1.7%	3.9%	7.8%	2.5%	4.3%	6.2%	1.9%
1970-1979	5.5%	6.2%	6.3%	5.9%	7.4%	6.9%	6.1%	(0.8)%
1980-1989	12.6%	13.0%	8.9%	17.5%	5.1%	5.8%	16.3%	10.5%
1990-1999	8.8%	8.4%	4.9%	18.2%	2.9%	4.2%	15.5%	11.3%
2000-2001	12.2%	11.8%	4.9%	(10.5)%	2.5%	5.1%	(3.8)%	(8.9)%
Last 52 Years	5.8%	6.2%	5.1%	12.6%	3.9%	5.1%	10.9%	5.8%

* Sample Balanced Fund	
Equities	70%
Bonds - Government	21%
- Corporate	8%
Cash Equivalents	1%
	100%

Basic Series   Year-by-Year Total Returns (1926-2001)

For a type of investment,
Red means a REAL Return less than 3%
[(Total - Inflation)<3%]

For Inflation,
RED means a purchasing power loss

Year	Large Company Stocks	Small Company Stocks	Long-Term Corporate Bonds	Long-Term Government Bonds	Intermediate Term Government Bonds	U.S. Treasury Bills	Inflation
1926	11.62	0.28	7.37	7.77	5.38	3.27	-1.49
1927	37.49	22.10	7.44	8.93	4.52	3.12	-2.08
1928	43.61	39.69	2.84	0.10	0.92	3.56	-0.97
1929	-8.42	-51.36	3.27	1.17	6.01	4.75	0.20
1930	-24.90	-38.15	7.98	4.66	6.72	2.41	-6.03
1931	-43.34	-49.75	-1.85	-5.31	-2.32	1.07	-9.52
1932	-8.19	-5.39	10.32	16.84	8.81	0.96	-10.30
1933	53.99	142.87	10.38	-0.07	1.83	0.30	0.51
1934	-1.44	24.22	13.84	10.03	9.00	0.16	2.03
1935	47.67	40.19	9.61	4.98	7.01	0.17	2.99
1936	33.92	64.80	6.74	7.52	3.06	0.18	1.21
1937	-35.03	-58.01	2.75	0.23	1.56	0.31	3.10
1938	31.12	32.80	6.13	5.53	6.23	-0.02	-2.78
1939	-0.41	0.35	3.97	5.94	4.52	0.02	-0.48
1940	-9.78	-5.16	3.39	6.09	2.96	0.00	0.96
1941	-11.59	-9.00	2.73	0.93	0.50	0.06	9.72
1942	20.34	44.51	2.60	3.22	1.94	0.27	9.29
1943	25.90	88.37	2.83	2.08	2.81	0.35	3.16
1944	19.75	53.72	4.73	2.81	1.80	0.33	2.11
1945	36.44	73.61	4.08	10.73	2.22	0.33	2.25
1946	-8.07	-11.63	1.72	-0.10	1.00	0.35	18.16
1947	5.71	0.92	-2.34	-2.62	0.91	0.50	9.01
1948	5.50	-2.11	4.14	3.40	1.85	0.81	2.71
1949	18.79	19.75	3.31	6.45	2.32	1.10	-1.80
1950	31.71	38.75	2.12	0.06	0.70	1.20	5.79
1951	24.02	7.80	-2.69	-3.93	0.36	1.49	5.87
1952	18.37	3.03	3.52	1.16	1.63	1.66	0.88
1953	-0.99	-6.49	3.41	3.64	3.23	1.82	0.62
1954	52.62	60.58	5.39	7.19	2.68	0.86	-0.50
1955	31.56	20.44	0.48	-1.29	-0.65	1.57	0.37
1956	6.56	4.28	-6.81	-5.59	-0.42	2.46	2.86
1957	-10.78	-14.57	8.71	7.46	7.84	3.14	3.02
1958	43.36	64.89	-2.22	-6.09	-1.29	1.54	1.76
1959	11.96	16.40	-0.97	-2.26	-0.39	2.95	1.50
1960	0.47	-3.29	9.07	13.76	11.76	2.66	1.48
1961	26.89	32.09	4.82	0.97	1.85	2.13	0.67
1962	-8.73	-11.90	7.95	6.89	5.56	2.73	1.22
1963	22.80	23.57	2.19	1.21	1.64	3.12	1.65
1964	16.48	23.52	4.77	3.51	4.04	3.54	1.19
1965	12.45	41.75	-0.46	0.71	1.02	3.93	1.92
1966	-10.06	-7.01	0.20	3.65	4.69	4.76	3.35
1967	23.98	83.57	-4.95	-9.18	1.01	4.21	3.04
1968	11.06	35.97	2.57	-0.26	4.54	5.21	4.72
1969	-8.50	-25.05	-8.09	-5.07	-0.74	6.58	6.11
1970	4.01	-17.43	18.37	12.11	16.86	6.52	5.49
1971	14.31	16.50	11.01	13.23	8.72	4.39	3.36
1972	18.98	4.43	7.26	5.69	5.16	3.84	3.41
1973	-14.66	-30.90	1.14	-1.11	4.61	6.93	8.80
1974	-26.47	-19.95	-3.06	4.35	5.69	8.00	12.20
1975	37.20	52.82	14.64	9.20	7.83	5.80	7.01
1976	23.84	57.38	18.65	16.75	12.87	5.08	4.81
1977	-7.18	25.38	1.71	-0.69	1.41	5.12	6.77
1978	6.56	23.46	-0.07	-1.18	3.49	7.18	9.03
1979	18.44	43.46	-4.18	-1.23	4.09	10.38	13.31
1980	32.42	39.88	-2.62	-3.95	3.91	11.24	12.40
1981	-4.91	13.88	-0.96	1.86	9.45	14.71	8.94
1982	21.41	28.01	43.79	40.36	29.10	10.54	3.87
1983	22.51	39.67	4.70	0.65	7.41	8.80	3.80
1984	6.27	-6.67	16.39	15.48	14.02	9.85	3.95
1985	32.16	24.66	30.09	30.97	20.33	7.72	3.77
1986	18.47	6.85	19.85	24.53	15.14	6.16	1.13
1987	5.23	-9.30	-0.27	-2.71	2.90	5.47	4.41
1988	16.81	22.87	10.70	9.67	6.10	6.35	4.42
1989	31.49	10.18	16.23	18.11	13.29	8.37	4.65
1990	-3.17	-21.56	6.78	6.18	9.73	7.81	6.11
1991	30.55	44.63	19.89	19.30	15.46	5.60	3.06
1992	7.67	23.35	9.39	8.05	7.19	3.51	2.90
1993	9.99	20.98	13.19	18.24	11.24	2.90	2.75
1994	1.31	3.11	-5.76	-7.77	-5.14	3.90	2.67
1995	37.43	34.46	27.20	31.67	16.80	5.60	2.54
1996	23.07	17.62	1.40	-0.93	2.10	5.21	3.32
1997	33.36	22.78	12.95	15.85	8.38	5.26	1.70
1998	28.58	-7.31	10.76	13.06	10.21	4.86	1.61
1999	21.04	29.79	-7.45	-8.96	-1.77	4.68	2.68
2000	-9.11	-3.59	12.87	21.48	12.59	5.89	3.39
2001	-11.88	22.77	10.65	3.70	7.62	3.83	1.55

SECTION B

Summary of Valuation Results

1996–2001 EXPERIENCE STUDY

ILLUSTRATIVE EFFECT ON RESULTS OF THE JUNE 30, 2000 ACTUARIAL VALUATION

	6/30/2000 Valuation	Alt. 1	Alt. 2	Alt. 3
Normal Cost	9.80%	9.73%	9.94%	10.39%
Member Contributions	6.00%	6.00%	6.00%	6.00%
State Normal Cost	3.80%	3.73%	3.94%	4.39%
Unfunded Actuarial Accrued Liabilities	3.84%	5.80%	6.38%	7.58%
State Contribution Rate	7.64%	9.53%	10.32%	11.97%

		Economic Assumptions	
Combinations	Interest Rate	Wage Inflation	Spread
Valuation	8.50%	5.00%	3.50%
Alternate 1	8.25%	4.25%	4.00%
Alternate 2	8.00%	4.00%	4.00%
Alternate 3	7.50%	3.50%	4.00%

The valuation of all alternates include the proposed decrement assumptions and the proposed merit and seniority component of the salary scale.

SECTION C

Withdrawal Experience

A withdrawal occurs when a member separates from active status in the Retirement System for a reason other than disability, death, or retirement. At the time of his/her separation from active status the member may be either vested or non-vested. Withdrawal experience was measured by years of service for those terminating with up to 10 years of service and by age for those terminating with more than 10 years service.

For the purpose of applying withdrawal rates in the valuation, the rates used are from a service based table for an initial period of employment. After the initial period, the rates are selected from the age based table. Prior valuations used a five year service based table. We believe a ten year period for the service based table will provide a better model for the withdrawal assumption as this period corresponds to the service requirement for vesting. This service based versus age based assumption may be more simply stated by saying that the likelihood of withdrawal is more closely related to service prior to vesting and age after vesting.

MALE WITHDRAWAL EXPERIENCE

There were 799 withdrawals and 17,901 years of exposure included in the male service-based withdrawal investigation and 271 withdrawals and 17,146 years of exposure included in the male age based withdrawal investigation. In the service-based table shown below, the current rates shown for years of service from 5 through 9 were set equal to the proposed rates for comparative purposes. This is done since the prior service-based rates were limited to five years.

Summary of Male Withdrawal Experience
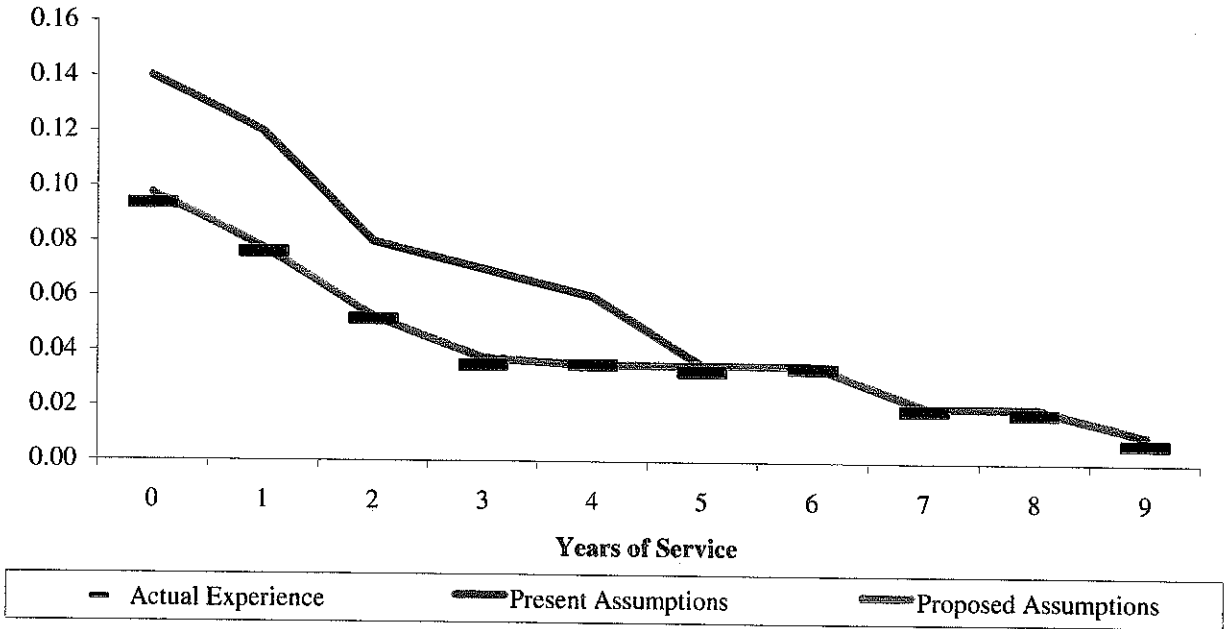### Up to 10 Years of Service At Assumed Termination (Beginning of Year)

Service	Withdrawals	Exposure	Rates			Expected Withdrawals	
			Crude	Current	Proposed	Current	Proposed
0	76	812	0.0936	0.1400	0.0975	114	79
1	267	3,516	0.0759	0.1200	0.0775	422	272
2	149	2,886	0.0516	0.0800	0.0525	231	152
3	85	2,425	0.0351	0.0700	0.0375	170	91
4	75	2,128	0.0352	0.0600	0.0350	128	74
5	55	1,676	0.0328	0.0350	0.0350	59	59
6	46	1,354	0.0340	0.0350	0.0350	47	47
7	21	1,110	0.0189	0.0200	0.0200	22	22
8	18	1,005	0.0179	0.0200	0.0200	20	20
9	7	989	0.0071	0.0100	0.0100	10	10
Totals	799	17,901	0.0446	0.0683	0.0461	1,223	826
Ref				170	266		

More than 10 Years of Service At Assumed Termination (Beginning of Year)

Age	Withdrawals	Exposure	Rates			Expected Withdrawals	
			Crude	Current	Proposed	Current	Proposed
30-34	8	232	0.0345	0.0500	0.0250	12	6
35-39	18	1,648	0.0109	0.0350	0.0150	58	25
40-44	36	3,996	0.0090	0.0150	0.0125	60	50
45-49	86	6,648	0.0129	0.0150	0.0125	100	83
50-54	78	3,883	0.0201	0.0150	0.0150	58	58
55-59	45	739	0.0609	0.0100	0.0250	7	18
Totals	271	17,146	0.0158	0.0172	0.0140	295	240
Ref				293	492		

Rates of Withdrawal with Fewer Than 10 Years of Service

Years of Service

— Actual Experience   ▬▬▬Present Assumptions   ▬▬▬Proposed Assumptions

Rates of Withdrawal with 10 or More Years of Service

Age

— Actual Experience   ▬▬▬Present Assumptions   ▬▬▬Proposed Assumptions
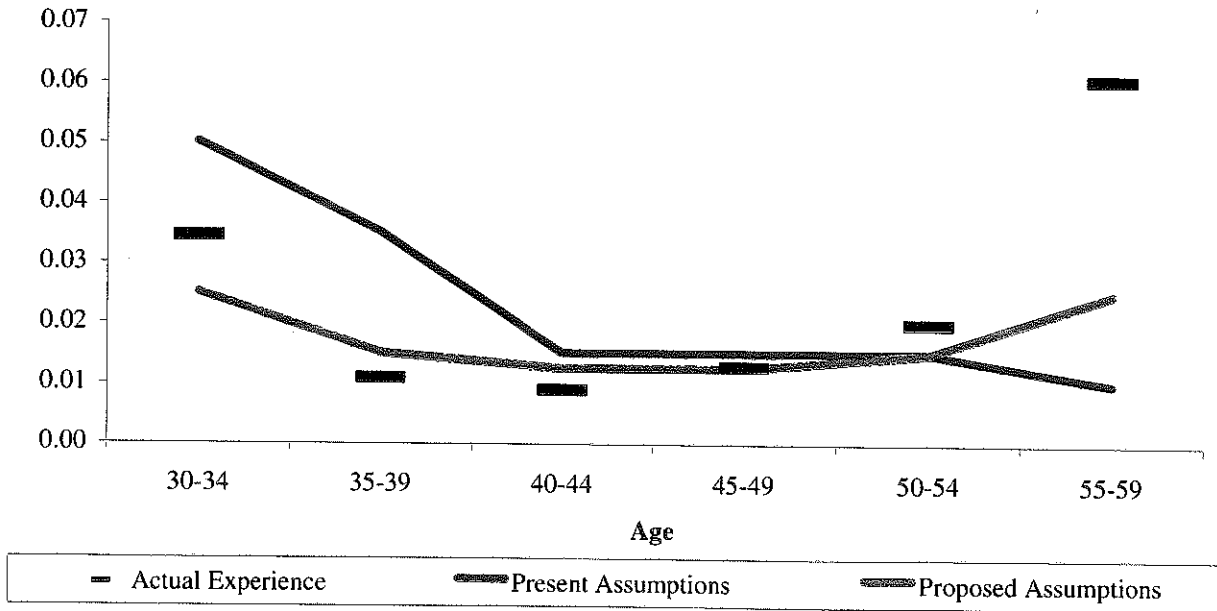
There were 3,387 withdrawals and 65,781 years of exposure included in the female service-based withdrawal investigation and 859 withdrawals and 60,695 years of exposure included in the female age based withdrawal investigation. Withdrawal experience was measured by years of service for those terminating with up to 10 years of service and by 5 year age groups for those terminating with more than 10 years service.

Summary of Female Withdrawal Experience
Up to 10 Years of Service At Assumed Termination (Beginning of Year)

Service	Withdrawals	Exposure	Rates			Expected Withdrawals	
			Crude	Current	Proposed	Current	Proposed
0	231	2,374	0.0973	0.1400	0.1000	332	237
1	841	11,340	0.0742	0.1200	0.0750	1,361	851
2	488	9,294	0.0525	0.0800	0.0550	744	511
3	393	8,328	0.0472	0.0700	0.0500	583	416
4	415	7,534	0.0551	0.0600	0.0500	452	377
5	288	6,415	0.0449	0.0450	0.0450	289	289
6	236	5,553	0.0425	0.0450	0.0450	250	250
7	206	5,062	0.0407	0.0400	0.0400	202	202
8	147	4,807	0.0306	0.0300	0.0300	144	144
9	142	5,074	0.0280	0.0300	0.0300	152	152
Totals	3,387	65,781	0.0515	0.0685	0.0521	4,509	3,429
Ref				170	267		

More than 10 Years of Service At Assumed Termination (Beginning of Year)

| Age	Withdrawals	Exposure	Rates			Expected Withdrawals	
			Crude	Current	Proposed	Current	Proposed
30-34	52	1,459	0.0356	0.0500	0.0300	73	44
35-39	169	6,837	0.0247	0.0350	0.0250	239	171
40-44	160	12,002	0.0133	0.0150	0.0150	180	180
45-49	191	19,007	0.0100	0.0150	0.0100	285	190
50-54	180	15,332	0.0117	0.0150	0.0125	230	192
55-59	107	6,058	0.0177	0.0100	0.0175	61	106
Totals	859	60,695	0.0142	0.0176	0.0145	1,068	883
Ref				293	493		

Rates of Withdrawal with Fewer Than 10 Years of Service
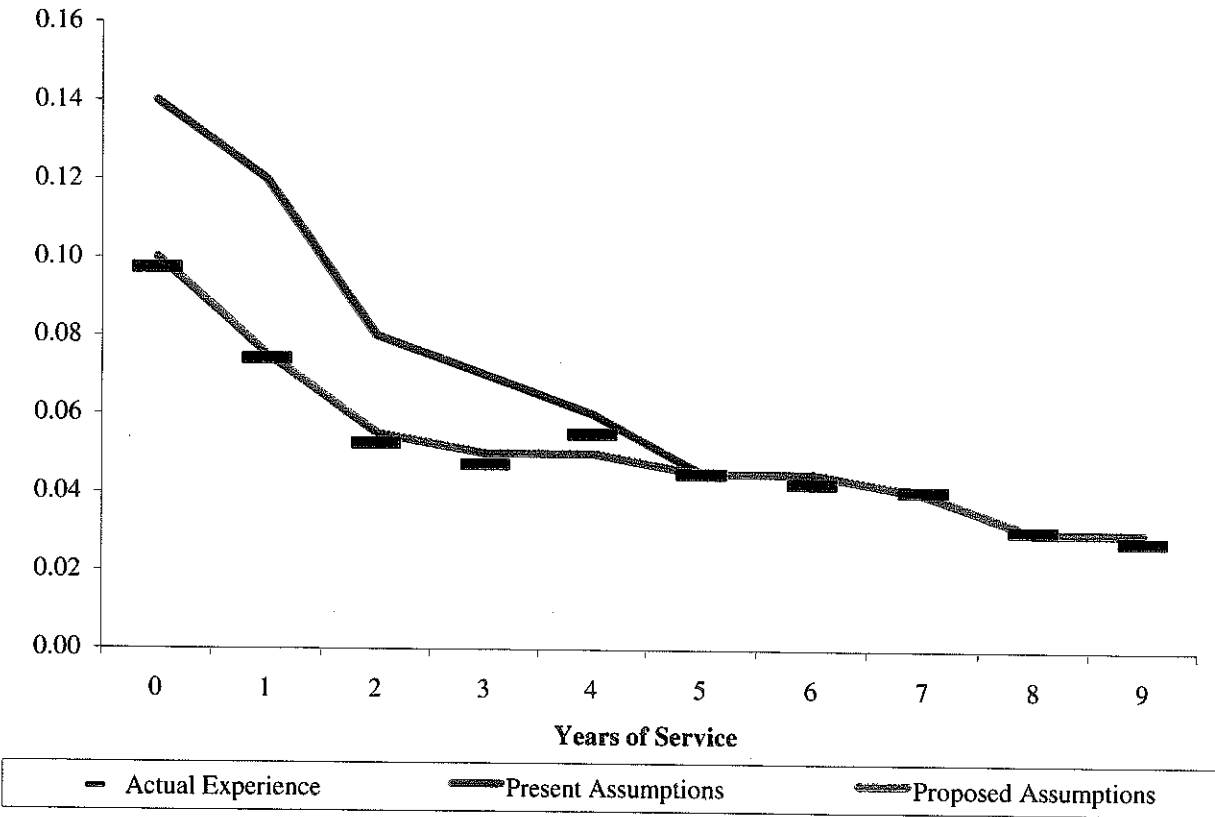
Rates of Withdrawal with 10 or More Years of Service
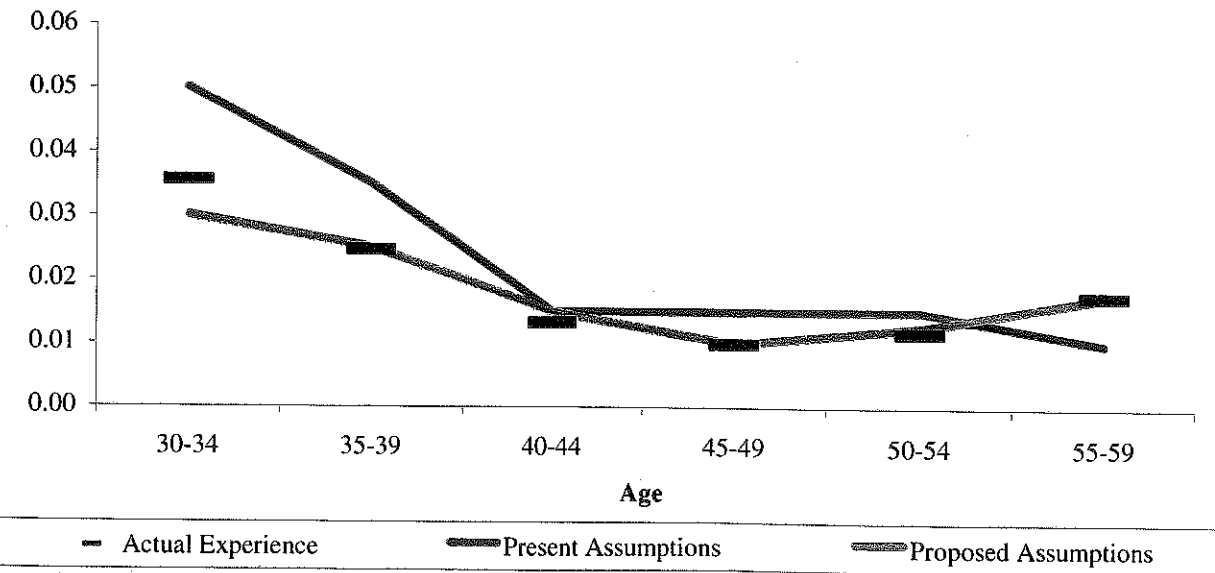
SECTION D

Disability Experience

DISABILITY EXPERIENCE

There were 69 male disability retirements reported for the 5-year period and 25,510 years of exposure (exposure includes active members with 5 or more years of service).

Summary of Male Disability Experience

Age	Disabilities	Exposure	Rates			Expected Disabilities	
			Crude	Current	Proposed	Current	Proposed
25-29	0	299	0.0000	0.0005	0.0005	0	0
30-34	0	1,865	0.0000	0.0003	0.0003	1	1
35-39	0	2,924	0.0000	0.0005	0.0005	1	1
40-44	2	4,973	0.0004	0.0005	0.0005	3	3
45-49	19	9,910	0.0019	0.0020	0.0020	20	20
50-54	30	4,459	0.0067	0.0065	0.0065	29	29
55-59	12	930	0.0129	0.0100	0.0100	9	9
60 and over	6	150	0.0400	0.0100	0.0100	2	2
Totals	69	25,510	0.0027	0.0025	0.0025	65	65
Ref				134x0.5	134x0.5		

Summary of Female Disability Experience

There were 156 female disability retirements reported for the 5-year period and 91,660 years of exposure (exposure includes active members with 5 or more years of service).

Age	Disabilities	Exposure	Rates			Expected Disabilities	
			Crude	Current	Proposed	Current	Proposed
25-29	0	1,972	0.0000	0.0005	0.0005	1	1
30-34	0	8,309	0.0000	0.0003	0.0003	3	3
35-39	3	10,329	0.0003	0.0004	0.0004	5	5
40-44	8	15,656	0.0005	0.0009	0.0009	14	14
45-49	42	29,118	0.0014	0.0014	0.0014	41	41
50-54	59	18,848	0.0031	0.0034	0.0034	65	65
55-59	35	7,120	0.0049	0.0050	0.0050	36	36
60-64	9	308	0.0292	0.0050	0.0050	2	2
Totals	156	91,660	0.0017	0.0018	0.0018	167	167
Ref				135x0.5	135x0.5		

The current disability rates provide a reasonable fit to the experience during the period studied. No change in the disability assumptions is recommended at this time.

SECTION E

Retirement Experience

There were 1,259 age and service unreduced retirements and 3,781 life years of exposure (exposure includes active members eligible for unreduced retirement) in the male retirement investigation for individuals under the age of 70.

Summary of Male Age & Service Unreduced Retirement Experience

Age	Retirements	Exposure	Rates			Expected Retirements	
			Crude	Current	Proposed	Current	Proposed
50	0	0	0.0000	0.1500	0.2500	0	0
51	0	1	0.0000	0.1500	0.2500	0	0
52	0	2	0.0000	0.1500	0.2500	0	1
53	3	8	0.3750	0.1500	0.2500	1	2
54	4	8	0.5000	0.1500	0.2500	1	2
55	7	12	0.5833	0.2000	0.3500	2	4
56	36	75	0.4800	0.2000	0.3500	15	26
57	165	341	0.4839	0.2000	0.3500	68	119
58	157	432	0.3634	0.2000	0.3500	86	151
59	159	376	0.4229	0.2000	0.3500	75	132
60	211	812	0.2599	0.2000	0.2000	162	162
61	157	549	0.2860	0.2000	0.2300	110	126
62	108	380	0.2842	0.2000	0.2300	76	87
63	84	260	0.3231	0.2000	0.2500	52	65
64	64	179	0.3575	0.2000	0.2500	36	45
65	45	121	0.3719	0.3000	0.3300	36	40
66	22	84	0.2619	0.3000	0.2500	25	21
67	17	65	0.2615	0.3000	0.2500	20	16
68	13	44	0.2955	0.3000	0.2500	13	11
69	7	32	0.2188	0.3000	0.2500	10	8
Totals	1,259	3,781				788	1,018
70 & Over	67	70	0.9571	0.5000	1.0000	35	70
Total	1,326	3,851		374	804	823	1,088

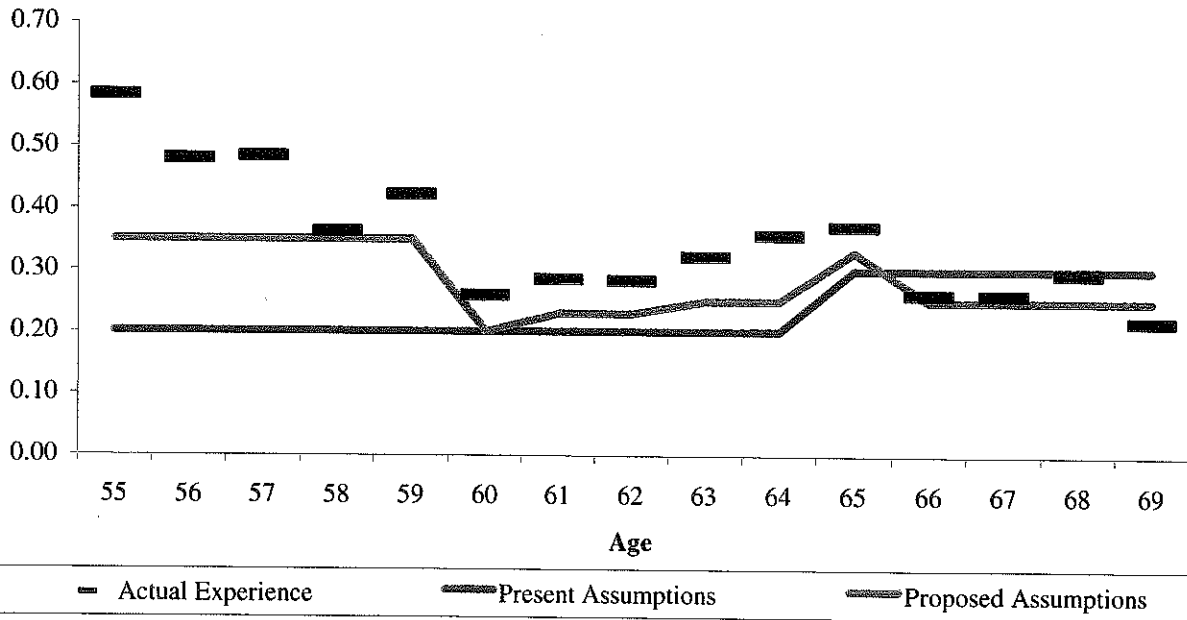# FEMALE AGE & SERVICE UNREDUCED RETIREMENT EXPERIENCE

There were 1,760 age and service unreduced retirements and 6,590 life years of exposure (exposure includes active members eligible for unreduced retirement) in the female retirement investigation for individuals under the age of 70.

Summary of Female Age & Service Unreduced Retirement Experience

Age	Retirements	Exposure	Rates			Expected Retirements	
			Crude	Current	Proposed	Current	Proposed
50	0	0	0.0000	0.1500	0.1500	0	0
51	0	0	0.0000	0.1500	0.1500	0	0
52	2	17	0.1176	0.1500	0.1500	3	3
53	1	28	0.0357	0.1500	0.1500	4	4
54	4	27	0.1481	0.1500	0.1500	4	4
55	12	32	0.3750	0.2000	0.3000	6	10
56	33	91	0.3626	0.2000	0.3000	18	27
57	163	357	0.4566	0.2000	0.3000	71	107
58	93	315	0.2952	0.2000	0.3000	63	95
59	92	256	0.3594	0.2000	0.3000	51	77
60	286	1,353	0.2114	0.2000	0.2000	271	271
61	230	988	0.2328	0.2000	0.2250	198	222
62	199	799	0.2491	0.2000	0.2250	160	180
63	160	647	0.2473	0.2000	0.2250	129	146
64	132	512	0.2578	0.2000	0.2250	102	115
65	124	404	0.3069	0.3000	0.3000	121	121
66	81	290	0.2793	0.3000	0.3000	87	87
67	73	223	0.3274	0.3000	0.3000	67	67
68	46	149	0.3087	0.3000	0.3000	45	45
69	29	102	0.2843	0.3000	0.3000	31	31
Totals	1,760	6,590				1,431	1,612
70 & Over	67	251	0.2669	0.5000	0.4000	126	100
Total	1,827	6,841		374	805	1,557	1,712

MALES

FEMALES

MALE AGE & SERVICE PRORATABLE RETIREMENT EXPERIENCE

There were 46 age and service unreduced retirements and 380 life years of exposure (exposure includes active members eligible for proratable retirement) in the male retirement investigation for individuals under the age of 70.

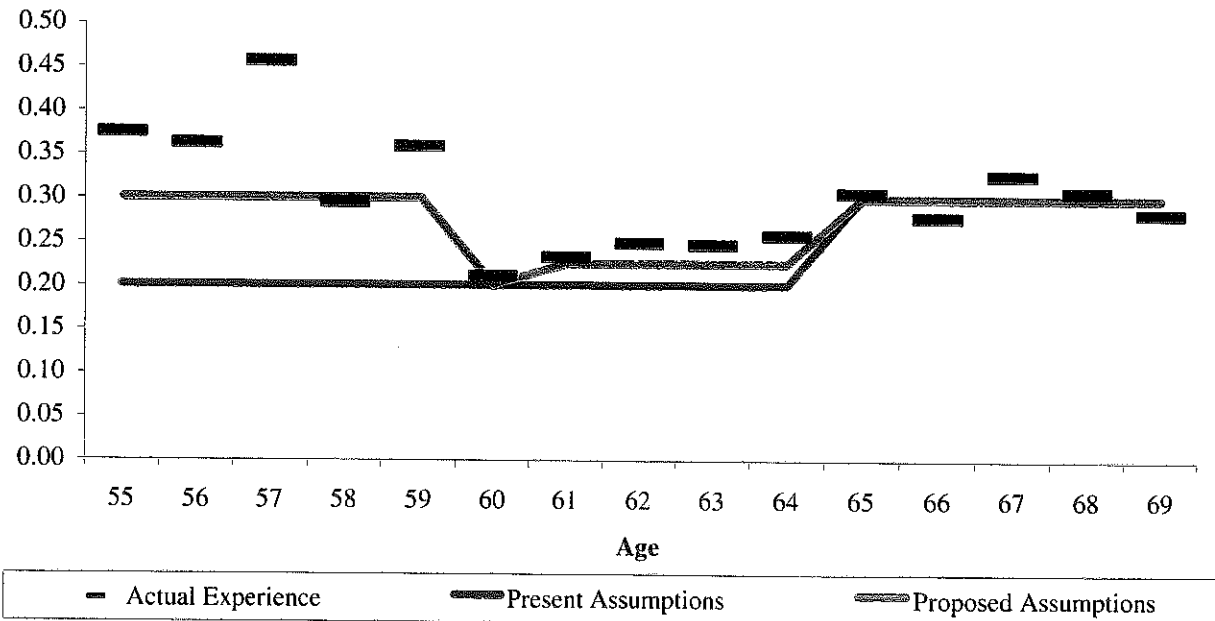## Summary of Male Age & Service Proratable Retirement Experience

Age	Retirements	Exposure	Rates			Expected Retirements	
			Crude	Current	Proposed	Current	Proposed
60	5	84	0.0595	0.1000	0.0600	8	5
61	4	65	0.0615	0.1000	0.0600	7	4
62	10	54	0.1852	0.1000	0.1500	5	8
63	5	40	0.1250	0.1000	0.1000	4	4
64	2	35	0.0571	0.1000	0.1000	4	4
65	3	27	0.1111	0.1000	0.2000	3	5
66	8	28	0.2857	0.1000	0.2000	3	6
67	1	17	0.0588	0.1000	0.2000	2	3
68	4	19	0.2105	0.1000	0.2000	2	4
69	4	11	0.3636	0.1000	0.3500	1	4
Totals	46	380				39	47
70 & Over	2	12	0.1667	1.0000	0.3500	12	4
Total	48	392		421	806	51	51

FEMALE AGE & SERVICE PRORATABLE RETIREMENT EXPERIENCE

There were 197 age and service unreduced retirements and 2,128 life years of exposure (exposure includes active members eligible for proratable retirement) in the female retirement investigation for individuals under the age of 70.

Summary of Female Age & Service Proratable Retirement Experience

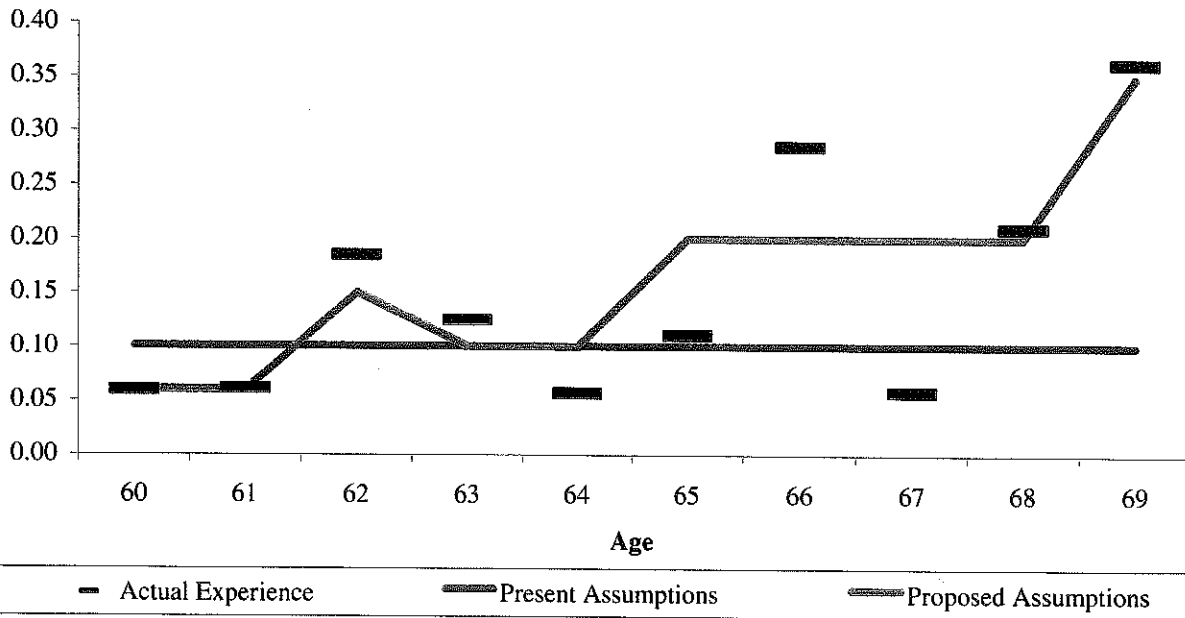| Age	Retirements	Exposure	Rates			Expected Retirements	
			Crude	Current	Proposed	Current	Proposed
60	33	565	0.0584	0.1000	0.0600	57	34
61	34	422	0.0806	0.1000	0.0800	42	34
62	38	336	0.1131	0.1000	0.1100	34	37
63	16	234	0.0684	0.1000	0.0800	23	19
64	15	179	0.0838	0.1000	0.0800	18	14
65	25	141	0.1773	0.1000	0.1500	14	21
66	14	99	0.1414	0.1000	0.1200	10	12
67	13	70	0.1857	0.1000	0.1500	7	11
68	5	47	0.1064	0.1000	0.1200	5	6
69	4	35	0.1143	0.1000	0.1200	4	4
Totals	197	2,128				214	192
70 & Over	6	49	0.1224	1.0000	0.1200	49	6
Total	203	2,177		421	807	263	198

MALES

FEMALES
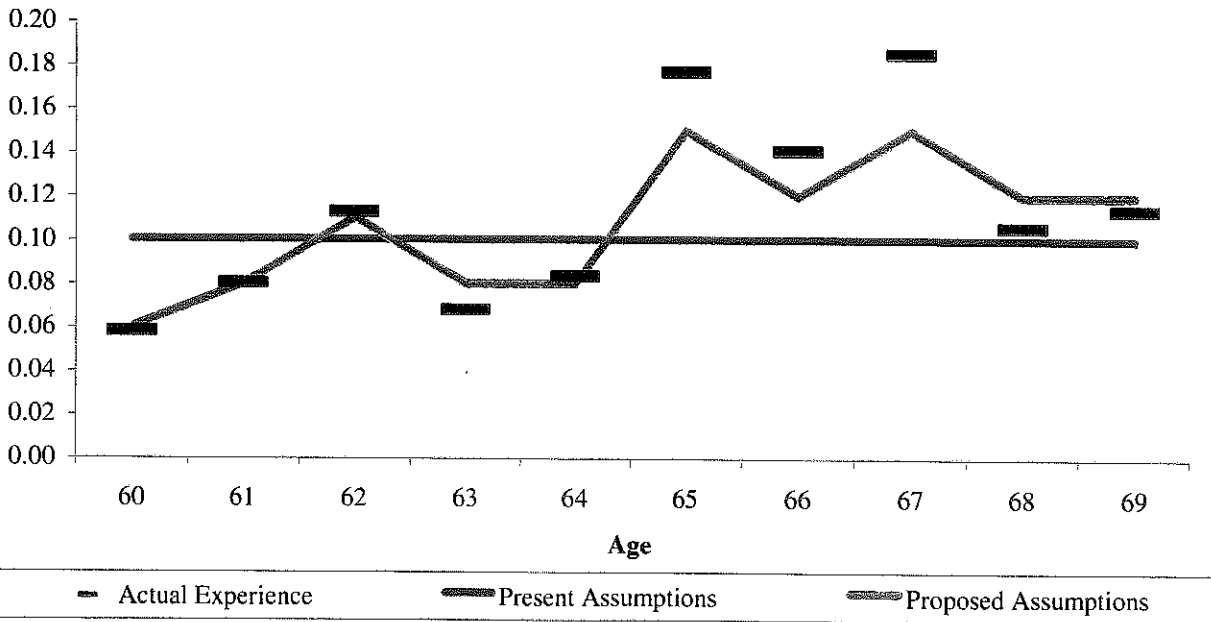
There were 899 age and service early retirements and 21,811 life years of exposure (exposure includes active members eligible for early retirement) in the male retirement investigation.

Summary of Male Age & Service Early Retirement Experience

Age	Retirements	Exposure	Rates			Expected Retirements	
			Crude	Current	Proposed	Current	Proposed
Under 50	39	2,426	0.0161	0.0100	0.0200	24	49
50	29	1,768	0.0164	0.0200	0.0200	35	35
51	37	2,105	0.0176	0.0200	0.0200	42	42
52	54	2,348	0.0230	0.0300	0.0200	70	47
53	62	2,472	0.0251	0.0300	0.0300	74	74
54	81	2,463	0.0329	0.0400	0.0300	99	74
55	105	2,535	0.0414	0.0500	0.0400	127	101
56	158	2,232	0.0708	0.0600	0.0700	134	156
57	153	1,618	0.0946	0.0700	0.1000	113	162
58	108	1,083	0.0997	0.0700	0.1000	76	108
59	73	761	0.0959	0.0700	0.1000	53	76
Totals	899	21,811		375	808	847	924

There were 1,489 age and service early retirements and 30,551 life years of exposure (exposure includes active members eligible for early retirement) in the female retirement investigation.

Summary of Female Age & Service Early Retirement Experience

Age	Retirements	Exposure	Rates			Expected Retirements	
			Crude	Current	Proposed	Current	Proposed
Under 50	105	4,967	0.0211	0.0100	0.0200	50	99
50	58	2,889	0.0201	0.0200	0.0200	58	58
51	60	3,080	0.0195	0.0200	0.0200	62	62
52	97	3,067	0.0316	0.0300	0.0300	92	92
53	122	2,914	0.0419	0.0300	0.0400	87	117
54	145	2,658	0.0546	0.0400	0.0500	106	133
55	212	3,128	0.0678	0.0500	0.0700	156	219
56	205	2,674	0.0767	0.0600	0.0800	160	214
57	164	2,058	0.0797	0.0700	0.0800	144	165
58	174	1,708	0.1019	0.0700	0.1000	120	171
59	147	1,408	0.1044	0.0700	0.1000	99	141
Totals	1,489	30,551		375	809	1,134	1,471
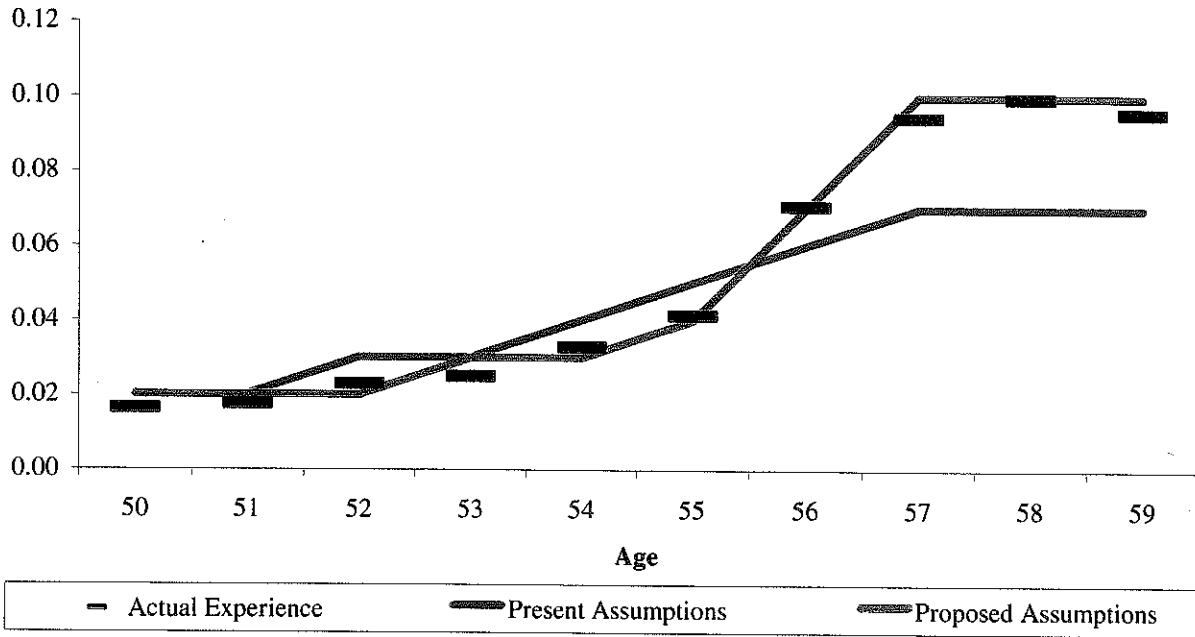
MALES

FEMALES
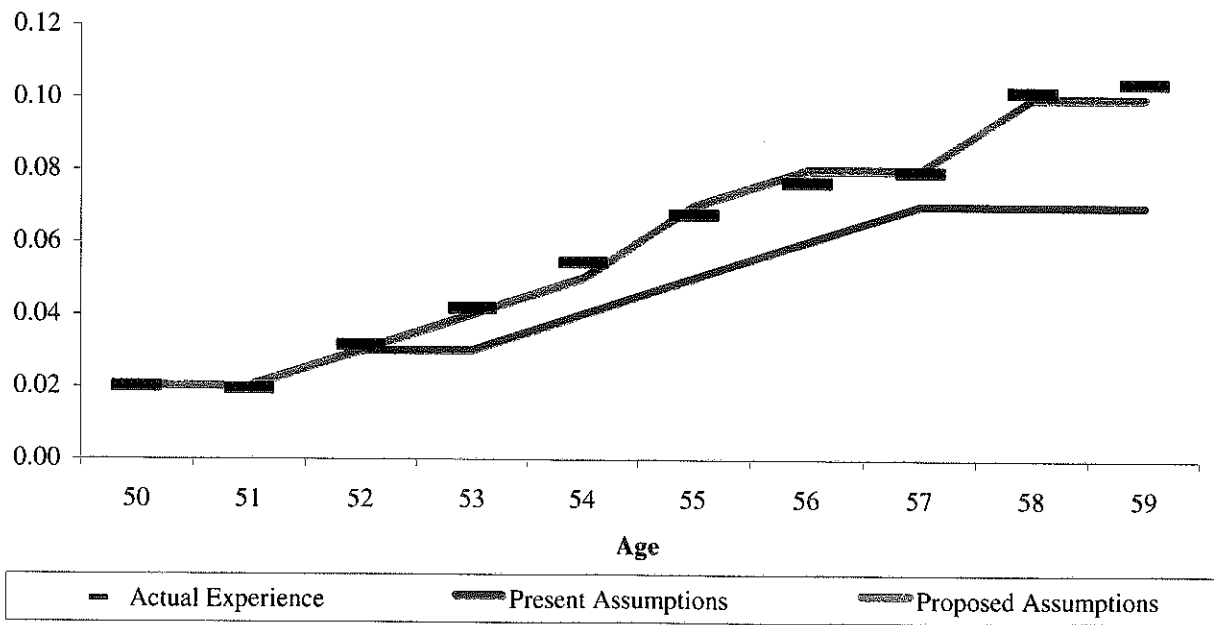
SECTION F

Mortality Experience

RETIRED LIFE MORTALITY STUDY
1996-2001

The retired life mortality study was performed with a file matching technique that tracks each individual record reported to the actuary year to year throughout the experience period. If a record is found in the valuation data in one year, and not in the following year, the person is treated as having died during the year. The study included non-disabled retirees and their beneficiaries.

The mortality tables proposed for use in future valuations are based on the 1994 Group Annuity Mortality Table. This Table is the result of the study of millions of lives from many sources including the Civil Service Retirement System. Small adjustments were made to the Table to provide a better fit to the experience of CSTRS and provide a small margin for future improvements in life expectancy.

Details of the study are reported on the following pages.

	Actual		Rates			Expected	
Age	Deaths	Exposure	Crude	Current	Proposed	Current	Proposed
50-54	2	244	0.0082	0.0060	0.0026	1	1
55-59	9	1,644	0.0055	0.0092	0.0044	15	7
60-64	41	5,069	0.0081	0.0146	0.0080	74	40
65-69	72	6,215	0.0116	0.0243	0.0145	151	90
70-74	93	4,884	0.0190	0.0411	0.0237	201	116
75-79	98	2,699	0.0363	0.0626	0.0372	169	100
80-84	66	1,161	0.0568	0.0997	0.0620	116	72
85-89	56	487	0.1150	0.1449	0.0972	71	47
90-94	30	171	0.1754	0.2017	0.1529	34	26
95-99	11	35	0.3143	0.2725	0.2336	10	8
100+	0	5	0.0000	0.3772	0.3172	2	2
Totals	478	22,614	0.0211	0.0373	0.0225	844	509
				#68x1sb0	#261x1sb2		

Retired Life Mortality was found to be significantly less than expected for males. A change is recommended in retired life mortality at this time.
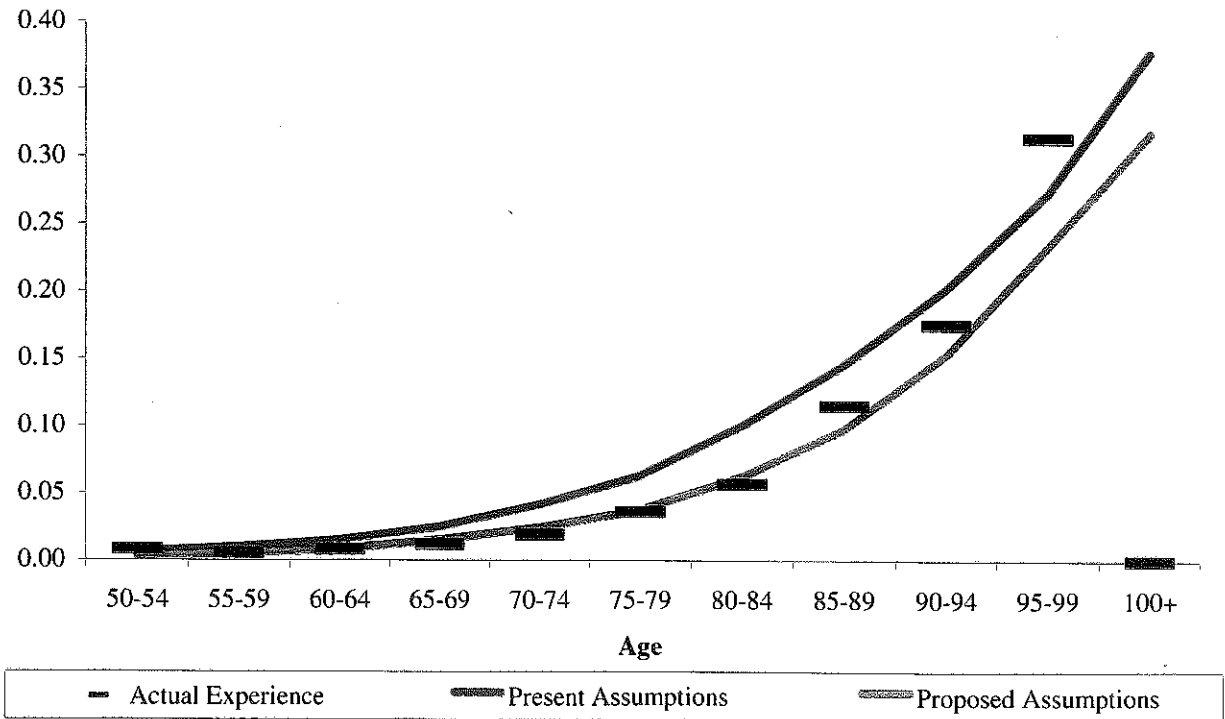
RETIRED LIFE MORTALITY - FEMALES

	Actual		Rates			Expected	
Age	Deaths	Exposure	Crude	Current	Proposed	Current	Proposed
50-54	0	373	0.0000	0.0021	0.0016	1	1
55-59	8	2,106	0.0038	0.0033	0.0026	7	5
60-64	44	6,901	0.0064	0.0058	0.0051	40	35
65-69	90	10,420	0.0086	0.0099	0.0097	103	101
70-74	115	9,929	0.0116	0.0189	0.0150	187	148
75-79	145	7,380	0.0196	0.0358	0.0253	264	187
80-84	223	5,772	0.0386	0.0612	0.0440	353	254
85-89	356	4,606	0.0773	0.0997	0.0753	459	347
90-94	377	2,677	0.1408	0.1651	0.1288	442	345
95-99	190	842	0.2257	0.2581	0.2025	217	171
100+	47	157	0.2994	0.3942	0.2966	62	47
Totals	1,595	51,163	0.0312	0.0417	0.0321	2,135	1,641
				#69x1sb0	#262x1sb1		

Retired Life Mortality was found to be significantly less than expected for females. A change is recommended in retired life mortality at this time.
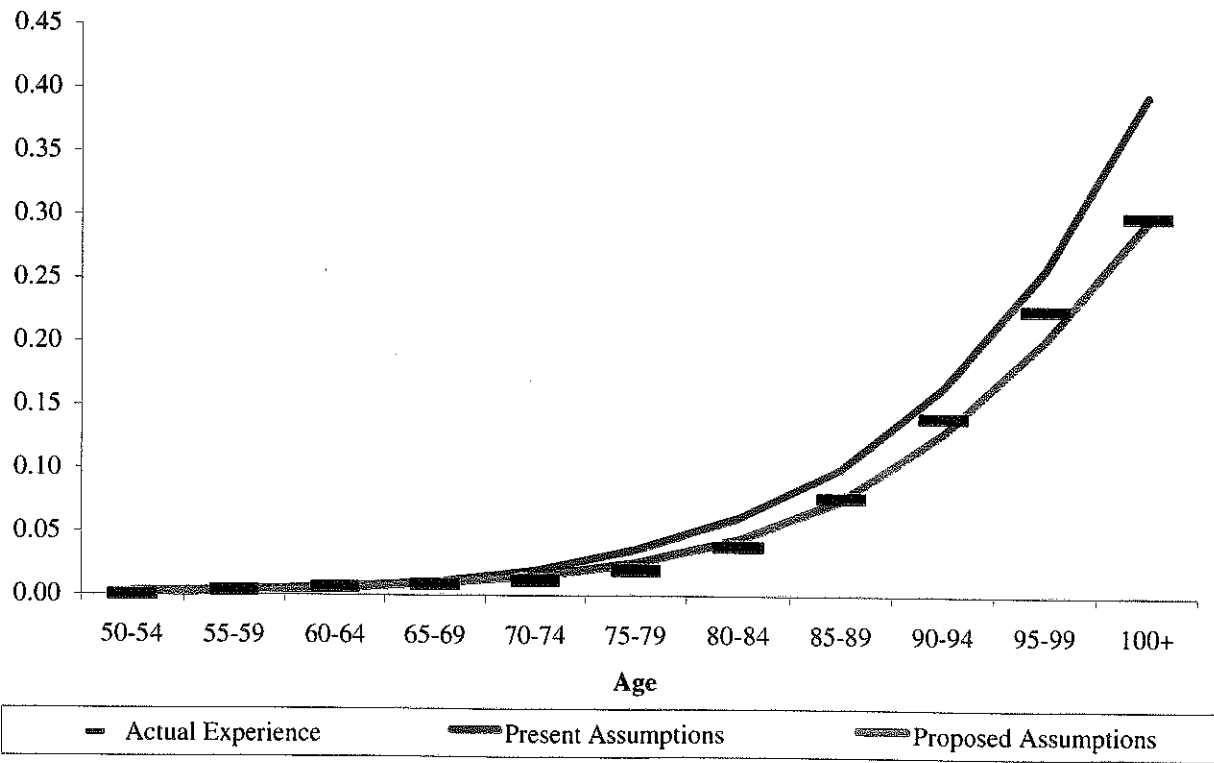

Legend: Actual Experience — Present Assumptions — Proposed Assumptions

ACTIVE LIFE MORTALITY - MALES

Sample Attained Ages	Future Life Expectancy (years)		Members Dying Within Next Year	
	Current	Proposed	Current	Proposed
25	54.23	56.49	0.04%	0.06%
30	49.35	51.67	0.06%	0.08%
35	44.50	46.87	0.08%	0.08%
40	39.69	42.06	0.11%	0.09%
45	34.95	37.27	0.20%	0.14%
50	30.38	32.55	0.36%	0.21%
55	26.01	27.95	0.59%	0.36%
60	21.84	23.52	0.90%	0.63%
65	17.93	19.39	1.46%	1.15%
70	14.42	15.66	2.50%	1.99%
	#68x0.75sb0	#261x1sb2		

ACTIVE LIFE MORTALITY - FEMALES

Sample Attained Ages	Future Life Expectancy (years)		Members Dying Within Next Year	
	Current	Proposed	Current	Proposed
25	60.57	61.97	0.02%	0.02%
30	55.64	57.04	0.03%	0.03%
35	50.73	52.12	0.04%	0.04%
40	45.85	47.22	0.06%	0.05%
45	41.00	42.36	0.09%	0.07%
50	36.20	37.53	0.14%	0.11%
55	31.47	32.76	0.21%	0.17%
60	26.84	28.10	0.35%	0.33%
65	22.38	23.67	0.61%	0.65%
70	18.13	19.53	1.05%	1.03%
	#69x0.75sb0	#262x0.75sb0		

Active member mortality rates were not explicitly studied. It is often very difficult to differentiate, in the data, between deaths and other terminations. This may be due to the fact that members with impaired health often leave active employment before death occurs (e.g. some become non-vested terminations or disability retirees). The proposed mortality rates are based on the same mortality table as is recommended for retired life mortality. In aggregate, the tables include a small margin for future increases in life expectancy.

Section G

Salary Increases

The salary scale is used to project current pays for the purpose of benefit calculations. It has two components: an increase due to wage inflation and an increase due to merit and seniority. The merit and seniority component of the salary scale will produce variations in the salary scale based on years of service. The wage inflation remains constant for different years of service and will push the entire curve up or down by a uniform amount.

In prior valuations the merit and seniority component of the salary scale was based on an individual's age. For future valuations, we are proposing a merit and seniority component that is service-based. The data seems to indicate that merit and seniority increases are more closely correlated to service than to age. In aggregate, the proposed service-based merit and seniority scale will produce slightly lower projected salaries than the prior age-based scale.

In the graph below and in the related table on the next page, a 4% wage inflation assumption has been added to the proposed merit and seniority component of the salary scale for illustrative purposes. The resulting scale produces an average wage increase that is close to that experienced over the study period.
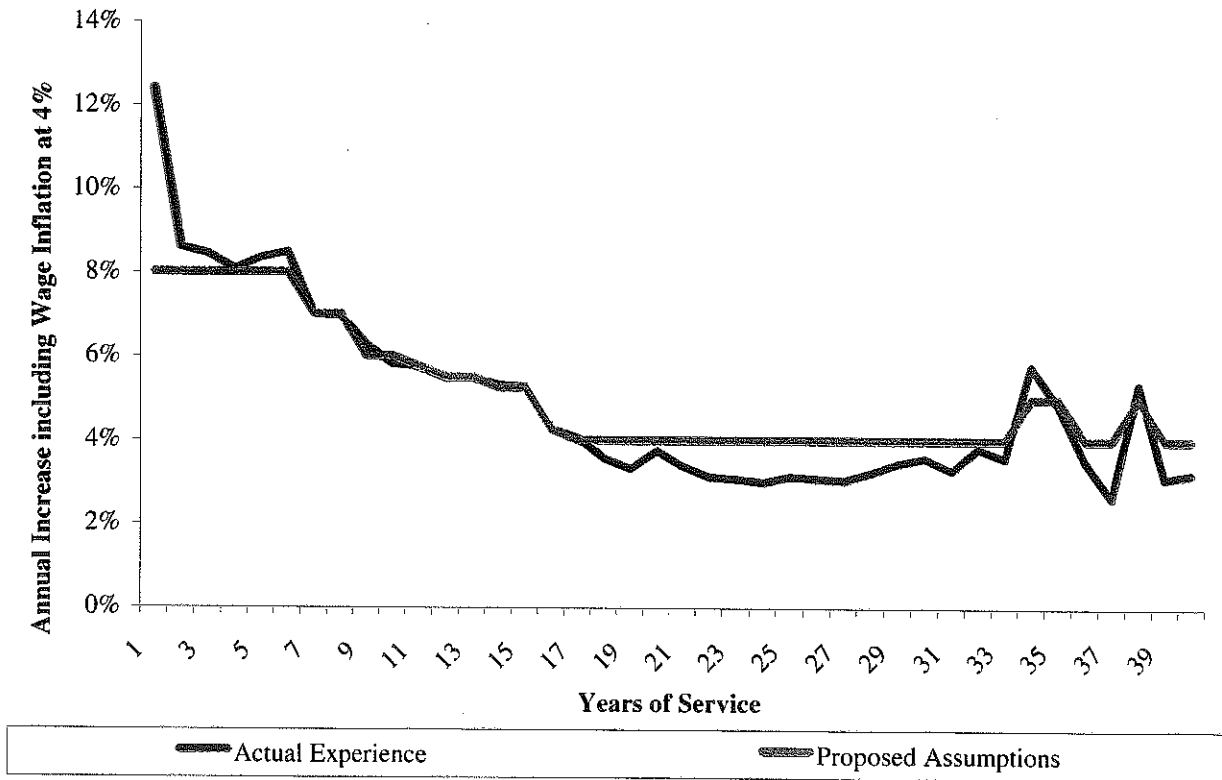
SALARY INCREASES

Service	Exposure Years	Total Change Actual	Proposed Rate	
			with 4.00% Wage Inflation	Merit & Seniority Rate Only
0	1,153	10.63%	8.00%	4.00%
1	8,886	12.40%	8.00%	4.00%
2	7,766	8.59%	8.00%	4.00%
3	7,271	8.43%	8.00%	4.00%
4	6,539	8.06%	8.00%	4.00%
5	5,231	8.34%	8.00%	4.00%
6	4,699	8.47%	8.00%	4.00%
7	4,403	7.01%	7.00%	3.00%
8	4,502	6.96%	7.00%	3.00%
9	5,137	6.26%	6.00%	2.00%
10	5,434	5.81%	6.00%	2.00%
11	5,590	5.75%	5.75%	1.75%
12	5,349	5.47%	5.50%	1.50%
13	4,723	5.48%	5.50%	1.50%
14	4,163	5.30%	5.25%	1.25%
15	3,797	5.27%	5.25%	1.25%
16	3,750	4.25%	4.25%	0.25%
17	4,021	4.05%	4.00%	0.00%
18	4,357	3.55%	4.00%	0.00%
19	4,534	3.31%	4.00%	0.00%
20	4,397	3.74%	4.00%	0.00%
21	4,184	3.37%	4.00%	0.00%
22	4,234	3.11%	4.00%	0.00%
23	4,506	3.07%	4.00%	0.00%
24	4,869	2.98%	4.00%	0.00%
25	5,155	3.13%	4.00%	0.00%
26	5,337	3.07%	4.00%	0.00%
27	5,377	3.03%	4.00%	0.00%
28	5,153	3.21%	4.00%	0.00%
29	4,664	3.44%	4.00%	0.00%
30	3,938	3.57%	4.00%	0.00%
31	3,041	3.27%	4.00%	0.00%
32	2,467	3.80%	4.00%	0.00%
33	1,883	3.56%	4.00%	0.00%
34	1,397	5.76%	5.00%	1.00%
35	701	4.85%	5.00%	1.00%
36	442	3.51%	4.00%	0.00%
37	263	2.64%	4.00%	0.00%
38	163	5.33%	5.00%	1.00%
39	107	3.09%	4.00%	0.00%
40	62	3.20%	4.00%	0.00%
Weighted Average Rate, All Years		**5.58%**	**5.54%**	71

SECTION H

Detailed Listing of Proposed Assumptions

PROPOSED SERVICE BASED AND AGE BASED WITHDRAWAL RATES

% of Active Participants Withdrawing					
Service Based Withdrawal			Age Based Withdrawal		
Service	Male	Female	Age	Male	Female
0-1	0.0975	0.1000	25	0.0250	0.0300
1-2	0.0775	0.0750	26	0.0250	0.0300
2-3	0.0525	0.0550	27	0.0250	0.0300
3-4	0.0375	0.0500	28	0.0250	0.0300
4-5	0.0350	0.0500	29	0.0250	0.0300
5-6	0.0350	0.0450	30	0.0250	0.0300
6-7	0.0350	0.0450	31	0.0250	0.0300
7-8	0.0200	0.0400	32	0.0250	0.0300
8-9	0.0200	0.0300	33	0.0230	0.0290
9-10	0.0100	0.0300	34	0.0210	0.0280
			35	0.0190	0.0270
			36	0.0170	0.0260
			37	0.0150	0.0250
			38	0.0145	0.0230
			39	0.0140	0.0210
			40	0.0135	0.0190
			41	0.0130	0.0170
			42	0.0125	0.0150
			43	0.0125	0.0140
			44	0.0125	0.0130
			45	0.0125	0.0120
			46	0.0125	0.0110
			47	0.0125	0.0100
			48	0.0130	0.0105
			49	0.0135	0.0110
			50	0.0140	0.0115
			51	0.0145	0.0120
			52	0.0150	0.0125
			53	0.0170	0.0135
			54	0.0190	0.0145
			55	0.0210	0.0155
			56	0.0230	0.0165
			57	0.0250	0.0175
			58	0.0250	0.0175
			59	0.0250	0.0175
Sw	266	267	Wx	492	493

PROPOSED SALARY INCREASE RATES

Service	% Increases in Salaries Next Year		
	Merit & Seniority	Base	Total
0	4.00%	4.00%	8.00%
1	4.00%	4.00%	8.00%
2	4.00%	4.00%	8.00%
3	4.00%	4.00%	8.00%
4	4.00%	4.00%	8.00%
5	4.00%	4.00%	8.00%
6	4.00%	4.00%	8.00%
7	3.00%	4.00%	7.00%
8	3.00%	4.00%	7.00%
9	2.00%	4.00%	6.00%
10	2.00%	4.00%	6.00%
11	1.75%	4.00%	5.75%
12	1.50%	4.00%	5.50%
13	1.50%	4.00%	5.50%
14	1.25%	4.00%	5.25%
15	1.25%	4.00%	5.25%
16	0.25%	4.00%	4.25%
17	0.00%	4.00%	4.00%
18	0.00%	4.00%	4.00%
19	0.00%	4.00%	4.00%
20	0.00%	4.00%	4.00%
21	0.00%	4.00%	4.00%
22	0.00%	4.00%	4.00%
23	0.00%	4.00%	4.00%
24	0.00%	4.00%	4.00%
25	0.00%	4.00%	4.00%
26	0.00%	4.00%	4.00%
27	0.00%	4.00%	4.00%
28	0.00%	4.00%	4.00%
29	0.00%	4.00%	4.00%
30	0.00%	4.00%	4.00%
31	0.00%	4.00%	4.00%
32	0.00%	4.00%	4.00%
33	0.00%	4.00%	4.00%
34	1.00%	4.00%	5.00%
35	1.00%	4.00%	5.00%
36	0.00%	4.00%	4.00%
37	0.00%	4.00%	4.00%
38	1.00%	4.00%	5.00%
39	0.00%	4.00%	4.00%
40	0.00%	4.00%	4.00%
Ref	71	4.00%	

| | % of Active Participants Retiring | | | | | |
| | Unreduced | | Proratable | | Reduced | |
Age	Male	Female	Male	Female	Male	Female
50	25%	15%			2%	2%
51	25%	15%			2%	2%
52	25%	15%			2%	3%
53	25%	15%			3%	4%
54	25%	15%			3%	5%
55	35%	30%			4%	7%
56	35%	30%			7%	8%
57	35%	30%			10%	8%
58	35%	30%			10%	10%
59	35%	30%			10%	10%
60	20%	20%	6%	6%		
61	23%	22%	6%	8%		
62	23%	22%	15%	11%		
63	25%	22%	10%	8%		
64	25%	22%	10%	8%		
65	33%	30%	20%	15%		
66	25%	30%	20%	12%		
67	25%	30%	20%	15%		
68	25%	30%	20%	12%		
69	25%	30%	35%	12%		
70	100%	40%	35%	12%		
71	100%	40%	35%	12%		
72	100%	40%	35%	12%		
73	100%	40%	35%	12%		
74	100%	40%	35%	20%		
75	100%	40%	40%	20%		
76	100%	40%	40%	20%		
77	100%	40%	40%	20%		
78	100%	40%	40%	20%		
79	100%	40%	40%	20%		
80	100%	100%	40%	20%		
Tbl	804	805	806	807	808	809
Anch	50	50	60	60	45	45

PROPOSED DISABILITY RATES

Age	% of Active Participants Becoming Disabled	
	Male	Female
20	0.05%	0.05%
21	0.05%	0.05%
22	0.05%	0.05%
23	0.05%	0.05%
24	0.05%	0.05%
25	0.05%	0.05%
26	0.05%	0.05%
27	0.05%	0.05%
28	0.05%	0.05%
29	0.04%	0.04%
30	0.04%	0.04%
31	0.04%	0.04%
32	0.03%	0.03%
33	0.04%	0.04%
34	0.04%	0.04%
35	0.04%	0.04%
36	0.05%	0.04%
37	0.05%	0.04%
38	0.05%	0.05%
39	0.05%	0.06%
40	0.05%	0.07%
41	0.05%	0.08%
42	0.05%	0.09%
43	0.08%	0.10%
44	0.11%	0.11%
45	0.14%	0.12%
46	0.17%	0.13%
47	0.20%	0.14%
48	0.29%	0.18%
49	0.38%	0.22%
50	0.47%	0.26%
51	0.56%	0.30%
52	0.65%	0.34%
53	0.72%	0.38%
54	0.79%	0.41%
55	0.86%	0.44%
56	0.93%	0.47%
57	1.00%	0.50%
58	1.00%	0.50%
59	1.00%	0.50%
60	1.00%	0.50%
Tbl	134	135
Mult	0.5	0.5

PROPOSED RETIRED MORTALITY RATES

Age	% Dying Next Year		Age	% Dying Next Year	
	Male	Female		Male	Female
50	0.2102%	0.1310%	81	5.5861%	3.9396%
51	0.2326%	0.1428%	82	6.2027%	4.3952%
52	0.2579%	0.1568%	83	6.8615%	4.9153%
53	0.2872%	0.1734%	84	7.5532%	5.4857%
54	0.3213%	0.1907%	85	8.2510%	6.0979%
55	0.3584%	0.2084%	86	8.9613%	6.7738%
56	0.3979%	0.2294%	87	9.7240%	7.5347%
57	0.4425%	0.2563%	88	10.5792%	8.4023%
58	0.4949%	0.2919%	89	11.5671%	9.3820%
59	0.5581%	0.3359%	90	12.6980%	10.4594%
60	0.6300%	0.3863%	91	13.9452%	11.6265%
61	0.7090%	0.4439%	92	15.2931%	12.8751%
62	0.7976%	0.5093%	93	16.7260%	14.1973%
63	0.8986%	0.5832%	94	18.2281%	15.5931%
64	1.0147%	0.6677%	95	19.8392%	17.0677%
65	1.1471%	0.7621%	96	21.5700%	18.6213%
66	1.2940%	0.8636%	97	23.3606%	20.2538%
67	1.4535%	0.9694%	98	25.1510%	21.9655%
68	1.6239%	1.0764%	99	26.8815%	23.7713%
69	1.8034%	1.1763%	100	28.5277%	25.6712%
70	1.9859%	1.2709%	101	30.1298%	27.6427%
71	2.1729%	1.3730%	102	31.7238%	29.6629%
72	2.3730%	1.4953%	103	33.3461%	31.7093%
73	2.5951%	1.6506%	104	35.0330%	33.8505%
74	2.8481%	1.8344%	105	36.8542%	36.1016%
75	3.1201%	2.0381%	106	38.7855%	38.3597%
76	3.4051%	2.2686%	107	40.7224%	40.5217%
77	3.7211%	2.5325%	108	42.5599%	42.4846%
78	4.0858%	2.8366%	109	44.1935%	44.4368%
79	4.5171%	3.1727%	110	100.0000%	100.0000%
80	5.0211%	3.5362%	Ref	#261sb2x1	#262sb1x1

PROPOSED ACTIVE MORTALITY RATES

Age	% Dying Next Year	
	Male	Female
20	0.0460%	0.0213%
21	0.0484%	0.0214%
22	0.0507%	0.0217%
23	0.0530%	0.0219%
24	0.0556%	0.0218%
25	0.0589%	0.0218%
26	0.0624%	0.0220%
27	0.0661%	0.0227%
28	0.0696%	0.0236%
29	0.0727%	0.0248%
30	0.0754%	0.0263%
31	0.0779%	0.0280%
32	0.0801%	0.0298%
33	0.0821%	0.0317%
34	0.0839%	0.0337%
35	0.0848%	0.0359%
36	0.0849%	0.0384%
37	0.0851%	0.0413%
38	0.0862%	0.0449%
39	0.0891%	0.0489%
40	0.0939%	0.0532%
41	0.0999%	0.0576%
42	0.1072%	0.0619%
43	0.1156%	0.0658%
44	0.1252%	0.0692%
45	0.1352%	0.0730%
46	0.1458%	0.0775%
47	0.1578%	0.0834%
48	0.1722%	0.0904%
49	0.1899%	0.0982%
50	0.2102%	0.1071%
51	0.2326%	0.1176%
52	0.2579%	0.1301%
53	0.2872%	0.1430%
54	0.3213%	0.1563%
55	0.3584%	0.1721%
56	0.3979%	0.1922%
57	0.4425%	0.2189%
58	0.4949%	0.2519%
59	0.5581%	0.2897%
60	0.6300%	0.3329%
61	0.7090%	0.3820%
62	0.7976%	0.4374%
63	0.8986%	0.5008%
64	1.0147%	0.5716%
65	1.1471%	0.6477%
Ref	#261sb2x1	#262sb0x0.75