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EMPLOYEES' RETIREMENT SYSTEM OF GEORGIA

GEORGIA PUBLIC SCHOOL EMPLOYEES' RETIREMENT SYSTEM

EXPERIENCE INVESTIGATION FOR THE FIVE-YEAR PERIOD ENDING JUNE 30, 2014

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December 17, 2015

Board of Trustees
Georgia Public School Employees' Retirement System
Two Northside 75, Suite 300
Atlanta, GA 30318

Members of the Board:

We are pleased to submit the results of an investigation of the economic and demographic experience for the Georgia Public School Employees' Retirement System. The purpose of the investigation was to assess the reasonability of the actuarial assumptions currently used by the Retirement System. This investigation covers the five-year period from July 1, 2009 to June 30, 2014. As a result of the investigation, it is recommended that revised economic and demographic tables be adopted by the Board for future use.

The investigation of the demographic experience of members of the System includes all active and retired members as well as beneficiaries of deceased members. The experience was investigated separately for males and females since different tables are used for each of these groups.

The number of members expected to separate from active service and the expected number of post-retirement deaths was obtained by use of the rates determined in the last experience investigation and adopted by the Board of Trustees. The results of the investigation indicate that the assumed rates of separation from active service due to withdrawal, death and retirement, and the rates of post-retirement mortality do not accurately reflect the actual and anticipated experience of the Retirement System. As a result of the investigation, new withdrawal, retirement and mortality tables have been developed which reflect more closely the actual experience of the membership.

This report shows a comparison of the actual and expected cases of separation from active service and actual and expected number of deaths. A comparison between the rates of separation and mortality presently in use and the recommended revised rates are also shown in this report.

All new assumptions are shown in the attached tables in Appendix C of this report. In the actuary's judgment, the recommended assumptions are suitable for use until further experience indicates that modifications are desirable.

The experience investigation was performed by, and under the supervision of, independent actuaries who are members of the American Academy of Actuaries with experience in performing valuations for public retirement systems. The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

Edward A. Macdonald, ASA, FCA, MAAA
President

Cathy Turcot
Principal and Managing Director

Edward J. Koebel, FCA, EA, MAAA
Principal and Consulting Actuary

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Section I
Executive Summary

The following table summarizes the findings and recommendations with regard to the assumptions utilized for the Georgia Public School Employees' Retirement System. Detailed explanations for the recommendations are found in the sections that follow.

Recommended Economic Assumption Changes

The table below lists the two economic assumptions used in the actuarial valuations and the current and proposed rates.

Item	Current	Proposed
Price Inflation	3.00%	2.75%
Investment Return*	7.50%	7.50%

* net of investment expenses.

Recommended Demographic Assumption Changes

The table below lists the demographic assumptions we recommend be changed based on the experience of the last five years.

Assumption Changes
Withdrawal, Pre-Retirement Mortality, Service Retirement and Post-Retirement Mortality

Recommended Other Assumption Changes

The table below lists the other assumptions that are considered in our valuations that should be reviewed during the experience study.

Assumption	Assumption Changes
Administrative Expenses	No Change to current method of determining rate
Amortization Method	No change to current method of level dollar amortization
Asset Smoothing	No change to current method of smoothing market gains and losses over 5 year period
Cost of Living	No change to current assumption of 1.5% semi-annually
Option Factors	Recommend change in current option factors to reflect change in mortality rate
Termination Benefits	Recommend change in assumption for active vested members receiving termination benefits
Valuation Cost Method	No change in Entry Age Normal Cost Method

Section II
Financial Impact

The following table highlights the impact of the recommended changes on the principal valuation results.

Impact on Principal Valuation Results		
	Valuation Results 2014	**Recommended Assumptions**
Unfunded Accrued Liability	$158,915,410	$189,416,143
Funding Ratio	82.8%	80.2%
Actuarially Determined Employer Contribution		
Normal Cost*	$11,779,000	$13,063,000
Accrued Liability	$14,498,000	$17,234,000
Total	$26,277,000	$30,297,000
Amortization Period (in years)	23.9	24.0

*Normal Cost includes estimated administrative expenses

Section III
Economic Assumptions

There are two economic assumptions used in the actuarial valuations performed for the System. They are:

- Price Inflation
- Investment Return

Actuarial Standard of Practice (ASOP) No. 27, *"Selection of Economic Assumptions for Measuring Pension Obligations"* provides guidance to actuaries in selecting economic assumptions for measuring obligations under defined benefit plans. ASOP No. 27 was revised in September, 2013 and no longer includes the concept of a "best estimate range". Instead, the revised standard now requires that each economic assumption selected by the actuary should be reasonable which means it has the following characteristics:

- It is appropriate for the purpose of the measurement;
- It reflects the actuary's professional judgment;
- It takes into account historical and current economic data that is relevant as of the measurement date;
- It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and
- It has no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included and disclosed, or when alternative assumptions are used for the assessment of risk.

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 27. The following table shows our recommendations followed by detailed discussions of each assumption.

Item	Current	Proposed
Price Inflation	3.00%	2.75%
Real Rate of Return*	4.50	4.75
Investment Return	7.50%	7.50%

**Net of Investment Expenses*

Price Inflation

Background: As can be seen from the table on the previous page, assumed price inflation is used as the basis for the investment return assumption. This latter assumption will be discussed in detail in the following section.

It is important that the price inflation assumption be consistently applied throughout the economic assumptions utilized in an actuarial valuation. This is called for in ASOP No. 27 and is also required to meet the parameters for determining pension liabilities and expense under Governmental Accounting Standards Board (GASB) Statements No. 67 and 68.

The current price inflation assumption is 3.00% per year.

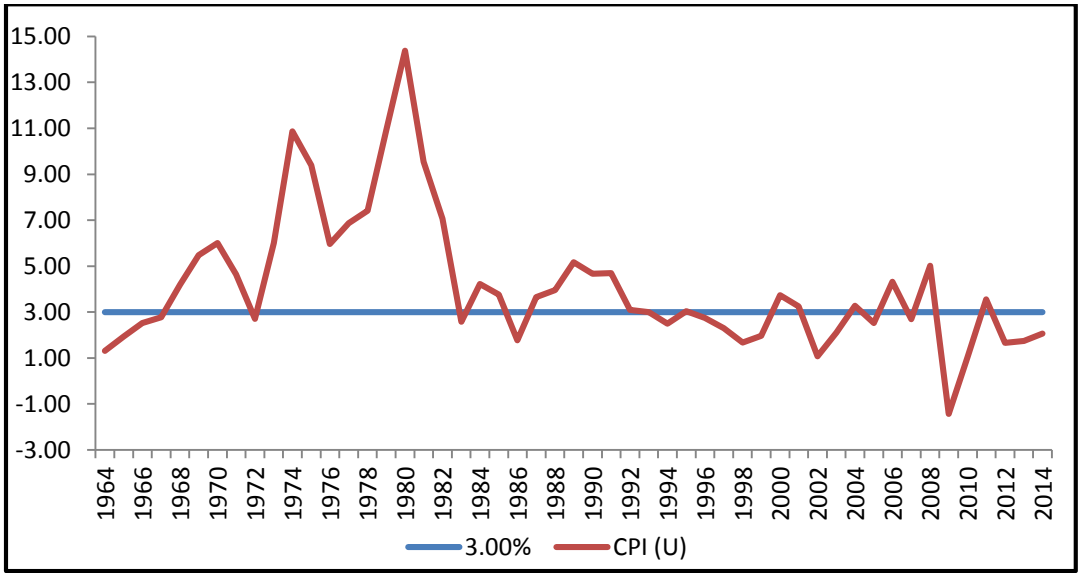
Past Experience: The Consumer Price Index, US City Average, All Urban Consumers, CPI (U), has been used as the basis for reviewing historical levels of price inflation. The level of that index in June of each of the last 50 years is provided in Appendix A.

In analyzing this data, annual rates of inflation have been determined by measuring the compound growth rate of the CPI (U) over various time periods. The results are as follows:

Period	Number of Years	Inflation	Annual Standard Deviation
2004-2014	10	2.31%	1.81%
1994-2004	10	2.51	0.83
1984-1994	10	3.62	1.06
1974-1984	10	7.78	3.39
1964-1974	10	4.68	2.63
1994-2014	20	2.41%	1.37%
1984-2014	30	2.81	1.39
1974-2014	40	4.03	2.99
1964-2014	50	4.16	2.90
1926-2014	88	2.98	4.15

The following graph illustrates the historical levels of price inflation measured as of June 30th of each of the last 50 years and compared to the current 3.00% annual rate currently assumed.

Annual Rate of CPI (U) Increases



Over more recent historical periods, the average annual rate of increase in the CPI-U has been below 3.00%. The period of high inflation from 1973 to 1982 has a significant impact on the averages over periods which include these rates. Further, the average rate of 2.98% over the entire 88 year period is close to the average rate of 2.81% for the prior 30 years (1984 to 2014) but the volatility of the annual rates in the more recent years has been markedly lower as indicated by the significantly lower annual standard deviations. Many experts attribute the lower average annual rates and lower volatility to the increased efforts of the Federal Reserve since the early 1980's to stabilize price inflation. The severe recession of 2008-2009 resulted in a short period of deflation followed by low levels of inflation. The Federal Reserve has combated this weak environment with zero interest rates and quantitative easing. Although the quantitative easing program has ended, the Federal Reserve has disclosed an inflation target of at least 2.0% annually and will keep interest rates very low until they see progress toward the target.

Recommendation: It is difficult to accurately predict inflation. Inflation's short-term volatility is illustrated by comparing its average rate over the last 10, 30 and 50 years. Although the 10-year average of 2.31% is lower than the System's assumed rate of 3.00%, the longer 30, 40 and 50-year averages of 2.79%, 3.94% and 4.25% respectively, are at or slightly higher than the System's rate. The validity of the System's assumption is, therefore, dependent upon the emphasis one assigns to the short and long-terms.

Current economic forecasts suggest lower inflation but are generally looking at a shorter time period than appropriate for our purposes. In the 2014 OASDI Trustees Report, the Chief Actuary for Social Security bases the 75 year cost projections on an intermediate inflation assumption of 2.7% with a range of 1.7% to 3.7%. We consider that range reasonable, and recommend that PSERS lower the current price inflation assumption from 3.00 to 2.75 % per year.

Price Inflation Assumption	
Current	3.00%
Recommended	2.75%

Investment Return

Background: The assumed investment return is one of the most significant assumptions in the annual actuarial valuation process as it is used to discount the expected benefit payments for all active, inactive and retired members of the System. Minor changes in this assumption can have a major impact on valuation results. The investment return assumption should reflect the asset allocation target for the funds set by the Board of Trustees.

The current assumption is 7.50%, consisting of a price inflation assumption of 3.00% and a real rate of return assumption of 4.50%. The return is net of all investment expenses.

Past Experience: The assets for the System are valued using a widely accepted asset-smoothing methodology (5-year smoothing) that fully recognizes the expected investment income and also recognizes 20% of each year's investment gain or loss (the difference between actual and expected investment income). The asset smoothing methodology from 2010 through 2012 was based on 7-year smoothing and actuarial value was set equal to market value in 2013. The recent experience over the last five years is shown in the table below.

Year Ending 6/30	Actuarial Value	Market Value Rate of Return
2010	2.17%	11.59%
2011	4.14	21.65
2012	4.37	2.00
2013	6.84	13.45
2014	9.47	17.37
Average	5.37%	13.02%

The impact of the asset smoothing method can be observed in the table. Very poor asset returns during 2008 and 2009 are reflected in the actuarial value returns through 2013. While important to review and analyze, historical returns over such a short time period are not credible for the purpose of setting the long-term assumed future rate of return.

We next include in our analysis information concerning future expectations for the investment return assumption. Because of the significant variability in past year-to-year results and the inter-play of inflation on those results in the short term, we prefer to base our investment return assumption on the capital market assumptions utilized by the Board in setting investment policy and the asset allocation established by the Board as a result of that policy. This approach is referred to as the building block method in ASOP No. 27.

Analysis: The current capital market assumptions and asset allocation as provided by the System are shown in Appendix B. We further assumed that investment returns approximately follow a lognormal distribution with no correlation between years. The results below provide an expected range of real rates of return over a 50 year time horizon. Looking at one year results produces an expected real return of 6.38% but also has a high standard deviation or measurement of volatility. By expanding the time horizon, the average return does not change much but the volatility declines significantly. The following table provides a summary of results. The geometric real rates of return are net of investment expenses.

Time Span In Years	Mean Real Return	Standard Deviation	Real Returns by Percentile				
			5th	25th	50th	75th	95th
1	6.38%	15.36%	-16.87%	-4.44%	5.29%	16.00%	33.35%
5	5.51%	6.79%	-5.27%	0.82%	5.29%	9.95%	17.02%
10	5.40%	4.79%	-2.29%	2.11%	5.29%	8.56%	13.46%
20	5.34%	3.38%	-0.13%	3.03%	5.29%	7.59%	11.00%
30	5.32%	2.76%	0.84%	3.44%	5.29%	7.17%	9.93%
40	5.32%	2.39%	1.43%	3.69%	5.29%	6.91%	9.30%
50	5.31%	2.14%	1.93%	3.86%	5.29%	6.74%	8.87%

Based on this analysis there is a 50% likelihood that the average real rate of return over a 50-year period will be 5.29%. it can also be inferred that for the 10 year time span, 5% of the resulting real rates of return were below -2.29% and 95% were above that. As the time span increases, the results begin to merge. Over a 50 year time span, the results indicate there is a 25% chance that real returns will be below 3.86% and a 25% chance they will be above 6.74%. In other words there is a 50% chance the real returns will be between 3.86% and 6.74 %.

Recommendation: Using the building block approach of ASOP No. 27 and the projection results outlined above, we are recommending a range for the investment return assumption of the 25th to 75th percentile real returns over the 50 year time span plus the recommended inflation assumption less the recommended expense rate. The following table details the range.

Item	25th Percentile	50th Percentile	75th Percentile
Real Rate of Return*	3.86%	5.29%	6.74%
Inflation	2.75	2.75	2.75
Net Investment Return	6.61%	8.04%	9.49%

* net of investment expenses.

There is a 50% chance that the net return will be 8.04% or more over a 50-year period. A net return of 7.50% is at the 40th percentile. Although not in the center of the recommended range, in our opinion a return of 7.50% is conservative yet reasonable. In addition, the most recent Public Fund Survey indicates that the current median return assumptions for the approximately 126 large public plans in the summary is 7.75%. Further, the recent trend in the return assumption of these large plans is toward lower annual rates of return.

After review of past experience for PSERS and future expectation analysis, we are recommending the real rate of return assumption can be increased from 4.50% to 4.75%. Combining this with our recommendation to lower the price inflation assumption, we recommend the long-term investment return assumption remain at 7.50%.

Investment Return Assumption		
	Current	Recommended
Real Rate of Return*	4.50%	4.75%
Inflation	3.00	2.75
Net Investment Return	7.50%	7.50%

**Net of Investment Expenses*

Section IV
Demographic Assumptions

There are several demographic assumptions used in the actuarial valuations performed for the Georgia Public School Employees' Retirement System. They are:

- Rates of Withdrawal
- Rates of Disability Retirement
- Rates of Service Retirement
- Rate of Mortality

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 35, *"Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations"*, which provides guidance to actuaries in selecting demographic assumptions for measuring obligations under defined benefit plans. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP No. 35.

The purpose of a study of demographic experience is to compare what actually happened to the membership during the study period (July 1, 2009, through June 30, 2014) with what was expected to happen based on the assumptions used in the most recent Actuarial Valuations.

Detailed tabulations by age, service and/or gender are performed over the entire study period. These tabulations look at all active and retired members during the period as well as separately annotating those who experience a demographic event, also referred to as a decrement. In addition the tabulation of all members together with the current assumptions permits the calculation of the number of expected decrements during the study period.

If the actual experience differs significantly from the overall expected results, or if the pattern of actual decrements, or rates of decrement, by age, gender, or service does not follow the expected pattern, new assumptions are recommended. Recommended changes usually do not follow the exact actual experience during the observation period. Judgment is required to extrapolate future experience from past trends and current member behavior.

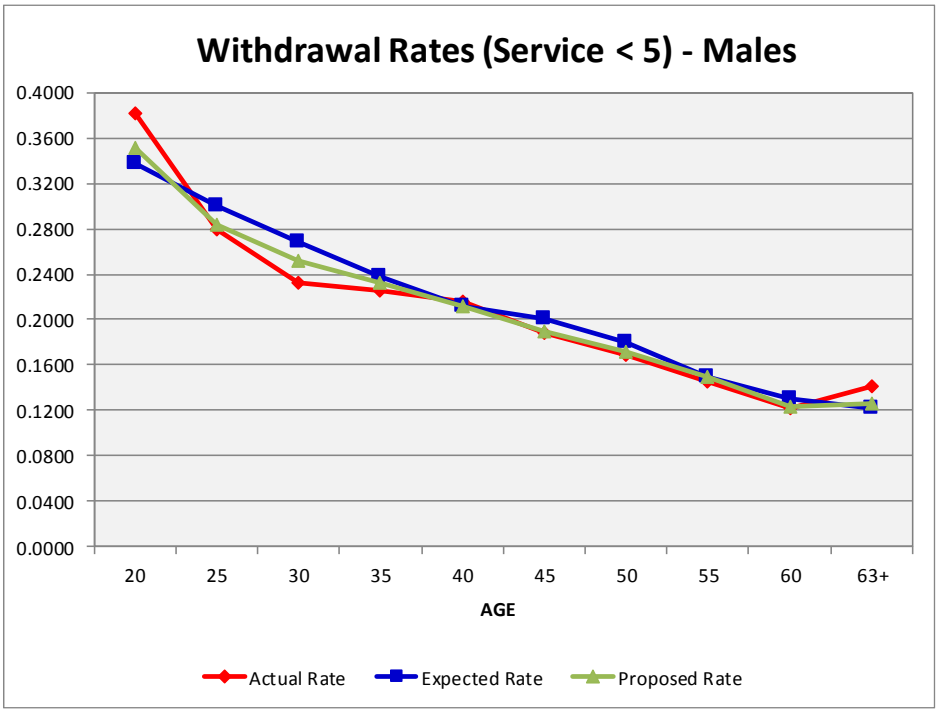
The remainder of this section presents the results of the demographic study. We have prepared tables that show a comparison of the actual and expected decrements and the overall ratio of actual to expected results (A/E Ratios) under the current assumptions. If a change is being proposed, the revised A/E Ratios are shown as well.

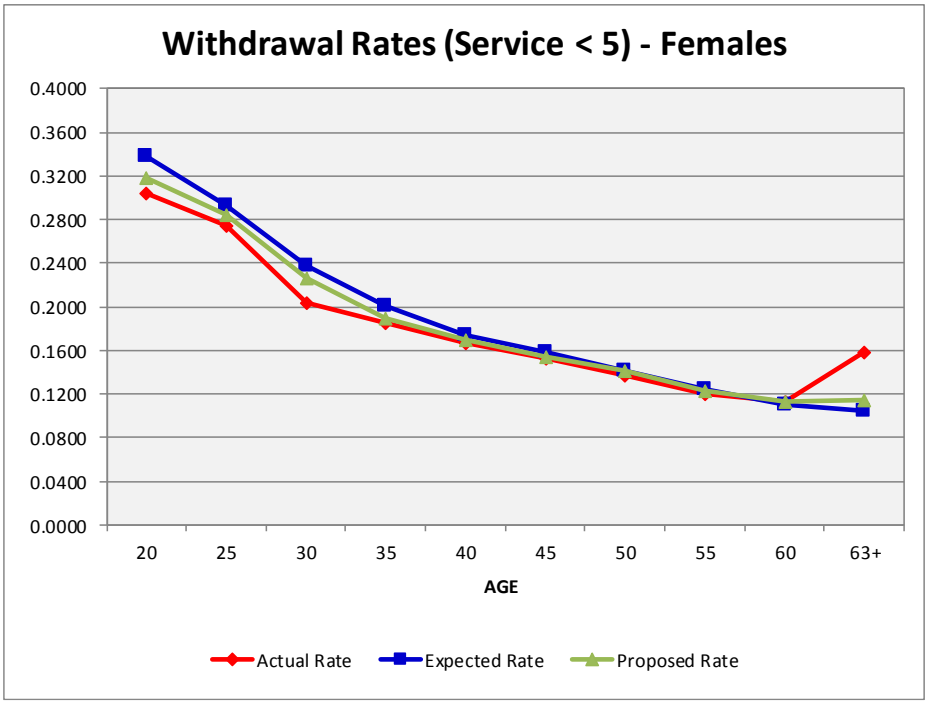
RATES OF WITHDRAWAL

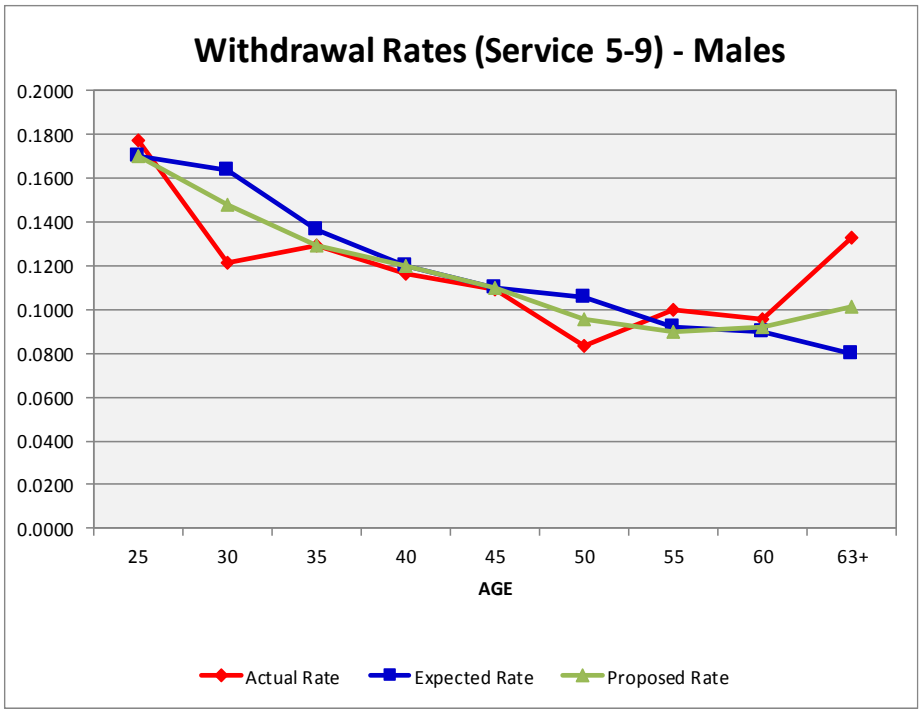
COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS FROM ACTIVE SERVICE

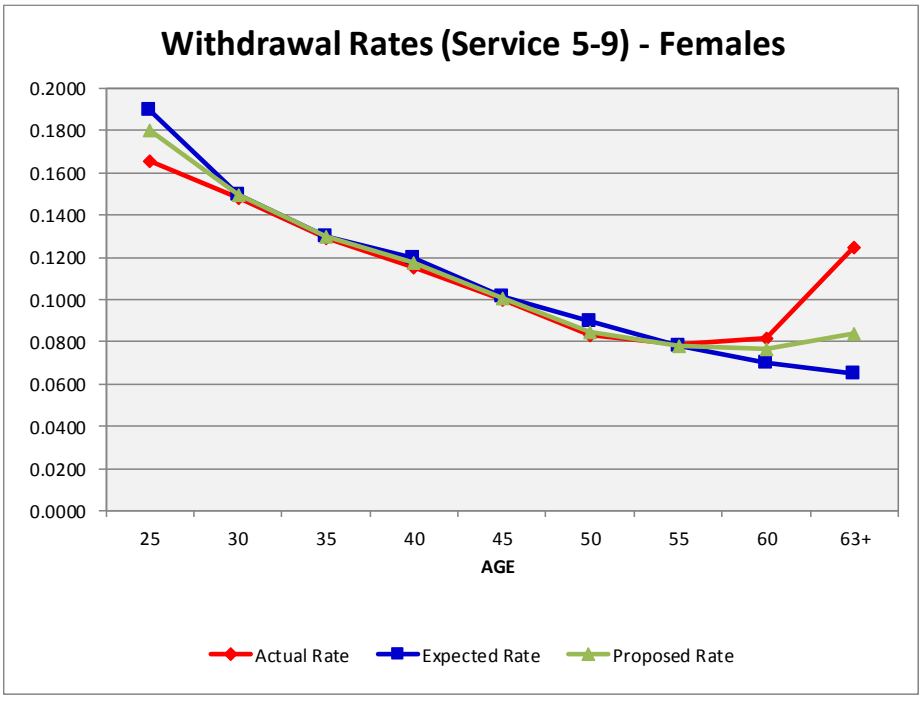
CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS					
	MALE			FEMALE		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with less than 5 years of service					
20	154	135.7	1.135	74	82.3	0.899
25	390	419.1	0.931	420	447.1	0.939
30	314	360.9	0.870	619	721.1	0.858
35	347	366.3	0.947	875	945.8	0.925
40	433	424.3	1.021	1,114	1,156.0	0.964
45	526	557.2	0.944	1,105	1,141.7	0.968
50	576	613.0	0.940	990	1,020.9	0.970
55	519	535.5	0.969	753	779.2	0.966
60	456	486.7	0.937	498	485.9	1.025
63 & Over	729	626.6	1.163	672	443.4	1.516
TOTAL	**4,444**	**4,525.3**	**0.982**	**7,120**	**7,223.4**	**0.986**
	Withdrawals with at least 5 but less than 10 years of service					
25	44	42.2	1.043	25	28.9	0.865
30	77	103.9	0.741	138	139.4	0.990
35	93	98.2	0.947	317	319.3	0.993
40	122	125.5	0.972	597	617.5	0.967
45	178	179.4	0.992	678	691.7	0.980
50	178	225.0	0.791	621	668.9	0.928
55	231	212.5	1.087	491	488.5	1.005
60	244	228.9	1.066	417	356.7	1.169
63 & Over	759	455.0	1.668	793	415.7	1.908
TOTAL	**1,926**	**1,670.6**	**1.153**	**4,077**	**3,726.6**	**1.094**
	Withdrawals with 10 or greater years of service					
30	13	18.0	0.722	6	9.2	0.652
35	33	34.7	0.951	73	65.5	1.115
40	67	57.7	1.161	191	206.6	0.924
45	108	106.4	1.015	454	427.3	1.062
50	166	167.5	0.991	555	625.7	0.887
55	166	174.9	0.949	515	597.1	0.863
58 & Over	67	52.5	1.276	178	193.5	0.920
TOTAL	**620**	**611.7**	**1.014**	**1,972**	**2,124.9**	**0.928**

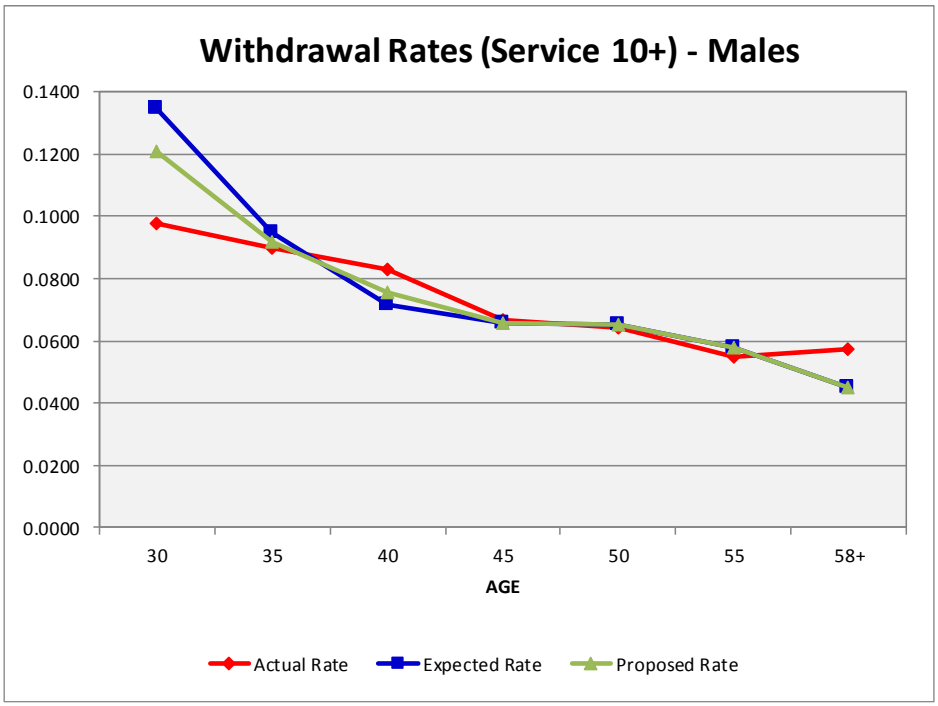
The following graphs show a comparison of the current expected, actual, and proposed rates of withdrawal for actives.

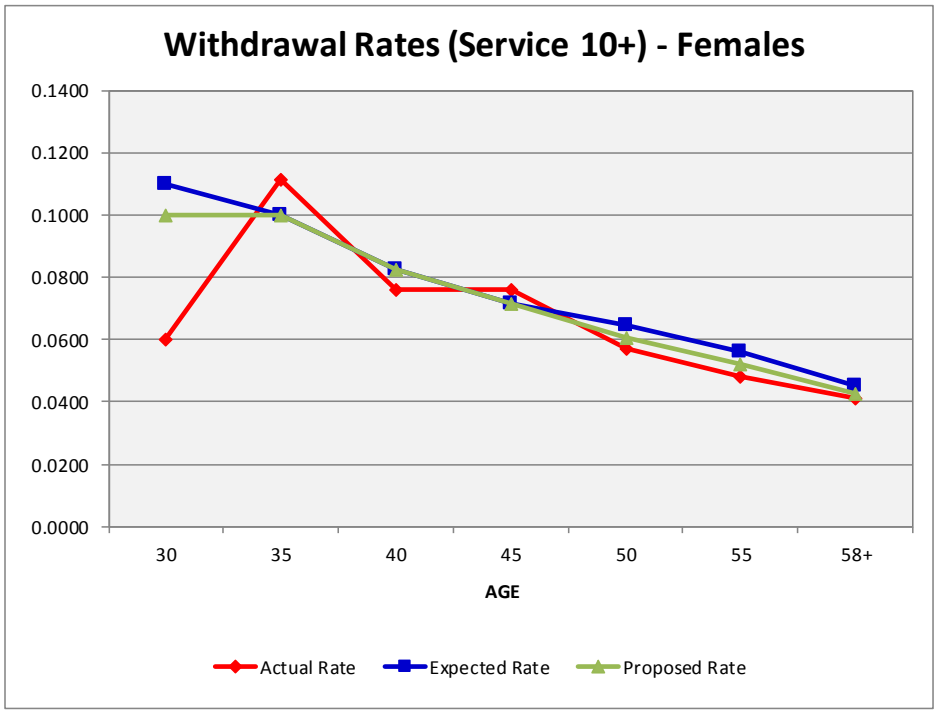





Withdrawal Rates (Service 5-9) - Males
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
25
30
35
40
45
50
55
60
63+
AGE
Actual Rate
Expected Rate
Proposed Rate


Withdrawal Rates (Service 5-9) - Females
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
25
30
35
40
45
50
55
60
63+
AGE
Actual Rate
Expected Rate
Proposed Rate


Withdrawal Rates (Service 10+) - Males
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
30
35
40
45
50
55
58+
AGE
Actual Rate
Expected Rate
Proposed Rate


Withdrawal Rates (Service 10+) - Females
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
30
35
40
45
50
55
58+
AGE
Actual Rate
Expected Rate
Proposed Rate

The rates of withdrawal adopted by the Board are used to determine the expected number of separations from active service which will occur as a result of resignation or dismissal. The preceding results indicate that during the study period the number of withdrawals varied from the expected in many age categories. We recommend that the rates of withdrawal be revised at this time to more closely reflect the experience of the System and maintain a degree of conservatism.

COMPARATIVE RATES OF WITHDRAWAL FROM ACTIVE SERVICE

AGE	RATES OF WITHDRAWAL					
	Present			Proposed		
	Years Of Service			Years Of Service		
	0 - 4	5 - 9	10 +	0 - 4	5 - 9	10 +
	Male					
20	35.00%			37.00%		
25	30.00%	17.00%		28.00%	17.00%	
30	27.00%	16.00%	14.00%	25.00%	15.00%	12.00%
35	24.00%	14.00%	9.00%	23.00%	13.00%	9.00%
40	21.00%	12.00%	7.00%	21.00%	12.00%	7.50%
45	20.00%	11.00%	6.50%	19.00%	11.00%	6.50%
50	18.00%	11.00%	6.50%	17.00%	9.00%	6.50%
55	15.00%	9.00%	6.00%	15.00%	9.00%	6.00%
60	13.00%	9.00%	0.00%	12.00%	7.50%	0.00%
64	13.00%	9.00%	0.00%	13.50%	11.50%	0.00%
	Female					
20	34.00%			32.00%		
25	29.00%	19.00%		28.00%	18.00%	
30	24.00%	15.00%	11.00%	23.00%	15.00%	10.00%
35	20.00%	13.00%	10.00%	19.00%	13.00%	10.00%
40	17.00%	12.00%	8.00%	17.00%	12.00%	8.00%
45	16.00%	10.00%	7.00%	15.50%	10.00%	7.00%
50	14.00%	9.00%	6.50%	14.00%	8.50%	6.00%
55	12.00%	8.00%	6.00%	12.00%	8.00%	5.50%
60	11.00%	7.00%	0.00%	11.00%	7.50%	0.00%
64	11.00%	7.00%	0.00%	12.00%	9.00%	0.00%

COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS BASED ON PROPOSED RATES

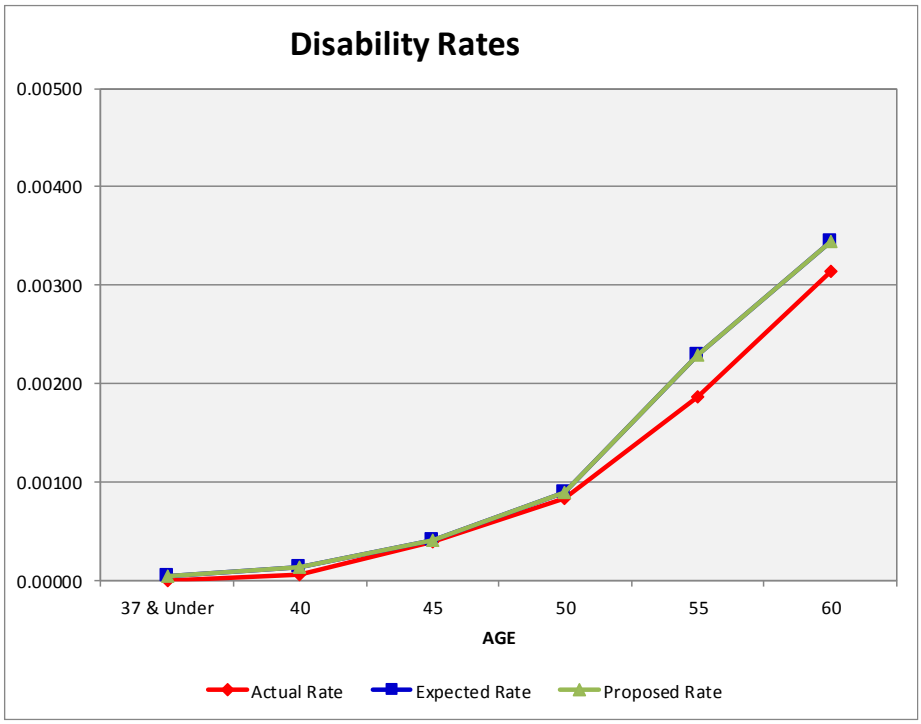
CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS					
	MALE			FEMALE		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with less than 5 years of service					
20	154	141.7	1.087	74	77.4	0.956
25	390	396.8	0.983	420	433.6	0.969
30	314	339.4	0.925	619	685.3	0.903
35	347	357.1	0.972	875	892.3	0.981
40	433	424.3	1.021	1,114	1,130.0	0.986
45	526	529.3	0.994	1,105	1,119.5	0.987
50	576	585.2	0.984	990	1,014.0	0.976
55	519	535.5	0.969	753	772.4	0.975
60	456	460.8	0.990	498	502.0	0.992
63 & Over	729	650.7	1.120	672	483.7	1.389
TOTAL	**4,444**	**4,420.8**	**1.005**	**7,120**	**7,110.2**	**1.001**
	Withdrawals with at least 5 but less than 10 years of service					
25	44	42.2	1.043	25	27.4	0.912
30	77	93.8	0.821	138	139.4	0.990
35	93	93.1	0.999	317	319.3	0.993
40	122	125.5	0.972	597	607.5	0.983
45	178	179.4	0.992	678	684.4	0.991
50	178	203.4	0.875	621	631.7	0.983
55	231	207.9	1.111	491	488.3	1.006
60	244	233.3	1.046	417	391.5	1.065
63 & Over	759	581.4	1.305	793	534.4	1.484
TOTAL	**1,926**	**1,760.0**	**1.094**	**4,077**	**3,823.9**	**1.066**
	Withdrawals with 10 or greater years of service					
30	13	16.2	0.802	6	8.4	0.714
35	33	33.7	0.979	73	65.5	1.115
40	67	60.7	1.104	191	206.6	0.924
45	108	106.4	1.015	454	427.3	1.062
50	166	167.5	0.991	555	588.8	0.943
55	166	174.8	0.950	515	554.5	0.929
58 & Over	67	52.5	1.276	178	182.8	0.974
TOTAL	**620**	**611.8**	**1.013**	**1,972**	**2,033.9**	**0.970**

RATES OF DISABILITY RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED DISABILITY RETIREMENTS

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS		
	Actual	Expected	Ratio of Actual to Expected
37 & Under	0	0.4	0.000
40	1	2.5	0.400
45	10	10.6	0.943
50	27	29.1	0.928
55	60	73.5	0.816
60	92	100.9	0.912
TOTAL	**190**	**217.0**	**0.876**

The following graph shows a comparison of the current expected, actual, and proposed rates of disability retirement.



During the period under investigation, the actual rates of disability retirement were somewhat less than expected over all age groups. However since this is a conservative result, we recommend no change to the rates of disability retirement at this time and will continue to monitor this assumption to see if future changes are needed.

RATES OF RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

AGE	NUMBER OF SERVICE RETIREMENTS		
	Actual	Expected	Ratio of Actual to Expected
60 & Under	316	411.5	0.768
61	278	399.6	0.696
62	561	568.5	0.987
63	374	409.1	0.914
64	321	373.5	0.859
65	497	524.2	0.948
66	424	385.8	1.099
67	257	316.0	0.813
68	241	275.5	0.875
69	257	251.0	1.024
70	233	214.8	1.085
71	190	168.3	1.129
72	154	142.0	1.085
73	137	128.5	1.066
74	112	109.3	1.025
SUBTOTAL	4,352	4,677.6	0.930
75 & Over	479	1,628.0	0.294
TOTAL	**4,831**	**6,305.6**	**0.766**

The following graph shows a comparison of the present, actual, and proposed rates of service retirements.

The analysis of the experience reflects that the current assumed rates of retirement over-anticipate retirements at the younger ages and under anticipate retirements at the older ages. We recommend adjustment to the rates to reflect the experience as well as maintain a reasonable degree of margin.

The following table shows a comparison of the present and proposed rates of service retiremen..

COMPARATIVE RATES OF RETIREMENT

AGE	RATES OF SERVICE RETIREMENT	
	Present	Proposed
60	15.0%	13.0%
61	15.0%	13.0%
62	22.0%	22.0%
63	18.0%	17.5%
64	18.0%	17.0%
65	28.0%	28.0%
66	25.0%	27.0%
67	25.0%	23.0%
68	25.0%	23.0%
69	25.0%	26.0%
70	25.0%	27.0%
71	25.0%	27.0%
72	25.0%	27.0%
73	25.0%	27.0%
74	25.0%	27.0%
75	100.0%	100.0%

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS BASED ON PROPOSED RATES OF RETIREMENT

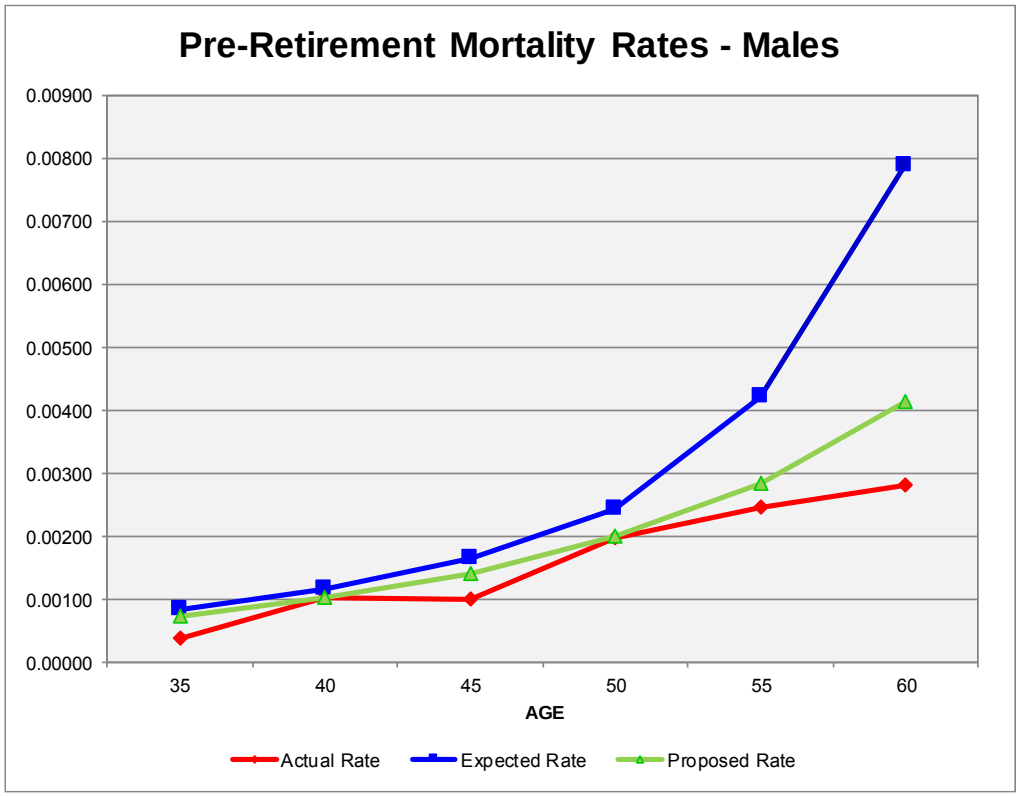
AGE	NUMBER OF SERVICE RETIREMENTS		
	Actual	Expected	Ratio of Actual to Expected
60 & Under	316	356.6	0.886
61	278	346.3	0.803
62	561	568.5	0.987
63	374	397.8	0.940
64	321	352.8	0.910
65	497	524.2	0.948
66	424	416.6	1.018
67	257	290.7	0.884
68	241	253.5	0.951
69	257	261.0	0.985
70	233	231.9	1.005
71	190	181.7	1.046
72	154	153.4	1.004
73	137	138.8	0.987
74	112	118.0	0.949
SUBTOTAL	4,352	4,591.8	0.948
75 & Over	479	1,628.0	0.294
TOTAL	**4,831**	**6,219.8**	**0.777**

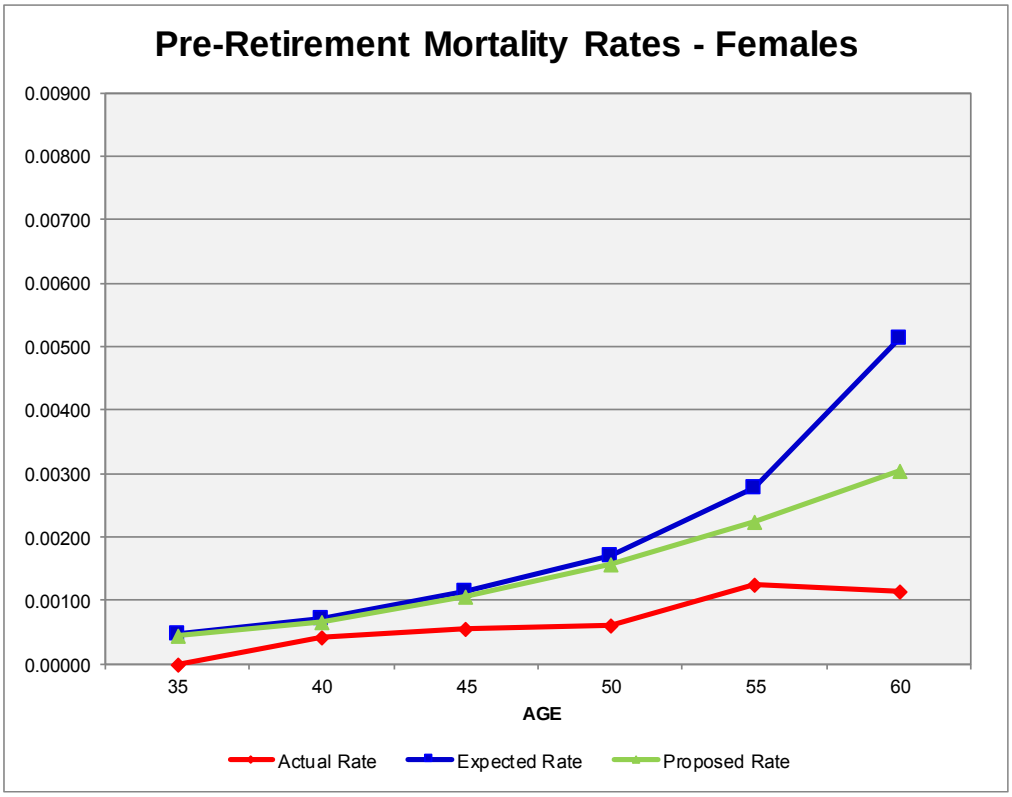
RATES OF PRE-RETIREMENT MORTALITY

COMPARISON OF ACTUAL AND EXPECTED CASES OF PRE-RETIREMENT MORTALITY

CENTRAL AGE OF GROUP	NUMBER OF PRE-RETIREMENT DEATHS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
20	0	0.2	0.000	0	0.1	0.000
25	0	0.6	0.000	0	0.4	0.000
30	3	1.1	2.727	1	1.2	0.833
35	1	2.2	0.455	0	3.8	0.000
40	4	4.5	0.889	6	10.4	0.577
45	6	9.9	0.606	11	22.8	0.482
50	16	19.8	0.808	15	41.5	0.361
55	22	37.4	0.588	29	64.1	0.452
58 & OVER	92	404.3	0.228	65	366.5	0.177
TOTAL	144	480.0	0.300	127	510.8	0.249

During the period under investigation, the actual rates of death in active service were significantly less than expected for both males and females at all ages. We recommend that the rates of mortality in active service for both males and females be changed to the RP-2000 Employee Mortality Table projected to 2025 with projection scale BB. The following graphs show a comparison of the present, actual, and proposed rates of pre-retirement mortality.


Pre-Retirement Mortality Rates - Males
0.00900
0.00800
0.00700
0.00600
0.00500
0.00400
0.00300
0.00200
0.00100
0.00000
35
40
45
50
55
60
AGE
Actual Rate
Expected Rate
Proposed Rate


Pre-Retirement Mortality Rates - Females
0.00900
0.00800
0.00700
0.00600
0.00500
0.00400
0.00300
0.00200
0.00100
0.00000
35
40
45
50
55
60
AGE
Actual Rate
Expected Rate
Proposed Rate

COMPARATIVE RATES OF PRE-RETIREMENT MORTALITY

AGE	RATES OF MORTALITY			
	MALE		FEMALE	
	Present	Proposed	Present	Proposed
20	0.0357%	0.0320%	0.0191%	0.0177%
25	0.0378%	0.0349%	0.0207%	0.0192%
30	0.0499%	0.0412%	0.0264%	0.0245%
35	0.0841%	0.0717%	0.0475%	0.0441%
40	0.1142%	0.1001%	0.0706%	0.0655%
45	0.1616%	0.1399%	0.1124%	0.1043%
50	0.2449%	0.1983%	0.1676%	0.1555%
55	0.4200%	0.2810%	0.2717%	0.2228%
60	0.7676%	0.4092%	0.5055%	0.3058%
64	1.2737%	0.5330%	0.8619%	0.4015%

COMPARISON OF ACTUAL AND EXPECTED CASES OF PRE-RETIREMENT DEATHS BASED ON PROPOSED RATES OF MORTALITY

CENTRAL AGE OF GROUP	NUMBER OF PRE-RETIREMENT DEATHS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
20	0	0.1	0.000	0	0.1	0.000
25	0	0.6	0.000	0	0.3	0.000
30	3	0.9	3.333	1	1.1	0.909
35	1	1.9	0.526	0	3.5	0.000
40	4	3.9	1.026	6	9.7	0.619
45	6	8.6	0.698	11	21.2	0.519
50	16	16.2	0.988	15	38.1	0.394
55	22	25.3	0.870	29	51.8	0.560
58 & OVER	92	192.0	0.479	65	196.8	0.330
TOTAL	144	249.5	0.577	127	322.6	0.394

RATES OF POST-RETIREMENT MORTALITY

The current basis for rate of post-retirement mortality for service retirees and beneficiaries is the RP-2000 Combined Mortality Table set forward one year for males. The current basis for rate of post-retirement mortality for disability retirees is the RP-2000 Disabled Mortality Table set back two years for males and set forward one year for females. The following shows a comparison of the actual and expected deaths during the study period.

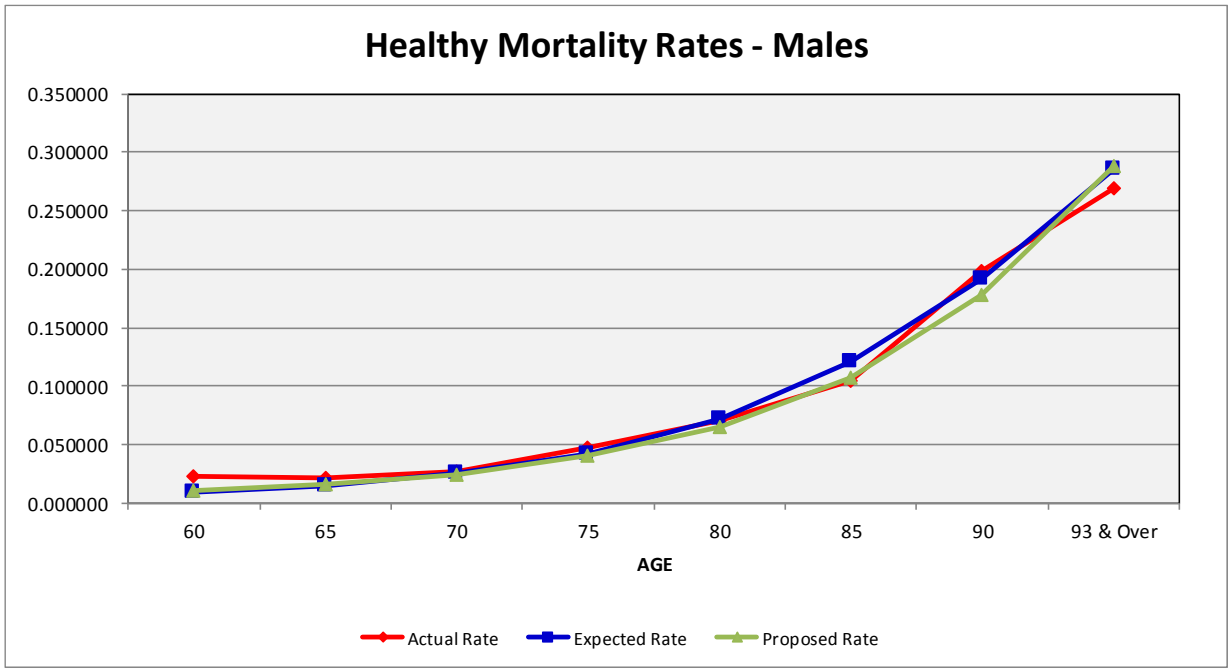
COMPARISON OF ACTUAL AND EXPECTED CASES OF POST-RETIREMENT DEATHS

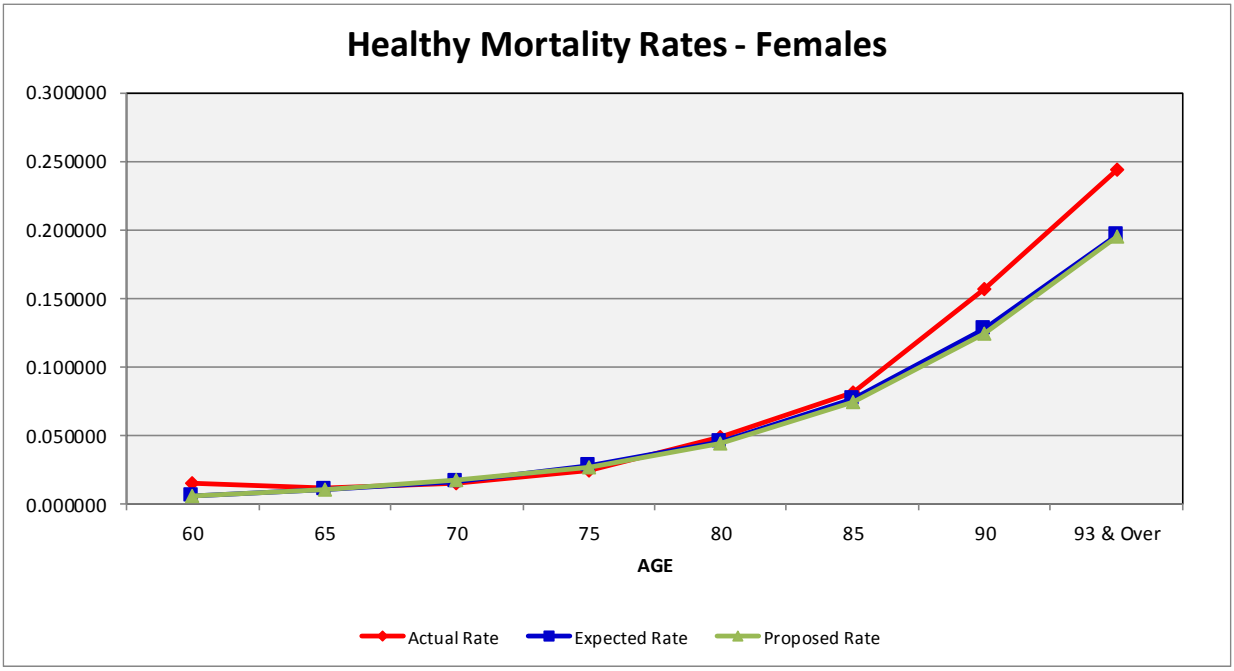
CENTRAL AGE OF GROUP	NUMBER OF DEATHS AMONG SERVICE RETIREMENTS AND BENEFICIARIES					
	MALE			FEMALE		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
57 & Under	10	0.8	12.500	15	1.2	12.500
60	10	4.0	2.500	26	10.4	2.500
65	52	37.0	1.405	102	89.7	1.137
70	102	94.2	1.083	178	198.5	0.897
75	181	162.6	1.113	269	301.5	0.892
80	230	234.2	0.982	398	375.7	1.059
85	190	220.1	0.863	422	397.5	1.062
90	152	147.2	1.033	415	338.2	1.227
93 & Over	54	57.3	0.942	266	214.3	1.241
TOTAL	**981**	**957.4**	**1.025**	**2,091**	**1,927.0**	**1.085**

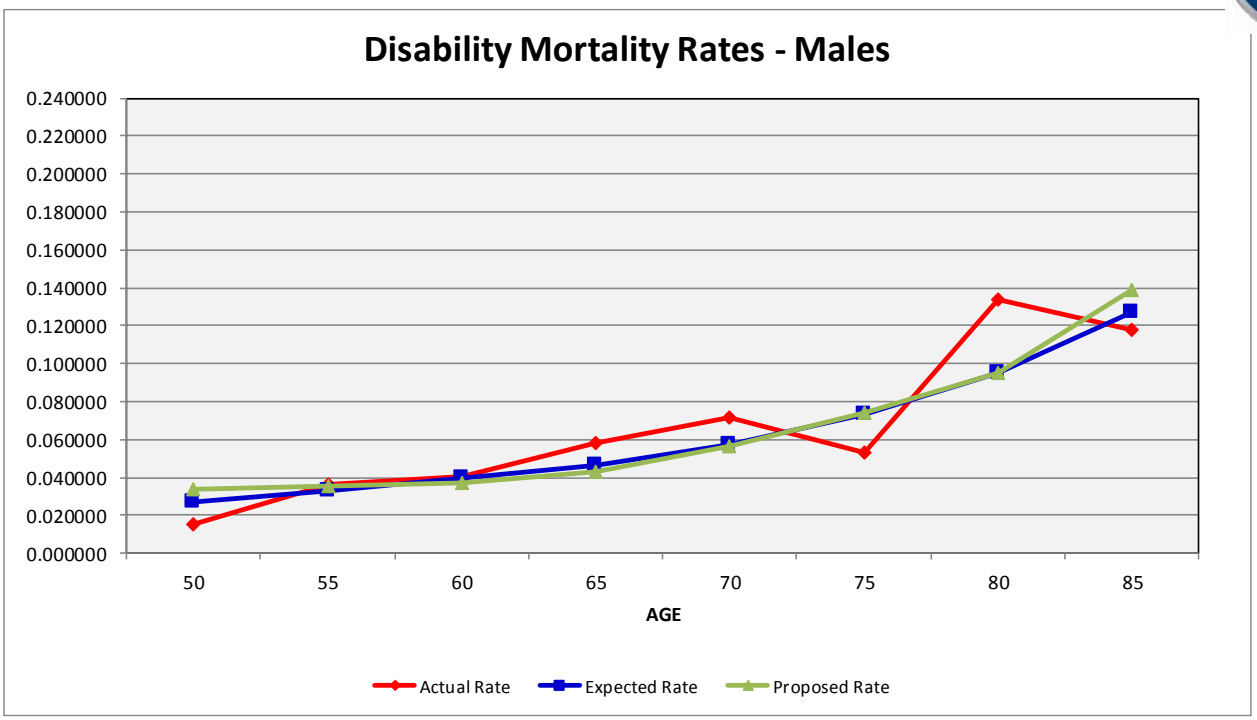
CENTRAL AGE OF GROUP	NUMBER OF DEATHS AMONG DISABILITY RETIREMENTS					
	MALE			FEMALE		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
47 & Under	2	0.5	4.000	0	0.3	0.000
50	1	1.8	0.556	5	1.2	4.167
55	7	6.4	1.094	6	6.1	0.984
60	10	9.8	1.020	16	17.8	0.899
65	14	11.2	1.250	35	29.0	1.207
70	15	11.9	1.261	33	39.6	0.833
75	7	9.6	0.729	34	34.4	0.988
80	10	7.1	1.408	24	20.3	1.182
85	4	4.3	0.930	11	8.7	1.264
90	2	2.1	0.952	5	5.5	0.909
93 & Over	1	0.2	5.000	3	1.7	1.765
TOTAL	**73**	**64.9**	**1.125**	**172**	**164.6**	**1.045**

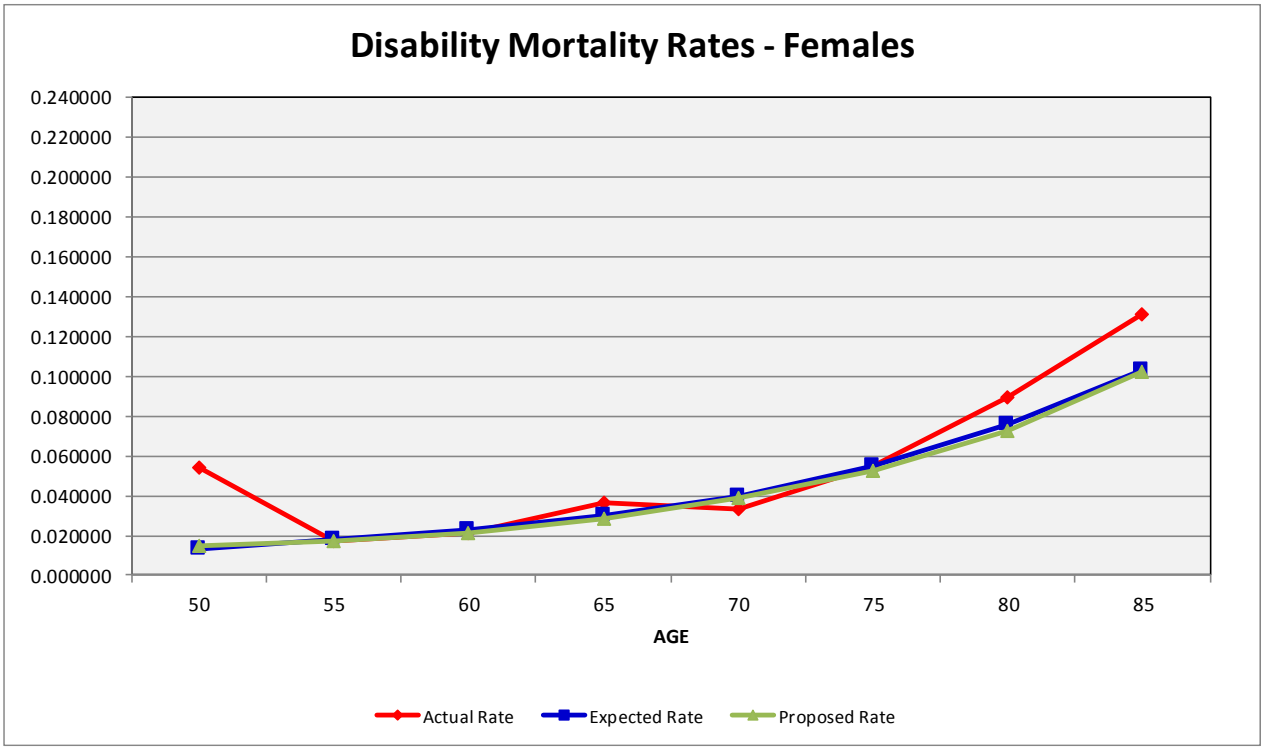
Overall, the number of actual deaths among all retirements and beneficiaries was greater than the number of deaths expected during the period under investigation. We recommend the RP-2000 Blue-Collar Mortality Table for service retirements and beneficiaries but in order to provide an additional margin for anticipated mortality improvement, we recommend projecting the table to 2025 with projection scale BB and setting the table forward 3 years for males and 2 years for females. Although an updated mortality table and mortality improvement scale have been published by the Society of Actuaries (SOA), the SOA did not include public sector data in the development of these new tables and relied on private sector data only. The SOA is currently reviewing mortality for the public sector and may issue a new table in time for the next experience study.

For the period after disability retirement, we recommend the RP-2000 Disabled Mortality Table projected to 2025 with scale BB set forward 5 years for both males and females. The following graphs show a comparison of the present, actual, and proposed rates of post-retirement mortality.


Healthy Mortality Rates - Males
0.350000
0.300000
0.250000
0.200000
0.150000
0.100000
0.050000
0.000000
60
65
70
75
80
85
90
93 & Over
AGE
Actual Rate
Expected Rate
Proposed Rate


Healthy Mortality Rates - Females
0.300000
0.250000
0.200000
0.150000
0.100000
0.050000
0.000000
60
65
70
75
80
85
90
93 & Over
AGE
Actual Rate
Expected Rate
Proposed Rate


Disability Mortality Rates - Males
0.240000
0.220000
0.200000
0.180000
0.160000
0.140000
0.120000
0.100000
0.080000
0.060000
0.040000
0.020000
0.000000
50
55
60
65
70
75
80
85
AGE
Actual Rate
Expected Rate
Proposed Rate


Disability Mortality Rates - Females
0.240000
0.220000
0.200000
0.180000
0.160000
0.140000
0.120000
0.100000
0.080000
0.060000
0.040000
0.020000
0.000000
50
55
60
65
70
75
80
85
AGE
Actual Rate
Expected Rate
Proposed Rate

The following tables show a comparison of the present and proposed rates of post-retireme... mortality.

COMPARATIVE RATES OF POST-RETIREMENT MORTALITY

AGE	SERVICE RETIREMENTS AND BENEFICIARIES			
	MALE		FEMALE	
	Present	Proposed	Present	Proposed
35	0.0841%	0.1171%	0.0475%	0.0597%
40	0.1142%	0.1476%	0.0706%	0.0995%
45	0.1616%	0.1974%	0.1124%	0.1484%
50	0.2449%	0.3057%	0.1676%	0.2084%
55	0.4200%	0.5644%	0.2717%	0.2844%
60	0.7676%	0.9575%	0.5055%	0.5014%
65	1.4409%	1.4859%	0.9706%	0.9774%
70	2.4570%	2.4262%	1.6742%	1.7054%
75	4.2169%	3.9830%	2.8106%	2.7288%
80	7.2041%	6.5238%	4.5879%	4.4542%
85	12.2797%	10.9551%	7.7446%	7.5727%
90	19.9769%	18.5991%	13.1682%	12.7995%

AGE	DISABILITY RETIREMENTS			
	MALE		FEMALE	
	Present	Proposed	Present	Proposed
35	2.2571%	2.0938%	0.7450%	0.6911%
40	2.2571%	2.0938%	0.7450%	0.6911%
45	2.2571%	2.6878%	0.8184%	1.0700%
50	2.6404%	3.2877%	1.2477%	1.4595%
55	3.2859%	3.5271%	1.7598%	1.6987%
60	3.9334%	3.7102%	2.2936%	2.0725%
65	4.6584%	4.2891%	2.9594%	2.7830%
70	5.6909%	5.6244%	4.0140%	3.8623%
75	7.3292%	7.4957%	5.5777%	5.3473%
80	9.7640%	9.7046%	7.7135%	7.4098%
85	12.8343%	13.9099%	10.7099%	10.6215%
90	16.2186%	23.0128%	14.9698%	16.7340%

COMPARISON OF ACTUAL AND EXPECTED CASES OF POST-RETIREMENT DEATHS BASED ON PROPOSED RATES OF MORTALITY

CENTRAL AGE OF GROUP	NUMBER OF DEATHS AMONG SERVICE RETIREMENTS AND BENEFICIARIES					
	MALE			FEMALE		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
57 & Under	10	1.1	9.091	15	1.4	10.714
60	10	4.7	2.128	26	10.5	2.476
65	52	38.6	1.347	102	89.8	1.136
70	102	93.0	1.097	178	202.3	0.880
75	181	153.4	1.180	269	293.7	0.916
80	230	211.5	1.087	398	365.0	1.090
85	190	196.1	0.969	422	387.2	1.090
90	152	136.9	1.110	415	328.2	1.264
93 & Over	54	58.0	0.931	266	213.0	1.249
TOTAL	**981**	**893.3**	**1.098**	**2,091**	**1,891.1**	**1.106**

CENTRAL AGE OF GROUP	NUMBER OF DEATHS AMONG DISABILITY RETIREMENTS					
	MALE			FEMALE		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
47 & Under	2	0.6	3.333	0	0.3	0.000
50	1	2.2	0.455	5	1.4	3.571
55	7	6.8	1.029	6	5.8	1.034
60	10	9.2	1.087	16	16.1	0.994
65	14	10.3	1.359	35	27.3	1.282
70	15	11.7	1.282	33	38.0	0.868
75	7	9.8	0.714	34	32.9	1.033
80	10	7.1	1.408	24	19.5	1.231
85	4	4.7	0.851	11	8.6	1.279
90	2	2.9	0.690	5	6.1	0.820
93 & Over	1	0.3	3.333	3	1.9	1.579
TOTAL	**73**	**65.6**	**1.113**	**172**	**157.9**	**1.089**

Section V
Other Assumptions and Methods and Administrative Procedures

ADMINISTRATIVE EXPENSES: Currently, the method used for administrative expenses is to add the budgeted expenses for the fiscal year to the normal cost. We recommend no change to this method

AMORTIZATION METHOD: Currently, the unfunded accrued liability is amortized using a level dollar amortization method. We recommend no change to this amortization method.

ASSETS: Currently, the actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected actuarial value of assets, based on the assumed valuation rate of return. The amount recognized each year is 20% of the difference between market value and expected actuarial value. We recommend maintaining the current smoothing method.

COST OF LIVING: Currently, we assume cost of living increases of 1.5% semi-annually. We recommend maintaining this assumption.

OPTION FACTORS: The option factors currently used by the Retirement System are based on the mortality tables and investment rate of return (discount rate) used in the valuation. We recommend that the factors be revised to the mortality table recommended in this experience study.

ASSUMPTION FOR ACTIVE VESTED MEMBERS TERMINATION BENEFITS: Currently, we assume that 25% of active members who terminate with ten or more years of service before retirement will receive a benefit beginning at age 60 and 75% will receive a refund of member contributions. We recommend changing this to assume that 50% will receive a benefit and 50% will receive a refund of member contributions.

VALUATION COST METHOD: Currently, the valuation uses the entry age actuarial cost method. This is the most widely used cost method of large public sector plans and has demonstrated the highest degree of stability as compared to alternative methods. We recommend no change to this assumption.

APPENDIX A

Historical June CPI (U) Index

Year	CPI (U)	Year	CPI (U)
1961	29.8	1988	118.0
1962	30.2	1989	124.1
1963	30.6	1990	129.9
1964	31.0	1991	136.0
1965	31.6	1992	140.2
1966	32.4	1993	144.4
1967	33.3	1994	148.0
1968	34.7	1995	152.5
1969	36.6	1996	156.7
1970	38.8	1997	160.3
1971	40.6	1998	163.0
1972	41.7	1999	166.2
1973	44.2	2000	172.4
1974	49.0	2001	178.0
1975	53.6	2002	179.9
1976	56.8	2003	183.7
1977	60.7	2004	189.7
1978	65.2	2005	194.5
1979	72.3	2006	202.9
1980	82.7	2007	208.352
1981	90.6	2008	218.815
1982	97.0	2009	215.693
1983	99.5	2010	217.965
1984	103.7	2011	225.722
1985	107.6	2012	229.478
1986	109.5	2013	233.504
1987	113.5	2014	238.343

APPENDIX B

Capital Market Assumptions and Asset Allocation

Real Rates of Return and Standard Deviations by Asset Class

Asset Class	Expected Real Rate of Return	Standard Deviation
Fixed Income	0.0%	9.0%
Domestic Stocks – Large Cap	9.0%	21.5%
Domestic Stocks – Mid Cap	12.0%	24.5%
Domestic Stocks – Small Cap	13.5%	34.0%
Int'l Stocks - Developed Mkt	8.0%	19.0%
Int'l Stocks - Emerging Mkt	12.0%	27.0%
Alternatives	10.5%	27.5%

Asset Class Correlation Coefficients

Asset Class	Fixed Income	Domestic Stocks – Large Cap	Domestic Stocks – Mid Cap	Domestic Stocks – Small Cap	Int'l Stocks - Developed Mkt	Int'l Stocks - Emerging Mkt	Alts
Fixed Income	1.00						
Domestic Stocks – Large Cap	0.18	1.00					
Domestic Stocks – Mid Cap	0.18	0.94	1.00				
Domestic Stocks – Small Cap	0.14	0.83	0.90	1.00			
Int'l Stocks - Developed Mkt	0.15	0.63	0.65	0.51	1.00		
Int'l Stocks - Emerging Mkt	0.08	0.67	0.70	0.65	0.69	1.00	
Alternatives	0.32	0.75	0.80	0.83	0.65	0.63	1.00

Asset Allocation Targets

Asset Class	Asset Allocation
Fixed Income	30.0%
US Large Stocks	39.7%
US Mid Stocks	3.7%
US Small Stocks	1.6%
Int'l Developed Mkt Stocks	18.9%
Int'l Emerging Mkt Stocks	6.1%

APPENDIX C

TABLE 1
RATES OF SEPARATION FROM ACTIVE SERVICE – MALES

AGE	Rates of Withdrawal Service 0 - 4	Rates of Withdrawal Service 5 - 9	Rates of Withdrawal Service 10+	Death	Disability	Retirement
19	0.37000			0.000307		
20	0.37000			0.000320		
21	0.36000			0.000331		
22	0.34000			0.000340		
23	0.29000	0.17000		0.000346		
24	0.29000	0.17000		0.000349		
25	0.28000	0.17000		0.000349		
26	0.28000	0.17000		0.000351		
27	0.28000	0.17000		0.000354		
28	0.27000	0.16000	0.13500	0.000365		
29	0.26000	0.15000	0.13000	0.000382		
30	0.25000	0.15000	0.12000	0.000412		
31	0.24000	0.14000	0.12000	0.000463	0.000005	
32	0.24000	0.14000	0.12000	0.000521	0.000005	
33	0.24000	0.14000	0.11000	0.000585	0.000010	
34	0.24000	0.13000	0.10000	0.000651	0.000010	
35	0.23000	0.13000	0.09000	0.000717	0.000025	
36	0.23000	0.13000	0.09000	0.000780	0.000035	
37	0.22000	0.12000	0.08000	0.000839	0.000050	
38	0.22000	0.12000	0.08000	0.000894	0.000080	
39	0.22000	0.12000	0.08000	0.000947	0.000095	
40	0.21000	0.12000	0.07500	0.001001	0.000110	
41	0.21000	0.12000	0.07500	0.001059	0.000160	
42	0.20000	0.12000	0.07000	0.001127	0.000215	
43	0.19000	0.11000	0.07000	0.001205	0.000270	
44	0.19000	0.11000	0.06500	0.001296	0.000320	
45	0.19000	0.11000	0.06500	0.001399	0.000370	
46	0.19000	0.11000	0.06500	0.001499	0.000465	
47	0.19000	0.11000	0.06500	0.001609	0.000565	
48	0.19000	0.11000	0.06500	0.001725	0.000665	
49	0.18000	0.10000	0.06500	0.001851	0.000765	
50	0.17000	0.09000	0.06500	0.001983	0.000865	
51	0.16000	0.09000	0.06500	0.002122	0.001015	
52	0.16000	0.09000	0.06500	0.002271	0.001165	
53	0.16000	0.09000	0.06500	0.002431	0.001750	
54	0.16000	0.09000	0.06000	0.002609	0.002000	
55	0.15000	0.09000	0.06000	0.002810	0.002250	
56	0.15000	0.09000	0.05500	0.003067	0.002500	
57	0.13000	0.09000	0.05000	0.003282	0.003000	
58	0.12000	0.09000	0.04500	0.003526	0.003250	
59	0.12000	0.08500	0.04500	0.003797	0.003500	
60	0.12000	0.07500		0.004092	0.003500	0.13000
61	0.12000	0.09000		0.004403	0.003500	0.13000
62	0.13500	0.11500		0.004721	0.003500	0.22000
63	0.13500	0.11500		0.005034	0.003500	0.17500
64	0.13500	0.11500		0.005330	0.003500	0.17000
65	0.13500	0.11500		0.005600		0.28000
66	0.13500	0.11500		0.005839		0.27000
67	0.13500	0.11500		0.006044		0.23000
68	0.13500	0.11500		0.006215		0.23000
69	0.13500	0.11500		0.006518		0.26000
70	0.13500	0.11500		0.006800		0.27000
71	0.13500	0.11500		0.016839		0.27000
72	0.13500	0.11500		0.018697		0.27000
73	0.13500	0.11500		0.020825		0.27000
74	0.13500	0.11500		0.023233		0.27000
75	0.00000	0.00000		0.025929		1.00000

TABLE 2
RATES OF SEPARATION FROM ACTIVE SERVICE – FEMALES

	Rates of Withdrawal					
	Service					
AGE	0 - 4	5 - 9	10+	Death	Disability	Retirement
19	0.32000			0.000176		
20	0.32000			0.000177		
21	0.32000			0.000178		
22	0.32000			0.000180		
23	0.32000	0.18000		0.000183		
24	0.30000	0.18000		0.000186		
25	0.28000	0.18000		0.000192		
26	0.28000	0.18000		0.000199		
27	0.26000	0.18000		0.000207		
28	0.25000	0.15000	0.10000	0.000218		
29	0.23000	0.15000	0.10000	0.000230		
30	0.23000	0.15000	0.10000	0.000245		
31	0.22000	0.15000	0.10000	0.000285	0.000005	
32	0.21000	0.15000	0.10000	0.000325	0.000005	
33	0.20000	0.14000	0.10000	0.000365	0.000010	
34	0.19000	0.13000	0.10000	0.000404	0.000010	
35	0.19000	0.13000	0.10000	0.000441	0.000025	
36	0.19000	0.13000	0.10000	0.000477	0.000035	
37	0.18000	0.12500	0.10000	0.000514	0.000050	
38	0.18000	0.12000	0.09000	0.000555	0.000080	
39	0.18000	0.12000	0.09000	0.000601	0.000095	
40	0.17000	0.12000	0.08000	0.000655	0.000110	
41	0.16000	0.12000	0.08000	0.000718	0.000160	
42	0.16000	0.11000	0.08000	0.000790	0.000215	
43	0.16000	0.11000	0.08000	0.000869	0.000270	
44	0.16000	0.10500	0.07000	0.000955	0.000320	
45	0.15500	0.10000	0.07000	0.001043	0.000370	
46	0.15000	0.10000	0.07000	0.001135	0.000465	
47	0.15000	0.09000	0.07000	0.001230	0.000565	
48	0.15000	0.09000	0.06500	0.001330	0.000665	
49	0.14000	0.08500	0.06000	0.001438	0.000765	
50	0.14000	0.08500	0.06000	0.001555	0.000865	
51	0.14000	0.08500	0.06000	0.001683	0.001015	
52	0.13500	0.08000	0.06000	0.001825	0.001165	
53	0.13500	0.08000	0.05500	0.001981	0.001750	
54	0.13000	0.08000	0.05500	0.002100	0.002000	
55	0.12000	0.08000	0.05500	0.002228	0.002250	
56	0.12000	0.07500	0.05000	0.002371	0.002500	
57	0.11000	0.07500	0.04500	0.002525	0.003000	
58	0.11000	0.07500	0.04500	0.002692	0.003250	
59	0.11000	0.07500	0.04000	0.002871	0.003500	
60	0.11000	0.07500		0.003058	0.003500	0.13000
61	0.12000	0.07500		0.003250	0.003500	0.13000
62	0.12000	0.08500		0.003443	0.003500	0.22000
63	0.12000	0.09000		0.003726	0.003500	0.17500
64	0.12000	0.09000		0.004015	0.003500	0.17000
65	0.12000	0.09000		0.004304		0.28000
66	0.12000	0.09000		0.004590		0.27000
67	0.12000	0.09000		0.004868		0.23000
68	0.12000	0.09000		0.005136		0.23000
69	0.12000	0.09000		0.005390		0.26000
70	0.12000	0.09000		0.005630		0.27000
71	0.12000	0.09000		0.013739		0.27000
72	0.12000	0.09000		0.015281		0.27000
73	0.12000	0.09000		0.016986		0.27000
74	0.12000	0.09000		0.018826		0.27000
75	0.00000	0.00000		0.020784		1.00000

TABLE 3
RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF SERVICE AND BENEFICIARIES OF DECEASED MEMBERS

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.000340	0.000178	71	0.026765	0.018905
20	0.000346	0.000180	72	0.029559	0.020840
21	0.000349	0.000183	73	0.032686	0.022841
22	0.000349	0.000186	74	0.036100	0.024982
23	0.000351	0.000192	75	0.039830	0.027288
24	0.000354	0.000199	76	0.043908	0.029886
25	0.000365	0.000207	77	0.048349	0.032811
26	0.000382	0.000218	78	0.053569	0.036200
27	0.000673	0.000230	79	0.059187	0.040104
28	0.000742	0.000272	80	0.065238	0.044542
29	0.000812	0.000304	81	0.071733	0.049549
30	0.000880	0.000340	82	0.078867	0.055210
31	0.000945	0.000383	83	0.086598	0.061450
32	0.001008	0.000429	84	0.097448	0.068280
33	0.001067	0.000481	85	0.109551	0.075727
34	0.001119	0.000537	86	0.122941	0.083791
35	0.001171	0.000597	87	0.137847	0.092252
36	0.001220	0.000663	88	0.152743	0.103665
37	0.001272	0.000736	89	0.168812	0.115625
38	0.001330	0.000814	90	0.185991	0.127995
39	0.001399	0.000901	91	0.204007	0.140681
40	0.001476	0.000995	92	0.223224	0.153204
41	0.001564	0.001091	93	0.250467	0.165667
42	0.001663	0.001189	94	0.271263	0.181190
43	0.001757	0.001287	95	0.285234	0.194718
44	0.001861	0.001384	96	0.306313	0.202595
45	0.001974	0.001484	97	0.319624	0.214644
46	0.002100	0.001588	98	0.341120	0.220284
47	0.002237	0.001699	99	0.353540	0.232882
48	0.002545	0.001821	100	0.373578	0.242074
49	0.002778	0.001946	101	0.382320	0.259472
50	0.003057	0.002084	102	0.397886	0.272162
51	0.003379	0.002234	103	0.400000	0.293116
52	0.003892	0.002342	104	0.400000	0.307811
53	0.004608	0.002466	105	0.400000	0.322725
54	0.005092	0.002632	106	0.400000	0.337441
55	0.005644	0.002844	107	0.400000	0.351544
56	0.006244	0.003107	108	0.400000	0.364617
57	0.006938	0.003437	109	0.400000	0.376246
58	0.007713	0.003849	110	0.400000	0.386015
59	0.008594	0.004394	111	0.400000	0.393507
60	0.009575	0.005014	112	0.400000	0.398308
61	0.010474	0.005900	113	0.400000	0.400000
62	0.011491	0.006755	114	0.400000	0.400000
63	0.012656	0.007689	115	0.400000	0.400000
64	0.013737	0.008754	116	0.400000	0.400000
65	0.014859	0.009774	117	1.000000	0.400000
66	0.016410	0.010882	118	1.000000	1.000000
67	0.018338	0.012118	119	1.000000	1.000000
68	0.020106	0.013779	120	1.000000	1.000000
69	0.022062	0.015332			
70	0.024262	0.017054			

TABLE 4
RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF DISABILITY

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.020938	0.006911	71	0.059591	0.041246
20	0.020938	0.006911	72	0.063153	0.044032
21	0.020938	0.006911	73	0.066917	0.046990
22	0.020938	0.006911	74	0.070859	0.050131
23	0.020938	0.006911	75	0.074957	0.053473
24	0.020938	0.006911	76	0.079187	0.057039
25	0.020938	0.006911	77	0.083527	0.060857
26	0.020938	0.006911	78	0.087959	0.064954
27	0.020938	0.006911	79	0.092468	0.069358
28	0.020938	0.006911	80	0.097046	0.074098
29	0.020938	0.006911	81	0.101687	0.079197
30	0.020938	0.006911	82	0.109122	0.084679
31	0.020938	0.006911	83	0.116934	0.090559
32	0.020938	0.006911	84	0.125144	0.096851
33	0.020938	0.006911	85	0.139099	0.106215
34	0.020938	0.006911	86	0.155385	0.116438
35	0.020938	0.006911	87	0.172787	0.127572
36	0.020938	0.006911	88	0.191152	0.139427
37	0.020938	0.006911	89	0.210317	0.153358
38	0.020938	0.006911	90	0.230128	0.167340
39	0.020938	0.006911	91	0.250467	0.181190
40	0.020938	0.006911	92	0.271263	0.194718
41	0.022121	0.007592	93	0.285234	0.202595
42	0.023306	0.008311	94	0.306313	0.214644
43	0.024493	0.009068	95	0.319624	0.220284
44	0.025684	0.009865	96	0.341120	0.232882
45	0.026878	0.010700	97	0.353540	0.242074
46	0.028078	0.011574	98	0.373578	0.259472
47	0.029279	0.012482	99	0.382320	0.272162
48	0.030481	0.013418	100	0.397886	0.293116
49	0.031681	0.014019	101	0.400000	0.307811
50	0.032877	0.014595	102	0.400000	0.322725
51	0.034074	0.015140	103	0.400000	0.337441
52	0.034400	0.015650	104	0.400000	0.351544
53	0.034701	0.016124	105	0.400000	0.364617
54	0.034987	0.016567	106	0.400000	0.376246
55	0.035271	0.016987	107	0.400000	0.386015
56	0.035565	0.017395	108	0.400000	0.393507
57	0.035881	0.017807	109	0.400000	0.398308
58	0.036234	0.018704	110	0.400000	0.400000
59	0.036637	0.019670	111	0.400000	0.400000
60	0.037102	0.020725	112	0.400000	0.400000
61	0.037645	0.021884	113	0.400000	0.400000
62	0.038275	0.023164	114	0.400000	0.400000
63	0.039002	0.024576	115	1.000000	1.000000
64	0.040855	0.026129	116	1.000000	1.000000
65	0.042891	0.027830	117	1.000000	1.000000
66	0.045123	0.029683	118	1.000000	1.000000
67	0.047566	0.031687	119	1.000000	1.000000
68	0.050230	0.033845	120	1.000000	1.000000
69	0.053122	0.036157			
70	0.056244	0.038623			