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**TEACHERS' RETIREMENT SYSTEM
OF THE STATE OF KENTUCKY
STATEMENT OF RESULTS OF THE
EXPERIENCE INVESTIGATION
PREPARED AS OF JUNE 30, 2015**

September 15, 2016

Mr. Gary Harbin
Teachers' Retirement System of
 The State of Kentucky
479 Versailles Road
Frankfort, KY 40601-3800

Dear Mr. Harbin:

Enclosed are 25 bound copies and 1 unbound copy of the "Teachers' Retirement System of the State of Kentucky Statement of the Results of the Experience Investigation Prepared as of June 30, 2015."

Please let us know if there are any questions concerning this report.

Sincerely,

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

Eric H. Gary, FSA, FCA, MAAA
Principal and Chief Health Actuary

EJK/EHG:jl

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September 15, 2016

Board of Trustees
Teachers' Retirement System of
   The State of Kentucky
479 Versailles Road
Frankfort, KY 40601-3800

Members of the Board:

An investigation of the economic assumptions and the mortality, service, compensation and healthcare experience of active and retired members of the Teachers' Retirement System of the State of Kentucky has been made covering the five-year period from July 1, 2010 to June 30, 2015. As a result of the investigation, it is recommended that revised economic and Other Postemployment Benefits (OPEB) assumptions, as well as demographic tables, be adopted by the Board for future use.

The number of members expected to separate from active service and the expected number of post-retirement deaths were obtained by use of the rates determined in the last experience investigation and adopted by the Board of Trustees on September 19, 2011. The results of the investigation indicate that the assumed rates of separation from active service due to withdrawal, disability and retirement, and rates of post-retirement mortality and salary increases, do not accurately reflect the actual and anticipated experience of the Retirement System. As a result of the investigation, new withdrawal, disability, retirement, salary increase 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, actual and expected number of deaths, and actual and expected salary increases. These tables are shown based on current assumed expected rates and based on new proposed expected rates.

A comparison between the rates of separation and mortality presently in use and the recommended revised rates are also shown in this report.

The recommended rates of separation, death and salary increase at each age are shown in the attached tables in Appendix D of this report. For convenience, we have included a resolution for adoption of these revised assumptions in Appendix E. In the actuary's judgment, the rates recommended are suitable for use until further experience indicates that modifications are desirable.

Respectfully submitted,

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

Eric H. Gary, FSA, FCA, MAAA
Principal and Chief Health Actuary

EJK/EHG:jl

Section I
Executive Summary

The following summarizes the findings and recommendations with regard to the assumptions utilized for the Kentucky Teachers' Retirement System. Detailed explanations for the recommendations are found in the sections that follow.

Economic Assumption Changes

The table below lists the three primary economic assumptions used in the actuarial valuation and their current and proposed rates.

Item	Current	Proposed
Price Inflation	3.50%	3.00%
Investment Rate of Return	7.50%	7.50%
Wage Inflation	4.00%	3.50%

We recommend that the Board lower the price inflation and the wage inflation assumptions.

Recommended Demographic Assumption Changes

The table below lists the demographic assumptions used in the actuarial valuation and any recommended changes to these assumptions based on the experience of the last five years.

Demographic	Proposed Assumption Changes
Withdrawal	Change rates to more closely reflect experience
Pre-Retirement Mortality	Adjust the Projection Period and Adjustments to the Current RP2000 Combined Mortality Table
Disability	Slightly increase rates for males and slightly decrease rates for females
Service Retirement	Change rates to more closely reflect experience & increase ultimate age to 75
Post-Retirement Retiree Mortality	Adjust the Projection Period and Adjustments to the Current RP2000 Combined Mortality Table
Post-Retirement Disabled Mortality	Adjust the Projection Period and Adjustments to the Current RP2000 Disabled Mortality Table
Salary Scale	Decrease merit and promotion rates by 0.25% for all ages

Recommended Other Assumption and Method Changes

The table below lists the other assumptions and methods used in the actuarial valuation and any recommended changes based on the experience of the last five years.

Assumption	Proposed Change
Actuarial Cost Method	No change from Entry Age Normal (EAN) Cost Method
Asset Method	No change in the 5 year smoothing of assets
Amortization Method	No change in the layered UAAL amortization approach (Legacy UAAL over a closed 30-year period from June 30, 2014 valuation and new sources of unfunded liabilities over a closed 20-year period from the valuation date they are initially measured).
Unused Sick Leave	No change in the 2% additional liability assumed for unused sick leave at retirement

Financial Impact

The following table highlights the impact of the recommended changes on the unfunded accrued liability (UAL), funding ratio and employer annual required contribution rate.

Pension Results
($ in Thousands)

System	Valuation Results 2015	After All Changes
Unfunded Accrued Liability	$13,930,442	$13,645,192
Funding Ratio	55.3%	55.8%
Actuarially Determined Employer Contribution Rate (ADEC)		
University	40.48%	38.93%
Non-University	45.39%	43.84%

In addition, we reviewed the financial impact of the recommended changes on the UAL, funding ratio and employer annual required contribution rate for the Retiree Medical and Life Insurance Funds. The impacts shown below reflect all the demographic changes.

<u>OPEB Results – Retiree Medical Insurance Fund</u>
($ in Thousands)

System	Valuation Results 2015	After Changes
Unfunded Accrued Liability	$2,887,745	$3,023,866
Funding Ratio	18.1%	17.4%
Annual Required Contribution	6.44%	6.95%
Discount Rate	8.00%	8.00%

<u>OPEB Results – Life Insurance Fund</u>
($ in Thousands)

System	Valuation Results 2015	After Changes
Unfunded Accrued Liability	$1,553	$3,456
Funding Ratio	98.4%	96.6%
Annual Required Contribution	0.03%	0.04%
Discount Rate	7.50%	7.50%

Section II
Economic Assumptions

There are three economic assumptions used in the actuarial valuations performed for the Kentucky Teachers' Retirement System. They are:

- Price Inflation
- Investment Return
- Wage Inflation

Each of these assumptions is separated into its relevant component parts. The investment rate of return assumption is comprised of an inflation component and a real rate of return component. Similarly, the rate of wage inflation assumption is comprised of an inflation component, a real rate of wage increase component (also called the productivity component). Finally, the payroll growth assumption uses the components for inflation and real wage increases in determining a reasonable range for annual growth in total payroll. The actuary is tasked with defining a reasonable range and, where appropriate, recommending a best estimate for each of the economic assumptions.

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 and was revised in September 2013. 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	3.50%	3.00%
Real Rate of Return	4.00	4.50%
Ultimate Investment Return	7.50%	7.50%
Price Inflation	3.50%	3.00%
Real Wage Growth	0.50	0.50
Wage Inflation	4.00%	3.50%

Price Inflation

Background: The assumed rate of price inflation is the expectation of the long-term annual rate of increase in the Consumer Price Index and is a component of all economic assumptions. As can be seen from the table on the previous page, assumed price inflation is used as the basis for both the ultimate investment return assumption and the wage inflation assumption. These latter two assumptions will be discussed in detail in the following sections.

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 an assumed annual rate of 3.50%.

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 graph below shows the annual increases in the CPI (U) as of June 30th for each of the latest 55 years compared to the current assumed 3.50% rate of inflation.

<p align="center">Annual CPI (U) Increases 1960 - 2015</p>
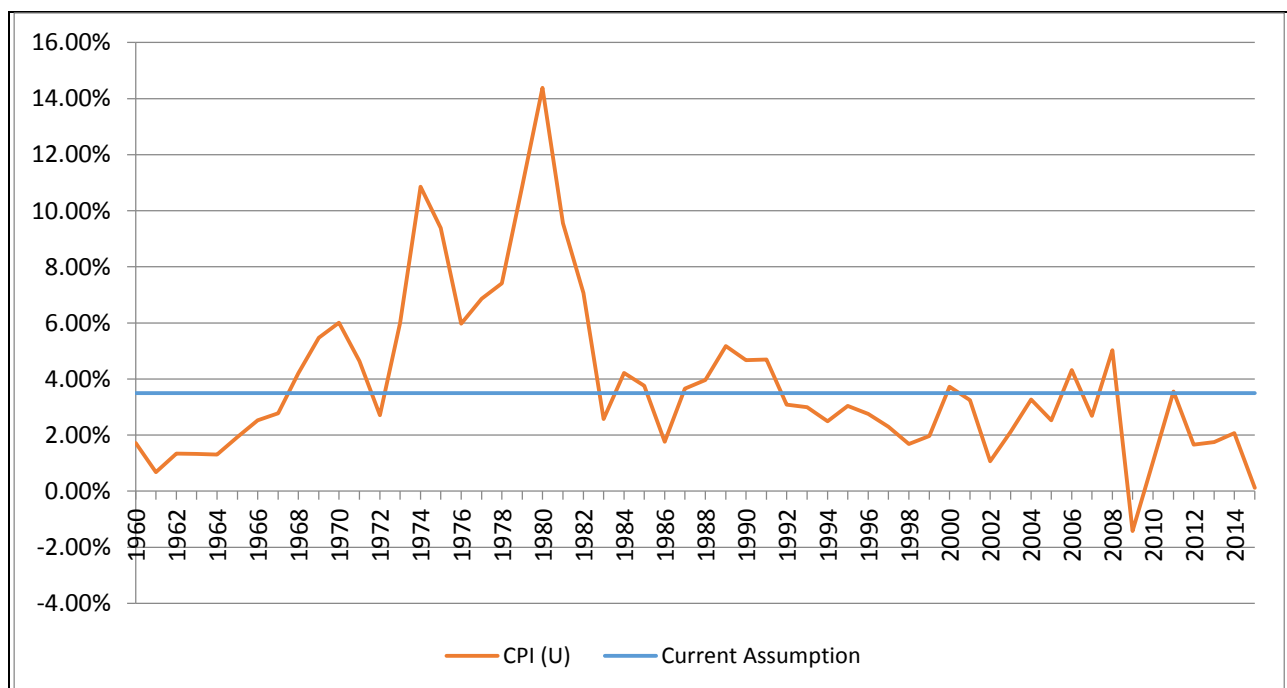
The table below provides historical annualized rates and annual standard deviation of the CPI-U over periods ending June 30th.

Period	Annualized Rate of Inflation	Annual Standard Deviation
1926 - 2015	2.93%	3.98%
1966 - 2015	4.12%	2.98%
1976 - 2015	3.75%	2.942%
1986 - 2015	2.66%	1.50%
1996 - 2015	2.23%	1.45%
2006 - 2015	1.81%	1.79%

Over shorter 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. As the rates of inflation decreased after this period so did the volatility of the rates as measured by the annual standard deviation. 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 lower 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 has stated it will keep interest rates very low until they see progress toward the target.

Additional information to consider is obtained from measuring the spread on treasury inflation protected securities (TIPS) and from the prevailing economic forecasts. The spread between the yield on treasury securities (bonds) and the inflation-indexed yield on TIPS of the same maturity is referred to as the "breakeven rate of inflation" and represents the bond market's expectation of inflation over the period to maturity. The table below provides the calculation of the breakeven rate of inflation as of June 30, 2015.

Years to Maturity	Bond Yield	TIPS Yield	Breakeven Rate of Inflation
10	2.35%	0.48%	1.87%
20	2.83%	0.88%	1.95%
30	3.11%	1.11%	2.00%

The bond market's expectation for the rate of inflation over the longer term is approximately 2.00%, which is significantly lower than long-term historical average annual rates. Additionally, based upon information contained in the "Survey of Professional Forecasters" for the second quarter of 2015 as published by the Philadelphia Federal Reserve Bank, the median of expected annual rate of inflation for the ten years

beginning July 1, 2015 is 2.14%. Although 10 years of future expectation is too short of a period for the basis of our inflation assumption, the information does provide additional evidence that the consensus expectations of these experts are for significantly lower rates of inflation than the historical average for the near term future.

Recommendation: It is difficult to predict inflation accurately. Current economic forecasts and the bond market suggest lower inflation over the next ten to thirty years. In the 2015 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 concur with a reasonable range of 1.75% - 3.75%, and recommend decreasing the inflation assumption to 3.00%.

Price Inflation Assumption	
Current	3.50%
Reasonable Range	1.75% - 3.75%
Recommended	3.00%

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 divisions. 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 3.50% and a real rate of return assumption of 4.00%. The return is net of all investment expenses.

Past Experience: The assets for KTRS are valued using a widely accepted asset-smoothing methodology 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 recent experience over the last five years is shown in the table below.

Year Ending 6/30	Actuarial Value	Market Value
2011	7.61%	26.49%
2012	2.92	2.09
2013	6.98	14.13
2014	13.96	17.86
2015	12.41	4.89
Average	8.78%	13.09%

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 are shown in Appendix B. We use statistical methods to approximate the longer-term expectation of investment returns. Looking at one-year results produces an expected real return of 5.35% 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.

Time Span In Years	Mean Real Return	Standard Deviation	Real Returns by Percentile				
			5th	25th	50th	75th	95th
1	5.35%	12.97%	-14.55%	-3.74%	4.56%	13.58%	27.94%
5	4.72%	5.75%	-4.46%	0.76%	4.56%	8.50%	14.44%
10	4.64%	4.06%	-1.90%	1.86%	4.56%	7.33%	11.45%
20	4.60%	2.87%	-0.05%	2.64%	4.56%	6.51%	9.39%
30	4.59%	2.34%	0.78%	2.99%	4.56%	6.15%	8.48%
40	4.58%	2.03%	1.28%	3.20%	4.56%	5.94%	7.95%
50	4.58%	1.81%	1.62%	3.34%	4.56%	5.79%	7.59%

We should note that the capital market assumptions produced by investment consultants vary over time. We recommend that we reassess the reasonable range with each significant future change to the asset allocations.

Thus for the 10 year time span, 5% of the resulting real rates of return are expected to be below -1.90% and 95% 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 3.34% and a 25% chance they will be above 5.79%. In other words, there is a 50% chance the real returns will be between 3.34% and 5.79%.

The most recent survey of large public plans, *Public Fund Survey* reported by the National Association of State Retirement Administrators, shows the median investment return assumption of the 126 funds surveyed is 7.50%. There is a clear trend in public plans lowering the investment return assumptions as can be seen in the following chart.

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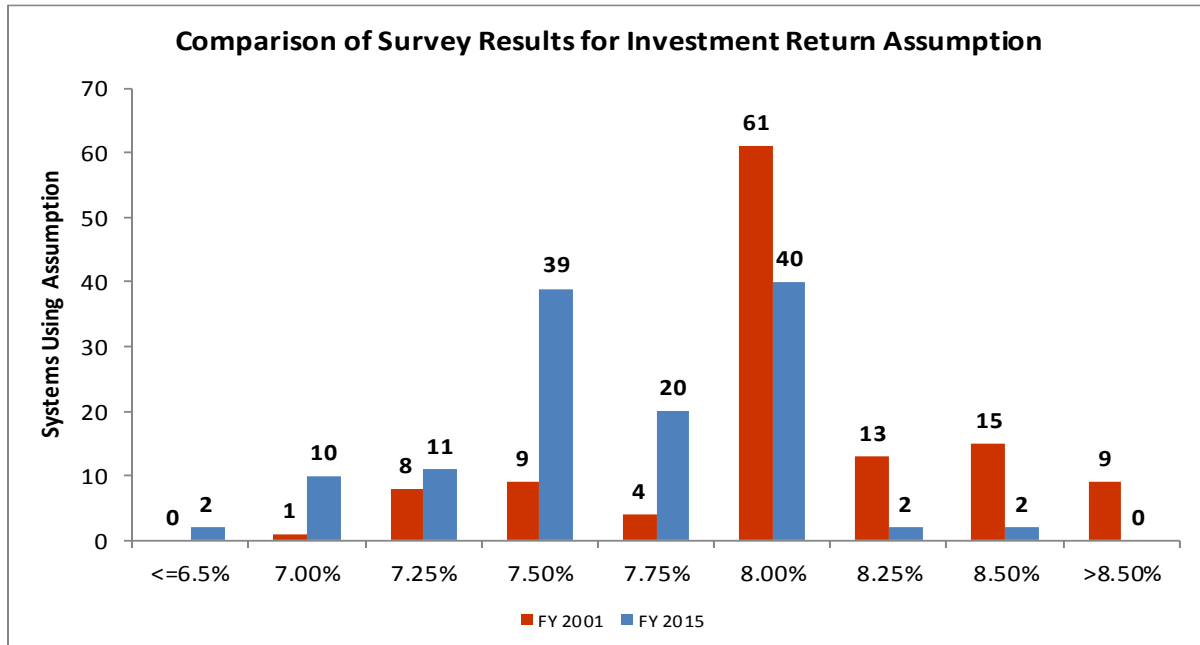
Recommendation: Using the building block approach of ASOP No. 27 and the projection results outlined above, we are recommending a range for the investment return assumption of the 25th to 75th percentile real returns over the 50 year time span plus the recommended inflation assumption less the recommended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

Item	25th Percentile	50th Percentile	75th Percentile
Real Rate of Return	3.34%	4.56%	5.79%
Inflation	3.00%	3.00%	3.00%
Ultimate Investment Return	6.34%	7.56%	8.79%

There is a slightly more than 50% chance that the net return will be 7.50% or more over a 50-year period. A net return of 7.50% is at the 49th percentile. In our opinion, a 7.50% return assumption is still a slightly conservative yet reasonable and we recommend no change in the investment return assumption.

Investment Return Assumption	
Current	7.50%
Reasonable Range	6.34% - 8.79%
Recommended	7.50%

Wage Inflation

Background: Wage inflation, thought of as the "across the board" rate of salary increases is comprised of the price inflation assumption combined with an assumption for the real rate of wage increases.   The real rate of wage increase is the rate of increase in wages above price inflation. In constructing the rates of salary increases assumptions, the rate of wage inflation assumption is further combined with an assumption for service based salary increases. The service based salary increase assumption is provided in the demographic assumption section of the report. The current assumption implies the assumed real rate of wage increase is 0.50%.

Past Experience: The Social Security Administration publishes data on wage growth in the United States. As with our analysis of inflation, we provide below wage inflation and a comparison with price inflation over various time periods. Since wage data is only available through 2014 we use that year as the end point.

Period Ending 12/31/2014	Average Annual Rate of Wage Inflation	Average Annual Rate of Price Inflation	Average Annual Rate of Real Wage Increase
5 Years	2.7%	1.7%	1.0%
10 Years	2.7%	1.8%	0.9%
20 Years	3.4%	2.2%	1.2%
30 Years	3.6%	2.7%	1.1%
50 Years	4.8%	4.1%	0.7%

Over the past 5 years of experience data we analyzed, there appear to be no real wage increases in the data above price inflation and not due to personal performance, promotions or seniority. We believe this is primarily due to the continuing impact of the financial crisis of 2008-2009.

Recommendation: We recommend maintaining the assumption of 0.50% per year real rate of wage increase.

Real Rate of Wage Increase Assumption	
Current	0.50%
Recommended	0.50%

Section III
Demographic Assumptions

There are several demographic assumptions used in the actuarial valuations performed for KTRS. They are:

- Rates of Withdrawal
- Pre-Retirement Mortality
- Rates of Disability Retirement
- Rates of Service Retirement
- Post-Retirement Mortality
- Rates of Salary Increase

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, 2010 through June 30, 2015) 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 showing 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. Salary adjustments, other than the economic assumption for wage inflation discussed in the previous section, are treated as demographic assumptions.

RATES OF WITHDRAWAL

COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS
FROM ACTIVE SERVICE

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
Withdrawals with less than 5 years of service						
20	6	1.8	3.333	27	6.9	3.936
25	548	382.4	1.433	1,766	1491.5	1.184
30	483	359.7	1.343	1,572	987.7	1.592
35	324	215.2	1.505	750	470.5	1.594
40	228	152.0	1.500	602	338.3	1.779
45	168	114.2	1.471	517	219.8	2.352
50	137	76.8	1.785	322	164.1	1.962
53 & OVER	261	138.6	1.883	478	114.3	4.181
TOTAL	2,155	1,440.7	1.496	6,034	3,793.0	1.591
Withdrawals with at least 5 but less than 10 years of service						
25	8	5.2	1.550	57	40.6	1.403
30	143	159.2	0.899	625	746.2	0.838
35	169	134.4	1.257	554	418.5	1.324
40	121	86.7	1.396	318	215.6	1.475
45	89	57.0	1.563	228	160.4	1.422
50	54	45.5	1.186	194	111.2	1.745
53 & OVER	26	15.5	1.679	68	40.7	1.669
TOTAL	610	503.3	1.212	2,044	1,733.3	1.179
Withdrawals with 10 or more years of service						
30	6	4.6	1.302	13	14.5	0.895
35	54	83.6	0.646	211	280.4	0.753
40	101	114.1	0.885	274	364.3	0.752
45	93	121.7	0.764	272	337.2	0.807
50	114	125.1	0.912	259	338.8	0.764
53 & OVER	44	44.4	0.991	126	124.5	1.012
TOTAL	412	493.5	0.835	1,155	1,459.8	0.791

The following graphs show a comparison of the present, actual, and proposed rates of withdrawal for each of the service categories.

RATES OF WITHDRAWAL FOR ACTIVE MEMBERS
WITH LESS THAN 5 YEARS OF SERVICE

Males

Females
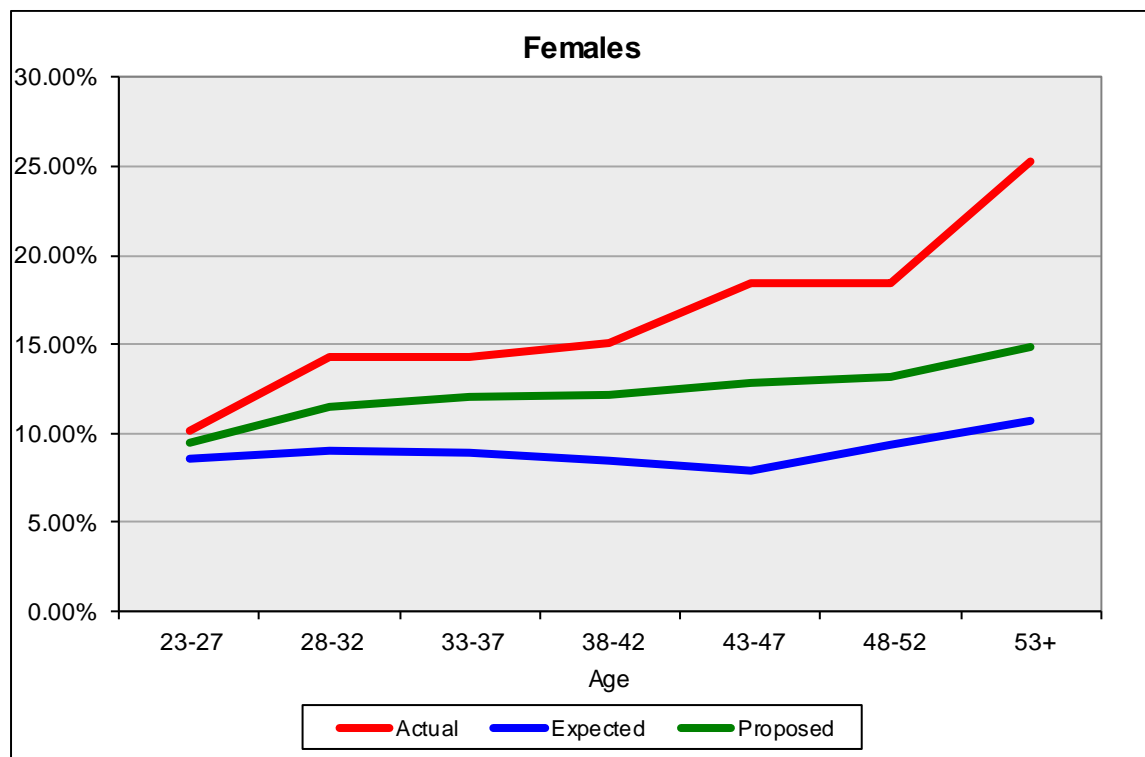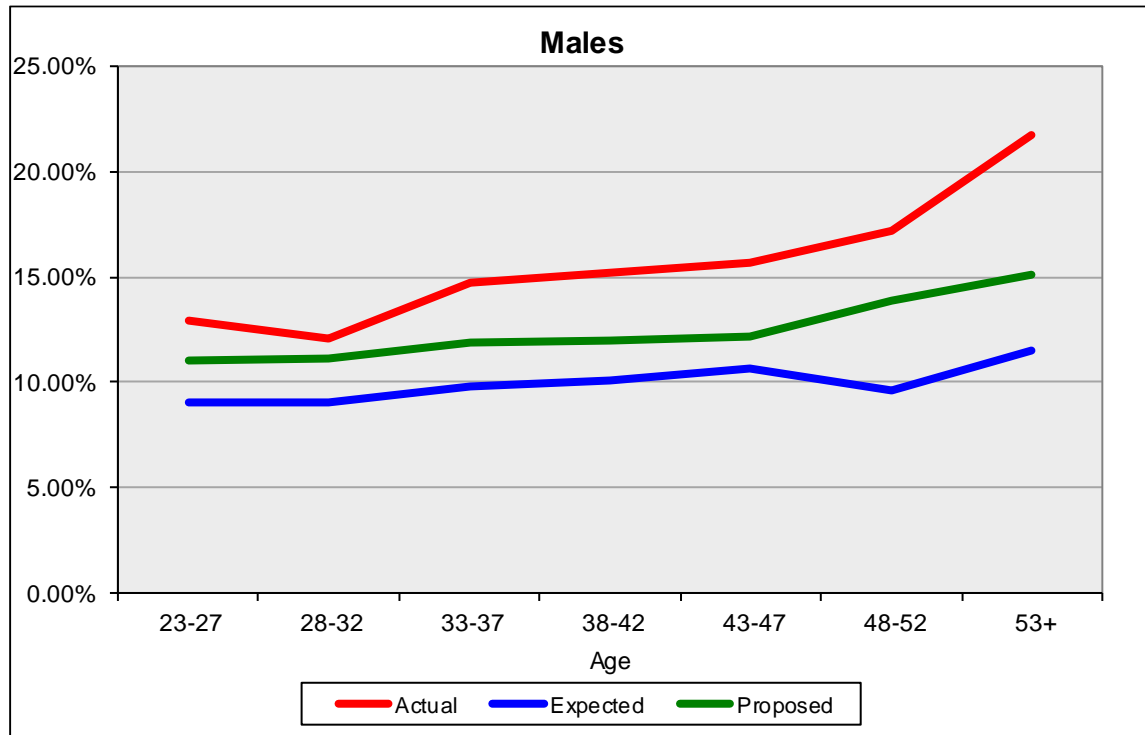
RATES OF WITHDRAWAL FOR ACTIVE MEMBERS
WITH AT LEAST 5 BUT LESS THAN 10 YEARS OF SERVICE
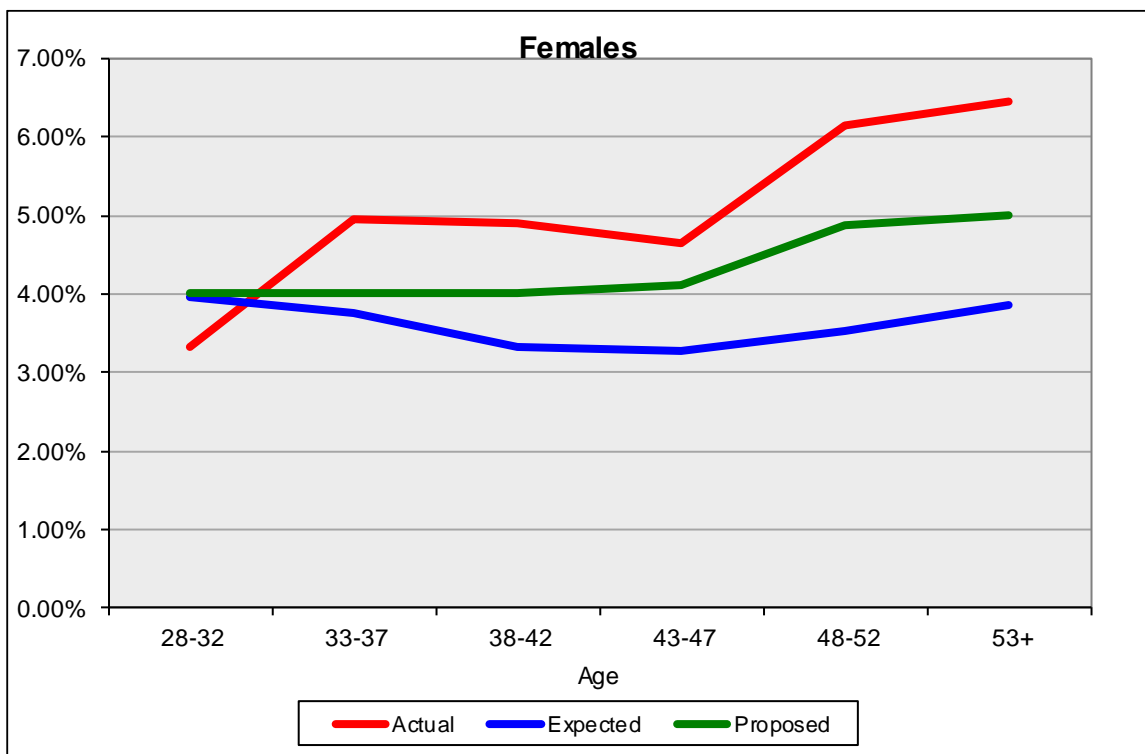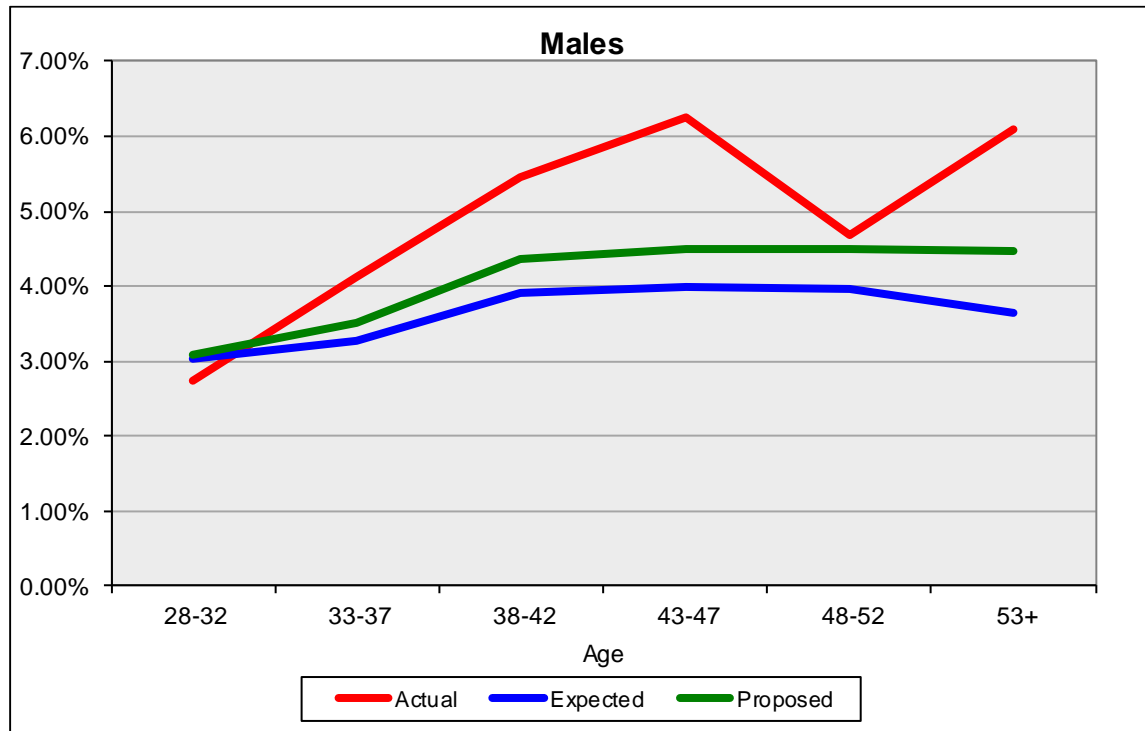
RATES OF WITHDRAWAL FOR ACTIVE MEMBERS
WITH 10 OR MORE YEARS OF SERVICE

Males

Legend: Actual (red), Expected (blue), Proposed (green)

X-axis: Age (33-37, 38-42, 43-47, 48-52, 53+)
Y-axis: 0.00% to 2.50%

Females

Legend: Actual (red), Expected (blue), Proposed (green)

X-axis: Age (33-37, 38-42, 43-47, 48-52, 53+)
Y-axis: 0.00% to 2.50%
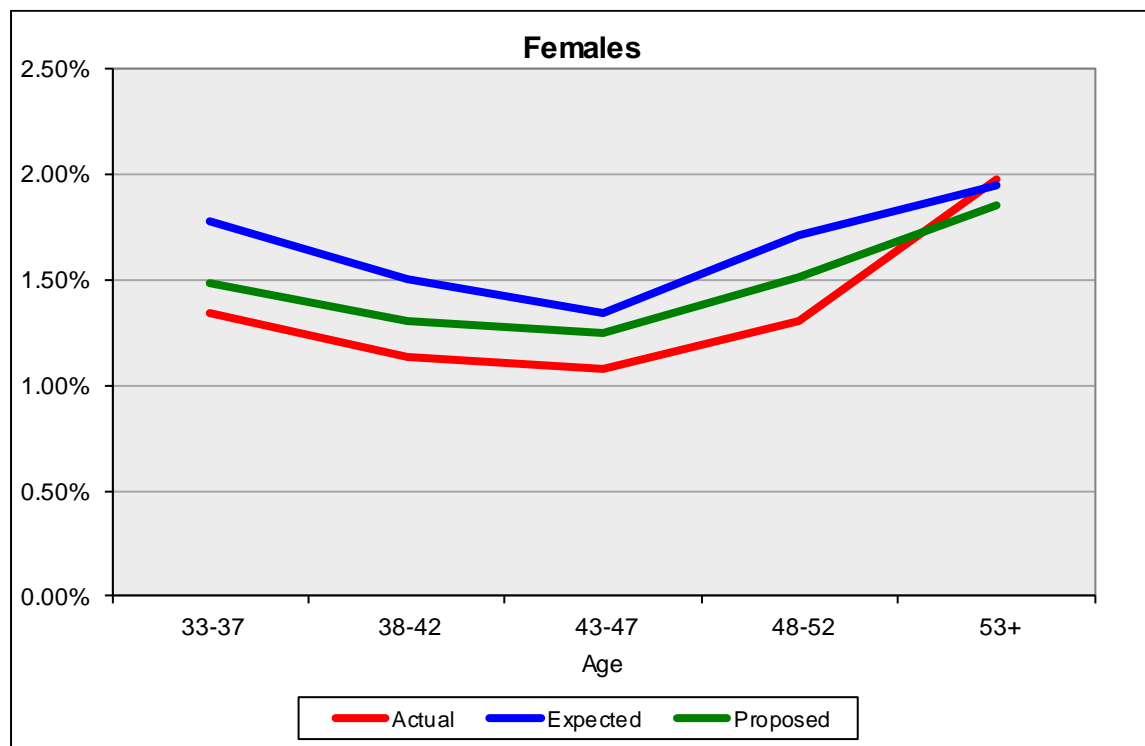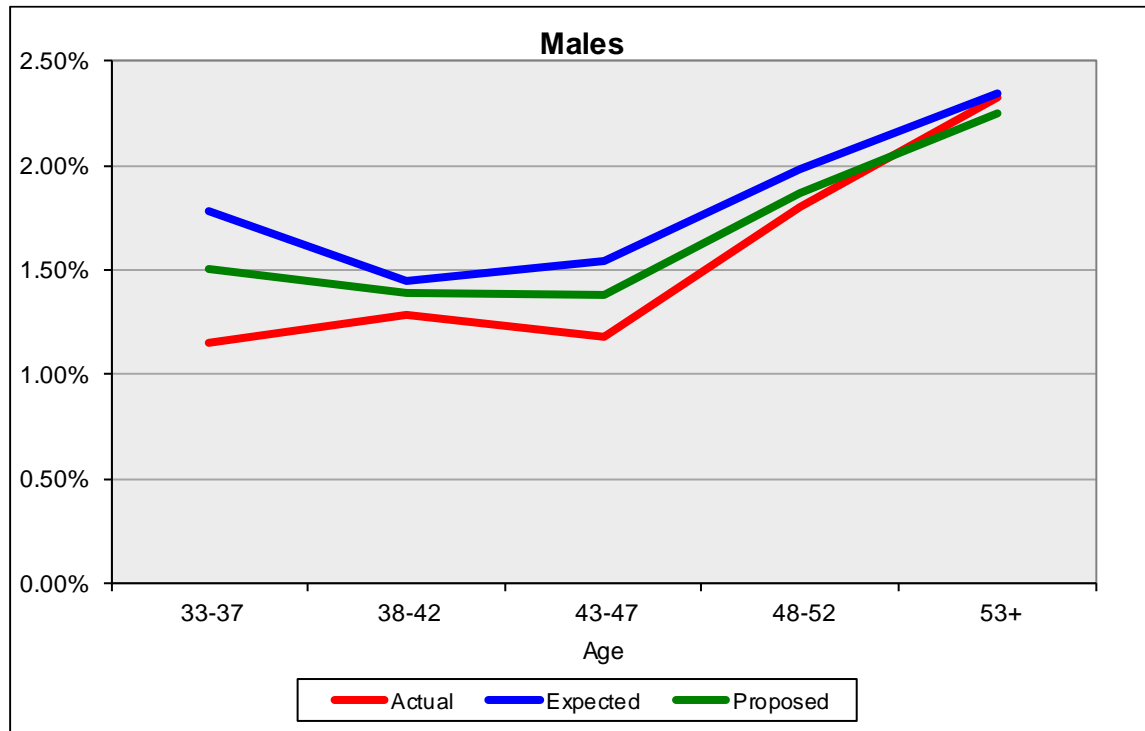
The rates of withdrawal adopted by the Board are used to determine the expected number of separations from active service, which will occur as a result of resignation or dismissal. The preceding results indicate that for male and female members with less than 5 years of service, the actual number who withdrew was much greater than expected at almost all ages.

The results show that for male and female members with greater than 5 years of service and less than 10 years of service, the actual number who withdrew was slightly greater than expected for most ages and for male and female members with greater than 10 years of service, the actual number who withdrew was less than expected at most ages.

We recommend that the rates of withdrawal be revised at this time to reflect the experience of the System, although, we have not increased the withdrawal rates to the high levels that were experienced in the less than 5 years of service during this experience period.

The following table shows a comparison between the present withdrawal rates and the proposed rates.

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+
Males						
20	9.00%			11.00%		
25	9.00%	3.00%		11.00%	3.00%	
30	9.00%	3.00%	3.00%	11.00%	3.00%	3.00%
35	10.00%	3.25%	1.75%	12.00%	3.50%	1.40%
40	10.00%	4.00%	1.40%	12.00%	4.50%	1.40%
45	11.00%	4.00%	1.50%	12.00%	4.50%	1.30%
50	9.00%	4.00%	2.00%	14.00%	4.50%	1.90%
55	12.00%	3.50%	2.50%	15.00%	4.50%	2.40%
Females						
20	7.00%			9.00%		
25	8.50%	4.00%		9.00%	4.00%	
30	9.00%	4.00%	1.65%	12.00%	4.00%	1.65%
35	9.00%	3.75%	1.85%	12.00%	4.00%	1.50%
40	8.50%	3.25%	1.50%	12.00%	4.00%	1.30%
45	7.50%	3.25%	1.25%	13.00%	4.00%	1.20%
50	9.50%	3.50%	1.75%	13.00%	5.00%	1.50%
55	11.00%	4.00%	2.00%	15.00%	5.00%	2.00%

The following table shows a comparison of the actual and expected withdrawals from active service based on the new proposed rates of withdrawal.

COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS
FROM ACTIVE SERVICE BASED ON PROPOSED RATES OF WITHDRAWAL

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
Withdrawals with less than 5 years of service						
20	6	2.2	2.727	27	8.8	3.061
25	548	467.4	1.172	1,766	1,641.2	1.076
30	483	443.4	1.089	1,572	1,261.4	1.246
35	324	261.2	1.240	750	631.0	1.189
40	228	180.5	1.263	602	485.6	1.240
45	168	130.9	1.283	517	360.4	1.435
50	137	110.7	1.237	322	231.0	1.394
53 & OVER	261	181.8	1.436	478	280.9	1.702
TOTAL	2,155	1,778.1	1.212	6,034	4,900.1	1.231
Withdrawals with at least 5 but less than 10 years of service						
25	8	5.2	1.550	57	40.6	1.403
30	143	161.2	0.887	625	752.8	0.830
35	169	143.9	1.175	554	446.7	1.240
40	121	97.0	1.247	318	260.2	1.222
45	89	64.1	1.389	228	200.8	1.135
50	54	51.9	1.041	194	153.7	1.262
53 & OVER	26	19.1	1.362	68	52.8	1.289
TOTAL	610	542.3	1.125	2,044	1,907.6	1.071
Withdrawals with 10 or more years of service						
30	6	4.4	1.367	13	13.4	0.971
35	54	71.0	0.761	211	233.4	0.904
40	101	109.1	0.926	274	316.6	0.865
45	93	108.9	0.854	272	314.1	0.866
50	114	117.9	0.967	259	299.9	0.864
53 & OVER	44	42.5	1.035	126	118.1	1.067
TOTAL	412	453.6	0.908	1,155	1,295.6	0.891

RATES OF PRE-RETIREMENT MORTALITY

COMPARISON OF ACTUAL AND EXPECTED PRE-RETIREMENT DEATHS

| CENTRAL AGE OF GROUP | NUMBER OF DEATHS | | | | | |
| | MALES | | | FEMALES | | |
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
20	0	0.0	0.000	1	0.0	100.000
25	0	0.7	0.000	1	1.4	0.694
30	1	2.0	0.503	3	3.2	0.929
35	3	3.8	0.783	4	5.6	0.718
40	4	5.4	0.748	10	8.5	1.179
45	11	6.0	1.830	19	12.2	1.564
50	15	7.0	2.143	14	16.0	0.877
53 & OVER	61	35.7	1.707	68	72.7	0.936
TOTAL	95	60.6	1.567	120	119.5	1.004

The experience during the 5-year period indicates that for males, there were more pre-retirement deaths than expected and for females, the actual number of pre-retirement deaths closely matched the expected. We recommend that KTRS adopt a prescribed mortality table for pre-retirement deaths. The proposed mortality table is the RP2000 Combined Mortality Table projected to 2025 with an adjustment in the rates of 60% and 40% for males and females, respectively. This adjustment will allow for an anticipation of increased longevity among active employees.

RATES OF DISABILITY RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED DISABILITY RETIREMENTS

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
25	0	0.4	0.000	0	4.2	0.000
30	0	1.8	0.000	6	13.1	0.458
35	4	5.6	0.714	17	26.5	0.642
40	10	11.2	0.896	30	54.0	0.556
45	23	19.3	1.194	82	101.4	0.809
50	27	30.7	0.881	131	120.7	1.086
53 & OVER	118	90.6	1.303	332	285.5	1.163
TOTAL	182	159.5	1.141	598	605.3	0.988

The following graphs show a comparison of the present, actual, and proposed rates of disability retirement.

RATES OF DISABILITY RETIREMENT
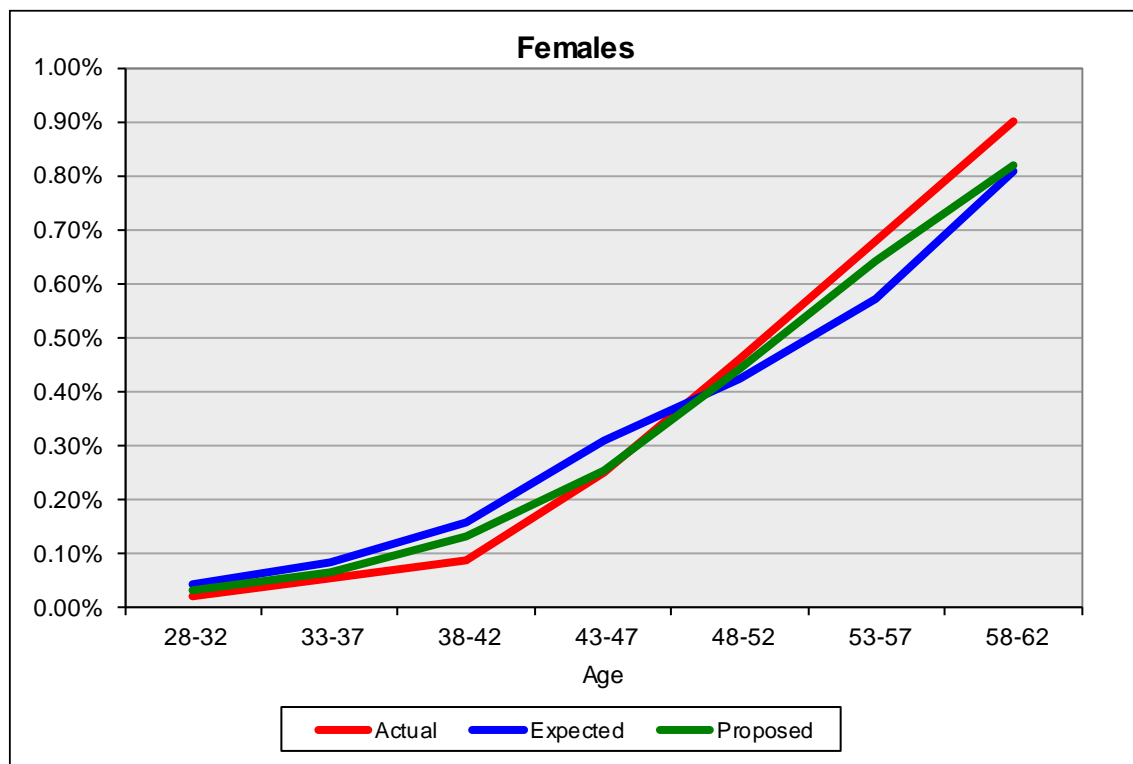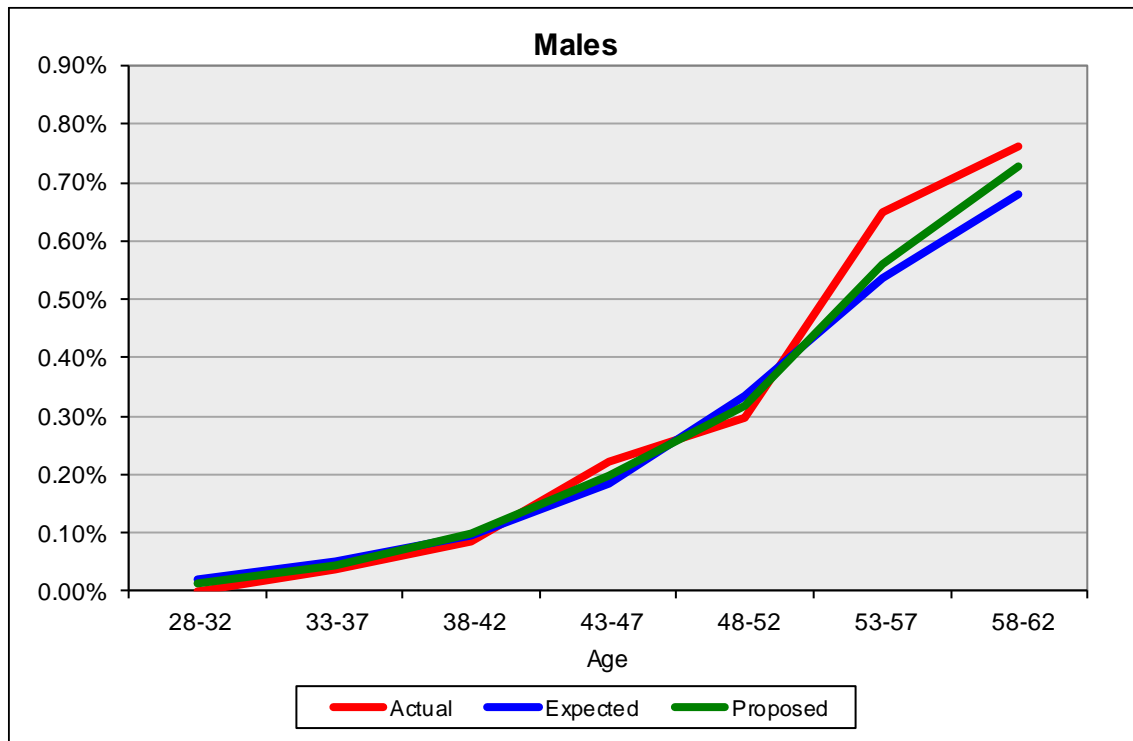
Males

Females

The preceding results indicate that the actual number of disability retirements for males was slightly greater than expected and the actual number for females was very close to expected overall but less than expected at younger ages and greater than expected at older ages. We recommend that the rates of disability retirements be revised to reflect more closely the actual experience of the membership.

The following table shows a comparison between the present and proposed rates of disability retirements.

COMPARATIVE RATES OF DISABILITY RETIREMENTS

AGE	RATES OF DISABILITY			
---	MALES		FEMALES	
	Present	Proposed	Present	Proposed
20	0.01%	0.01%	0.01%	0.01%
25	0.01%	0.01%	0.02%	0.01%
30	0.02%	0.01%	0.04%	0.03%
35	0.05%	0.04%	0.08%	0.06%
40	0.09%	0.09%	0.14%	0.12%
45	0.18%	0.20%	0.32%	0.25%
50	0.33%	0.30%	0.42%	0.44%
55	0.55%	0.58%	0.56%	0.65%
60	0.70%	0.75%	0.85%	0.85%

The following table shows a comparison of the actual and expected disability retirements based on new proposed rates of disability.

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

| CENTRAL AGE OF GROUP | NUMBER OF DISABILITY RETIREMENTS | | | | | |
| | MALES | | | FEMALES | | |
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
25	0	0.4	0.000	0	2.5	0.000
30	0	1.3	0.000	6	9.7	0.622
35	4	4.7	0.853	17	20.5	0.831
40	10	11.3	0.884	30	44.9	0.668
45	23	20.5	1.122	82	83.7	0.979
50	27	29.1	0.928	131	125.5	1.044
53 & OVER	118	102.7	1.149	332	306.5	1.083
TOTAL	182	170.1	1.070	598	593.2	1.008

RATES OF RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

MEMBERS WITH LESS THAN 27 YEARS OF SERVICE

	NUMBER OF RETIREMENTS					
	MALES			FEMALES		
AGE	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
55	39	56.3	0.692	179	201.3	0.889
56	46	55.1	0.835	162	190.4	0.851
57	49	51.1	0.959	159	180.2	0.882
58	46	48.4	0.950	145	164.8	0.880
59	63	47.9	1.315	169	151.7	1.114
60	94	104.0	0.904	288	319.8	0.901
61	63	101.9	0.619	273	262.5	1.040
62	92	89.6	1.027	226	189.3	1.194
63	69	64.5	1.070	191	182.4	1.047
64	57	61.2	0.931	116	167.0	0.694
65	66	68.3	0.967	142	152.0	0.934
66	42	53.4	0.787	113	101.9	1.109
67	34	37.6	0.904	58	46.7	1.241
68	29	25.2	1.151	37	31.4	1.180
69	17	17.6	0.964	28	21.9	1.277
SUBTOTAL	806	881.9	0.914	2,286	2,363.3	0.967
70 & Over	38	227.0	0.167	65	323.0	0.201
TOTAL	844	1,108.9	0.761	2,351	2,686.3	0.875
Average Retirement Age	62.0	63.7	0.974	61.0	61.9	0.985

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

MEMBERS WITH 27 OR MORE YEARS OF SERVICE

| | NUMBER OF RETIREMENTS | | | | | |
| | MALES | | | FEMALES | | |
AGE	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
52 & Under	204	188.7	1.081	798	726.2	1.099
53	49	50.2	0.976	225	174.0	1.293
54	80	55.3	1.448	308	228.1	1.351
55	197	154.0	1.279	788	505.4	1.559
56	114	86.1	1.324	437	306.4	1.426
57	93	74.5	1.248	295	185.6	1.589
58	87	56.1	1.550	260	154.0	1.688
59	60	48.2	1.244	234	150.0	1.560
60	78	50.5	1.544	257	174.5	1.473
61	61	43.8	1.393	188	140.8	1.335
62	44	43.7	1.007	165	99.3	1.662
63	45	36.2	1.244	153	87.9	1.741
64	28	22.2	1.261	103	70.1	1.469
65	25	25.5	0.979	86	55.9	1.538
66	33	32.6	1.012	60	38.9	1.541
67	19	18.2	1.047	44	25.8	1.709
68	18	16.3	1.104	32	17.7	1.808
69	9	14.4	0.625	16	12.0	1.333
SUBTOTAL	1,244	1,016.5	1.224	4,449	3,152.4	1.411
70 & Over	40	138.0	0.290	49	155.0	0.316
TOTAL	1,284	1,154.5	1.112	4,498	3,307.4	1.360
Average Retirement Age	57.5	58.7	0.979	56.7	56.7	0.999

The following graphs show a comparison of the present, actual, and proposed rates of service retirements.

RATES OF RETIREMENT

Male Retirements Less then 27 Years of Service

Actual — Expected — Proposed

Female Retirements Less than 27 Years of Service

Actual — Expected — Proposed

RATES OF RETIREMENT

Male Retirements 27 Years and more of Service

Legend: Actual (red), Expected (blue), Proposed (green)
X-axis: Age (48-51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69)
Y-axis: 0.00% to 50.00%

Female Retirements 27 Years and more of Service

Legend: Actual (red), Expected (blue), Proposed (green)
X-axis: Age (48-51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69)
Y-axis: 0.00% to 60.00%

The preceding results indicates that, overall, the actual rates of retirement for members with less than 27 years of service for both males and females were somewhat less than expected.

For members with 27 or more years of service, the actual rates of retirement were significantly greater than expected at most ages, particularly for females. On the basis of this experience, we recommend that the rates of retirement be revised to reflect actual experience more closely. The following table shows a comparison of the present and proposed rates of service retirement.

COMPARATIVE RATES OF RETIREMENT

	RATES OF RETIREMENT							
	MALES				FEMALES			
AGE	Present Less than 27 Years of Service	Present* 27 Years of Service and More	Proposed Less than 27 Years of Service	Proposed* 27 Years of Service and More	Present Less than 27 Years of Service	Present* 27 Years of Service and More	Proposed Less than 27 Years of Service	Proposed* 27 Years of Service and More
48	0.0%	17.0%	0.0%	17.0%	0.0%	15.0%	0.0%	15.0%
49	0.0%	17.0%	0.0%	17.0%	0.0%	15.0%	0.0%	17.0%
50	0.0%	17.0%	0.0%	17.0%	0.0%	15.0%	0.0%	18.0%
51	0.0%	17.0%	0.0%	17.0%	0.0%	15.0%	0.0%	18.0%
52	0.0%	15.0%	0.0%	16.0%	0.0%	15.0%	0.0%	18.0%
53	0.0%	13.0%	0.0%	13.0%	0.0%	12.0%	0.0%	18.0%
54	0.0%	12.0%	0.0%	15.0%	0.0%	15.0%	0.0%	18.0%
55	5.5%	35.0%	5.0%	45.0%	6.0%	35.0%	5.5%	50.0%
56	5.5%	27.0%	5.0%	35.0%	6.0%	32.0%	5.5%	45.0%
57	5.5%	27.0%	5.5%	35.0%	6.0%	25.0%	5.5%	40.0%
58	5.5%	22.0%	5.5%	35.0%	6.0%	23.0%	5.5%	40.0%
59	5.5%	22.0%	5.5%	25.0%	6.0%	25.0%	6.0%	40.0%
60	13.0%	24.0%	13.0%	35.0%	14.0%	30.0%	14.0%	40.0%
61	15.0%	22.0%	13.0%	30.0%	14.0%	30.0%	14.0%	40.0%
62	15.0%	25.0%	15.0%	25.0%	12.5%	25.0%	14.0%	40.0%
63	13.0%	22.0%	13.0%	25.0%	15.0%	25.0%	15.0%	40.0%
64	15.0%	20.0%	15.0%	25.0%	18.0%	30.0%	15.0%	40.0%
65	21.0%	26.0%	20.0%	25.0%	22.0%	30.0%	22.0%	35.0%
66	23.0%	30.0%	20.0%	30.0%	22.0%	28.0%	22.0%	35.0%
67	21.0%	25.0%	20.0%	25.0%	16.0%	25.0%	18.0%	35.0%
68	21.0%	25.0%	20.0%	25.0%	16.0%	25.0%	18.0%	35.0%
69	21.0%	30.0%	20.0%	20.0%	16.0%	25.0%	18.0%	35.0%
70	100.0%	100.0%	20.0%	20.0%	100.0%	100.0%	20.0%	35.0%
71			20.0%	20.0%			20.0%	35.0%
72			20.0%	20.0%			20.0%	35.0%
73			20.0%	20.0%			20.0%	35.0%
74			20.0%	20.0%			20.0%	35.0%
75			100.0%	100.0%			100.0%	100.0%

*Plus 7.5% in year when first eligible for unreduced retirement with 27 years of service.

The following table shows a comparison of actual and expected service retirements based on new proposed rates of retirement.

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS
BASED ON PROPOSED RETIREMENT RATES

MEMBERS WITH LESS THAN 27 YEARS OF SERVICE

| AGE | NUMBER OF RETIREMENTS | | | | | |
| | MALES | | | FEMALES | | |
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
55	39	51.2	0.762	179	184.5	0.970
56	46	50.1	0.918	162	174.6	0.928
57	49	51.1	0.959	159	165.2	0.963
58	46	48.4	0.950	145	151.1	0.960
59	63	47.9	1.315	169	151.7	1.114
60	94	104.0	0.904	288	319.8	0.901
61	63	88.3	0.714	273	262.5	1.040
62	92	89.6	1.027	226	212.0	1.066
63	69	64.5	1.070	191	182.4	1.047
64	57	61.2	0.931	116	139.2	0.833
65	66	65.0	1.015	142	152.0	0.934
66	42	46.4	0.905	113	101.9	1.109
67	34	35.8	0.950	58	52.6	1.104
68	29	24.0	1.208	37	35.3	1.049
69	17	16.8	1.012	28	24.7	1.135
SUBTOTAL	806	844.2	0.955	2,286	2,309.2	0.990
70 & Over	38	87.0	0.437	65	113.4	0.573
TOTAL	844	931.2	0.906	2,351	2,422.6	0.970
Average Retirement Age	62.0	62.6	0.991	61.0	61.3	0.996

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS
BASED ON PROPOSED RETIREMENT RATES

MEMBERS WITH 27 YEARS OF SERVICE AND MORE

	NUMBER OF RETIREMENTS					
	MALES			FEMALES		
AGE	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
52 & Under	204	191.7	1.064	798	831.4	0.960
53	49	50.2	0.976	225	249.4	0.902
54	80	67.2	1.190	308	269.2	1.144
55	197	196.2	1.004	788	715.2	1.102
56	114	110.1	1.035	437	424.6	1.029
57	93	94.8	0.982	295	290.6	1.015
58	87	86.8	1.002	260	258.4	1.006
59	60	54.3	1.105	234	232.8	1.005
60	78	72.3	1.079	257	228.8	1.123
61	61	58.6	1.041	188	185.1	1.016
62	44	43.7	1.007	165	154.6	1.067
63	45	40.8	1.103	153	136.2	1.123
64	28	27.6	1.016	103	92.1	1.118
65	25	24.6	1.016	86	64.6	1.331
66	33	32.6	1.012	60	47.9	1.253
67	19	18.2	1.047	44	35.3	1.248
68	18	16.3	1.104	32	24.3	1.317
69	9	9.7	0.928	16	16.4	0.976
SUBTOTAL	1,244	1,195.5	1.041	4,449	4,256.8	1.045
70 & Over	40	51.1	0.783	49	82.0	0.598
TOTAL	1,284	1,246.6	1.030	4,498	4,338.8	1.037
Average Retirement Age	57.5	57.6	0.998	56.7	56.6	1.002

RATES OF POST-RETIREMENT MORTALITY

COMPARISON OF ACTUAL AND EXPECTED CASES OF
POST-RETIREMENT DEATHS

CENTRAL AGE OF GROUP	NUMBER OF POST-RETIREMENT DEATHS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
SERVICE RETIREMENTS						
57 & UNDER	55	10.4	5.288	73	25.6	2.852
60	81	55.4	1.462	125	127.7	0.979
65	229	165.1	1.387	343	291.7	1.176
70	292	223.9	1.304	303	335.1	0.904
75	293	259.3	1.130	360	360.3	0.999
80	332	324.9	1.022	442	428.5	1.032
85	318	311.1	1.022	644	552.1	1.166
90	235	227.8	1.032	661	552.3	1.197
93 & OVER	127	107.8	1.178	717	529.0	1.355
TOTAL	1,962	1,685.7	1.164	3,668	3,202.3	1.145
DISABILITY RETIREMENTS						
52 & UNDER	11	7.0	1.571	72	22.3	3.229
55	15	8.5	1.765	42	30.4	1.382
60	22	20.8	1.058	47	62.9	0.747
65	22	26.5	0.830	50	75.5	0.662
70	20	21.8	0.917	30	50.9	0.589
75	19	16.7	1.138	24	40.2	0.597
80	16	9.5	1.684	29	30.6	0.948
85	4	4.5	0.889	19	33.1	0.574
90	7	2.8	2.500	25	18.9	1.323
93 & OVER	4	2.4	1.667	13	8.3	1.566
TOTAL	140	120.5	1.162	351	373.1	0.941

The following graphs show a comparison of the present, actual and proposed rates of post-retirement deaths.

POST-RETIREMENT DEATHS
SERVICE RETIREMENTS

Mortality of Male Retirements

Legend: Actual, Expected, Proposed

X-axis: 53-57, 58-62, 63-67, 68-72, 73-77, 78-82, 83-87, 88-92, 93+
Y-axis: 0.00% to 35.00%

Mortality of Female Retirements

Legend: Actual, Expected, Proposed

X-axis: 53-57, 58-62, 63-67, 68-72, 73-77, 78-82, 83-87, 88-92, 93+
Y-axis: 0.00% to 30.00%
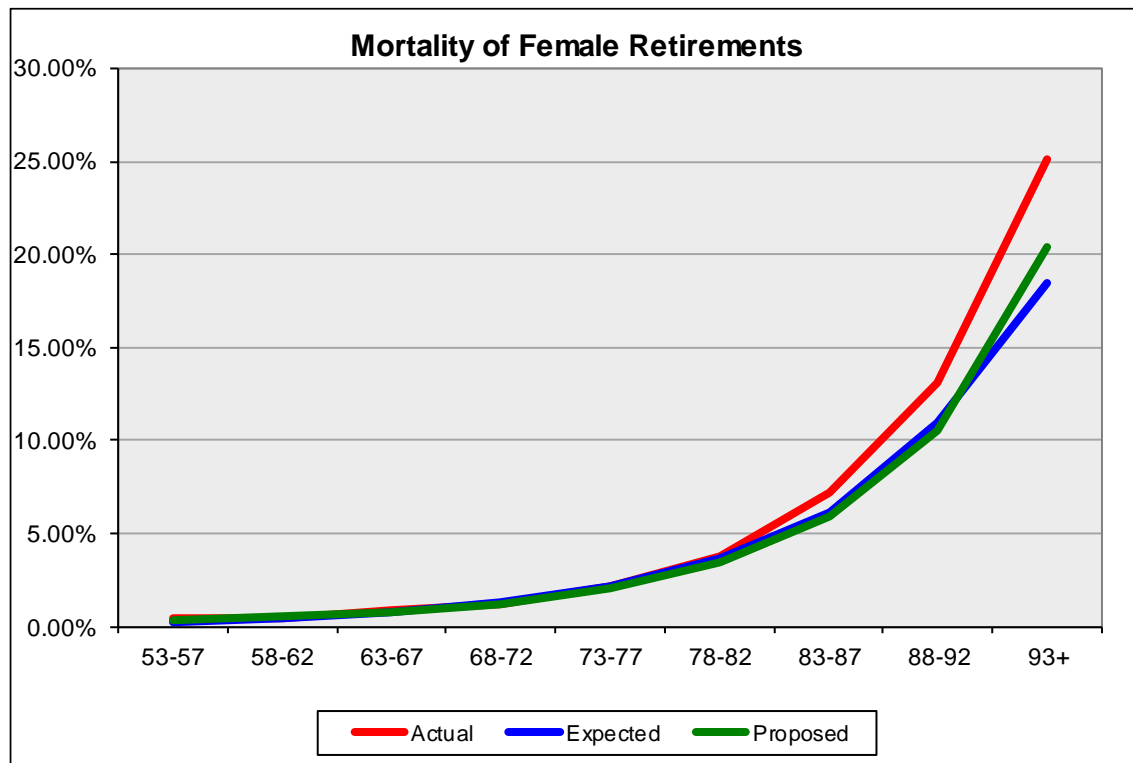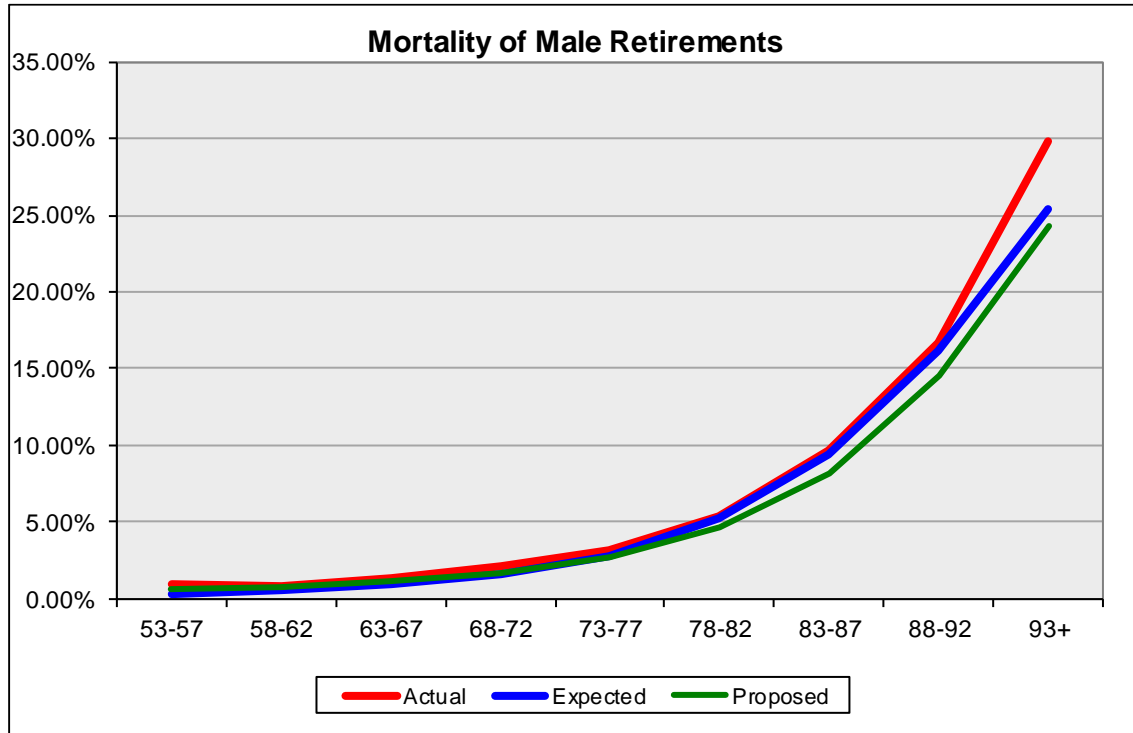
POST-RETIREMENT DEATHS
DISABILITY RETIREMENTS

Mortality of Male Disabled Retirements

Mortality of Female Disabled Retirements
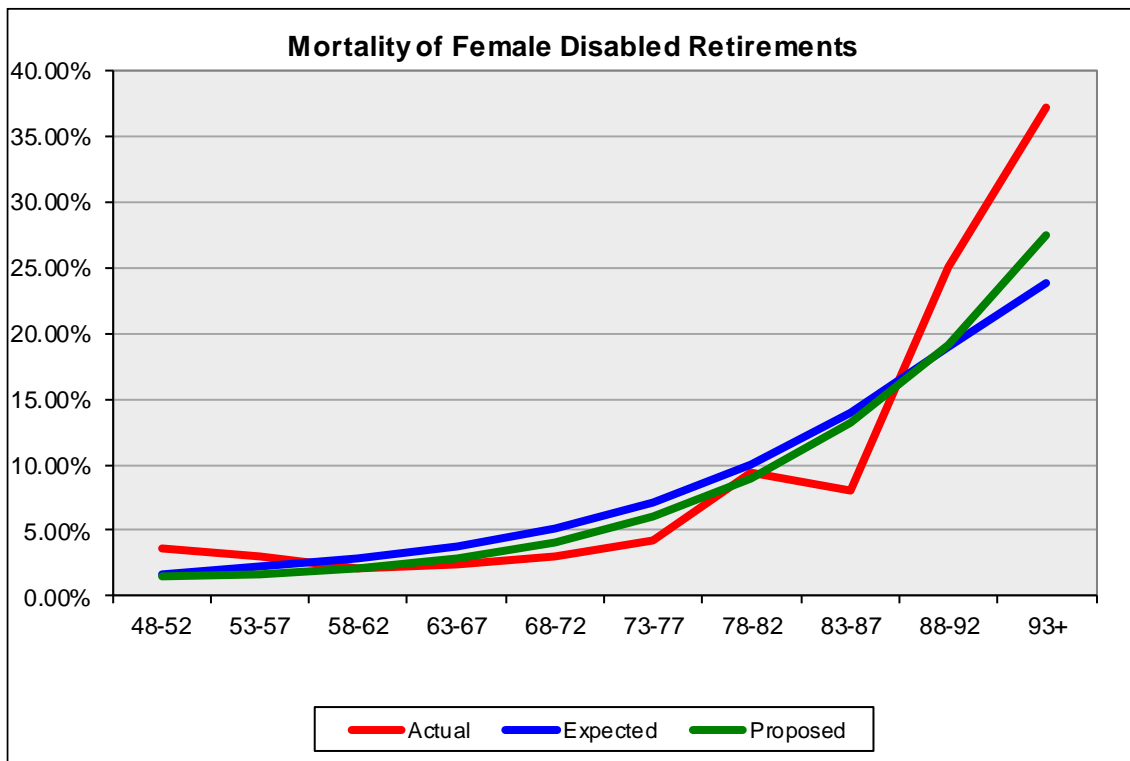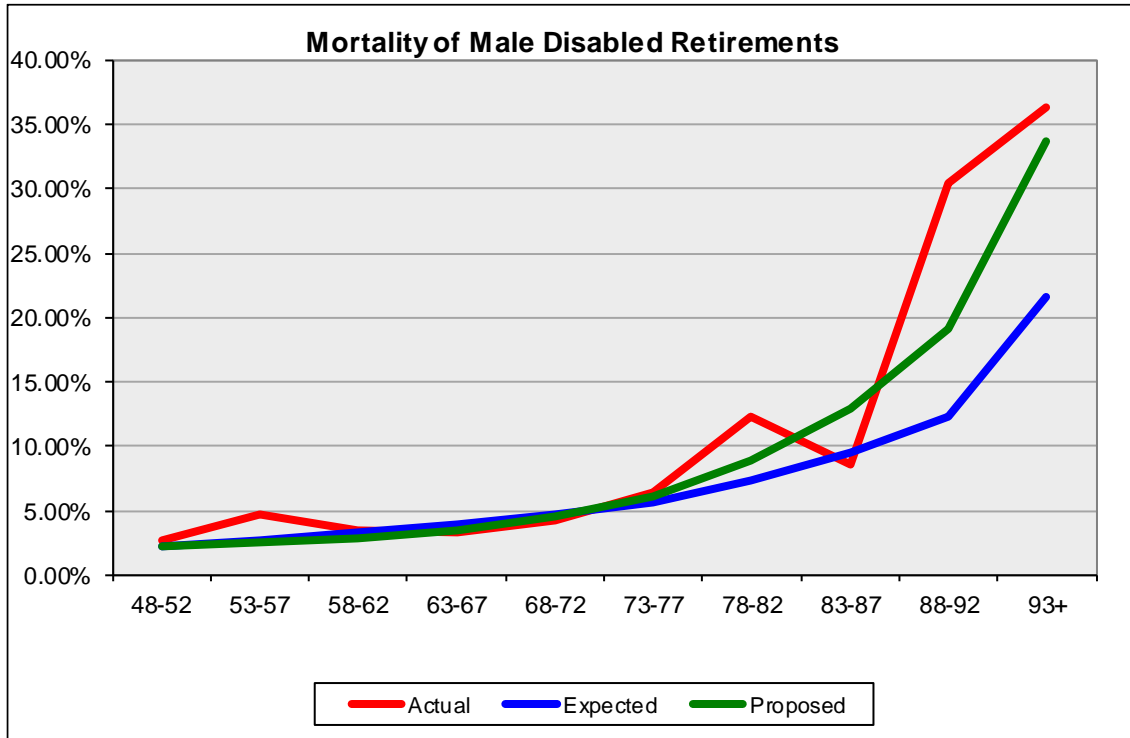
The preceding results indicate that the actual number of post-retirement deaths for both males and females was greater than expected at most ages. For disability retirement, the actual number of deaths were more than expected for males and less than expected at most ages for females. Since the experience is showing more deaths than expected, we recommend maintaining the same mortality table, the RP 2000 Combined Mortality Table for service retirements and dependents of deceased pensioners, with mortality improvements projected to 2025 using Scale BB set forward 2 years for males and 1 year for females.

For the period after disability retirement, we recommend that the rates of mortality be revised to the RP 2000 Disabled Mortality Table set forward 2 years for males and 7 years for females.

These assumed rates of mortality recognize the expectation of continued improvement in longevity. The following table shows a comparison between the present and proposed rates of mortality.

COMPARATIVE RATES OF POST-RETIREMENT MORTALITY

	SERVICE RETIREMENTS AND DEPENDENTS OF DECEASED MEMBERS			
	MALES		FEMALES	
AGE	Present	Proposed	Present	Proposed
35	0.07%	0.08%	0.03%	0.05%
40	0.09%	0.11%	0.05%	0.07%
45	0.12%	0.15%	0.07%	0.11%
50	0.15%	0.23%	0.11%	0.17%
55	0.25%	0.39%	0.21%	0.27%
60	0.49%	0.63%	0.40%	0.44%
65	0.96%	1.04%	0.78%	0.81%
70	1.64%	1.68%	1.34%	1.37%
75	2.85%	2.89%	2.17%	2.29%
80	5.26%	4.94%	3.61%	3.76%
85	9.62%	8.42%	6.16%	6.39%
90	16.93%	15.54%	11.22%	11.25%

COMPARATIVE RATES OF POST-RETIREMENT MORTALITY

AGE	DISABILITY RETIREMENTS			
---	MALES		FEMALES	
	Present	Proposed	Present	Proposed
35	2.26%	0.97%	0.75%	0.53%
40	2.26%	1.34%	0.75%	0.88%
45	2.26%	1.85%	1.15%	1.15%
50	2.26%	2.15%	1.65%	1.37%
55	2.64%	2.38%	2.18%	1.52%
60	3.29%	2.62%	2.80%	1.83%
65	3.93%	3.08%	3.76%	2.47%
70	4.66%	4.06%	5.22%	3.59%
75	5.69%	5.62%	7.23%	5.34%
80	7.33%	8.16%	10.02%	7.92%
85	9.76%	12.62%	14.00%	11.75%
90	12.83%	19.86%	19.45%	18.33%

The following shows a comparison of the actual and expected post-retirement deaths based on new revised rates of mortality.

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

CENTRAL AGE OF GROUP	NUMBER OF POST-RETIREMENT DEATHS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
SERVICE RETIREMENTS						
57 & UNDER	55	23.7	2.321	73	42.3	1.726
60	81	86.6	0.935	125	154.9	0.807
65	229	188.0	1.218	343	289.5	1.185
70	292	232.2	1.258	303	309.3	0.980
75	293	253.2	1.157	360	333.8	1.078
80	332	289.4	1.147	442	404.1	1.094
85	318	269.5	1.180	644	528.9	1.218
90	235	204.9	1.147	661	529.8	1.248
93 & OVER	127	103.3	1.229	717	584.6	1.226
TOTAL	1,962	1,650.8	1.189	3,668	3,177.2	1.154
DISABILITY RETIREMENTS						
52 & UNDER	11	5.9	1.864	72	20.5	3.512
55	15	7.8	1.923	42	23.7	1.772
60	22	18.0	1.222	47	46.9	1.002
65	22	23.4	0.940	50	56.6	0.883
70	20	21.2	0.943	30	40.0	0.750
75	19	18.1	1.050	24	33.8	0.710
80	16	11.5	1.391	29	27.5	1.055
85	4	6.1	0.656	19	31.4	0.605
90	7	4.4	1.591	25	19.1	1.309
93 & OVER	4	3.7	1.081	13	9.6	1.354
TOTAL	140	120.1	1.166	351	309.1	1.136

RATES OF SALARY INCREASE

**COMPARISON OF ACTUAL AND EXPECTED SALARIES
OF ACTIVE MEMBERS**

CENTRAL AGE OF GROUP	SALARIES AT END OF YEAR ($1,000's)		
	MALES AND FEMALES		
	Actual	Expected	Ratio of Actual to Expected
25	$1,057,005	$1,067,948	0.990
30	1,826,395	1,859,146	0.989
35	2,199,785	2,240,941	0.986
40	2,590,229	2,643,228	0.984
45	2,415,041	2,467,984	0.980
50	2,143,172	2,185,019	0.981
55	1,613,087	1,627,362	0.990
60	935,017	937,372	0.996
63+	343,492	343,658	0.996
TOTAL	$15,571,191	$15,748,427	0.989

During the period under investigation, the actual rates of salary increase were lower than expected for both males and females at all ages. The rates of salary increase consist of wage inflation and a scale for merit and promotion. We recommended in the Economic section of this report that the wage inflation assumption be reduced by 0.50% from 4.00% to 3.50%. In addition, we recommend a decrease of 0.25% in the rates of merit and promotion at all age bands.

Section IV
Assumptions Specific to the Medical Insurance Fund and the Life Insurance Fund

Health Care Cost Trend Rates

Background: In addition to the economic assumptions used in all of the actuarial valuations performed for the Teachers' Retirement System of the State of Kentucky (System), the health care cost trend rates reflect the change in per capita health claims rates over time due to factors such as medical inflation, utilization, plan design, and technology improvements. For the Medical Insurance Fund (MIF), health care cost trend rates are needed to project the future cost of providing benefits of the MIF, including Kentucky Employees' Health Plan (KEHP) premiums, Medicare Eligible Health Plan (MEHP) costs, and Shared Responsibility contributions based upon Medicare Part B premiums.

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, "Measuring Retiree Group Benefit Obligations", which provides guidance to actuaries in selecting economic assumptions for measuring obligations of postretirement plans other than pensions. As noted in ASOP No. 6, the actuary should consider the following key components in setting the health care cost trend rate: inflation, medical inflation, definition of covered charges, frequency of services, leveraging caused by plan design features not explicitly modeled, and plan participation. The actuary should not consider aging of the covered population when selecting the trend assumption for projecting future costs.

Currently, the System's valuations utilize initial trend rates based upon input from the System regarding near-term expectations and an annual meta-analysis of trend surveys. The initial trend rates grade to an ultimate trend rate of 5.00% over a three (MEHP) to five (KEHP) year period.

In projecting medical and prescription drug premiums and costs, Cavanaugh Macdonald Consulting, LLC (CMC) assumes health care plan cost trend rates will decrease from an initial rate to an ultimate level. For the initial trend rate, CMC's methodology includes input from the Teachers' Retirement System of the State of Kentucky (the System) regarding near-term expectations and the use of published annual health care inflation surveys in conjunction with actual plan experience, where credible. Given the volatile nature of medical and prescription drug costs, the initial trend rate assumption is subject to continued update and review with each valuation performed. As for the decrease to the ultimate trend rate, there are various approaches used to determine the timing and level of the decreases (e.g., multi-year grading period, SOA-Getzen Model). The assumed decrease in health care cost trend rates reflects the belief that health care inflation cannot indefinitely outstrip the growth rate of employer budgets and the overall economy. As a standard of practice, CMC typically assumes a grading period of around five years, depending on the level of change (i.e., larger differences between the initial trend rate and the ultimate trend rate are assumed to require a longer reduction period). For the ultimate trend rate assumption, Medicare expenditures increasing at the rate of long-term per capita GDP growth + 1.0% was felt to be reasonable by a 2004 Medicare Trustees Technical Review Panel, and is widely used. As a standard of practice, CMC believes the use of the "GDP+1%" assumption is reasonable and typically assumes an ultimate trend rate of 5.0%. As with any standard of practice, the specifics of each plan are reviewed to ensure there is nothing unusual that would necessitate a long-term trend rate that is either higher or lower than what is typical. It appears to be reasonable to use an ultimate rate of 5.0% and beyond.

In projecting the offsets associated with the Federal Supplementary Medical Insurance Trust Fund (Medicare Part B Premiums), projected trends from the CMS actuary in the most recent annual report to the trustees appear to provide a reasonable basis for the projection of these costs. As a standard of practice, CMC typically develops the trend assumptions for these benefits based upon the CMS actuary's most recent estimates.

Health Care Cost Trend Rates (continued)

In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 6. The following tables illustrate the projected results generated by the trend assumptions used over the experience period.

Health Care Cost Trend Rates (continued)

Projected Medicare Part B Premiums
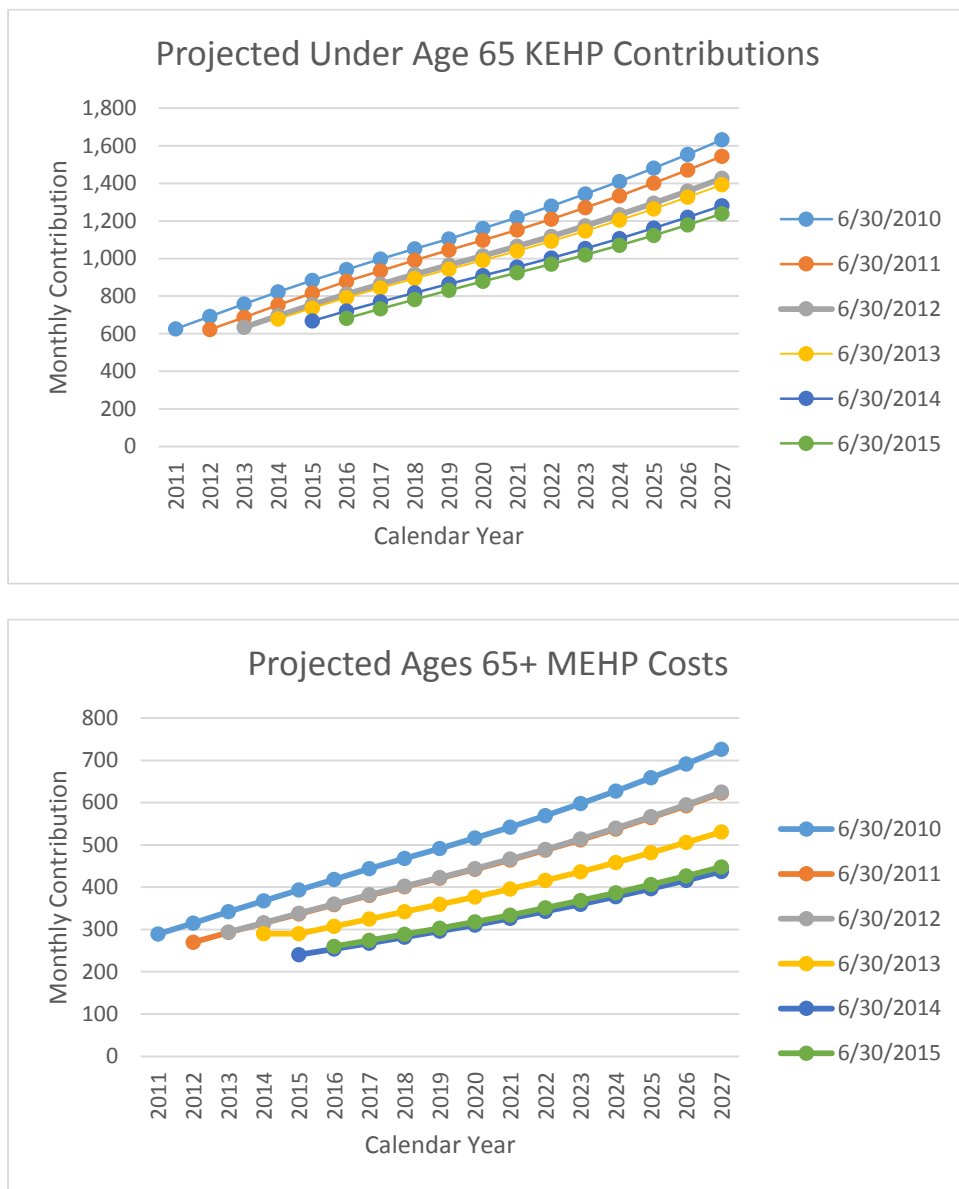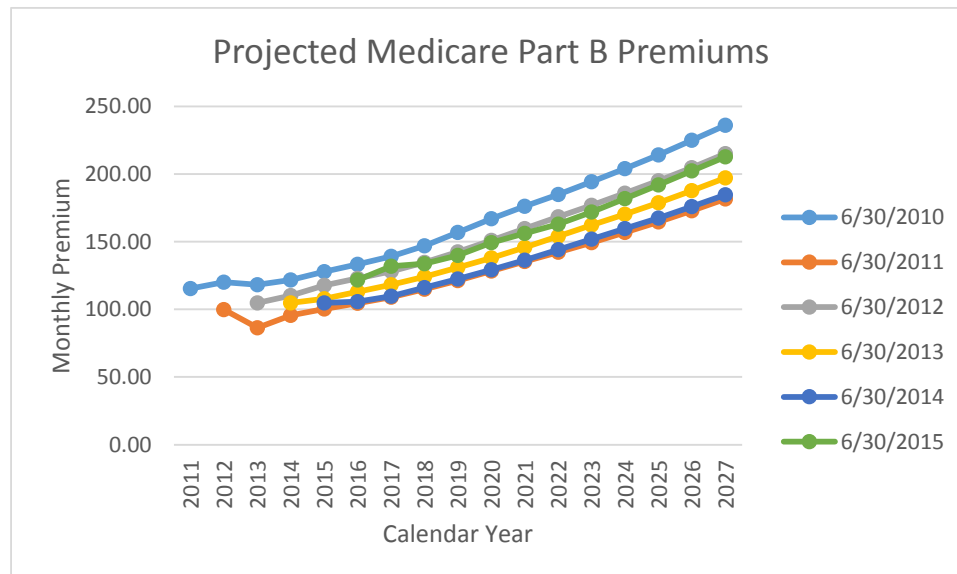
Recommendation: In our opinion, the health care cost trend rates recommended in each year's valuation report are developed in accordance with ASOP No. 6. We recommend the continued update and review of the initial rates with each year's valuation. As for the ultimate health care cost trend rate, CMC typically uses an ultimate rate of 5.0%, reflecting research (e.g., Follette & Sheiner, Chernew, Hirth, & Cutler) suggesting that health care spending growth is sustainable in the long-term only up to a one percentage point gap between the growth rates of health spending and GDP (i.e., higher increases will lead to a decline in non-health consumption, leaving no resources for non-health care consumption). As there appears to be nothing unusual about the System's medical plans that would necessitate a long-term trend that is either higher or lower than what is typically used for this type of calculation, we believe this assumption to be reasonable.

Morbidity

Background: The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, "Measuring Retiree Group Benefit Obligations", which provides guidance to actuaries when developing benefit cost projection assumptions for measuring obligations of postretirement plans other than pensions. As noted in ASOP No. 6, the actuary should consider the variation in rates by age for the benefits being modeled and use appropriate age bands if the rates vary significantly. The age bands should not be overly broad, based on the expected rate variations within the bands. If rates vary significantly by age, it is inappropriate to assume a single per capita rate that does not vary by age. The relationship between the rates at various ages is an actuarial assumption that may be based on normative databases.

Morbidity (continued)

Recommendation: In the absence of credible plan experience, CMC assumes the projected medical and prescription drug costs of MEHP vary significantly by age from the average cost at the central age of the applicable group based upon the paper "Aging Curves for Health Care Costs in Retirements", The North American Actuarial Journal, July 2005, Jeffrey P. Petertil. Here, the paper's "Representative Curve for General Use" is used for ages 50 and older, and factors developed from a national average claims and utilization database are used for ages below 50. CMC continuously monitors all available data, publications, and research projects undertaken by actuarial organizations regarding age-related morbidity (e.g., "Health Care Costs—From Birth to Death", Health Care Cost Institute's Independent Report Series – Report 2013-1, June 2013, Dale H. Yamamoto) and see no indication of the factors no longer being appropriate.

For the retiree health care liabilities of those under age 65, the current premium charged by the Kentucky Employees' Health Plan (KEHP) is used as the base cost and is projected forward using the health care trend assumption (i.e., no implicit rate subsidy is calculated or recognized). Under Actuarial Standard of Practice No. 6 (ASOP No. 6), aging subsidies (or implicit rate subsidies) should be recognized, as the differences in health care utilization and cost due to age have been demonstrated and well quantified. The impact of aging on a valuation's results can be as significant as the use of mortality, trend, and discounting. It has been the long-standing position that the responsibility for compliance with GASB Statement No. 43, when it relates to KEHP implicit subsidies, rests with KEHP, not the System, as the System has no operational authority over KEHP. As such, KEHP implicit subsidies are excluded from the OPEB valuation process of the MIF. As GASB 74 and 75 prohibit such a deviation from ASOP No. 6, additional consideration to the current treatment of KEHP implicit rate subsidies may be needed in the future.

Coverage Assumptions

In addition to covering eligible retirees, many plans cover the spouse and dependents of retirees. In addition, plans may offer some or all participants a choice of coverage such as HMOs, PPOs, and POS plans. The magnitude of the retiree group benefit obligation can vary significantly as a result of the coverage assumptions. The actuary should therefore consider historical participation rates and trends in coverage rates when selecting the coverage assumptions.

Member Participation

Background: For plans that require some form of contribution to maintain coverage, some eligible inactive members may not elect to be covered, particularly if they have other coverage available from their most recent employer. Empirical data on plan participation, where available and credible, should be considered when selecting the participation assumption for future covered retirees that retire from an eligible inactive status. When developing the participation rates, how plan eligibility rules, plan choices, or retiree contribution rates have changed over time should be considered.

Furthermore, plan participation may be different in the future due to participants' response to changes in retiree contribution levels and plan choices. For plans that anticipate changes in retiree contributions, the appropriateness of participation rates that vary over the projection period for both current and future retirees should be considered. In addition, plan eligibility rules governing dropping coverage and subsequent re-enrollment when selecting participation rates should be considered.

Coverage Assumptions (continued)

Recommendation: Historical MIF participation levels suggest an adjustment to the current assumption. The use of the historical average is proposed, with adjustments to reflect an increase in participation as the System's contribution amount increases.

KTRS Contribution %	Valuation Date					
	6/30/2011	6/30/2012	6/30/2013	6/30/2014	6/30/2015	Total
Number of Retirees Electing MIF Coverage						
10%	36	52	63	67	n/a	218
25%	198	207	222	229	n/a	856
45%	2	2	2	6	n/a	12
50%	682	747	798	808	n/a	3,035
65%	0	1	4	3	n/a	8
70%	252	239	218	203	n/a	912
75%	1,097	1,220	1,294	1,343	n/a	4,954
80%	449	401	372	346	n/a	1,568
90%	718	629	590	553	n/a	2,490
95%	0	0	0	0	n/a	0
100%	31,599	32,502	33,214	33,715	n/a	131,030
Number of Retirees Eligible for MIF Coverage						
10%	138	206	273	333	n/a	950
25%	1,006	1,062	1,143	1,224	n/a	4,435
45%	4	8	16	27	n/a	55
50%	1,356	1,502	1,622	1,735	n/a	6,215
65%	3	4	10	19	n/a	36
70%	561	538	501	476	n/a	2,076
75%	1,574	1,721	1,841	1,947	n/a	7,083
80%	661	627	586	545	n/a	2,419
90%	894	843	785	736	n/a	3,258
95%	0	3	5	5	n/a	13
100%	34,555	35,686	36,560	37,264	n/a	144,065
% Electing MIF Coverage						
10%	26%	25%	23%	20%	n/a	23%
25%	20%	19%	19%	19%	n/a	19%
45%	50%	25%	13%	22%	n/a	22%
50%	50%	50%	49%	47%	n/a	49%
65%	0%	25%	40%	16%	n/a	22%
70%	45%	44%	44%	43%	n/a	44%
75%	70%	71%	70%	69%	n/a	70%
80%	68%	64%	63%	63%	n/a	65%
90%	80%	75%	75%	75%	n/a	76%
95%	n/a	0%	0%	0%	n/a	0%
100%	91%	91%	91%	90%	n/a	91%

Coverage Assumptions (continued)

Summary of MIF Election Rates			
KTRS Contribution %	Experience	Current	Proposed
10%	23%	9%	*20%*
25%	19%	23%	*20%*
45%	22%	41%	*41%*
50%	49%	45%	*49%*
65%	22%	59%	*61%*
70%	44%	n/a	*n/a*
75%	70%	68%	*70%*
80%	65%	n/a	*n/a*
90%	76%	81%	*76%*
95%	0%	86%	*84%*
100%	91%	93%	*91%*

Plan Elections

Background: As KEHP costs vary by plan, the future level of participation in the plans for covered members under 65 should be considered based upon historical participation rates, and how plan eligibility rules, plan choices, and retiree contribution rates have changed over time.

Recommendation: Based upon recent experience, plan election options can change, and plan election rates can shift over time. As a result, continued monitoring of experience and annual updating of the KEHP coverage assumption is proposed.

Valuation Date	Standard PPO	Capitol Choice	Optimum PPO	LivingWell CDHP	LivingWell PPO	Standard PPO	Standard CDHP	Total
KEHP Retiree Coverage Elections								
6/30/2011	489	2,948	12,487	n/a	n/a	n/a	n/a	15,924
6/30/2012	651	2,772	11,839	n/a	n/a	n/a	n/a	15,262
6/30/2013	753	2,554	11,270	n/a	n/a	n/a	n/a	14,577
6/30/2014	n/a	n/a	n/a	4,364	6,890	1,295	873	13,422
6/30/2015	n/a	n/a	n/a	4,887	5,736	1,044	805	12,472
KEHP Retiree Coverage Election %s								
6/30/2011	3%	19%	78%	n/a	n/a	n/a	n/a	100%
6/30/2012	4%	18%	78%	n/a	n/a	n/a	n/a	100%
6/30/2013	n/a*	n/a*	n/a*	35%	55%	10%	0%	100%
6/30/2014	n/a	n/a	n/a	32%	51%	10%	7%	100%
6/30/2015	n/a	n/a	n/a	39%	46%	8%	7%	100%

*As the actual plan elections for January 1, 2014 were not known on the valuation date, the prospective election percentages were determined via migration analysis.

Coverage Assumptions (continued)

Spouse Participation

Background: Those who are eligible for coverage under the plan should be considered and appropriate assumptions made regarding the coverage of spouses and dependents. Additionally, the impact of plan rules governing changes in coverage after retirement, such as remarriage, if significant should be considered. A review of historical data on spouse and dependent coverage rates when selecting the assumption to be used in the projection should be made.

Recommendation: The percentage of those electing MIF coverage for their spouses has remained steady over time and MIF's benefits and rules regarding dependent coverage are not anticipated to change. As a result, the use of the historical spouse coverage election average is proposed.

Valuation Date	Gender		
	Male	**Female**	**Total**
Number of Retirees Electing to Cover a Spouse			
6/30/2011	2,464	3,542	6,006
6/30/2012	2,425	3,655	6,080
6/30/2013	2,386	3,728	6,114
6/30/2014	2,272	3,804	6,076
6/30/2015	3,115	3,049	6,164
Total	*12,662*	*17,778*	*30,440*
Number of Retirees Electing Coverage			
6/30/2011	10,400	24,633	35,033
6/30/2012	10,539	25,461	36,000
6/30/2013	10,684	26,093	36,777
6/30/2014	10,680	26,595	37,275
6/30/2015	10,779	27,296	38,075
Total	*53,082*	*130,078*	*183,160*
% Electing Spouse Coverage			
6/30/2011	24%	14%	17%
6/30/2012	23%	14%	17%
6/30/2013	22%	14%	17%
6/30/2014	21%	14%	16%
6/30/2015	29%	11%	16%
Total	*24%*	*14%*	*17%*
Current Assumption	20%		
Proposed %	***25%***	***15%***	

Coverage Assumptions (continued)

KEHP Dependent Coverage Elections

Background: Beginning with the June 30, 2015 valuation, a liability for the State's KEHP Spouse/Dependent Subsidy is recognized. To determine the value of the KEHP Spouse/Dependent Subsidy for future retirees, an assumption regarding coverage tier elections is needed.

Recommendation: As historical experience is not available, continued monitoring of experience and annual updating of the assumption is proposed.

| Valuation Date | KEHP Coverage Tier | | | | | |
	Family Cross Reference	Couple	Family	Parent Plus	Single	Total
Number of Retirees Electing Coverage Tier						
6/30/2015	632	1,361	400	708	9,313	12,414
% of Retirees Electing Coverage Tier						
6/30/2015	5%	11%	3%	6%	75%	100%

Coverage Assumptions (continued)

<u>*Terminated and Vested Participation*</u>

Background: Although eligible inactive members may begin receiving benefits once meeting the age and service requirements for retirement eligibility, some members may withdrawal, and those members electing to receive benefits may not begin receiving benefits at the earliest eligibility date. For eligible inactive members, a rate of benefit participation and an average age in which benefits are to begin must be assumed.

Recommendation: Based upon the four most recent years of experience, the rates of withdrawal for those active members under the age of 55 who have less than 27 years of service have increased slightly. As the average rate of withdrawal has remained relatively steady over time, the use of the historical average is proposed for members under the age of 55 who have less than 27 years of service.

Rates of Withdrawal			
Experience Period	**Years of Service**		
	5-10	**10-15**	**15-27**
Number of Active Members Under Age 55 Entering Vested and Terminated Status			
7/1/2011 – 6/30/2012	463	144	83
7/1/2012 – 6/30/2013	496	179	90
7/1/2013 – 6/30/2014	504	170	120
7/1/2014 – 6/30/2015	518	221	91
Total	*1,981*	*714*	*384*
Number of Active Members Under Age 55 Entering Vested and Terminated Status or Withdrawing			
7/1/2011 – 6/30/2012	567	168	94
7/1/2012 – 6/30/2013	612	216	101
7/1/2013 – 6/30/2014	649	205	135
7/1/2014 – 6/30/2015	647	272	112
Total	*2,475*	*861*	*442*
% of Active Members Under Age 55 Electing to Retain Membership upon Termination			
7/1/2011 – 6/30/2012	82%	86%	88%
7/1/2012 – 6/30/2013	81%	83%	89%
7/1/2013 – 6/30/2014	78%	83%	89%
7/1/2014 – 6/30/2015	80%	81%	81%
Total	*80%*	*83%*	*87%*
Current Assumption	50%		
Proposed %	***80%***	***85%***	***90%****

*To be used for all other age/service combinations.

Coverage Assumptions (continued)

Based upon the four most recent years of experience, the rates of vested and terminated benefit participation have decreased. To prevent giving too much weight to the most recent year, the recommendation reflects an equal weighting of each of the four years. As the average age of initial benefit receipt has remained relatively steady over time, the use of the historical average is proposed for the age of initial benefit receipt.

Terminated and Vested Rates of Benefit Participation								
Experience Period	**Years of Service**							
	5 - 10	**10 - 15**	**15 - 20**	**20 - 25**	**25 - 26**	**26 - 27**	**27+**	**Total**
Number Receiving a Pension Benefit or Returning to Active Status								
7/1/2011 – 6/30/2012	329	159	60	26	14	11	21	620
7/1/2012 – 6/30/2013	405	157	75	32	9	7	17	702
7/1/2013 – 6/30/2014	355	155	69	25	8	9	15	636
7/1/2014 – 6/30/2015	470	200	83	60	12	15	20	860
Total	1,559	671	287	143	43	42	73	2,818
Number Receiving a Pension Benefit, Returning to Active Status, or Withdrawing								
7/1/2011 – 6/30/2012	412	178	66	26	14	11	23	730
7/1/2012 – 6/30/2013	515	181	82	33	9	7	20	847
7/1/2013 – 6/30/2014	508	182	76	26	8	9	16	825
7/1/2014 – 6/30/2015	666	263	104	88	18	25	97	1,261
Total	2,101	804	328	173	49	52	156	3,663
% Receiving a Pension Benefit or Returning to Active Status								
7/1/2011 – 6/30/2012	80%	89%	91%	100%	100%	100%	91%	85%
7/1/2012 – 6/30/2013	79%	87%	91%	97%	100%	100%	85%	83%
7/1/2013 – 6/30/2014	70%	85%	91%	96%	100%	100%	94%	77%
7/1/2014 – 6/30/2015	71%	76%	80%	68%	67%	60%	21%	68%
Total	74%	83%	88%	83%	88%	81%	47%	77%
Average %	75%	84%	88%	90%	92%	90%	73%	78%
Current Assumption	70%							
Proposed %	*75%*	*85%*	*90%*				*75%*	
Average Age of Initial Pension Benefit								
7/1/2011 – 6/30/2012	61	59	60	59	60	51	59	60
7/1/2012 – 6/30/2013	62	60	59	59	67	59	59	61
7/1/2013 – 6/30/2014	61	60	57	57	60	59	59	59
7/1/2014 – 6/30/2015	64	60	60	58	54	56	64	62
Total	62	60	59	58	61	57	60	61
Average Age	62	60	59	58	60	56	60	60
Current Assumption	60							
Proposed	*60*							

Coverage Assumptions (continued)

<u>*Spouse Age Difference*</u>

Background: The actual data for the age of the covered spouse and dependents of retired participants is used. The spouse and dependents of an active employee today may not be the same spouse and dependents covered at retirement, therefore the actuary should generally select an assumed covered spouse age difference for purposes of projecting future spouse coverage and assumed dependents' ages for projecting dependent coverage.

Recommendation: The average age difference between MIF covered male and female spouses has remained steady over time. As a result, the use of the historical average is proposed.

Valuation Date	Gender		
	Male	**Female**	**Total**
Average Age of Retiree Electing to Cover a Spouse			
6/30/2011	69	65	66
6/30/2012	69	65	67
6/30/2013	69	65	67
6/30/2014	70	66	67
6/30/2015	Excluded	Excluded	Excluded
Average	*69*	*65*	*67*
Average Age of Covered Spouse			
6/30/2011	65	66	66
6/30/2012	66	66	66
6/30/2013	66	67	66
6/30/2014	66	67	67
6/30/2015	Excluded	Excluded	Excluded
Average	*66*	*67*	*66*
Age Difference			
6/30/2011	3	-1	1
6/30/2012	3	-1	0
6/30/2013	3	-1	0
6/30/2014	3	-1	0
6/30/2015	Excluded	Excluded	Excluded
Average	*3*	*-1*	*0*
Current Assumption	3	-3	
Proposed %	***3***	***-1***	

Coverage Assumptions (continued)

No Part A Subsidy

Background: The premiums charged to an enrollee who is age sixty-five or older and who is not eligible for premium-free benefits under Medicare Part A is the same as the premium charged to an enrollee eligible for premium-free benefits under Medicare Part A with the same service credit. As a result, an additional, "No Part A" subsidy is paid on behalf of those enrollees who are age sixty-five or older and are not eligible for premium-free benefits under Medicare Part A.

9% of current retirees under the age of 65 who were hired prior to 4/1/1986 are currently assumed to be ineligible for premium-free Medicare Part A benefits upon reaching Medicare eligibility (age 65) based upon the current population that is ineligible for premium-free Medicare Part A benefits. 0% of these retirees are assumed to cover a spouse, reflecting the MIF's current benefit policy. All active members are assumed to have begun contributing to Medicare as of 4/1/1986 and are assumed eligible for premium-free Medicare Part A benefits.

Recommendation: As of June 30, 2015, the System began to provide member-level data for those retiree receiving the "No Part A" Subsidy. As a result, continued monitoring of experience and annual updating of the assumption is proposed.

Valuation Date	Experience	Assumption
6/30/2011	n/a	0%
6/30/2012	n/a	17%
6/30/2013	n/a	19%
6/30/2014	n/a	21%
6/30/2015	9%	9%

Section V
Other Assumptions and Methods

AMORTIZATION METHOD: Currently, the unfunded accrued liability is amortized using the level percent of payroll amortization method. We recommend no change in this methodology. We also recommend no change in the layered UAAL approach that was adopted by the Board in the Funding Policy.

ASSETS: Currently, the actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected market 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 market value. In addition, the actuarial value of assets cannot be less than 80% or more than 120% of the market value of assets. We recommend maintaining the current smoothing method.

ADMINISTRATIVE TOOLS: We recommend that any administrative tools utilized by the Retirement System be revised to be based on the mortality table and investment rate of return recommended for the valuation.

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 be based on the mortality table recommended for the valuation.

VALUATION COST METHOD: Currently, the valuation uses the Entry Age Normal (EAN) 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 in the cost method.

PERCENT MARRIED: Currently, 100% of all members are assumed to be married with the male three years older than his spouse. This assumption is used to determine if anyone is entitled to a Survivor Benefit from a death in active service. The survivor benefits for members with 10 years of service before death can be paid to either spouses or dependent children or other dependents. An analysis of active members shows that 99% of all active members have listed either a spouse or a dependent beneficiary on file. Therefore, we recommend no change in this assumption at this time.

PART-TIMERS: Currently, we assume that all part time employees will accrue 0.25 years of service each year while in that status. After review of the data for the past 5 years, part-timers are averaging 0.24 years of service each year, therefore, we recommend no change in this assumption at this time.

UNUSED SICK LEAVE: Currently, we assume a load of 2.0% to all active liability for all unused sick leave added at retirement. KTRS staff has supplied us with average service credits due to unused sick leave for those active members that retired in the last 10 years that were not in Local School Districts. The average unused sick leave credit for these individuals was approximately 0.33 years of service. For those active members retiring from the Local School Districts, Final Average Compensation is increased by the average additional payroll they received from their unused sick leave time. Average additional payroll for these members averaged around $10,000. Using these figures, we are computing that the load for unused sick leave should be 2.0% and we recommend no change at this time.

Appendix A

Historical June CPI (U) Index

Year	CPI (U)	Year	CPI (U)
1960	29.6	1988	118.0
1961	29.8	1989	124.1
1962	30.2	1990	129.9
1963	30.6	1991	136.0
1964	31.0	1992	140.2
1965	31.6	1993	144.4
1966	32.4	1994	148.0
1967	33.3	1995	152.5
1968	35.7	1996	156.7
1969	34.7	1997	160.3
1970	38.8	1998	163.0
1971	40.6	1999	166.2
1972	41.7	2000	172.4
1973	44.2	2001	178.0
1974	49.0	2002	179.9
1975	53.6	2003	183.7
1976	56.8	2004	189.7
1977	60.7	2005	194.5
1978	65.2	2006	202.9
1979	72.3	2007	208.352
1980	82.7	2008	218.815
1981	90.6	2009	215.693
1982	97.0	2010	217.965
1983	99.5	2011	225.722
1984	103.7	2012	229.478
1985	107.6	2013	233.504
1986	109.5	2014	238.343
1987	113.5	2015	238.638

Appendix B

Capital Market Assumptions and Asset Allocation

Geometric Rates of Return and Standard Deviations by Asset Class

Asset Class	Expected Geometric Real Rates of Return	Standard Deviation
U.S. Equity	4.4%	17.8%
International Equity	5.3%	21.7%
Fixed Income	1.5%	5.0%
Additional Categories*	3.6%	8.5%
Real Estate	4.4%	12.5%
Private Equity	6.7%	24.5%
Cash	0.8%	2.0%

* Includes Hedge Funds, High Yield and Non-US Developed Bonds

Long Term Asset Allocation Targets

Asset Class	Asset Allocation
U.S. Equity	42%
International Equity	20%
Fixed Income	16%
Additional Categories	9%
Real Estate	5%
Private Equity	6%
Cash	2%

Appendix C

Social Security Administration Wage Index

Year	Wage Index	Annual Increase	Year	Wage Index	Annual Increase
1957	$3,641.72		1986	17,321.82	2.97
1958	3,673.80	0.88%	1987	18,426.51	6.38
1959	3,855.80	4.95	1988	19,334.04	4.93
1960	4,007.12	3.92	1989	20,099.55	3.96
1961	4,086.76	1.99	1990	21,027.98	4.62
1962	4,291.40	5.01	1991	21,811.60	3.73
1963	4,396.64	2.45	1992	22,935.42	5.15
1964	4,576.32	4.09	1993	23,132.67	0.86
1965	4,658.72	1.80	1994	23,753.53	2.68
1966	4,938.36	6.00	1995	24,705.66	4.01
1967	5,213.44	5.57	1996	25,913.90	4.89
1968	5,571.76	6.87	1997	27,426.00	5.84
1969	5,893.76	5.78	1998	28,861.44	5.23
1970	6,186.24	4.96	1999	30,469.84	5.57
1971	6,497.08	5.02	2000	32,154.82	5.53
1972	7,133.80	9.80	2001	32,921.92	2.39
1973	7,580.16	6.26	2002	33,252.09	1.00
1974	8,030.76	5.94	2003	34,064.95	2.44
1975	8,630.92	7.47	2004	35,648.55	4.65
1976	9,226.48	6.90	2005	36,952.94	3.66
1977	9,779.44	5.99	2006	38,651.41	4.60
1978	10,556.03	7.94	2007	40,405.48	4.54
1979	11,479.46	8.75	2008	41,334.97	2.30
1980	12,513.46	9.01	2009	40,711.61	(1.50)
1981	13,773.10	10.07	2010	41,673.83	2.36
1982	14,531.34	5.51	2011	42,979.61	3.13
1983	15,239.24	4.87	2012	44,321.67	3.12
1984	16,135.07	5.88	2013	44,888.16	1.28
1985	16,822.51	4.26	2014	46,481.52	3.55

Appendix D
TABLE 1

RATES OF SEPARATION FROM ACTIVE SERVICE – MALES

AGE	RATES OF WITHDRAWAL Service			DEATH	DISABILITY	RATES OF RETIREMENT BEFORE 27 YEARS OF SERVICE	RATES OF RETIREMENT AFTER 27 YEARS OF SERVICE*
	0 – 4	5 – 9	10+				
20	0.1100			0.000192	0.00010		
21	0.1100			0.000199	0.00010		
22	0.1100			0.000204	0.00010		
23	0.1100			0.000208	0.00010		
24	0.1100			0.000209	0.00010		
25	0.1100	0.0300		0.000209	0.00010		
26	0.1100	0.0300		0.000210	0.00010		
27	0.1100	0.0300		0.000213	0.00010		
28	0.1100	0.0300		0.000219	0.00010		
29	0.1100	0.0300		0.000229	0.00010		
30	0.1100	0.0300	0.0300	0.000247	0.00010		
31	0.1120	0.0310	0.0268	0.000278	0.00016		
32	0.1140	0.0320	0.0236	0.000313	0.00022		
33	0.1160	0.0330	0.0204	0.000351	0.00028		
34	0.1180	0.0340	0.0172	0.000391	0.00034		
35	0.1200	0.0350	0.0140	0.000430	0.00040		
36	0.1200	0.0370	0.0140	0.000468	0.00050		
37	0.1200	0.0390	0.0140	0.000503	0.00060		
38	0.1200	0.0410	0.0140	0.000537	0.00070		
39	0.1200	0.0430	0.0140	0.000568	0.00080		
40	0.1200	0.0450	0.0140	0.000601	0.00090		
41	0.1200	0.0450	0.0138	0.000636	0.00112		
42	0.1200	0.0450	0.0136	0.000676	0.00134		
43	0.1200	0.0450	0.0134	0.000723	0.00156		
44	0.1200	0.0450	0.0132	0.000778	0.00178		
45	0.1200	0.0450	0.0130	0.000839	0.00200		0.170
46	0.1240	0.0450	0.0142	0.000899	0.00220		0.170
47	0.1280	0.0450	0.0154	0.000965	0.00240		0.170
48	0.1320	0.0450	0.0166	0.001035	0.00260		0.170
49	0.1360	0.0450	0.0178	0.001110	0.00280		0.170
50	0.1400	0.0450	0.0190	0.001190	0.00300		0.170
51	0.1420	0.0450	0.0200	0.001363	0.00356		0.170
52	0.1440	0.0450	0.0210	0.001484	0.00412		0.160
53	0.1460	0.0450	0.0220	0.001623	0.00468		0.130
54	0.1480	0.0450	0.0230	0.001779	0.00524		0.150
55	0.1500	0.0450	0.0240	0.002017	0.00580	0.050	0.450
56	0.1500	0.0440	0.0240	0.002338	0.00614	0.050	0.350
57	0.1500	0.0430	0.0240	0.002547	0.00648	0.055	0.350
58	0.1500	0.0420	0.0240	0.002791	0.00682	0.055	0.350
59	0.1500	0.0410	0.0240	0.003069	0.00716	0.055	0.250
60	0.1500	0.0400	0.0240	0.003396	0.00750	0.130	0.350
61	0.1500	0.0390	0.0240	0.003768	0.00750	0.130	0.300
62	0.1500	0.0380	0.0240	0.004191	0.00750	0.150	0.250
63	0.1500	0.0370	0.0240	0.004673	0.00750	0.130	0.250
64	0.1500	0.0360	0.0240	0.005133	0.00750	0.150	0.250
65	0.1500	0.0350	0.0240	0.005651	0.00750	0.200	0.250
66	0.1600	0.0280	0.0192	0.006233	0.00750	0.200	0.300
67	0.1700	0.0210	0.0144	0.006780	0.00750	0.200	0.250
68	0.1800	0.0140	0.0096	0.007349	0.00750	0.200	0.250
69	0.1900	0.0070	0.0048	0.008143	0.00750	0.200	0.200
70	0.2000	0.0000	0.0000	0.009131	0.00750	0.200	0.200
71	0.2000	0.0000	0.0000	0.010103	0.00750	0.200	0.200
72	0.2000	0.0000	0.0000	0.011218	0.00750	0.200	0.200
73	0.2000	0.0000	0.0000	0.012495	0.00750	0.200	0.200
74	0.2000	0.0000	0.0000	0.013940	0.00750	0.200	0.200
75	0.2000	0.0000	0.0000	0.015557	0.00750	1.000	1.000

*Plus 7.5% in year when first eligible for unreduced retirement with 27 years of service.

TABLE 2
RATES OF SEPARATION FROM ACTIVE SERVICE – FEMALES

AGE	RATES OF WITHDRAWAL Service 0 – 4	5 – 9	10+	RATES OF DEATH	RATES OF DISABILITY	RATES OF RETIREMENT BEFORE 27 YEARS OF SERVICE	RATES OF RETIREMENT AFTER 27 YEARS OF SERVICE*
20	0.0900			0.000071	0.00010		
21	0.0900			0.000071	0.00010		
22	0.0900			0.000072	0.00010		
23	0.0900			0.000073	0.00010		
24	0.0900			0.000075	0.00010		
25	0.0900	0.0400		0.000077	0.00010		
26	0.0960	0.0400		0.000079	0.00014		
27	0.1020	0.0400		0.000083	0.00018		
28	0.1080	0.0400		0.000087	0.00022		
29	0.1140	0.0400		0.000092	0.00026		
30	0.1200	0.0400	0.0165	0.000098	0.00030		
31	0.1200	0.0400	0.0162	0.000114	0.00036		
32	0.1200	0.0400	0.0159	0.000130	0.00042		
33	0.1200	0.0400	0.0156	0.000146	0.00048		
34	0.1200	0.0400	0.0153	0.000161	0.00054		
35	0.1200	0.0400	0.0150	0.000176	0.00060		
36	0.1200	0.0400	0.0146	0.000191	0.00072		
37	0.1200	0.0400	0.0142	0.000206	0.00084		
38	0.1200	0.0400	0.0138	0.000222	0.00096		
39	0.1200	0.0400	0.0134	0.000240	0.00108		
40	0.1200	0.0400	0.0130	0.000262	0.00120		
41	0.1220	0.0400	0.0128	0.000287	0.00146		
42	0.1240	0.0400	0.0126	0.000316	0.00172		
43	0.1260	0.0400	0.0124	0.000348	0.00198		
44	0.1280	0.0400	0.0122	0.000382	0.00224		
45	0.1300	0.0400	0.0120	0.000417	0.00250		0.150
46	0.1300	0.0420	0.0126	0.000454	0.00288		0.150
47	0.1300	0.0440	0.0132	0.000492	0.00326		0.150
48	0.1300	0.0460	0.0138	0.000532	0.00364		0.150
49	0.1300	0.0480	0.0144	0.000575	0.00402		0.170
50	0.1300	0.0500	0.0150	0.000622	0.00440		0.180
51	0.1340	0.0500	0.0160	0.000687	0.00482		0.180
52	0.1380	0.0500	0.0170	0.000749	0.00524		0.180
53	0.1420	0.0500	0.0180	0.000819	0.00566		0.180
54	0.1460	0.0500	0.0190	0.000877	0.00608		0.180
55	0.1500	0.0500	0.0200	0.000959	0.00650	0.055	0.500
56	0.1500	0.0500	0.0200	0.001063	0.00690	0.055	0.450
57	0.1500	0.0500	0.0200	0.001167	0.00730	0.055	0.400
58	0.1500	0.0500	0.0200	0.001284	0.00770	0.055	0.400
59	0.1500	0.0500	0.0200	0.001417	0.00810	0.060	0.400
60	0.1500	0.0500	0.0200	0.001573	0.00850	0.140	0.400
61	0.1500	0.0480	0.0200	0.001764	0.00850	0.140	0.400
62	0.1500	0.0460	0.0200	0.001969	0.00850	0.140	0.400
63	0.1500	0.0440	0.0200	0.002262	0.00850	0.150	0.400
64	0.1500	0.0420	0.0200	0.002549	0.00850	0.150	0.400
65	0.1500	0.0400	0.0200	0.002871	0.00850	0.220	0.350
66	0.1500	0.0320	0.0160	0.003240	0.00850	0.220	0.350
67	0.1500	0.0240	0.0120	0.003598	0.00850	0.180	0.350
68	0.1500	0.0160	0.0080	0.003977	0.00850	0.180	0.350
69	0.1500	0.0080	0.0040	0.004395	0.00850	0.180	0.350
70	0.1500	0.0000	0.0000	0.004952	0.00850	0.200	0.350
71	0.1500	0.0000	0.0000	0.005495	0.00850	0.200	0.350
72	0.1500	0.0000	0.0000	0.006113	0.00850	0.200	0.350
73	0.1500	0.0000	0.0000	0.006794	0.00850	0.200	0.350
74	0.1500	0.0000	0.0000	0.007530	0.00850	0.200	0.350
75	0.1500	0.0000	0.0000	0.008313	0.00850	1.000	1.000

*Plus 7.5% in year when first eligible for unreduced retirement with 27 years of service.

TABLE 3

RATES OF ANTICIPATED SALARY INCREASES
(For Both Males and Females)

AGE	RATE*
19	1.038
20	1.037
21	1.035
22	1.034
23	1.032
24	1.030
25	1.029
26	1.027
27	1.025
28	1.023
29	1.021
30	1.019
31	1.018
32	1.016
33	1.015
34	1.013
35	1.012
36	1.011
37	1.010
38	1.009
39	1.008
40	1.007
41	1.006
42	1.006
43	1.005
44	1.004
45	1.003
46	1.003
47	1.003
48	1.002
49	1.002
50	1.002
51	1.001
52	1.001
53	1.000
54	1.000
55	1.000
56	1.000
57	1.000
58	1.000
59	1.000
60	1.000
61	1.000
62	1.000
63	1.000
64	1.000
65	1.000
66	1.000
67	1.000
68	1.000
69	1.000
70	1.000

*Does not include wage inflation assumption at 3.50% per annum.

TABLE 4

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

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.000331	0.000177	71	0.020825	0.015281
20	0.000340	0.000178	72	0.023233	0.016986
21	0.000346	0.000180	73	0.025929	0.018826
22	0.000349	0.000183	74	0.028900	0.020784
23	0.000349	0.000186	75	0.032147	0.022899
24	0.000351	0.000192	76	0.035722	0.025220
25	0.000354	0.000199	77	0.039700	0.027801
26	0.000365	0.000207	78	0.044114	0.030693
27	0.000382	0.000218	79	0.049373	0.033926
28	0.000412	0.000230	80	0.055160	0.037551
29	0.000463	0.000245	81	0.061487	0.041628
30	0.000521	0.000285	82	0.068382	0.046222
31	0.000585	0.000325	83	0.075906	0.051406
32	0.000651	0.000365	84	0.084158	0.057269
33	0.000717	0.000404	85	0.095631	0.063873
34	0.000780	0.000441	86	0.108574	0.071239
35	0.000839	0.000477	87	0.123063	0.079348
36	0.000894	0.000514	88	0.139099	0.088111
37	0.000947	0.000555	89	0.155385	0.099870
38	0.001001	0.000601	90	0.172787	0.112476
39	0.001059	0.000655	91	0.191152	0.125732
40	0.001127	0.000718	92	0.210317	0.139427
41	0.001205	0.000790	93	0.230128	0.153358
42	0.001296	0.000869	94	0.250467	0.167340
43	0.001399	0.000955	95	0.271263	0.181190
44	0.001499	0.001043	96	0.285234	0.194718
45	0.001609	0.001135	97	0.306313	0.202595
46	0.001725	0.001230	98	0.319624	0.214644
47	0.001851	0.001330	99	0.341120	0.220284
48	0.001983	0.001438	100	0.353540	0.232882
49	0.002272	0.001555	101	0.373578	0.242074
50	0.002474	0.001718	102	0.382320	0.259472
51	0.002705	0.001872	103	0.397886	0.272162
52	0.002965	0.002047	104	0.400000	0.293116
53	0.003362	0.002193	105	0.400000	0.307811
54	0.003896	0.002397	106	0.400000	0.322725
55	0.004246	0.002658	107	0.400000	0.337441
56	0.004652	0.002918	108	0.400000	0.351544
57	0.005115	0.003209	109	0.400000	0.364617
58	0.005660	0.003543	110	0.400000	0.376246
59	0.006280	0.003932	111	0.400000	0.386015
60	0.006985	0.004409	112	0.400000	0.393507
61	0.007788	0.004923	113	0.400000	0.398308
62	0.008555	0.005656	114	0.400000	0.400000
63	0.009419	0.006374	115	0.400000	0.400000
64	0.010389	0.007177	116	0.400000	0.400000
65	0.011300	0.008100	117	0.400000	0.400000
66	0.012248	0.008994	118	1.000000	0.400000
67	0.013571	0.009942	119	1.000000	1.000000
68	0.015219	0.010989	120	1.000000	1.000000
69	0.016839	0.012380			
70	0.018697	0.013739			

TABLE 5

RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF DISABILITY

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

Appendix E

ADOPTION OF TABLES HEREIN PRESENTED

In order that the tables herein presented may have the official approval of the Board of Trustees, the following resolutions are recommended for adoption.

WHEREAS, The investigation of the mortality, service and compensation experience of the members of the Teachers' Retirement System of the State of Kentucky which was prepared as of June 30, 2015 indicated that the mortality tables and active service tables previously adopted by the Board of Trustees require modification in order that they may reflect more closely the actual past experience of the membership, and

WHEREAS, The actuary has prepared new tables of rates which he recommends for adoption, therefore, be it

RESOLVED, That the Board of Trustees, acting in accordance with Section 161.400 of the retirement law and upon the recommendation of the actuary, hereby discontinues the use in calculating the State's rates of contribution and in valuing the liabilities of the System of the active service tables and mortality tables adopted by the Board on September 19, 2011, and approves for use instead the attached active service tables, and mortality tables, and be in further

RESOLVED, That the use of the new tables in the valuation as of June 30, 2016 and in all actuarial valuations thereafter, is hereby approved.

The Board of Trustees of the Teachers' Retirement System of the State of Kentucky approved the preceding resolution at a meeting held on September 19, 2016.

BOARD OF TRUSTEES,
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF
KENTUCKY

By …………………………………………………………
                        Chairperson

Attest:

…………………………………………………..
                Secretary