County Employees Retirement System

2022 Actuarial Experience Study
for the Period Ending June 30, 2022

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May 9, 2023

Board of Trustees
County Employees Retirement System
Perimeter Park West
1260 Louisville Road
Frankfort, KY 40601

Dear Members of the Board:

Subject: Results of 2022 Experience Study

We are pleased to present our report of the 2022 Experience Investigation Study for the County Employees Retirement System for the period ending June 30, 2022. This report includes summaries and analysis of the experience data. Based on this analysis, we have recommendations for updates to certain actuarial assumptions and methods for use in the actuarial valuation, which will be first used in the June 30, 2023 actuarial valuation.

In addition, the report provides the estimated effect on the actuarial liabilities and the contribution requirements if these recommendations are adopted by the Board. This is the second experience study performed by GRS for the County Employees Retirement System. While there were some material changes in the actuarial assumptions adopted by the Board in the prior experience study conducted in 2018, the Board will find our recommendations to be significantly subtler in this report. Further to this point, the analysis in this experience study confirms that the demographic assumptions currently used in the actuarial valuation remain applicable best estimates of the future experience of the plan.

This experience investigation study was conducted in accordance with generally accepted actuarial principles and practices, and in full compliance with the Actuarial Standards of Practice as issued by the Actuarial Standards Board. All of the undersigned are members of and meet the Qualification Standards of the American Academy of Actuaries and have experience with large public sector retirement systems.

We wish to thank the KPPA staff for their assistance in this project.

Sincerely,

Janie Shaw, ASA, EA, MAAA
Consultant

Daniel J. White, FSA, EA, MAAA
Senior Consultant

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Summary of Process

A periodic review and selection of the actuarial assumptions is one of many important components of understanding and managing the financial aspects of the County Employees Retirement System. Use of outdated or inappropriate assumptions can result in understated costs which will lead to higher future contribution requirements or perhaps an inability to pay benefits when due. Also, a single set of assumptions is typically not expected to be suitable forever. As the actual experience of the plan changes, the assumptions should be reviewed and adjusted accordingly.

It is important to recognize that the impact from various outcomes and the ability to adjust from experience deviating from the assumption are not symmetric. Due to compounding economic forces, legal limitations, and moral obligations, outcomes from underestimating future liabilities are much more difficult to manage than outcomes of overestimates, and that un-symmetric risk should be considered when the assumption set, investment policy, and funding policy are created. As such, the assumption set used in the valuation process needs to represent the best estimate of the future experience of each fund and be at least as likely, if not more than likely, to overestimate the future liabilities versus underestimate them.

Changes in certain assumptions and methods are suggested upon this comparison to remove any bias that may exist, except to perhaps include some margin for future adverse experience where appropriate. Next, the assumption set as a whole was analyzed for consistency and to ensure that the projection of liabilities was reasonable and consistent.

The following report provides our recommended changes to the current actuarial assumptions.

SECTION I

INTRODUCTION

Introduction

In determining liabilities and contribution rates for retirement plans, actuaries must make assumptions about the future. Among the assumptions that must be made are:

- Investment return rate
- Salary increase rates
- Inflation rate
- Mortality rates
- Retirement rates
- Termination rates
- Disability rates

For some of these assumptions, such as the mortality rates, past experience provides important evidence about the future. For other assumptions, such as the investment return rate, the link between past and future results is much weaker. In either case, though, actuaries should review their assumptions periodically and determine whether these assumptions are consistent with actual past experience and with anticipated future experience.

In conducting experience studies, actuaries generally use data over a period of several years. This is necessary in order to gather enough data so that the results are statistically significant. In addition, if the study period is too short, the impact of the current economic conditions may lead to misleading results. It is known, for example, that the health of the general economy can impact salary increase rates and termination rates. Using results gathered during a short-term economic expansion or contraction will not be representative of the long-term trends in these assumptions. Also, the adoption of legislation, plan improvements or changes in salary schedules will sometimes cause a short-term distortion in the experience. For example, if an early retirement window was opened during the study period, we would usually see a short-term spike in the number of retirements. Using a longer period prevents giving too much weight to such short-term effects. On the other hand, using a much longer period can increase the difficulty of identifying changes in behavior that may be occurring, such as a change in the ages at which members retire. In our view, using a five-year period ending June 30, 2022 is generally reasonable for many assumptions, however we used seven and nine years of experience for developing recommended salary, termination, and mortality assumptions. More detail is provided in each applicable section.

In the review of the demographic assumptions, we first determine the number of deaths, retirements, etc. that occurred during the period. Then we determine the number expected to occur, based on the current actuarial assumptions. The number “expected” is determined by multiplying the probability of the occurrence at the given age, by the “exposures” at that same age. For example, let’s assume there is a rate of retirement of 30% at age 55. The number of exposures can only be those members who are age 55 and eligible for retirement at that time. Thus, they are considered “exposed” to that assumption. Finally, we calculate the A/E ratio, where "A" is the actual number (of retirements, for example) and "E" is the expected number. If the current assumptions were "perfect", the A/E ratio would be 100%. When it varies significantly from this figure, it is a sign that a new assumption may be needed. (However, in some cases we prefer to set our assumptions to produce an A/E ratio a little above or below 100%, in order to

introduce some conservatism.) Of course, we not only look at the assumptions as a whole, but we also review how well they fit the actual results by gender, by age, and by service.

In some instances, we will compare the actual and expected experience based on headcount. On the other hand, there are other instances it is more appropriate to "weigh" the experience by benefit amount, liability, or salary, with the intention that our review and recommendations provide a better fit to the actual experience on a benefit basis which should result in smaller liability gains and losses prospectively.

Finally, if the data leads the actuary to conclude that new tables are needed, we will take into consideration the statistical credibility of the assumption as well as "graduate" or smooth the recommended assumption in instances where the experience has material variation age to age or from service year to service year. Please bear in mind that, while the recommended assumption set represents our best estimate, there are other reasonable assumption sets that could be supported. Some reasonable assumption sets would show higher or lower liabilities or costs.

Organization of Report

Section II of this report summarizes our recommended changes and the fiscal impact if those assumptions are adopted. Section III contains our findings and a more detailed analysis of our recommendation for each actuarial assumption. Section IV provides a summary of the recommended assumptions for each CERS fund (e.g. Non-Hazardous and Hazardous). Finally, Section V presents detailed summaries of the data and comparisons of the A/E ratios.

Section V Exhibits

The exhibits in Section V should generally be self-explanatory. For example, on page 50, we show the exhibit analyzing the service-based termination rates. The second column shows the total number of members who terminated during the study period. This excludes members who became disabled or retired. Column (3) shows the total exposures. This is the number of members who could have terminated during any of the years (in this case weighted by the member's salary). In this exhibit, the exposures exclude anyone eligible for retirement. A member is counted in each year they could have terminated, so the total shown is the total exposures for the study period. Column (4) shows the probability of termination based on the raw data. That is, it is the result of dividing the actual number of terminations (col. 2) by the number exposed (col. 3). Column (5) shows the current termination rate and column (6) shows the new recommended termination rate. Columns (7) and (8) show the expected numbers of terminations based on the current and proposed termination assumptions. Columns (9) and (10) show the Actual-to-Expected ratios under the current and proposed termination assumptions.

SECTION II

SUMMARY OF RECOMMENDATIONS AND FISCAL IMPACTS

Summary of Recommendations CERS

Our recommendations for the actuarial assumptions to be used in the future actuarial valuations for CERS funds may be summarized as follows:

Economic Assumptions

1. Inflation Assumption: Given the current inflationary environment, we recommend increasing the price inflation assumption to 2.50% (i.e. a 0.20% increase from the current assumption). Changing this assumption has no impact on projected benefits, liability, and cost.

2. Investment Return Assumption: We recommend an increase in the investment return assumption to 6.50% for the CERS Non-Hazardous and Hazardous Retirement funds. We also recommend the use of a 6.50% investment return assumption for the health insurance funds. This is a 0.25% increase in the investment return assumption for all funds. However, since the investment return assumption is the most subjective assumption in the actuarial valuation and investment risk is nonsymmetrical (i.e. there is greater risk of downside returns compared to upside returns), it would also be reasonable if the Board elected to maintain the assumed rate of return for these funds.

3. Tier 3 Cash Balance Interest Credit Assumption: As a result of stochastic analysis performed on investment returns and volatility and how it relates to the Tier 3 cash balance interest crediting rate, we recommend increasing the interest crediting assumption to 6.75% for the Non-Hazardous and Hazardous pension funds (based on a 6.50% investment return assumption).

4. Salary Increases for Individual Members: We recommend an increase in the rate of salary increase at certain service intervals for members in the Non-Hazardous and Hazardous funds.

5. Payroll growth rate (used for amortizing the UAAL): We recommend no change to the 2% payroll growth rate assumption for the Non-Hazardous and Hazardous funds.

Demographic Assumptions:

6. Mortality: We recommend replacing the base retiree mortality tables with an updated mortality table developed using the actual mortality experience of non-disabled retirees in CERS, KERS, and SPRS through June 30, 2022. We also recommend using a more recently released generational mortality improvement assumption based on the ultimate rates of the published MP-2020 improvement scales ("2020MP-Ultimate") to explicitly project future improvement in life expectancy.

   We also recommend making an adjustment to the current mortality tables for disabled retirees. We do not recommend any change to the mortality assumption for active members, which is one of the least material assumptions used in the actuarial valuation.

7. Termination/Withdrawal: We recommend increasing the rates of termination prior to retirement for both the non-hazardous and hazardous funds.

8. Disability Incidence: We recommend decreasing the rates of disability incidence for both the non-hazardous and hazardous funds.

9. Retirement: Expected retirement patterns continue to follow actual experience. We are not recommending any changes to the rates used for the non-hazardous or hazardous fund. The rates of retirement used in the valuation will continue to differentiate anticipated retirement behaviors for Tier 1, Tier 2, and Tier 3 members.

10. Participation in the Retiree Health Insurance Plan: We recommend no changes to the current assumptions regarding participation in the retiree health insurance plan.

Actuarial Methods and Policies

11. Asset Valuation Method: We recommend continued use of the five-year asset smoothing method with each year's investment losses based on the expected and actual investment earning determined on a market value of asset basis.

12. Actuarial Cost Method: We recommend the continued use of the individual Entry Age Normal cost method (EAN) used to determine the actuarial accrued liability.

Summary of Recommendations

Our recommendations to the actuarial assumptions for use in the actuarial valuation may be summarized as follows:

Assumption (1)	**CERS Non-Hazardous** (2)	**CERS Hazardous** (3)
Economic Assumptions		
1. Inflation	Increase	Increase
2. Investment Return (Pension / Insurance)	Increase	Increase
3. Short-Service Salary Increase	Increase	Increase
4. Long-Service Salary Increase	No Change	No Change
5. Payroll Growth Assumption	No Change	No Change
6. Cash Balance Interest Credit Assumption	Increase	Increase
Demographic Assumptions		
7. Retiree Mortality	Increase (KPPA Specific)	Increase (KPPA Specific)
8. Termination	Increase	Increase
9. Retirement	No Change	No Change
10. Disability	Decrease	Decrease
11. Health Insurance Participation	No Change	No Change
Other Assumptions and Methods		
12. Asset Method	No Change	No Change
13. Entry Age Normal Cost Method	No Change	No Change

Summary of Financial Impact of Recommendations

The following pages provide the actuarial impact of the recommended assumptions for each fund based on the June 30, 2022 actuarial valuation. In actuality, these recommended assumptions will be first used when preparing the June 30, 2023 actuarial valuation, which identifies the employer contribution requirements for the fiscal year beginning July 1, 2024 and ending June 30, 2025. For informational purposes, the tables show the changes in the contribution requirement, unfunded actuarial accrued liability, and funded ratio due to the recommended assumption changes. The exhibits identify the financial effect due to the change in the demographic assumptions and the change in the investment return assumption. We believe the Board's decision about whether or not to adopt our recommendations should be based on the collective effect on the contribution rate or the actuarial liabilities and not changes in individual assumptions.

Fiscal Impact of Proposed Assumptions

CERS Non-Hazardous

($ in Thousands)

	Current Assumptions	Proposed Demographic Assumptions	Proposed Assumptions incl Discount Rate
1. Covered Payroll	$ 2,744,994	$ 2,744,994	$ 2,744,994
Liability and Assets - Pension Fund			
2. Actuarial Accrued Liability	$ 15,674,220	$ 15,191,551	$ 14,803,576
3. Actuarial Value of Assets	8,148,912	8,148,912	8,148,912
4. Unfunded Liability	$ 7,525,308	$ 7,042,639	$ 6,654,664
5. Funded Ratio	52.0%	53.6%	55.0%
Liability and Assets - Insurance Fund			
6. Actuarial Accrued Liability	$ 2,391,990	$ 2,309,029	$ 2,242,062
7. Actuarial Value of Assets	3,160,084	3,160,084	3,160,084
8. Unfunded Liability	$ (768,094)	$ (851,055)	$ (918,022)
9. Funded Ratio	132.1%	136.9%	140.9%
Actuarially Determined Employer Contribution - Pension Fund			
10. Normal Cost Rate	6.06%	5.88%	5.44%
11. Amortization Cost	17.28%	15.84%	15.08%
12. Pension Employer Contribution Rate	23.34%	21.72%	20.52%
Actuarially Determined Employer Contribution - Insurance Fund			
13. Normal Cost Rate	2.14%	1.92%	1.78%
14. Amortization Cost	-3.01%	-3.28%	-3.55%
15. Insurance Employer Contribution Rate	0.00%	0.00%	0.00%
16. Total Employer Contribution Rate	23.34%	21.72%	20.52%
17. Change in Contribution Rate		**-1.62%**	**-2.82%**
18. Estimated Contributions	$ 640,682	$ 596,213	$ 563,273
19. Change in Contributions		**$ (44,469)**	**$ (77,409)**

Fiscal Impact of Proposed Assumptions

CERS Hazardous

($ in Thousands)

	Current Assumptions	Proposed Demographic Assumptions	Proposed Assumptions incl Discount Rate
1. Covered Payroll	$ 633,353	$ 633,353	$ 633,353
Liability and Assets - Pension Fund			
2. Actuarial Accrued Liability	$ 5,861,691	$ 5,750,833	$ 5,590,596
3. Actuarial Value of Assets	2,788,714	2,788,714	2,788,714
4. Unfunded Liability	$ 3,072,977	$ 2,962,119	$ 2,801,882
5. Funded Ratio	47.6%	48.5%	49.9%
Liability and Assets - Insurance Fund			
6. Actuarial Accrued Liability	$ 1,538,131	$ 1,514,874	$ 1,477,066
7. Actuarial Value of Assets	1,553,761	1,553,761	1,553,761
8. Unfunded Liability	$ (15,630)	$ (38,887)	$ (76,695)
9. Funded Ratio	101.0%	102.6%	105.2%
Actuarially Determined Employer Contribution - Pension Fund			
10. Normal Cost Rate	10.34%	10.97%	10.09%
11. Amortization Cost	30.77%	29.40%	28.05%
12. Pension Employer Contribution Rate	41.11%	40.37%	38.14%
Actuarially Determined Employer Contribution - Insurance Fund			
13. Normal Cost Rate	3.99%	3.88%	3.62%
14. Amortization Cost	-1.41%	-1.71%	-2.24%
15. Insurance Employer Contribution Rate	2.58%	2.17%	1.38%
16. Total Employer Contribution Rate	43.69%	42.54%	39.52%
17. Change in Contribution Rate		**-1.15%**	**-4.17%**
18. Estimated Contributions	$ 276,712	$ 269,428	$ 250,301
19. Change in Contributions		**$ (7,284)**	**$ (26,411)**

SECTION III

ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS

Analysis of Experience and Recommendations

We will begin by discussing the economic assumptions: inflation, expenses, the investment return rate, the salary increase assumption, and the rate of payroll growth. Next are the demographic assumptions: mortality, disability, termination and retirement. Finally, we will discuss all of the actuarial methods used.

ECONOMIC ASSUMPTIONS

As no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The economic assumptions are much more subjective in nature than the demographic assumptions. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate historical and forward-looking information.

Also, actuaries are guided by the Actuarial Standards of Practice (ASOP) adopted by the Actuarial Standards Board (ASB) and one of these standards is ASOP No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, which provides guidance to actuaries giving advice on selecting economic assumptions for measuring obligations under defined benefit plans.

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. Nevertheless, the economic assumptions are much more subjective in nature than the demographic assumptions, which in themselves can still create a difference in opinion among individuals in the actuarial profession and possibly stakeholders of the Retirement Systems.

INFLATION ASSUMPTION

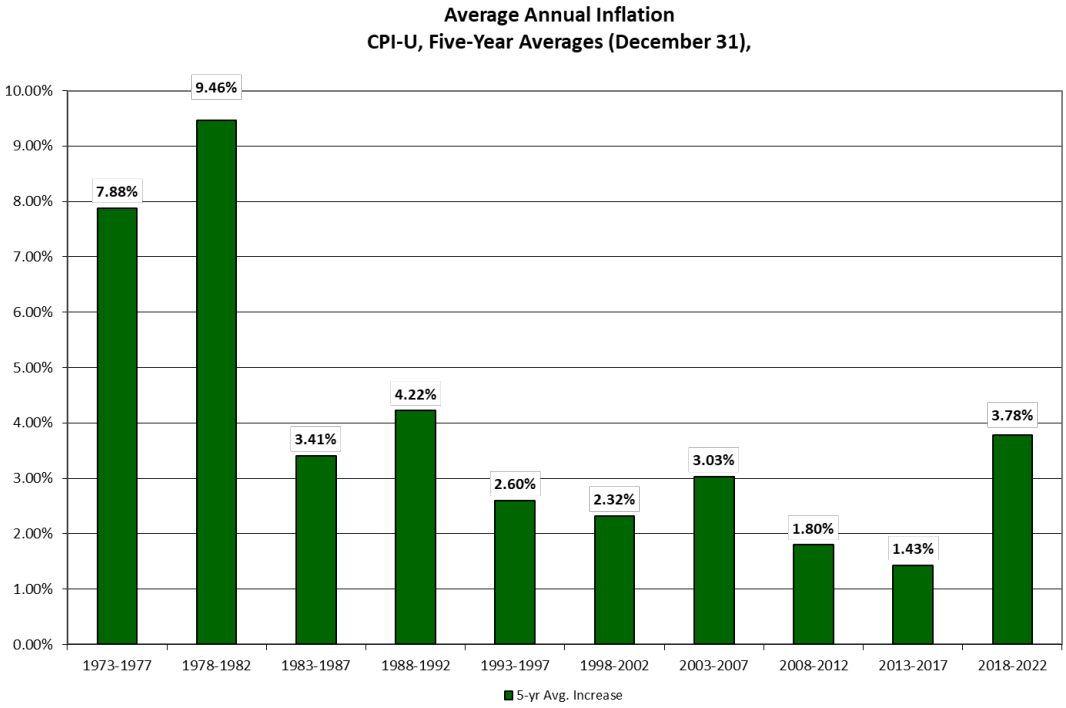
By "inflation," we mean price inflation as measured by annual increases in the Consumer Price Index (CPI). Benefits provided to members in CERS are not explicitly impacted by the actual change in price inflation. As a result, this is a relatively insignificant assumption in the valuation, but in theory underlies some of the other economic assumptions (e.g. the investment return assumption). The current annual inflation assumption is 2.3% and has remained unchanged since the June 30, 2017 actuarial valuation.

We recognize that actual inflation as measured by CPI has been much higher than the current 2.3% assumption during the last 24 months, however the Federal Reserve has broadcasted repeatedly the Committee seeks to achieve maximum employment and an inflation rate of 2% over the longer run.

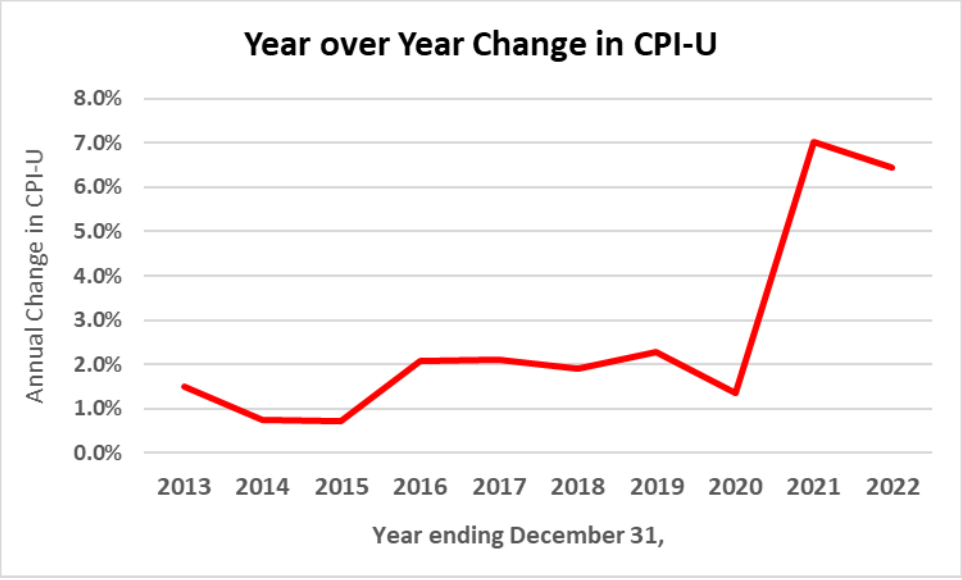
Please see the following exhibits and forward-looking sources of inflation expectations.

Actual Change in CPI-U

The chart below shows the average annual inflation in each of the ten consecutive five-year periods over the last fifty years:



The following chart shows the year over year change in CPI-U over the last 10 years ending December 31, 2022:



Source: Bureau of Labor Statistics, CPI-U, all items, not seasonally adjusted.

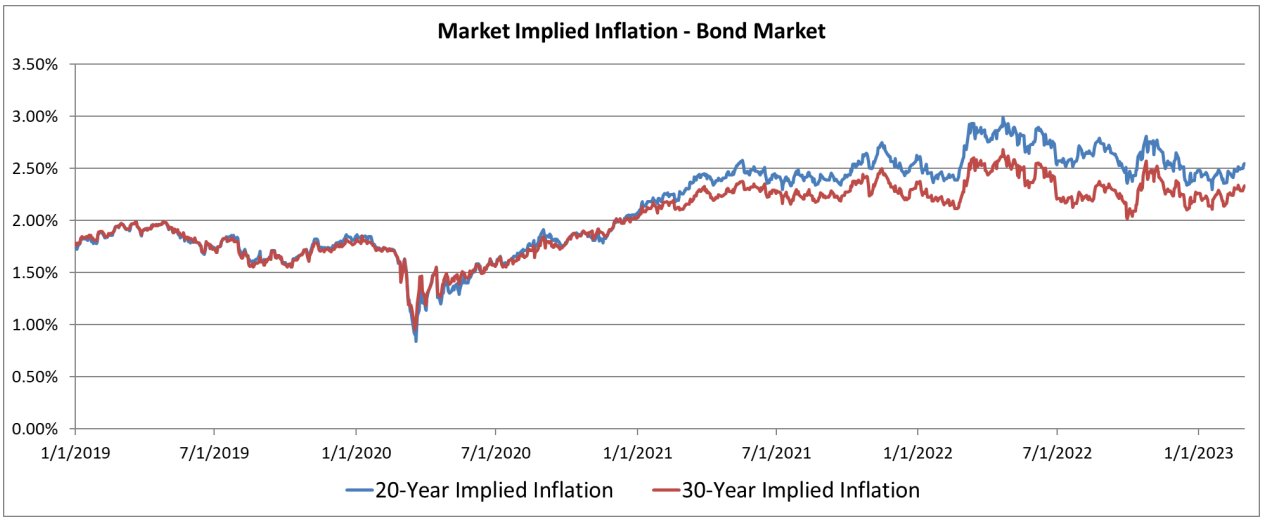
As the charts show, with the exception of the last two years, inflation has been benign for the prior thirty years. The following is a discussion of the various sources of forward-looking inflation expectations.

Forward-Looking Expectations Developed by Investment Consulting Firms

Most investment consulting firms, in setting their capital market assumptions, make a price inflation assumption as a building block for developing forward-looking return expectations. Based on a survey of 2023 capital market assumptions of nine investment consulting firms, the average expected price inflation for the next ten years is 2.40%. Of these nine, the minimum expectation was 2.0% (one of the nine firms) and the maximum was 2.50% (five of the nine firms).

Expectations Implied in the Bond Market

Another source of information about future inflation is the market for US Treasury bonds. For example, the March 1, 2023 yield for 20-year inflation indexed Treasury bonds was 1.58% plus actual inflation. The yield for 20-year non-indexed US Treasury bonds was 4.17%. Simplistically, this means that on that day the bond market was predicting that inflation over the next twenty years would average 2.55% [(1 + 4.17%) / (1 + 1.58%) - 1] per year. The difference in yield for 30-year bonds implies 2.33% inflation over the next 30 years. This is consistent with most forecasts that inflation is expected to be higher for the next few years before settling down near the Federal Reserve's 2.0% target. Below is a chart with the history of the implied inflation for 20-year and 30-year Treasury securities from January 2019 through February 2023. However, this analysis is known to be imperfect as it ignores the inflation risk premium that buyers of US Treasury bonds often demand as well as possible differences in liquidity between US Treasury bonds and TIPS.



Forecasts from Social Security Administration

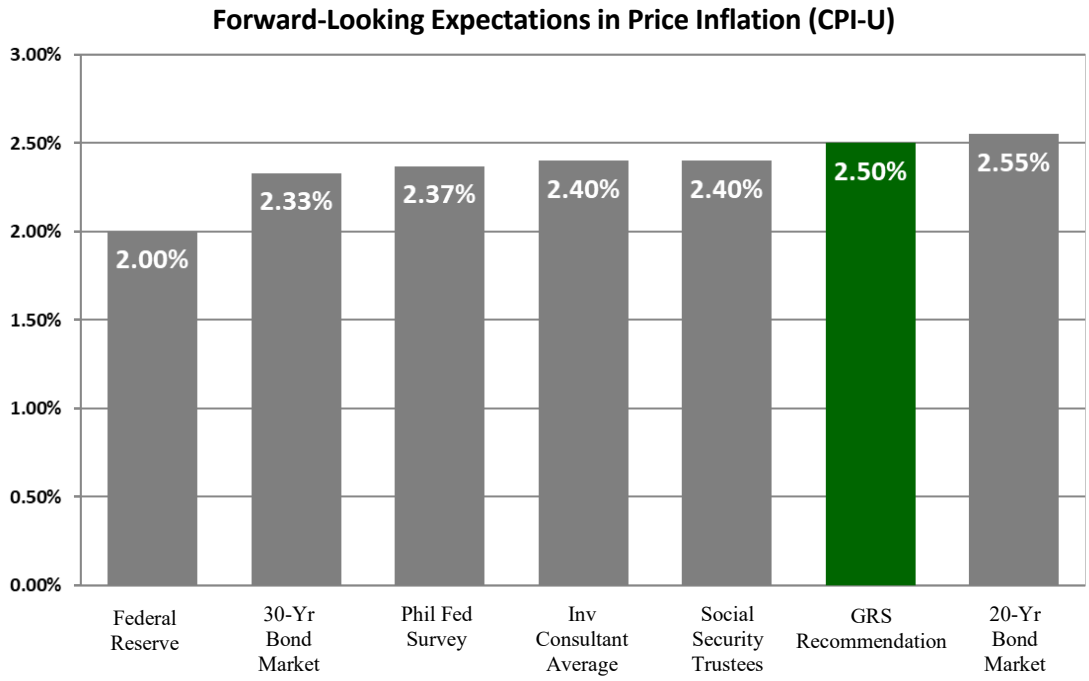
In the Social Security Administration's 2023 Trustees Report, the Office of the Chief Actuary is projecting a long-term average annual inflation rate of 2.4% under the intermediate cost assumption and low cost and high cost scenarios are 1.8% and 3.0%, respectively. The Chief Actuary for the Social Security Administration has kept this assumption unchanged for the last three years.

Survey of Professional Forecasters

The Philadelphia Federal Reserve conducts a quarterly survey of the Society of Professional Forecasters. Their forecast for the first quarter of 2023 was for inflation over the next ten years (2023 to 2032) to average 2.37%. This survey average was a decrease from 2.80% and 2.95% in their third quarter 2022 and fourth quarter 2022 surveys, respectively.

Recommendation

The following is a chart to summarize the various forward-looking expectations.



Using these sources, we recommend the use of a 2.50% assumption, which is a 0.20% increase from the current assumption in recognition that near-term inflation will remain elevated compared to historical levels.

Investment Return Assumption

The investment return assumption is one of the principal assumptions used in any actuarial valuation of a retirement plan. It is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plans. Even a small change to this assumption can produce significant changes to the liabilities and contribution rates.

CERS maintains two retirement funds and two health insurance funds, and the current investment return assumption is 6.25% for all the funds.

Investment and Administrative Expenses

The trust fund pays expenses in addition to member benefits and refunds; we must make some assumption about these. Currently an explicit administrative expense assumption is included in the normal cost rate. This assumption is updated on an annual basis and is equal to the prior year's administrative expense divided by covered payroll. We recommend no change to this process.

Additionally, the analysis below develops an investment return assumption net of any investment related expenses.

Actual Investment Performance

Below are tables with the actual annualized investment return performance on a market value of asset basis.

	Historical Average Annual Return – Retirement Funds			
Fund	**FY 2022**	**3-Year**	**5-Year**	**10-Year**
CERS Non-Hazardous	-5.9%	6.1%	6.5%	7.3%
CERS Hazardous	-6.1%	5.9%	6.5%	7.3%

Source: 2022 KPPA Summary Annual Report

	Historical Average Annual Return – Insurance Funds			
Fund	**FY 2022**	**3-Year**	**5-Year**	**10-Year**
CERS Non-Hazardous	-5.4%	5.8%	6.5%	7.2%
CERS Hazardous	-5.0%	6.0%	6.6%	7.3%

Source: 2022 KPPA Summary Annual Report

However, past performance is not a reliable indicator of future investment performance, even when returns are averaged over a long time. The actual asset allocation of the trust fund will significantly impact the overall performance, so returns achieved under a different allocation are not meaningful.

Forward-Looking Return Expectations

We believe the most appropriate approach to identifying an appropriate investment return assumption is to identify expected returns developed by mapping the asset allocation policy to forward-looking capital market assumptions that are developed by professional investment consulting firms.

Wilshire Associates (CERS's Investment Consultant) provided a recommended asset allocation policy in their February 22, 2023 Board material. The following table provides a summary of the asset allocation policy that was used in our analysis of the investment return assumption.

Asset Class	CERS Retirement and Insurance Funds
Public Equity	50.0%
Private Equity	10.0%
Core Fixed Income	10.0%
Specialty Credit	10.0%
Real Estate	7.0%
Real Return	13.0%
Cash	0.0%
Total	**100.0%**

GRS is a benefits consulting firm and does not provide investment consulting advice. We also do not develop or maintain our own forecasts of capital market expectations. Instead, we utilized 2023 forward-looking capital market return expectations developed by CERS's investment consultant, Wilshire Associates, as well as other investment consulting firms that are listed below. The primary purpose of performing this analysis using multiple investment consulting firms is to quantify possible differences in forward-looking return expectations within the professional investment community.

- Aon (10-Year and 30-Year)
- Callan
- Cambridge (10-Year and 30-Year)
- NEPC (7-Year and 30-Year)
- RV Kuhns (20-Year)
- Wilshire (CERS's Investment Consultant)
- BNY Mellon
- Meketa (10-Year and 30-Year)
- JP Morgan
- Mercer (10-Year and 20-Year)
- Verus

Each of these investment consultants provided forward-looking return expectations for the next 7 to 10 years. Additionally, six of these firms (Aon, Cambridge, Meketa, Mercer, and NEPC and RV Kuhns) develop return expectations over a longer, 20- to 30-year period.

CERS theoretically has an indefinite life span which may result in some stakeholders believing that emphasis should be placed solely on long-term expectations, even if short-term expectations are materially different. While CERS is expected to have an indefinite life span, this system is relatively mature with material shorter-term liability attributable to current retirees. We believe it is important for decision makers to also consider return expectations over the next seven to ten years.

Throughout the 2022 calendar year, the capital markets and economic assumptions have vastly changed. The S&P 500 return during the calendar year were -18%. Actual inflation has been at a 40-year high and the year to year change continues to be over 6%. Also, the current yield on 10-year Treasuries have increased from 1.8% in January 2022 to 3.8% at the end of the 2022 calendar year. Because of these market changes, investment consultants have noticeably increased their forward-looking expectations in 2023. As a result, we believe it is prudent to view and compare the return expectations based on the 2022 and 2023 capital market assumptions for decision making purposes.

CERS Retirement and Insurance Funds
Expected Annual Geometric Returns and Return Probabilities

	Investment Consultant	50th Percentiale Expected Return (Geometric) 2023	2022	Probability of Exeeding 6.25% 2023	2022
	(1)	(2)	(3)	(4)	(5)
7 to 10 Year Expectations	1	6.2%	4.9%	49%	38%
	2	6.4%	5.4%	51%	42%
	3	6.9%	5.9%	56%	47%
	4	7.1%	5.8%	58%	46%
	5	7.5%	6.0%	59%	43%
	6	7.3%	5.8%	60%	45%
	7	7.4%	6.2%	61%	50%
	8	7.5%	6.2%	62%	50%
	9	7.8%	5.3%	66%	40%
	10	7.9%	5.8%	65%	46%
20 to 30 Year Expectations	1	6.2%	5.3%	49%	40%
	2	7.1%	6.4%	58%	52%
	3	7.3%	6.5%	60%	53%
	4	7.8%	6.8%	65%	55%
	5	7.8%	6.6%	65%	54%
	6	8.6%	6.9%	71%	56%
7-10 Year Expectation Avg:		7.2%	5.7%	59%	45%
20-30 Year Expectation Avg:		7.5%	6.4%	61%	52%

Recommendation

Investment return expectations increased significantly compared to the prior year. Based on our broader survey, the average of the 50th percentile return expectations is 7.2% based on the 10-year assumptions and 7.5% based on the longer 30-year assumptions. The probability of exceeding the current investment return assumption of 6.25% is greater than 50% for each 2023 assumption set. However, we do not recommend the Board put undue weight in one particular investment consultant or one particular year's survey of return expectations. As a result, we recommend increasing the investment return assumption by 0.25% to 6.50% for both the retirement funds and the insurance funds. Since investment risk is nonsymmetrical and there is greater risk of downside returns compared to upside returns, it would also be reasonable if the Board elected to maintain the assumed rate of return for these funds.

Cash Balance Interest Credit Rate Assumption

Members who become participants in the System after January 1, 2014 earn benefits in the Tier 3 cash balance plan, where their hypothetical account balance increases with member and employer pay credits and an interest credit based on the System's actual investment performance. Specifically, each year's interest credit is equal to a minimum of 4.0% plus 75% of the five-year geometric average actual return in excess of 4.0% (if any).

With the incorporation of a 4% minimum interest credit rate, it is possible for the interest credit rate to exceed the actual five-year geometric return. The use of a five-year average period greatly reduces likelihood the 4% minimum interest credit would apply as well as the year-to-year volatility in the interest credit rate. The 4% minimum interest credit rate has never exceeded the five-year average return since the Tier 3 plan has been in place, but this plan has only been in place since 2014, which is not a sufficient time for analysis purposes.

Instead, we believe it is more relevant to model a projected average compound interest credit rate stochastically based on the mean and variance expectations for the fund. We also look at the average compound interest credit to better reflect the anticipated accumulation of a members' account balance with interest over a 30-year career. Based on a 50th percentile return expectation of 6.50% and a 13% standard deviation; our stochastic model produced an average compound interest crediting rate of 6.75%. As a result, we recommend the use of 6.75% cash balance interest credit rate for the Tier 3 benefit in both retirement funds (based on the adoption of a 6.50% investment return assumption).

Salary Increase Rates

In order to project future benefits, the actuary must project future salary increases. Salaries may increase for a variety of reasons:

- Across-the-board increases for all employees;
- Across-the-board increases for a given group of employees;
- Increases to a minimum salary schedule;
- Additional pay for additional duties;
- Step or service-related increases;
- Increases for acquisition of advanced degrees or specialized training;
- Promotions; or
- Merit increases, if available.

Our salary increase assumption is meant to reflect all of these types of increases, since all of these affect the salaries used in benefit calculations and upon which contributions are made.

An actuary should not look at the overall increase in payroll when setting this assumption, because total payroll can increase at a rate different from the average pay increase for individual members. There are two reasons for this. First, when older, longer-service employees terminate, retire or die, they are generally replaced with new employees who have a lower salary. This causes the growth in total payroll to be smaller than the average pay increase for individual employees. Second, total payroll can change due to an increase or decrease in the size of the employee group. Rather we examine the actual compensation increases on an individual basis.

We analyzed the salary increases based on the change in each member's reported pay from one year to the next. That is, we looked at each member who appeared as an active member in two consecutive valuations—these are referred to as continuing active members—and measured his/her salary increase.

Below is a table showing the average increase given to continuing members by year for members in various groups:

Fiscal Year Ending	CERS Non-Hazardous	CERS Hazardous
2014	3.5%	5.0%
2015	4.3%	4.3%
2016	5.1%	5.9%
2017	4.3%	9.0%
2018	4.1%	5.5%
2019	4.6%	5.9%
2020	4.2%	5.8%
2021	3.6%	7.7%
2022	9.3%	11.0%
Average	4.8%	6.7%

It is typical to assume larger pay increases for younger or shorter-service employees as promotions and productivity increases tend to be greater in the first few years of a career, even if the new employee is older than the average new hire.

The current assumptions follow this pattern for all employee groups. Therefore, we divide the task of setting the salary increase into two pieces:

1. Determining the assumption for long-service employees

2. Determining the additional increases to be applied to shorter-service employees

The next two subsections will discuss these components of the salary assumption.

Salary Increase Assumptions for Long-Service Employees

Many of the sources of pay increases have diminished importance for longer-service employees. Step or service-related increases are usually smaller and promotions occur with less frequency. Additional training or acquisition of advanced degrees usually occurs early in the career. Thus, our salary increase assumption has an ultimate level when members are assumed to receive increases equal to wage inflation plus smaller increases for merit, promotion, and longevity.

The data suggests the patterns level off after around 16 years of service for a member to be considered a long-service employee for the purposes of this analysis.

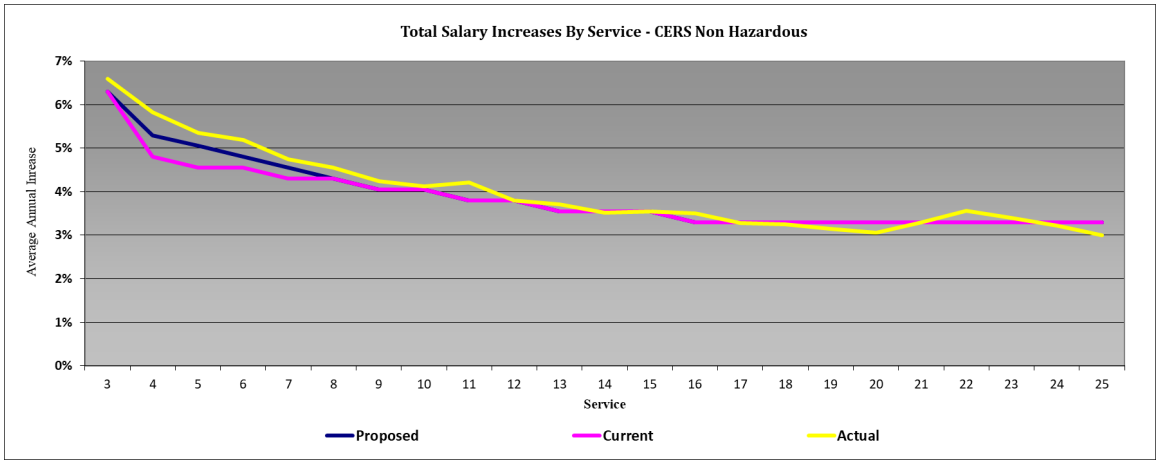
Given our analysis, we are not recommending any changes to the current salary increase assumption for long-service employees, which is 3.30% per year for members in the non-hazardous fund and 3.55% per year for members in the hazardous fund.

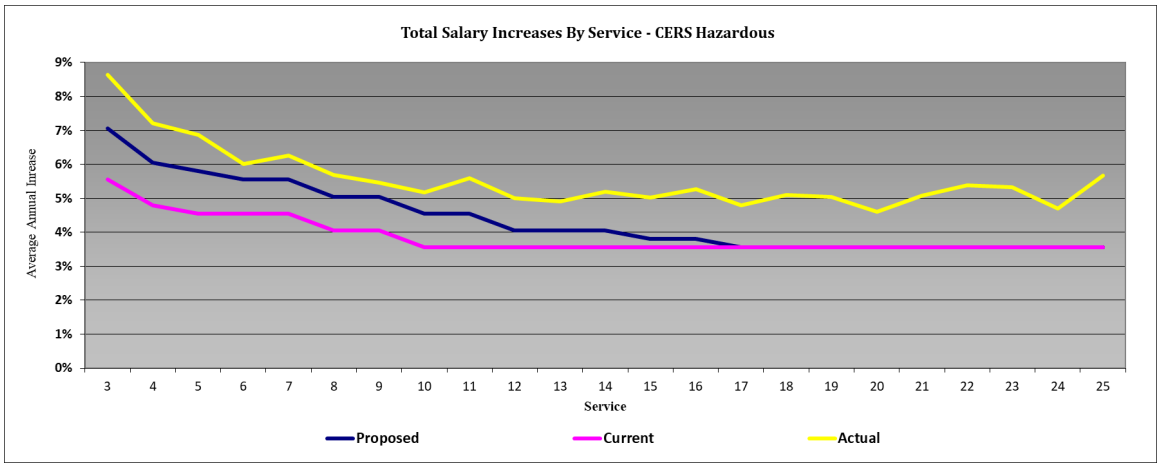
Salary Increase Assumption for Shorter-Service Employees

To analyze the service-related salary assumption, we looked at the excess in the average increases for shorter service employees over the average for longer-service employees. For example, CERS non-hazardous members with four years of service received an average increase of 5.24%, which was 2.06% more than the average increase of 3.18% for the same type of employee with sixteen or more years of service. This component of the salary scale assumption behaves more like a demographic assumption than an economic assumption, and therefore, the historical experience has a high level of creditability for purposes of establishing future expectations. After review of this information, we are proposing a slight increase to the step-rate salary assumptions for members with four to seven years in the non-hazardous fund and two to sixteen years for the hazardous fund. Details of our analysis are shown in Section V beginning on page 44.

Salary Increases – Combined Effect

The following charts provide a comparison of the salary increase rates applied to individuals discussed above for the service period of three years to twenty-five years.





Note, the appearance of greater volatility of the actual experience for the hazardous fund in the above graph is primarily due to this fund having far fewer members compared to the non-hazardous fund.

PAYROLL GROWTH RATE

The rate of salary increases discussed above are assumptions applied to individuals and are used in projecting future benefits.

The change in total covered payroll is dependent on the salary increases provided to individual members as well as the change in active membership. Given the historical change in covered payroll and membership, it is appropriate to review the change in total payroll and membership in developing this assumption.

Average Annual Change in Membership and Payroll				
	Change in Membership		Change in Payroll	
Averaging Period	5 Years	10 Years	5 Years	10 Years
Non-Hazardous	-1.1%	-0.6%	1.9%	1.9%
Hazardous	-0.7%	0.1%	2.8%	3.0%

Our recommendation is for the Board to maintain the current 2% payroll growth assumption for both the non-hazardous and hazardous fund for use in developing the actuarial contribution rate in the June 30, 2023 actuarial valuation.

DEMOGRAPHIC ASSUMPTIONS

Actuaries are guided by the Actuarial Standards of Practice (ASOP) adopted by the Actuarial Standards Board (ASB). One of these standards is ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*. This standard provides guidance to actuaries giving advice on selecting noneconomic assumptions for measuring obligations under defined benefit plans. We believe the recommended assumptions in this report were developed in compliance with this standard.

POST-RETIREMENT MORTALITY RATES

CERS's actuarial liabilities depend in part on how long retirees live. The longer a retiree lives, the longer the retiree receives benefits from the System resulting in a larger liability to each fund.

The current mortality assumption is a custom table developed in 2018 that was based on the actual retiree experience of CERS and KERS. It is a gender distinct assumption, but there is no distinction between retirees in CERS or KERS, or the non-hazardous and hazardous funds. Separate mortality tables are used for active members and disabled retirees; these assumptions are discussed separately in a following subsection. The current mortality assumption also includes an explicit assumption for future improvement in life expectancy based on a mortality improvement assumption developed by the Society of Actuaries in 2014.

Due to the COVID-19 pandemic, mortality has come to be in the national spotlight. As our analysis will show, the retirees in CERS were also affected by the pandemic.

Analysis of Credibility of the Retirement Systems' Mortality Experience

When selecting an appropriate mortality assumption, actuaries often use standard published mortality tables. Depending on the size, or statistical credibility, of the retiree population, actuaries often also adjust these published mortality tables with multipliers or age setbacks to better reflect characteristics of the covered group and to provide for expectations of future mortality improvement (both up to and after the measurement date). On the other hand, a retirement system with a sufficiently large number of retirees may be able to better model mortality experience using a mortality table based on their experience. Factors that may be considered in selecting and/or adjusting a mortality table include the demographics of the retiree group and the statistical credibility of its experience.

Studies on mortality consistently show that longevity can vary significantly among industries, ethnicity, education, and geographic location. It has been documented in several sources that residents in Kentucky have a life expectancy well below the national average. A report issued in August 23, 2022 by the National Vital Statistics, states that Kentucky residents ranked 47th in life expectancy at age 65 compared to populations in the other US States. However, members in CERS and KERS predominately have formal education beyond high school or have a professional degree, which is also well documented to be an indicator they will have a longer life expectancy than someone in the same geographic location without a formal education beyond high school. Due to these possible variances, it is even more important to consider the statistical credibility of the system's experience and provide the appropriate credibility weighting to the observed mortality experience, versus the use of a published table based on national population experience.

In our analysis of the mortality experience for CERS, we first measured the credibility of the dataset to determine whether standard published tables should be used or if a statistical analysis of the Retirement Systems' data was warranted. Generally, we consider 1,000 deaths per gender is the minimum necessary to be considered fully credible, however it is also preferable to develop a base mortality table with larger datasets to increase the statistical credibility that the base mortality assumption is closer to the true mortality experience of the system. The following table gives the number of deaths needed by gender to have a given level of confidence that the data is +/- X% of the actual pattern.

Statistical Confidence by Observed Deaths during the Experience Period

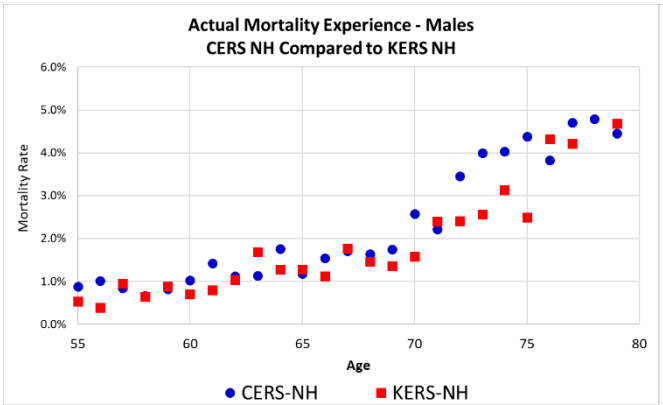
Std Score	Confidence	99%-101%	97%-103%	95%-105%	90%-110%	80%-120%
1.1503	75%	13,233	1,470	529	132	33
1.2816	80%	16,424	1,825	657	164	41
1.6449	90%	27,055	3,006	1,082	271	68
1.9600	95%	38,415	4,268	1,537	384	96
2.5758	99%	66,349	7,372	2,654	663	166

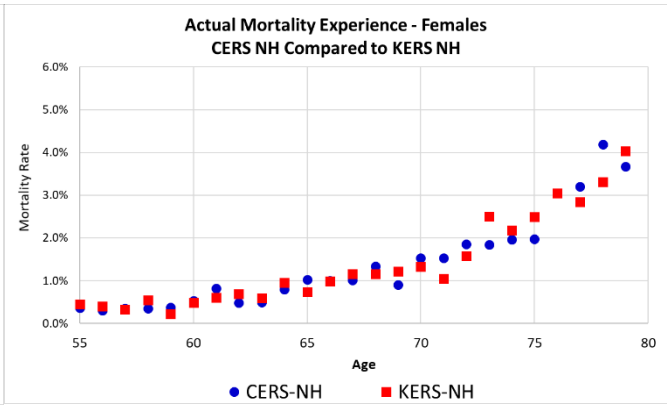
The following table provides the number of male and female deaths for each fund maintained by KPPA over the last five years.

Number of Deaths for Each Fund During the Last Five Fiscal Years

Fund	Male	Female
KERS - NH	2,718	3,142
KERS - HZ	365	94
SPRS	*127*	-
Sub-total	3,210	3,236
CERS - NH	3,844	4,916
CERS - HZ	*675*	*58*
Sub-total	4,519	4,974
Total	7,729	8,210

We also compared the last five years of mortality experience for the CERS non-hazardous and KERS non-hazardous funds to identify how similar the mortality experience is for the two retiree groups. Below are charts that compare the actual mortality experience for the CERS non-hazardous and KERS non-hazardous funds for males and females.





In our professional opinion, the retiree mortality experience for these two funds are very similar and appropriate to combine for developing an updated base mortality assumption to be used by all funds maintained by KPPA. While the KERS and CERS mortality experience may appear to have some divergence for males between the ages 70 and 75, the experience is not sufficiently large enough to conclude there is a difference in the true underlying mortality experience on a forward-looking basis. We also compared the mortality experience of the hazardous funds to the non-hazardous funds and determined it also remains appropriate to use the same base mortality assumption for both non-hazardous and hazardous members. While the Society of Actuaries has developed and published mortality tables that are different for general employees and public safety members, we believe it continues to be appropriate to use the same mortality table for the valuation of all funds maintained by KPPA.

Using a system-specific mortality assumption will reduce the risk of undervaluing or overvaluing liabilities, provide better future estimates of liabilities and projected benefit payments. It will also allow for smaller,

more frequent adjustments to the assumption as necessary in future experience studies instead of having to wait for a new, published table.

Recommended Base Mortality Assumption

We performed our analysis using a benefit-weighted approach, where we measure the exposures and actual deaths weighted by the retiree's benefit amount, rather than a headcount approach that applies an equal weighting to all retirees. Developing a base table using a benefit-weighted approach is preferable because: (1) research studies have consistently shown that higher wage earners generally have a longer life expectancy than lower wage earners and (2) this approach should better model the actual liability that is released when retirees die. A benefit-weighted approach is the same method used by the Society of Actuaries' Retirement Plans Experience Committee when they develop published mortality tables.

We also used nine years of experience in developing the table, as we believe it will result in a more appropriate table for modeling the mortality experience after the COVID-19 pandemic period. To provide a perspective of the impact of COVID-19 on the mortality experience, below is a table with the mortality experience for each fund for the last six years with the first three years being prior to the pandemic. As the table shows, the crude mortality experience for the last three years is noticeably higher than the in the first three years of the table. However, we anticipate the mortality rates will decrease to be closer, but not less than the pre-2020 mortality rates in the near-term future.

Crude Mortality Rate for Non-Disabled Retirees by Fiscal Year Ending June 30,

	Males					Females				
FY Ending	**K-NH**	**K-HZ**	**SPRS**	**C-NH**	**C-HZ**	**K-NH**	**K-HZ**	**SPRS[1]**	**C-NH**	**C-HZ**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2017	2.1%	1.8%	1.0%	2.3%	1.1%	1.5%	1.4%	--	1.8%	1.1%
2018	2.1%	1.9%	0.9%	2.5%	1.5%	1.6%	0.2%	--	1.8%	0.6%
2019	2.3%	1.5%	2.1%	2.4%	1.4%	1.5%	0.8%	--	1.8%	1.0%
2020	3.7%	2.8%	2.4%	3.7%	1.8%	2.6%	1.9%	--	2.7%	0.6%
2021	3.0%	2.3%	2.4%	3.0%	1.4%	1.9%	1.4%	--	2.2%	0.3%
2022	3.2%	2.4%	1.7%	3.2%	1.5%	2.0%	1.6%	--	2.4%	1.5%

[1] Experience for female retirees for SPRS has been excluded since there are very few female retirees in this fund.

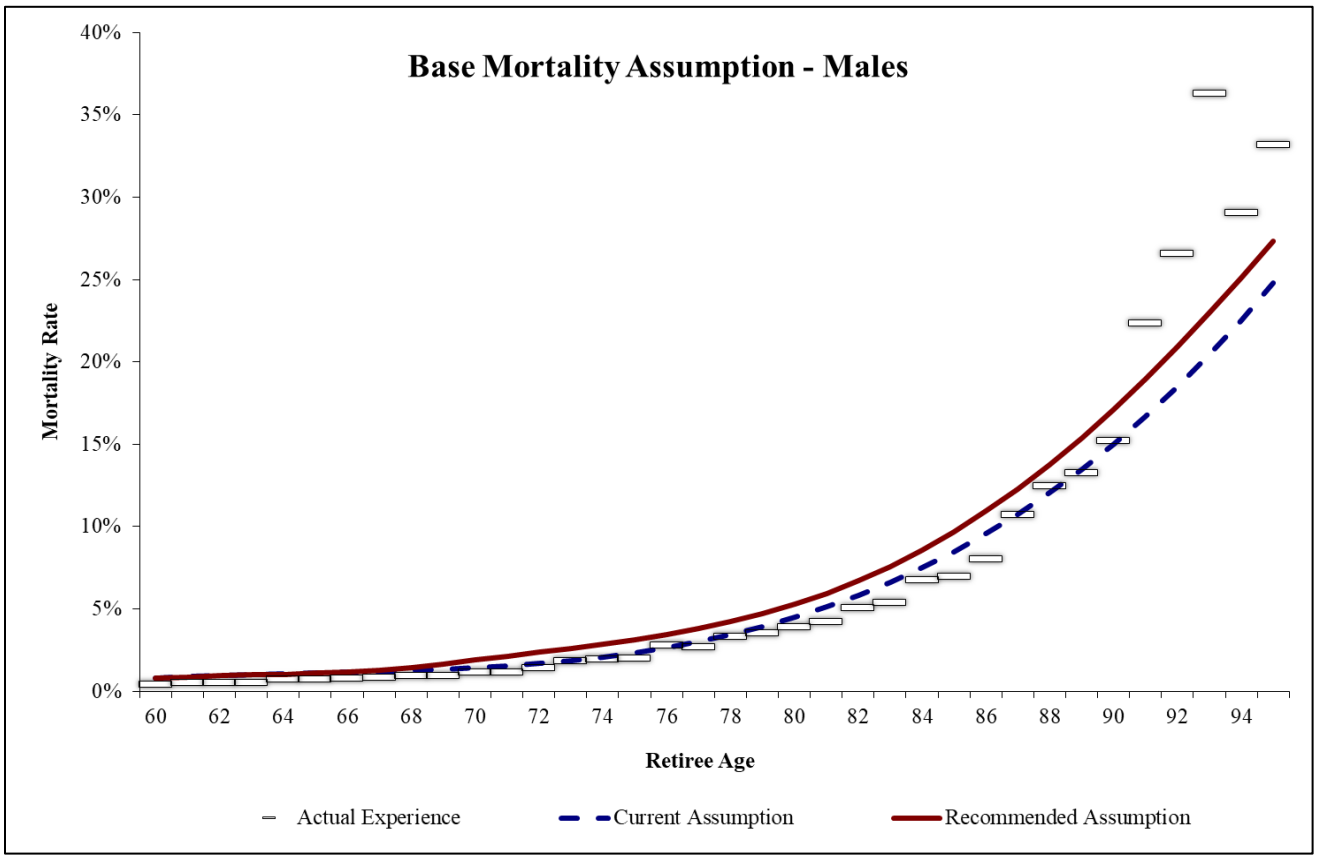
Note, comparing the crude rates from fund to fund does not provide any type of meaningful conclusion since the retiree demographics are different for each group. For instance, a higher average age for a retiree group is generally expected to result in a slightly higher crude rate.

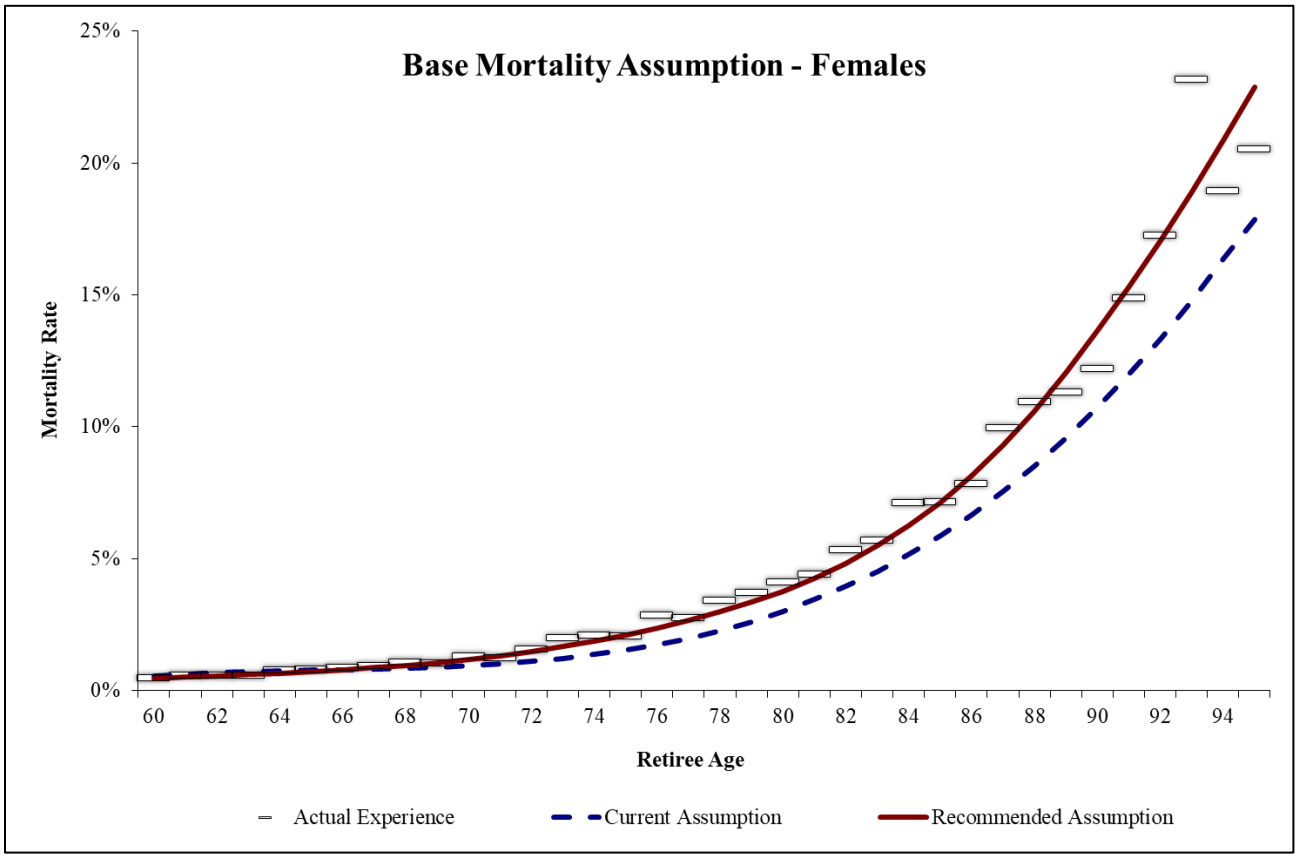
To develop the recommended mortality assumption for each gender, we grouped the data into five-year ages bands. Mortality rates for ages under age 55 are based on the Pub2010 mortality assumption for general employees (adjusted forward to the central point of the experience period). The mortality rates between ages 55 and 60 are equal to a credibility adjusted version of the published table and the Systems' actual experience. The mortality rates on and after age 60 and prior to age 85 are based on the plan's actual crude rate for the midpoint of the quintile and graduated using a cubic spline method to provide a smooth fit to the experience. For the oldest segment of the mortality table, the mortality rates in the table after age

84 are projected from the previous midpoint quintile using the rate of change from the current assumption. The R^2 for the fit of the tables to actual experience in five-year age bands was .987 and .991 for males and females, respectively. The final steps in the creation of the base mortality assumption was to project the preliminary table from the center point of the analysis period (i.e. 2017) to the year 2023 using the recommended projection scale below.

We will refer to this new table as the 2023 Public Retirees of Kentucky Mortality Table (2023 PRK).

The following charts show the actual mortality experience assumption for male and female retirees, along with the current mortality assumption, and the recommended mortality assumption. As the following charts show, the best way to provide a better fit along the entire "curve" is to use an assumption developed using actual experience, which includes ages beyond age 90 for male retirees.





As the charts show, the difference in the base mortality rate for the recommended assumption is not much different than the current base mortality assumption for male retirees. On the other hand, there is a more noticeable difference between the current and recommended base mortality assumption for females. As a result, the cost impact of changing to the updated recommended base table is minor, resulting in between a 1% and 3% decrease in the actuarial liabilities. The non-hazardous fund will have a larger decrease due to its higher concentration of female members.

In the next section, we will discuss the explicit assumption for future improvement in mortality (and life expectancy).

Recommended Mortality Improvement Assumption

Society of Actuaries' Retirement Plans Experience Committee (RPEC) recognizes that there is a wide range of opinion with respect to future levels of mortality (especially since the COVID-19 pandemic) and that the assumptions underlying mortality improvement reflect some degree of subjectivity. However, there is little disagreement whether mortality will continue to improve.

The current mortality improvement assumption is based on the ultimate rates of improvement (e.g. generally 1%) in the MP-2014 improvement assumption issued by the Society of Actuaries. The Society of Actuaries have subsequently issued mortality improvement assumptions in 2015, 2016, 2017, 2018, and 2019, with reduced improvement assumptions during the selection period (approximately 15 years) but the ultimate improvement assumption has remained unchanged. However, in the Society of Actuaries 2020 report the ultimate mortality improvement rates were modified to be higher at some ages and

adjusted to better reflect historical trends for different age groups. Specifically, the pattern is a rate of 1.35% for ages 62 and younger, decreasing linearly to 1.10% at age 80, further decreasing linearly to 0.40% at age 95, and then decreasing linearly to 0.00% at age 115 (and thereafter). In general, the net change in overall liabilities is minimal if a retirement system adopted the ultimate rates of the MP-2020 version because the overall pattern of the improvement over a retiree's lifetime is not much different. However, we give preference to the more recently published report all else being equal as the 2020 report provides several pages of rationale and disclosure of the process used to generate the new long-term rates, including comparing to historical trends, and we find the analysis thorough and reasonable. Thus, we are recommending use of the ultimate rates in the MP-2020 scales, applied for all years, which we refer to as the "2020MP-Ultimate" improvement assumption.

Below is a table with the life expectancy for an age 65 retiree, in years, under the current and recommended mortality assumption.

Life Expectancy for an Age 65 Retiree in Years					
Assumption	**Year of Retirement**				
	2025	**2030**	**2035**	**2040**	**2045**
Current Assumption – Male	21.4	21.8	22.2	22.6	23.0
Recommended Assumption – Male	19.8	20.2	20.6	21.0	21.3
Current Assumption – Female	24.4	24.8	25.2	25.6	25.9
Recommended Assumption – Female	22.4	22.7	23.1	23.4	23.7

As shown, life expectancies under the new assumption have decreased compared to the current assumption. This decrease reflects the actual mortality experience during FY 2020, FY2021, and FY2022. However, the mortality assumption will continue to explicitly build in the assumption that mortality will gradually improve in future years. As the table shows, a 65-year old male in 2040 is assumed to live, on average, 0.8 years longer than a 65-year old in 2030.

Disabled Retiree Mortality Rates

This is a less significant assumption than the mortality assumption for non-disabled retirees, because only one out of eighteen retirees in CERS is classified as disabled. Because the number of disabled retirees is much smaller, there is not sufficient experience to develop a system-specific assumption and we must continue to rely on using a published table.

The current disability mortality assumption is based on the Pub-2010 Disabled Mortality table, with various adjustments to appropriately fit to the experience.

The analysis shows that the mortality was greater than expected compared to the current assumption. As a result, we recommend adjusting the mortality assumption such that the new assumption is 150% of the base published mortality table without an age set-forward or set-back for both male and female rates. We also recommend applying the "2020MP-Ultimate" mortality improvement assumption to this assumption as well.

Mortality Experience for Disabled Retirees for the Nine-Year Period Ending June 30, 2022 (Amounts are benefit-weighted and scaled to thousands)					
		Current		Recommended	
Group	Actual	Expected	A/E	Expected	A/E
Male	174	137	127%	161	108%
Female	135	112	121%	130	103%

Details are provided in Section V on pages 48-49.

Active Mortality Rates

This is the least significant of all the mortality assumptions because the mortality rates for active members are considerably lower than mortality rates for retired members (nondisabled and disabled).

The current mortality assumption for employees is the Public Retirement Plan (PUB-2010) Mortality table for employees. The assumption for the non-hazardous funds is the published table for General Employees and the assumption for the hazardous funds is the published table for Public Safety members. The census data that we receive from KPPA does not include a code that consistently identifies the members who died while employed. However, the table below provides the number of active member deaths that occurred during the last five years, which was provided by KPPA.

Fund	Actual Deaths	Expected Deaths
Non-Hazardous	2,056	1,340
Hazardous	63	59

The current assumption remains the most recently published mortality table for public employees; therefore, we recommend no change in the current assumption.

Since the death benefit provided to a beneficiary is more generous if an active member's death is duty related or as a result of an act while in the line of duty, it is relevant for the valuation to include an assumption regarding the number of expected deaths that will occur in the line of duty. The valuation currently assumes that 25% of the active membership deaths are duty related or occur in the line of duty (same assumption for each fund). Over the last five years there were a total of ten CERS active duty-related/line-of-duty deaths (five non-hazardous and five hazardous). While the current 25% assumption appears much higher than recent experience, we remain comfortable that this remains a reasonable assumption and do not recommend a change to this assumption.

DISABILITY INCIDENCE

The disability rates are intended to reflect the probability that a member will retire with a disability retirement allowance. We analyzed the disability experience year by year separately for each fund. Our review includes an investigation to determine if there is a time-lag in the processing of disability retirements that we discuss in more detail below. The following is a table with a summary of the results of the analysis for the five-year period ending June 30, 2022.

Disability Incidence for the Five-Year Period Ending June 30, 2022							
				Current Assumptions		Proposed Assumptions	
Fund	Census Data	Processing Time-Lag	Actual for Analysis	Exp.	A/E	Exp.	A/E
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-Hazardous	513	436	949	1,056	90%	1,005	94%
Hazardous	49	55	104	129	81%	119	87%

Note: the actual and expected statistics are headcount based and not benefit-weighted.

Typically, when we review a System's disability experience, our review includes an investigation into whether there is delay in a System's classification of a retiree as a disabled retiree. Often if there is a delay, it is due to a combination of the time of year the member becomes disabled and the time necessary to approve a member's application for a disability retirement benefit. For example, a member who becomes disabled late in the fiscal year may be reported in the census data files as follows: Year 1: "Active", Year 2: "Inactive", Year 3: "Disabled Retiree". The reporting of the member as "Inactive" in year 2 is due to the processing of a member's application for a disability retirement, where in reality the member was actually a "Disabled Retiree" in year 2.

The count in column (2) provides the number of members who are identified as having a year-to-year status change from "Active" to "Disabled Retiree". The count in column (3) is the number of members who were identified as having a status change to "Disabled Retiree" during the five-year period from inactive status. Together, these represent the number of disability retirements that are studied for the purposes of the actuarial assumption. Note, due to the processing delay, this may be different than the number of disability applications processed by the retirement system in any given year.

Based on the analysis above, we recommend a small decrease to the disability rates for both the non-hazardous and hazardous funds. However, we also noticed that over the last five years the number of disabilities has gradually decreased each year. We will watch the annual number of disabilities to identify if the reduced number of disabilities will continue or revert back to historical patterns and if further changes to this assumption are necessary.

Duty Related and Line of Duty Disability

Since there are minimum benefits provided to members who become disabled in the line of duty or as a result of a duty-related disability, it is important to review the System's experience regarding disability retirements under these circumstances. KPPA provided the disability experience on a fund basis and separately identified the number of ordinary disabilities, duty related disabilities, and in the line of duty disabilities, as well as the number of total and permanent disabilities since the passing of SB169 in 2021.

The following table provides a summary of the number of disabilities for each fund for the five-year period ending June 30, 2022.

Prevalence of Disability Incidence by Type for the Five-Year Period Ending June 30, 2022			
Fund	Percent of Disabilities Duty Related/ILD	Current Assumption for Duty Related/ILD	Recommended Assumption for Duty Related/ILD
(1)	(2)	(4)	(5)
Non-Hazardous	<0%	2%	2%
Hazardous	50%	50%	50%

The current assumption tracked reasonably well for both the non-hazardous and hazardous funds. Therefore, we recommend no change to the duty-related or in the line of duty disability incidence assumption.

Total and Permanent Disability

Additional benefits are provided to members who become "totally and permanently" disabled in the line of duty or as a result of duty-related disability. The provisions for a non-hazardous duty-related disability have a requirement for "total and permanent" disability so there is no separate assumption for the non-hazardous fund. The provisions for a hazardous disability in the line of duty do not have a "total and permanent" disability requirement; therefore, we do make a separate assumption for this type of disability in the valuation for the hazardous fund.

Since the passing of SB169 in 2021, there has only been one member to qualify as "total and permanently" disabled under the hazardous fund. Historically, approximately 10% of the in line of duty/duty-related disabilities during the period from 2010-2019 would have classified as "total and permanent". We recommend no change to the assumption that 10% of disabilities in the line of duty will be total and permanent for the hazardous fund.

TERMINATION RATES

The termination assumption is used to model the effect of members leaving active membership in the System for any reason other than death, disability, or service retirement. This applies whether the termination is voluntary or involuntary, and whether the member takes a refund or keeps his/her account balance on deposit. However, we only consider a termination to occur if the member changes status in the retirement system to an inactive member. We don't consider a termination to occur if the member works for a new employer, but remains an active member in the same fund. The valuation uses the same termination assumption for males and females, but different assumptions for each fund. The current assumption is structured as a function of service. No terminations are assumed once a member becomes retirement eligible (i.e. members who leave active service who are eligible to retire are assumed to commence their retirement benefit).

A higher paid member has a greater liability relative to a lower paid member, and has been shown to have lower turnover. Along those lines the termination pattern for the higher paid members will have more impact on the future liabilities of the plan. Therefore, we have weighted the experience by salary and are counting the payroll and the portion of the payroll that terminates employment (versus headcount) for the last nine years. For this assumption, it is more conservative to have an A/E ratio over 100%.

The analysis indicated that termination experience is still correlated with service. Also, we continue to develop a termination assumption that is applied to both genders for increased statistical credibility. The following table provides a summary of the results for the termination rates by fund:

Summary of Termination Analysis (Hundreds of Thousands of Payroll)					
	Actual	Current Assumption		Recommended Assumption	
Fund	Experience	Expected	A/E	Expected	A/E
(1)	(2)	(3)	(4)	(5)	(6)
Non-Hazardous	27,407	19,192	143%	22,499	122%
Hazardous	6,458	4,790	135%	5,650	114%

In summary, the rates of termination were higher than expected for both funds. The higher actual turnover experience was not surprising given the extraordinary economic changes that occurred during the last few years. We are recommending a 15% increase to the termination rates for both the non-hazardous and hazardous funds.

Details of the termination experience are provided in Section V on pages 50-51.

Refund of Member Contribution Balance

If a member terminates employment with a vested benefit but prior to their retirement age, they may keep their member contributions in the System and receive a monthly annuity when they reach their eligible retirement age or withdrawal their member contributions at any time and forfeit the monthly annuity. Currently, the valuation assumes that members in each fund will refund their contributions if the value of their member contributions exceeds the value of their deferred monthly retirement benefit. We recommend no change to this assumption.

RETIREMENT RATES

The retirement rates are used to model when an employee will commence their retirement allowance. The current retirement assumption is the same for males and females, but vary by fund and benefit tier.

For this analysis we have weighted the experience by the member's benefit. Thus, the retirement pattern for the members with a greater benefit will have a larger impact on the future liabilities of the plan. For this assumption, it is more conservative to have an A/E ratio less 100%, however, it is still reasonable to have an A/E ratio greater than 100% if there is reason to believe that future retirement experience will be different than the experience period reviewed.

We recommend the continued use of an age-based and gender-distinct retirement assumption for the non-hazardous fund. For the hazardous fund, the use of a service-based retirement assumption provides a better indicator of the members' retirement pattern. And, there is not enough female members in the hazardous fund to create a credible gender-distinct retirement assumption.

Summary of Retirement Analysis (Hundreds of Thousands of Payroll)						
	Males			Females		
Fund	Actual	Expected	A/E	Actual	Expected	A/E
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous	7,958	8,119	98%	9,231	9,265	100%
Hazardous	10,180	9,866	103%	Included with Males	Included with Males	Included with Males

We are recommending no change the retirement rates for the non-hazardous fund. Overall, the expected average retirement age for males is age 60 and age 61 for females. The valuation also includes assumptions for reduced, early retirement which are less material than the normal retirement assumptions. We are recommending no change to the early retirement rates as well. Similarly, we recommend continued use of the current retirement assumption for the hazardous fund.

Details of the retirement experience are provided in Section V on pages 52-55.

Adjustment to Retirement Rates for Members Participating on or after July 1, 2003

Members with a participation date on or after July 1, 2003, receive a relatively less generous pre-age 65 health insurance benefit compared to the benefit provided to members who become participants prior to July 1, 2003. Therefore, we recommend continued use of a different retirement assumption to reflect an expectation that these members will retire at slightly later ages. Specifically, for members with a participation date on or after July 1, 2003 the retirement rates at each age (or service) below age 65 are 80% of the retirement rates that are developed for the members with a participation date prior to July 1, 2003. Additional adjustments were made to retirement rates for Tier 2 and Tier 3 members to reflect the different retirement eligibility and benefits applicable to these members. Note that we are relying on our professional judgement regarding these retirement rates as it will be many years into the future before there is sufficient experience to analyze their actual retirement pattern. There were no recommended changes to the adjustment for members with a participation date on or after July 1, 2003 or to the retirement rates for Tier 2 and Tier 3 members. These retirement rates are shown in Sections IV.

Retiree Medical Participation

A retiree's participation in the health insurance plan is voluntary, not mandatory. Some retirees may not elect to be covered, especially if they have coverage through a spouse or a previous employer. As a result, it is relevant to include an assumption in the actuarial valuation regarding the number of future retirees that will elect to participate in the retiree health insurance plan. It may be relevant to take into consideration the design of the health insurance plan when selecting this assumption, such as eligibility, plan choices, and retiree contribution requirements, which may affect a retiree's decision to participate in the health insurance plan.

The current assumption is a service-based assumption, which is logical since the retiree's cost subsidy increases as their service at retirement increases. The following table summarizes the current participation assumption.

Health Insurance Participation Assumption at Retirement
(members with a participation date before July 1, 2003)

Service at Retirement (Years)	Fund	
	Non-Hazardous	Hazardous
(1)	(2)	(3)
Under 10	50%	50%
10 to 14	75%	75%
15 to 19	90%	90%
20 or more	100%	100%

Additionally, 50% of inactive vested members with a participation date before July 1, 2003 are assumed to elect health coverage and 75% of members with hazardous service are assumed to elect spouse coverage.

We reviewed the actual participation experience for the five-year period for each fund. The actual election rate remains relatively close to the expected election rate for those retirees. As a result, we recommend no change to the participation assumptions for the health insurance funds.

For members with a participation date on or after July 1, 2003 who receive the dollar subsidy benefit, 100% of members are assumed to elect health coverage. While actual participation experience for this benefit has been lower than 100%, recent experience shows that participation for this benefit is increasing as the members begin retiring with higher service. Therefore, we recommend no change to this assumption at this time.

Other Assumptions

There are other assumptions made in the course of a valuation, such as the percentage of members who are married, the age difference between members and spouses, etc. Currently 100% of the members are assumed to be married with the husband three years older than the wife. We believe they are generally realistic and/or conservative and recommend no changes to these other assumptions.

There are also assumptions that are specifically used in the valuation of the retiree health insurance funds. These include: the age-related morbidity/claims utilization, health care trend, and baseline claims cost. Each of these assumptions are reviewed on an annual basis and may be periodically updated as each year of claims experience is reviewed, as well as with possible plan design changes.

Actuarial Cost Method

The individual Entry Age Normal cost method (EAN) is the current funding method being used to allocate the actuarial costs of each fund. The Entry Age Normal method will generally produce relatively level contribution amounts as a percentage of payroll from year-to-year, and allocates costs among various generations of taxpayers in a reasonable manner. It is by far the most commonly used actuarial cost method for large public retirement systems. We continue to believe this is the most appropriate funding method and recommend no change.

Actuarial Asset Method

The current method for developing the actuarial value of assets is based on a five-year asset smoothing method that will identify each year's investment gain or loss on a market value of asset basis, and recognize that amount at the rate of 20% per year. Under this method, an investment gain or loss that occurs in a particular year will be fully recognized in the actuarial value of assets after five years. This asset method is also the most common asset valuation method used by large public retirement systems and the actual investment volatility experienced in FY 2021 and FY 2022 shows the relevance and importance of using this method for purposes of determining the actuarial contribution rate. As a result, we recommend continued use of this asset smoothing method.

SECTION IV

SUMMARY OF RECOMMENDED ASSUMPTIONS

County Employees Retirement System
Summary of Actuarial Methods and Assumptions

The following presents a summary of the actuarial assumptions and methods proposed for use in the valuation of the County Employees Retirement System beginning with the valuation date June 30, 2023.

Investment return rate:

Assumed annual rate of 6.50% net of investment expenses for the retirement funds and the insurance funds

Price Inflation:

Assumed annual rate of 2.50%

Payroll Growth Assumption (used for amortization of unfunded accrued liabilities):

Assumed annual rate of 2.00%

Rates of Annual Salary Increase:

Assumed rates of annual salary increases are shown below.

Service Years	Annual Rates of Salary Increase					
	Merit & seniority		Price Inflation & Productivity		Total Increase	
	Non-Hazardous	Hazardous	Non-Hazardous	Hazardous	Non-Hazardous	Hazardous
0	7.00%	15.50%	3.30%	3.55%	10.30%	19.05%
1	4.00%	5.50%	3.30%	3.55%	7.30%	9.05%
2	3.00%	3.50%	3.30%	3.55%	6.30%	7.05%
3	2.00%	2.50%	3.30%	3.55%	5.30%	6.05%
4	1.75%	2.25%	3.30%	3.55%	5.05%	5.80%
5	1.50%	2.00%	3.30%	3.55%	4.80%	5.55%
6	1.25%	2.00%	3.30%	3.55%	4.55%	5.55%
7	1.00%	1.50%	3.30%	3.55%	4.30%	5.05%
8	0.75%	1.50%	3.30%	3.55%	4.05%	5.05%
9	0.75%	1.00%	3.30%	3.55%	4.05%	5.55%
10	0.50%	1.00%	3.30%	3.55%	3.80%	5.55%
11	0.50%	0.50%	3.30%	3.55%	3.80%	4.05%
12	0.25%	0.50%	3.30%	3.55%	3.55%	4.05%
13	0.25%	0.50%	3.30%	3.55%	3.55%	4.05%
14	0.25%	0.25%	3.30%	3.55%	3.55%	3.80%
15	0.00%	0.25%	3.30%	3.55%	3.30%	3.80%
16 &Over	0.00%	0.00%	3.30%	3.55%	3.30%	3.55%

Retirement rates:

Assumed annual rates of retirement are shown below. Rates are only applicable for members who are eligible for a service retirement.

	Non-Hazardous					Hazardous		
	Normal Retirement		Early Retirement[1]			Members participating before 9/1/2008[2]	Members participating between 9/1/2008 and 1/1/2014[3]	Members participating after 1/1/2014[3]
Age	Male	Female	Male	Female	Service			
Under 45	35.0%	27.0%			5	17.0%		
45	35.0%	27.0%			6	17.0%		
46	35.0%	27.0%			7	17.0%		
47	35.0%	27.0%			8	17.0%		
48	35.0%	27.0%			9	17.0%		
49	35.0%	27.0%			10	17.0%		
50	30.0%	27.0%			11	17.0%		
51	30.0%	27.0%			12	17.0%		
52	30.0%	27.0%			13	17.0%		
53	30.0%	27.0%			14	17.0%		
54	30.0%	27.0%			15	17.0%		
55	30.0%	27.0%	4.0%	5.0%	16	17.0%		
56	30.0%	27.0%	4.0%	5.0%	17	17.0%		
57	30.0%	27.0%	4.0%	5.0%	18	17.0%		
58	30.0%	27.0%	4.0%	5.0%	19	17.0%		
59	30.0%	27.0%	4.0%	5.0%	20	30.0%		
60	30.0%	27.0%	4.0%	8.0%	21	22.5%		
61	30.0%	27.0%	4.0%	9.0%	22	18.0%		
62	30.0%	40.0%	15.0%	20.0%	23	21.0%		
63	30.0%	35.0%	15.0%	18.0%	24	24.0%		
64	30.0%	30.0%	15.0%	16.0%	25	27.0%	21.6%	16.0%
65	30.0%	30.0%			26	30.0%	24.0%	16.0%
66	30.0%	27.0%			27	33.0%	26.4%	16.0%
67	30.0%	27.0%			28	36.0%	28.8%	16.0%
68	30.0%	27.0%			29	39.0%	31.2%	16.0%
69	30.0%	27.0%			30+	39.0%	31.2%	100.0%
70	30.0%	27.0%						
71	30.0%	27.0%						
72	30.0%	27.0%						
73	30.0%	27.0%						
74	30.0%	27.0%						
75	100.0%	100.0%						

[1] The annual rate of retirement is 11% for male members and 12% for female members with 25-26 years of service.

[2] The annual rate of retirement is 100% at age 62.

[3] The annual rate of retirement is 100% at age 60.

Non-Hazardous System: For members hired after 7/1/2003, the rates shown above are multiplied by 80% if he member is under age 65 to reflect the different retiree health insurance benefit.

Hazardous System: For members hired after 7/1/2003 and prior to 9/1/2008, the rates shown above are multiplied by 80% if the member is under age 62 to reflect the different retiree health insurance benefit.

Disability rates:

An abbreviated table with assumed rates of disability is show below.

Age	Non-Hazardous		Hazardous	
	Male	Female	Male	Female
20	0.04%	0.04%	0.07%	0.07%
30	0.06%	0.06%	0.12%	0.12%
40	0.14%	0.14%	0.26%	0.26%
50	0.39%	0.39%	0.73%	0.73%
60	1.02%	1.02%	1.90%	1.90%

Withdrawal rates (for causes other than disability and retirement):

Assumed annual rates of withdrawal are shown below and include pre-retirement mortality rates as described on the next page.

Service Years	Annual Rates of Withdrawal	
	Non-Hazardous	Hazardous
1	20.00%	20.00%
2	17.92%	10.48%
3	14.35%	8.33%
4	12.26%	7.06%
5	10.78%	6.18%
6	9.63%	5.47%
7	8.69%	4.91%
8	7.90%	4.43%
9	7.21%	4.01%
10	6.60%	3.66%
11	6.06%	3.32%
12	5.57%	3.02%
13	5.12%	2.76%
14	4.70%	2.51%
15	4.32%	2.28%
16	3.97%	2.07%
17	3.63%	1.86%
18	3.32%	1.68%
19	3.04%	1.50%
20	2.75%	1.33%
21	2.48%	0.00%
22	2.23%	0.00%
23	2.00%	0.00%
24	1.77%	0.00%
25	1.55%	0.00%
26 & Over	0.00%	0.00%

Mortality Assumption:

Pre-retirement mortality: PUB-2010 General Mortality table, for the Non-Hazardous System, and the PUB-2010 Public Safety Mortality table for the Hazardous System, projected with the ultimate rates from the MP-2020 mortality improvement scale using a base year of 2010.

Post-retirement mortality (non-disabled): System-specific mortality table based on mortality experience from 2013-2022, projected with the ultimate rates from the MP-2020 mortality improvement scale using a base year of 2023.

The following table provides the life expectancy for a non-disabled retiree in future years based on the assumption with full generational projection:

Life Expectancy for an Age 65 Retiree in Years					
Gender	**Year of Retirement**				
	2025	**2030**	**2035**	**2040**	**2045**
Male	19.8	20.2	20.6	21.0	21.3
Female	22.4	22.7	23.1	23.4	23.7

Post-retirement mortality (disabled): PUB-2010 Disabled Mortality table, with rates multiplied by 150% for both male and female rates, projected with the ultimate rates from the mortality improvement scale MP-2020 using a base year of 2010.

Marital status:

100% of employees are assumed to be married, with the female spouse 3 years younger than the male spouse.

Line of Duty/Duty-Related Disability

Non-Hazardous: 2% of disabilities are assumed to be duty-related (100% of which are assumed to be "total and permanent")

Hazardous: 50% of disabilities are assumed to occur in the line of duty (10% of which are assumed to be "total and permanent")

Line of Duty Death

25% of deaths are assumed to occur in the line of duty

Dependent Children:

For members in the Hazardous Plan who receive a duty-related death or disability benefit, the member is assumed to be survived by two dependent children, each age 6 with payments for 15 years.

Form of Payment:

Members are assumed to elect a life-only annuity at retirement.

Actuarial Cost Method:

Entry Age Normal, Level Percentage of Pay. The Entry Age Normal actuarial cost method allocates the System's actuarial present value of future benefits to various periods based upon service. The portion of the present value of future benefits allocated to years of service prior to the valuation date is the actuarial accrued liability, and the portion allocated to years following the valuation date is the present value of future normal costs. The normal cost is determined for each active member as the level percent of pay necessary to fully fund the expected benefits to be earned over the career of each individual active member. The normal cost is partially funded with active member contributions with the remainder funded by employer contributions.

Health Care Participation Assumptions:

- Active members are assumed to elect health coverage at retirement at the following participation rates.

Service at Retirement	Members participating before 7/1/2003*	Members participating after 7/1/2003
Under 10	50%	100%
10-14	75%	100%
15-19	90%	100%
Over 20	100%	100%

* 100% of members with a duty disability or a duty death (in service) benefit are assumed to elect coverage at retirement.

- Future retirees are assumed to have a similar distribution by plan type as the current retirees.

Medicare Plan	Participation Percentage
Medical Only[1]	5%
Essential Plan	8%
Premium Plan	87%

Non-Medicare Plan	Participation Percentage
LivingWell Basic	2%
LivingWell CDHP	35%
LivingWell PPO	63%

[1] Includes Medicare Advantage Mirror Plans

Health Care Participation Assumptions (continued):

- 50% of deferred vested members participating before July 1, 2003 are assumed to elect health coverage at retirement. 100% of deferred vested members participating after July 1, 2003 are assumed to elect health coverage at retirement.

- Deferred vested members receiving insurance benefits from the non-hazardous fund are assumed to begin health coverage at age 55 for members participating before September 1, 2008, at age 60 for members participating on or after September 1, 2008 but before January 1, 2014, and at age 65 for members participating on or after January 1, 2014.

- Deferred vested members receiving insurance benefits from the hazardous fund are assumed to begin health coverage at age 50 for members participating before January 1, 2014 and at age 60 for members participating on or after January 1, 2014.

- 75% of future retirees, with hazardous service, are assumed to elect spouse health care coverage. No dependent coverage is assumed for members who only have non-hazardous service. 100% of spouses with health care coverage are assumed to continue coverage after the member's death.

Other Assumptions

1. Valuation payroll (used for determining the amortization contribution rate): Current fiscal year payroll.

2. Individual salaries used to project benefits: For salary amounts prior to the valuation date, the salary from the last fiscal year is projected backward with the valuation salary scale assumption. For future salaries, the salary from the last fiscal year is projected forward with one year's salary scale.

3. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported salaries represent amounts paid to members during the year ending on the valuation date.

4. Current active members that terminate employment (for reasons other than retirement, disability, or death) are assumed to commence their retirement benefits at first unreduced retirement eligibility. Members are assumed to elect a refund of member contributions if the value of their account balance exceeds the present value of the deferred benefit. Members participating in the Cash Balance plan are assumed to elect to receive a lump sum of their cash balance account if their account balance exceeds the present value of the deferred benefit and the member is not eligible for insurance benefits at termination.

5. The beneficiaries of current active members that die while active are assumed to commence their survivor benefits at the member's first unreduced retirement eligibility. Beneficiaries are assumed to elect a refund of member contributions if the value of the member's account balance exceeds the present value of the survivor benefit. Beneficiaries of active members that die while in the line of duty are assumed to commence their survivor benefits immediately at the death of the member.

6. There will be no recoveries once disabled.

7. Cash Balance Provisions: The cash balance interest crediting rate while a member is an active employee is assumed to equal 6.75% (based upon the 6.50% assumed investment return). The interest crediting rate after a member terminates employment is 4%.

8. Decrement timing: Decrements of all types are assumed to occur mid-year. Decrement rates are used as described in this report, without adjustment for multiple decrement table effects.

9. Service: All members are assumed to accrue 1 year of benefit and eligibility service each year.

10. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.

11. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.

12. Current Inactive Population (Retirement Fund): All non-vested members are assumed to take an immediate refund of member contributions. Vested members are assumed to elect an immediate refund of member contributions at the valuation date if the value of their account balance exceeds the present value of their deferred benefit. Non-hazardous members are assumed to retire at age 65. Hazardous members hired prior to September 1, 2008 are assumed to retire at age 55 and hazardous members hired on or after September 1, 2008 are assumed to retire at age 60.

13. The additional $5 per year of service insurance dollar subsidy effective January 1, 2023 is assumed to be paid in all applicable years.

SECTION V

SUMMARY OF DATA AND EXPERIENCE

List of Tables

Kentucky Public Pensions Authority
County Employees Retirement System (CERS)
Non-Hazardous
Salary Increase Experience

	Current Salary Scale		2014-2022 Actual Experience			Proposed Salary Scale	
Years of Service	Total	Step Rate/ Promotional	Total	Above Inflation	Step Rate/ Promotional	Total	Step Rate/ Promotional
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	10.30%	7.00%	9.52%	6.84%	6.34%	10.30%	7.00%
2	7.30%	4.00%	6.54%	3.86%	3.36%	7.30%	4.00%
3	6.30%	3.00%	5.72%	3.04%	2.55%	6.30%	3.00%
4	4.80%	1.50%	5.24%	2.56%	2.07%	5.30%	2.00%
5	4.55%	1.25%	5.15%	2.46%	1.97%	5.05%	1.75%
6	4.55%	1.25%	4.71%	2.03%	1.53%	4.80%	1.50%
7	4.30%	1.00%	4.51%	1.83%	1.33%	4.55%	1.25%
8	4.30%	1.00%	4.24%	1.56%	1.06%	4.30%	1.00%
9	4.05%	0.75%	4.19%	1.50%	1.01%	4.05%	0.75%
10	4.05%	0.75%	4.24%	1.56%	1.06%	4.05%	0.75%
11	3.80%	0.50%	3.83%	1.15%	0.65%	3.80%	0.50%
12	3.80%	0.50%	3.82%	1.14%	0.64%	3.80%	0.50%
13	3.55%	0.25%	3.57%	0.88%	0.39%	3.55%	0.25%
14	3.55%	0.25%	3.57%	0.88%	0.39%	3.55%	0.25%
15	3.55%	0.25%	3.52%	0.83%	0.34%	3.55%	0.25%
16 & Over	3.30%	0.00%	3.18%	0.50%	0.00%	3.30%	0.00%

Current Inflation Assumption	2.30%	Proposed Inflation Assumption	2.50%
Current Productivity Component	1.00%	Proposed Productivity Component	0.80%
Actual CPI-U Inflation for June 2013 - June 2018	2.68%	Proposed Wage Inflation	3.30%
Apparent Productivity Component	0.50%		

Kentucky Public Pensions Authority
County Employees Retirement System (CERS)
Hazardous
Salary Increase Experience

	Current Salary Scale		2014-2022 Actual Experience			Proposed Salary Scale	
Years of Service	Total	Step Rate/ Promotional	Total	Above Inflation	Step Rate/ Promotional	Total	Step Rate/ Promotional
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	19.05%	15.50%	19.77%	17.09%	14.87%	19.05%	15.50%
2	7.55%	4.00%	8.58%	5.90%	3.68%	9.05%	5.50%
3	5.55%	2.00%	6.96%	4.28%	2.06%	7.05%	3.50%
4	4.80%	1.25%	6.59%	3.91%	1.69%	6.05%	2.50%
5	4.55%	1.00%	5.79%	3.11%	0.89%	5.80%	2.25%
6	4.55%	1.00%	6.18%	3.50%	1.28%	5.55%	2.00%
7	4.55%	1.00%	5.68%	3.00%	0.78%	5.55%	2.00%
8	4.05%	0.50%	5.34%	2.66%	0.44%	5.05%	1.50%
9	4.05%	0.50%	5.12%	2.44%	0.22%	5.05%	1.50%
10	3.55%	0.00%	5.54%	2.86%	0.64%	4.55%	1.00%
11	3.55%	0.00%	5.06%	2.38%	0.16%	4.55%	1.00%
12	3.55%	0.00%	4.95%	2.27%	0.05%	4.05%	0.50%
13	3.55%	0.00%	5.13%	2.45%	0.23%	4.05%	0.50%
14	3.55%	0.00%	4.98%	2.30%	0.08%	4.05%	0.50%
15	3.55%	0.00%	5.13%	2.45%	0.23%	3.80%	0.25%
16 & Over	3.55%	0.00%	4.90%	2.22%	0.00%	3.80%	0.25%

Current Inflation Assumption	2.30%	Proposed Inflation Assumption	2.50%
Current Productivity Component	1.25%	Proposed Productivity Component	1.05%
Actual CPI-U Inflation for June 2013 - June 2018	2.68%	Proposed Wage Inflation	3.55%
Apparent Productivity Component	2.22%		

Kentucky Public Pensions Authority
Post-Retirement Mortality Experience - Male

				Assumed Rate		Expected Deaths		Actual/Expected	
Age	Actual Deaths	Total Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
50-54	27	7,034	0.0038	0.32%	0.34%	23	25	116.08%	106.17%
55-59	70	11,349	0.0062	0.48%	0.62%	64	73	109.94%	96.83%
60-64	159	15,704	0.0101	1.06%	1.01%	165	159	96.66%	100.35%
65-69	259	18,509	0.0140	1.30%	1.40%	242	267	106.81%	97.01%
70-74	349	13,647	0.0256	1.83%	2.56%	250	342	139.86%	102.17%
75-79	303	7,450	0.0407	3.27%	4.07%	241	301	125.70%	100.74%
80-84	284	3,980	0.0713	6.25%	7.13%	244	279	116.47%	101.75%
85-89	236	1,762	0.1340	11.40%	12.86%	194	219	121.73%	107.83%
90-94	107	508	0.2111	19.35%	21.62%	93	104	115.01%	102.94%
95-99	26	82	0.3180	27.33%	32.86%	22	25	119.80%	103.44%
100-104	3	8	0.4015	35.06%	45.52%	2	3	121.62%	92.93%
105-109	0	0	0.3333	44.56%	50.00%	0	0	77.97%	67.24%
Total	1,825	80,033				1,541	1,797	118.42%	101.51%

Actual, expected and exposures are in thousands of benefit

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Kentucky Public Pensions Authority
Post-Retirement Mortality Experience - Female

				Assumed Rate		Expected Deaths		Actual/Expected	
Age	Actual Deaths	Total Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
50-54	9	3,646	0.0025	0.23%	0.24%	8	9	109.03%	98.86%
55-59	30	8,524	0.0035	0.29%	0.41%	30	36	100.81%	83.24%
60-64	85	14,145	0.0060	0.73%	0.65%	102	94	82.90%	89.97%
65-69	157	16,655	0.0094	0.90%	1.03%	150	172	104.48%	90.97%
70-74	199	12,512	0.0159	1.20%	1.73%	151	216	131.65%	92.06%
75-79	207	7,227	0.0287	2.15%	3.12%	154	222	134.74%	93.21%
80-84	194	3,778	0.0513	4.24%	5.59%	157	208	123.40%	93.24%
85-89	169	1,864	0.0909	8.00%	10.61%	145	193	116.54%	87.71%
90-94	118	729	0.1619	13.94%	19.23%	97	134	121.35%	88.32%
95-99	38	150	0.2534	21.60%	30.47%	31	43	124.01%	88.44%
100-104	6	15	0.4084	30.98%	44.60%	4	6	142.45%	98.32%
105-109	0	1	0.5820	41.38%	54.50%	0	0	151.72%	110.98%
Total	1,212	69,246				1,030	1,334	117.69%	90.87%

Actual, expected, and exposures are in thousands of benefit.

Kentucky Public Pensions Authority
Post-Retirement Mortality Experience - Disabled Male

				Assumed Rate		Expected Deaths		Actual/Expected	
Age	Actual Deaths	Total Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
40-44	2	106	0.0198	1.03%	1.04%	1	1	182.91%	181.82%
45-49	5	245	0.0204	1.60%	1.67%	4	4	125.54%	117.90%
50-54	9	423	0.0212	2.05%	2.48%	9	11	102.97%	84.76%
55-59	16	611	0.0254	2.41%	3.11%	15	19	104.51%	81.46%
60-64	31	760	0.0408	2.98%	3.65%	23	28	136.37%	110.93%
65-69	34	682	0.0496	3.83%	4.60%	26	31	129.72%	108.30%
70-74	29	435	0.0662	5.16%	5.98%	22	26	129.12%	111.33%
75-79	23	235	0.0992	7.39%	8.20%	17	19	135.62%	122.06%
80-84	18	116	0.1517	10.88%	11.97%	12	14	142.79%	129.82%
85-89	6	36	0.1727	16.51%	17.91%	6	6	109.81%	100.44%
90-94	2	7	0.2672	23.68%	27.62%	2	2	117.18%	101.51%
95-99	0	1	0.2527	32.81%	39.38%	0	0	81.32%	67.82%
Total	174	3,656				137	161	127.46%	108.27%

Actual, expected, and exposures are in thousands of benefit.

Kentucky Public Pensions Authority
Post-Retirement Mortality Experience - Disabled Female

				Assumed Rate		Expected Deaths		Actual/Expected	
Age	Actual Deaths	Total Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
40-44	0	47	0.0085	1.00%	1.03%	0	1	79.86%	77.22%
45-49	4	151	0.0283	1.43%	1.59%	2	2	196.35%	171.93%
50-54	10	316	0.0301	1.67%	2.16%	5	7	179.87%	138.05%
55-59	14	580	0.0243	1.86%	2.50%	11	15	129.27%	96.85%
60-64	21	775	0.0273	2.19%	2.80%	17	22	124.24%	97.27%
65-69	24	698	0.0342	2.83%	3.36%	20	23	120.84%	101.83%
70-74	23	484	0.0477	4.03%	4.46%	19	22	119.00%	107.33%
75-79	18	300	0.0608	6.11%	6.48%	18	19	100.45%	94.58%
80-84	12	137	0.0905	9.47%	9.99%	13	13	98.97%	93.54%
85-89	6	35	0.1632	13.65%	15.65%	5	5	124.08%	109.42%
90-94	2	5	0.2774	19.51%	22.58%	1	1	150.83%	130.00%
95-99	0	1	0.2777	28.67%	32.83%	0	0	105.26%	92.02%
Total	135	3,529				112	130	120.56%	103.20%

Actual, expected, and exposures are in thousands of benefit.

Termination Experiences

Kentucky Public Pensions Authority
County Employees Retirement System
Non-Hazardous
Termination Experience - Service Based

				Assumed Rate		Expected Terminations		Actual/Expected	
Service	Actual Terminations	Total Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	1,195	4,354	0.2744	20.00%	20.00%	875	875	136.56%	136.56%
2	2,774	12,381	0.2240	15.58%	17.92%	1,943	2,218	142.77%	125.06%
3	2,229	12,807	0.1741	12.48%	14.35%	1,615	1,838	138.04%	121.29%
4	1,808	12,907	0.1401	10.66%	12.26%	1,394	1,582	129.73%	114.32%
5	1,597	12,896	0.1238	9.37%	10.78%	1,207	1,390	132.32%	114.90%
6	1,459	13,199	0.1106	8.37%	9.63%	1,083	1,270	134.74%	114.90%
7	1,375	13,761	0.0999	7.56%	8.69%	1,017	1,196	135.21%	114.97%
8	1,332	14,394	0.0926	6.87%	7.90%	965	1,137	138.07%	117.18%
9	1,269	14,951	0.0849	6.27%	7.21%	912	1,078	139.18%	117.75%
10	1,223	15,074	0.0812	5.74%	6.60%	841	995	145.48%	122.96%
11	1,146	15,407	0.0744	5.27%	6.06%	789	934	145.27%	122.71%
12	1,145	16,254	0.0704	4.84%	5.57%	762	905	150.21%	126.48%
13	1,077	17,138	0.0629	4.45%	5.12%	737	877	146.19%	122.85%
14	1,113	18,363	0.0606	4.09%	4.70%	723	864	153.88%	128.77%
15	990	19,112	0.0518	3.76%	4.32%	690	826	143.54%	119.91%
16	958	19,419	0.0493	3.45%	3.97%	640	770	149.67%	124.40%
17	806	19,277	0.0418	3.16%	3.63%	578	701	139.38%	114.93%
18	741	19,104	0.0388	2.89%	3.32%	520	635	142.57%	116.75%
19	619	18,686	0.0331	2.64%	3.04%	461	567	134.29%	109.19%
20	606	18,081	0.0335	2.39%	2.75%	400	497	151.49%	121.93%
21	660	16,921	0.0390	2.16%	2.48%	335	420	196.94%	157.09%
22	439	15,380	0.0285	1.94%	2.23%	269	343	163.03%	127.86%
23	338	13,848	0.0244	1.74%	2.00%	214	277	157.95%	122.03%
24	274	12,369	0.0222	1.54%	1.77%	165	219	166.15%	125.18%
25	232	5,479	0.0423	1.35%	1.55%	57	85	406.63%	272.68%
Total	27,407	371,562				19,192	22,499	142.80%	121.81%

Actual, expected, and exposures are in thousands of salary.

Termination Experiences

Kentucky Public Pensions Authority
County Employees Retirement System
Hazardous
Termination Experience - Service Based

				Assumed Rate		Expected Terminations		Actual/Expected	
Service	Actual Terminations	Total Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	221	1,298	0.1706	20.00%	20.00%	260	260	85.18%	85.18%
2	488	4,122	0.1183	9.11%	10.48%	376	432	129.67%	112.86%
3	511	5,003	0.1021	7.24%	8.33%	364	417	140.27%	122.44%
4	489	5,350	0.0914	6.14%	7.06%	330	378	148.20%	129.38%
5	425	5,711	0.0744	5.37%	6.18%	305	353	139.36%	120.41%
6	444	6,242	0.0711	4.76%	5.47%	292	342	152.07%	129.84%
7	372	6,692	0.0555	4.27%	4.91%	280	329	132.69%	112.93%
8	422	7,370	0.0572	3.85%	4.43%	277	326	152.24%	129.36%
9	366	8,114	0.0451	3.49%	4.01%	275	326	132.95%	112.15%
10	400	8,519	0.0469	3.18%	3.66%	262	312	152.65%	128.19%
11	370	8,767	0.0422	2.89%	3.32%	244	291	151.59%	127.11%
12	395	9,278	0.0426	2.63%	3.02%	233	281	169.68%	140.69%
13	251	9,896	0.0254	2.40%	2.76%	226	273	111.16%	92.02%
14	285	10,786	0.0264	2.18%	2.51%	222	270	128.48%	105.64%
15	228	10,944	0.0208	1.98%	2.28%	203	249	112.25%	91.51%
16	212	10,926	0.0194	1.80%	2.07%	183	226	115.59%	93.60%
17	208	10,800	0.0192	1.62%	1.86%	161	201	129.11%	103.41%
18	190	10,308	0.0184	1.46%	1.68%	137	173	138.42%	109.61%
19	117	9,953	0.0117	1.30%	1.50%	116	149	100.52%	78.26%
20	66	4,657	0.0142	1.16%	1.33%	44	62	150.55%	106.84%
Total	6,458	154,735				4,790	5,650	134.82%	114.30%

Actual, expected, and exposures are in thousands of salary.

Kentucky Public Pensions Authority
County Employees Retirement System
Non-Hazardous
Unreduced Retirement Experience - Age Based - Male

				Assumed Rate		Expected Retirements		Actual/Expected	
Age	Actual Retirements	Total Exposures	Actual Rate	Current[1]	Proposed[1]	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 45	81	83	0.97	35%	35%	29	29	279.17%	279.17%
45	44	69	0.63	35%	35%	24	24	182.04%	182.04%
46	66	192	0.35	35%	35%	67	67	98.72%	98.72%
47	168	350	0.48	35%	35%	123	123	136.68%	136.68%
48	161	477	0.34	35%	35%	167	167	96.70%	96.70%
49	208	569	0.36	35%	35%	199	199	104.33%	104.33%
50	227	670	0.34	30%	30%	201	201	112.90%	112.90%
51	251	851	0.29	30%	30%	255	255	98.41%	98.41%
52	341	939	0.36	30%	30%	282	282	120.76%	120.76%
53	277	937	0.30	30%	30%	281	281	98.67%	98.67%
54	337	1,041	0.32	30%	30%	312	312	108.12%	108.12%
55	365	1,197	0.31	30%	30%	359	359	101.80%	101.80%
56	336	1,179	0.28	30%	30%	354	354	94.92%	94.92%
57	295	1,120	0.26	30%	30%	335	335	88.12%	88.12%
58	338	1,166	0.29	30%	30%	350	350	96.57%	96.57%
59	249	1,011	0.25	30%	30%	303	303	82.13%	82.13%
60	215	938	0.23	30%	30%	281	281	76.45%	76.45%
61	256	954	0.27	30%	30%	286	286	89.37%	89.37%
62	370	940	0.39	30%	30%	282	282	131.31%	131.31%
63	295	713	0.41	30%	30%	214	214	137.66%	137.66%
64	177	581	0.30	30%	30%	174	174	101.68%	101.68%
65	748	2,636	0.28	30%	30%	791	791	94.60%	94.60%
66	658	2,044	0.32	30%	30%	613	613	107.27%	107.27%
67	422	1,530	0.28	30%	30%	459	459	92.01%	92.01%
68	277	1,150	0.24	30%	30%	345	345	80.32%	80.32%
69	245	964	0.25	30%	30%	289	289	84.62%	84.62%
70	174	764	0.23	30%	30%	229	229	75.84%	75.84%
71	126	604	0.21	30%	30%	181	181	69.48%	69.48%
72	99	441	0.22	30%	30%	132	132	75.04%	75.04%
73	75	372	0.20	30%	30%	112	112	67.38%	67.38%
74	77	302	0.26	30%	30%	90	90	86.03%	86.03%
Total	7,958	26,782				8,119	8,119	98.02%	98.02%
75 & Over	245	1,010	0.24	100%	100%	1,010	1,010	24.28%	24.28%
Total	8,203	27,792				9,129	9,129	89.86%	89.86%

[1] For members hired after 09/01/2008 and younger than 65, the rates other than 100% are reduced by 20% to account for a different health insurance benefit.

Actual, expected, and exposures are in thousands of benefit.

Kentucky Public Pensions Authority
County Employees Retirement System
Non-Hazardous
Unreduced Retirement Experience - Age Based - Female

				Assumed Rate		Expected Retirements		Actual/Expected	
Age	Actual Retirements	Total Exposures	Actual Rate	Current[1]	Proposed[1]	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 45	24	59	0.41	27%	27%	16	16	152.50%	152.50%
45	23	44	0.52	27%	27%	12	12	189.99%	189.99%
46	61	187	0.33	27%	27%	50	50	121.88%	121.88%
47	77	242	0.32	27%	27%	65	65	119.12%	119.12%
48	106	403	0.26	27%	27%	109	109	97.15%	97.15%
49	187	621	0.30	27%	27%	168	168	111.14%	111.14%
50	148	741	0.20	27%	27%	200	200	73.92%	73.92%
51	181	741	0.24	27%	27%	200	200	90.46%	90.46%
52	207	944	0.22	27%	27%	255	255	81.06%	81.06%
53	250	1,039	0.24	27%	27%	280	280	89.26%	89.26%
54	280	1,130	0.25	27%	27%	305	305	91.81%	91.81%
55	336	1,216	0.28	27%	27%	328	328	102.50%	102.50%
56	347	1,281	0.27	27%	27%	345	345	100.57%	100.57%
57	311	1,229	0.25	27%	27%	331	331	93.98%	93.98%
58	294	1,296	0.23	27%	27%	350	350	83.91%	83.91%
59	402	1,473	0.27	27%	27%	398	398	100.93%	100.93%
60	437	1,418	0.31	27%	27%	383	383	114.13%	114.13%
61	449	1,372	0.33	27%	27%	370	370	121.42%	121.42%
62	558	1,385	0.40	40%	40%	554	554	100.68%	100.68%
63	381	1,091	0.35	35%	35%	382	382	99.72%	99.72%
64	294	913	0.32	30%	30%	274	274	107.43%	107.43%
65	1,123	3,757	0.30	30%	30%	1,127	1,127	99.65%	99.65%
66	876	2,722	0.32	27%	27%	735	735	119.18%	119.18%
67	525	1,970	0.27	27%	27%	532	532	98.75%	98.75%
68	326	1,502	0.22	27%	27%	405	405	80.45%	80.45%
69	294	1,152	0.26	27%	27%	311	311	94.58%	94.58%
70	217	879	0.25	27%	27%	237	237	91.58%	91.58%
71	193	705	0.27	27%	27%	190	190	101.51%	101.51%
72	126	512	0.25	27%	27%	138	138	91.06%	91.06%
73	101	426	0.24	27%	27%	115	115	87.83%	87.83%
74	97	372	0.26	27%	27%	100	100	97.17%	97.17%
Total	9,231	32,821				9,265	9,265	99.63%	99.63%
75 & Over	269	964	0.28	100%	100%	964	964	27.91%	27.91%
Total	9,500	33,785				10,229	10,229	92.87%	92.87%

[1] For members hired after 09/01/2008 and younger than 65, the rates other than 100% are reduced by 20% to account for a different health insurance benefit.

Actual, expected, and exposures are in thousands of benefit.

Kentucky Public Pensions Authority
County Employees Retirement System (CERS)
Hazardous
Unreduced Retirement Experience - Age Based - Male & Female

				Assumed Rate		Expected Retirements		Actual/Expected	
Service	Actual Retirements	Total Exposures	Actual Rate	Current[1]	Proposed[1]	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
20	2,031	7,202	0.28	30%	30%	2,155	2,155	94.24%	94.24%
21	1,582	5,770	0.27	23%	23%	1,296	1,296	122.08%	122.08%
22	956	4,685	0.20	18%	18%	842	842	113.57%	113.57%
23	980	4,268	0.23	21%	21%	896	896	109.36%	109.36%
24	846	3,683	0.23	24%	24%	883	883	95.76%	95.76%
25	870	3,060	0.28	27%	27%	826	826	105.38%	105.38%
26	856	2,369	0.36	30%	30%	711	711	120.41%	120.41%
27	613	1,642	0.37	33%	33%	542	542	113.15%	113.15%
28	307	1,169	0.26	36%	36%	421	421	72.94%	72.94%
29	371	942	0.39	39%	39%	368	368	100.69%	100.69%
30	246	748	0.33	39%	39%	292	292	84.32%	84.32%
31	189	474	0.40	39%	39%	185	185	102.32%	102.32%
32	125	357	0.35	39%	39%	139	139	89.92%	89.92%
33	82	251	0.33	39%	39%	98	98	84.10%	84.10%
34	72	216	0.33	39%	39%	84	84	85.90%	85.90%
35	36	133	0.27	39%	39%	52	52	69.66%	69.66%
36	8	88	0.09	39%	39%	34	34	23.99%	23.99%
37	8	76	0.11	39%	39%	30	30	26.94%	26.94%
38	0	32	0.00	39%	39%	13	13	0.00%	0.00%
39	0	0	N/A	39%	39%	0	0	N/A	N/A
40	0	0	N/A	39%	39%	0	0	N/A	N/A
Total	10,180	37,167				9,867	9,867	103.17%	103.17%

[1] For members hired before 09/01/2008, the annual rate of service retirement is 100% at age 62.
[1] For members hired on or after 09/01/2008, the annual rate of service retirement is 100% at age 60.
[1] For member with years of service greater than 5, but less than 20, the rate is 17%.
[1] For members hired after 09/01/2008 and younger than 65, the rates other than 100% are reduced by 20% to account for a different health insurance benefit.
[1] For members hired after 01/01/2014, the rate is 20% until 30 years of service

Actual, expected, and exposures are in thousands of benefit.

Kentucky Public Pensions Authority
County Employees Retirement System
Non-Hazardous
Reduced Retirement Experience - Age Based - Male

				Assumed Rate		Expected Retirements		Actual/Expected	
Age	Actual Retirements	Total Exposures	Actual Rate	Current[1]	Proposed[1]	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 55[2]	579	6,421	0.09	11%	11%	706	706	82.08%	82.08%
55	152	4,020	0.04	4%	4%	153	153	99.31%	99.31%
56	182	3,930	0.05	4%	4%	149	149	122.40%	122.40%
57	169	3,901	0.04	4%	4%	148	148	114.39%	114.39%
58	122	3,654	0.03	4%	4%	139	139	87.53%	87.53%
59	191	3,650	0.05	4%	4%	139	139	137.52%	137.52%
60	162	3,575	0.05	4%	4%	135	135	119.91%	119.91%
61	228	3,362	0.07	4%	4%	127	127	179.35%	179.35%
62	552	3,137	0.18	15%	15%	443	443	124.68%	124.68%
63	404	2,644	0.15	15%	15%	372	372	108.58%	108.58%
64	329	2,227	0.15	15%	15%	311	311	105.70%	105.70%
Total	3,071	40,520				2,822	2,822	108.81%	108.81%

[1] For members hired after 09/01/2008 and younger than 65, the rates other than 100% are reduced by 20% to account for a different health insurance benefit.

[2] Reflects members eligible for early retirement with 25-26 years of service but prior to reaching age 55

Kentucky Public Pensions Authority
County Employees Retirement System
Non-Hazardous
Reduced Retirement Experience - Age Based - Female

				Assumed Rate		Expected Retirements		Actual/Expected	
Age	Actual Retirements	Total Exposures	Actual Rate	Current[1]	Proposed[1]	Current	Proposed	Current (2)/(7)	Proposed (2)/(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 55[2]	427	5,414	0.08	12%	12%	650	650	65.72%	65.72%
55	322	6,699	0.05	5%	5%	320	320	100.66%	100.66%
56	390	6,841	0.06	5%	5%	327	327	119.21%	119.21%
57	376	6,891	0.05	5%	5%	329	329	114.32%	114.32%
58	368	6,661	0.06	5%	5%	319	319	115.31%	115.31%
59	401	6,269	0.06	5%	5%	300	300	133.81%	133.81%
60	486	6,042	0.08	8%	8%	461	461	105.36%	105.36%
61	480	5,611	0.09	9%	9%	481	481	99.80%	99.80%
62	849	5,070	0.17	20%	20%	966	966	87.84%	87.84%
63	762	4,193	0.18	18%	18%	719	719	106.02%	106.02%
64	521	3,452	0.15	16%	16%	526	526	99.04%	99.04%
Total	5,382	63,142				5,398	5,398	99.70%	99.70%

[1] For members hired after 09/01/2008 and younger than 65, the rates other than 100% are reduced by 20% to account for a different health insurance benefit.

[2] Reflects members eligible for early retirement with 25-26 years of service but prior to reaching age 55

Actual, expected, and exposures are in thousands of benefit.