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December 2, 2021

Board of Trustees
Kentucky Public Pensions Authority
Perimeter Park West
1260 Louisville Road
Frankfort, KY 40601

Subject: Certification of the June 30, 2021 Actuarial Valuation Results

Dear Members of the Board:

The purpose of this letter is to summarize the June 30, 2021 actuarial valuation reports for the County Employees Retirement System (CERS), the Kentucky Retirement System (KRS), and the State Police Retirement System (SPRS). These reports provide the current actuarial and financial condition of the funds and analyze fluctuations in the employer contribution requirements since the prior actuarial valuation.

Under Kentucky Statute, the Board of Trustees of the Kentucky Retirement System (KRS) must recommend the employer contribution requirements for KERS and SPRS for the fiscal years beginning July 1, 2022 and ending June 30, 2024. The Board of Trustees of the County Employees Retirement System (CERS) must certify the employer contribution rates for CERS for the fiscal year beginning July 1, 2022 and ending June 30, 2023. The contribution requirements determined by June 30, 2021 actuarial valuations are intended to become effective twelve months after the valuation date and, as such, are intended to be used by the Board for recommending these required contributions effective July 1, 2022.

These contributions are calculated based on the membership data and plan assets as of June 30, 2021. These calculations are also based on the benefit provisions in effect as of June 30, 2021. If new legislation is enacted between the valuation date and the date the contributions become effective, the applicable Board of these Systems may adjust the calculated rates to reflect this new legislation. Such adjustments are based on information supplied by the actuary.

Financing Objectives and Funding Policy

The Kentucky Public Pensions Authority (KPPA) administers pension and health insurance funds to provide for monthly retirement income and retiree health insurance benefits. The total employer contribution requirement is comprised of a contribution to each respective fund.

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The employer contribution is determined in accordance with Section 61.565 of Kentucky Statute. As specified by the Statute, the employer contribution is comprised of a normal cost contribution and an actuarial accrued liability contribution. The actuarial accrued liability contribution is calculated by amortizing the unfunded accrued liability as of June 30, 2019 over a closed 30-year amortization period (28 years remaining as of June 30, 2021). Gains and losses incurring in years after June 30, 2019 are amortized as separate closed 20-year amortization bases.

House Bill 8 passed during the 2021 legislative session and changed how employer contributions are allocated and collected from the participating employers in the KERS Non-Hazardous Fund. Each employer will pay a normal cost contribution on the payroll of their covered employees and contribute to the fund an allocated share of the cost required to amortize the unfunded liability.

Progress Towards Realization of Funding Objectives

One way to measure the progress towards achieving the intended funding objective is to measure the relationship between the actuarial value of assets and the actuarial accrued liabilities for each fund. This relationship is referred to as the funded ratio and should increase over time (absent of benefit improvements) with the goal of attaining 100%.

Table 1 shown below provides a comparison of the change in funded ratio from June 30, 2020 to June 30, 2021 for the retirement funds. As the table shows, the funded ratios for all funds have increased since the prior year. The improvement in the financial health of these retirement funds is dependent on CERS and KRS Boards, as well as the Commonwealth maintaining a sound funding policy and the participating employers paying the full actuarially determined contributions. Additionally, the funded ratios increased more than expected from June 30, 2020 to June 30, 2021, primarily due to favorable investment experience during the prior year.

Table 1. Change in the Funded Ratio (AVA / AAL)
from June 30, 2020 to June 30, 2021 for the Retirement Funds

	Funded Ratio – Retirement Funds	
System	June 30, 2020	June 30, 2021
CERS Non-Hazardous	49.4%	51.8%
CERS Hazardous	45.1%	46.7%
KERS Non-Hazardous	14.2%	16.8%
KERS Hazardous	55.3%	60.4%
SPRS	28.1%	30.7%

Table 2 shown below provides a similar comparison of the change in funded ratio for the insurance funds. As the table shows, the funded ratio increased for all funds. Similar to the retirement funds, the funded ratios increased more than expected from June 30, 2020 to June 30, 2021, primarily due to favorable investment experience during the prior year, as well as due to the accrued liability being lower than expected due the favorable 2022 healthcare premium experience.

Table 2. Change in the Funded Ratio (AVA / AAL) from June 30, 2020 to June 30, 2021 for the Insurance Funds

	Funded Ratio – Insurance Funds	
System	June 30, 2020	June 30, 2021
CERS Non-Hazardous	78.5%	85.4%
CERS Hazardous	78.2%	84.3%
KERS Non-Hazardous	42.7%	50.2%
KERS Hazardous	126.0%	135.5%
SPRS	75.0%	82.0%

SUMMARY OF CHANGE IN CONTRIBUTION RATES SINCE THE PRIOR VALUATION

The following tables provide a comparison of the actuarially determined employer contributions (ADEC) determined by the June 30, 2020 actuarial valuation, the contribution rates that are in effect for the fiscal year ending June 30, 2022 (which were based on the June 30, 2020 actuarial valuation), and the actuarially determined employer contributions determined by the June 30, 2021 actuarial valuation. The table also provides the recommended contribution rates for fiscal year ending June 30, 2023, based on the June 30, 2021 actuarial valuation.

Table 3. Comparison of the Contribution Rates (Retirement and Insurance)

System	2020 Valuation ADEC	Effective for FY2021-22	2021 Valuation ADEC	Recommend for FY2022-23
CERS Non-Hazardous	28.05%	26.95%[1]	26.79%	26.79%[1]
CERS Hazardous	51.96%	44.33%[1]	49.59%	49.59%[1]
KERS Non-Hazardous[2]	$1,023M	$1,023M	$994M	$994M
KERS Hazardous	33.43%	33.43%	31.82%	31.82%
SPRS	146.06%	146.06%	140.51%	140.51%

[1] House Bill 362 passed during the 2018 legislative session and limits the increases to the CERS employer contribution rates to 12% over the prior fiscal year through June 30, 2028.

[2] House Bill 8 passed during the 2021 legislative session and changed how employer contributions are allocated and collected from the participating employers in the KERS Non-Hazardous Fund. Amount shown above reflects only the amortization cost portion of the required contribution.

The amortization cost for the KERS non-hazardous fund (to be allocated amongst the employers in accordance with House Bill 8) decreased by $28.7 million, primarily due to favorable investment experience in the past year.

The contribution rates for the KERS hazardous fund and SPRS decreased by 1.61% of pay and 5.55% of pay, respectively, primarily due to favorable investment experience in the past year. Both funds' accrued liability was lower than expected, which lowered the contribution rates further. However, covered payroll decreased by 4.7% for the KERS hazardous fund and by 1.7% for SPRS. The employer contribution calculations assume that payroll will remain constant in future years. If payroll decreases, the required contribution as a percentage of pay must increase, which partially offsets the effects of liability gains that these funds experienced when determining the contribution rate.

The actuarially determined contribution rates for the CERS non-hazardous fund and hazardous fund decreased by 1.26% of pay and 2.37% of pay, respectively, again, primarily due to favorable investment experience in the past year. House Bill 362 passed during the 2018 legislative session and introduced a contribution rate "phase-in" policy for CERS. The employer contribution rates were scheduled to increase significantly effective July 1, 2018 due a decrease in the investment return assumption from 7.50% to 6.25%. House Bill 362 limited the increases to the CERS contribution rates to 12% over the prior fiscal year. The actuarially determined contributions are now fully phased in, with the recommended contribution rates under House Bill 362 equal to the actuarially determined rates for FYE 2023. Contribution rates payable by employers in FYE 2023 will remain relatively stable for the CERS non-hazardous fund and will increase by 5.26% of pay for the CERS hazardous fund.

KERS NON-HAZARDOUS RETIREMENT FUND

For FYE 2021, the KERS Non-Hazardous retirement fund distributed $1,030 million in benefit payments and administrative expenses, and received $1,224 million in employer and employee contributions. As of June 30, 2021, plan assets for this system were $3,019 million (excluding assets in the 401(h) account). To stabilize the financial condition of this system, it is imperative that contributions to the system continue to exceed the benefit payments.

House Bill 8 passed during the 2021 legislative session and changed how employer contributions are allocated and collected from the participating employers in the KERS Non-Hazardous Fund. The amortization cost (i.e. the portion of the contribution requirement that pays down the unfunded liability) is no longer collected as a percentage of payroll. Rather, employers are allocated a dollar amount based on their accrued liability as of June 30, 2019.

As of last year, covered payroll had decreased nearly 20% from $1,732 as of June 30, 2011 to $1,388 as of June 30, 2020. Covered payroll decreased an additional 2.8% in the past year, from June 30, 2020 to June 30, 2021. Prior to the passage of House Bill 8, this continual decline in covered payroll would have increased the employer contribution rates significantly. As contribution rates increased for this fund, there became increased incentive for participating employers to make business decisions to reduce their covered payroll to decrease their pension cost, thereby resulting in a continual pattern of additional increases in contribution rates. As a result, we believe the enactment of House Bill 8 is significant in providing a sustainable method for collecting contributions from employers which will ultimately result in an improved financial condition of the KERS Non-Hazardous Fund.

Assumptions and Methods

The Boards of Trustees, in consultation with the actuary, set the actuarial assumptions and methods used in the actuarial valuation. In general, the assumptions used in the June 30, 2021 actuarial valuations were adopted for first use in the June 30, 2019 actuarial valuation and are based on an experience study conducted with experience through June 30, 2018. There were no changes in actuarial assumptions or methods since the prior valuation.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can, and almost certainly will, differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rate, and funding periods. The actuarial calculations are intended to provide information for rational decision making.

Benefit Provisions

The benefit provisions reflected in the June 30, 2021 valuations are those which were in effect on June 30, 2021. Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for certain members who become “totally and permanently disabled” in the line of duty or as a result of a duty-related disability. There were no other material benefit provision changes since the prior valuation.

Data

Member data for retired, active and inactive members was supplied as of June 30, 2021, by KPPA staff. The staff also supplied asset information as of June 30, 2021. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent with the prior year's data. GRS is not responsible for the accuracy or completeness of the information provided to us by KPPA.

CERTIFICATION

The information provided in this letter compliments the information provided in the June 30, 2021 actuarial valuation reports. Please refer to the June 30, 2021 actuarial valuation reports for additional discussion of the actuarial valuation, including the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

The undersigned are independent actuaries and consultants. Both of the undersigned are Enrolled Actuaries, Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. Both of the undersigned are experienced in performing valuations for large public retirement systems. This communication shall not be construed to provide tax advice, legal advice or investment advice.

Sincerely,

Gabriel, Roeder, Smith & Company

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

Janie Shaw, ASA, EA, MAAA
Consultant

Summary of June 30, 2021 Actuarial Valuation Results

	CERS Non-Hazardous	CERS Hazardous	KERS Non-Hazardous	KERS Hazardous	SPRS
Actuarially Determined Contribution:					
Pension Fund Contribution	23.40%	42.81%	7.82%	31.82%	126.40%
Insurance Fund Contribution	3.39%	6.78%	2.15%	0.00%	14.11%
Employer Contribution, payable as a percentage of payroll	26.79%	49.59%	9.97% [2]	31.82%	140.51%
Amortization Cost to be Allocated, if applicable	N/A	N/A	$994,421,476 [2]	N/A	N/A
Certified Contribution Rate for Fiscal Year Ending 2023	26.79% [1]	49.59% [1]	N/A	31.82% [3]	140.51% [3]
Assets:					
Retirement					
• Actuarial value (AVAR)	$7,715,883,468	$2,628,621,092	$2,735,875,974	$782,496,050	$323,250,208
• Market value (MVAR)	$8,565,652,199	$2,914,408,092	$3,018,659,670	$866,140,470	$356,345,662
• Ratio of actuarial to market value of assets	90.1%	90.2%	90.6%	90.3%	90.7%
Insurance					
• Actuarial value (AVAI)	$2,947,311,993	$1,475,634,783	$1,291,472,004	$575,024,703	$223,251,488
• Market value (MVAI)	$3,246,801,110	$1,627,823,974	$1,419,477,195	$633,676,988	$247,318,260
• Ratio of actuarial to market value of assets	90.8%	90.7%	91.0%	90.7%	90.3%
Funded Status:					
Retirement					
• Actuarial accrued liability	$14,894,906,514	$5,629,457,968	$16,321,372,580	$1,295,242,844	$1,053,259,535
• Unfunded accrued liability on AVAR	$7,179,023,046	$3,000,836,876	$13,585,496,606	$512,746,794	$730,009,327
• Funded ratio on AVAR	51.8%	46.7%	16.8%	60.4%	30.7%
• Unfunded accrued liability on MVAR	$6,329,254,315	$2,715,049,876	$13,302,712,910	$429,102,374	$696,913,873
• Funded ratio on MVAR	57.5%	51.8%	18.5%	66.9%	33.8%
Insurance					
• Actuarial accrued liability	$3,450,484,466	$1,751,203,226	$2,574,111,678	$424,455,939	$272,405,954
• Unfunded accrued liability on AVAI	$503,172,473	$275,568,443	$1,282,639,674	($150,568,764)	$49,154,466
• Funded ratio on AVAI	85.4%	84.3%	50.2%	135.5%	82.0%
• Unfunded accrued liability on MVAI	$203,683,356	$123,379,252	$1,154,634,483	($209,221,049)	$25,087,694
• Funded ratio on MVAI	94.1%	93.0%	55.1%	149.3%	90.8%
Membership:					
• Number of					
- Active Members	77,367	9,173	30,186	3,827	775
- Retirees and Beneficiaries	67,206	10,858	47,700	4,726	1,673
- Inactive Members	100,738	3,895	54,522	7,680	634
- Total	245,311	23,926	132,408	16,233	3,082
• Projected payroll of active members	$2,528,734,577	$578,355,213	$1,349,329,648	$162,835,694	$45,337,921
• Average salary of active members	$32,685	$63,050	$44,701	$42,549	$58,501

[1] CERS contribution rates reflect House Bill 362 (2018 legislative session), which limits the increases to the employer contribution rates to 12% over the prior fiscal year through June 30, 2028.

[2] For the KERS non-hazardous fund, contribution rate includes the normal cost portion of the contribution requirement only. Amortization cost will be allocated to employers as a dollar amount.

[3] Contribution rates for KERS and SPRS calculated with the June 30, 2021 valuation are effective for fiscal years ending June 30, 2023 and June 30, 2024.

County Employees Retirement System (CERS)

Actuarial Valuation Report as of June 30, 2021

P: 469.524.0000 | www.grsconsulting.com

December 1, 2021

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

Subject: **Actuarial Valuation as of June 30, 2021**

Dear Trustees of the Board:

This report describes the current actuarial condition of the County Employees Retirement System (CERS) and provides the actuarially determined employer contribution rates for fiscal year ending June 30, 2023. In addition, the report analyzes changes in CERS's financial condition and provides various summaries of the data.

Separate reports are issued with regard to valuation results determined in accordance with Governmental Accounting Standards Board (GASB) Statements 67, 68, 74 and 75. Results of this report should not be used for any other purpose without consultation with the undersigned. Valuations are prepared annually as of June 30, the first day of the plan year for CERS. This report was prepared at the request of the Board of Trustees of the County Employees Retirement System (Board) and is intended for use by the Kentucky Public Pensions Authority (KPPA) staff and those designated or approved by the Board.

Financing Objectives and Funding Policy

The contribution rates determined by these actuarial valuations are intended to become effective twelve months after the valuation date and, as such, are intended to be used by the Board for recommending required contribution rates effective July 1, 2022. If new legislation is enacted between the valuation date and the date the contribution rates become effective, the Board may adjust the calculated rates before certifying them, in order to reflect this new legislation. Such adjustments are based on information supplied by the actuary.

The employer contribution rate is determined in accordance with Section 61.565 of Kentucky Statute. As specified by the Statute, the employer contribution is comprised of a normal cost contribution and an actuarial accrued liability contribution. The actuarial accrued liability contribution is calculated by amortizing the unfunded accrued liability as of June 30, 2019 over a closed 30-year amortization period (28 years remaining as of June 30, 2021). Gains and losses incurring in years after June 30, 2019 are amortized as separate closed 20-year amortization bases. House Bill 362 (passed during the 2018 legislative session) limits the increases to the employer contribution rates to 12% over the prior fiscal year through June 30, 2028.

Assumptions and Methods

The Board of Trustees, in consultation with the actuary, sets the actuarial assumptions and methods used in the actuarial valuation. Except where noted in this report, the assumptions used in this actuarial valuation were adopted by the Board for first use in the June 30, 2019 actuarial valuation and are based on an experience study conducted with experience through June 30, 2018. There were no changes in actuarial assumptions or methods since the prior valuation.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can, and almost certainly will, differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rate, and funding periods. The actuarial calculations are intended to provide information for rational decision making.

This report was prepared using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

Benefit Provisions

The benefit provisions reflected in these valuations are those which were in effect on June 30, 2021. Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for certain members who become "totally and permanently disabled" in the line of duty or as a result of a duty-related disability. There were no other material benefit provision changes since the prior valuation.

Data

Member data for retired, active and inactive members was supplied as of June 30, 2021, by KPPA staff. The staff also supplied asset information as of June 30, 2021. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent with the prior year's data. GRS is not responsible for the accuracy or completeness of the information provided to us by KPPA.

CERTIFICATION

We certify that the information presented herein is accurate and fairly portrays the actuarial position of CERS as of June 30, 2021.

All of our work conforms with generally accepted actuarial principles and practices, and is in conformity with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of Kentucky Code of Laws and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board.

The undersigned are independent actuaries and consultants. Both of the undersigned are Enrolled Actuaries, Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. Both of the undersigned are experienced in performing valuations for large public retirement systems. This communication shall not be construed to provide tax advice, legal advice or investment advice.

Sincerely,

Gabriel, Roeder, Smith & Company

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

Janie Shaw, ASA, EA, MAAA
Consultant

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SECTION 1

EXECUTIVE SUMMARY

Summary of Principal Results

(Dollar amounts expressed in thousands)

	Non-Hazardous		Hazardous		Total	
	June 30, 2021	June 30, 2020	June 30, 2021	June 30, 2020	June 30, 2021	June 30, 2020
Actuarially Determined Contribution:						
Retirement	23.40%	23.88%	42.81%	43.23%		
Insurance	3.39%	4.17%	6.78%	8.73%		
Total	26.79%	28.05%	49.59%	51.96%	N/A	N/A
Contribution Rate for Next Fiscal Year[1]	26.79%	26.95%	49.59%	44.33%		
Assets:						
Retirement						
• Actuarial value (AVAR)	$7,715,883	$7,220,607	$2,628,621	$2,447,885	$10,344,504	$9,668,492
• Market value (MVAR)	$8,565,652	$7,027,327	$2,914,408	$2,379,704	$11,480,060	$9,407,031
• Ratio of actuarial to market value of assets	90.1%	102.8%	90.2%	102.9%	90.1%	102.8%
Insurance						
• Actuarial value (AVAI)	$2,947,312	$2,661,351	$1,475,635	$1,362,028	$4,422,947	$4,023,379
• Market value (MVAI)	$3,246,801	$2,581,613	$1,627,824	$1,321,117	$4,874,625	$3,902,730
• Ratio of actuarial to market value of assets	90.8%	103.1%	90.7%	103.1%	90.7%	103.1%
Funded Status:						
Retirement						
• Actuarial accrued liability	$14,894,906	$14,610,868	$5,629,458	$5,431,299	$20,524,364	$20,042,167
• Unfunded accrued liability on AVAR	$7,179,023	$7,390,261	$3,000,837	$2,983,414	$10,179,860	$10,373,675
• Funded ratio on AVAR	51.8%	49.4%	46.7%	45.1%	50.4%	48.2%
• Unfunded accrued liability on MVAR	$6,329,254	$7,583,541	$2,715,050	$3,051,595	$9,044,304	$10,635,136
• Funded ratio on MVAR	57.5%	48.1%	51.8%	43.8%	55.9%	46.9%
Insurance						
• Actuarial accrued liability	$3,450,484	$3,392,085	$1,751,203	$1,740,971	$5,201,687	$5,133,056
• Unfunded accrued liability on AVAI	$503,172	$730,734	$275,568	$378,943	$778,740	$1,109,677
• Funded ratio on AVAI	85.4%	78.5%	84.3%	78.2%	85.0%	78.4%
• Unfunded accrued liability on MVAI	$203,683	$810,472	$123,379	$419,854	$327,062	$1,230,326
• Funded ratio on MVAI	94.1%	76.1%	93.0%	75.9%	93.7%	76.0%
Membership:						
• Number of						
- Active Members	77,367	81,250	9,173	9,419	86,540	90,669
- Retirees and Beneficiaries	67,206	65,414	10,858	10,452	78,064	75,866
- Inactive Members	100,738	95,692	3,895	3,590	104,633	99,282
- Total	245,311	242,356	23,926	23,461	269,237	265,817
• Projected payroll of active members	$2,528,735	$2,565,391	$578,355	$568,558	$3,107,090	$3,133,949
• Average salary of active members	$32,685	$31,574	$63,050	$60,363	$35,904	$34,565

[1] Contribution rates reflect House Bill 362 (passed during the 2018 legislative session), which limits the increases to the employer contribution rates to 12% over the prior fiscal year through June 30, 2028. Contribution rates calculated with the June 30, 2021 valuation (June 30, 2020 valuation) are effective for fiscal year ending June 30, 2023 (June 30, 2022).

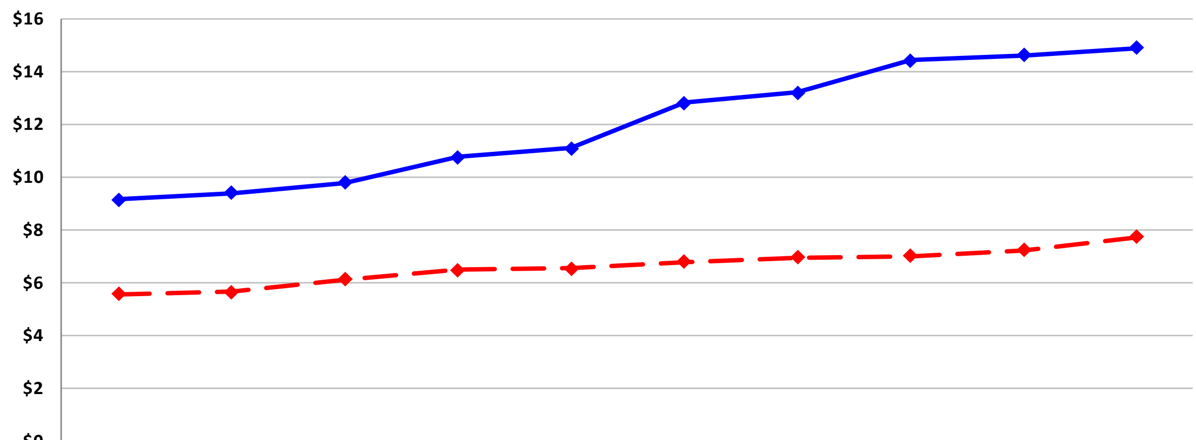
Executive Summary (Continued)

Non-Hazardous Retirement Fund

The unfunded actuarial accrued liability of the non-hazardous retirement fund decreased by $211 million since the prior year's valuation to $7.179 billion. The unfunded liability was expected to increase by $107 million so actual experience resulted in an unfunded liability that was approximately $318 million less than expected, primarily due to favorable investment experience in the past year.

Below is a chart with the historical actuarial value of assets and actuarial accrued liability. The divergence in the assets and liability over the last ten years has generally been due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return between 2015 and 2017.

History of Actuarial Assets vs. Actuarial Accrued Liability
(Dollars in Billions)



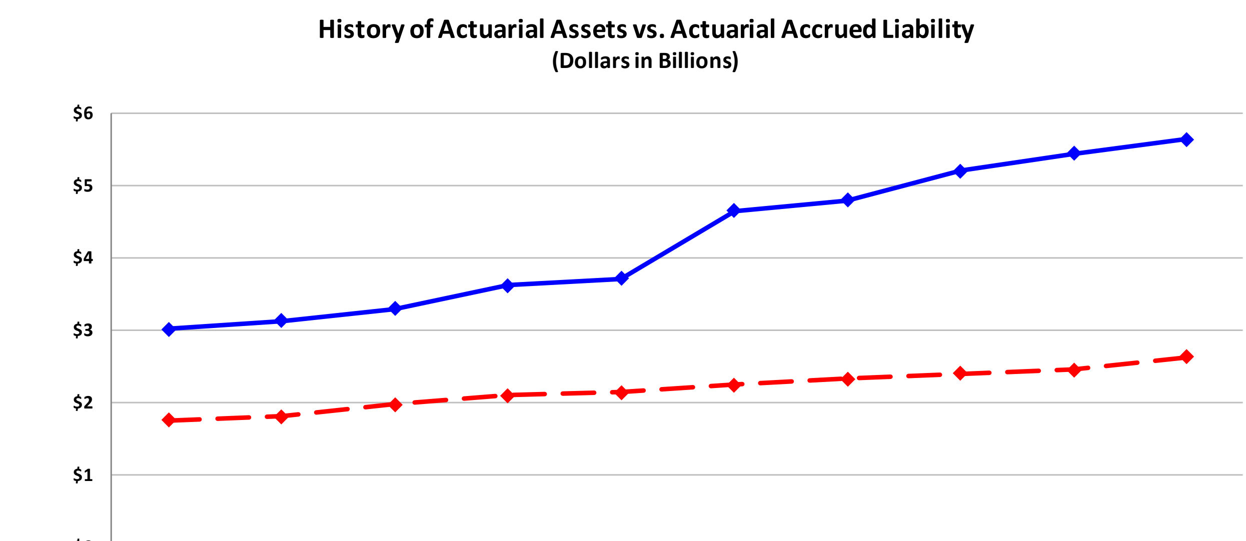
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AAL	9.1	9.4	9.8	10.7	11.1	12.8	13.2	14.4	14.6	14.9
AVA	5.5	5.6	6.1	6.5	6.5	6.8	7.0	7.0	7.2	7.7

Executive Summary (Continued)

Hazardous Retirement Fund

The unfunded actuarial accrued liability of the hazardous retirement fund increased by $17 million since the prior year's valuation to $3.001 billion. This increase was approximately $39 million less than expected, primarily due to favorable investment experience in the past year. The favorable investment experience was partially offset by liability losses, primarily due to higher than expected salary increases for active members.

Below is a chart with the historical actuarial value of assets and actuarial accrued liability. The divergence in the assets and liability over the last ten years has generally been due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return between 2015 and 2017.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AAL	3.0	3.1	3.3	3.6	3.7	4.6	4.8	5.2	5.4	5.6
AVA	1.7	1.8	2.0	2.1	2.1	2.2	2.3	2.4	2.4	2.6

Executive Summary (Continued)

Summary of Change in Financial Condition of the Insurance Funds

Both the 2022 non-Medicare and Medicare premiums were lower than expected based on the prior year's actuarial assumptions, which resulted in lower than expected accrued liability for the insurance fund.

Specifically, the non-Medicare premiums were expected to increase by 6.4% from calendar year 2021 to calendar year 2022 (i.e. the medical trend assumption for non-Medicare premiums) and the actual premiums increased by approximately 2.4%. The Medicare premiums were expected to increase by 2.9% from calendar year 2021 to calendar year 2022, which was based on the "Not to Exceed" 2022 Medicare premiums that Humana provided in 2021. Actual Medicare premiums increased by approximately 2.0%.

<u>Non-Hazardous Insurance Fund</u>

Since the prior year's valuation, the unfunded actuarial accrued liability of the non-hazardous insurance fund decreased by $228 million since the prior year's valuation to $503 million. This decrease was approximately $209 million more than expected, which includes a $95 million gain due to favorable investment experience and a $45 million gain due to the favorable premium experience. The corresponding funded ratio increased from 78.5% at June 30, 2020 to 85.4% at June 30, 2021.

<u>Hazardous Insurance Fund</u>

Since the prior year's valuation, the unfunded actuarial accrued liability of the hazardous insurance fund decreased by $103 million since the prior year's valuation to $276 million. This decrease was approximately $94 million more than expected, which includes a $49 million gain due to favorable investment experience and a $40 million gain due to the favorable premium experience. The corresponding funded ratio increased from 78.2% at June 30, 2020 to 84.3% at June 30, 2021.

SECTION 2

DISCUSSION

Discussion

The County Employees Retirement System (CERS) is a cost-sharing, multiple-employer defined benefit pension plan that provides coverage for regular full-time members employed by positions of each participating county, city, and school board, and any additional eligible local agencies electing to participate in CERS. CERS includes both non-hazardous and hazardous duty benefits. This report presents the results of the June 30, 2021 actuarial funding valuation for both the Retirement Funds and Insurance Funds.

The primary purposes of the valuation report are to describe the current actuarial condition of CERS and provide the actuarially determined employer contribution rates for fiscal year ending June 30, 2023. In addition, the report analyzes changes in CERS's financial condition and provides various summaries of the data.

The actuarially determined contribution consist of two components: a normal cost rate and an amortization cost to finance the unfunded actuarial accrued liability. The normal cost rate is the theoretical amount which would be required to pay the members' benefits, based on the current plan provisions, if this amount had been contributed from each member's entry date and if the fund's experience exactly followed the actuarial assumptions. This is the amount that it should cost to provide the benefits for an average member. Since members contribute to the fund, only the excess of the normal rate over the member contribution rate is included in the employer contribution. The amortization cost is the amount necessary to amortize the unfunded actuarial accrued liability. The payroll growth rate and discount rate assumptions are selected by the Board. The funding period is specified in Section 61.565 of Kentucky Statute.

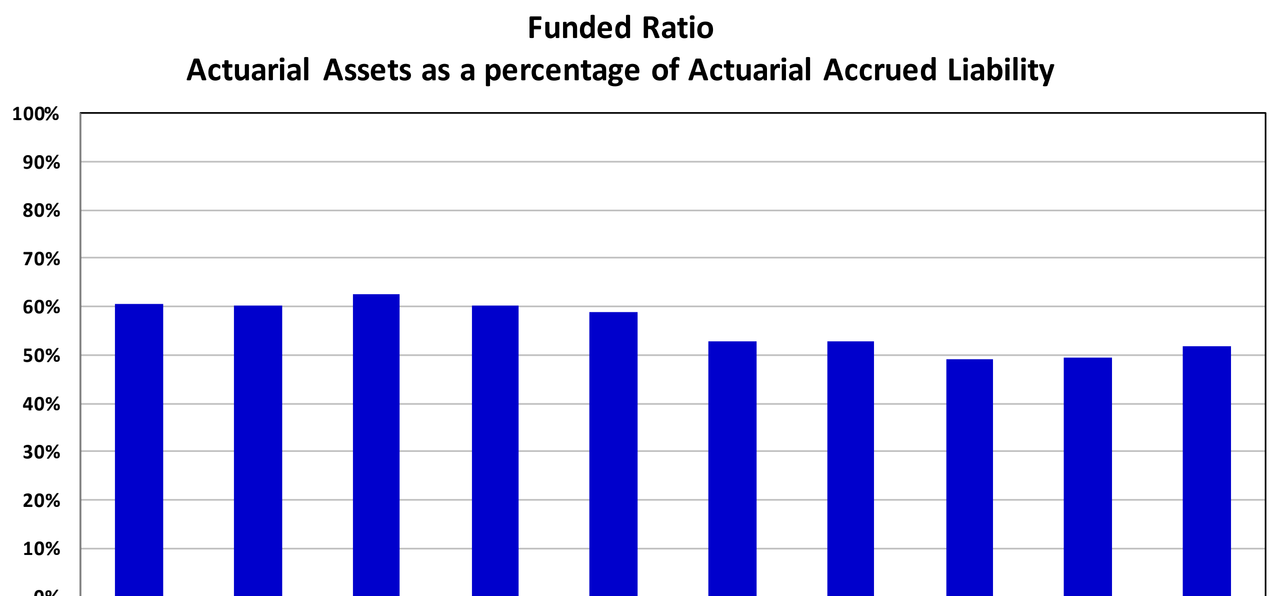
All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides additional details related to the calculation of the amortization of the unfunded actuarial accrued liability. Section 5 provides member data and statistical information. Section 6 provides a discussion of various risk measures, which are intended to aid stakeholders in understanding the effects of future experience differing from the assumptions used in performing an actuarial valuation. Appendices A and B provide summaries of the principle actuarial assumptions and methods and plan provisions. Finally, Appendix C provides a glossary of technical terms that are used throughout this report.

Funding Progress

The following charts provide a ten-year history of the retirement funds' funded ratio (i.e. the Actuarial Value of Assets divided by the Actuarial Accrued Liability). The decline in the funded ratio over the last ten years has generally been due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return between 2015 and 2017.

The funded ratio increased from 2020 to 2021 for both the non-hazardous and hazardous funds. Now that the full actuarially determined contributions have been fully phased-in and absent future unfavorable experience, the funded ratio is expected to continue improving. Also, the dollar amount of the unfunded actuarial accrued liability, or the difference between the actuarial accrued liability and the actuarial value of assets, is expected to begin decreasing. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the Retirement Funds.

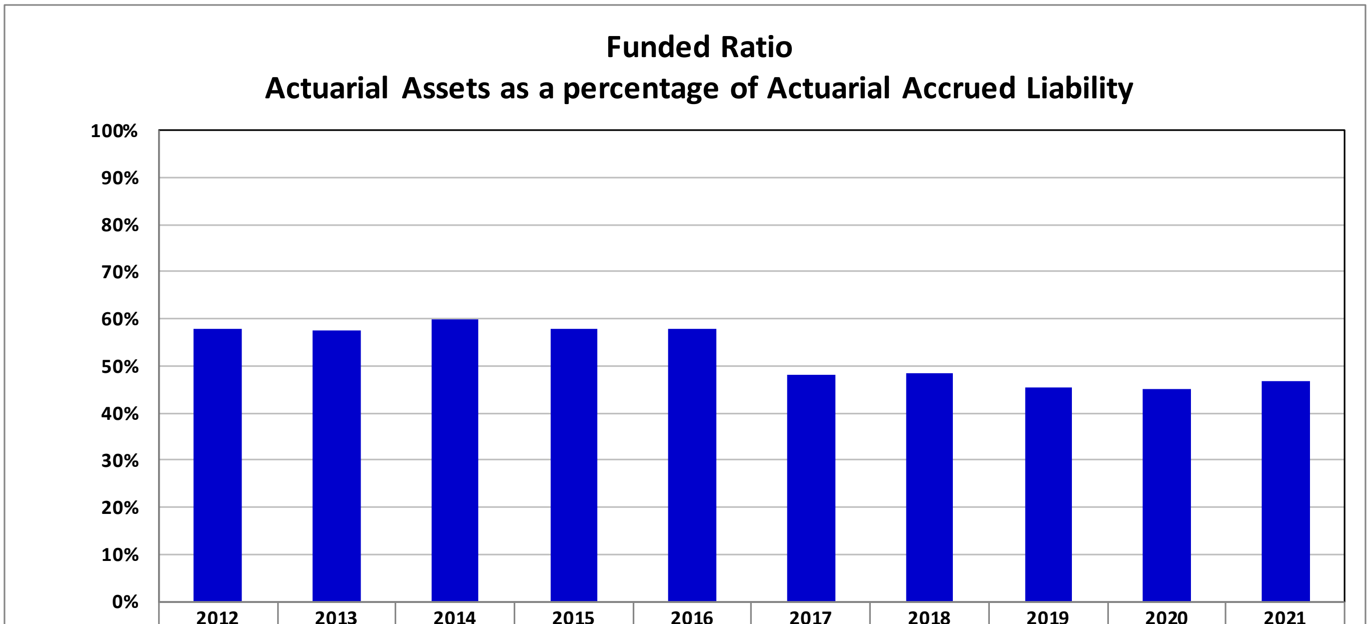
Non-Hazardous Retirement Fund



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Funded Ratio	60.7%	60.1%	62.6%	60.3%	59.0%	52.8%	52.7%	49.1%	49.4%	51.8%

Funding Progress (Continued)

Hazardous Retirement Fund



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Funded Ratio	58.1%	57.7%	59.8%	58.0%	57.7%	48.1%	48.4%	45.3%	45.1%	46.7%

Asset Gains/ (Losses)

The actuarial value of assets ("AVA") is based on a smoothed market value of assets, using a systematic approach to phase-in the difference between the actual and expected investment return on the market value of assets (adjusted for receipts and disbursements during the year). This is appropriate because it dampens the short-term volatility inherent in investment markets. The return is computed net of investment expenses.

Non-Hazardous Retirement Fund

The actuarial value of assets for the non-hazardous retirement fund increased from $7.221 billion to $7.716 billion since the prior valuation. The rate of return on the market value of assets on a dollar-weighted basis for the prior fiscal year was 25.5% which is greater than the 6.25% expected annual return. The return on an actuarial (smoothed) asset value was 10.1%, which resulted in a $275.4 million gain for the fiscal year. This difference in the estimated return on market value and actuarial value illustrates the smoothing effect of the asset valuation method. The market value of assets is $850 million greater than the actuarial value of assets, which signifies that the retirement fund is in a position of deferred gains to be realized in future years.

Hazardous Retirement Fund

Likewise, the actuarial value of assets for the hazardous retirement fund increased from $2.448 billion to $2.629 billion since the prior valuation. The rate of return on the market value of assets on a dollar-weighted basis for the prior fiscal year was 25.4% which is greater than the 6.25% expected annual return. The return on an actuarial (smoothed) asset value was 10.0%, which resulted in a $91.6 million gain for the fiscal year. The market value of assets is $286 million greater than the actuarial value of assets, which signifies that the retirement fund is in a position of deferred gains to be realized in future years.

Table 6 in the following section of this report provides asset information that was included in the annual financial statements of the funds, as well as the estimated yield on a market value basis. Tables 7 and 8 provide the development of the actuarial value of assets and the estimated yield on an actuarial value basis.

Actuarial Gains/ (Losses)

The annual actuarial valuation is a snapshot analysis of the benefit liabilities, assets and funded position of the funds as of the first day of the plan year. In any one fiscal year, the experience can be better or worse from that which is assumed or expected. The actuarial assumptions do not necessarily attempt to model what the experience will be for any one given fiscal year, but instead try to model the overall experience over many years. Therefore, as long as the actual experience of a retirement system is reasonably close to the current assumptions, the long-term funding requirements of the system will remain relatively consistent.

Below are tables that separately show a reconciliation of the unfunded liability since the prior actuarial valuation for the retirement and health insurance funds, which include the effect of asset and liability gains and losses, changes in assumptions, and changes in plan provisions.

Retirement Experience Gain or (Loss)
(Dollar amounts expressed in thousands)

	Non-Hazardous	Hazardous
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	$ 7,390,261	$ 2,983,414
2. Normal cost and administrative expenses	293,994	108,026
3. Less: contributions for the year	(637,926)	(234,573)
4. Interest accrual	451,143	182,509
5. Expected UAAL (Sum of Items 1 - 4)	$ 7,497,472	$ 3,039,376
6. Actual UAAL as of June 30,2021	$ 7,179,023	$ 3,000,837
7. Total gain (loss) for the year (Item 5 - Item 6)	$ 318,449	$ 38,539
B. Source of gains and losses		
8. Asset gain (loss) for the year	$ 275,416	$ 91,616
9. Liability experience gain (loss) for the year	47,138	(52,744)
10. Plan Change	(4,105)	(333)
11. Assumption change	—	—
12. Total	$ 318,449	$ 38,539

The accrued liability was approximately 0.3% less than expected and 0.9% more than expected for the non-hazardous and hazardous funds, respectively, resulting in the liability experience gains/losses shown above. This experience for the non-hazardous fund was primarily due to lower than expected salary increases for active members and the experience for the hazardous fund was primarily due to higher than expected salary increases for active members.

Actuarial Gains/ (Losses) (Continued)

Insurance Experience Gain or (Loss)
(Dollar amounts expressed in thousands)

	Non-Hazardous		Hazardous	
A. Calculation of total actuarial gain or loss				
1. Unfunded actuarial accrued liability (UAAL), previous year	$	730,734	$	378,943
2. Normal cost and administrative expenses		81,331		30,448
3. Less: contributions for the year		(143,517)		(62,897)
4. Interest accrual		43,728		22,670
5. Expected UAAL (Sum of Items 1 - 4)	$	712,276	$	369,164
6. Actual UAAL as of June 30,2021	$	503,172	$	275,568
7. Total gain (loss) for the year (Item 5 - Item 6)	$	209,104	$	93,596
B. Source of gains and losses				
8. Asset gain (loss) for the year	$	94,770	$	49,310
9. Liability experience gain (loss) for the year		117,360		45,344
10. Plan Change		(3,026)		(1,058)
11. Assumption change		—		—
12. Total	$	209,104	$	93,596

The liability experience gains shown above include a $45 million gain for the non-hazardous fund and a $40 million gain for the hazardous fund due to the funds' favorable premium experience. See the discussion in the Executive Summary for additional information.

Actuarial Assumptions and Methods

In determining costs and liabilities, actuaries use assumptions about the future, such as rates of salary increase, probabilities of retirement, termination, death and disability, and an annual investment return assumption. The Board of Trustees, in consultation with the actuary, sets the actuarial assumptions and methods used in the actuarial valuation.

In conjunction with the review of the healthcare per capita claims cost, the assumed increase in future healthcare costs, or trend assumption, is reviewed on an annual basis. The trend assumption was last updated at the June 30, 2020 valuation. All other assumptions were adopted by the Board for first use in the June 30, 2019 actuarial valuation and are based on an experience study conducted based on experience through June 30, 2018. There were no changes in actuarial assumptions or methods since the prior valuation.

It is our opinion that the assumptions are internally consistent, reasonable, and reflect anticipated future experience of the System. Appendix A includes a summary of the actuarial assumptions and methods used in this valuation.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. This report does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

Benefit Provisions

Appendix B of this report includes a summary of the major benefit provisions for System.

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become "totally and permanently disabled" in the line of duty or as a result of a duty-related disability. The minimum disability benefit increased from 25% of the member's monthly final rate of pay to 75% of the member's monthly average pay. The insurance premium for the member, the member's spouse, and the member's dependent children shall also be paid in full by the System. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.

There were no other material plan provision changes since the prior valuation.

SECTION 3

ACTUARIAL TABLES

Actuarial Tables

RETIREMENT BENEFITS

ACTUARIAL TABLES

Development of Unfunded Actuarial Accrued Liability
Retirement Benefits

(Dollar amounts expressed in thousands)

			June 30, 2021	
			Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members		$ 2,528,735	$ 578,355
2.	Present value of future pay		$ 19,509,117	$ 5,069,067
3.	Normal cost rate			
	a.	Total normal cost rate	10.44%	18.39%
	b.	Less: member contribution rate	-5.00%	-8.00%
	c.	Employer normal cost rate	5.44%	10.39%
4.	Actuarial accrued liability for active members			
	a.	Present value of future benefits	$ 7,407,127	$ 2,717,895
	b.	Less: present value of future normal costs	(1,910,189)	(865,750)
	c.	Actuarial accrued liability	$ 5,496,938	$ 1,852,145
5.	Total actuarial accrued liability			
	a.	Retirees and beneficiaries	$ 8,774,177	$ 3,699,392
	b.	Inactive members	623,791	77,921
	c.	Active members (Item 4c)	5,496,938	1,852,145
	d.	Total	$ 14,894,906	$ 5,629,458
6.	Actuarial value of assets		$ 7,715,883	$ 2,628,621
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)		$ 7,179,023	$ 3,000,837
8.	Funded Ratio		51.8%	46.7%

Actuarial Present Value of Future Benefits
Retirement Benefits
(Dollar amounts expressed in thousands)

		June 30, 2021	
		Non-Hazardous (1)	Hazardous (2)
1.	Active members		
	a. Service retirement	$ 6,527,367	$ 2,466,372
	b. Deferred termination benefits and refunds	447,670	106,229
	c. Survivor benefits	126,285	22,917
	d. Disability benefits	305,805	122,377
	e. Total	$ 7,407,127	$ 2,717,895
2.	Retired members		
	a. Service retirement	$ 7,775,419	$ 3,365,052
	b. Disability retirement	468,076	115,412
	c. Beneficiaries	530,682	218,928
	d. Total	$ 8,774,177	$ 3,699,392
3.	Inactive members		
	a. Vested terminations	$ 553,657	$ 69,478
	b. Nonvested terminations	70,134	8,443
	c. Total	$ 623,791	$ 77,921
4.	Total actuarial present value of future benefits	$ 16,805,095	$ 6,495,208

Development of Actuarially Determined Contribution Rate
Retirement Benefits

		June 30, 2021	
		Non-Hazardous (1)	Hazardous (2)
1.	Total normal cost rate		
	a. Service retirement	7.13%	14.53%
	b. Deferred termination benefits and refunds	2.22%	2.22%
	c. Survivor benefits	0.37%	0.29%
	d. Disability benefits	0.72%	1.35%
	e. Total	10.44%	18.39%
2.	Less: member contribution rate	-5.00%	-8.00%
3.	Total employer normal cost rate	5.44%	10.39%
4.	Administrative expenses	0.86%	0.32%
5.	Net employer normal cost rate	6.30%	10.71%
6.	UAAL amortization contribution rate	17.10%	32.10%
7.	Total calculated employer contribution	23.40%	42.81%

Actuarial Balance Sheet

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)

			June 30, 2021 (1)		June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources				
	a. Current assets (actuarial value)	$	7,715,883	$	7,220,607
	b. Present value of future member contributions	$	975,456	$	988,813
	c. Present value of future employer contributions				
	i. Normal cost contributions	$	934,733	$	980,126
	ii. Unfunded accrued liability contributions		7,179,023		7,390,261
	iii. Total future employer contributions	$	8,113,756	$	8,370,387
	d. Total assets	$	16,805,095	$	16,579,807
2.	Liabilities - Present Value of Expected Future Benefit Payments				
	a. Active members				
	i. Present value of future normal costs	$	1,910,189	$	1,968,939
	ii. Accrued liability		5,496,938		5,522,631
	iii. Total present value of future benefits	$	7,407,127	$	7,491,570
	b. Present value of benefits payable on account of current retired members and beneficiaries	$	8,774,177	$	8,501,757
	c. Present value of benefits payable on account of current inactive members	$	623,791	$	586,480
	d. Total liabilities	$	16,805,095	$	16,579,807

Actuarial Balance Sheet

Hazardous Members Retirement

(Dollar amounts expressed in thousands)

			June 30, 2021 (1)		June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources				
	a. Current assets (actuarial value)	$	2,628,621	$	2,447,885
	b. Present value of future member contributions	$	405,525	$	393,591
	c. Present value of future employer contributions				
	i. Normal cost contributions	$	460,225	$	461,175
	ii. Unfunded accrued liability contributions		3,000,837		2,983,414
	iii. Total future employer contributions	$	3,461,062	$	3,444,589
	d. Total assets	$	6,495,208	$	6,286,065
2.	Liabilities - Present Value of Expected Future Benefit Payments				
	a. Active members				
	i. Present value of future normal costs	$	865,750	$	854,766
	ii. Accrued liability		1,852,145		1,825,208
	iii. Total present value of future benefits	$	2,717,895	$	2,679,974
	b. Present value of benefits payable on account of current retired members and beneficiaries	$	3,699,392	$	3,537,224
	c. Present value of benefits payable on account of current inactive members	$	77,921	$	68,867
	d. Total liabilities	$	6,495,208	$	6,286,065

Reconciliation of Retirement Net Assets

(Dollar amounts expressed in thousands)[1]

		Year Ending	
		June 30, 2021	June 30, 2021
		(1)	(2)
		Non-Hazardous	**Hazardous**
1.	Value of assets at beginning of year	$ 7,027,327	$ 2,379,704
2.	Revenue for the year		
	a. Contributions		
	i. Member contributions	$ 165,698	$ 62,367
	ii. Employer contributions	472,196	172,089
	iii. Other contributions (less 401h)	32	116
	iv. Total	$ 637,926	$ 234,573
	b. Income		
	i. Interest, dividends, and other income	$ 218,835	$ 73,662
	ii. Investment expenses	(83,124)	(27,813)
	iii. Net	$ 135,711	$ 45,850
	c. Net realized and unrealized gains (losses)	1,627,028	550,792
	d. Total revenue	$ 2,400,665	$ 831,214
3.	Expenditures for the year		
	a. Disbursements		
	i. Refunds	$ 13,862	$ 4,662
	ii. Regular annuity benefits	826,749	289,999
	iii. Other benefit payments	0	0
	iv. Transfers to other systems	0	0
	v. Total	$ 840,611	$ 294,662
	b. Administrative expenses and depreciation	21,729	1,848
	c. Total expenditures	$ 862,340	$ 296,510
4.	Increase in net assets (Item 2. - Item 3.)	$ 1,538,325	$ 534,704
5.	Value of assets at end of year (Item 1. + Item 4.)	$ 8,565,652	$ 2,914,408
6.	Net external cash flow		
	a. Dollar amount	$ (224,414)	$ (61,937)
	b. Percentage of market value	-2.9%	-2.3%
7.	Estimated annual return on net assets	25.5%	25.4%

[1] Amounts may not add due to rounding

[1] Excludes 401h assets

Development of Actuarial Value of Assets

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	7,220,607
2.	Market value of assets at beginning of year	$	7,027,327
3.	Net new investments		
	a. Contributions	$	637,926
	b. Benefit payments		(840,611)
	c. Administrative expenses		(21,729)
	d. Subtotal	$	(224,414)
4.	Market value of assets at end of year	$	8,565,652
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	1,762,739
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	432,195
8.	Excess return for phased recognition	$	1,330,544

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	1,330,544	$	266,109
b.	2020		(385,418)		(77,084)
c.	2019		(40,218)		(8,044)
d.	2018		163,357		32,671
e.	2017		369,213		73,843
f.	Total			$	287,496

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	7,715,883
11.	Ratio of actuarial value to market value		90.1%
12.	Estimated annual return on actuarial value of assets		10.1%

* Amounts may not add due to rounding

Development of Actuarial Value of Assets

Hazardous Members Retirement

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	2,447,885
2.	Market value of assets at beginning of year	$	2,379,704
3.	Net new investments		
	a. Contributions	$	234,573
	b. Benefit payments		(294,662)
	c. Administrative expenses		(1,848)
	d. Subtotal	$	(61,937)
4.	Market value of assets at end of year	$	2,914,408
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	596,642
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	146,796
8.	Excess return for phased recognition	$	449,846

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	449,846	$	89,969
b.	2020		(133,383)		(26,677)
c.	2019		(12,449)		(2,490)
d.	2018		54,598		10,920
e.	2017		120,774		24,155
f.	Total			$	95,877

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	2,628,621
11.	Ratio of actuarial value to market value		90.2%
12.	Estimated annual return on actuarial value of assets		10.0%

* Amounts may not add due to rounding

Schedule of Funding Progress
Retirement Benefits
(Dollar amounts expressed in thousands)

June 30,	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annual Covered Payroll	UAAL as % of Payroll (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Non-Hazardous Members			
2012	$ 5,547,236	$ 9,139,568	$ 3,592,332	60.7%	$ 2,236,546	160.6%
2013	5,637,094	9,378,876	3,741,782	60.1%	2,236,277	167.3%
2014	6,117,134	9,772,523	3,655,389	62.6%	2,272,270	160.9%
2015	6,474,849	10,740,325	4,265,476	60.3%	2,296,716	185.7%
2016	6,535,372	11,076,457	4,541,085	59.0%	2,352,762	193.0%
2017	6,764,873	12,803,510	6,038,637	52.8%	2,452,407	246.2%
2018	6,950,225	13,191,505	6,241,280	52.7%	2,466,801	253.0%
2019	7,049,527	14,356,113	7,306,586	49.1%	2,521,860	289.7%
2020	7,220,607	14,610,868	7,390,261	49.4%	2,565,391	288.1%
2021	7,715,883	14,894,906	7,179,023	51.8%	2,528,735	283.9%
			Hazardous Members			
2012	$ 1,747,379	$ 3,009,992	$ 1,262,613	58.1%	$ 464,229	272.0%
2013	1,801,691	3,124,206	1,322,515	57.7%	461,673	286.5%
2014	1,967,640	3,288,826	1,321,186	59.8%	479,164	275.7%
2015	2,096,783	3,613,308	1,516,525	58.0%	483,641	313.6%
2016	2,139,119	3,704,456	1,565,337	57.7%	492,851	317.6%
2017	2,238,320	4,649,047	2,410,727	48.1%	541,633	445.1%
2018	2,321,721	4,792,548	2,470,827	48.4%	533,618	463.0%
2019	2,375,106	5,245,365	2,870,259	45.3%	559,353	513.1%
2020	2,447,885	5,431,299	2,983,414	45.1%	568,558	524.7%
2021	2,628,621	5,629,458	3,000,837	46.7%	578,355	518.9%
			Total CERS Members			
2012	$ 7,294,615	$ 12,149,560	$ 4,854,945	60.0%	$ 2,700,775	179.8%
2013	7,438,785	12,503,082	5,064,297	59.5%	2,697,950	187.7%
2014	8,084,774	13,061,349	4,976,575	61.9%	2,751,434	180.9%
2015	8,571,632	14,353,633	5,782,001	59.7%	2,780,357	208.0%
2016	8,674,491	14,780,913	6,106,422	58.7%	2,845,613	214.6%
2017	9,003,193	17,452,557	8,449,364	51.6%	2,994,040	282.2%
2018	9,271,946	17,984,053	8,712,107	51.6%	3,000,419	290.4%
2019	9,424,633	19,601,478	10,176,845	48.1%	3,081,213	330.3%
2020	9,668,492	20,042,167	10,373,675	48.2%	3,133,949	331.0%
2021	10,344,504	20,524,364	10,179,860	50.4%	3,107,090	327.6%

Summary of Principal Assumptions and Methods

Below is a summary of the principal economic assumptions, cost method, and the method for financing the unfunded actuarial accrued liability:

	Non-Hazardous	Hazardous
Valuation date:	June 30, 2021	June 30, 2021
Actuarial cost method:	Entry Age Normal	Entry Age Normal
Amortization method:	Level percentage of payroll (2% payroll growth assumed)	Level percentage of payroll (2% payroll growth assumed)
Amortization period for contribution rate:	30-year closed period at June 30, 2019 Gains/losses incurring after 2019 will be amortized over separate closed 20-year amortization bases	30-year closed period at June 30, 2019 Gains/losses incurring after 2019 will be amortized over separate closed 20-year amortization bases
Asset valuation method:	5-Year Smoothed Market	5-Year Smoothed Market
Actuarial assumptions:		
Investment rate of return	6.25%	6.25%
Projected salary increases	3.30% to 10.30% (varies by service)	3.55% to 19.05% (varies by service)
Inflation	2.30%	2.30%
Post-retirement benefit adjustments	0.00%	0.00%
Retiree Mortality	System-specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2019.	System-specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2019.

Solvency Test
Retirement Benefits
(Dollar amounts expressed in thousands)

	Actuarial Accrued Liability				Portion of Aggregate Accrued Liabilities Covered by Assets		
June 30,	Active Member Contributions	Retired Members & Beneficiaries	Active Members (Employer Financed)	Valuation Assets	Active	Retired	ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-Hazardous Members							
2012	$ 1,117,549	$ 5,416,933	$ 2,605,085	$ 5,547,236	100.0%	81.8%	0.0%
2013	1,149,611	5,638,371	2,590,894	5,637,094	100.0%	79.6%	0.0%
2014	1,204,383	5,873,279	2,694,860	6,117,134	100.0%	83.6%	0.0%
2015	1,216,585	6,489,863	3,033,878	6,474,849	100.0%	81.0%	0.0%
2016	1,231,027	6,785,530	3,059,900	6,535,372	100.0%	78.2%	0.0%
2017	1,277,432	7,731,682	3,794,396	6,764,873	100.0%	71.0%	0.0%
2018	1,269,287	8,196,719	3,725,499	6,950,225	100.0%	69.3%	0.0%
2019	1,280,679	8,905,544	4,169,890	7,049,527	100.0%	64.8%	0.0%
2020	1,312,554	9,088,237	4,210,077	7,220,607	100.0%	65.0%	0.0%
2021	1,324,826	9,397,968	4,172,112	7,715,883	100.0%	68.0%	0.0%
Hazardous Members							
2012	$ 381,672	$ 1,889,884	$ 738,435	$ 1,747,379	100.0%	72.3%	0.0%
2013	390,471	1,988,030	745,705	1,801,691	100.0%	71.0%	0.0%
2014	415,070	2,077,517	796,239	1,967,640	100.0%	74.7%	0.0%
2015	422,359	2,297,703	893,246	2,096,783	100.0%	72.9%	0.0%
2016	428,713	2,388,712	887,031	2,139,119	100.0%	71.6%	0.0%
2017	458,808	2,910,601	1,279,638	2,238,320	100.0%	61.1%	0.0%
2018	442,637	3,151,058	1,198,853	2,321,721	100.0%	59.6%	0.0%
2019	458,559	3,399,954	1,386,852	2,375,106	100.0%	56.4%	0.0%
2020	454,801	3,606,091	1,370,407	2,447,885	100.0%	55.3%	0.0%
2021	457,391	3,777,313	1,394,754	2,628,621	100.0%	57.5%	0.0%

INSURANCE BENEFITS

ACTUARIAL TABLES

Development of Unfunded Actuarial Accrued Liability
Insurance Benefits

(Dollar amounts expressed in thousands)

		June 30, 2021	
		Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members	$ 2,528,735	$ 578,355
2.	Present value of future pay	$ 18,993,123	$ 5,098,809
3.	Normal cost rate		
	a. Total normal cost rate	3.07%	4.83%
	b. Less: member contribution rate	-0.55%	-0.55%
	c. Employer normal cost rate	2.52%	4.28%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 2,155,414	$ 722,989
	b. Less: present value of future normal costs	(540,664)	(189,313)
	c. Actuarial accrued liability	$ 1,614,750	$ 533,676
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 1,644,607	$ 1,196,333
	b. Inactive members	191,127	21,194
	c. Active members (Item 4c)	1,614,750	533,676
	d. Total	$ 3,450,484	$ 1,751,203
6.	Actuarial value of assets	$ 2,947,312	$ 1,475,635
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 503,172	$ 275,568
8.	Funded Ratio	85.4%	84.3%

Development of Actuarially Determined Contribution Rate
Insurance Benefits

		June 30, 2021	
		Non-Hazardous	Hazardous
		(1)	(2)
1.	Total normal cost rate	3.07%	4.83%
2.	Less: member contribution rate	-0.55%	-0.55%
3.	Total employer normal cost rate	2.52%	4.28%
4.	Administrative expenses	0.04%	0.09%
5.	Net employer normal cost rate	2.56%	4.37%
6.	UAAL amortization contribution rate	0.83%	2.41%
7.	Total calculated employer contribution	3.39%	6.78%

Actuarial Balance Sheet

Non-Hazardous Members Insurance

(Dollar amounts expressed in thousands)

		June 30, 2021 (1)	June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 2,947,312	$ 2,661,351
	b. Present value of future member contributions	$ 123,783	$ 118,827
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 416,881	$ 451,657
	ii. Unfunded accrued liability contributions	503,172	730,734
	iii. Total future employer contributions	$ 920,053	$ 1,182,391
	d. Total assets	$ 3,991,148	$ 3,962,569
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 540,664	$ 570,484
	ii. Accrued liability	1,614,750	1,645,926
	iii. Total present value of future benefits	$ 2,155,414	$ 2,216,410
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 1,644,607	$ 1,562,540
	c. Present value of benefits payable on account of current inactive members	$ 191,127	$ 183,619
	d. Total liabilities	$ 3,991,148	$ 3,962,569

Actuarial Balance Sheet

Hazardous Members Insurance

(Dollar amounts expressed in thousands)

		June 30, 2021 (1)		June 30, 2020 (2)
1. Assets - Present and Expected Future Resources				
a. Current assets (actuarial value)	$	1,475,635	$	1,362,028
b. Present value of future member contributions	$	38,017	$	34,978
c. Present value of future employer contributions				
i. Normal cost contributions	$	151,296	$	161,722
ii. Unfunded accrued liability contributions		275,568		378,943
iii. Total future employer contributions	$	426,864	$	540,665
d. Total assets	$	1,940,516	$	1,937,671
2. Liabilities - Present Value of Expected Future Benefit Payments				
a. Active members				
i. Present value of future normal costs	$	189,313	$	196,700
ii. Accrued liability		533,676		586,582
iii. Total present value of future benefits	$	722,989	$	783,282
b. Present value of benefits payable on account of current retired members and beneficiaries	$	1,196,333	$	1,133,807
c. Present value of benefits payable on account of current inactive members	$	21,194	$	20,582
d. Total liabilities	$	1,940,516	$	1,937,671

Reconciliation of Insurance Net Assets

(Dollar amounts expressed in thousands)[1]

		Year Ending		
		June 30, 2021		June 30, 2021
		(1)		(2)
		Non-Hazardous		**Hazardous**
1. Value of assets at beginning of year	$	2,581,613	$	1,321,117
2. Revenue for the year				
a. Contributions				
i. Member contributions	$	13,613	$	3,098
ii. Employer contributions		124,697		58,451
iii. Other contributions (less 401h)		5,206		1,348
iv. Total	$	143,517	$	62,897
b. Income				
i. Interest, dividends, and other income	$	73,643	$	38,313
ii. Investment expenses		(32,634)		(18,029)
iii. Net	$	41,009	$	20,284
c. Net realized and unrealized gains (losses)		600,076		306,622
d. Total revenue	$	784,602	$	389,802
3. Expenditures for the year				
a. Disbursements				
i. Refunds	$	0	$	0
ii. Healthcare premium subsidies		136,263		85,152
iii. Other benefit payments[2]		(17,772)		(2,584)
iv. Transfers to other systems		0		0
v. Total	$	118,491	$	82,568
b. Administrative expenses and depreciation		922		528
c. Total expenditures	$	119,413	$	83,095
4. Increase in net assets (Item 2. - Item 3.)	$	665,188	$	306,707
5. Value of assets at end of year (Item 1. + Item 4.)	$	3,246,801	$	1,627,824
6. Net external cash flow				
a. Dollar amount	$	24,103	$	(20,199)
b. Percentage of market value		0.8%		-1.4%
7. Estimated annual return on net assets		24.7%		24.9%

[1] Amounts may not add due to rounding and include 401h assets

[2] Benefit payments have been offset by Medicare Drug Reimbursements, Insurance Premiums, and Humana Gain Share Payments

Development of Actuarial Value of Assets

Non-Hazardous Members Insurance

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	2,661,351
2.	Market value of assets at beginning of year	$	2,581,613
3.	Net new investments		
	a. Contributions	$	143,517
	b. Benefit payments		(118,491)
	c. Administrative expenses		(922)
	d. Subtotal	$	24,103
4.	Market value of assets at end of year	$	3,246,801
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	641,085
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	162,104
8.	Excess return for phased recognition	$	478,981

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	478,981	$	95,796
b.	2020		(151,527)		(30,305)
c.	2019		(13,849)		(2,770)
d.	2018		63,800		12,760
e.	2017		121,364		24,273
f.	Total			$	99,754

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	2,947,312
11.	Ratio of actuarial value to market value		90.8%
12.	Estimated annual return on actuarial value of assets		9.8%

* Amounts may not add due to rounding

Development of Actuarial Value of Assets

Hazardous Members Insurance

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	1,362,028
2.	Market value of assets at beginning of year	$	1,321,117
3.	Net new investments		
	a. Contributions	$	62,897
	b. Benefit payments		(82,568)
	c. Administrative expenses		(528)
	d. Subtotal	$	(20,199)
4.	Market value of assets at end of year	$	1,627,824
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	326,906
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	81,939
8.	Excess return for phased recognition	$	244,967

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	244,967	$	48,993
b.	2020		(80,794)		(16,159)
c.	2019		(6,320)		(1,264)
d.	2018		36,099		7,220
e.	2017		65,383		13,077
f.	Total			$	51,867

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	1,475,635
11.	Ratio of actuarial value to market value		90.7%
12.	Estimated annual return on actuarial value of assets		9.9%

* Amounts may not add due to rounding

Schedule of Funding Progress
Insurance Benefits
(Dollar amounts expressed in thousands)

June 30, (1)	Actuarial Value of Assets (AVA) (2)	Actuarial Accrued Liability (AAL) (3)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2) (4)	Funded Ratio (2)/(3) (5)	Annual Covered Payroll (6)	UAAL as % of Payroll (4)/(6) (7)
			Non-Hazardous Members			
2012	$ 1,512,854	$ 2,370,771	$ 857,917	63.8%	$ 2,236,546	38.4%
2013	1,628,244	2,443,894	815,650	66.6%	2,236,277	36.5%
2014	1,831,199	2,616,915	785,716	70.0%	2,272,270	34.6%
2015	1,997,456	2,907,827	910,371	68.7%	2,296,716	39.6%
2016	2,079,811	2,988,121	908,310	69.6%	2,352,762	38.6%
2017	2,227,401	3,355,151	1,127,750	66.4%	2,452,407	46.0%
2018	2,371,430	3,092,624	721,194	76.7%	2,466,801	29.2%
2019	2,523,249	3,567,947	1,044,698	70.7%	2,521,860	41.4%
2020	2,661,351	3,392,085	730,734	78.5%	2,565,391	28.5%
2021	2,947,312	3,450,484	503,172	85.4%	2,528,735	19.9%
			Hazardous Members			
2012	$ 829,041	$ 1,364,843	$ 535,802	60.7%	$ 464,229	115.4%
2013	892,774	1,437,333	544,559	62.1%	461,673	118.0%
2014	997,733	1,493,864	496,131	66.8%	479,164	103.5%
2015	1,087,707	1,504,015	416,308	72.3%	483,641	86.1%
2016	1,135,784	1,558,818	423,034	72.9%	492,851	85.8%
2017	1,196,780	1,788,433	591,653	66.9%	541,633	109.2%
2018	1,256,306	1,684,028	427,722	74.6%	533,618	80.2%
2019	1,313,659	1,732,879	419,220	75.8%	559,353	74.9%
2020	1,362,028	1,740,971	378,943	78.2%	568,558	66.6%
2021	1,475,635	1,751,203	275,568	84.3%	578,355	47.6%
			Total CERS Members			
2012	$ 2,341,895	$ 3,735,614	$ 1,393,719	62.7%	$ 2,700,775	51.6%
2013	2,521,018	3,881,227	1,360,209	65.0%	2,697,950	50.4%
2014	2,828,932	4,110,779	1,281,847	68.8%	2,751,434	46.6%
2015	3,085,163	4,411,842	1,326,679	69.9%	2,780,357	47.7%
2016	3,215,595	4,546,939	1,331,344	70.7%	2,845,613	46.8%
2017	3,424,181	5,143,584	1,719,403	66.6%	2,994,040	57.4%
2018	3,627,736	4,776,652	1,148,916	75.9%	3,000,419	38.3%
2019	3,836,908	5,300,826	1,463,918	72.4%	3,081,213	47.5%
2020	4,023,379	5,133,056	1,109,677	78.4%	3,133,949	35.4%
2021	4,422,947	5,201,687	778,740	85.0%	3,107,090	25.1%

Solvency Test
Insurance Benefits
(Dollar amounts expressed in thousands)

	Actuarial Accrued Liability				Portion of Aggregate Accrued Liabilities Covered by Assets		
June 30,	Active Member Contributions	Retired Members & Beneficiaries	Active Members (Employer Financed)	Valuation Assets	Active	Retired	ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Non-Hazardous Members				
2012	$ -	$ 1,146,908	$ 1,223,864	$ 1,512,854	100.0%	100.0%	29.9%
2013	-	1,205,599	1,238,295	1,628,244	100.0%	100.0%	34.1%
2014	-	1,318,183	1,298,732	1,831,199	100.0%	100.0%	39.5%
2015	-	1,372,597	1,535,231	1,997,456	100.0%	100.0%	40.7%
2016	-	1,484,937	1,503,184	2,079,811	100.0%	100.0%	39.6%
2017	-	1,603,438	1,751,713	2,227,401	100.0%	100.0%	35.6%
2018	-	1,525,323	1,567,301	2,371,430	100.0%	100.0%	54.0%
2019	-	1,830,692	1,737,255	2,523,249	100.0%	100.0%	39.9%
2020	-	1,746,159	1,645,926	2,661,351	100.0%	100.0%	55.6%
2021	-	1,835,734	1,614,750	2,947,312	100.0%	100.0%	68.8%
			Hazardous Members				
2012	$ -	$ 575,099	$ 789,744	$ 829,041	100.0%	100.0%	32.2%
2013	-	660,955	776,377	892,774	100.0%	100.0%	29.9%
2014	-	700,312	793,553	997,733	100.0%	100.0%	37.5%
2015	-	790,714	713,301	1,087,707	100.0%	100.0%	41.6%
2016	-	879,360	679,458	1,135,784	100.0%	100.0%	37.7%
2017	-	994,764	793,669	1,196,780	100.0%	100.0%	25.5%
2018	-	1,001,717	682,311	1,256,306	100.0%	100.0%	37.3%
2019	-	1,072,861	660,018	1,313,659	100.0%	100.0%	36.5%
2020	-	1,154,389	586,582	1,362,028	100.0%	100.0%	35.4%
2021	-	1,217,527	533,676	1,475,635	100.0%	100.0%	48.4%

SECTION 4

AMORTIZATION BASES

Amortization of Unfunded Liability

Non-Hazardous Members Retirement

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 7,306,586	$ 7,443,201	$ 459,563	28
June 30, 2020	(43,634)	69,417	5,410	19
June 30, 2021	(333,595)	(333,595)	(24,003)	20
Total		$ 7,179,023	$ 440,970	

Projected Payroll for FYE 2023	$ 2,579,309
Amortization Payments as a Percentage of Payroll	17.10%

Hazardous Members Retirement

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 2,870,259	$ 2,945,514	$ 181,864	28
June 30, 2020	41,583	112,660	8,781	19
June 30, 2021	(57,337)	(57,337)	(1,272)	20
Total		$ 3,000,837	$ 189,373	

Projected Payroll for FYE 2023	$ 589,922
Amortization Payments as a Percentage of Payroll	32.10%

Note:
Budgeted contribution rates for FYE 2022 were known at the time of the June 30, 2021 Valuation. Amortization bases established at this valuation date were adjusted accordingly.

Amortization of Unfunded Liability

Non-Hazardous Members Insurance

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 1,044,698	$ 1,064,711	$ 65,738	28
June 30, 2020	(332,646)	(342,367)	(26,685)	19
June 30, 2021	(219,172)	(219,172)	(17,948)	20
Total		$ 503,172	$ 21,105	

Projected Payroll for FYE 2023	$ 2,549,478
Amortization Payments as a Percentage of Payroll	0.83%

Hazardous Members Insurance

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 419,220	$ 422,550	$ 26,089	28
June 30, 2020	(43,079)	(46,725)	(3,642)	19
June 30, 2021	(100,257)	(100,257)	(8,376)	20
Total		$ 275,568	$ 14,071	

Projected Payroll for FYE 2023	$ 584,902
Amortization Payments as a Percentage of Payroll	2.41%

Note:
Budgeted contribution rates for FYE 2022 were known at the time of the June 30, 2021 Valuation. Amortization bases established at this valuation date were adjusted accordingly.

SECTION 5

MEMBERSHIP INFORMATION

Membership Tables

Summary of Membership Data

(Total dollar amounts expressed in thousands)

		Non-Hazardous June 30, 2021 (1)	Hazardous June 30, 2021 (2)	Total June 30, 2021 (3)	Total June 30, 2020 (4)
1.	Active members				
	a. Males	28,622	8,186	36,808	37,793
	b. Females	48,745	987	49,732	52,876
	c. Total members	77,367	9,173	86,540	90,669
	d. Total annualized prior year salaries	$ 2,528,735	$ 578,355	$ 3,107,090	$ 3,133,949
	e. Average salary[2]	$ 32,685	$ 63,050	$ 35,904	$ 34,565
	f. Average age	48.0	38.4	46.9	46.8
	g. Average service	9.4	10.0	9.5	9.2
	h. Member contributions with interest	$ 1,324,826	$ 457,391	$ 1,782,217	$ 1,767,355
	i. Average contributions with interest[2]	$ 17,124	$ 49,863	$ 20,594	$ 19,492
2.	Vested inactive members[1]				
	a. Number	50,723	1,811	52,534	52,366
	b. Total annual deferred benefits	$ 82,739	$ 8,570	$ 91,309	$ 87,591
	c. Average annual deferred benefit[2]	$ 1,631	$ 4,732	$ 1,738	$ 1,673
	d. Average age at the valuation date	53.5	46.3	53.3	52.7
3.	Nonvested inactive members[1]				
	a. Number	50,015	2,084	52,099	46,916
	b. Total member contributions with interest	$ 67,154	$ 8,024	$ 75,178	$ 62,357
	c. Average contributions with interest[2]	$ 1,343	$ 3,850	$ 1,443	$ 1,329
4.	Service retirees				
	a. Number	57,100	8,969	66,069	64,079
	b. Total annual benefits	$ 686,160	$ 258,133	$ 944,293	$ 906,216
	c. Average annual benefit[2]	$ 12,017	$ 28,781	$ 14,293	$ 14,142
	d. Average age at the valuation date	70.9	62.4	69.8	69.6
5.	Disabled retirees				
	a. Number	3,971	578	4,549	4,593
	b. Total annual benefits	$ 46,151	$ 9,773	$ 55,924	$ 56,049
	c. Average annual benefit[2]	$ 11,622	$ 16,908	$ 12,294	$ 12,203
	d. Average age at the valuation date	66.4	57.9	65.3	64.9
6.	Beneficiaries				
	a. Number	6,135	1,311	7,446	7,194
	b. Total annual benefits	$ 59,251	$ 20,970	$ 80,221	$ 75,985
	c. Average annual benefit[2]	$ 9,658	$ 15,995	$ 10,774	$ 10,562
	d. Average age at the valuation date	68.4	59.4	66.8	66.5

[1] Vested inactive member section includes Tier 1 members eligible for a benefit equal to the actuarially equivalent of two times the member's contribution balance.

[2] Average dollar amounts shown are expressed to the dollar.

Summary of Historical Active Membership

June 30,	Active Members: Number	Active Members: Percent Increase /(Decrease)	Covered Payroll[1]: Amount in Thousands	Covered Payroll[1]: Percent Increase /(Decrease)	Average Annual Pay: Amount	Average Annual Pay: Percent Increase /(Decrease)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous Members						
2012	83,052		$ 2,236,546		$ 26,929	
2013	81,815	-1.5%	2,236,277	0.0%	27,333	1.5%
2014	81,115	-0.9%	2,272,270	1.6%	28,013	2.5%
2015	80,852	-0.3%	2,296,716	1.1%	28,406	1.4%
2016	80,664	-0.2%	2,352,762	2.4%	29,167	2.7%
2017	82,198	1.9%	2,452,407	4.2%	29,835	2.3%
2018	81,818	-0.5%	2,466,801	0.6%	30,150	1.1%
2019	81,506	-0.4%	2,521,860	2.2%	30,941	2.6%
2020	81,250	-0.3%	2,565,391	1.7%	31,574	2.0%
2021	77,367	-4.8%	2,528,735	-1.4%	32,685	3.5%
Hazardous Members						
2012	9,130		$ 464,229		$ 50,847	
2013	9,123	-0.1%	461,673	-0.6%	50,605	-0.5%
2014	9,194	0.8%	479,164	3.8%	52,117	3.0%
2015	9,172	-0.2%	483,641	0.9%	52,730	1.2%
2016	9,084	-1.0%	492,851	1.9%	54,255	2.9%
2017	9,495	4.5%	541,633	9.9%	57,044	5.1%
2018	9,263	-2.4%	533,618	-1.5%	57,607	1.0%
2019	9,474	2.3%	559,353	4.8%	59,041	2.5%
2020	9,419	-0.6%	568,558	1.6%	60,363	2.2%
2021	9,173	-2.6%	578,355	1.7%	63,050	4.5%

[1] Covered payroll is the annualized, projected compensation for the following year and does not include payroll attributable to working retirees.

Distribution of Active Members by Age and by Years of Service

Non-Hazardous Members

	Years of Credited Service												
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	Total
Attained Age	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.
Under 20	169	11	0	0	2	0	0	0	0	0	0	0	182
	$14,901	$20,292	$0	$0	$27,655	$0	$0	$0	$0	$0	$0	$0	$15,367
20-24	1,335	702	344	150	62	17	0	0	0	0	0	0	2,610
	$18,921	$24,593	$27,254	$29,575	$31,469	$36,403	$0	$0	$0	$0	$0	$0	$22,569
25-29	1,135	1,026	875	623	437	640	9	0	0	0	0	0	4,745
	$21,884	$26,843	$28,875	$31,010	$33,789	$36,646	$40,772	$0	$0	$0	$0	$0	$28,567
30-34	920	903	854	728	578	1,631	380	25	0	0	0	0	6,019
	$21,297	$26,233	$29,357	$29,572	$31,307	$37,132	$44,401	$50,641	$0	$0	$0	$0	$31,015
35-39	868	810	880	739	570	1,843	1,066	438	26	0	0	0	7,240
	$22,591	$26,208	$27,406	$28,458	$30,838	$35,478	$44,312	$47,799	$52,352	$0	$0	$0	$32,939
40-44	768	848	834	740	690	2,189	1,307	1,061	516	29	0	0	8,982
	$22,871	$25,484	$28,407	$28,960	$29,935	$33,732	$41,034	$46,635	$51,897	$63,561	$0	$0	$34,572
45-49	662	670	718	595	583	2,200	1,636	1,379	1,030	258	4	0	9,735
	$23,521	$26,494	$28,632	$27,551	$29,479	$31,668	$38,017	$42,644	$50,126	$62,398	$107,172	$0	$35,571
50-54	619	618	674	561	530	2,127	1,901	1,871	1,587	535	74	5	11,102
	$20,970	$26,582	$29,089	$29,619	$31,379	$31,492	$35,344	$37,913	$44,304	$54,656	$64,142	$89,928	$35,319
55-59	537	513	621	476	487	1,878	1,804	2,030	1,956	735	130	42	11,209
	$21,612	$24,725	$28,065	$28,450	$29,355	$31,437	$34,858	$35,347	$37,196	$46,840	$62,648	$72,104	$34,043
60-64	412	411	507	416	369	1,647	1,459	1,631	1,479	707	126	51	9,215
	$18,923	$24,333	$24,442	$26,098	$28,273	$29,625	$32,457	$34,374	$37,280	$41,902	$48,327	$57,728	$32,283
65 & Over	344	372	428	311	328	1,333	1,169	919	598	322	130	74	6,328
	$14,970	$17,710	$21,102	$20,880	$22,021	$25,349	$29,430	$33,022	$36,713	$41,734	$42,047	$59,903	$28,179
Total	7,769	6,884	6,735	5,339	4,636	15,505	10,731	9,354	7,192	2,586	464	172	77,367
	$20,915	$25,422	$27,696	$28,404	$29,954	$32,385	$36,542	$38,442	$41,703	$48,211	$53,609	$63,110	$32,685

Distribution of Active Members by Age and by Years of Service

Hazardous Members

Attained Age	0 Count & Avg. Comp.	1 Count & Avg. Comp.	2 Count & Avg. Comp.	3 Count & Avg. Comp.	4 Count & Avg. Comp.	5-9 Count & Avg. Comp.	10-14 Count & Avg. Comp.	15-19 Count & Avg. Comp.	20-24 Count & Avg. Comp.	25-29 Count & Avg. Comp.	30-34 Count & Avg. Comp.	35 & Over Count & Avg. Comp.	Total Count & Avg. Comp.
	Years of Credited Service												
Under 20	7	0	0	0	0	0	0	0	0	0	0	0	7
	$33,235	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$33,235
20-24	191	159	68	30	8	3	0	0	0	0	0	0	459
	$32,684	$46,778	$51,522	$46,054	$53,065	$58,751	$0	$0	$0	$0	$0	$0	$41,756
25-29	151	216	265	264	223	268	1	0	0	0	0	0	1,388
	$34,676	$46,321	$53,449	$54,345	$55,508	$57,064	$63,665	$0	$0	$0	$0	$0	$51,504
30-34	88	103	141	170	161	846	171	3	0	0	0	0	1,683
	$35,416	$45,068	$52,352	$55,002	$56,033	$61,886	$66,806	$63,218	$0	$0	$0	$0	$57,921
35-39	54	70	67	57	89	515	635	233	4	0	0	0	1,724
	$36,946	$49,057	$52,823	$52,276	$58,521	$63,088	$70,203	$72,743	$88,355	$0	$0	$0	$64,691
40-44	21	30	25	35	43	220	392	609	155	12	0	0	1,542
	$33,595	$53,262	$48,726	$50,830	$55,721	$62,309	$70,481	$74,925	$88,389	$101,911	$0	$0	$71,067
45-49	18	23	21	16	16	105	198	372	251	73	3	0	1,096
	$36,324	$42,865	$46,910	$47,097	$46,845	$56,600	$67,841	$73,400	$87,479	$94,092	$117,889	$0	$72,981
50-54	10	12	11	12	20	72	142	232	158	52	12	1	734
	$25,140	$51,652	$61,100	$50,724	$42,582	$56,693	$66,077	$68,593	$83,604	$91,816	$117,286	$121,140	$70,701
55-59	3	2	2	7	9	28	76	103	48	29	12	3	322
	$38,928	$64,034	$60,932	$42,569	$49,066	$50,824	$69,473	$73,385	$72,168	$87,389	$94,796	$118,640	$70,993
60-64	3	3	7	5	1	14	45	37	18	6	5	3	147
	$36,131	$36,812	$50,639	$42,100	$77,209	$56,555	$64,133	$64,879	$70,834	$78,974	$97,197	$102,120	$64,493
65 & Over	2	0	1	2	2	7	19	21	8	6	0	3	71
	$32,876	$0	$53,888	$44,479	$46,442	$54,826	$52,773	$64,383	$106,012	$79,624	$0	$95,288	$65,517
Total	548	618	608	598	572	2,078	1,679	1,610	642	178	32	10	9,173
	$34,169	$46,862	$52,621	$53,173	$55,317	$60,947	$68,897	$72,856	$85,370	$91,865	$105,770	$106,929	$63,050

Distribution of Annuitant Monthly Benefit by Status and Age
Non-Hazardous Retirees and Beneficiaries
(Dollar amounts expressed in thousands)

	Retirement		Disability		Survivors & Beneficiaries		Total	
Current Age	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Under 50	267	$ 5,980	143	$ 1,638	691	$ 5,723	1,101	$ 13,341
50 - 54	1,127	24,464	260	3,388	289	2,702	1,676	30,555
55 - 59	3,802	66,371	521	6,886	423	4,357	4,746	77,614
60 - 64	8,641	127,586	895	11,286	717	8,304	10,253	147,176
65 - 69	13,445	165,934	831	9,518	836	8,526	15,112	183,978
70 - 74	13,172	145,640	639	7,041	1,035	10,326	14,846	163,008
75 - 79	8,201	79,046	386	3,743	813	8,007	9,400	90,797
80 - 84	5,031	44,825	212	2,005	659	6,148	5,902	52,978
85 - 89	2,430	19,551	69	547	433	3,409	2,932	23,507
90 And Over	984	6,761	15	99	239	1,748	1,238	8,608
Total	**57,100**	**$ 686,160**	**3,971**	**$ 46,151**	**6,135**	**$ 59,251**	**67,206**	**$ 791,562**

*Amounts may not add due to rounding

Distribution of Annuitant Monthly Benefit by Status and Age
Hazardous Retirees and Beneficiaries
(Dollar amounts expressed in thousands)

	Retirement		Disability		Survivors & Beneficiaries		Total	
Current Age	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Under 50	1,014	$ 35,081	135	$ 2,420	302	$ 2,897	1,451	$ 40,397
50 - 54	1,374	46,303	103	1,909	90	1,441	1,567	49,653
55 - 59	1,538	48,786	101	1,801	114	2,036	1,753	52,624
60 - 64	1,405	39,139	85	1,369	139	2,398	1,629	42,906
65 - 69	1,515	39,912	84	1,190	199	3,702	1,798	44,803
70 - 74	1,198	29,002	48	771	190	3,664	1,436	33,437
75 - 79	561	12,243	17	254	128	2,377	706	14,874
80 - 84	264	5,368	2	40	90	1,529	356	6,938
85 - 89	82	1,810	3	19	44	684	129	2,513
90 And Over	18	488	0	0	15	244	33	732
Total	**8,969**	**$ 258,133**	**578**	**$ 9,773**	**1,311**	**$ 20,970**	**10,858**	**$ 288,876**

*Amounts may not add due to rounding

Non-Hazardous Retired Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	6,338	$	6,793,492	23,646	$	18,054,563	29,984	$	24,848,056
Joint & Survivor:									
100% to Beneficiary	4,232		5,039,360	2,756		1,877,142	6,988		6,916,503
66 2/3% to Beneficiary	890		1,698,064	790		868,371	1,680		2,566,435
50% to Beneficiary	1,235		2,060,290	1,979		2,298,260	3,214		4,358,550
Pop-up Option	4,359		7,182,978	4,396		4,750,731	8,755		11,933,708
Social Security Option:									
Age 62 Basic	238		407,343	545		598,162	783		1,005,505
Age 62 Survivorship	588		1,050,560	375		387,593	963		1,438,153
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	0		0	0		0	0		0
10 Years Certain & Life	1,521		1,732,012	3,955		3,221,741	5,476		4,953,754
15 Years Certain & Life	690		746,060	1,106		843,082	1,796		1,589,142
20 Years Certain & Life	508		715,685	924		700,446	1,432		1,416,130
Total:	20,599	$	27,425,844	40,472	$	33,600,092	61,071	$	61,025,936

Hazardous Retired Lives Summary

Form of Payment	Male Lives: Number	Male Lives: Monthly Benefit Amount	Female Lives: Number	Female Lives: Monthly Benefit Amount	Total: Number	Total: Monthly Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Basic	1,366	$ 2,861,288	426	$ 696,939	1,792	$ 3,558,227
Joint & Survivor:						
100% to Beneficiary	1,439	3,145,146	72	105,127	1,511	3,250,273
66 2/3% to Beneficiary	378	974,334	28	66,004	406	1,040,338
50% to Beneficiary	524	1,322,979	64	145,764	588	1,468,743
Pop-up Option	3,771	10,006,659	185	412,829	3,956	10,419,488
Social Security Option:						
Age 62 Basic	110	169,584	13	14,217	123	183,801
Age 62 Survivorship	290	497,407	21	36,335	311	533,742
Partial Deferred (Old Plan)	0	0	0	0	0	0
Widows Age 60	0	0	0	0	0	0
5 Years Certain	0	0	0	0	0	0
10 Years Certain	122	323,244	5	7,907	127	331,150
10 Years Certain & Life	267	580,080	77	147,113	344	727,193
15 Years Certain & Life	122	252,657	23	46,995	145	299,652
20 Years Certain & Life	211	458,601	33	54,232	244	512,833
Total:	8,600	$ 20,591,978	947	$ 1,733,460	9,547	$ 22,325,438

Non-Hazardous Beneficiary Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	31	$	11,498	68	$	63,543	99	$	75,041
Joint & Survivor:									
100% to Beneficiary	554		341,547	2,078		1,530,399	2,632		1,871,946
66 2/3% to Beneficiary	80		48,734	283		238,386	363		287,119
50% to Beneficiary	187		88,497	427		260,080	614		348,577
Pop-up Option	281		248,780	964		1,064,193	1,245		1,312,974
Social Security Option:									
Age 62 Basic	1		1,291	5		4,806	6		6,097
Age 62 Survivorship	33		21,893	173		218,966	206		240,858
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	92		67,965	103		86,842	195		154,806
10 Years Certain	150		91,331	177		150,124	327		241,455
10 Years Certain & Life	72		54,811	114		102,466	186		157,277
15 Years Certain & Life	47		40,632	89		78,269	136		118,900
20 Years Certain & Life	45		32,921	81		89,640	126		122,561
Total:	1,573	$	1,049,899	4,562	$	3,887,712	6,135	$	4,937,610

Hazardous Beneficiary Lives Summary

	Male Lives			Female Lives			Total		
Form of Payment	Number		Monthly Benefit Amount	Number		Monthly Benefit Amount	Number		Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	18	$	9,236	86	$	92,460	104	$	101,695
Joint & Survivor:									
100% to Beneficiary	30		21,773	350		452,502	380		474,275
66 2/3% to Beneficiary	1		329	62		94,397	63		94,726
50% to Beneficiary	13		10,304	113		103,522	126		113,826
Pop-up Option	48		31,252	382		681,451	430		712,703
Social Security Option:									
Age 62 Basic	0		0	2		1,641	2		1,641
Age 62 Survivorship	0		0	112		153,384	112		153,384
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	2		1,469	2		1,469
5 Years Certain	5		9,540	4		3,561	9		13,101
10 Years Certain	16		18,542	24		24,509	40		43,052
10 Years Certain & Life	2		2,216	12		9,971	14		12,187
15 Years Certain & Life	5		2,097	6		7,373	11		9,470
20 Years Certain & Life	3		2,099	15		13,909	18		16,008
Total:	141	$	107,387	1,170	$	1,640,149	1,311	$	1,747,536

Schedule of Retirees Added to And Removed from Rolls

(Dollar amounts except average allowance expressed in thousands)

Year Ended	Added to Rolls Number	Removed from Rolls Number	Rolls End of the Year Number	Rolls End of the Year Annual Benefits	% Increase in Annual Benefit	Average Annual Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous						
2012	3,300	1,207	45,304	$ 515,008		$ 11,368
2013	3,570	1,198	47,676	557,979	8.3%	11,704
2014	3,480	1,221	49,935	582,958	4.5%	11,674
2015	4,020	1,304	52,651	617,551	5.9%	11,729
2016	4,409	721	56,339	661,217	7.1%	11,736
2017	4,141	1,467	59,013	667,468	0.9%	11,311
2018	4,650	1,725	61,938	710,374	6.4%	11,469
2019	4,472	1,871	64,539	747,117	5.2%	11,576
2020	3,550	2,675	65,414	763,459	2.2%	11,671
2021	4,350	2,558	67,206	791,562	3.7%	11,778
Hazardous						
2012	483	73	6,878	$ 173,221		$ 25,185
2013	519	104	7,293	182,635	5.4%	25,042
2014	469	116	7,646	191,008	4.6%	24,981
2015	526	138	8,034	202,153	5.8%	25,162
2016	604	75	8,563	215,302	6.5%	25,143
2017	576	141	8,998	226,680	5.3%	25,192
2018	779	190	9,587	245,675	8.4%	25,626
2019	608	172	10,023	258,813	5.3%	25,822
2020	621	192	10,452	274,791	6.2%	26,291
2021	651	245	10,858	288,876	5.1%	26,605

SECTION 6

ASSESSMENT AND DISCLOSURE OF RISK

Risks Associated with Measuring the Accrued Liability And Actuarially Determined Contribution

(As Required by ASOP No. 51)

The determination of CERS's accrued liability and actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. The risk measures illustrated in this section are intended to aid stakeholders in understanding the effects of future experience differing from the assumptions used in performing an actuarial valuation. These risk measures may also help with illustrating the potential volatility in the funded status and actuarially determined contributions that result from differences between actual experience and the expected experience based on the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience (economic and demographic) differing from the assumptions, changes in assumptions due to changing conditions, changes in contribution requirements due to modifications to the funding policy, and changes in the liability and cost due to changes in plan provisions or applicable law. The scope of this actuarial valuation does not include any analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the System's future financial condition include:

- Investment risk – actual investment returns may differ from expected returns;
- Longevity risk – members may live longer or shorter than expected and receive pensions for a time period different than assumed;
- Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future contributions differing from expected;
- Salary and payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liabilities or contributions differing from expected;
- Asset/Liability mismatch – changes in assets may be inconsistent with changes in liabilities, thereby altering the relative difference between the assets and liabilities which may alter the funded status and contribution requirements;
- Contribution risk – actual contributions may differ from expected future contributions (for example, actual contributions not being paid in accordance with the System's funding policy, withdrawal liability assessments or other anticipated payments to the plan are not being paid, or material changes occurring in the anticipated number of covered employees, covered payroll, or another relevant contribution base).

Effects of certain experience can generally be anticipated. For example, if investment returns since the most recent actuarial valuation are less (or more) than the assumed rate of return, then the funded status of the plan can be expected to decrease (or increase) more than anticipated.

The required contributions in this report were established in accordance with applicable Statutes and assumptions adopted by the Board. However, stakeholders should be aware that the scheduled contributions specified in State Code do not necessarily guarantee that the contribution requirements will not increase in a future year.

Employer Risk with Contribution Rates

Currently contributions are collected from participating employers based on the employer's total payroll of employees who are earning benefits in CERS (i.e. covered payroll). The actuarially determined contribution rate is comprised of two components - the normal cost rate (to pay for the benefits accruing in the next year) and the unfunded amortization (to pay for the benefits accrued by members in previous years). The unfunded amortization is calculated by first determining the dollar amount necessary to pay for the unfunded liability based on CERS's funding policy, and then by dividing that dollar amount by expected covered payroll to convert that contribution requirement to a percentage of payroll (i.e. a contribution rate).

As the contribution requirement, as a percentage of payroll, increases then there is increased incentive for participating employers to make deliberate business action to reduce their payroll reported to the System in order to reduce their pension cost.

Plan Specific Risk Measures

Risks faced by a pension plan evolve over time. A relatively new plan with virtually no assets and paying few benefits will experience lower investment risk than a mature plan with a significant amount of assets and large number of members receiving benefits. There are a few measures that can assist stakeholders in understanding and comparing the maturity of a plan to other systems, which include:

- <u>Ratio of market value of assets to payroll</u>: The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. If assets are approximately the same as covered payroll, an investment return that is 5% different than assumed would equal 5% of payroll. In another example, if the assets are approximately twice as large as covered payroll, an investment return that is 5% different than assumed would equal 10% of payroll. A ratio that increases over time generally indicates the potential of an increasing volatility in employer contribution rates as a percentage of payroll.
- <u>Ratio of actuarial accrued liability to payroll</u>: The ratio of actuarial accrued liability to payroll can be used as a measure to indicate the potential volatility of contributions due to volatility in the liability experience. For instance, if the actuarial accrued liability is 5 times the size of the covered payroll, then a change in the liability that is 2% different than expected would be a change in magnitude that is 10% of payroll. A ratio that increases over time generally indicates the potential of an increasing volatility in employer contribution rates as a percentage of payroll.
- <u>Percentage of Expected Contributions Actually Received</u>: This measure identifies the percentage difference between the contributions the fund expects to receive during the fiscal year to and actual contributions received by the fund during the fiscal year. A percentage that is less than 100% means that actual contributions the fund received were less than the expected contributions determined by a prior actuarial valuation. On the other hand, a percentage that is greater than 100% means that actual contributions the fund received were more than the expected contributions.

- Ratio of active to retired members: A relatively mature open plan is likely to have close to the same number of actives to retirees resulting in a ratio that is around 1.0. On the other hand, a super-mature plan, or a plan that is closed to new entrants will have more retirees than active members resulting in a ratio below 1.0. As this ratio declines, a larger portion of the total actuarial accrued liability in the System is attributable to retirees. This metric also typically moves in tandem with the liability to payroll metric, which provides an indication of potential contribution volatility.

The following tables provide a summary of these measures for CERS Non-Hazardous and Hazardous Funds for the current year and the prior four years so stakeholders can identify how these measures are trending. While ASOP No. 51 requires this disclosure with respect to only the retirement funds, we have included this information for the insurance funds for completeness.

CERS Non-Hazardous

	Retirement Fund					Insurance Fund				
	June 30,					June 30,				
	2021	2020	2019	2018	2017	2021	2020	2019	2018	2017
Ratio of the market value of assets to total payroll	3.39	2.74	2.84	2.85	2.73	1.28	1.01	1.02	0.98	0.90
Ratio of actuarial accrued liability to payroll	5.89	5.70	5.69	5.35	5.22	1.36	1.32	1.41	1.25	1.37
Ratio of net cash flow to market value of assets	-2.9%	-2.7%	-3.5%	-3.5%	-3.7%	0.8%	0.1%	0.7%	0.0%	0.1%
Percentage of Expected Contribution Actually Received	76% [1]	82%	72%	96%	97%	88% [1]	102%	87%	101%	97%
Ratio of actives to retirees and beneficiaries	1.15	1.24	1.26	1.32	1.39					

[1] Expected contribution for FYE2021 based on the actuarially determined contribution rate of 29.24% from the June 30, 2019 valuation as amended by SB249, which reset the amortization period to 30 years, and expected compensation based on census data from the June 30, 2020 valuation.

CERS Hazardous

	Retirement Fund					Insurance Fund				
	June 30,					June 30,				
	2021	2020	2019	2018	2017	2021	2020	2019	2018	2017
Ratio of the market value of assets to total payroll	5.04	4.19	4.32	4.40	4.10	2.81	2.32	2.40	2.40	2.20
Ratio of actuarial accrued liability to payroll	9.73	9.55	9.38	8.98	8.58	3.03	3.06	3.10	3.16	3.30
Ratio of net cash flow to market value of assets	-2.3%	-2.1%	-2.8%	-2.7%	-2.6%	-1.4%	-1.6%	-1.0%	-1.4%	-1.6%
Percentage of Expected Contribution Actually Received	71% [1]	80%	71%	100%	103%	102% [1]	104%	92%	104%	101%
Ratio of actives to retirees and beneficiaries	0.84	0.90	0.95	0.97	1.06					

[1] Expected contribution for FYE2021 based on the actuarially determined contribution rate of 51.88% from the June 30, 2019 valuation as amended by SB249, which reset the amortization period to 30 years, and expected compensation based on census data from the June 30, 2020 valuation.

APPENDIX A

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Methods and Assumptions

The following presents a summary of the actuarial assumptions and methods used in the valuation of the County Employees Retirement System.

In general, the assumptions and methods used in the valuation are based on the actuarial experience study for the five-year period ending June 30, 2018 and adopted by the Board in April 2019.

Investment return rate:

Assumed annual rate of 6.25% net of investment expenses for the retirement funds and the insurance funds

Price Inflation:

Assumed annual rate of 2.30%

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%	4.00%	3.30%	3.55%	7.30%	7.55%
2	3.00%	2.00%	3.30%	3.55%	6.30%	5.55%
3	1.50%	1.25%	3.30%	3.55%	4.80%	4.80%
4	1.25%	1.00%	3.30%	3.55%	4.55%	4.55%
5	1.25%	1.00%	3.30%	3.55%	4.55%	4.55%
6	1.00%	1.00%	3.30%	3.55%	4.30%	4.55%
7	1.00%	0.50%	3.30%	3.55%	4.30%	4.05%
8	0.75%	0.50%	3.30%	3.55%	4.05%	4.05%
9	0.75%	0.00%	3.30%	3.55%	4.05%	3.55%
10	0.50%	0.00%	3.30%	3.55%	3.80%	3.55%
11	0.50%	0.00%	3.30%	3.55%	3.80%	3.55%
12	0.25%	0.00%	3.30%	3.55%	3.55%	3.55%
13	0.25%	0.00%	3.30%	3.55%	3.55%	3.55%
14	0.25%	0.00%	3.30%	3.55%	3.55%	3.55%
15 & 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.

	Non-Hazardous		Hazardous	
Age	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	15.58%	9.11%
3	12.48%	7.24%
4	10.66%	6.14%
5	9.37%	5.37%
6	8.37%	4.76%
7	7.56%	4.27%
8	6.87%	3.85%
9	6.27%	3.49%
10	5.74%	3.18%
11	5.27%	2.89%
12	4.84%	2.63%
13	4.45%	2.40%
14	4.09%	2.18%
15	3.76%	1.98%
16	3.45%	1.80%
17	3.16%	1.62%
18	2.89%	1.46%
19	2.64%	1.30%
20	2.39%	1.16%
21	2.16%	0.00%
22	1.94%	0.00%
23	1.74%	0.00%
24	1.54%	0.00%
25	1.35%	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-2014 mortality improvement scale using a base year of 2010.

Post-retirement mortality (non-disabled): System-specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from the MP-2014 mortality improvement scale using a base year of 2019.

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**				
	2020	**2025**	**2030**	**2035**	**2040**
Male	21.0	21.4	21.8	22.2	22.6
Female	24.0	24.4	24.8	25.2	25.6

Post-retirement mortality (disabled): PUB-2010 Disabled Mortality table, with a 4-year set-forward for both male and female rates, projected with the ultimate rates from the MP-2014 mortality improvement scale 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 Age Related Morbidity/Claims Utilization:

To model the impact of aging on the underlying health care costs for Medicare retirees, the valuation relied on the Society of Actuaries' 2013 Study "Health Care Costs – From Birth to Death". Table 4 (Development of Plan Specific Medicare Age Curve) was used to model the impact of aging for ages 65 and over.

Health Care Cost Trend Rates:

Year	Non-Medicare Plans[1]	Medicare Plans[1]	Dollar Contribution[2]
2023	6.30%	6.30%	1.50%
2024	6.20%	6.20%	1.50%
2025	6.10%	6.10%	1.50%
2026	6.00%	6.00%	1.50%
2027	5.80%	5.80%	1.50%
2028	5.60%	5.60%	1.50%
2029	5.40%	5.40%	1.50%
2030	5.20%	5.20%	1.50%
2031	5.00%	5.00%	1.50%
2032	4.80%	4.80%	1.50%
2033	4.60%	4.60%	1.50%
2034	4.40%	4.40%	1.50%
2035	4.20%	4.20%	1.50%
2036 & Beyond	4.05%	4.05%	1.50%

[1]All increases are assumed to occur on January 1. The 2022 premiums were known at the time of the valuation and were incorporated into the liability measurement
[2]Applies to members participating on or after July 1, 2003. All increases are assumed to occur on July 1.

Health care trend assumptions are based on the model issued by the Society of Actuaries "Getzen model of Long-Run Medical Cost Trends for the SOA; Thomas E. Getzen, iHEA and Temple University 2014 © Society of Actuaries.

The underlying assumptions used to develop the health care trend rates include:

- A short run period-this is a period for which anticipated health care trend rates are manually set based on local information as well as plan-specific and carrier information.
- Long term real GDP growth – 1.75%
- Long term rate of inflation – 2.30%
- Long term nominal GDP growth – 4.05%
- Year that excess rate converges to 0 – 2036

Health care trend rates are thus the manually set rates for the short run period and rates which decline to an ultimate trend rate which equals the assumed nominal long-term GDP growth rate.

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]	6%
Essential Plan	8%
Premium Plan	86%

[1] Includes Medicare Advantage Mirror Plans

Non-Medicare Plan	Participation Percentage
LivingWell Limited	4%
LivingWell Basic	2%
LivingWell CDHP	33%
LivingWell PPO	61%

- 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 5.6875% (based upon the 6.25% 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.

Participant Data

Participant data was supplied in electronic text files. There were separate files for (i) active and inactive members, and (ii) members and beneficiaries receiving benefits.

The data for active and terminated members included date of birth, gender, date of participation, benefit tier indicator, service with the current system, total vesting service, salary, employee contribution account balances, and employer pay credits for members participating in the cash balance plan. For retired members and beneficiaries, the data included date of birth, gender, spouse's date of birth (where applicable), amount of monthly benefit, date of retirement, and form of payment code.

Assumptions were made to correct for missing, bad, or inconsistent data. These had no material impact on the results presented.

Changes in assumptions since the prior valuation:

None

Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2022, and are used for both current and future retirees. An inherent assumption in this methodology is that the projected future retirees will have a similar distribution by plan type as the current retirees. The spouse/dependent premium of $926.73 for non-Medicare retirees is based on a blending of Family and Couple premiums for the current retirees that have over 4 years of hazardous service. The fully-insured premiums paid to the Kentucky Employees' Health Plan (KEHP) are blended rates based on the combined experience of active and retired members. Because the average cost of providing health care benefits to retirees under age 65 is higher than the average cost of providing health care benefits to active employees, there is an implicit rate subsidy for the non-Medicare eligible retirees. Actuarial Standard of Practice No. 6 (ASOP No. 6) requires aging subsidies (or implicit rate subsidies) to be recognized. However, the health insurance trusts are only used to reimburse KEHP for the employer's portion of the blended premiums. Said another way, the trusts are not used to fund the difference between the underlying retiree claims and the blended KEHP premiums. As a result, the retiree health care liabilities developed in this report for the non-Medicare retirees are based solely on the premiums charged by KEHP, without any age-adjustment. GASB Statements No. 74 and No. 75 prohibit such a deviation from ASOP No. 6. The liabilities developed in this report are solely for the purpose of funding the benefits paid by the health insurance funds and are not appropriate for financial statement disclosures required by GASB. GRS provides separate GASB reports which include the liabilities associated with the implicit rate subsidy.

For those not eligible for Medicare		
Age	Member	Spouse/Dependents
<65	$758.99	$926.73

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2022, and are used for both current and future retirees. An inherent assumption in this methodology is that the projected future retirees will have a similar distribution by plan type as the current retirees. Age graded and sex distinct premiums are utilized for retirees over the age of 65. These costs are appropriate for the unique age and sex distribution currently existing. Over the future years covered by this valuation, the age and sex distribution will most likely change. Therefore, our process "distributes" the average premium over all age/sex combinations and assigns a unique premium for each combination. The age/sex specific costs more accurately reflect the health care utilization and cost at that age.

For those eligible for Medicare		
Age	Male	Female
65	$188.91	$178.18
75	221.03	215.67
85	233.72	236.47

Appendix B of the report provides a full schedule of premiums.

Mehdi Riazi is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Mehdi Riazi

Mehdi Riazi, FSA, EA, FCA, MAAA

APPENDIX B

BENEFIT PROVISIONS

Summary of Benefit Provisions for County Employees Retirement System (CERS)

CERS Non-Hazardous Employees

Retirement: Tier 1, Participation before 9/1/2008

Normal Retirement Eligibility	Age 65 with at least 1 month of service credit; or Any age with at least 27 years of service
Benefit Amount	If a member has at least 48 months of service, the monthly benefit is 2.00% times final average compensation times years of service. For members who began participating prior to 8/1/2004, the monthly benefit is 2.20% times final average compensation times years of service. If a member has less than 48 months of service, the monthly benefit is the actuarial equivalent of two times the member's contributions with interest. Final average compensation is based on the member's highest 5 years of compensation.
Early Retirement Eligibility	Any age (prior to age 65) with at least 25 years of service; or Age 55 with at least 5 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement eligibility precedes the member's normal retirement date.

CERS Non-Hazardous Employees (continued)

Retirement: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Normal Retirement Eligibility	Age 65 with at least 5 years of service; or Rule of 87 (Age 57 or older if age plus service equals 87)
Benefit Amount	The monthly benefit is equal to the applicable benefit multiplier times final average compensation times years of service.

Years of Service	Benefit Multiplier
10 or less	1.10%
10-20	1.30%
20-26	1.50%
26-30	1.75%
Greater than 30*	2.00%

* The 2.00% benefit multiplier only applies to service credit in excess of 30 years. If a member has greater than 30 years of service at retirement, service prior to 30 years will be multiplied by the 1.75% benefit multiplier.

Final compensation is based on the member's last 5 years of compensation.

Early Retirement Eligibility	Age 60 with at least 10 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement date precedes the member's normal retirement eligibility.

Retirement: Tier 3, Participation on or after 1/1/2014

Normal Retirement Eligibility	Age 65 with at least 5 years of service; or Rule of 87 (Age 57 or older if age plus service equals 87)
Benefit Amount	Each year that the member is active, a 4.00% employer pay credit and the employee's 5.00% contribution will be credited to each member's hypothetical cash balance account. The hypothetical account will earn interest at a minimum rate of 4%, annually. If the System's geometric average net investment return for the previous five years exceeds 4%, then the hypothetical account will be credited with an additional amount of interest in that year equal to 75% of the amount of the return which exceeds 4%. All interest credits will be applied to the hypothetical account balance on June 30 based on the account balance as of June 30 of the previous year. At retirement, the member's hypothetical account balance may be converted into an annuity based on an actuarial factor.
Early Retirement Eligibility	N/A

CERS Non-Hazardous Employees (continued)

Deferred Vested Benefit: Tier 1, Participation before 9/1/2008

Eligibility	At least 1 month of service credit
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Eligibility	5 years of service
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit Tier 3, Participation on or after 1/1/2014

Eligibility	5 years of service
Benefit Amount	At termination of employment, members may choose to leave their account balance with the System and retire once they are eligible. The hypothetical account balance will earn 4% annual interest after termination. Members may also choose to withdrawal their entire accumulated balance. If a member does not have 5 years of service at termination, the member is eligible to receive a partial refund of their account balance. This refund includes the member's contributions with interest.

Disability Retirement: Participation before 8/1/2004

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	Disability benefits are calculated in the same manner as the normal retirement benefit with years of service and final compensation being determined as of the date of disability, except that service credit shall be added to the person's total service beginning with the last date of paid employment and continuing to the member's 65th birthday, with total service not exceeding 25 years. Total service credit added shall not be greater than the member's actual service at disability. For members with at least 25 years of service on the last day of paid employment but less than 27 years of service, total service shall be 27 years. For members with 27 or more years of service credit, actual service will be used.

CERS Non-Hazardous Employees (continued)

Disability Retirement: Participation on or after 8/1/2004 but before 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 20% of the member's final monthly rate of pay or the member's normal retirement benefit (without reduction for early retirement) with years and final compensation being determined as of the date of disability.

Disability Retirement: Participation on or after 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 20% of the member's final monthly rate of pay or the member's retirement benefit calculated at the member's normal retirement date.

Duty-Related Disability Benefit

Disability Benefit	If the disability is a direct result of an act in the line of duty, the benefit shall not be less than 25% of the member's final monthly final rate of pay. If the disability is deemed to be Total and Permanent (and the member is working in a non-hazardous position that could be certified as a hazardous position), then this benefit shall not be less than 75% of the member's monthly average pay.
Child Benefit	Additionally, each eligible dependent child will receive 10% of the member's monthly average pay up to a maximum of 40%. Member and dependent payment shall not exceed 100% of member's monthly average pay.

Pre-Retirement Death Benefit

Eligibility	Eligible for early or normal retirement; or Under age 65 with at least 60 months of service and actively working at the time of death; or At least 144 months of service, if no longer actively working
Spouse Benefit	The member's retirement benefit calculated in the same manner as if the member had retired on the day of the member's death and elected a 100% joint and survivor benefit. The benefit is actuarially reduced if the member dies prior to their normal retirement age.

CERS Non-Hazardous Employees (continued)

Pre-Retirement Death Benefit (Death in the Line of Duty)

Eligibility	One month of service credit
Spouse Benefit	A $10,000 lump sum payment plus a monthly payment of 75% of the deceased member's final monthly average pay. Each dependent child will receive 10% of the final monthly average pay (not to exceed a total child benefit of 25% while the spouse is alive). A spouse may also elect the non-line of duty death benefit.
Child Benefit	In the event there is no surviving spouse, the benefit is 50% of final monthly average pay for one child, 65% of final monthly average pay for two children, or 75% of final monthly average pay for three or more eligible children.

Post-Retirement Death Benefit

Eligibility	48 months of service, and in receipt of retirement benefits
Death Benefit	A $5,000 lump sum payment

Member Contributions

Tier 1, Participation before 9/1/2008	5% of creditable compensation. Members who do not receive a retirement benefit are entitled to a full refund of contributions with interest. The annual interest rate is set by the Board, not less than 2.0%.
Tier 2, Participation on or after 9/1/2008 but before 1/1/2014	5% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest. The annual interest rate is 2.5%.
Tier 3, Participation after 1/1/2014	5% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest.

Changes since the Prior Valuation

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become "totally and permanently disabled" as a result of a duty-related disability. The minimum disability benefit increased from 25% of the member's monthly final rate of pay to 75% of the member's monthly average pay. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.

CERS Hazardous Employees

Retirement: Tier 1, Participation before 9/1/2008

Normal Retirement Eligibility	Age 55 with at least 1 month of service credit; or Any age with at least 20 years of service
Benefit Amount	If a member has at least 60 months of service, the monthly benefit is 2.50% times final average compensation times years of service. If a member has less than 60 months of service, the monthly benefit is the actuarial equivalent of two times the member's contributions with interest. Final average compensation is based on the member's highest 3 years of compensation.
Early Retirement Eligibility	Age 50 with at least 15 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement date precedes the member's normal retirement eligibility.

CERS Hazardous Employees (continued)

Retirement: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Normal Retirement Eligibility	Age 60 with at least 5 years of service; or Any age with at least 25 years of service
Benefit Amount	The monthly benefit is equal to the applicable benefit multiplier times final average compensation times years of service.

Years of Service	Benefit Multiplier
10 or less	1.30%
10-20	1.50%
20-25	2.25%
Greater than 25	2.50%

Final average compensation is based on the member's highest 3 years of compensation.

Early Retirement Eligibility	Age 50 with at least 15 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement date precedes the member's normal retirement eligibility.

Retirement: Tier 3, Participation on or after 1/1/2014

Normal Retirement Eligibility	Age 60 with at least 5 years of service; or Any age with at least 25 years of service
Benefit Amount	Each year that the member is active, a 7.50% employer pay credit and the employee's 8.00% contribution will be credited to each member's hypothetical cash balance account. The hypothetical account will earn interest at a minimum rate of 4%, annually. If the System's geometric average net investment return for the previous five years exceeds 4%, then the hypothetical account will be credited with an additional amount of interest in that year equal to 75% of the amount of the return which exceeds 4%. All interest credits will be applied to the hypothetical account balance on June 30 based on the account balance as of June 30 of the previous year. At retirement, the member's hypothetical account balance may be converted into an annuity based on an actuarial factor.
Early Retirement Eligibility	N/A

CERS Hazardous Employees (continued)

Deferred Vested Benefit: Tier 1, Participation before 9/1/2008

Eligibility	At least 1 month of service credit
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Eligibility	5 years of service
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit Tier 3, Participation on or after 1/1/2014

Eligibility	5 years of service
Benefit Amount	At termination of employment, members may choose to leave their account balance with the System and retire once they are eligible. The hypothetical account balance will earn 4% annual interest after termination. Members may also choose to withdrawal their entire accumulated balance. If a member does not have 5 years of service at termination, the member is eligible to receive a partial refund of their account balance. This refund includes the member's contributions with interest.

Disability Retirement: Participation before 8/1/2004

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	Disability benefits are calculated in the same manner as the normal retirement benefit with years of service and final compensation being determined as of the date of disability, except that if the member has less than 20 years of service at disability, service credit shall be added to the person's total service beginning with the last date of paid employment and continuing to the member's 55th birthday, with total service not exceeding 20 years. Total service credit added shall not be greater than the member's actual service at disability.

CERS Hazardous Employees (continued)

Disability Retirement: Participation on or after 8/1/2004 but before 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 25% of the member's final monthly rate of pay or the member's normal retirement benefit (without reduction for early retirement) with years and final compensation being determined as of the date of disability.

Disability Retirement: Participation on or after 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 25% of the member's final monthly rate of pay or the member's retirement benefit calculated at the member's normal retirement date.

Line of Duty Disability Benefit

Disability Benefit	If the disability is a direct result of an act in the line of duty, the benefit shall not be less than 25% of the member's final monthly final rate of pay. If the disability is deemed to be Total and Permanent, then this benefit shall not be less than 75% of the member's monthly average pay.
Child Benefit	Additionally, each eligible dependent child will receive 10% of the member's monthly average pay up to a maximum of 40%. Member and dependent payment shall not exceed 100% of member's monthly average pay.

Pre-Retirement Death Benefit

Eligibility	Eligible for early or normal retirement; or Under age 55 with at least 60 months of service and actively working at the time of death; or At least 144 months of service, if no longer actively working
Spouse Benefit	The member's retirement benefit calculated in the same manner as if the member had retired on the day of the member's death and elected a 100% joint and survivor benefit. The benefit is actuarially reduced if the member dies prior to their normal retirement age.

CERS Hazardous Employees (continued)

Pre-Retirement Death Benefit (Death in the Line of Duty)

Eligibility	One month of service credit
Spouse Benefit	A $10,000 lump sum payment plus a monthly payment of 75% of the deceased member's final monthly average pay. Each dependent child will receive 10% of the final monthly average pay (not to exceed a total child benefit of 25% while the spouse is alive). A spouse may also elect the non-line of duty death benefit.
Non-Spouse Benefit	If the beneficiary is only one person who is a dependent receiving at least 50% of his or her support from the member, the beneficiary may elect a lump sum payment of$10,000.
Child Benefit	In the event there is no surviving spouse, the benefit is 50% of final monthly average pay for one child, 65% of final average pay for two children, or 75% of final average pay for three or more eligible children.

Post-Retirement Death Benefit

Eligibility	48 months of service, and in receipt of retirement benefits
Death Benefit	A $5,000 lump sum payment

Member Contributions

Tier 1, Participation before 9/1/2008	8% of creditable compensation. Members who do not receive a retirement benefit are entitled to a full refund of contributions with interest. The annual interest rate is set by the Board, not less than 2.0%.
Tier 2, Participation on or after 9/1/2008 but before 1/1/2014	8% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest. The annual interest rate is 2.5%.
Tier 3, Participation after 1/1/2014	8% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest.

Changes since the Prior Valuation

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become "totally and permanently disabled" in the line of duty. The minimum disability benefit increased from 25% of the member's monthly final rate of pay to 75% of the member's monthly average pay.

Summary of Main Retiree Insurance Benefit Provisions

Insurance Tier 1: Participation began before 7/1/2003

Benefit Eligibility Recipient of a retirement allowance

Benefit Amount

Non-Hazardous Service	Percentage of Member Premium Paid by Retirement System	Hazardous Service	Percentage of Member & Dependent Premium Paid by Retirement System
Less than 4 years	0%	Less than 4 years	0%
4 – 9 years	25%	4 – 9 years	25%
10 – 14 years	50%	10 – 14 years	50%
15 – 19 years	75%	15 – 19 years	75%
20 or more years	100%	20 or more years	100%

The percentage paid by the retirement system is applied to the 'contribution' plan selected by the Board.

Duty Disability Retirement If disability was a result of injuries sustained while in the line of duty, the member receives 100% of the maximum contribution for the member and dependents. This benefit is provided to members in the Non-hazardous and Hazardous plans alike.

Duty Death in Service If an active employee's death was a result of injuries sustained while in the line of duty, the member's spouse and children receive a fully subsidized health insurance benefit. This benefit is provided to members in the Non-hazardous and Hazardous plans alike.

Non-Duty Death in Service If the surviving spouses is in receipt of a pension allowance, he or she is eligible for continued health coverage. The percentage of the premium paid for by the retirement system is based on the member's years of hazardous service at the time of death.

Surviving Spouse of a Retiree A surviving spouse of a retiree, who is in receipt of a pension allowance, will receive a premium subsidy based on the member's years of hazardous service.

Hazardous employees who retired prior to August 1, 1998 System's contribution for spouse and dependents is based on total service.

Insurance Tier 2: Participation began on or after 7/1/2003, but before 9/1/2008

Benefit Eligibility	Recipient of a retirement allowance with at least 120 months of service at retirement
Non-Hazardous Subsidy	Monthly contribution of $10 for each year of earned non-hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2021, the Non-Hazardous monthly contribution was $13.99/year of service. Upon the retiree's death, the surviving spouse may continue coverage (if in receipt of a retirement allowance) but will be 100% responsible for the premiums.
Hazardous Subsidy	Monthly contribution of $15 for each year of earned hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2021, the Hazardous monthly contribution was $20.99/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($13.99 as of July 1, 2021) for each year of hazardous service.
Duty Disability Retirement	If disability was a result of injuries sustained while in the line of duty or was duty-related, the member receives a benefit based on at least 20 years of service. This benefit is provided to members in the Non-Hazardous and Hazardous plans alike. If the disability is deemed to be Total and Permanent, the insurance premium for the member, the member's spouse, and the member's dependent children shall also be paid in full by the System. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.
Duty Death in Service	If an active employee's death was a result of injuries sustained while in the line of duty, the member's spouse and children receive a fully subsidized health insurance benefit. This benefit is provided to members in the Non-Hazardous and Hazardous plans alike.
Non-Duty Death in Service	If the surviving spouse is in receipt of a pension allowance, he or she is eligible for continued health coverage. The percentage of the premium paid for by the retirement system is based on the member's years of hazardous service at the time of death.

Insurance Tier 3: Participation began on or after 9/1/2008

Tier 3 insurance benefits are identical to Tier 2, except Tier 3 members are required to have at least 180 months of service in order to be eligible.

Monthly Health Plan Premiums – Effective January 1, 2022

		Non-Medicare Plan Options			
Plan Option	Single	Parent Plus	Couple	Family	Family X-Ref
LivingWell PPO[1]	$772.16	$1,101.08	$1,691.64	$1,883.60	$929.70
LivingWell CDHP	750.30	1,036.40	1,453.30	1,623.94	866.72
LivingWell Basic	721.54	994.72	1,537.72	1,713.58	846.38
Living Well Limited	642.02	914.78	1,407.32	1,566.78	772.32

Medicare Plan Options	
Medical Only Plan	$186.87
Medicare Advantage Mirror Essential Plan	228.12
Medicare Advantage Mirror Premium Plan	327.97
Kentucky Retirement Systems – Essential Plan[2]	49.25
Kentucky Retirement Systems – Premium Plan[3]	227.03

[1] Contribution plan selected by the Board was the LivingWell PPO plan option for non-Medicare retirees.
[2] Contribution rate for retirees selected by the Board remains at $75.56.
[3] Contribution rate for retirees selected by the Board remains at $252.51.

Dollar Contribution Amount for Insurance Tier 2 and Tier 3

Monthly contribution amounts per year of service as of July 1, 2021.

Non-Hazardous Service	Hazardous Service
$13.99	$20.99

Changes since the Prior Valuation

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become “totally and permanently disabled” in the line of duty or as a result of a duty-related disability. The insurance premium for the member, the member’s spouse, and the member’s dependent children shall be paid in full by the System. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.

APPENDIX C

GLOSSARY

Glossary

Actuarial Accrued Liability (AAL): That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

Actuarial Assumptions: Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

Actuarial Cost Method or ***Funding Method:*** A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

Actuarial Gain or ***Actuarial Loss:*** A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the fund's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)

b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and

c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.

Actuarial Valuation: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial valuation for a governmental retirement system typically also includes calculations that provide the financial information of the plan, such as the funded ratio, unfunded actuarial accrued liability and the ADC.

Actuarial Value of Assets or ***Valuation Assets:*** The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Actuarially Determined Contribution (ADC): The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ADC consists of the Employer Normal Cost and the Amortization Payment.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: The portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Closed Amortization Period: A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decrements: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: A retirement plan that is not a Defined Contribution Plan. Typically a defined benefit plan is one in which benefits are defined by a formula applied to the member's compensation and/or years of service.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Experience Study: A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Funding Period or ***Amortization Period:*** The term "Funding Period" is used two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period specified in State statute. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on a statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: Governmental Accounting Standards Board.

GASB 67 and ***GASB 68***: Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting and reporting rules for public retirement systems and the employers that sponsor, participate in, or contribute to them. Statement No. 67 sets the accounting rules for the financial reporting of the retirement systems, while Statement No. 68 sets the rules for the employers that sponsor, participate in, or contribute to public retirement systems.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded

Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but may not decrease by exactly one year in the subsequent year's actuarial valuation. For instance, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year.

Unfunded Actuarial Accrued Liability: The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or Actuarial Valuation Date: The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

P: 469.524.0000 | www.grsconsulting.com

December 1, 2021

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

Re: Sensitivity Analysis Based on Results of the June 30, 2021 Actuarial Valuation

Dear Members of the Board:

Per Kentucky State Statute 61.670, we are providing this supplemental information regarding the sensitivity of the valuation results to changes in some of the economic assumptions. Specifically, the enclosed tables show the impact for the **County Employees Retirement System (CERS)** due to changes in the investment return assumption, the inflation rate assumption, and the payroll growth rate assumption.

Background

Investment Assumption

The investment return assumption is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plans. The lower the investment return assumption, the less the benefit payments are discounted and the higher the valuation liability. The current investment return assumption is 6.25% for the CERS non-hazardous and hazardous retirement and insurance funds. The sensitivity analysis shows the financial impact of a 1.00% increase and a 1.00% decrease in the investment return assumption. For purposes of this sensitivity analysis, the inflation assumption and payroll growth assumption remain unchanged from the valuation assumption.

Inflation Assumption

The inflation assumption underlies most of the other economic assumptions, including the investment return, salary increases, and payroll growth rate. This is a macroeconomic assumption and as such the same assumption is used in the valuation of each of the retirement systems. The current assumption is 2.30% for all funds. The sensitivity analysis shows the financial impact of a 0.25% increase and a 0.25% decrease in the inflation assumption. Note, the change in the inflation assumption results in a corresponding change in the investment return assumption, the individual salary increase assumption for projecting members' benefit amounts, the payroll growth rate assumption, and the healthcare trend assumption that is used in the valuation of the health insurance funds.

Payroll Growth Assumption

Participating employers of CERS make contributions to the system as a percentage of the covered payroll. Therefore, as payroll changes over time these amortization payments will also change. If actual covered payroll increases at a rate that is less than assumed, then the retirement system receives fewer contribution dollars than expected to finance the unfunded liability, which means the contribution rates in future years will be required to increase in order to finance the unfunded liability over the same time period. The current payroll growth assumption is 2.00% for all the CERS retirement and insurance funds. The analysis shows the impact of a 1.00% increase and a 1.00% decrease in the payroll growth assumption.

Please note that the payroll growth assumption does not impact the valuation liabilities, unfunded liability, or funded status of the system. Rather, this assumption only impacts the amortization rate for financing the existing unfunded actuarial accrued liability and the actuarially determined employer contribution. For purposes of this analysis, the investment return assumption and the inflation assumption are held at their current valuation assumptions.

Certification

The information provided in this letter compliments the information provided in the June 30, 2021 actuarial valuation report. Please refer to the June 30, 2021 actuarial valuation report for additional discussion of the actuarial valuation, including the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

Actual results can, and almost certainly will, differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rate, and funding periods. The actuarial calculations are intended to provide information for rational decision making. The purpose of this information is to provide stakeholders the financial sensitivity of the unfunded liability and contribution rates to changes in the inflation, assumed rate of return, and payroll growth assumption.

The undersigned are independent actuaries and consultants. Both of the undersigned are Enrolled Actuaries, Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. Both of the undersigned are experienced in performing valuations for large public retirement systems. This communication shall not be construed to provide tax advice, legal advice or investment advice.

Sincerely,

Gabriel, Roeder, Smith & Company

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

Janie Shaw, ASA, EA, MAAA
Consultant

Sensitivity Analysis - Discount Rate
Non-Hazardous Members
(Dollar amounts expressed in thousands)

	Decrease Discount Rate	Valuation Results	Increase Discount Rate
(1)	(2)	(3)	(4)
Payroll Growth Rate	2.00%	2.00%	2.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	6.25%	7.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 16,691,423	$ 14,894,906	$ 13,407,431
Actuarial Value of Assets	7,715,883	7,715,883	7,715,883
Unfunded Actuarial Accrued Liability	8,975,540	7,179,023	5,691,548
Funded Ratio	46.2%	51.8%	57.5%
Actuarially Determined Contribution Rate	29.33%	23.40%	18.39%
Insurance			
Actuarial Accrued Liability	$ 3,933,488	$ 3,450,484	$ 3,055,228
Actuarial Value of Assets	2,947,312	2,947,312	2,947,312
Unfunded Actuarial Accrued Liability	986,176	503,172	107,916
Funded Ratio	74.9%	85.4%	96.5%
Actuarially Determined Contribution Rate	5.62%	3.39%	1.44%
Combined			
Actuarial Accrued Liability	$ 20,624,911	$ 18,345,390	$ 16,462,659
Actuarial Value of Assets	10,663,195	10,663,195	10,663,195
Unfunded Actuarial Accrued Liability	9,961,716	7,682,195	5,799,464
Funded Ratio	51.7%	58.1%	64.8%
Actuarially Determined Contribution Rate	34.95%	26.79%	19.83%

Sensitivity Analysis - Inflation Rate
Non-Hazardous Members
(Dollar amounts expressed in thousands)

(1)	Decrease Inflation Rate (2)	Valuation Results (3)	Increase Inflation Rate (4)
Payroll Growth Rate	1.75%	2.00%	2.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	6.00%	6.25%	6.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 15,271,045	$ 14,894,906	$ 14,536,063
Actuarial Value of Assets	7,715,883	7,715,883	7,715,883
Unfunded Actuarial Accrued Liability	7,555,162	7,179,023	6,820,180
Funded Ratio	50.5%	51.8%	53.1%
Actuarially Determined Contribution Rate	24.94%	23.40%	21.93%
Insurance			
Actuarial Accrued Liability	$ 3,488,189	$ 3,450,484	$ 3,414,990
Actuarial Value of Assets	2,947,312	2,947,312	2,947,312
Unfunded Actuarial Accrued Liability	540,877	503,172	467,678
Funded Ratio	84.5%	85.4%	86.3%
Actuarially Determined Contribution Rate	3.63%	3.39%	3.17%
Combined			
Actuarial Accrued Liability	$ 18,759,234	$ 18,345,390	$ 17,951,053
Actuarial Value of Assets	10,663,195	10,663,195	10,663,195
Unfunded Actuarial Accrued Liability	8,096,039	7,682,195	7,287,858
Funded Ratio	56.8%	58.1%	59.4%
Actuarially Determined Contribution Rate	28.57%	26.79%	25.10%

Sensitivity Analysis - Payroll Growth
Non-Hazardous Members
(Dollar amounts expressed in thousands)

	Decrease Payroll Growth	Valuation Results	Increase Payroll Growth
(1)	(2)	(3)	(4)
Payroll Growth Rate	1.00%	2.00%	3.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	6.25%	6.25%	6.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 14,894,906	$ 14,894,906	$ 14,894,906
Actuarial Value of Assets	7,715,883	7,715,883	7,715,883
Unfunded Actuarial Accrued Liability	7,179,023	7,179,023	7,179,023
Funded Ratio	51.8%	51.8%	51.8%
Actuarially Determined Contribution Rate	25.43%	23.40%	21.51%
Insurance			
Actuarial Accrued Liability	$ 3,450,484	$ 3,450,484	$ 3,450,484
Actuarial Value of Assets	2,947,312	2,947,312	2,947,312
Unfunded Actuarial Accrued Liability	503,172	503,172	503,172
Funded Ratio	85.4%	85.4%	85.4%
Actuarially Determined Contribution Rate	3.54%	3.39%	3.25%
Combined			
Actuarial Accrued Liability	$ 18,345,390	$ 18,345,390	$ 18,345,390
Actuarial Value of Assets	10,663,195	10,663,195	10,663,195
Unfunded Actuarial Accrued Liability	7,682,195	7,682,195	7,682,195
Funded Ratio	58.1%	58.1%	58.1%
Actuarially Determined Contribution Rate	28.97%	26.79%	24.76%

Sensitivity Analysis - Discount Rate
Hazardous Members
(Dollar amounts expressed in thousands)

(1)	Decrease Discount Rate (2)	Valuation Results (3)	Increase Discount Rate (4)
Payroll Growth Rate	2.00%	2.00%	2.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	6.25%	7.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 6,370,300	$ 5,629,458	$ 5,026,026
Actuarial Value of Assets	2,628,621	2,628,621	2,628,621
Unfunded Actuarial Accrued Liability	3,741,679	3,000,837	2,397,405
Funded Ratio	41.3%	46.7%	52.3%
Actuarially Determined Contribution Rate	53.49%	42.81%	33.93%
Insurance			
Actuarial Accrued Liability	$ 1,986,555	$ 1,751,203	$ 1,560,638
Actuarial Value of Assets	1,475,635	1,475,635	1,475,635
Unfunded Actuarial Accrued Liability	510,920	275,568	85,003
Funded Ratio	74.3%	84.3%	94.6%
Actuarially Determined Contribution Rate	10.98%	6.78%	3.09%
Combined			
Actuarial Accrued Liability	$ 8,356,855	$ 7,380,661	$ 6,586,664
Actuarial Value of Assets	4,104,256	4,104,256	4,104,256
Unfunded Actuarial Accrued Liability	4,252,599	3,276,405	2,482,408
Funded Ratio	49.1%	55.6%	62.3%
Actuarially Determined Contribution Rate	64.47%	49.59%	37.02%

Sensitivity Analysis - Inflation Rate
Hazardous Members
(Dollar amounts expressed in thousands)

	Decrease Inflation Rate	Valuation Results	Increase Inflation Rate
(1)	(2)	(3)	(4)
Payroll Growth Rate	1.75%	2.00%	2.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	6.00%	6.25%	6.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 5,785,313	$ 5,629,458	$ 5,481,043
Actuarial Value of Assets	2,628,621	2,628,621	2,628,621
Unfunded Actuarial Accrued Liability	3,156,692	3,000,837	2,852,422
Funded Ratio	45.4%	46.7%	48.0%
Actuarially Determined Contribution Rate	45.59%	42.81%	40.18%
Insurance			
Actuarial Accrued Liability	$ 1,764,970	$ 1,751,203	$ 1,738,251
Actuarial Value of Assets	1,475,635	1,475,635	1,475,635
Unfunded Actuarial Accrued Liability	289,335	275,568	262,616
Funded Ratio	83.6%	84.3%	84.9%
Actuarially Determined Contribution Rate	7.15%	6.78%	6.41%
Combined			
Actuarial Accrued Liability	$ 7,550,283	$ 7,380,661	$ 7,219,294
Actuarial Value of Assets	4,104,256	4,104,256	4,104,256
Unfunded Actuarial Accrued Liability	3,446,027	3,276,405	3,115,038
Funded Ratio	54.4%	55.6%	56.9%
Actuarially Determined Contribution Rate	52.74%	49.59%	46.59%

Sensitivity Analysis - Payroll Growth
Hazardous Members
(Dollar amounts expressed in thousands)

(1)	Decrease Payroll Growth (2)	Valuation Results (3)	Increase Payroll Growth (4)
Payroll Growth Rate	1.00%	2.00%	3.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	6.25%	6.25%	6.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 5,629,458	$ 5,629,458	$ 5,629,458
Actuarial Value of Assets	2,628,621	2,628,621	2,628,621
Unfunded Actuarial Accrued Liability	3,000,837	3,000,837	3,000,837
Funded Ratio	46.7%	46.7%	46.7%
Actuarially Determined Contribution Rate	46.55%	42.81%	39.34%
Insurance			
Actuarial Accrued Liability	$ 1,751,203	$ 1,751,203	$ 1,751,203
Actuarial Value of Assets	1,475,635	1,475,635	1,475,635
Unfunded Actuarial Accrued Liability	275,568	275,568	275,568
Funded Ratio	84.3%	84.3%	84.3%
Actuarially Determined Contribution Rate	7.12%	6.78%	6.46%
Combined			
Actuarial Accrued Liability	$ 7,380,661	$ 7,380,661	$ 7,380,661
Actuarial Value of Assets	4,104,256	4,104,256	4,104,256
Unfunded Actuarial Accrued Liability	3,276,405	3,276,405	3,276,405
Funded Ratio	55.6%	55.6%	55.6%
Actuarially Determined Contribution Rate	53.67%	49.59%	45.80%

County Employees Retirement System
CERS Non-Hazardous Retirement Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 14,895	$ 7,716	$ 7,179	52%	$ 576	$ 126	$ 2,529	22.78%	23.88%
2022	15,240	8,308	6,932	55%	604	129	2,579	23.40%	23.40%
2023	15,563	8,881	6,682	57%	585	132	2,631	22.25%	22.25%
2024	15,867	9,432	6,435	59%	572	134	2,684	21.33%	21.33%
2025	16,152	10,034	6,118	62%	560	137	2,737	20.45%	20.45%
2026	16,415	10,340	6,075	63%	542	140	2,792	19.42%	19.42%
2027	16,656	10,612	6,044	64%	547	142	2,848	19.21%	19.21%
2028	16,875	10,871	6,004	64%	553	145	2,905	19.03%	19.03%
2029	17,073	11,119	5,954	65%	559	148	2,963	18.86%	18.86%
2030	17,253	11,359	5,894	66%	565	151	3,022	18.70%	18.70%
2031	17,416	11,595	5,821	67%	572	154	3,083	18.56%	18.56%
2032	17,575	11,838	5,737	67%	579	157	3,144	18.43%	18.43%
2033	17,722	12,084	5,638	68%	588	160	3,207	18.32%	18.32%
2034	17,859	12,333	5,526	69%	596	164	3,271	18.22%	18.22%
2035	17,988	12,591	5,397	70%	605	167	3,337	18.13%	18.13%
2036	18,112	12,861	5,251	71%	614	170	3,403	18.05%	18.05%
2037	18,236	13,148	5,088	72%	625	174	3,471	17.99%	17.99%
2038	18,365	13,461	4,904	73%	635	177	3,541	17.93%	17.93%
2039	18,502	13,802	4,700	75%	646	181	3,612	17.89%	17.89%
2040	18,651	14,179	4,472	76%	650	184	3,684	17.64%	17.64%
2041	18,815	14,586	4,229	78%	697	188	3,758	18.54%	18.54%
2042	18,995	15,071	3,924	79%	742	192	3,833	19.35%	19.35%
2043	19,193	15,638	3,555	82%	783	195	3,909	20.02%	20.02%
2044	19,411	16,287	3,124	84%	824	199	3,988	20.66%	20.66%
2045	19,649	17,025	2,624	87%	873	203	4,067	21.47%	21.47%
2046	19,910	17,864	2,046	90%	891	207	4,149	21.47%	21.47%
2047	20,194	18,778	1,416	93%	909	212	4,232	21.47%	21.47%
2048	20,501	19,771	730	96%	926	216	4,316	21.46%	21.46%
2049	20,834	20,834	-	100%	160	220	4,403	3.64%	3.64%
2050	21,193	21,193	-	100%	163	225	4,491	3.64%	3.64%

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

New active members are assumed to be hired as current active members are assumed to terminate employment or retire.

The total active population is assumed to remain level throughout the entire projection.

Covered payroll is assumed to increase 2% each year throughout the entire projection.

The Board certified contribution rate paid by employers is assumed to be equal to the full actuarially determined contribution rate, except as allowed by House Bill 362 (passed during the 2018 legislative session), which limits the certified contribution rate to a 12% increase over the prior year rate for the period of July 1, 2018 to June 30, 2028.

County Employees Retirement System
CERS Hazardous Retirement Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 5,629	$ 2,629	$ 3,000	47%	$ 206	$ 46	$ 578	35.60%	43.23%
2022	5,784	2,834	2,950	49%	253	47	590	42.81%	42.81%
2023	5,929	3,067	2,862	52%	247	48	602	41.04%	41.04%
2024	6,067	3,292	2,775	54%	243	49	614	39.63%	39.63%
2025	6,199	3,537	2,662	57%	240	50	626	38.29%	38.29%
2026	6,324	3,685	2,639	58%	234	51	639	36.70%	36.70%
2027	6,444	3,825	2,619	59%	237	52	651	36.33%	36.33%
2028	6,560	3,963	2,597	60%	239	53	664	36.00%	36.00%
2029	6,671	4,103	2,568	62%	242	54	678	35.68%	35.68%
2030	6,782	4,247	2,535	63%	245	55	691	35.43%	35.43%
2031	6,893	4,398	2,495	64%	248	56	705	35.22%	35.22%
2032	7,008	4,558	2,450	65%	252	58	719	35.04%	35.04%
2033	7,125	4,727	2,398	66%	256	59	733	34.88%	34.88%
2034	7,247	4,908	2,339	68%	260	60	748	34.74%	34.74%
2035	7,371	5,099	2,272	69%	264	61	763	34.60%	34.60%
2036	7,499	5,302	2,197	71%	268	62	778	34.46%	34.46%
2037	7,628	5,515	2,113	72%	272	64	794	34.31%	34.31%
2038	7,757	5,737	2,020	74%	277	65	810	34.15%	34.15%
2039	7,883	5,968	1,915	76%	281	66	826	33.98%	33.98%
2040	8,009	6,209	1,800	78%	272	67	843	32.34%	32.34%
2041	8,134	6,448	1,686	79%	279	69	859	32.43%	32.43%
2042	8,261	6,701	1,560	81%	294	70	877	33.59%	33.59%
2043	8,390	6,981	1,409	83%	309	72	894	34.53%	34.53%
2044	8,522	7,288	1,234	86%	323	73	912	35.45%	35.45%
2045	8,657	7,621	1,036	88%	341	74	930	36.67%	36.67%
2046	8,792	7,986	806	91%	348	76	949	36.67%	36.67%
2047	8,931	8,373	558	94%	355	77	968	36.68%	36.68%
2048	9,072	8,785	287	97%	362	79	987	36.70%	36.70%
2049	9,215	9,215	-	100%	59	81	1,007	5.88%	5.88%
2050	9,361	9,361	-	100%	61	82	1,027	5.90%	5.90%

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

New active members are assumed to be hired as current active members are assumed to terminate employment or retire.

The total active population is assumed to remain level throughout the entire projection.

Covered payroll is assumed to increase 2% each year throughout the entire projection.

The Board certified contribution rate paid by employers is assumed to be equal to the full actuarially determined contribution rate, except as allowed by House Bill 362 (passed during the 2018 legislative session), which limits the certified contribution rate to a 12% increase over the prior year rate for the period of July 1, 2018 to June 30, 2028.

County Employees Retirement System
CERS Non-Hazardous Insurance Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 3,450	$ 2,947	$ 503	85%	$ 104	$ 14	$ 2,499	4.17%	4.17%
2022	3,595	3,196	399	89%	86	15	2,549	3.39%	3.39%
2023	3,736	3,415	321	91%	76	16	2,600	2.93%	2.93%
2024	3,872	3,624	248	94%	68	18	2,652	2.55%	2.55%
2025	4,000	3,849	151	96%	59	19	2,706	2.19%	2.19%
2026	4,122	3,966	156	96%	48	20	2,760	1.75%	1.75%
2027	4,234	4,064	170	96%	46	22	2,815	1.62%	1.62%
2028	4,337	4,152	185	96%	42	23	2,871	1.48%	1.48%
2029	4,431	4,230	201	96%	40	24	2,929	1.35%	1.35%
2030	4,517	4,297	220	95%	37	26	2,987	1.24%	1.24%
2031	4,596	4,355	241	95%	35	27	3,047	1.14%	1.14%
2032	4,668	4,405	263	94%	32	28	3,108	1.04%	1.04%
2033	4,735	4,448	287	94%	31	29	3,170	0.97%	0.97%
2034	4,800	4,487	313	94%	29	30	3,233	0.90%	0.90%
2035	4,865	4,522	343	93%	28	31	3,298	0.85%	0.85%
2036	4,931	4,557	374	92%	27	32	3,364	0.79%	0.79%
2037	5,000	4,592	408	92%	26	33	3,431	0.76%	0.76%
2038	5,072	4,627	445	91%	26	34	3,500	0.74%	0.74%
2039	5,146	4,662	484	91%	25	35	3,570	0.71%	0.71%
2040	5,224	4,698	526	90%	63	36	3,641	1.74%	1.74%
2041	5,305	4,774	531	90%	90	37	3,714	2.42%	2.42%
2042	5,390	4,880	510	91%	102	38	3,788	2.70%	2.70%
2043	5,479	5,004	475	91%	114	38	3,864	2.94%	2.94%
2044	5,571	5,145	426	92%	124	39	3,941	3.15%	3.15%
2045	5,666	5,303	363	94%	138	40	4,020	3.44%	3.44%
2046	5,764	5,483	281	95%	141	41	4,101	3.44%	3.44%
2047	5,864	5,672	192	97%	144	42	4,183	3.44%	3.44%
2048	5,966	5,870	96	98%	146	43	4,266	3.42%	3.42%
2049	6,068	6,068	-	100%	37	43	4,352	0.84%	0.84%
2050	6,171	6,171	-	100%	37	44	4,439	0.83%	0.83%

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

New active members are assumed to be hired as current active members are assumed to terminate employment or retire.

The total active population is assumed to remain level throughout the entire projection.

Covered payroll is assumed to increase 2% each year throughout the entire projection.

The Board certified contribution rate paid by employers is assumed to be equal to the full actuarially determined contribution rate, except as allowed by House Bill 362 (passed during the 2018 legislative session), which limits the certified contribution rate to a 12% increase over the prior year rate for the period of July 1, 2018 to June 30, 2028.

County Employees Retirement System
CERS Hazardous Insurance Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 1,751	$ 1,476	$ 275	84%	$ 50	$ 3	$ 573	8.73%	8.73%
2022	1,797	1,578	219	88%	40	3	585	6.78%	6.78%
2023	1,836	1,660	176	90%	34	4	597	5.62%	5.62%
2024	1,868	1,731	137	93%	29	4	609	4.71%	4.71%
2025	1,892	1,808	84	96%	24	5	621	3.88%	3.88%
2026	1,912	1,829	83	96%	19	5	633	2.93%	2.93%
2027	1,928	1,840	88	95%	17	5	646	2.68%	2.68%
2028	1,939	1,846	93	95%	16	6	659	2.48%	2.48%
2029	1,945	1,848	97	95%	16	6	672	2.31%	2.31%
2030	1,950	1,846	104	95%	15	6	685	2.18%	2.18%
2031	1,952	1,842	110	94%	15	6	699	2.08%	2.08%
2032	1,952	1,835	117	94%	14	7	713	2.00%	2.00%
2033	1,953	1,828	125	94%	14	7	727	1.94%	1.94%
2034	1,954	1,821	133	93%	14	7	742	1.88%	1.88%
2035	1,956	1,815	141	93%	14	7	757	1.85%	1.85%
2036	1,961	1,810	151	92%	14	8	772	1.82%	1.82%
2037	1,970	1,809	161	92%	14	8	787	1.79%	1.79%
2038	1,983	1,811	172	91%	14	8	803	1.78%	1.78%
2039	1,998	1,814	184	91%	14	8	819	1.75%	1.75%
2040	2,018	1,822	196	90%	20	8	835	2.36%	2.36%
2041	2,041	1,837	204	90%	32	9	852	3.77%	3.77%
2042	2,067	1,867	200	90%	39	9	869	4.45%	4.45%
2043	2,097	1,909	188	91%	44	9	887	4.97%	4.97%
2044	2,130	1,959	171	92%	49	9	904	5.47%	5.47%
2045	2,166	2,018	148	93%	57	9	922	6.14%	6.14%
2046	2,202	2,088	114	95%	58	9	941	6.13%	6.13%
2047	2,240	2,161	79	97%	59	10	960	6.11%	6.11%
2048	2,278	2,238	40	98%	60	10	979	6.11%	6.11%
2049	2,316	2,316	-	100%	16	10	998	1.62%	1.62%
2050	2,354	2,354	-	100%	16	10	1,018	1.61%	1.61%

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

New active members are assumed to be hired as current active members are assumed to terminate employment or retire.

The total active population is assumed to remain level throughout the entire projection.

Covered payroll is assumed to increase 2% each year throughout the entire projection.

The Board certified contribution rate paid by employers is assumed to be equal to the full actuarially determined contribution rate, except as allowed by House Bill 362 (passed during the 2018 legislative session), which limits the certified contribution rate to a 12% increase over the prior year rate for the period of July 1, 2018 to June 30, 2028.

Kentucky Employees Retirement System (KERS)

Actuarial Valuation Report as of June 30, 2021

P: 469.524.0000 | www.grsconsulting.com

December 2, 2021

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

Subject: Actuarial Valuation as of June 30, 2021

Dear Trustees of the Board:

This report describes the current actuarial condition of the Kentucky Employees Retirement System (KERS) and provides the actuarially determined employer contribution rates for fiscal years ending June 30, 2023 and June 30, 2024. In addition, the report analyzes changes in KERS's financial condition and provides various summaries of the data.

Separate reports are issued with regard to valuation results determined in accordance with Governmental Accounting Standards Board (GASB) Statements 67, 68, 74 and 75. Results of this report should not be used for any other purpose without consultation with the undersigned. Valuations are prepared annually as of June 30, the first day of the plan year for KERS. This report was prepared at the request of the Board of Trustees of the Kentucky Retirement System (Board) and is intended for use by the Kentucky Public Pensions Authority (KPPA) staff and those designated or approved by the Board.

Financing Objectives and Funding Policy

The contribution rates determined by these actuarial valuations are intended to become effective twelve months after the valuation date and, as such, are intended to be used by the Board for recommending required contribution rates effective July 1, 2022, as well as the subsequent fiscal year beginning July 1, 2023 and ending June 30, 2024.

The employer contribution is determined in accordance with Section 61.565 of Kentucky Statute. As specified by the Statute, the employer contribution is comprised of a normal cost contribution and an actuarial accrued liability contribution. The actuarial accrued liability contribution is calculated by amortizing the unfunded accrued liability as of June 30, 2019 over a closed 30-year amortization period (28 years remaining as of June 30, 2021). Gains and losses incurring in years after June 30, 2019 are amortized as separate closed 20-year amortization bases.

House Bill 8 passed during the 2021 legislative session and changed how employer contributions are allocated and collected from the participating employers in the KERS Non-Hazardous Fund. Each employer will pay a normal cost contribution on the payroll of their covered employees and contribute to the fund an allocated share of the cost required to amortize the unfunded liability.

Assumptions and Methods

The Board of Trustees, in consultation with the actuary, sets the actuarial assumptions and methods used in the actuarial valuation. Except where noted in this report, the assumptions used in this actuarial valuation were adopted by the Board for first use in the June 30, 2019 actuarial valuation and are based on an experience study conducted with experience through June 30, 2018. There were no changes in actuarial assumptions or methods since the prior valuation.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can, and almost certainly will, differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rate, and funding periods. The actuarial calculations are intended to provide information for rational decision making.

This report was prepared using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

Benefit Provisions

The benefit provisions reflected in these valuations are those which were in effect on June 30, 2021. Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for certain members who become “totally and permanently disabled” in the line of duty or as a result of a duty-related disability. There were no other material benefit provision changes since the prior valuation.

Data

Member data for retired, active and inactive members was supplied as of June 30, 2021, by KPPA staff. The staff also supplied asset information as of June 30, 2021. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent with the prior year's data. GRS is not responsible for the accuracy or completeness of the information provided to us by KPPA.

CERTIFICATION

We certify that the information presented herein is accurate and fairly portrays the actuarial position of KERS as of June 30, 2021.

All of our work conforms with generally accepted actuarial principles and practices, and is in conformity with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of Kentucky Code of Laws and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board.

The undersigned are independent actuaries and consultants. Both of the undersigned are Enrolled Actuaries, Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. Both of the undersigned are experienced in performing valuations for large public retirement systems. This communication shall not be construed to provide tax advice, legal advice or investment advice.

Sincerely,

Gabriel, Roeder, Smith & Company

Daniel J. White, FSA, EA, MAAA	Janie Shaw, ASA, EA, MAAA
Senior Consultant	Consultant

Table of Contents

SECTION 1

EXECUTIVE SUMMARY

Summary of Principal Results

(Dollar amounts expressed in thousands)

	Non-Hazardous		Hazardous		Total	
	June 30, 2021	June 30, 2020	June 30, 2021	June 30, 2020	June 30, 2021	June 30, 2020
Contribution Rate, payable on covered payroll[1]:						
Retirement	7.82%	7.90%	31.82%	33.43%		
Insurance	2.15%	2.20%	0.00%	0.00%		
Total	9.97%	10.10%	31.82%	33.43%	N/A	N/A
Amortization Cost to be allocated amongst employers[2]	$994,422	$1,022,725	N/A	N/A	N/A	N/A
Assets:						
Retirement						
• Actuarial value (AVAR)	$2,735,876	$2,323,298	$782,496	$709,587	$3,518,372	$3,032,885
• Market value (MVAR)	$3,018,660	$2,308,080	$866,140	$690,350	$3,884,800	$2,998,430
• Ratio of actuarial to market value of assets	90.6%	100.7%	90.3%	102.8%	90.6%	101.1%
Insurance						
• Actuarial value (AVAI)	$1,291,472	$1,095,959	$575,025	$539,251	$1,866,497	$1,635,210
• Market value (MVAI)	$1,419,477	$1,060,649	$633,677	$521,755	$2,053,154	$1,582,404
• Ratio of actuarial to market value of assets	91.0%	103.3%	90.7%	103.4%	90.9%	103.3%
Funded Status:						
Retirement						
• Actuarial accrued liability	$16,321,372	$16,348,961	$1,295,243	$1,283,769	$17,616,615	$17,632,730
• Unfunded accrued liability on AVAR	$13,585,496	$14,025,663	$512,747	$574,182	$14,098,243	$14,599,845
• Funded ratio on AVAR	16.8%	14.2%	60.4%	55.3%	20.0%	17.2%
• Unfunded accrued liability on MVAR	$13,302,712	$14,040,881	$429,103	$593,419	$13,731,815	$14,634,300
• Funded ratio on MVAR	18.5%	14.1%	66.9%	53.8%	22.1%	17.0%
Insurance						
• Actuarial accrued liability	$2,574,112	$2,564,788	$424,455	$427,977	$2,998,567	$2,992,765
• Unfunded accrued liability on AVAI	$1,282,640	$1,468,829	($150,570)	($111,274)	$1,132,070	$1,357,555
• Funded ratio on AVAI	50.2%	42.7%	135.5%	126.0%	62.2%	54.6%
• Unfunded accrued liability on MVAI	$1,154,635	$1,504,139	($209,222)	($93,778)	$945,413	$1,410,361
• Funded ratio on MVAI	55.1%	41.4%	149.3%	121.9%	68.5%	52.9%
Membership:						
• Number of						
- Active Members	30,186	31,703	3,827	4,094	34,013	35,797
- Retirees and Beneficiaries	47,700	47,333	4,726	4,628	52,426	51,961
- Inactive Members	54,522	53,499	7,680	6,941	62,202	60,440
- Total	132,408	132,535	16,233	15,663	148,641	148,198
• Projected payroll of active members	$1,349,330	$1,387,761	$162,836	$170,826	$1,512,166	$1,558,587
• Average salary of active members	$44,701	$43,774	$42,549	$41,726	$44,458	$43,540

[1] Reflects contribution rate payable as a percentage of covered payroll. For the non-hazardous fund, this includes the normal cost portion of the contribution requirement only. For the hazardous fund, this includes both the normal cost and unfunded liability portion of the contribution requirement.

[2] Amortization cost shown for the June 30, 2020 valuation excludes amortization cost payable by employers that ceased participation after June 30, 2020.

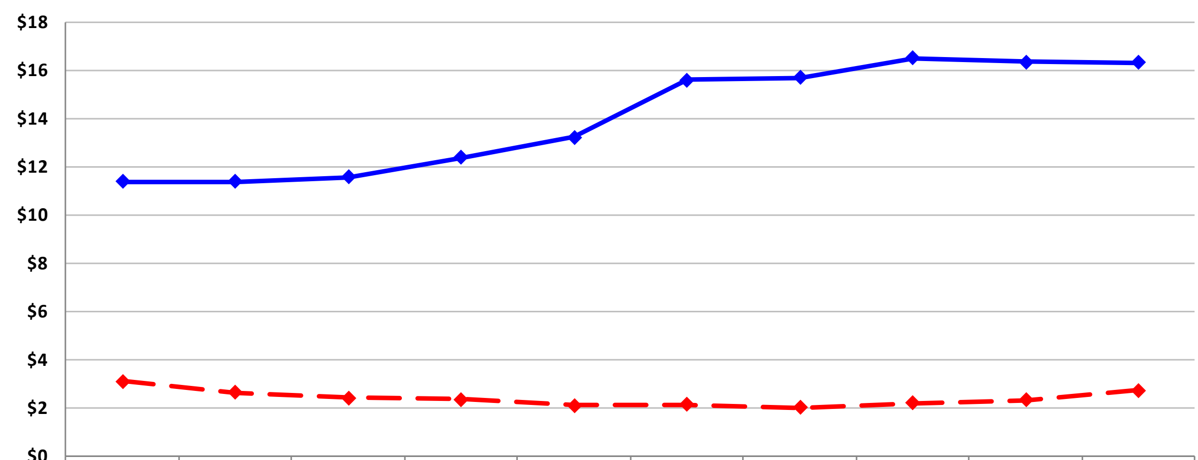
Non-Hazardous Retirement Fund

The unfunded actuarial accrued liability of the non-hazardous retirement fund decreased by $440 million since the prior year's valuation to $13.585 billion. This decrease was approximately $104 million more than expected, primarily due to favorable investment experience in the past year.

For FYE 2021, the non-hazardous retirement fund distributed $1,030 million in benefit payments and administrative expenses, and received $1,224 million in employer and employee contributions. As of June 30, 2021, plan assets for this system were $3,019 million (excluding assets in the 401(h) account). To stabilize the financial condition of this system, it is imperative that contributions to the system continue to exceed the benefit payments.

Below is a chart with the historical actuarial value of assets and actuarial accrued liability. The divergence in the assets and liability over the last ten years has generally been due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return between 2015 and 2017.

History of Actuarial Assets vs. Actuarial Accrued Liability
(Dollars in Billions)



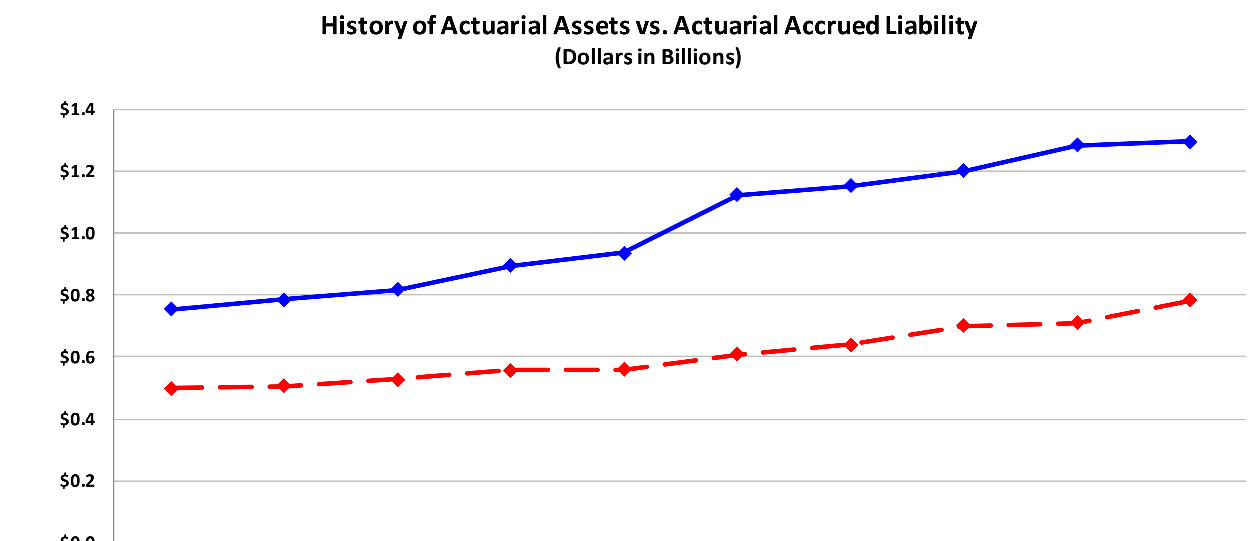
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AAL	11.4	11.4	11.6	12.4	13.2	15.6	15.7	16.5	16.3	16.3
AVA	3.1	2.6	2.4	2.4	2.1	2.1	2.0	2.2	2.3	2.7

Executive Summary (Continued)

Hazardous Retirement Fund

The unfunded actuarial accrued liability of the hazardous retirement fund decreased by $61 million since the prior year's valuation to $513 million. This decrease was approximately $42 million more than expected, primarily due to favorable investment experience in the past year and liability gains due to the mortality experience for retired members and salary experience for active members.

Below is a chart with the historical actuarial value of assets and actuarial accrued liability. The divergence in the assets and liability over the last ten years has generally been due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return between 2015 and 2017.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AAL	0.8	0.8	0.8	0.9	0.9	1.1	1.2	1.2	1.3	1.3
AVA	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.8

Executive Summary (Continued)

Summary of Change in Financial Condition of the Insurance Funds

Both the 2022 non-Medicare and Medicare premiums were lower than expected based on the prior year's actuarial assumptions, which resulted in lower than expected accrued liability for the insurance fund.

Specifically, the non-Medicare premiums were expected to increase by 6.4% from calendar year 2021 to calendar year 2022 (i.e. the medical trend assumption for non-Medicare premiums) and the actual premiums increased by approximately 2.4%. The Medicare premiums were expected to increase by 2.9% from calendar year 2021 to calendar year 2022, which was based on the "Not to Exceed" 2022 Medicare premiums that Humana provided in 2021. Actual Medicare premiums increased by approximately 2.0%.

Non-Hazardous Insurance Fund

Since the prior year's valuation, the unfunded actuarial accrued liability of the non-hazardous insurance fund decreased by $186 million since the prior year's valuation to $1,283 million. This decrease was approximately $116 million more than expected, which includes a $36 million gain due to favorable investment experience and a $39 million gain due to the favorable premium experience. The corresponding funded ratio increased from 42.7% at June 30, 2020 to 50.3% at June 30, 2021.

Hazardous Insurance Fund

Since the prior year's valuation, the plan assets in excess of the actuarial accrued liability of the hazardous insurance fund increased by $39 million since the prior year's valuation to a $151 million surplus. This increase was approximately $38 million more than expected, which includes a $19 million gain due to favorable investment experience and a $8 million gain due to the favorable premium experience. The corresponding funded ratio increased from 126.0% at June 30, 2020 to 135.5% at June 30, 2021.

SECTION 2

DISCUSSION

Discussion

The Kentucky Employees Retirement System (KERS) is a defined benefit pension plan that provides coverage for employees of state government, non-teaching staff at regional state supported universities, local health departments, regional mental health/mental retardation agencies, and other quasi-state agencies. KERS includes both non-hazardous and hazardous duty benefits. This report presents the results of the June 30, 2021 actuarial funding valuation for both the Retirement Funds and Insurance Funds.

The primary purposes of the valuation report are to describe the current actuarial condition of KERS and provide the actuarially determined employer contributions for fiscal years ending June 30, 2023 and June 30, 2024. In addition, the report analyzes changes in KERS's financial condition and provides various summaries of the data.

The actuarially determined contribution consist of two components: a normal cost rate and an amortization cost to finance the unfunded actuarial accrued liability. The normal cost rate is the theoretical amount which would be required to pay the members' benefits, based on the current plan provisions, if this amount had been contributed from each member's entry date and if the fund's experience exactly followed the actuarial assumptions. This is the amount that it should cost to provide the benefits for an average member. Since members contribute to the fund, only the excess of the normal rate over the member contribution rate is included in the employer contribution. The amortization cost is the amount necessary to amortize the unfunded actuarial accrued liability. The payroll growth rate and discount rate assumptions are selected by the Board. The funding period is specified in Section 61.565 of Kentucky Statute.

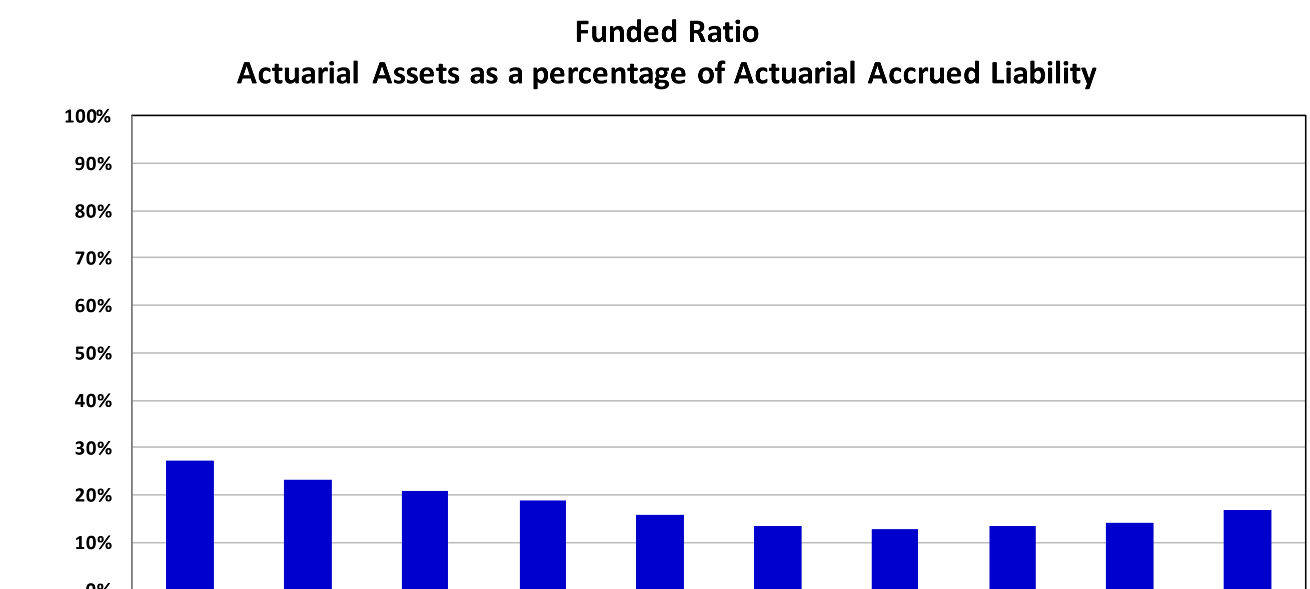
All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides additional details related to the calculation of the amortization of the unfunded actuarial accrued liability. Section 5 provides member data and statistical information. Section 6 provides a discussion of various risk measures, which are intended to aid stakeholders in understanding the effects of future experience differing from the assumptions used in performing an actuarial valuation. Appendices A and B provide summaries of the principle actuarial assumptions and methods and plan provisions. Appendix C provides a glossary of technical terms that are used throughout this report. Finally, Appendix D provides the allocation of the amortization cost amongst KERS Non-Hazardous employers for fiscal year ending June 30, 2023. This appendix was added to the report this year due to the passing of House Bill 8 during the 2021 legislation session, which changed how the amortization cost component of the actuarially determined employer contribution would be collected and allocated to employers.

Funding Progress

The following charts provide a ten-year history of the retirement funds' funded ratio (i.e. the Actuarial Value of Assets divided by the Actuarial Accrued Liability). The decline in the funded ratio over the last ten years has generally been due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return between 2015 and 2017.

The funded ratio increased from 2020 to 2021 for both the non-hazardous and hazardous funds. Assuming the full actuarially determined contributions are paid in future years and absent future unfavorable experience, the funded ratio is expected to continue improving. Also, the dollar amount of the unfunded actuarial accrued liability, or the difference between the actuarial accrued liability and the actuarial value of assets, is also expected to continue decreasing. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the Retirement Funds.

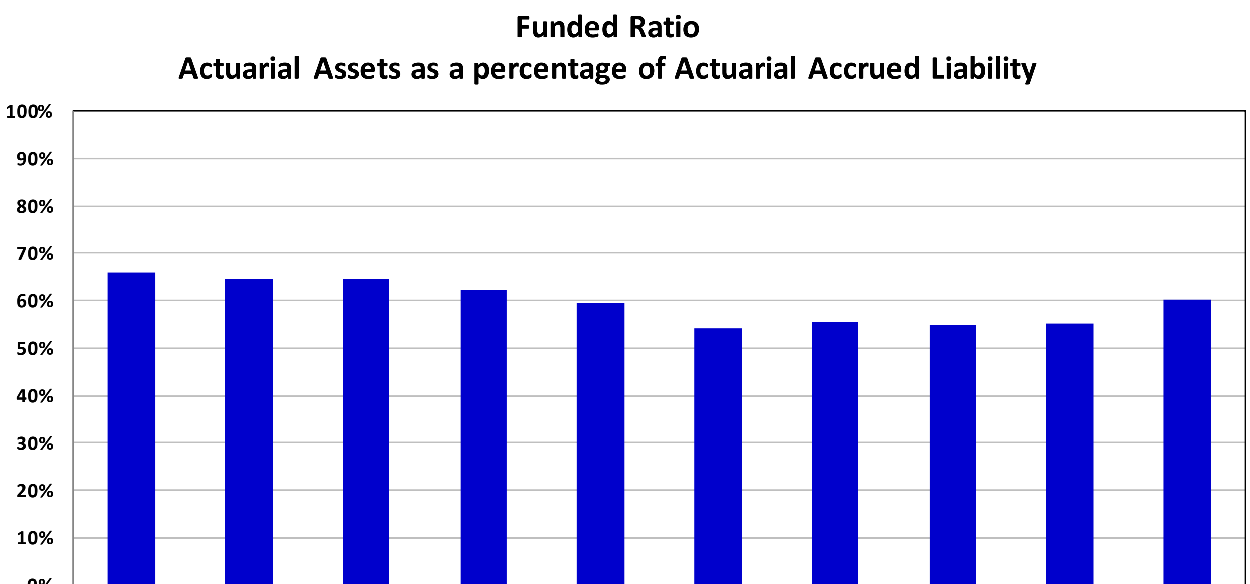
Non-Hazardous Retirement Fund



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Funded Ratio	27.3%	23.2%	21.0%	19.0%	16.0%	13.6%	12.9%	13.4%	14.2%	16.8%

Funding Progress (Continued)

Hazardous Retirement Fund



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Funded Ratio	66.1%	64.5%	64.6%	62.2%	59.7%	54.1%	55.5%	54.8%	55.3%	60.4%

Asset Gains/ (Losses)

The actuarial value of assets ("AVA") is based on a smoothed market value of assets, using a systematic approach to phase-in the difference between the actual and expected investment return on the market value of assets (adjusted for receipts and disbursements during the year). This is appropriate because it dampens the short-term volatility inherent in investment markets. The return is computed net of investment expenses.

Non-Hazardous Retirement Fund

The actuarial value of assets for the retirement fund increased from $2.323 billion to $2.736 billion since the prior valuation. The rate of return on the market value of assets on a dollar-weighted basis for the prior fiscal year was 21.5% which is greater than the 5.25% expected annual return. The return on an actuarial (smoothed) asset value was 9.0%, which resulted in a $91.1 million gain for the fiscal year. This difference in the estimated return on market value and actuarial value illustrates the smoothing effect of the asset valuation method. The market value of assets is $283 million greater than the actuarial value of assets, which signifies that the retirement fund is in a position of deferred gains to be realized in future years.

Hazardous Retirement Fund

Likewise, the actuarial value of assets for the hazardous retirement fund increased from $710 million to $782 million since the prior valuation. The rate of return on the market value of assets on a dollar-weighted basis for the prior fiscal year was 25.0% which is greater than the 6.25% expected annual return. The return on an actuarial (smoothed) asset value was 9.9%, which resulted in a $25.8 million gain for the fiscal year. The market value of assets is $84 million greater than the actuarial value of assets, which signifies that the retirement fund is in a position of deferred gains to be realized in future years.

Table 6 in the following section of this report provides asset information that was included in the annual financial statements of the funds, as well as the estimated yield on a market value basis. Tables 7 and 8 provide the development of the actuarial value of assets and the estimated yield on an actuarial value basis.

Actuarial Gains/ (Losses)

The annual actuarial valuation is a snapshot analysis of the benefit liabilities, assets and funded position of the funds as of the first day of the plan year. In any one fiscal year, the experience can be better or worse from that which is assumed or expected. The actuarial assumptions do not necessarily attempt to model what the experience will be for any one given fiscal year, but instead try to model the overall experience over many years. Therefore, as long as the actual experience of a retirement system is reasonably close to the current assumptions, the long-term funding requirements of the system will remain relatively consistent.

Below are tables that separately show a reconciliation of the unfunded liability since the prior actuarial valuation for the retirement and health insurance funds, which include the effect of asset and liability gains and losses, changes in assumptions, and changes in plan provisions.

Retirement Experience Gain or (Loss)
(Dollar amounts expressed in thousands)

	Non-Hazardous	Hazardous
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	$ 14,025,663	$ 574,182
2. Normal cost and administrative expenses	179,021	28,767
3. Less: contributions for the year	(1,224,433)	(82,161)
4. Interest accrual	708,905	34,218
5. Expected UAAL (Sum of Items 1 - 4)	$ 13,689,156	$ 555,006
6. Actual UAAL as of June 30,2021	$ 13,585,496	$ 512,747
7. Total gain (loss) for the year (Item 5 - Item 6)	$ 103,660	$ 42,259
B. Source of gains and losses		
8. Asset gain (loss) for the year	$ 91,146	$ 25,840
9. Liability experience gain (loss) for the year	14,605	16,445
10. Plan Change	(2,091)	(26)
11. Assumption change	—	—
12. Total	$ 103,660	$ 42,259

The contributions shown above for the non-hazardous fund include $175.6 million in payments made by employers ceasing participation from the fund. The accrued liability was approximately 0.1% and 1.3% less than expected for the non-hazardous and hazardous funds, respectively, resulting in the liability experience gains shown above. This experience for the hazardous fund was primarily due to the mortality experience for retired members and salary experience for active members.

Actuarial Gains/ (Losses) (Continued)

Insurance Experience Gain or (Loss)
(Dollar amounts expressed in thousands)

	Non-Hazardous		Hazardous	
A. Calculation of total actuarial gain or loss				
1. Unfunded actuarial accrued liability (UAAL), previous year	$	1,468,829	$	(111,274)
2. Normal cost and administrative expenses		36,348		7,993
3. Less: contributions for the year		(192,993)		(2,467)
4. Interest accrual		86,907		(6,782)
5. Expected UAAL (Sum of Items 1 - 4)	$	1,399,091	$	(112,530)
6. Actual UAAL as of June 30,2021	$	1,282,640	$	(150,570)
7. Total gain (loss) for the year (Item 5 - Item 6)	$	116,451	$	38,040
B. Source of gains and losses				
8. Asset gain (loss) for the year	$	36,248	$	18,901
9. Liability experience gain (loss) for the year		81,438		19,184
10. Plan Change		(1,235)		(45)
11. Assumption change		—		—
12. Total	$	116,451	$	38,040

The contributions shown above for the non-hazardous fund include $28.4 million in payments made by employers ceasing participation from the fund. The liability experience gains shown above include a $39 million gain for the non-hazardous fund and a $8.4 million gain for the hazardous fund due to the funds' favorable premium experience. See the discussion in the Executive Summary for additional information.

Actuarial Assumptions and Methods

In determining costs and liabilities, actuaries use assumptions about the future, such as rates of salary increase, probabilities of retirement, termination, death and disability, and an annual investment return assumption. The Board of Trustees, in consultation with the actuary, sets the actuarial assumptions and methods used in the actuarial valuation.

In conjunction with the review of the healthcare per capita claims cost, the assumed increase in future healthcare costs, or trend assumption, is reviewed on an annual basis. The trend assumption was last updated at the June 30, 2020 valuation. All other assumptions were adopted by the Board for first use in the June 30, 2019 actuarial valuation and are based on an experience study conducted with experience through June 30, 2018. There were no changes in actuarial assumptions or methods since the prior valuation.

It is our opinion that the assumptions are internally consistent, reasonable, and reflect anticipated future experience of the System. Appendix A includes a summary of the actuarial assumptions and methods used in this valuation.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. This report does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

Benefit Provisions

Appendix B of this report includes a summary of the major benefit provisions for System.

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become “totally and permanently disabled” in the line of duty or as a result of a duty-related disability. The minimum disability benefit increased from 25% of the member’s monthly final rate of pay to 75% of the member’s monthly average pay. The insurance premium for the member, the member’s spouse, and the member’s dependent children shall also be paid in full by the System. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.

There were no other material plan provision changes since the prior valuation.

SECTION 3

ACTUARIAL TABLES

Actuarial Tables

RETIREMENT BENEFITS

ACTUARIAL TABLES

Development of Unfunded Actuarial Accrued Liability
Retirement Benefits

(Dollar amounts expressed in thousands)

		June 30, 2021	
		Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members	$ 1,349,330	$ 162,836
2.	Present value of future pay	$ 10,485,622	$ 1,227,325
3.	Normal cost rate		
	a. Total normal cost rate	11.96%	16.01%
	b. Less: member contribution rate	-5.00%	-8.00%
	c. Employer normal cost rate	6.96%	8.01%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 5,086,196	$ 566,017
	b. Less: present value of future normal costs	(1,190,775)	(187,205)
	c. Actuarial accrued liability	$ 3,895,421	$ 378,812
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 11,736,267	$ 864,939
	b. Inactive members	689,684	51,492
	c. Active members (Item 4c)	3,895,421	378,812
	d. Total	$ 16,321,372	$ 1,295,243
6.	Actuarial value of assets	$ 2,735,876	$ 782,496
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 13,585,496	$ 512,747
8.	Funded Ratio	16.8%	60.4%

Actuarial Present Value of Future Benefits
Retirement Benefits
(Dollar amounts expressed in thousands)

		June 30, 2021	
		Non-Hazardous (1)	Hazardous (2)
1.	Active members		
	a. Service retirement	$ 4,525,329	$ 504,241
	b. Deferred termination benefits and refunds	335,876	39,364
	c. Survivor benefits	69,495	5,208
	d. Disability benefits	155,496	17,204
	e. Total	$ 5,086,196	$ 566,017
2.	Retired members		
	a. Service retirement	$ 10,727,024	$ 794,207
	b. Disability retirement	260,039	17,472
	c. Beneficiaries	749,204	53,260
	d. Total	$ 11,736,267	$ 864,939
3.	Inactive members		
	a. Vested terminations	$ 642,278	$ 40,608
	b. Nonvested terminations	47,406	10,884
	c. Total	$ 689,684	$ 51,492
4.	Total actuarial present value of future benefits	$ 17,512,147	$ 1,482,448

Development of Actuarially Determined Contribution Rate
Retirement Benefits

		June 30, 2021	
		Non-Hazardous (1)	Hazardous (2)
1.	Total normal cost rate		
	a. Service retirement	8.14%	11.38%
	b. Deferred termination benefits and refunds	2.86%	3.62%
	c. Survivor benefits	0.34%	0.30%
	d. Disability benefits	0.62%	0.71%
	e. Total	11.96%	16.01%
2.	Less: member contribution rate	-5.00%	-8.00%
3.	Total employer normal cost rate	6.96%	8.01%
4.	Administrative expenses	0.86%	0.77%
5.	Net employer normal cost rate	7.82%	8.78%
6.	UAAL amortization contribution rate	N/A	23.04%
7.	Total calculated employer contribution payable as a percentage of covered payroll	7.82%	31.82%
8.	Total amortization cost to be allocated amongst employers	$ 906,020	N/A

Note: Per House Bill 8 (passed during the 2021 legislative session), amortization cost for the KERS Non-Hazardous fund is allocated amongst employers based on their 2019 Actuarial Accrued Liability. See appendix D for more information. Amortization cost for the hazardous fund is included in the contribution rate, payable as a percentage of payroll.

Actuarial Balance Sheet

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)

			June 30, 2021 (1)		June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources				
	a. Current assets (actuarial value)	$	2,735,876	$	2,323,298
	b. Present value of future member contributions	$	524,281	$	542,793
	c. Present value of future employer contributions				
	i. Normal cost contributions	$	666,494	$	702,916
	ii. Unfunded accrued liability contributions		13,585,496		14,025,663
	iii. Total future employer contributions	$	14,251,990	$	14,728,579
	d. Total assets	$	17,512,147	$	17,594,670
2.	Liabilities - Present Value of Expected Future Benefit Payments				
	a. Active members				
	i. Present value of future normal costs	$	1,190,775	$	1,245,709
	ii. Accrued liability		3,895,421		3,881,439
	iii. Total present value of future benefits	$	5,086,196	$	5,127,148
	b. Present value of benefits payable on account of current retired members and beneficiaries	$	11,736,267	$	11,810,296
	c. Present value of benefits payable on account of current inactive members	$	689,684	$	657,226
	d. Total liabilities	$	17,512,147	$	17,594,670

Actuarial Balance Sheet

Hazardous Members Retirement

(Dollar amounts expressed in thousands)

		June 30, 2021 (1)		June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources			
	a. Current assets (actuarial value)	$	782,496	$	709,587
	b. Present value of future member contributions	$	98,186	$	102,792
	c. Present value of future employer contributions				
	i. Normal cost contributions	$	89,019	$	95,352
	ii. Unfunded accrued liability contributions		512,747		574,182
	iii. Total future employer contributions	$	601,766	$	669,534
	d. Total assets	$	1,482,448	$	1,481,913
2.	Liabilities - Present Value of Expected Future Benefit Payments				
	a. Active members				
	i. Present value of future normal costs	$	187,205	$	198,144
	ii. Accrued liability		378,812		385,641
	iii. Total present value of future benefits	$	566,017	$	583,785
	b. Present value of benefits payable on account of current retired members and beneficiaries	$	864,939	$	849,773
	c. Present value of benefits payable on account of current inactive members	$	51,492	$	48,355
	d. Total liabilities	$	1,482,448	$	1,481,913

Reconciliation of Retirement Net Assets

(Dollar amounts expressed in thousands)[1]

	Year Ending June 30, 2021 (1) Non-Hazardous		Year Ending June 30, 2021 (2) Hazardous	
1. Value of assets at beginning of year	$	2,308,080	$	690,350
2. Revenue for the year				
a. Contributions				
i. Member contributions	$	90,202	$	19,961
ii. Employer contributions		958,580		62,181
iii. Other contributions (less 401h)		175,652		18
iv. Total	$	1,224,433	$	82,161
b. Income				
i. Interest, dividends, and other income	$	69,710	$	21,559
ii. Investment expenses		(19,080)		(7,617)
iii. Net	$	50,630	$	13,943
c. Net realized and unrealized gains (losses)		465,592		159,210
d. Total revenue	$	1,740,656	$	255,314
3. Expenditures for the year				
a. Disbursements				
i. Refunds	$	8,953	$	4,380
ii. Regular annuity benefits		1,009,502		73,888
iii. Other benefit payments		0		0
iv. Transfers to other systems		0		0
v. Total	$	1,018,454	$	78,268
b. Administrative expenses and depreciation		11,622		1,255
c. Total expenditures	$	1,030,076	$	79,524
4. Increase in net assets (Item 2. - Item 3.)	$	710,580	$	175,791
5. Value of assets at end of year (Item 1. + Item 4.)	$	3,018,660	$	866,140
6. Net external cash flow				
a. Dollar amount	$	194,357	$	2,637
b. Percentage of market value		7.3%		0.3%
7. Estimated annual return on net assets		21.5%		25.0%

[1] Amounts may not add due to rounding

[1] Excludes 401h assets

Development of Actuarial Value of Assets

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	2,323,298
2.	Market value of assets at beginning of year	$	2,308,080
3.	Net new investments		
	a. Contributions	$	1,224,433
	b. Benefit payments		(1,018,454)
	c. Administrative expenses		(11,622)
	d. Subtotal	$	194,357
4.	Market value of assets at end of year	$	3,018,660
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	516,223
6.	Assumed investment return rate for fiscal year		5.25%
7.	Expected return for immediate recognition	$	126,276
8.	Excess return for phased recognition	$	389,946

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	389,946	$	77,989
b.	2020		(65,343)		(13,069)
c.	2019		4,070		814
d.	2018		42,022		8,404
e.	2017		89,028		17,806
f.	Total			$	91,945

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	2,735,876
11.	Ratio of actuarial value to market value		90.6%
12.	Estimated annual return on actuarial value of assets		9.0%

* Amounts may not add due to rounding

Development of Actuarial Value of Assets

Hazardous Members Retirement

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	709,587
2.	Market value of assets at beginning of year	$	690,350
3.	Net new investments		
	a. Contributions	$	82,161
	b. Benefit payments		(78,268)
	c. Administrative expenses		(1,255)
	d. Subtotal	$	2,637
4.	Market value of assets at end of year	$	866,140
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	173,153
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	43,229
8.	Excess return for phased recognition	$	129,924

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	129,924	$	25,985
b.	2020		(35,903)		(7,181)
c.	2019		(3,933)		(787)
d.	2018		14,102		2,820
e.	2017		31,023		6,205
f.	Total			$	27,043

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	782,496
11.	Ratio of actuarial value to market value		90.3%
12.	Estimated annual return on actuarial value of assets		9.9%

* Amounts may not add due to rounding

Schedule of Funding Progress

Retirement Benefits

(Dollar amounts expressed in thousands)

June 30, (1)	Actuarial Value of Assets (AVA) (2)	Actuarial Accrued Liability (AAL) (3)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2) (4)	Funded Ratio (2)/(3) (5)	Annual Covered Payroll (6)	UAAL as % of Payroll (4)/(6) (7)
			Non-Hazardous Members			
2012	$ 3,101,317	$ 11,361,048	$ 8,259,731	27.3%	$ 1,644,897	502.1%
2013	2,636,123	11,386,602	8,750,479	23.2%	1,644,409	532.1%
2014	2,423,957	11,550,110	9,126,153	21.0%	1,577,496	578.5%
2015	2,350,990	12,359,673	10,008,683	19.0%	1,544,234	648.1%
2016	2,112,286	13,224,698	11,112,412	16.0%	1,529,249	726.7%
2017	2,123,623	15,591,641	13,468,018	13.6%	1,531,535	879.4%
2018	2,019,278	15,675,232	13,655,954	12.9%	1,471,477	928.0%
2019	2,206,280	16,466,428	14,260,148	13.4%	1,437,647	991.9%
2020	2,323,298	16,348,961	14,025,663	14.2%	1,387,761	1010.7%
2021	2,735,876	16,321,372	13,585,496	16.8%	1,349,330	1006.8%
			Hazardous Members			
2012	$ 497,226	$ 752,699	$ 255,473	66.1%	$ 131,977	193.6%
2013	505,657	783,981	278,324	64.5%	132,015	210.8%
2014	527,897	816,850	288,953	64.6%	129,076	223.9%
2015	556,688	895,433	338,745	62.2%	128,680	263.2%
2016	559,487	936,706	377,219	59.7%	147,563	255.6%
2017	607,159	1,121,420	514,261	54.1%	162,418	316.6%
2018	639,262	1,151,923	512,661	55.5%	158,213	324.0%
2019	671,647	1,226,195	554,548	54.8%	150,446	368.6%
2020	709,587	1,283,769	574,182	55.3%	170,826	336.1%
2021	782,496	1,295,243	512,747	60.4%	162,836	314.9%
			Total KERS Members			
2012	$ 3,598,543	$ 12,113,747	$ 8,515,204	29.7%	$ 1,776,874	479.2%
2013	3,141,780	12,170,583	9,028,803	25.8%	1,776,424	508.3%
2014	2,951,854	12,366,960	9,415,106	23.9%	1,706,572	551.7%
2015	2,907,678	13,255,106	10,347,428	21.9%	1,672,914	618.5%
2016	2,671,773	14,161,404	11,489,631	18.9%	1,676,812	685.2%
2017	2,730,782	16,713,061	13,982,279	16.3%	1,693,953	825.4%
2018	2,658,540	16,827,155	14,168,615	15.8%	1,629,690	869.4%
2019	2,877,927	17,692,623	14,814,696	16.3%	1,588,093	932.9%
2020	3,032,885	17,632,730	14,599,845	17.2%	1,558,587	936.7%
2021	3,518,372	17,616,615	14,098,243	20.0%	1,512,166	932.3%

Summary of Principal Assumptions and Methods

Below is a summary of the principal economic assumptions, cost method, and the method for financing the unfunded actuarial accrued liability:

	Non-Hazardous	Hazardous
Valuation date:	June 30, 2021	June 30, 2021
Actuarial cost method:	Entry Age Normal	Entry Age Normal
Amortization method:	Level percentage of payroll (0% payroll growth assumed)	Level percentage of payroll (0% payroll growth assumed)
Amortization period for contribution rate:	30-year closed period at June 30, 2019 Gains/losses incurring after 2019 will be amortized over separate closed 20-year amortization bases	30-year closed period at June 30, 2019 Gains/losses incurring after 2019 will be amortized over separate closed 20-year amortization bases
Asset valuation method:	5-Year Smoothed Market	5-Year Smoothed Market
Actuarial assumptions:		
Investment rate of return	5.25%	6.25%
Projected salary increases	3.30% to 15.30% (varies by service)	3.55% to 20.05% (varies by service)
Inflation	2.30%	2.30%
Post-retirement benefit adjustments	0.00%	0.00%
Retiree Mortality	System-specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2019.	System-specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2019.

Solvency Test
Retirement Benefits
(Dollar amounts expressed in thousands)

June 30,	Actuarial Accrued Liability: Active Member Contributions	Retired Members & Beneficiaries	Active Members (Employer Financed)	Valuation Assets	Portion of Aggregate Accrued Liabilities Covered by Assets: Active	Retired	ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Non-Hazardous Members				
2012	$ 885,137	$ 8,708,536	$ 1,767,375	$ 3,101,317	100.0%	25.4%	0.0%
2013	922,928	8,709,324	1,754,351	2,636,123	100.0%	19.7%	0.0%
2014	928,558	8,870,693	1,750,860	2,423,957	100.0%	16.9%	0.0%
2015	925,934	9,437,468	1,996,271	2,350,990	100.0%	15.1%	0.0%
2016	920,120	10,010,168	2,294,410	2,112,286	100.0%	11.9%	0.0%
2017	934,559	11,608,346	3,048,736	2,123,623	100.0%	10.2%	0.0%
2018	892,033	11,929,019	2,854,180	2,019,278	100.0%	9.4%	0.0%
2019	881,020	12,513,231	3,072,177	2,206,280	100.0%	10.6%	0.0%
2020	869,196	12,467,522	3,012,243	2,323,298	100.0%	11.7%	0.0%
2021	877,142	12,425,951	3,018,279	2,735,876	100.0%	15.0%	0.0%
			Hazardous Members				
2012	$ 82,101	$ 521,689	$ 148,910	$ 497,226	100.0%	79.6%	0.0%
2013	82,146	545,597	156,238	505,657	100.0%	77.6%	0.0%
2014	83,664	581,231	151,955	527,897	100.0%	76.4%	0.0%
2015	83,606	633,189	178,638	556,688	100.0%	74.7%	0.0%
2016	86,705	648,482	201,519	559,487	100.0%	72.9%	0.0%
2017	93,350	746,350	281,720	607,159	100.0%	68.8%	0.0%
2018	89,106	810,311	252,506	639,262	100.0%	67.9%	0.0%
2019	86,663	879,818	259,714	671,647	100.0%	66.5%	0.0%
2020	95,528	898,128	290,113	709,587	100.0%	68.4%	0.0%
2021	97,559	916,431	281,253	782,496	100.0%	74.7%	0.0%

INSURANCE BENEFITS

ACTUARIAL TABLES

Development of Unfunded Actuarial Accrued Liability
Insurance Benefits

(Dollar amounts expressed in thousands)

		June 30, 2021	
		Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members	$ 1,349,330	$ 162,836
2.	Present value of future pay	$ 9,758,517	$ 1,224,582
3.	Normal cost rate		
	a. Total normal cost rate	2.54%	4.46%
	b. Less: member contribution rate	-0.45%	-0.66%
	c. Employer normal cost rate	2.09%	3.80%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 1,186,423	$ 182,132
	b. Less: present value of future normal costs	(222,086)	(45,691)
	c. Actuarial accrued liability	$ 964,337	$ 136,441
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 1,461,617	$ 276,981
	b. Inactive members	148,158	11,033
	c. Active members (Item 4c)	964,337	136,441
	d. Total	$ 2,574,112	$ 424,455
6.	Actuarial value of assets	$ 1,291,472	$ 575,025
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 1,282,640	$ (150,570)
8.	Funded Ratio	50.2%	135.5%

Development of Actuarially Determined Contribution Rate
Insurance Benefits

		June 30, 2021	
		Non-Hazardous (1)	Hazardous (2)
1.	Total normal cost rate	2.54%	4.46%
2.	Less: member contribution rate	-0.45%	-0.66%
3.	Total employer normal cost rate	2.09%	3.80%
4.	Administrative expenses	0.06%	0.07%
5.	Net employer normal cost rate	2.15%	3.87%
6.	UAAL amortization contribution rate	N/A	-7.59%
7.	Total calculated employer contribution payable as a percentage of covered payroll Max (0%, item 5. + item6.)	2.15%	0.00%
8.	Total amortization cost to be allocated amongst employers	$ 88,402	N/A

Note: Per House Bill 8 (passed during the 2021 legislative session), amortization cost for the KERS Non-Hazardous fund is allocated amongst employers based on their 2019 Actuarial Accrued Liability. See appendix D for more information. Amortization cost for the hazardous fund is included in the contribution rate, payable as a percentage of payroll.

Actuarial Balance Sheet

Non-Hazardous Members Insurance

(Dollar amounts expressed in thousands)

		June 30, 2021 (1)	June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources		
a.	Current assets (actuarial value)	$ 1,291,472	$ 1,095,959
b.	Present value of future member contributions	$ 54,640	$ 53,935
c.	Present value of future employer contributions		
	i. Normal cost contributions	$ 167,446	$ 182,067
	ii. Unfunded accrued liability contributions	1,282,640	1,468,829
	iii. Total future employer contributions	$ 1,450,086	$ 1,650,896
d.	Total assets	$ 2,796,198	$ 2,800,790
2.	Liabilities - Present Value of Expected Future Benefit Payments		
a.	Active members		
	i. Present value of future normal costs	$ 222,086	$ 236,002
	ii. Accrued liability	964,337	975,045
	iii. Total present value of future benefits	$ 1,186,423	$ 1,211,047
b.	Present value of benefits payable on account of current retired members and beneficiaries	$ 1,461,617	$ 1,445,401
c.	Present value of benefits payable on account of current inactive members	$ 148,158	$ 144,342
d.	Total liabilities	$ 2,796,198	$ 2,800,790

Actuarial Balance Sheet

Hazardous Members Insurance

(Dollar amounts expressed in thousands)

		June 30, 2021 (1)	June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources		
a.	Current assets (actuarial value)	$ 575,025	$ 539,251
b.	Present value of future member contributions	$ 9,821	$ 9,956
c.	Present value of future employer contributions		
	i. Normal cost contributions	$ 35,870	$ 38,918
	ii. Unfunded accrued liability contributions	(150,570)	(111,274)
	iii. Total future employer contributions	$ (114,700)	$ (72,356)
d.	Total assets	$ 470,146	$ 476,851
2.	Liabilities - Present Value of Expected Future Benefit Payments		
a.	Active members		
	i. Present value of future normal costs	$ 45,691	$ 48,874
	ii. Accrued liability	136,441	146,053
	iii. Total present value of future benefits	$ 182,132	$ 194,927
b.	Present value of benefits payable on account of current retired members and beneficiaries	$ 276,981	$ 271,249
c.	Present value of benefits payable on account of current inactive members	$ 11,033	$ 10,675
d.	Total liabilities	$ 470,146	$ 476,851

Reconciliation of Insurance Net Assets

(Dollar amounts expressed in thousands)[1]

	Year Ending June 30, 2021 (1) Non-Hazardous	Year Ending June 30, 2021 (2) Hazardous
1. Value of assets at beginning of year	$ 1,060,649	$ 521,755
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 6,318	$ 1,167
ii. Employer contributions	153,570	23
iii. Other contributions (less 401h)	33,105	1,277
iv. Total	$ 192,993	$ 2,467
b. Income		
i. Interest, dividends, and other income	$ 29,358	$ 15,205
ii. Investment expenses	(10,880)	(6,832)
iii. Net	$ 18,478	$ 8,373
c. Net realized and unrealized gains (losses)	252,333	119,870
d. Total revenue	$ 463,805	$ 130,710
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 0	$ 0
ii. Healthcare premium subsidies	119,897	19,800
iii. Other benefit payments[2]	(15,740)	(1,129)
iv. Transfers to other systems	0	0
v. Total	$ 104,157	$ 18,670
b. Administrative expenses and depreciation	819	118
c. Total expenditures	$ 104,976	$ 18,788
4. Increase in net assets (Item 2. - Item 3.)	$ 358,829	$ 111,922
5. Value of assets at end of year (Item 1. + Item 4.)	$ 1,419,477	$ 633,677
6. Net external cash flow		
a. Dollar amount	$ 88,017	$ (16,321)
b. Percentage of market value	7.1%	-2.8%
7. Estimated annual return on net assets	24.5%	25.0%

[1] Amounts may not add due to rounding and include 401h assets

[2] Benefit payments have been offset by Medicare Drug Reimbursements, Insurance Premiums, and Humana Gain Share Payments

Development of Actuarial Value of Assets

Non-Hazardous Members Insurance

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	1,095,959
2.	Market value of assets at beginning of year	$	1,060,649
3.	Net new investments		
	a. Contributions	$	192,993
	b. Benefit payments		(104,157)
	c. Administrative expenses		(819)
	d. Subtotal	$	88,017
4.	Market value of assets at end of year	$	1,419,477
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	270,811
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	69,041
8.	Excess return for phased recognition	$	201,770

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	201,770	$	40,354
b.	2020		(52,052)		(10,410)
c.	2019		(11,768)		(2,354)
d.	2018		12,636		2,527
e.	2017		41,687		8,337
f.	Total			$	38,455

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	1,291,472
11.	Ratio of actuarial value to market value		91.0%
12.	Estimated annual return on actuarial value of assets		9.4%

* Amounts may not add due to rounding

Development of Actuarial Value of Assets

Hazardous Members Insurance

(Dollar amounts expressed in thousands)*

Year Ending		June 30, 2021
1. Actuarial value of assets at beginning of year	$	539,251
2. Market value of assets at beginning of year	$	521,755
3. Net new investments		
a. Contributions	$	2,467
b. Benefit payments		(18,670)
c. Administrative expenses		(118)
d. Subtotal	$	(16,321)
4. Market value of assets at end of year	$	633,677
5. Net earnings (Item 4. - Item 2. - Item 3.d.)	$	128,243
6. Assumed investment return rate for fiscal year		6.25%
7. Expected return for immediate recognition	$	32,100
8. Excess return for phased recognition	$	96,144

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	96,144	$	19,229
b.	2020		(32,268)		(6,454)
c.	2019		(3,651)		(730)
d.	2018		12,794		2,559
e.	2017		26,956		5,391
f.	Total			$	19,995

10. Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	575,025
11. Ratio of actuarial value to market value		90.7%
12. Estimated annual return on actuarial value of assets		9.8%

* Amounts may not add due to rounding

Schedule of Funding Progress
Insurance Benefits
(Dollar amounts expressed in thousands)

June 30,	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annual Covered Payroll	UAAL as % of Payroll (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Non-Hazardous Members			
2012	$ 446,081	$ 3,125,330	$ 2,679,249	14.3%	$ 1,644,897	162.9%
2013	497,584	2,128,754	1,631,170	23.4%	1,644,409	99.2%
2014	621,237	2,226,760	1,605,523	27.9%	1,577,496	101.8%
2015	695,018	2,413,705	1,718,687	28.8%	1,544,234	111.3%
2016	743,270	2,456,678	1,713,408	30.3%	1,529,249	112.0%
2017	823,918	2,683,496	1,859,578	30.7%	1,531,535	121.4%
2018	887,121	2,435,505	1,548,384	36.4%	1,471,477	105.2%
2019	991,427	2,733,065	1,741,638	36.3%	1,437,647	121.1%
2020	1,095,959	2,564,788	1,468,829	42.7%	1,387,761	105.8%
2021	1,291,472	2,574,112	1,282,640	50.2%	1,349,330	95.1%
			Hazardous Members			
2012	$ 345,574	$ 384,592	$ 39,018	89.9%	$ 131,977	29.6%
2013	370,774	385,518	14,744	96.2%	132,015	11.2%
2014	419,396	396,987	(22,409)	105.6%	129,076	-17.4%
2015	451,514	374,904	(76,610)	120.4%	128,680	-59.5%
2016	473,160	377,745	(95,415)	125.3%	147,563	-64.7%
2017	493,458	419,439	(74,019)	117.6%	162,418	-45.6%
2018	511,441	393,481	(117,960)	130.0%	158,213	-74.6%
2019	525,315	426,704	(98,611)	123.1%	150,446	-65.5%
2020	539,251	427,977	(111,274)	126.0%	170,826	-65.1%
2021	575,025	424,455	(150,570)	135.5%	162,836	-92.5%
			Total KERS Members			
2012	$ 791,655	$ 3,509,922	$ 2,718,267	22.6%	$ 1,776,874	153.0%
2013	868,358	2,514,272	1,645,914	34.5%	1,776,424	92.7%
2014	1,040,633	2,623,747	1,583,114	39.7%	1,706,572	92.8%
2015	1,146,532	2,788,609	1,642,077	41.1%	1,672,914	98.2%
2016	1,216,430	2,834,423	1,617,993	42.9%	1,676,812	96.5%
2017	1,317,376	3,102,935	1,785,559	42.5%	1,693,953	105.4%
2018	1,398,562	2,828,986	1,430,424	49.4%	1,629,690	87.8%
2019	1,516,742	3,159,769	1,643,027	48.0%	1,588,093	103.5%
2020	1,635,210	2,992,765	1,357,555	54.6%	1,558,587	87.1%
2021	1,866,497	2,998,567	1,132,070	62.2%	1,512,166	74.9%

Solvency Test
Insurance Benefits
(Dollar amounts expressed in thousands)

June 30,	Actuarial Accrued Liability: Active Member Contributions	Actuarial Accrued Liability: Retired Members & Beneficiaries	Actuarial Accrued Liability: Active Members (Employer Financed)	Valuation Assets	Portion of Aggregate Accrued Liabilities Covered by Assets: Active	Retired	ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-Hazardous Members							
2012	$ -	$ 1,924,069	$ 1,201,262	$ 446,081	100.0%	23.2%	0.0%
2013	-	1,338,773	789,981	497,584	100.0%	37.2%	0.0%
2014	-	1,425,605	801,155	621,237	100.0%	43.6%	0.0%
2015	-	1,428,350	985,355	695,018	100.0%	48.7%	0.0%
2016	-	1,483,636	973,042	743,270	100.0%	50.1%	0.0%
2017	-	1,575,294	1,108,202	823,918	100.0%	52.3%	0.0%
2018	-	1,475,953	959,552	887,121	100.0%	60.1%	0.0%
2019	-	1,686,604	1,046,461	991,427	100.0%	58.8%	0.0%
2020	-	1,589,743	975,045	1,095,959	100.0%	68.9%	0.0%
2021	-	1,609,775	964,337	1,291,472	100.0%	80.2%	0.0%
Hazardous Members							
2012	$ -	$ 196,579	$ 188,013	$ 345,574	100.0%	100.0%	79.2%
2013	-	202,032	183,486	370,774	100.0%	100.0%	92.0%
2014	-	206,477	190,509	419,396	100.0%	100.0%	100.0%
2015	-	221,115	153,789	451,514	100.0%	100.0%	100.0%
2016	-	228,361	149,384	473,160	100.0%	100.0%	100.0%
2017	-	243,816	175,623	493,458	100.0%	100.0%	100.0%
2018	-	248,775	144,706	511,441	100.0%	100.0%	100.0%
2019	-	282,069	144,635	525,315	100.0%	100.0%	100.0%
2020	-	281,924	146,053	539,251	100.0%	100.0%	100.0%
2021	-	288,014	136,441	575,025	100.0%	100.0%	100.0%

SECTION 4

AMORTIZATION BASES

Amortization of Unfunded Liability

Non-Hazardous Members Retirement

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 14,260,148	$ 13,960,514	$ 938,364	28
June 30, 2020	(153,145)	(32,895)	(2,708)	19
June 30, 2021	(342,123)	(342,123)	(29,636)	20
Total		$ 13,585,496	$ 906,020	

Projected Payroll for FYE 2023	N/A
Amortization Payments as a Percentage of Payroll	N/A

Hazardous Members Retirement

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 554,548	$ 542,997	$ 40,306	28
June 30, 2020	24,023	19,248	1,706	19
June 30, 2021	(49,498)	(49,498)	(4,491)	20
Total		$ 512,747	$ 37,521	

Projected Payroll for FYE 2023	$ 162,836
Amortization Payments as a Percentage of Payroll	23.04%

Note:
Budgeted contribution rates for FYE 2022 were known at the time of the June 30, 2021 Valuation.
Amortization bases established at this valuation date were adjusted accordingly.
Per House Bill 8 (passed during the 2021 legislative session), amortization cost for the KERS Non-Hazardous fund is allocated amongst employers based on their 2019 Actuarial Accrued Liability. See appendix D for more information. Amortization cost for the hazardous fund is included in the contribution rate, payable as a percentage of payroll.

Amortization of Unfunded Liability

Non-Hazardous Members Insurance

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 1,741,638	$ 1,693,386	$ 125,697	28
June 30, 2020	(246,890)	(251,598)	(22,305)	19
June 30, 2021	(159,148)	(159,148)	(14,990)	20
Total		$ 1,282,640	$ 88,402	

Projected Payroll for FYE 2023	N/A
Amortization Payments as a Percentage of Payroll	N/A

Hazardous Members Insurance

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ (98,611)	$ (100,442)	$ (7,456)	28
June 30, 2020	(9,508)	(10,670)	(946)	19
June 30, 2021	(39,458)	(39,458)	(3,911)	20
Total		$ (150,570)	$ (12,313)	

Projected Payroll for FYE 2023	$ 162,117
Amortization Payments as a Percentage of Payroll	-7.59%

Note:
Budgeted contribution rates for FYE 2022 were known at the time of the June 30, 2021 Valuation. Amortization bases established at this valuation date were adjusted accordingly.
Per House Bill 8 (passed during the 2021 legislative session), amortization cost for the KERS Non-Hazardous fund is allocated amongst employers based on their 2019 Actuarial Accrued Liability. See appendix D for more information. Amortization cost for the hazardous fund is included in the contribution rate, payable as a percentage of payroll.

SECTION 5

MEMBERSHIP INFORMATION

Membership Tables

Summary of Membership Data
(Total dollar amounts expressed in thousands)

		Non-Hazardous June 30, 2021 (1)	Hazardous June 30, 2021 (2)	Total June 30, 2021 (3)	Total June 30, 2020 (4)
1.	Active members				
a.	Males	11,586	2,627	14,213	14,993
b.	Females	18,600	1,200	19,800	20,804
c.	Total members	30,186	3,827	34,013	35,797
d.	Total annualized prior year salaries	$ 1,349,330	$ 162,836	$ 1,512,165	$ 1,558,587
e.	Average salary[2]	$ 44,701	$ 42,549	$ 44,458	$ 43,540
f.	Average age	46.0	40.1	45.4	45.0
g.	Average service	11.6	7.7	11.2	10.8
h.	Member contributions with interest	$ 877,142	$ 97,559	$ 974,701	$ 964,724
i.	Average contributions with interest[2]	$ 29,058	$ 25,492	$ 28,657	$ 26,950
2.	Vested inactive members[1]				
a.	Number	31,661	2,192	33,853	34,030
b.	Total annual deferred benefits	$ 88,519	$ 4,662	$ 93,181	$ 91,158
c.	Average annual deferred benefit[2]	$ 2,796	$ 2,127	$ 2,753	$ 2,679
d.	Average age at the valuation date	52.5	47.9	52.2	51.6
3.	Nonvested inactive members[1]				
a.	Number	22,861	5,488	28,349	26,410
b.	Total member contributions with interest	$ 45,703	$ 10,777	$ 56,480	$ 48,829
c.	Average contributions with interest[2]	$ 1,999	$ 1,964	$ 1,992	$ 1,849
4.	Service retirees				
a.	Number	40,846	4,061	44,907	44,532
b.	Total annual benefits	$ 871,149	$ 64,134	$ 935,283	$ 932,062
c.	Average annual benefit[2]	$ 21,328	$ 15,793	$ 20,827	$ 20,930
d.	Average age at the valuation date	70.0	65.4	69.6	69.2
5.	Disabled retirees				
a.	Number	1,777	154	1,931	1,989
b.	Total annual benefits	$ 23,555	$ 1,488	$ 25,043	$ 25,791
c.	Average annual benefit[2]	$ 13,255	$ 9,662	$ 12,969	$ 12,967
d.	Average age at the valuation date	66.5	60.4	66.0	65.6
6.	Beneficiaries				
a.	Number	5,077	511	5,588	5,440
b.	Total annual benefits	$ 77,730	$ 5,181	$ 82,911	$ 79,192
c.	Average annual benefit[2]	$ 15,310	$ 10,139	$ 14,837	$ 14,557
d.	Average age at the valuation date	70.5	66.7	70.1	70.1

[1] Vested inactive member section includes Tier 1 members eligible for a benefit equal to the actuarially equivalent of two times the member's contribution balance.

[2] Average dollar amounts shown are expressed to the dollar.

Summary of Historical Active Membership

June 30,	Active Members: Number	Active Members: Percent Increase /(Decrease)	Covered Payroll[1]: Amount in Thousands	Covered Payroll[1]: Percent Increase /(Decrease)	Average Annual Pay: Amount	Average Annual Pay: Percent Increase /(Decrease)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous Members						
2012	42,196		$ 1,644,897		$ 38,982	
2013	42,226	0.1%	1,644,409	0.0%	38,943	-0.1%
2014	40,365	-4.4%	1,577,496	-4.1%	39,081	0.4%
2015	39,056	-3.2%	1,544,234	-2.1%	39,539	1.2%
2016	37,779	-3.3%	1,529,249	-1.0%	40,479	2.4%
2017	37,234	-1.4%	1,531,535	0.1%	41,133	1.6%
2018	35,139	-5.6%	1,471,477	-3.9%	41,876	1.8%
2019	33,696	-4.1%	1,437,647	-2.3%	42,665	1.9%
2020	31,703	-5.9%	1,387,761	-3.5%	43,774	2.6%
2021	30,186	-4.8%	1,349,330	-2.8%	44,701	2.1%
Hazardous Members						
2012	4,086		$ 131,977		$ 32,300	
2013	4,127	1.0%	132,015	0.0%	31,988	-1.0%
2014	4,024	-2.5%	129,076	-2.2%	32,077	0.3%
2015	3,886	-3.4%	128,680	-0.3%	33,114	3.2%
2016	3,959	1.9%	147,563	14.7%	37,273	12.6%
2017	4,047	2.2%	162,418	10.1%	40,133	7.7%
2018	3,929	-2.9%	158,213	-2.6%	40,268	0.3%
2019	3,705	-5.7%	150,446	-4.9%	40,606	0.8%
2020	4,094	10.5%	170,826	13.5%	41,726	2.8%
2021	3,827	-6.5%	162,836	-4.7%	42,549	2.0%

[1] Covered payroll is the annualized, projected compensation for the following year and does not include payroll attributable to working retirees.

Distribution of Active Members by Age and by Years of Service

Non-Hazardous Members

Years of Credited Service

Attained Age	0 Count & Avg. Comp.	1 Count & Avg. Comp.	2 Count & Avg. Comp.	3 Count & Avg. Comp.	4 Count & Avg. Comp.	5-9 Count & Avg. Comp.	10-14 Count & Avg. Comp.	15-19 Count & Avg. Comp.	20-24 Count & Avg. Comp.	25-29 Count & Avg. Comp.	30-34 Count & Avg. Comp.	35 & Over Count & Avg. Comp.	Total Count & Avg. Comp.
Under 20	8	1	0	0	0	0	0	0	0	0	0	0	9
	$21,876	$17,917	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,436
20-24	325	196	102	26	15	5	0	0	0	0	0	0	669
	$24,712	$31,733	$32,576	$31,931	$34,219	$42,641	$0	$0	$0	$0	$0	$0	$28,596
25-29	397	482	389	284	213	339	7	0	0	0	0	0	2,111
	$27,294	$34,303	$35,356	$36,440	$37,957	$38,973	$43,380	$0	$0	$0	$0	$0	$34,615
30-34	225	288	272	260	304	1,163	228	2	0	0	0	0	2,742
	$29,488	$35,790	$36,905	$39,452	$38,872	$41,914	$43,950	$62,616	$0	$0	$0	$0	$39,368
35-39	204	258	251	229	216	1,091	1,010	277	19	0	0	0	3,555
	$27,922	$38,614	$37,894	$39,155	$39,955	$44,131	$47,103	$48,595	$49,573	$0	$0	$0	$43,007
40-44	195	247	213	155	167	873	1,010	1,080	497	44	0	0	4,481
	$29,089	$37,324	$39,380	$41,044	$41,817	$44,704	$48,424	$50,204	$49,953	$53,678	$0	$0	$45,965
45-49	148	197	189	165	147	725	777	880	1,037	284	16	0	4,565
	$28,585	$38,563	$40,292	$39,992	$41,023	$41,613	$46,877	$51,410	$53,501	$58,636	$77,201	$0	$47,595
50-54	133	144	172	126	154	710	682	740	912	500	90	9	4,372
	$31,565	$39,189	$38,539	$36,572	$38,895	$42,678	$46,643	$51,124	$50,545	$58,230	$59,254	$56,129	$47,590
55-59	90	148	124	97	104	541	629	667	648	365	116	43	3,572
	$32,028	$36,953	$37,037	$42,901	$38,135	$41,066	$45,824	$47,282	$52,202	$56,683	$65,344	$68,581	$47,227
60-64	45	66	72	89	87	391	522	564	509	221	81	39	2,686
	$33,094	$50,858	$41,108	$38,311	$38,945	$41,688	$45,113	$46,493	$50,068	$52,427	$58,537	$67,749	$46,586
65 & Over	18	29	19	41	49	220	317	319	218	97	47	50	1,424
	$35,272	$59,583	$47,201	$47,023	$44,439	$44,722	$47,610	$48,331	$52,492	$54,974	$62,131	$71,236	$49,840
Total	1,788	2,056	1,803	1,472	1,456	6,058	5,182	4,529	3,840	1,511	350	141	30,186
	$28,233	$36,992	$37,552	$39,043	$39,547	$42,617	$46,798	$49,471	$51,589	$56,742	$62,313	$68,497	$44,701

Distribution of Active Members by Age and by Years of Service
Hazardous Members

Attained Age	0 Count & Avg. Comp.	1 Count & Avg. Comp.	2 Count & Avg. Comp.	3 Count & Avg. Comp.	4 Count & Avg. Comp.	5-9 Count & Avg. Comp.	10-14 Count & Avg. Comp.	15-19 Count & Avg. Comp.	20-24 Count & Avg. Comp.	25-29 Count & Avg. Comp.	30-34 Count & Avg. Comp.	35 & Over Count & Avg. Comp.	Total Count & Avg. Comp.
	Years of Credited Service												
Under 20	0	1	0	0	0	0	0	0	0	0	0	0	1
	$0	$32,493	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$32,493
20-24	131	76	27	6	4	0	0	0	0	0	0	0	244
	$29,344	$39,498	$42,052	$36,027	$48,361	$0	$0	$0	$0	$0	$0	$0	$34,389
25-29	139	140	81	76	59	69	0	0	0	0	0	0	564
	$28,781	$37,277	$39,857	$39,574	$41,300	$47,378	$0	$0	$0	$0	$0	$0	$37,520
30-34	74	91	61	47	58	250	33	0	0	0	0	0	614
	$28,027	$36,416	$41,190	$40,734	$42,893	$46,034	$44,460	$0	$0	$0	$0	$0	$41,170
35-39	40	43	32	38	29	153	154	42	0	0	0	0	531
	$26,933	$38,527	$38,705	$41,173	$39,666	$45,461	$47,736	$50,053	$0	$0	$0	$0	$43,496
40-44	41	36	21	24	28	106	101	143	17	1	0	0	518
	$27,271	$37,759	$39,510	$43,701	$39,439	$45,839	$48,100	$50,433	$50,160	$67,728	$0	$0	$45,000
45-49	24	24	25	22	17	84	91	114	53	4	0	0	458
	$21,985	$40,493	$40,706	$40,570	$41,281	$41,573	$47,377	$49,726	$54,622	$59,968	$0	$0	$45,237
50-54	23	30	18	12	20	83	80	102	35	7	0	0	410
	$31,391	$42,082	$44,853	$39,825	$49,324	$45,449	$45,155	$50,359	$50,232	$63,516	$0	$0	$46,293
55-59	10	19	15	10	14	76	57	61	24	4	4	0	294
	$27,939	$41,199	$44,005	$43,948	$40,127	$41,723	$44,313	$48,174	$52,114	$51,852	$66,680	$0	$44,503
60-64	2	4	10	5	5	35	34	31	12	1	0	0	139
	$29,347	$46,881	$45,622	$33,331	$43,215	$41,276	$46,394	$47,359	$50,959	$89,450	$0	$0	$45,153
65 & Over	1	2	0	2	3	11	17	11	4	3	0	0	54
	$20,357	$24,675	$0	$38,904	$50,301	$55,830	$40,107	$48,424	$41,578	$71,466	$0	$0	$46,440
Total	485	466	290	242	237	867	567	504	145	20	4	0	3,827
	$28,293	$38,277	$40,986	$40,521	$42,150	$45,082	$46,535	$49,720	$51,961	$63,174	$66,680	$0	$42,549

Distribution of Annuitant Monthly Benefit by Status and Age
Non-Hazardous Retirees and Beneficiaries
(Dollar amounts expressed in thousands)

	Retirement		Disability		Survivors & Beneficiaries		Total	
Current Age	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Under 50	400	$ 9,209	73	$ 991	497	$ 5,880	970	$ 16,080
50 - 54	1,451	36,965	141	2,084	207	2,692	1,799	41,741
55 - 59	3,308	81,720	233	3,534	287	3,764	3,828	89,018
60 - 64	6,124	142,309	329	4,564	496	7,371	6,949	154,243
65 - 69	9,526	201,875	372	4,946	702	10,975	10,600	217,796
70 - 74	9,551	204,366	308	3,793	771	13,855	10,630	222,014
75 - 79	5,204	105,331	155	1,768	727	12,285	6,086	119,385
80 - 84	3,038	55,743	115	1,296	619	10,607	3,772	67,646
85 - 89	1,476	23,178	44	538	445	6,510	1,965	30,226
90 And Over	768	10,452	7	42	326	3,790	1,101	14,284
Total	**40,846**	**$ 871,149**	**1,777**	**$ 23,555**	**5,077**	**$ 77,730**	**47,700**	**$ 972,434**

*Amounts may not add due to rounding

Distribution of Annuitant Monthly Benefit by Status and Age
Hazardous Retirees and Beneficiaries
(Dollar amounts expressed in thousands)

	Retirement		Disability		Survivors & Beneficiaries		Total	
Current Age	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Under 50	282	$ 5,639	23	$ 289	64	$ 606	369	$ 6,535
50 - 54	389	7,448	22	265	27	346	438	8,060
55 - 59	516	9,259	30	286	35	397	581	9,942
60 - 64	668	11,893	34	302	64	676	766	12,871
65 - 69	819	12,086	20	152	92	1,092	931	13,331
70 - 74	811	11,435	13	127	79	874	903	12,436
75 - 79	361	4,465	6	43	69	611	436	5,119
80 - 84	151	1,449	4	17	44	344	199	1,810
85 - 89	50	316	2	6	26	147	78	470
90 And Over	14	143	0	0	11	87	25	230
Total	**4,061**	**$ 64,134**	**154**	**$ 1,488**	**511**	**$ 5,181**	**4,726**	**$ 70,803**

*Amounts may not add due to rounding

Non-Hazardous Retired Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	4,495	$	7,915,623	13,390	$	19,233,861	17,885	$	27,149,483
Joint & Survivor:									
100% to Beneficiary	2,832		5,078,749	1,592		2,009,943	4,424		7,088,692
66 2/3% to Beneficiary	805		2,215,402	622		1,165,353	1,427		3,380,755
50% to Beneficiary	1,102		2,771,419	1,587		3,076,109	2,689		5,847,528
Pop-up Option	4,080		9,791,103	3,958		7,622,422	8,038		17,413,525
Social Security Option:									
Age 62 Basic	377		778,518	917		1,529,221	1,294		2,307,739
Age 62 Survivorship	725		1,459,118	579		925,176	1,304		2,384,294
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	0		0	0		0	0		0
10 Years Certain & Life	986		1,716,693	2,332		3,520,903	3,318		5,237,596
15 Years Certain & Life	446		712,301	684		1,009,307	1,130		1,721,608
20 Years Certain & Life	440		963,155	674		1,064,297	1,114		2,027,452
Total:	16,288	$	33,402,081	26,335	$	41,156,590	42,623	$	74,558,672

Hazardous Retired Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	739	$	817,226	611	$	672,693	1,350	$	1,489,919
Joint & Survivor:									
100% to Beneficiary	469		575,102	82		95,586	551		670,688
66 2/3% to Beneficiary	127		171,334	33		38,810	160		210,145
50% to Beneficiary	176		285,901	78		118,718	254		404,620
Pop-up Option	986		1,551,252	213		297,805	1,199		1,849,057
Social Security Option:									
Age 62 Basic	59		63,169	34		28,878	93		92,048
Age 62 Survivorship	136		160,205	19		15,506	155		175,711
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	55		95,267	16		24,624	71		119,891
10 Years Certain & Life	112		140,458	80		73,270	192		213,728
15 Years Certain & Life	55		67,228	29		25,982	84		93,210
20 Years Certain & Life	68		96,595	38		52,948	106		149,543
Total:	2,982	$	4,023,737	1,233	$	1,444,822	4,215	$	5,468,559

Non-Hazardous Beneficiary Lives Summary

Form of Payment	Male Lives			Female Lives			Total		
	Number		Monthly Benefit Amount	Number		Monthly Benefit Amount	Number		Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	28	$	20,376	51	$	71,991	79	$	92,367
Joint & Survivor:									
100% to Beneficiary	373		321,489	1,597		1,870,021	1,970		2,191,510
66 2/3% to Beneficiary	70		77,741	294		402,153	364		479,894
50% to Beneficiary	170		146,305	483		425,850	653		572,155
Pop-up Option	239		366,149	863		1,554,106	1,102		1,920,255
Social Security Option:									
Age 62 Basic	1		1,293	11		12,803	12		14,096
Age 62 Survivorship	78		110,298	340		594,996	418		705,294
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	2		611	2		611
5 Years Certain	37		47,554	50		46,538	87		94,093
10 Years Certain	76		67,581	91		65,115	167		132,695
10 Years Certain & Life	38		41,100	47		45,005	85		86,105
15 Years Certain & Life	21		23,508	43		38,862	64		62,369
20 Years Certain & Life	20		36,036	54		89,979	74		126,015
Total:	1,151	$	1,259,430	3,926	$	5,218,029	5,077	$	6,477,459

Hazardous Beneficiary Lives Summary

Form of Payment	Male Lives Number	Male Lives Monthly Benefit Amount	Female Lives Number	Female Lives Monthly Benefit Amount	Total Number	Total Monthly Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Basic	1	$ 1,046	12	$ 9,554	13	$ 10,600
Joint & Survivor:						
100% to Beneficiary	17	12,258	176	130,262	193	142,520
66 2/3% to Beneficiary	1	481	21	10,358	22	10,839
50% to Beneficiary	4	2,769	41	15,480	45	18,249
Pop-up Option	12	12,515	139	152,253	151	164,768
Social Security Option:						
Age 62 Basic	0	0	1	18	1	18
Age 62 Survivorship	1	313	47	48,730	48	49,044
Partial Deferred (Old Plan)	0	0	0	0	0	0
Widows Age 60	0	0	0	0	0	0
5 Years Certain	0	0	5	3,360	5	3,360
10 Years Certain	2	2,253	9	8,744	11	10,997
10 Years Certain & Life	0	0	5	2,647	5	2,647
15 Years Certain & Life	3	3,903	3	1,548	6	5,451
20 Years Certain & Life	2	4,048	9	9,181	11	13,229
Total:	43	$ 39,587	468	$ 392,135	511	$ 431,722

Schedule of Retirees Added to And Removed from Rolls

(Dollar amounts except average allowance expressed in thousands)

Year Ended	Added to Rolls Number	Removed from Rolls Number	Rolls End of the Year Number	Rolls End of the Year Annual Benefits	% Increase in Annual Benefit	Average Annual Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Non-Hazardous			
2012	1,707	1,078	39,226	$ 844,881		$ 21,539
2013	1,982	1,014	40,194	872,140	3.2%	21,698
2014	2,067	1,038	41,223	866,047	-0.7%	21,009
2015	2,140	1,094	42,269	883,578	2.0%	20,904
2016	2,441	706	44,004	934,930	5.8%	21,246
2017	2,181	1,269	44,916	921,302	-1.5%	20,512
2018	2,853	1,243	46,526	952,951	3.4%	20,482
2019	2,226	1,342	47,410	968,706	1.7%	20,433
2020	1,806	1,883	47,333	967,963	-0.1%	20,450
2021	2,026	1,659	47,700	972,434	0.5%	20,386
			Hazardous			
2012	243	54	3,253	$ 49,231		$ 15,134
2013	229	52	3,430	51,122	3.8%	14,905
2014	256	66	3,620	54,272	6.2%	14,992
2015	203	65	3,758	56,431	4.0%	15,016
2016	237	29	3,966	59,001	4.6%	14,877
2017	206	79	4,093	59,162	0.3%	14,455
2018	321	44	4,370	64,050	8.3%	14,657
2019	227	60	4,537	67,523	5.4%	14,883
2020	214	123	4,628	69,081	2.3%	14,927
2021	263	165	4,726	70,803	2.5%	14,982

SECTION 6

ASSESSMENT AND DISCLOSURE OF RISK

Risks Associated with Measuring the Accrued Liability And Actuarially Determined Contribution

(As Required by ASOP No. 51)

The determination of KERS's accrued liability and actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. The risk measures illustrated in this section are intended to aid stakeholders in understanding the effects of future experience differing from the assumptions used in performing an actuarial valuation. These risk measures may also help with illustrating the potential volatility in the funded status and actuarially determined contributions that result from differences between actual experience and the expected experience based on the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience (economic and demographic) differing from the assumptions, changes in assumptions due to changing conditions, changes in contribution requirements due to modifications to the funding policy, and changes in the liability and cost due to changes in plan provisions or applicable law. The scope of this actuarial valuation does not include any analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the System's future financial condition include:

- Investment risk – actual investment returns may differ from expected returns;
- Longevity risk – members may live longer or shorter than expected and receive pensions for a time period different than assumed;
- Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future contributions differing from expected;
- Salary and payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liabilities or contributions differing from expected;
- Asset/Liability mismatch – changes in assets may be inconsistent with changes in liabilities, thereby altering the relative difference between the assets and liabilities which may alter the funded status and contribution requirements;
- Contribution risk – actual contributions may differ from expected future contributions (for example, actual contributions not being paid in accordance with the System's funding policy, withdrawal liability assessments or other anticipated payments to the plan are not being paid, or material changes occurring in the anticipated number of covered employees, covered payroll, or another relevant contribution base).

Effects of certain experience can generally be anticipated. For example, if investment returns since the most recent actuarial valuation are less (or more) than the assumed rate of return, then the funded status of the plan can be expected to decrease (or increase) more than anticipated.

The required contributions in this report were established in accordance with applicable Statutes and assumptions adopted by the Board. However, stakeholders should be aware that the scheduled contributions specified in State Code do not necessarily guarantee that the contribution requirements will not increase in a future year.

Employer Risk with Contribution Rates

Currently contributions for the hazardous fund are collected from participating employers based on the employer's total payroll of employees who are earning benefits in KERS (i.e. covered payroll). The actuarially determined contribution rate is comprised of two components - the normal cost rate (to pay for the benefits accruing in the next year) and the unfunded amortization (to pay for the benefits accrued by members in previous years). The unfunded amortization is calculated by first determining the dollar amount necessary to pay for the unfunded liability based on KERS's funding policy, and then by dividing that dollar amount by expected covered payroll to convert that contribution requirement to a percentage of payroll (i.e. a contribution rate).

As the contribution requirement, as a percentage of payroll, increases then there is increased incentive for participating employers to make deliberate business action to reduce their payroll reported to the System in order to reduce their pension cost. House Bill 8 passed during the 2021 legislative session and changed how the amortization cost would be collected and allocated amongst employers in the non-hazardous fund. This portion of the contribution requirement is no longer collected as a percentage of payroll for the non-hazardous fund.

Plan Specific Risk Measures

Risks faced by a pension plan evolve over time. A relatively new plan with virtually no assets and paying few benefits will experience lower investment risk than a mature plan with a significant amount of assets and large number of members receiving benefits. There are a few measures that can assist stakeholders in understanding and comparing the maturity of a plan to other systems, which include:

- Ratio of market value of assets to payroll: The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. If assets are approximately the same as covered payroll, an investment return that is 5% different than assumed would equal 5% of payroll. In another example, if the assets are approximately twice as large as covered payroll, an investment return that is 5% different than assumed would equal 10% of payroll. A ratio that increases over time generally indicates the potential of an increasing volatility in employer contribution rates as a percentage of payroll.
- Ratio of actuarial accrued liability to payroll: The ratio of actuarial accrued liability to payroll can be used as a measure to indicate the potential volatility of contributions due to volatility in the liability experience. For instance, if the actuarial accrued liability is 5 times the size of the covered payroll, then a change in the liability that is 2% different than expected would be a change in magnitude that is 10% of payroll. A ratio that increases over time generally indicates the potential of an increasing volatility in employer contribution rates as a percentage of payroll.
- Percentage of Expected Contributions Actually Received: This measure identifies the percentage difference between the contributions the fund expects to receive during the fiscal year to and actual contributions received by the fund during the fiscal year. A percentage that is less than 100% means that actual contributions the fund received were less than the expected contributions determined by a prior actuarial valuation. On the other hand, a percentage that is greater than 100% means that actual contributions the fund received were more than the expected contributions.

- Ratio of active to retired members: A relatively mature open plan is likely to have close to the same number of actives to retirees resulting in a ratio that is around 1.0. On the other hand, a super-mature plan, or a plan that is closed to new entrants will have more retirees than active members resulting in a ratio below 1.0. As this ratio declines, a larger portion of the total actuarial accrued liability in the System is attributable to retirees. This metric also typically moves in tandem with the liability to payroll metric, which provides an indication of potential contribution volatility.

The following tables provide a summary of these measures for KERS Non-Hazardous and Hazardous Funds for the current year and the prior four years so stakeholders can identify how these measures are trending. While ASOP No. 51 requires this disclosure with respect to only the retirement funds, we have included this information for the insurance funds for completeness.

KERS Non-Hazardous

	Retirement Fund					Insurance Fund				
	June 30,					June 30,				
	2021	2020	2019	2018	2017	2021	2020	2019	2018	2017
Ratio of the market value of assets to total payroll	2.24	1.66	1.55	1.36	1.34	1.05	0.76	0.69	0.61	0.53
Ratio of actuarial accrued liability to payroll	12.10	11.78	11.45	10.65	10.18	1.91	1.85	1.90	1.66	1.75
Ratio of net cash flow to market value of assets	7.3%	1.0%	5.5%	-9.7%	-5.7%	7.1%	5.2%	6.2%	1.1%	3.6%
Percentage of Expected Contribution Actually Received	94% [1]	93%	91%	93%	104%	99% [1]	96%	95%	99%	100%
Ratio of actives to retirees and beneficiaries	0.63	0.67	0.71	0.76	0.83					

[1] Expected contribution for FYE2021 based on the actuarially determined contribution rate of 84.43% from the June 30, 2019 valuation, as amended by SB249, which reset the amortization period to 30 years, and expected compensation based on census data from the June 30, 2020 valuation.

KERS Hazardous

	Retirement Fund					Insurance Fund				
	June 30,					June 30,				
	2021	2020	2019	2018	2017	2021	2020	2019	2018	2017
Ratio of the market value of assets to total payroll	5.32	4.04	4.53	4.08	3.70	3.89	3.05	3.55	3.28	3.01
Ratio of actuarial accrued liability to payroll	7.95	7.52	8.15	7.28	6.90	2.61	2.51	2.84	2.49	2.58
Ratio of net cash flow to market value of assets	0.3%	0.4%	-0.1%	-1.2%	1.1%	-2.8%	-2.5%	-2.5%	-2.5%	-2.4%
Percentage of Expected Contribution Actually Received	101% [1]	114%	102%	95%	116%	N/A [1]	N/A [1]	96%	190%	111%
Ratio of actives to retirees and beneficiaries	0.81	0.88	0.82	0.90	0.99					

[1] Expected contribution for FYE2021 based on the actuarially determined contribution rate of 36.00% from the June 30, 2019 valuation, as amended by SB249, which reset the amortization period to 30 years, and expected compensation based on census data from the June 30, 2020 valuation. As of the 2018 valuation (FYE2020), the required employer contribution was 0% of pay for the insurance fund.

APPENDIX A

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Methods and Assumptions

The following presents a summary of the actuarial assumptions and methods used in the valuation of the Kentucky Employees Retirement System.

In general, the assumptions and methods used in the valuation are based on the actuarial experience study for the five-year period ending June 30, 2018 and adopted by the Board in April 2019.

Investment return rate:

Assumed annual rate of 5.25% net of investment expenses for the non-hazardous retirement fund
Assumed annual rate of 6.25% net of investment expenses for the hazardous retirement fund, non-hazardous insurance fund, and hazardous insurance fund

Price Inflation:

Assumed annual rate of 2.30%

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

Assumed annual rate of 0.00%

Rates of Annual Salary Increase:

Assumed rates of annual salary increases are shown below.

Service Years	Annual Rates of Salary					
	Merit & Seniority		Price Inflation & Productivity		Total Increase	
	Non-Hazardous	Hazardous	Non-Hazardous	Hazardous	Non-Hazardous	Hazardous
0	12.00%	16.50%	3.30%	3.55%	15.30%	20.05%
1	3.50%	4.00%	3.30%	3.55%	6.80%	7.55%
2	2.75%	3.00%	3.30%	3.55%	6.05%	6.55%
3	2.50%	3.00%	3.30%	3.55%	5.80%	6.55%
4	2.00%	2.00%	3.30%	3.55%	5.30%	5.55%
5	1.50%	1.50%	3.30%	3.55%	4.80%	5.05%
6	1.25%	1.00%	3.30%	3.55%	4.55%	4.55%
7	1.00%	0.50%	3.30%	3.55%	4.30%	4.05%
8	0.75%	0.50%	3.30%	3.55%	4.05%	4.05%
9	0.50%	0.00%	3.30%	3.55%	3.80%	3.55%
10	0.50%	0.00%	3.30%	3.55%	3.80%	3.55%
11 & 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	Age 55-61	Age 62+		
Under 45	20.0%	33.0%			5	10.0%	35.0%		
45	21.0%	33.0%			6	10.0%	35.0%		
46	22.0%	33.0%			7	10.0%	35.0%		
47	23.0%	33.0%			8	10.0%	35.0%		
48	24.0%	33.0%			9	10.0%	35.0%		
49	25.0%	33.0%			10	10.0%	35.0%		
50	26.0%	33.0%			11	10.0%	35.0%		
51	27.0%	33.0%			12	10.0%	35.0%		
52	28.0%	33.0%			13	10.0%	35.0%		
53	29.0%	33.0%			14	10.0%	35.0%		
54	30.0%	33.0%			15	10.0%	35.0%		
55	30.0%	33.0%	5.0%	5.0%	16	10.0%	35.0%		
56	30.0%	33.0%	5.0%	5.0%	17	10.0%	35.0%		
57	30.0%	33.0%	5.0%	5.0%	18	10.0%	35.0%		
58	30.0%	33.0%	5.0%	5.0%	19	10.0%	35.0%		
59	30.0%	33.0%	5.0%	5.0%	20	50.0%	50.0%		
60	30.0%	33.0%	5.0%	8.0%	21	32.0%	32.0%		
61	30.0%	33.0%	8.0%	9.0%	22	32.0%	32.0%		
62	35.0%	35.0%	15.0%	20.0%	23	32.0%	32.0%		
63	30.0%	33.0%	15.0%	18.0%	24	32.0%	32.0%		
64	30.0%	33.0%	15.0%	16.0%	25	32.0%	32.0%	25.6%	16.0%
65	30.0%	33.0%			26	32.0%	32.0%	25.6%	16.0%
66	30.0%	33.0%			27	32.0%	32.0%	25.6%	16.0%
67	30.0%	33.0%			28	32.0%	32.0%	25.6%	16.0%
68	30.0%	33.0%			29	32.0%	32.0%	25.6%	16.0%
69	30.0%	33.0%			30+	32.0%	32.0%	25.6%	100.0%
70	30.0%	33.0%							
71	30.0%	33.0%							
72	30.0%	33.0%							
73	30.0%	33.0%							
74	30.0%	33.0%							
75	100.0%	100.0%							

[1] *The annual rate of retirement is 12% for male members and 14% for female members with 25-26 years of service.*
[2] *The annual rate of retirement is 100% at age 65.*
[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 the 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 65 to reflect the different retiree health insurance benefit.

Disability rates:

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

Age	Non-Hazardous Male	Non-Hazardous Female	Hazardous Male	Hazardous Female
20	0.03%	0.03%	0.05%	0.05%
30	0.06%	0.06%	0.08%	0.08%
40	0.12%	0.12%	0.18%	0.18%
50	0.34%	0.34%	0.50%	0.50%
60	0.88%	0.88%	1.32%	1.32%

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%	25.00%
2	16.45%	19.68%
3	13.39%	15.12%
4	11.61%	12.45%
5	10.34%	10.56%
6	9.35%	9.09%
7	8.55%	7.89%
8	7.87%	6.87%
9	7.28%	5.99%
10	6.76%	5.22%
11	6.30%	4.53%
12	5.88%	3.90%
13	5.49%	3.33%
14	5.14%	2.80%
15	4.81%	2.31%
16	4.51%	1.86%
17	4.22%	1.43%
18	3.96%	1.03%
19	3.70%	0.66%
20	3.47%	0.30%
21	3.24%	0.00%
22	3.02%	0.00%
23	2.82%	0.00%
24	2.62%	0.00%
25	2.43%	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-2014 mortality improvement scale using a base year of 2010.

Post-retirement mortality (non-disabled): System-specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2019.

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**				
	2020	**2025**	**2030**	**2035**	**2040**
Male	21.0	21.4	21.8	22.2	22.6
Female	24.0	24.4	24.8	25.2	25.6

Post-retirement mortality (disabled): PUB-2010 Disabled Mortality table, with a 4-year set-forward for both male and female rates, projected with the ultimate rates from the MP-2014 mortality improvement scale 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: 10% 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 Age Related Morbidity/Claims Utilization:

To model the impact of aging on the underlying health care costs for Medicare retirees, the valuation relied on the Society of Actuaries' 2013 Study "Health Care Costs – From Birth to Death". Table 4 (Development of Plan Specific Medicare Age Curve) was used to model the impact of aging for ages 65 and over.

Health Care Cost Trend Rates:

Year	Non-Medicare Plans[1]	Medicare Plans[1]	Dollar Contribution[2]
2023	6.30%	6.30%	1.50%
2024	6.20%	6.20%	1.50%
2025	6.10%	6.10%	1.50%
2026	6.00%	6.00%	1.50%
2027	5.80%	5.80%	1.50%
2028	5.60%	5.60%	1.50%
2029	5.40%	5.40%	1.50%
2030	5.20%	5.20%	1.50%
2031	5.00%	5.00%	1.50%
2032	4.80%	4.80%	1.50%
2033	4.60%	4.60%	1.50%
2034	4.40%	4.40%	1.50%
2035	4.20%	4.20%	1.50%
2036 & Beyond	4.05%	4.05%	1.50%

[1]All increases are assumed to occur on January 1. The 2022 premiums were known at the time of the valuation and were incorporated into the liability measurement
[2]Applies to members participating on or after July 1, 2003. All increases are assumed to occur on July 1.

Health care trend assumptions are based on the model issued by the Society of Actuaries "Getzen model of Long-Run Medical Cost Trends for the SOA; Thomas E. Getzen, iHEA and Temple University 2014 © Society of Actuaries.

The underlying assumptions used to develop the health care trend rates include:

- A short run period-this is a period for which anticipated health care trend rates are manually set based on local information as well as plan-specific and carrier information.
- Long term real GDP growth – 1.75%
- Long term rate of inflation – 2.30%
- Long term nominal GDP growth – 4.05%
- Year that excess rate converges to 0 – 2036

Health care trend rates are thus the manually set rates for the short run period and rates which decline to an ultimate trend rate which equals the assumed nominal long-term GDP growth rate.

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]	6%
Essential Plan	8%
Premium Plan	86%

[1] Includes Medicare Advantage Mirror Plans

Non-Medicare Plan	Participation Percentage
LivingWell Limited	4%
LivingWell Basic	2%
LivingWell CDHP	33%
LivingWell PPO	61%

- 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.

- 50% 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 terminated 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 4.9375% (based upon the 5.25% assumed investment return) for the Non-Hazardous Fund and 5.6875% (based upon the 6.25% assumed investment return) for the Hazardous Fund. The interest crediting rate after a member terminates employment is 4% for all plans.

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 Funds): 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.

Participant Data

Participant data was supplied in electronic text files. There were separate files for (i) active and inactive members, and (ii) members and beneficiaries receiving benefits.

The data for active and terminated members included date of birth, gender, date of participation, benefit tier indicator, service with the current system, total vesting service, salary, employee contribution account balances, and employer pay credits for members participating in the cash balance plan. For retired members and beneficiaries, the data included date of birth, gender, spouse's date of birth (where applicable), amount of monthly benefit, date of retirement, and form of payment code.

Assumptions were made to correct for missing, bad, or inconsistent data. These had no material impact on the results presented.

Changes in assumptions since the prior valuation:

None

Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2022, and are used for both current and future retirees. An inherent assumption in this methodology is that the projected future retirees will have a similar distribution by plan type as the current retirees. The spouse/dependent premium of $926.73 for non-Medicare retirees is based on a blending of Family and Couple premiums for the current retirees that have over 4 years of hazardous service. The fully-insured premiums paid to the Kentucky Employees' Health Plan (KEHP) are blended rates based on the combined experience of active and retired members. Because the average cost of providing health care benefits to retirees under age 65 is higher than the average cost of providing health care benefits to active employees, there is an implicit rate subsidy for the non-Medicare eligible retirees. Actuarial Standard of Practice No. 6 (ASOP No. 6) requires aging subsidies (or implicit rate subsidies) to be recognized. However, the health insurance trusts are only used to reimburse KEHP for the employer's portion of the blended premiums. Said another way, the trusts are not used to fund the difference between the underlying retiree claims and the blended KEHP premiums. As a result, the retiree health care liabilities developed in this report for the non-Medicare retirees are based solely on the premiums charged by KEHP, without any age-adjustment. GASB Statements No. 74 and No. 75 prohibit such a deviation from ASOP No. 6. The liabilities developed in this report are solely for the purpose of funding the benefits paid by the health insurance funds and are not appropriate for financial statement disclosures required by GASB. GRS provides separate GASB reports which include the liabilities associated with the implicit rate subsidy.

For those not eligible for Medicare		
Age	Member	Spouse/Dependents
<65	$ 758.99	$ 926.73

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2022, and are used for both current and future retirees. An inherent assumption in this methodology is that the projected future retirees will have a similar distribution by plan type as the current retirees. Age graded and sex distinct premiums are utilized for retirees over the age of 65. These costs are appropriate for the unique age and sex distribution currently existing. Over the future years covered by this valuation, the age and sex distribution will most likely change. Therefore, our process "distributes" the average premium over all age/sex combinations and assigns a unique premium for each combination. The age/sex specific costs more accurately reflect the health care utilization and cost at that age.

For those eligible for Medicare		
Age	Male	Female
65	$188.91	$178.18
75	221.03	215.67
85	233.72	236.47

Appendix B of the report provides a full schedule of premiums.

Mehdi Riazi is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Mehdi Riazi

Mehdi Riazi, FSA, EA, FCA, MAAA

Appendix B

Benefit Provisions

Summary of Benefit Provisions for Kentucky Employees Retirement System (KERS)

KERS Non-Hazardous Employees

Retirement: Tier 1, Participation before 9/1/2008

Normal Retirement Eligibility	Age 65 with at least 1 month of service credit; or Any age with at least 27 years of service
Benefit Amount	If a member has at least 48 months of service, the monthly benefit is 2.00% times final average compensation times years of service. For members who did not have 13 months of service credit for 1/1/1998-1/1/1999, the monthly benefit is 1.97% times final average compensation times years of service. If a member has less than 48 months of service, the monthly benefit is the actuarial equivalent of two times the member's contributions with interest. Final average compensation is based on the member's highest 5 years of compensation.
Early Retirement Eligibility	Any age (prior to age 65) with at least 25 years of service; or Age 55 with at least 5 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement eligibility precedes the member's normal retirement date.

KERS Non-Hazardous Employees (continued)

Retirement: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Normal Retirement Eligibility	Age 65 with at least 5 years of service; or Rule of 87 (Age 57 or older if age plus service equals 87)
Benefit Amount	The monthly benefit is equal to the applicable benefit multiplier times final average compensation times years of service.

Years of Service	Benefit Multiplier
10 or less	1.10%
10-20	1.30%
20-26	1.50%
26-30	1.75%
Greater than 30*	2.00%

* The 2.00% benefit multiplier only applies to service credit in excess of 30 years. If a member has greater than 30 years of service at retirement, service prior to 30 years will be multiplied by the 1.75% benefit multiplier.

Final compensation is based on the member's last 5 years of compensation.

Early Retirement Eligibility	Age 60 with at least 10 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement date precedes the member's normal retirement eligibility.

Retirement: Tier 3, Participation on or after 1/1/2014

Normal Retirement Eligibility	Age 65 with at least 5 years of service; or Rule of 87 (Age 57 or older if age plus service equals 87)
Benefit Amount	Each year that the member is active, a 4.00% employer pay credit and the employee's 5.00% contribution will be credited to each member's hypothetical cash balance account. The hypothetical account will earn interest at a minimum rate of 4%, annually. If the System's geometric average net investment return for the previous five years exceeds 4%, then the hypothetical account will be credited with an additional amount of interest in that year equal to 75% of the amount of the return which exceeds 4%. All interest credits will be applied to the hypothetical account balance on June 30 based on the account balance as of June 30 of the previous year. At retirement, the member's hypothetical account balance may be converted into an annuity based on an actuarial factor.
Early Retirement Eligibility	N/A

KERS Non-Hazardous Employees (continued)

Deferred Vested Benefit: Tier 1, Participation before 9/1/2008

Eligibility	At least 1 month of service credit
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Eligibility	5 years of service
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit Tier 3, Participation on or after 1/1/2014

Eligibility	5 years of service
Benefit Amount	At termination of employment, members may choose to leave their account balance with the System and retire once they are eligible. The hypothetical account balance will earn 4% annual interest after termination. Members may also choose to withdrawal their entire accumulated balance. If a member does not have 5 years of service at termination, the member is eligible to receive a partial refund of their account balance. This refund includes the member's contributions with interest.

Disability Retirement: Participation before 8/1/2004

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	Disability benefits are calculated in the same manner as the normal retirement benefit with years of service and final compensation being determined as of the date of disability, except that service credit shall be added to the person's total service beginning with the last date of paid employment and continuing to the member's 65th birthday, with total service not exceeding 25 years. Total service credit added shall not be greater than the member's actual service at disability. For members with at least 25 years of service on the last day of paid employment but less than 27 years of service, total service shall be 27 years. For members with 27 or more years of service credit, actual service will be used.

KERS Non-Hazardous Employees (continued)

Disability Retirement: Participation on or after 8/1/2004 but before 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 20% of the member's final monthly rate of pay or the member's normal retirement benefit (without reduction for early retirement) with years and final compensation being determined as of the date of disability.

Disability Retirement: Participation on or after 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 20% of the member's final monthly rate of pay or the member's retirement benefit calculated at the member's normal retirement date.

Duty-Related Disability Benefit

Disability Benefit	If the disability is a direct result of an act in the line of duty, the benefit shall not be less than 25% of the member's final monthly final rate of pay. If the disability is deemed to be Total and Permanent (and the member is working in a non-hazardous position that could be certified as a hazardous position), then this benefit shall not be less than 75% of the member's monthly average pay.
Child Benefit	Additionally, each eligible dependent child will receive 10% of the member's monthly average pay up to a maximum of 40%. Member and dependent payment shall not exceed 100% of member's monthly average pay.

Pre-Retirement Death Benefit

Eligibility	Eligible for early or normal retirement; or Under age 65 with at least 60 months of service and actively working at the time of death; or At least 144 months of service, if no longer actively working
Spouse Benefit	The member's retirement benefit calculated in the same manner as if the member had retired on the day of the member's death and elected a 100% joint and survivor benefit. The benefit is actuarially reduced if the member dies prior to their normal retirement age.

KERS Non-Hazardous Employees (continued)

Pre-Retirement Death Benefit (Death in the Line of Duty)

Eligibility	One month of service credit
Spouse Benefit	A $10,000 lump sum payment plus a monthly payment of 75% of the deceased member's final monthly average pay. Each dependent child will receive 10% of the final monthly average pay (not to exceed a total child benefit of 25% while the spouse is alive). A spouse may also elect the non-line of duty death benefit.
Child Benefit	In the event there is no surviving spouse, the benefit is 50% of final monthly average pay for one child, 65% of final monthly average pay for two children, or 75% of final monthly average pay for three or more eligible children.

Post-Retirement Death Benefit

Eligibility	48 months of service, and in receipt of retirement benefits
Death Benefit	A $5,000 lump sum payment

Member Contributions

Tier 1, Participation before 9/1/2008	5% of creditable compensation. Members who do not receive a retirement benefit are entitled to a full refund of contributions with interest. The annual interest rate is set by the Board, not less than 2.0%.
Tier 2, Participation on or after 9/1/2008 but before 1/1/2014	5% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest. The annual interest rate is 2.5%.
Tier 3, Participation after 1/1/2014	5% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest.

Changes since the Prior Valuation

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become "totally and permanently disabled" as a result of a duty-related disability. The minimum disability benefit increased from 25% of the member's monthly final rate of pay to 75% of the member's monthly average pay. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.

KERS Hazardous Employees

Retirement: Tier 1, Participation before 9/1/2008

Normal Retirement Eligibility	Age 55 with at least 1 month of service credit; or Any age with at least 20 years of service
Benefit Amount	If a member has at least 60 months of service, the monthly benefit is 2.49% times final average compensation times years of service. If a member has less than 60 months of service, the monthly benefit is the actuarial equivalent of two times the member's contributions with interest. Final average compensation is based on the member's highest 3 years of compensation.
Early Retirement Eligibility	Age 50 with at least 15 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement date precedes the member's normal retirement eligibility.

KERS Hazardous Employees (continued)

Retirement: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Normal Retirement Eligibility	Age 60 with at least 5 years of service; or Any age with at least 25 years of service
Benefit Amount	The monthly benefit is equal to the applicable benefit multiplier times final average compensation times years of service.

Years of Service	Benefit Multiplier
10 or less	1.30%
10-20	1.50%
20-25	2.25%
Greater than 25	2.50%

Final average compensation is based on the member's highest 3 years of compensation.

Early Retirement Eligibility	Age 50 with at least 15 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement date precedes the member's normal retirement eligibility.

Retirement: Tier 3, Participation on or after 1/1/2014

Normal Retirement Eligibility	Age 60 with at least 5 years of service; or Any age with at least 25 years of service
Benefit Amount	Each year that the member is active, a 7.50% employer pay credit and the employee's 8.00% contribution will be credited to each member's hypothetical cash balance account. The hypothetical account will earn interest at a minimum rate of 4%, annually. If the System's geometric average net investment return for the previous five years exceeds 4%, then the hypothetical account will be credited with an additional amount of interest in that year equal to 75% of the amount of the return which exceeds 4%. All interest credits will be applied to the hypothetical account balance on June 30 based on the account balance as of June 30 of the previous year. At retirement, the member's hypothetical account balance may be converted into an annuity based on an actuarial factor.
Early Retirement Eligibility	N/A

Deferred Vested Benefit: Tier 1, Participation before 9/1/2008

Eligibility	At least 1 month of service credit
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Eligibility	5 years of service
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit Tier 3, Participation on or after 1/1/2014

Eligibility	5 years of service
Benefit Amount	At termination of employment, members may choose to leave their account balance with the System and retire once they are eligible. The hypothetical account balance will earn 4% annual interest after termination. Members may also choose to withdrawal their entire accumulated balance. If a member does not have 5 years of service at termination, the member is eligible to receive a partial refund of their account balance. This refund includes the member's contributions with interest.

Disability Retirement: Participation before 8/1/2004

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	Disability benefits are calculated in the same manner as the normal retirement benefit with years of service and final compensation being determined as of the date of disability, except that if the member has less than 20 years of service at disability, service credit shall be added to the person's total service beginning with the last date of paid employment and continuing to the member's 55th birthday, with total service not exceeding 20 years. Total service credit added shall not be greater than the member's actual service at disability.

KERS Hazardous Employees (continued)

Disability Retirement: Participation on or after 8/1/2004 but before 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 25% of the member's final monthly rate of pay or the member's normal retirement benefit (without reduction for early retirement) with years and final compensation being determined as of the date of disability.

Disability Retirement: Participation on or after 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 25% of the member's final monthly rate of pay or the member's retirement benefit calculated at the member's normal retirement date.

Line of Duty Disability Benefit

Disability Benefit	If the disability is a direct result of an act in the line of duty, the benefit shall not be less than 25% of the member's final monthly final rate of pay. If the disability is deemed to be Total and Permanent, then this benefit shall not be less than 75% of the member's monthly average pay.
Child Benefit	Additionally, each eligible dependent child will receive 10% of the member's monthly average pay up to a maximum of 40%. Member and dependent payment shall not exceed 100% of member's monthly average pay.

Pre-Retirement Death Benefit

Eligibility	Eligible for early or normal retirement; or Under age 55 with at least 60 months of service and actively working at the time of death; or At least 144 months of service, if no longer actively working
Spouse Benefit	The member's retirement benefit calculated in the same manner as if the member had retired on the day of the member's death and elected a 100% joint and survivor benefit. The benefit is actuarially reduced if the member dies prior to their normal retirement age.

KERS Hazardous Employees (continued)

Pre-Retirement Death Benefit (Death in the Line of Duty)

Eligibility	One month of service credit
Spouse Benefit	A $10,000 lump sum payment plus a monthly payment of 75% of the deceased member's final monthly average pay. Each dependent child will receive 10% of the final monthly average pay (not to exceed a total child benefit of 25% while the spouse is alive). A spouse may also elect the non-line of duty death benefit.
Non-Spouse Benefit	If the beneficiary is only one person who is a dependent receiving at least 50% of his or her support from the member, the beneficiary may elect a lump-sum payment of $10,000.
Child Benefit	In the event there is no surviving spouse, the benefit is 50% of final monthly average pay for one child, 65% of final average pay for two children, or 75% of final average pay for three or more eligible children.

Post-Retirement Death Benefit

Eligibility	48 months of service, and in receipt of retirement benefits
Death Benefit	A $5,000 lump sum payment

Member Contributions

Tier 1, Participation before 9/1/2008	8% of creditable compensation. Members who do not receive a retirement benefit are entitled to a full refund of contributions with interest. The annual interest rate is set by the Board, not less than 2.0%.
Tier 2, Participation on or after 9/1/2008 but before 1/1/2014	8% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest. The annual interest rate is 2.5%.
Tier 3, Participation after 1/1/2014	8% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest.

Changes since the Prior Valuation

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become "totally and permanently disabled" in the line of duty. The minimum disability benefit increased from 25% of the member's monthly final rate of pay to 75% of the member's monthly average pay.

Summary of Main Retiree Insurance Benefit Provisions

Insurance Tier 1: Participation began before 7/1/2003

Benefit Eligibility Recipient of a retirement allowance

Benefit Amount

Non-Hazardous Service	Percentage of Member Premium Paid by Retirement System	Hazardous Service	Percentage of Member & Dependent Premium Paid by Retirement System
Less than 4 years	0%	Less than 4 years	0%
4 – 9 years	25%	4 – 9 years	25%
10 – 14 years	50%	10 – 14 years	50%
15 – 19 years	75%	15 – 19 years	75%
20 or more years	100%	20 or more years	100%

The percentage paid by the retirement system is applied to the ‘contribution’ plan selected by the Board.

Duty Disability Retirement If disability was a result of injuries sustained while in the line of duty, the member receives 100% of the maximum contribution for the member and dependents. This benefit is provided to members in the Non-hazardous and Hazardous plans alike.

Duty Death in Service If an active employee’s death was a result of injuries sustained while in the line of duty, the member’s spouse and children receive a fully subsidized health insurance benefit. This benefit is provided to members in the Non-hazardous and Hazardous plans alike.

Non-Duty Death in Service If the surviving spouses is in receipt of a pension allowance, he or she is eligible for continued health coverage. The percentage of the premium paid for by the retirement system is based on the member’s years of hazardous service at the time of death.

Surviving Spouse of a Retiree A surviving spouse of a retiree, who is in receipt of a pension allowance, will receive a premium subsidy based on the member’s years of hazardous service.

Hazardous employees who retired prior to August 1, 1998 System’s contribution for spouse and dependents is based on total service.

Insurance Tier 2: Participation began on or after 7/1/2003, but before 9/1/2008

Benefit Eligibility	Recipient of a retirement allowance with at least 120 months of service at retirement
Non-Hazardous Subsidy	Monthly contribution of $10 for each year of earned non-hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2021, the Non-Hazardous monthly contribution was $13.99/year of service. Upon the retiree's death, the surviving spouse may continue coverage (if in receipt of a retirement allowance) but will be 100% responsible for the premiums.
Hazardous Subsidy	Monthly contribution of $15 for each year of earned hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2021, the Hazardous monthly contribution was $20.99/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($13.99 as of July 1, 2021) for each year of hazardous service.
Duty Disability Retirement	If disability was a result of injuries sustained while in the line of duty or was duty-related, the member receives a benefit based on at least 20 years of service. This benefit is provided to members in the Non-Hazardous and Hazardous plans alike. If the disability is deemed to be Total and Permanent, the insurance premium for the member, the member's spouse, and the member's dependent children shall also be paid in full by the System. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.
Duty Death in Service	If an active employee's death was a result of injuries sustained while in the line of duty, the member's spouse and children receive a fully subsidized health insurance benefit. This benefit is provided to members in the Non-Hazardous and Hazardous plans alike.
Non-Duty Death in Service	If the surviving spouse is in receipt of a pension allowance, he or she is eligible for continued health coverage. The percentage of the premium paid for by the retirement system is based on the member's years of hazardous service at the time of death.

Insurance Tier 3: Participation began on or after 9/1/2008

Tier 3 insurance benefits are identical to Tier 2, except Tier 3 members are required to have at least 180 months of service in order to be eligible.

Monthly Health Plan Premiums – Effective January 1, 2022

		Non-Medicare Plan Options			
Plan Option	Single	Parent Plus	Couple	Family	Family X-Ref
LivingWell PPO[1]	$772.16	$1,101.08	$1,691.64	$1,883.60	$929.70
LivingWell CDHP	750.30	1,036.40	1,453.30	1,623.94	866.72
LivingWell Basic	721.54	994.72	1,537.72	1,713.58	846.38
Living Well Limited	642.02	914.78	1,407.32	1,566.78	772.32

Medicare Plan Options	
Medical Only Plan	$186.87
Medicare Advantage Mirror Essential Plan	228.12
Medicare Advantage Mirror Premium Plan	327.97
Kentucky Retirement Systems – Essential Plan[2]	49.25
Kentucky Retirement Systems – Premium Plan[3]	227.03

[1] Contribution plan selected by the Board was the LivingWell PPO plan option for non-Medicare retirees.
[2] Contribution rate for retirees selected by the Board remains at $75.56.
[3] Contribution rate for retirees selected by the Board remains at $252.51.

Dollar Contribution Amount for Insurance Tier 2 and Tier 3

Monthly contribution amounts per year of service as of July 1, 2021.

Non-Hazardous Service	Hazardous Service
$13.99	$20.99

Changes since the Prior Valuation

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become “totally and permanently disabled” in the line of duty or as a result of a duty-related disability. The insurance premium for the member, the member’s spouse, and the member’s dependent children shall be paid in full by the System. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.

APPENDIX C

GLOSSARY

Glossary

Actuarial Accrued Liability (AAL): That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

Actuarial Assumptions: Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

Actuarial Cost Method or ***Funding Method:*** A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

Actuarial Gain or ***Actuarial Loss:*** A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the fund's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)

b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and

c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.

Actuarial Valuation: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial valuation for a governmental retirement system typically also includes calculations that provide the financial information of the plan, such as the funded ratio, unfunded actuarial accrued liability and the ADC.

Actuarial Value of Assets or ***Valuation Assets:*** The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Actuarially Determined Contribution (ADC): The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ADC consists of the Employer Normal Cost and the Amortization Payment.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: The portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Closed Amortization Period: A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decrements: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: A retirement plan that is not a Defined Contribution Plan. Typically a defined benefit plan is one in which benefits are defined by a formula applied to the member's compensation and/or years of service.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Experience Study: A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Funding Period or ***Amortization Period:*** The term "Funding Period" is used two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period is specified in State statute. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on a statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: Governmental Accounting Standards Board.

GASB 67 and ***GASB 68***: Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting and reporting rules for public retirement systems and the employers that sponsor, participate in, or contribute to them. Statement No. 67 sets the accounting rules for the financial reporting of the retirement systems, while Statement No. 68 sets the rules for the employers that sponsor, participate in, or contribute to public retirement systems.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded

Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but may not decrease by exactly one year in the subsequent year's actuarial valuation. For instance, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year.

Unfunded Actuarial Accrued Liability: The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or Actuarial Valuation Date: The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

APPENDIX D

KERS NON-HAZARDOUS EMPLOYER CONTRIBUTION BY AGENCY

Appendix D
Kentucky Employees Retirement System (Non-Hazardous) - Retirement and Insurance Combined
Employer Contribution by Agency

Agency Name[1]	Agency Classification[1]	Fixed Percentage of the Total Amortization Cost: Accrued Liability based on June 30, 2019 Valuation[2]	Fixed Allocation of Amortization Cost	Amortization Cost for prior year (FYE2022) adjusted for Appeals[3]	Amortization Cost Remains Level until Actuarial Investigation[4]	Components of Required Contribution for FYE 2023: Normal Cost (% of Pay)	Amortization Cost
(1)	(2)	(3)	(4) = (3) / $18,813M	(5)	(6), per KRS 61.565(1)(d)1d	(7) = 9.97% of pay for all employers	(8) = (4) x $994M[5]
LEGISLATIVE BRANCH AGENCIES	LEGISLATIVE BRANCH	343,338,931	1.82505%	18,665,294	No	9.97%	18,070,756
JUDICIAL BRANCH AGENCIES	JUDICIAL BRANCH	471,819,378	2.50801%	25,650,066	No	9.97%	24,833,094
EXECUTIVE BRANCH AGENCIES	EXECUTIVE BRANCH	14,661,188,769	77.93303%	797,041,531	No	9.97%	772,046,864
LEX FAYETTE CO HLTH DEPT	Health Departments	87,677,599	0.46606%	4,766,461	Yes	9.97%	4,766,461
LAKE CUMBERLAND DISTRICT	Health Departments	73,620,021	0.39134%	4,002,276	Yes	9.97%	4,002,276
BARREN RVR DIST HLTH DEPT	Health Departments	68,379,065	0.36348%	3,717,357	Yes	9.97%	3,717,357
GREEN RVR DIST HLTH DEPT	Health Departments	81,739,718	0.43450%	4,443,692	Yes	9.97%	4,443,692
NORTHERN KY DIST HLTH DEP	Health Departments	54,194,473	0.28808%	2,946,205	Yes	9.97%	2,946,205
LINCOLN TRL DIST HLTH DEP	Health Departments	66,500,206	0.35349%	3,615,244	Yes	9.97%	3,615,244
KY RIVER DIST HEALTH DEPT	Health Departments	70,220,607	0.37327%	3,817,495	Yes	9.97%	3,817,495
MADISON CO HEALTH DEP	Health Departments	53,457,239	0.28416%	2,906,171	Yes	9.97%	2,906,171
CUMBERLAND VLY DIST HEALT	Health Departments	89,949,862	0.47814%	4,889,995	Yes	9.97%	4,889,995
WEDCO DIST HEALTH DEPT	Health Departments	28,173,710	0.14976%	1,531,594	Yes	9.97%	1,531,594
FRANKLIN CO HEALTH DEPT	Health Departments	22,299,718	0.11854%	1,212,256	Yes	9.97%	1,212,256
WHITLEY CO HEALTH DEPT	Health Departments	28,890,387	0.15357%	1,570,588	Yes	9.97%	1,570,588
PIKE CO HEALTH DEPT	Health Departments	24,182,977	0.12855%	1,314,681	Yes	9.97%	1,314,681
THREE RIVERS DIST HLTH	Health Departments	22,852,018	0.12147%	1,242,308	Yes	9.97%	1,242,308
KNOX CO HEALTH DEPT	Health Departments	28,079,768	0.14926%	1,526,499	Yes	9.97%	1,526,499
PURCHASE DIST HLTH DEPT	Health Departments	43,960,371	0.23368%	2,389,886	Yes	9.97%	2,389,886
CLARK CO HEALTH DEPT	Health Departments	16,463,623	0.08751%	894,998	Yes	9.97%	894,998
GATEWAY DIST HEALTH DEPT	Health Departments	29,474,251	0.15667%	1,602,304	Yes	9.97%	1,602,304
N CENTRAL DIST HLTH DEPT	Health Departments	21,562,812	0.11462%	1,172,222	Yes	9.97%	1,172,222
BREATHITT CO HEALTH DEPT	Health Departments	18,123,824	0.09634%	985,257	Yes	9.97%	985,257
PENNYRILE DIST HLTH DEPT	Health Departments	15,661,674	0.08325%	851,429	Yes	9.97%	851,429
MARSHALL CO HEALTH DEPT	Health Departments	15,263,463	0.08113%	829,800	Yes	9.97%	829,800
CHRISTIAN CO HEALTH DEPT	Health Departments	13,360,854	0.07102%	726,335	Yes	9.97%	726,335
MONTGOMERY CO HEALTH DEPT	Health Departments	10,699,698	0.05688%	581,692	Yes	9.97%	581,692
HOPKINS CO HEALTH DEPT	Health Departments	17,815,060	0.09470%	968,516	Yes	9.97%	968,516
JOHNSON CO HEALTH DEPT	Health Departments	15,484,079	0.08231%	841,758	Yes	9.97%	841,758
FLOYD CO HEALTH CENTER	Health Departments	12,298,013	0.06537%	668,519	Yes	9.97%	668,519
ASHLAND BOYD CO HEALTH DP	Health Departments	17,566,824	0.09338%	954,998	Yes	9.97%	954,998
LAUREL CO HEALTH DEPT	Health Departments	14,475,341	0.07695%	786,958	Yes	9.97%	786,958
BULLITT CO HEALTH DEPT	Health Departments	13,823,739	0.07348%	751,499	Yes	9.97%	751,499
BELL CO HEALTH DEPT	Health Departments	10,731,667	0.05705%	583,459	Yes	9.97%	583,459
GREENUP CO HLTH DEPT	Health Departments	11,509,071	0.06118%	625,677	Yes	9.97%	625,677
JESSAMINE CO HEALTH DEPT	Health Departments	8,409,539	0.04470%	457,222	Yes	9.97%	457,222
GRAVES CO HEALTH CENTER	Health Departments	6,110,503	0.03248%	332,232	Yes	9.97%	332,232
HARLAN CO HEALTH DEPT	Health Departments	7,218,470	0.03837%	392,439	Yes	9.97%	392,439
OLDHAM CO HEALTH DEPT	Health Departments	10,480,598	0.05571%	569,733	Yes	9.97%	569,733
ALLEN CO HEALTH DEPT	Health Departments	7,911,333	0.04205%	430,082	Yes	9.97%	430,082
BUFFALO TRACE HEALTH DEPT	Health Departments	10,788,599	0.05735%	586,475	Yes	9.97%	586,475
MUHLENBERG CO.HEALTH DEPT	Health Departments	7,886,100	0.04192%	428,730	Yes	9.97%	428,730
MERCER CO HEALTH DEPT	Health Departments	8,877,255	0.04719%	482,594	Yes	9.97%	482,594
LAWRENCE CO HEALTH DEPT	Health Departments	3,868,705	0.02056%	210,362	Yes	9.97%	210,362
WOODFORD CO HEALTH DEPT	Health Departments	5,453,322	0.02899%	296,461	Yes	9.97%	296,461
CALLOWAY CO HEALTH DEPT	Health Departments	4,137,638	0.02199%	224,919	Yes	9.97%	224,919
MAGOFFIN CO HEALTH DEPT	Health Departments	6,467,092	0.03438%	351,573	Yes	9.97%	351,573
MARTIN CO HEALTH DEPT	Health Departments	5,286,010	0.02810%	287,414	Yes	9.97%	287,414
BOYLE CO HEALTH DEPT	Health Departments	6,346,920	0.03374%	345,022	Yes	9.97%	345,022
BOURBON CO HEALTH CENTER	Health Departments	7,775,901	0.04133%	422,699	Yes	9.97%	422,699
ANDERSON CO HEALTH DEPT	Health Departments	5,076,042	0.02698%	275,976	Yes	9.97%	275,976
LEWIS CO HEALTH DEPT	Health Departments	3,061,131	0.01627%	166,376	Yes	9.97%	166,376
ESTILL CO HEALTH DEPT	Health Departments	5,579,547	0.02966%	303,324	Yes	9.97%	303,324
LINCOLN CO HEALTH DEPT	Health Departments	4,897,375	0.02603%	266,201	Yes	9.97%	266,201
BRECKINRIDGE CO HEALTH BD	Health Departments	7,704,261	0.04095%	418,851	Yes	9.97%	418,851
GRAYSON COUNTY HEALTH DEPT	Health Departments	4,598,067	0.02444%	249,980	Yes	9.97%	249,980
GARRARD COUNTY HEALTH DPT	Health Departments	3,926,271	0.02087%	213,481	Yes	9.97%	213,481
TODD CO HEALTH DEPT	Health Departments	4,687,868	0.02492%	254,867	Yes	9.97%	254,867
FLEMING CO HEALTH DEP	Health Departments	4,386,549	0.02332%	238,437	Yes	9.97%	238,437
MONROE CO HEALTH DEPT	Health Departments	3,137,459	0.01668%	170,535	Yes	9.97%	170,535
BRACKEN CO HEALTH DEPT	Health Departments	2,410,616	0.01281%	131,021	Yes	9.97%	131,021
POWELL CO HEALTH DEPT	Health Departments	4,200,545	0.02233%	228,351	Yes	9.97%	228,351
CARTER CO HEALTH DEPT	Health Departments	5,555,239	0.02953%	301,972	Yes	9.97%	301,972
KY HIGHER ED STUD LN CORP	Non-P1 State Assoc/Corp.	81,896,904	0.43533%	4,452,219	No	9.97%	4,310,426
CSG HEADQUARTERS	Non-P1 State Assoc/Corp.	19,274,916	0.10246%	1,047,856	No	9.97%	1,014,509
KET FOUNDATION	Non-P1 State Assoc/Corp.	15,066,238	0.08009%	819,089	No	9.97%	793,012
ASST OF COMMONWEALTH ATTY	Non-P1 State Assoc/Corp.	5,807,856	0.03087%	315,698	No	9.97%	305,660
HIGHSCHOOL ATHLETIC ASSOC	Non-P1 State Assoc/Corp.	1,413,847	0.00752%	76,845	No	9.97%	74,459

Appendix D
Kentucky Employees Retirement System (Non-Hazardous) - Retirement and Insurance Combined
Employer Contribution by Agency

		Fixed Percentage of the Total Amortization Cost				Components of Required Contribution for FYE 2023	
Agency Name[1]	Agency Classification[1]	Accrued Liability based on June 30, 2019 Valuation[2]	Fixed Allocation of Amortization Cost	Amortization Cost for prior year (FYE2022) adjusted for Appeals[3]	Amortization Cost Remains Level until Actuarial Investigation[4]	Normal Cost (% of Pay)	Amortization Cost
(1)	(2)	(3)	(4) = (3) / $18,813M	(5)	(6), per KRS 61.565(1)(d)1d	(7) = 9.97% of pay for all employers	(8) = (4) x $994M[5]
O A S I S	Non-P1 State Agencies	2,304,549	0.01225%	125,302	Yes	9.97%	125,302
KDVA	Non-P1 State Agencies	2,431,059	0.01292%	132,165	Yes	9.97%	132,165
B.R.A.S.S.	Non-P1 State Agencies	2,132,362	0.01133%	115,943	Yes	9.97%	115,943
BLUEGRASS RAPE CRISIS CTR	Non-P1 State Agencies	2,744,493	0.01459%	149,218	Yes	9.97%	149,218
SAFE HARBOR	Non-P1 State Agencies	1,312,696	0.00698%	71,334	Yes	9.97%	71,334
SANCTUARY INC	Non-P1 State Agencies	2,510,255	0.01334%	136,428	Yes	9.97%	136,428
LOTUS	Non-P1 State Agencies	1,074,054	0.00571%	58,440	Yes	9.97%	58,440
BETHANY HOUSE ABUSE SHELT	Non-P1 State Agencies	1,675,224	0.00890%	91,091	Yes	9.97%	91,091
SPRINGHAVEN INC	Non-P1 State Agencies	1,527,812	0.00812%	83,084	Yes	9.97%	83,084
KASAP	Non-P1 State Agencies	943,862	0.00502%	51,265	Yes	9.97%	51,265
SILVERLEALF	Non-P1 State Agencies	2,017,711	0.01073%	109,704	Yes	9.97%	109,704
WOMEN AWARE	Non-P1 State Agencies	975,811	0.00519%	53,032	Yes	9.97%	53,032
D.O.V.E.S.	Non-P1 State Agencies	1,319,147	0.00701%	71,750	Yes	9.97%	71,750
NURSING HOME OMBUDSMAN	Non-P1 State Agencies	879,808	0.00468%	47,833	No	9.97%	46,339
HOPE HARBOR INC	Non-P1 State Agencies	824,202	0.00438%	44,818	Yes	9.97%	44,818
CHILD WATCH ADVOCACY CTR	Non-P1 State Agencies	718,149	0.00382%	38,994	Yes	9.97%	38,994
FRANKLIN CO COUNCIL AGING	Non-P1 State Agencies	2,147,140	0.01141%	116,775	No	9.97%	112,976
JUDI'S PLACE FOR KIDS, INC.	Non-P1 State Agencies	777,468	0.00413%	42,218	Yes	9.97%	42,218
CUMBERLAND V C A CENTER	Non-P1 State Agencies	821,917	0.00437%	44,714	Yes	9.97%	44,714
KY ASSOC OF REGIONAL PROG	Non-P1 State Agencies	1,817,343	0.00966%	98,786	Yes	9.97%	98,786
BARREN RIVER CHILD ADVOCA	Non-P1 State Agencies	406,450	0.00216%	22,045	Yes	9.97%	22,045
CHILD ADV CTR OF GRN RVR	Non-P1 State Agencies	572,517	0.00304%	31,091	Yes	9.97%	31,091
MUN ELEC POW ASSOC OF KY	Non-P1 State Agencies	1,745,743	0.00928%	94,938	No	9.97%	91,886
KY RIVER CHILD ADVOCACY	Non-P1 State Agencies	290,885	0.00155%	15,806	Yes	9.97%	15,806
PENNYRILE CHILD ADV CTR	Non-P1 State Agencies	460,162	0.00245%	25,060	Yes	9.97%	25,060
LAKE CUMB CHILD ADV CTR	Non-P1 State Agencies	545,959	0.00290%	29,636	Yes	9.97%	29,636
BUFFALO TR CHILD ADV INC	Non-P1 State Agencies	252,189	0.00134%	13,726	Yes	9.97%	13,726
NEW VISTA OF THE BLUEGRASS, INC.	Reg Mental Hlth Units	183,780,745	0.97691%	9,991,080	Yes	9.97%	9,991,080
CUMBERLAND RIVER MHMR	Reg Mental Hlth Units	98,252,502	0.52227%	5,341,394	Yes	9.97%	5,341,394
LIFESKILLS INC	Reg Mental Hlth Units	129,215,562	0.68686%	7,024,702	Yes	9.97%	7,024,702
COMMUNICARE INC	Reg Mental Hlth Units	66,572,026	0.35387%	3,619,091	Yes	9.97%	3,619,091
ADANTA/BEHAVIORAL HLTH SR	Reg Mental Hlth Units	89,012,578	0.47316%	4,839,042	Yes	9.97%	4,839,042
MOUNTAIN COMP CARE CENTER	Reg Mental Hlth Units	45,808,460	0.24350%	2,490,335	Yes	9.97%	2,490,335
GREEN RVR REG MHMR BD	Reg Mental Hlth Units	29,849,717	0.15867%	1,622,789	Yes	9.97%	1,622,789
NORTHERN KY REG MHMR BD	Reg Mental Hlth Units	57,271,755	0.30443%	3,113,517	Yes	9.97%	3,113,517
WESTERN KY REG MHMR ADV	Reg Mental Hlth Units	35,526,557	0.18885%	1,931,416	Yes	9.97%	1,931,416
COMPREHEND INC REG MHMR B	Reg Mental Hlth Units	29,064,447	0.15450%	1,580,051	Yes	9.97%	1,580,051
SEVEN CO SERVICES INC	Reg Mental Hlth Units	154,213,520	0.81974%	8,383,681	Yes	9.97%	8,383,681
KY RIVER COMM CARE INC	Reg Mental Hlth Units	26,687,511	0.14186%	1,450,798	Yes	9.97%	1,450,798
EASTERN KY UNIV	Universities	239,031,382	1.27060%	12,994,684	No	9.97%	12,580,858
KCTCS	Universities	156,197,124	0.83028%	8,491,513	No	9.97%	8,220,992
WESTERN KENTUCKY UNIV	Universities	180,798,950	0.96106%	9,828,967	No	9.97%	9,515,948
MURRAY STATE UNIV	Universities	132,693,175	0.70534%	7,213,746	No	9.97%	6,983,851
MOREHEAD STATE UNIVERSITY	Universities	120,999,617	0.64319%	6,577,982	No	9.97%	6,368,494
KENTUCKY STATE UNIVERSITY	Universities	44,391,511	0.23597%	2,413,282	No	9.97%	2,336,460
ALLEN COUNTY ATTORNEY	County Attorneys	1,658,981	0.00882%	90,155	No	9.97%	87,331
ANDERSON COUNTY ATTORNEY	County Attorneys	1,971,500	0.01048%	107,208	No	9.97%	103,768
BARREN COUNTY ATTORNEY	County Attorneys	2,875,029	0.01528%	156,289	No	9.97%	151,295
BATH COUNTY ATTORNEY	County Attorneys	2,729	0.00001%	104	No	9.97%	99
BELL COUNTY ATTORNEY	County Attorneys	1,931,690	0.01027%	105,025	No	9.97%	101,689
BOONE COUNTY ATTORNEY	County Attorneys	5,092,956	0.02707%	276,912	No	9.97%	268,034
BOYLE COUNTY ATTORNEY	County Attorneys	155,378	0.00083%	8,423	No	9.97%	8,218
BRECKINRIDGE CO ATTORNEY	County Attorneys	1,029,674	0.00547%	55,944	No	9.97%	54,161
BULLITT COUNTY ATTORNEY	County Attorneys	703,350	0.00374%	38,266	No	9.97%	37,032
CALLOWAY COUNTY ATTORNEY	County Attorneys	54,643	0.00029%	3,016	No	9.97%	2,871
CARROLL COUNTY ATTORNEY	County Attorneys	873,614	0.00464%	47,521	No	9.97%	45,943
CASEY COUNTY ATTORNEY	County Attorneys	947,428	0.00504%	51,473	No	9.97%	49,904
CHILD SUPPORT ENCORCEMENT	County Attorneys	255,979	0.00136%	13,934	No	9.97%	13,466
CHRISTIAN COUNTY ATTORNEY	County Attorneys	984,086	0.00523%	53,448	No	9.97%	51,785
CLARK COUNTY ATTORNEY	County Attorneys	1,322,750	0.00703%	71,958	No	9.97%	69,608
CRITTENDEN CO ATTORNEY	County Attorneys	365,437	0.00194%	19,861	No	9.97%	19,209
DAVIESS COUNTY ATTORNEY	County Attorneys	1,578,350	0.00839%	85,788	No	9.97%	83,074
EDMONSON COUNTY ATTORNEY	County Attorneys	474,886	0.00252%	25,788	No	9.97%	24,952
FAYETTE CO ATTORNEY OFF	County Attorneys	3,136,743	0.01667%	170,535	No	9.97%	165,058
FLOYD COUNTY ATTORNEY	County Attorneys	1,121,075	0.00596%	60,935	No	9.97%	59,013
FRANKLIN COUNTY ATTORNEY	County Attorneys	4,833,960	0.02570%	262,770	No	9.97%	254,469
GARRARD COUNTY ATTORNEY	County Attorneys	988,761	0.00526%	53,760	No	9.97%	52,082
GRANT COUNTY CHILD SUPPOR	County Attorneys	363,477	0.00193%	19,757	No	9.97%	19,110
GRAVES COUNTY ATTORNEY	County Attorneys	3,272,663	0.01740%	177,918	No	9.97%	172,286

Appendix D
Kentucky Employees Retirement System (Non-Hazardous) - Retirement and Insurance Combined
Employer Contribution by Agency

Agency Name[1]	Agency Classification[1]	Fixed Percentage of the Total Amortization Cost: Accrued Liability based on June 30, 2019 Valuation[2]	Fixed Allocation of Amortization Cost	Amortization Cost for prior year (FYE2022) adjusted for Appeals[3]	Amortization Cost Remains Level until Actuarial Investigation[4]	Components of Required Contribution for FYE 2023: Normal Cost (% of Pay)	Amortization Cost
(1)	(2)	(3)	(4) = (3) / $18,813M	(5)	(6), per KRS 61.565(1)(d)1d	(7) = 9.97% of pay for all employers	(8) = (4) x $994M[5]
HANCOCK COUNTY ATTORNEY	County Attorneys	386,098	0.00205%	21,005	No	9.97%	20,298
HARRISON COUNTY ATTORNEY	County Attorneys	114,873	0.00061%	6,239	No	9.97%	6,040
HICKMAN COUNTY ATTORNEY	County Attorneys	1,028,593	0.00547%	55,944	No	9.97%	54,161
HOPKINS COUNTY ATTORNEY	County Attorneys	1,751,470	0.00931%	95,250	No	9.97%	92,183
JACKSON COUNTY ATTORNEY	County Attorneys	700,551	0.00372%	38,058	No	9.97%	36,834
JEFFERSON CO ATTORNEY	County Attorneys	17,081,131	0.09080%	928,585	No	9.97%	899,042
JOHNSON COUNTY ATTORNEY	County Attorneys	230,506	0.00123%	12,582	No	9.97%	12,179
KENTON COUNTY ATTORNEY	County Attorneys	1,021,997	0.00543%	55,528	No	9.97%	53,765
KNOTT COUNTY ATTORNEY	County Attorneys	900,207	0.00479%	48,977	No	9.97%	47,428
KNOX COUNTY ATTORNEY	County Attorneys	5,454	0.00003%	312	No	9.97%	297
LARUE COUNTY ATTORNEY	County Attorneys	1,041,769	0.00554%	56,672	No	9.97%	54,854
LAUREL COUNTY ATTORNEY	County Attorneys	353,526	0.00188%	19,237	No	9.97%	18,615
LAWRENCE COUNTY ATTORNEY	County Attorneys	144	0.00000%	-	No	9.97%	-
LEE COUNTY ATTORNEY	County Attorneys	888,298	0.00472%	48,249	No	9.97%	46,735
LOGAN COUNTY ATTORNEY	County Attorneys	1,781,059	0.00947%	96,810	No	9.97%	93,767
MADISON COUNTY ATTORNEY	County Attorneys	6,471,517	0.03440%	351,781	No	9.97%	340,612
MAGOFFIN CO ATTORNEY	County Attorneys	195,563	0.00104%	10,606	No	9.97%	10,298
MCCRACKEN COUNTY ATTORNEY	County Attorneys	1,092,697	0.00581%	59,375	No	9.97%	57,528
MCCREARY COUNTY ATTORNEY	County Attorneys	1,920,823	0.01021%	104,401	No	9.97%	101,094
MEADE COUNTY ATTORNEY	County Attorneys	1,485,282	0.00790%	80,796	No	9.97%	78,222
MENIFEE COUNTY ATTORNEY	County Attorneys	568,840	0.00302%	30,884	No	9.97%	29,903
MERCER COUNTY ATTORNEY	County Attorneys	507,084	0.00270%	27,556	No	9.97%	26,734
MONROE CO ATTORNEY	County Attorneys	617,699	0.00328%	33,587	No	9.97%	32,477
MONTGOMERY CO ATTORNEY	County Attorneys	1,684,951	0.00896%	91,611	No	9.97%	88,718
MORGAN COUNTY ATTORNEY	County Attorneys	1,815,404	0.00965%	98,682	No	9.97%	95,550
OLDHAM COUNTY ATTORNEY	County Attorneys	1,690,959	0.00899%	91,923	No	9.97%	89,015
OWEN COUNTY ATTORNEY	County Attorneys	490,212	0.00261%	26,620	No	9.97%	25,843
PENDLETON COUNTY ATTORNEY	County Attorneys	155,600	0.00083%	8,423	No	9.97%	8,218
POWELL COUNTY ATTORNEY	County Attorneys	26,895	0.00014%	1,456	No	9.97%	1,386
PULASKI COUNTY ATTORNEY	County Attorneys	1,602,159	0.00852%	87,139	No	9.97%	84,361
ROCKCASTLE CO ATTORNEY	County Attorneys	774,276	0.00412%	42,114	No	9.97%	40,794
ROWAN COUNTY ATTORNEY	County Attorneys	820,120	0.00436%	44,610	No	9.97%	43,171
SHELBY COUNTY ATTORNEY	County Attorneys	400,120	0.00213%	21,733	No	9.97%	21,090
SIMPSON COUNTY ATTORNEY	County Attorneys	521,989	0.00277%	28,388	No	9.97%	27,427
SPENCER COUNTY ATTORNEY	County Attorneys	1,200,709	0.00638%	65,303	No	9.97%	63,172
TRIGG COUNTY ATTORNEY	County Attorneys	933,350	0.00496%	50,745	No	9.97%	49,112
TRIMBLE COUNTY ATTORNEY	County Attorneys	749,934	0.00399%	40,762	No	9.97%	39,507
UNION COUNTY ATTORNEY	County Attorneys	293,278	0.00156%	15,910	No	9.97%	15,446
WAYNE COUNTY ATTORNEY	County Attorneys	668,657	0.00355%	36,395	No	9.97%	35,150
WEBSTER COUNTY ATTORNEY	County Attorneys	1,413,256	0.00751%	76,845	No	9.97%	74,360
WHITLEY COUNTY ATTORNEY	County Attorneys	2,013,956	0.01071%	109,496	No	9.97%	106,045
	Total	18,812,529,777	100.00000%	1,022,724,699	N/A	9.97%	994,421,476
Agencies that have ceased participation in the System:							
KENTUCKY BAR ASSOCIATION	Non-P1 State Agencies	9,726,855	N/A	-	N/A	N/A	N/A
KENTUCKY ASSOCIATION OF CHILDREN'S ADVOC.	Non-P1 State Agencies	14,508	N/A	-	N/A	N/A	N/A
COMMONWEALTH CREDIT UNION	Non-P1 State Agencies	46,950,704	N/A	-	N/A	N/A	N/A
KENTUCKY EMPLOYERS MUTUAL INSURANCE	Non-P1 State Agencies	15,220,243	N/A	-	N/A	N/A	N/A
GATEWAY CHILD ADVOCACY	Non-P1 State Agencies	53,228	N/A	-	N/A	N/A	N/A
NORTHERN KY UNIVERSITY	Universities	216,716,312	N/A	-	N/A	N/A	N/A
KENTUCKY HOUSING CORP	Non-P1 State Assoc/Corp.	98,280,874	N/A	-	N/A	N/A	N/A
	Total	19,199,492,501	100.00000%	1,022,724,699	N/A	9.97%	994,421,476

Notes and Assumptions

[1] Agency names and classification information have been provided to GRS by KPPA. We have reviewed this data for consistency but did not audit the data.

[2] The accrued liability as of June 30, 2019 has been adjusted based on the approved employer appeals. The liability associated with these appeals was compiled by KPPA based on the liability amounts provided by GRS.

[3] The amortization cost for FYE 2022 was re-calculated based on the fixed allocation adjusted for approved employer appeals. Per House Bill 8, any adjustments made for employer appeals are effective July 1, 2022; therefore, for agencies whose amortization cost remains level (as allowed per KRS 61.565(1)(d)1d), this amount will first be payable for FYE 2023 and will not be applicable for payments in FYE2022.

[4] The amortization cost for certain employers (as defined in KRS 61.565(1)(d)1d) will not be adjusted in terms of dollars paid by the individual employer, except for after the completion of an actuarial investigation as provided by KRS 61.670, so long as at least four years have passed since the last adjustment.

[5] The amortization cost for employers whose amortization cost does not remain level (as allowed per KRS 61.565(1)(d)1d) has been adjusted so that the total amortization cost required by employers is equal to the actuarially determined amount for the System, which is $994,421,476 for the fiscal year ending 2023.

P: 469.524.0000 | www.grsconsulting.com

December 2, 2021

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

Re: Sensitivity Analysis Based on Results of the June 30, 2021 Actuarial Valuation

Dear Members of the Board:

Per Kentucky State Statute 61.670, we are providing this supplemental information regarding the sensitivity of the valuation results to changes in some of the economic assumptions. Specifically, the enclosed tables show the impact for the **Kentucky Employees Retirement System (KERS)** due to changes in the investment return assumption, the inflation rate assumption, and the payroll growth rate assumption.

Background

Investment Assumption

The investment return assumption is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plans. The lower the investment return assumption, the less the benefit payments are discounted and the higher the valuation liability. The current investment return assumption is 5.25% for the KERS non-hazardous retirement fund and 6.25% for the KERS hazardous retirement fund and both KERS insurance funds. The sensitivity analysis shows the financial impact of a 1.00% increase and a 1.00% decrease in the investment return assumption. For purposes of this sensitivity analysis, the inflation assumption and payroll growth assumption remain unchanged from the valuation assumption.

Inflation Assumption

The inflation assumption underlies most of the other economic assumptions, including the investment return, salary increases, and payroll growth rate. This is a macroeconomic assumption and as such the same assumption is used in the valuation of each of the retirement systems. The current assumption is 2.30% for all funds. The sensitivity analysis shows the financial impact of a 0.25% increase and a 0.25% decrease in the inflation assumption. Note, the change in the inflation assumption results in a corresponding change in the investment return assumption, the individual salary increase assumption for projecting members' benefit amounts, the payroll growth rate assumption, and the healthcare trend assumption that is used in the valuation of the health insurance funds.

Payroll Growth Assumption

Participating employers of the KERS hazardous fund make contributions to the system as a percentage of the covered payroll. Therefore, as payroll changes over time these amortization payments will also change. If actual covered payroll increases at a rate that is less than assumed, then the retirement system receives fewer contribution dollars than expected to finance the unfunded liability, which means the contribution rate in future years will be required to increase in order to finance the unfunded liability over the same time period. The current payroll growth assumption is 0.00% for all the KERS retirement and insurance funds. The analysis shows the impact of a 1.00% increase and a 1.00% decrease in the payroll growth assumption.

For completeness, we have included this sensitivity for the non-hazardous fund. House Bill 8 passed during the 2021 legislative session and changed how contributions are collected and allocated amongst employers. The portion of the required contribution that amortizes (or pays for) the unfunded liability for the non-hazardous fund is no longer collected as a percentage of payroll. This sensitivity for the non-hazardous fund shows the impact of assuming that the amortization cost contributions paid by employers either decrease by 1% or increase by 1% annually (versus the valuation assumption that they remain level through the end of the funding period).

Please note that the payroll growth assumption does not impact the valuation liabilities, unfunded liability, or funded status of the system. Rather, this assumption only impacts the amortization rate for financing the existing unfunded actuarial accrued liability and the actuarially determined employer contribution. For purposes of this analysis, the investment return assumption and the inflation assumption are held at their current valuation assumptions.

Certification

The information provided in this letter compliments the information provided in the June 30, 2021 actuarial valuation report. Please refer to the June 30, 2021 actuarial valuation report for additional discussion of the actuarial valuation, including the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

Actual results can, and almost certainly will, differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rate, and funding periods. The actuarial calculations are intended to provide information for rational decision making. The purpose of this information is to provide stakeholders the financial sensitivity of the unfunded liability and contribution rates to changes in the inflation, assumed rate of return, and payroll growth assumption.

The undersigned are independent actuaries and consultants. Both of the undersigned are Enrolled Actuaries, Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. Both of the undersigned are experienced in performing valuations for large public retirement systems. This communication shall not be construed to provide tax advice, legal advice or investment advice.

Sincerely,

Gabriel, Roeder, Smith & Company

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

Janie Shaw, ASA, EA, MAAA
Consultant

Sensitivity Analysis - Discount Rate
Non-Hazardous Members
(Dollar amounts expressed in thousands)

(1)	Decrease Discount Rate (2)	Valuation Results (3)	Increase Discount Rate (4)
Payroll Growth Rate	0.00%	0.00%	0.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	4.25%	5.25%	6.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 18,344,613	$ 16,321,372	$ 14,655,807
Actuarial Value of Assets	2,735,876	2,735,876	2,735,876
Unfunded Actuarial Accrued Liability	15,608,737	13,585,496	11,919,931
Funded Ratio	14.9%	16.8%	18.7%
Normal Cost Rate	11.31%	7.82%	5.41%
Amortization Cost	$ 969,447	$ 906,020	$ 851,816
Insurance			
Actuarial Accrued Liability	$ 2,922,389	$ 2,574,112	$ 2,289,072
Actuarial Value of Assets	1,291,472	1,291,472	1,291,472
Unfunded Actuarial Accrued Liability	1,630,917	1,282,640	997,600
Funded Ratio	44.2%	50.2%	56.4%
Normal Cost Rate	2.96%	2.15%	1.56%
Amortization Cost	$ 108,804	$ 88,402	$ 69,580
Combined			
Actuarial Accrued Liability	$ 21,267,002	$ 18,895,484	$ 16,944,879
Actuarial Value of Assets	4,027,348	4,027,348	4,027,348
Unfunded Actuarial Accrued Liability	17,239,654	14,868,136	12,917,531
Funded Ratio	18.9%	21.3%	23.8%
Normal Cost Rate	14.27%	9.97%	6.97%
Amortization Cost	$ 1,078,251	$ 994,422	$ 921,396

Sensitivity Analysis - Inflation Rate
Non-Hazardous Members
(Dollar amounts expressed in thousands)

(1)	Decrease Inflation Rate (2)	Valuation Results (3)	Increase Inflation Rate (4)
Payroll Growth Rate	-0.25%	0.00%	0.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	5.00%	5.25%	5.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 16,759,612	$ 16,321,372	$ 15,903,291
Actuarial Value of Assets	2,735,876	2,735,876	2,735,876
Unfunded Actuarial Accrued Liability	14,023,736	13,585,496	13,167,415
Funded Ratio	16.3%	16.8%	17.2%
Normal Cost Rate	8.29%	7.82%	7.39%
Amortization Cost	$ 941,717	$ 906,020	$ 871,875
Insurance			
Actuarial Accrued Liability	$ 2,594,161	$ 2,574,112	$ 2,555,191
Actuarial Value of Assets	1,291,472	1,291,472	1,291,472
Unfunded Actuarial Accrued Liability	1,302,689	1,282,640	1,263,719
Funded Ratio	49.8%	50.2%	50.5%
Normal Cost Rate	2.23%	2.15%	2.08%
Amortization Cost	$ 90,101	$ 88,402	$ 86,800
Combined			
Actuarial Accrued Liability	$ 19,353,773	$ 18,895,484	$ 18,458,482
Actuarial Value of Assets	4,027,348	4,027,348	4,027,348
Unfunded Actuarial Accrued Liability	15,326,425	14,868,136	14,431,134
Funded Ratio	20.8%	21.3%	21.8%
Normal Cost Rate	10.52%	9.97%	9.47%
Amortization Cost	$ 1,031,818	$ 994,422	$ 958,675

Sensitivity Analysis - Payroll Growth
Non-Hazardous Members
(Dollar amounts expressed in thousands)

	Decrease Payroll Growth	Valuation Results	Increase Payroll Growth
(1)	(2)	(3)	(4)
Payroll Growth Rate	-1.00%	0.00%	1.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	5.25%	5.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 16,321,372	$ 16,321,372	$ 16,321,372
Actuarial Value of Assets	2,735,876	2,735,876	2,735,876
Unfunded Actuarial Accrued Liability	13,585,496	13,585,496	13,585,496
Funded Ratio	16.8%	16.8%	16.8%
Normal Cost Rate	7.82%	7.82%	7.82%
Amortization Cost	$ 999,804	$ 906,020	$ 817,234
Insurance			
Actuarial Accrued Liability	$ 2,574,112	$ 2,574,112	$ 2,574,112
Actuarial Value of Assets	1,291,472	1,291,472	1,291,472
Unfunded Actuarial Accrued Liability	1,282,640	1,282,640	1,282,640
Funded Ratio	50.2%	50.2%	50.2%
Normal Cost Rate	2.15%	2.15%	2.15%
Amortization Cost	$ 97,919	$ 88,402	$ 79,350
Combined			
Actuarial Accrued Liability	$ 18,895,484	$ 18,895,484	$ 18,895,484
Actuarial Value of Assets	4,027,348	4,027,348	4,027,348
Unfunded Actuarial Accrued Liability	14,868,136	14,868,136	14,868,136
Funded Ratio	21.3%	21.3%	21.3%
Normal Cost Rate	9.97%	9.97%	9.97%
Amortization Cost	$ 1,097,723	$ 994,422	$ 896,584

Sensitivity Analysis - Discount Rate
Hazardous Members
(Dollar amounts expressed in thousands)

(1)	Decrease Discount Rate (2)	Valuation Results (3)	Increase Discount Rate (4)
Payroll Growth Rate	0.00%	0.00%	0.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	6.25%	7.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 1,456,984	$ 1,295,243	$ 1,163,824
Actuarial Value of Assets	782,496	782,496	782,496
Unfunded Actuarial Accrued Liability	674,488	512,747	381,328
Funded Ratio	53.7%	60.4%	67.2%
Actuarially Determined Contribution Rate	41.89%	31.82%	23.38%
Insurance			
Actuarial Accrued Liability	$ 482,624	$ 424,455	$ 377,419
Actuarial Value of Assets	575,025	575,025	575,025
Unfunded Actuarial Accrued Liability	(92,401)	(150,570)	(197,606)
Funded Ratio	119.1%	135.5%	152.4%
Actuarially Determined Contribution Rate	1.55%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 1,939,608	$ 1,719,698	$ 1,541,243
Actuarial Value of Assets	1,357,521	1,357,521	1,357,521
Unfunded Actuarial Accrued Liability	582,087	362,177	183,722
Funded Ratio	70.0%	78.9%	88.1%
Actuarially Determined Contribution Rate	43.44%	31.82%	23.38%

Sensitivity Analysis - Inflation Rate
Hazardous Members
(Dollar amounts expressed in thousands)

(1)	Decrease Inflation Rate (2)	Valuation Results (3)	Increase Inflation Rate (4)
Payroll Growth Rate	-0.25%	0.00%	0.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	6.00%	6.25%	6.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 1,329,512	$ 1,295,243	$ 1,262,660
Actuarial Value of Assets	782,496	782,496	782,496
Unfunded Actuarial Accrued Liability	547,016	512,747	480,164
Funded Ratio	58.9%	60.4%	62.0%
Actuarially Determined Contribution Rate	34.35%	31.82%	29.44%
Insurance			
Actuarial Accrued Liability	$ 428,678	$ 424,455	$ 420,489
Actuarial Value of Assets	575,025	575,025	575,025
Unfunded Actuarial Accrued Liability	(146,347)	(150,570)	(154,536)
Funded Ratio	134.1%	135.5%	136.8%
Actuarially Determined Contribution Rate	0.00%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 1,758,190	$ 1,719,698	$ 1,683,149
Actuarial Value of Assets	1,357,521	1,357,521	1,357,521
Unfunded Actuarial Accrued Liability	400,669	362,177	325,628
Funded Ratio	77.2%	78.9%	80.7%
Actuarially Determined Contribution Rate	34.35%	31.82%	29.44%

Sensitivity Analysis - Payroll Growth
Hazardous Members
(Dollar amounts expressed in thousands)

	Decrease Payroll Growth	Valuation Results	Increase Payroll Growth
(1)	(2)	(3)	(4)
Payroll Growth Rate	-1.00%	0.00%	1.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	6.25%	6.25%	6.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 1,295,243	$ 1,295,243	$ 1,295,243
Actuarial Value of Assets	782,496	782,496	782,496
Unfunded Actuarial Accrued Liability	512,747	512,747	512,747
Funded Ratio	60.4%	60.4%	60.4%
Actuarially Determined Contribution Rate	34.35%	31.82%	29.45%
Insurance			
Actuarial Accrued Liability	$ 424,455	$ 424,455	$ 424,455
Actuarial Value of Assets	575,025	575,025	575,025
Unfunded Actuarial Accrued Liability	(150,570)	(150,570)	(150,570)
Funded Ratio	135.5%	135.5%	135.5%
Actuarially Determined Contribution Rate	0.00%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 1,719,698	$ 1,719,698	$ 1,719,698
Actuarial Value of Assets	1,357,521	1,357,521	1,357,521
Unfunded Actuarial Accrued Liability	362,177	362,177	362,177
Funded Ratio	78.9%	78.9%	78.9%
Actuarially Determined Contribution Rate	34.35%	31.82%	29.45%

State Police Retirement System (SPRS)

Actuarial Valuation Report
as of June 30, 2021

P: 469.524.0000 | www.grsconsulting.com

December 2, 2021

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

Subject: Actuarial Valuation as of June 30, 2021

Dear Trustees of the Board:

This report describes the current actuarial condition of the State Police Retirement System (SPRS) and provides the actuarially determined employer contribution rates for fiscal years ending June 30, 2023 and June 30, 2024. In addition, the report analyzes changes in SPRS's financial condition and provides various summaries of the data.

Separate reports are issued with regard to valuation results determined in accordance with Governmental Accounting Standards Board (GASB) Statements 67, 68, 74 and 75. Results of this report should not be used for any other purpose without consultation with the undersigned. Valuations are prepared annually as of June 30, the first day of the plan year for SPRS. This report was prepared at the request of the Board of Trustees of the Kentucky Retirement System (Board) and is intended for use by the Kentucky Public Pensions Authority (KPPA) staff and those designated or approved by the Board.

FINANCING OBJECTIVES AND FUNDING POLICY

The contribution rates determined by these actuarial valuations are intended to become effective twelve months after the valuation date and, as such, are intended to be used by the Board for recommending required contribution rates effective July 1, 2022, as well as the subsequent fiscal year beginning July 1, 2023 and ending June 30, 2024.

The employer contribution rate is determined in accordance with Section 61.565 of Kentucky Statute. As specified by the Statute, the employer contribution is comprised of a normal cost contribution and an actuarial accrued liability contribution. The actuarial accrued liability contribution is calculated by amortizing the unfunded accrued liability as of June 30, 2019 over a closed 30-year amortization period (28 years remaining as of June 30, 2021). Gains and losses incurring in years after June 30, 2019 are amortized as separate closed 20-year amortization bases.

Assumptions and Methods

The Board of Trustees, in consultation with the actuary, sets the actuarial assumptions and methods used in the actuarial valuation. Except where noted in this report, the assumptions used in this actuarial valuation were adopted by the Board for first use in the June 30, 2019 actuarial valuation and are based on an experience study conducted with experience through June 30, 2018. There were no changes in actuarial assumptions or methods since the prior valuation.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can, and almost certainly will, differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rate, and funding periods. The actuarial calculations are intended to provide information for rational decision making.

This report was prepared using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

Benefit Provisions

The benefit provisions reflected in these valuations are those which were in effect on June 30, 2021. Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for certain members who become "totally and permanently disabled" in the line of duty or as a result of a duty-related disability. There were no other material benefit provision changes since the prior valuation.

Data

Member data for retired, active and inactive members was supplied as of June 30, 2021, by KPPA staff. The staff also supplied asset information as of June 30, 2021. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent with the prior year's data. GRS is not responsible for the accuracy or completeness of the information provided to us by KPPA.

CERTIFICATION

We certify that the information presented herein is accurate and fairly portrays the actuarial position of SPRS as of June 30, 2021.

All of our work conforms with generally accepted actuarial principles and practices, and is in conformity with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of Kentucky Code of Laws and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board.

The undersigned are independent actuaries and consultants. Both of the undersigned are Enrolled Actuaries, Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. Both of the undersigned are experienced in performing valuations for large public retirement systems. This communication shall not be construed to provide tax advice, legal advice or investment advice.

Sincerely,

Gabriel, Roeder, Smith & Company

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

Janie Shaw, ASA, EA, MAAA
Consultant

Table of Contents

SECTION 1

EXECUTIVE SUMMARY

Summary of Principal Results

(Dollar amounts expressed in thousands)

	SPRS	
	June 30, 2021	June 30, 2020
Actuarially Determined Contribution:		
Retirement	126.40%	127.99%
Insurance	14.11%	18.07%
Total	140.51%	146.06%
Contribution Rate for Next Fiscal Year[1]	140.51%	146.06%
Assets:		
Retirement		
• Actuarial value (AVAR)	$323,250	$296,126
• Market value (MVAR)	$356,346	$293,949
• Ratio of actuarial to market value of assets	90.7%	100.7%
Insurance		
• Actuarial value (AVAI)	$223,251	$207,018
• Market value (MVAI)	$247,318	$201,340
• Ratio of actuarial to market value of assets	90.3%	102.8%
Funded Status:		
Retirement		
• Actuarial accrued liability	$1,053,259	$1,053,158
• Unfunded accrued liability on AVAR	$730,009	$757,032
• Funded ratio on AVAR	30.7%	28.1%
• Unfunded accrued liability on MVAR	$696,913	$759,209
• Funded ratio on MVAR	33.8%	27.9%
Insurance		
• Actuarial accrued liability	$272,406	$276,144
• Unfunded accrued liability on AVAI	$49,155	$69,126
• Funded ratio on AVAI	82.0%	75.0%
• Unfunded accrued liability on MVAI	$25,088	$74,804
• Funded ratio on MVAI	90.8%	72.9%
Membership:		
• Number of		
- Active Members	775	798
- Retirees and Beneficiaries	1,673	1,669
- Inactive Members	634	589
- Total	3,082	3,056
• Projected payroll of active members	$45,338	$46,145
• Average salary of active members	$58,501	$57,826

[1] Contribution rates calculated with the June 30, 2021 valuation are effective for fiscal years ending June 30, 2023 and June 30 2024. Rates calculated with the June 30, 2020 valuation are effective for fiscal year ending June 30, 2022.

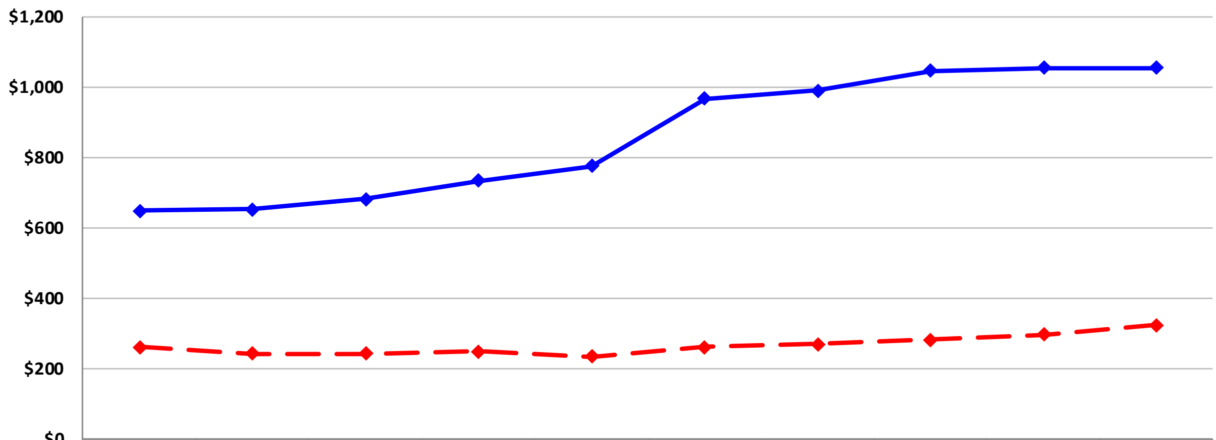
Executive Summary (Continued)

Retirement Fund

The unfunded actuarial accrued liability of the retirement fund decreased by $27 million since the prior year's valuation to $730 million. This decrease was approximately $13.5 million more than expected, primarily due to favorable investment experience in the past year.

Below is a chart with the historical actuarial value of assets and actuarial accrued liability. The divergence in the assets and liability over the last ten years has generally been due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return between 2015 and 2017.

History of Actuarial Assets vs. Actuarial Accrued Liability
(Dollars in Millions)



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AAL	648	652	681	734	775	967	990	1,045	1,053	1,053
AVA	260	242	243	248	235	261	268	282	296	323

Executive Summary (Continued)

Summary of Change in Financial Condition of the Insurance Fund

Both the 2022 non-Medicare and Medicare premiums were lower than expected based on the prior year's actuarial assumptions, which resulted in lower than expected accrued liability for the insurance fund.

Specifically, the non-Medicare premiums were expected to increase by 6.4% from calendar year 2021 to calendar year 2022 (i.e. the medical trend assumption for non-Medicare premiums used) and the actual premiums increased by approximately 2.4%. The Medicare premiums were expected to increase by 2.9% from calendar year 2021 to calendar year 2022, which was based on the "Not to Exceed" 2022 Medicare premiums that Humana provided in 2021. Actual Medicare premiums increased by approximately 2.0%.

Since the prior year's valuation, the unfunded actuarial accrued liability of the insurance fund decreased by $20 million since the prior year's valuation to $49 million. This decrease was approximately $18 million more than expected, which includes a $8 million gain due to favorable investment experience and a $6 million gain due to the favorable premium experience. The corresponding funded ratio increased from 75.0% at June 30, 2020 to 82.0% at June 30, 2021.

SECTION 2

DISCUSSION

Discussion

The State Police Retirement System (SPRS) is a defined benefit pension plan that provides coverage for uniformed state police officers. SPRS includes hazardous duty benefits only. This report presents the results of the June 30, 2021 actuarial funding valuation for both the Retirement Fund and Insurance Fund.

The primary purposes of the valuation report are to describe the current actuarial condition of SPRS and provide the actuarially determined employer contribution rates for fiscal years ending June 30, 2023 and June 30, 2024. In addition, the report analyzes changes in SPRS's financial condition and provides various summaries of the data.

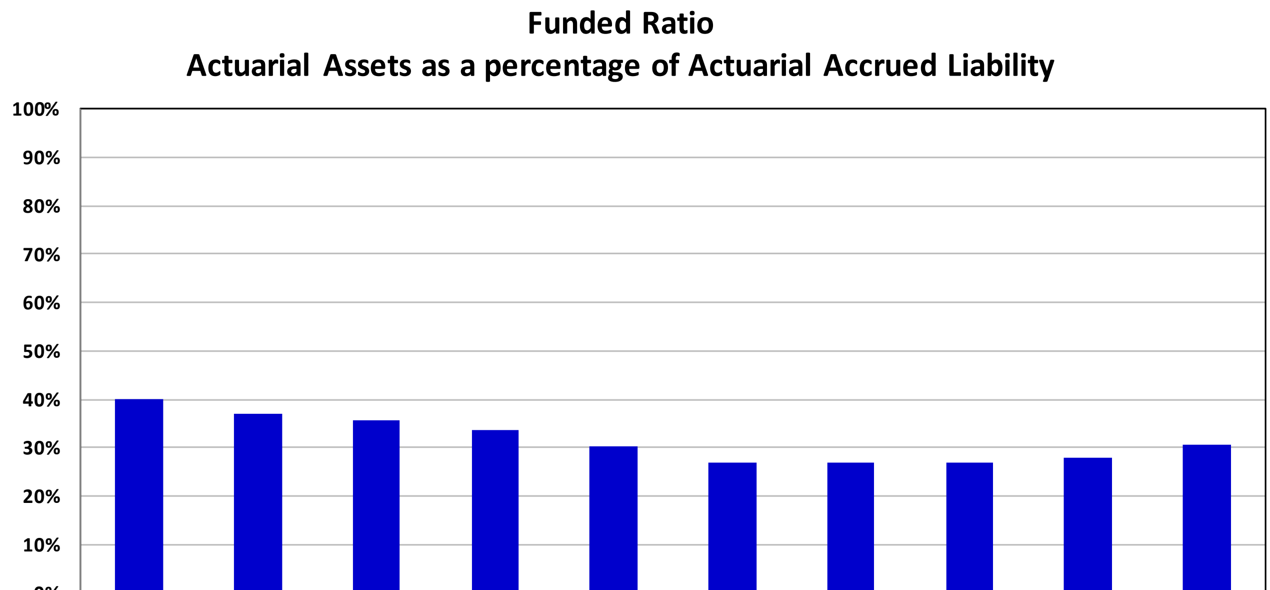
The actuarially determined contribution consist of two components: a normal cost rate and an amortization cost to finance the unfunded actuarial accrued liability. The normal cost rate is the theoretical amount which would be required to pay the members' benefits, based on the current plan provisions, if this amount had been contributed from each member's entry date and if the fund's experience exactly followed the actuarial assumptions. This is the amount that it should cost to provide the benefits for an average member. Since members contribute to the fund, only the excess of the normal rate over the member contribution rate is included in the employer contribution. The amortization cost is the amount necessary to amortize the unfunded actuarial accrued liability. The payroll growth rate and discount rate assumptions are selected by the Board. The funding period is specified in Section 61.565 of Kentucky Statute.

All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides additional details related to the calculation of the amortization of the unfunded actuarial accrued liability. Section 5 provides member data and statistical information. Section 6 provides a discussion of various risk measures, which are intended to aid stakeholders in understanding the effects of future experience differing from the assumptions used in performing an actuarial valuation. Appendices A and B provide summaries of the principle actuarial assumptions and methods and plan provisions. Finally, Appendix C provides a glossary of technical terms that are used throughout this report.

Funding Progress

The following chart provides a ten-year history of the retirement fund's funded ratio (i.e. the Actuarial Value of Assets divided by the Actuarial Accrued Liability). The decline in the funded ratio over the last ten years has generally been due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return between 2015 and 2017.

The funded ratio increased from 2020 to 2021 for the retirement fund. Assuming the full actuarially determined contributions are paid in future years and absent future unfavorable experience, the funded ratio is expected to continue improving. Also, the dollar amount of the unfunded actuarial accrued liability, or the difference between the actuarial accrued liability and the actuarial value of assets, is expected to continue decreasing. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the Retirement Funds.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Funded Ratio	40.1%	37.1%	35.6%	33.8%	30.3%	27.0%	27.1%	27.0%	28.1%	30.7%

Asset Gains/ (Losses)

The actuarial value of assets ("AVA") is based on a smoothed market value of assets, using a systematic approach to phase-in the difference between the actual and expected investment return on the market value of assets (adjusted for receipts and disbursements during the year). This is appropriate because it dampens the short-term volatility inherent in investment markets. The return is computed net of investment expenses.

Retirement Fund

The actuarial value of assets for the retirement fund increased from $296 million to $323 million since the prior valuation. The rate of return on the market value of assets on a dollar-weighted basis for the prior fiscal year was 21.0% which is greater than the 5.25% expected annual return. The return on an actuarial (smoothed) asset value was 8.9%, which resulted in a $10.9 million gain for the fiscal year. This difference in the estimated return on market value and actuarial value illustrates the smoothing effect of the asset valuation method. The market value of assets is $33 million greater than the actuarial value of assets, which signifies that the retirement fund is in a position of deferred gains to be realized in future years.

Table 6 in the following section of this report provides asset information that was included in the annual financial statements of the funds, as well as the estimated yield on a market value basis. Table 7 provides the development of the actuarial value of assets and the estimated yield on an actuarial value basis.

Actuarial Gains/ (Losses)

The annual actuarial valuation is a snapshot analysis of the benefit liabilities, assets and funded position of the funds as of the first day of the plan year. In any one fiscal year, the experience can be better or worse from that which is assumed or expected. The actuarial assumptions do not necessarily attempt to model what the experience will be for any one given fiscal year, but instead try to model the overall experience over many years. Therefore, as long as the actual experience of a retirement system is reasonably close to the current assumptions, the long-term funding requirements of the system will remain relatively consistent.

Below is a table that separately shows a reconciliation of the unfunded liability since the prior actuarial valuation for the retirement and health insurance funds, which include the effect of asset and liability gains and losses, changes in assumptions, and changes in plan provisions.

Experience Gain or (Loss)
(Dollar amounts expressed in thousands)

	Retirement	Insurance
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	$ 757,032	$ 69,126
2. Normal cost and administrative expenses	12,478	3,618
3. Less: contributions for the year	(64,402)	(9,494)
4. Interest accrual	38,381	4,137
5. Expected UAAL (Sum of Items 1 - 4)	$ 743,489	$ 67,387
6. Actual UAAL as of June 30,2021	$ 730,009	$ 49,155
7. Total gain (loss) for the year (Item 5 - Item 6)	$ 13,480	$ 18,232
B. Source of gains and losses		
8. Asset gain (loss) for the year	$ 10,893	$ 7,740
9. Liability experience gain (loss) for the year	2,622	10,591
10. Plan Change	(35)	(99)
11. Assumption change	—	—
12. Total	$ 13,480	$ 18,232

The accrued liability was approximately 0.2% less than expected for the retirement fund, resulting in the liability experience gain shown above. This experience was primarily due to lower than expected salary increases for active members and more terminations of vested active members than expected. The liability experience gain shown above for the insurance fund includes a $6.5 million gain due to the fund's favorable premium experience. See the discussion in the Executive Summary for additional information.

Actuarial Assumptions and Methods

In determining costs and liabilities, actuaries use assumptions about the future, such as rates of salary increase, probabilities of retirement, termination, death and disability, and an annual investment return assumption. The Board of Trustees, in consultation with the actuary, sets the actuarial assumptions and methods used in the actuarial valuation.

In conjunction with the review of the healthcare per capita claims cost, the assumed increase in future healthcare costs, or trend assumption, is reviewed on an annual basis. The trend assumption was last updated at the June 30, 2020 valuation. All other assumptions were adopted by the Board for first use in the June 30, 2019 actuarial valuation and are based on an experience study conducted based on experience through June 30, 2018. There were no changes in actuarial assumptions or methods since the prior valuation.

It is our opinion that the assumptions are internally consistent, reasonable, and reflect anticipated future experience of the System. Appendix A includes a summary of the actuarial assumptions and methods used in this valuation.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. This report does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

Benefit Provisions

Appendix B of this report includes a summary of the major benefit provisions for System.

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become “totally and permanently disabled” in the line of duty or as a result of a duty-related disability. The minimum disability benefit increased from 25% of the member’s monthly final rate of pay to 75% of the member’s monthly average pay. The insurance premium for the member, the member’s spouse, and the member’s dependent children shall also be paid in full by the System.

There were no other material plan provision changes since the prior valuation.

SECTION 3

ACTUARIAL TABLES

Actuarial Tables

Development of Unfunded Actuarial Accrued Liability

(Dollar amounts expressed in thousands)

		June 30, 2021	
		Retirement (1)	Insurance (2)
1.	Projected payroll of active members	$ 45,338	$ 45,338
2.	Present value of future pay	$ 440,256	$ 408,099
3.	Normal cost rate		
	a. Total normal cost rate	26.13%	7.35%
	b. Less: member contribution rate	-8.00%	-0.46%
	c. Employer normal cost rate	18.13%	6.89%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 293,928	$ 86,466
	b. Less: present value of future normal costs	(101,470)	(20,767)
	c. Actuarial accrued liability	$ 192,458	$ 65,699
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 850,336	$ 202,737
	b. Inactive members	10,465	3,970
	c. Active members (Item 4c)	192,458	65,699
	d. Total	$ 1,053,259	$ 272,406
6.	Actuarial value of assets	$ 323,250	$ 223,251
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 730,009	$ 49,155
8.	Funded Ratio	30.7%	82.0%

Actuarial Present Value of Future Benefits

(Dollar amounts expressed in thousands)

			June 30, 2021	
			Retirement (1)	Insurance (2)
1.	Active members			
	a.	Service retirement	$ 280,002	
	b.	Deferred termination benefits and refunds	3,244	
	c.	Survivor benefits	2,115	
	d.	Disability benefits	8,567	
	e.	Total	$ 293,928	$ 86,466
2.	Retired members			
	a.	Service retirement	$ 768,875	
	b.	Disability retirement	12,197	
	c.	Beneficiaries	69,264	
	d.	Total	$ 850,336	$ 202,737
3.	Inactive members			
	a.	Vested terminations	$ 10,003	$ 3,970
	b.	Nonvested terminations	462	N/A
	c.	Total	$ 10,465	$ 3,970
4.	Total actuarial present value of future benefits		$ 1,154,729	$ 293,173

Development of Actuarially Determined Contribution Rate

		June 30, 2021	
		Retirement	Insurance
		(1)	(2)
1.	Total normal cost rate		
	a. Service retirement	23.53%	
	b. Deferred termination benefits and refunds	1.04%	
	c. Survivor benefits	0.33%	
	d. Disability benefits	1.23%	
	e. Total	26.13%	7.35%
2.	Less: member contribution rate	-8.00%	-0.46%
3.	Total employer normal cost rate	18.13%	6.89%
4.	Administrative expenses	0.47%	0.20%
5.	Net employer normal cost rate	18.60%	7.09%
6.	UAAL amortization contribution rate	107.80%	7.02%
7.	Total calculated employer contribution	126.40%	14.11%

Actuarial Balance Sheet

Retirement Benefits

(Dollar amounts expressed in thousands)

			June 30, 2021 (1)	June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources			
	a.	Current assets (actuarial value)	$ 323,250	$ 296,126
	b.	Present value of future member contributions	$ 35,221	$ 36,457
	c.	Present value of future employer contributions		
		i. Normal cost contributions	$ 66,249	$ 71,416
		ii. Unfunded accrued liability contributions	730,009	757,032
		iii. Total future employer contributions	$ 796,258	$ 828,448
	d.	Total assets	$ 1,154,729	$ 1,161,031
2.	Liabilities - Present Value of Expected Future Benefit Payments			
	a.	Active members		
		i. Present value of future normal costs	$ 101,470	$ 107,873
		ii. Accrued liability	192,458	189,578
		iii. Total present value of future benefits	$ 293,928	$ 297,451
	b.	Present value of benefits payable on account of current retired members and beneficiaries	$ 850,336	$ 854,711
	c.	Present value of benefits payable on account of current inactive members	$ 10,465	$ 8,869
	d.	Total liabilities	$ 1,154,729	$ 1,161,031

Actuarial Balance Sheet

Insurance Benefits

(Dollar amounts expressed in thousands)

			June 30, 2021 (1)	June 30, 2020 (2)
1.	Assets - Present and Expected Future Resources			
	a.	Current assets (actuarial value)	$ 223,251	$ 207,018
	b.	Present value of future member contributions	$ 2,970	$ 2,921
	c.	Present value of future employer contributions		
		i. Normal cost contributions	$ 17,797	$ 19,361
		ii. Unfunded accrued liability contributions	49,155	69,126
		iii. Total future employer contributions	$ 66,952	$ 88,487
	d.	Total assets	$ 293,173	$ 298,426
2.	Liabilities - Present Value of Expected Future Benefit Payments			
	a.	Active members		
		i. Present value of future normal costs	$ 20,767	$ 22,282
		ii. Accrued liability	65,699	68,506
		iii. Total present value of future benefits	$ 86,466	$ 90,788
	b.	Present value of benefits payable on account of current retired members and beneficiaries	$ 202,737	$ 203,813
	c.	Present value of benefits payable on account of current inactive members	$ 3,970	$ 3,825
	d.	Total liabilities	$ 293,173	$ 298,426

Reconciliation of Net Assets

(Dollar amounts expressed in thousands)[1]

	Year Ending June 30, 2021 (1) Retirement	Year Ending June 30, 2021 (2) Insurance
1. Value of assets at beginning of year	$ 293,949	$ 201,340
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 4,752	$ 209
ii. Employer contributions	59,263	9,285
iii. Other contributions (less 401h)	388	0
iv. Total	$ 64,402	$ 9,494
b. Income		
i. Interest, dividends, and other income	$ 8,243	$ 5,846
ii. Investment expenses	(2,357)	(2,785)
iii. Net	$ 5,886	$ 3,061
c. Net realized and unrealized gains (losses)	55,843	47,228
d. Total revenue	$ 126,131	$ 59,782
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 273	$ 0
ii. Regular annuity benefits / Healthcare premiums	63,249	14,487
iii. Other benefit payments[2]	0	(772)
iv. Transfers to other systems	0	0
v. Total	$ 63,523	$ 13,715
b. Administrative expenses and depreciation	212	89
c. Total expenditures	$ 63,734	$ 13,804
4. Increase in net assets (Item 2. - Item 3.)	$ 62,396	$ 45,978
5. Value of assets at end of year (Item 1. + Item 4.)	$ 356,346	$ 247,318
6. Net external cash flow		
a. Dollar amount	$ 667	$ (4,310)
b. Percentage of market value	0.2%	-1.9%
7. Estimated annual return on net assets	21.0%	25.2%

[1] Amounts may not add due to rounding. Retirement assets exclude 401h assets. Insurance assets include 401h assets

[2] Insurance benefit payments have been offset by Medicare Drug Reimbursements, Insurance Premiums, and Humana Gain Share Payments

Development of Actuarial Value of Assets

Retirement Benefits

(Dollar amounts expressed in thousands)*

			June 30, 2021
	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	296,126
2.	Market value of assets at beginning of year	$	293,949
3.	Net new investments		
	a. Contributions	$	64,402
	b. Benefit payments		(63,523)
	c. Administrative expenses		(212)
	d. Subtotal	$	667
4.	Market value of assets at end of year	$	356,346
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	61,729
6.	Assumed investment return rate for fiscal year		5.25%
7.	Expected return for immediate recognition	$	15,450
8.	Excess return for phased recognition	$	46,279

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	46,279	$	9,256
b.	2020		(8,720)		(1,744)
c.	2019		669		134
d.	2018		5,183		1,037
e.	2017		11,623		2,325
f.	Total			$	11,007

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	323,250
11.	Ratio of actuarial value to market value		90.7%
12.	Estimated annual return on actuarial value of assets		8.9%

* Amounts may not add due to rounding

Development of Actuarial Value of Assets

Insurance Benefits

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2021
1.	Actuarial value of assets at beginning of year	$	207,018
2.	Market value of assets at beginning of year	$	201,340
3.	Net new investments		
	a. Contributions	$	9,494
	b. Benefit payments		(13,715)
	c. Administrative expenses		(89)
	d. Subtotal	$	(4,310)
4.	Market value of assets at end of year	$	247,318
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	50,289
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	12,449
8.	Excess return for phased recognition	$	37,840

9. Phased-in recognition, 20% of excess return on assets for prior years:

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2021	$	37,840	$	7,568
b.	2020		(11,419)		(2,284)
c.	2019		(1,099)		(220)
d.	2018		5,431		1,086
e.	2017		9,723		1,945
f.	Total			$	8,095

10.	Actuarial value of assets as of June 30, 2021 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	223,251
11.	Ratio of actuarial value to market value		90.3%
12.	Estimated annual return on actuarial value of assets		10.0%

* Amounts may not add due to rounding

Schedule of Funding Progress

(Dollar amounts expressed in thousands)

June 30, (1)	Actuarial Value of Assets (AVA) (2)	Actuarial Accrued Liability (AAL) (3)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2) (4)	Funded Ratio (2)/(3) (5)	Annual Covered Payroll (6)	UAAL as % of Payroll (4)/(6) (7)
			Retirement			
2012	$ 259,792	$ 647,689	$ 387,897	40.1%	$ 48,373	801.9%
2013	241,800	651,581	409,781	37.1%	45,256	905.5%
2014	242,742	681,118	438,376	35.6%	44,616	982.6%
2015	248,388	734,156	485,768	33.8%	45,765	1061.4%
2016	234,568	775,160	540,592	30.3%	45,551	1186.8%
2017	261,320	967,145	705,825	27.0%	48,598	1452.4%
2018	268,259	989,528	721,269	27.1%	48,808	1477.8%
2019	282,162	1,045,318	763,156	27.0%	47,752	1598.2%
2020	296,126	1,053,158	757,032	28.1%	46,145	1640.6%
2021	323,250	1,053,259	730,009	30.7%	45,338	1610.1%
			Insurance			
2012	$ 124,372	$ 333,904	$ 209,532	37.2%	$ 48,373	433.2%
2013	136,321	222,327	86,006	61.3%	45,256	190.0%
2014	155,595	234,271	78,676	66.4%	44,616	176.3%
2015	167,775	254,839	87,064	65.8%	45,765	190.2%
2016	172,704	257,197	84,493	67.1%	45,551	185.5%
2017	180,464	276,641	96,177	65.2%	48,598	197.9%
2018	187,535	262,088	74,553	71.6%	48,808	152.7%
2019	197,395	276,809	79,414	71.3%	47,752	166.3%
2020	207,018	276,144	69,126	75.0%	46,145	149.8%
2021	223,251	272,406	49,155	82.0%	45,338	108.4%

Summary of Principal Assumptions and Methods

Below is a summary of the principal economic assumptions, cost method, and the method for financing the unfunded actuarial accrued liability:

Valuation date:	June 30, 2021
Actuarial cost method:	Entry Age Normal
Amortization method:	Level percentage of payroll (0% payroll growth assumed)
Amortization period for contribution rate:	30-year closed period at June 30, 2019 Gains/losses incurring after 2019 will be amortized over separate closed 20-year amortization bases
Asset valuation method:	5-Year Smoothed Market
Actuarial assumptions:	
Investment rate of return, retirement	5.25%
Investment rate of return, insurance	6.25%
Projected salary increases	3.55% to 16.05% (varies by service)
Inflation	2.30%
Post-retirement pension benefit adjustments	0.00%
Retiree Mortality	System-specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2019.

Solvency Test

(Dollar amounts expressed in thousands)

June 30,	Actuarial Accrued Liability: Active Member Contributions	Actuarial Accrued Liability: Retired Members & Beneficiaries	Actuarial Accrued Liability: Active Members (Employer Financed)	Valuation Assets	Portion of Aggregate Accrued Liabilities Covered by Assets: Active	Portion of Aggregate Accrued Liabilities Covered by Assets: Retired	Portion of Aggregate Accrued Liabilities Covered by Assets: ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Retirement							
2012	$ 41,139	$ 523,017	$ 83,533	$ 259,792	100.0%	41.8%	0.0%
2013	39,788	535,720	76,072	241,800	100.0%	37.7%	0.0%
2014	41,831	563,011	76,276	242,742	100.0%	35.7%	0.0%
2015	41,567	605,855	86,734	248,388	100.0%	34.1%	0.0%
2016	41,871	636,499	96,791	234,568	100.0%	30.3%	0.0%
2017	44,798	773,982	148,365	261,320	100.0%	28.0%	0.0%
2018	43,835	800,788	144,905	268,259	100.0%	28.0%	0.0%
2019	41,948	848,397	154,973	282,162	100.0%	28.3%	0.0%
2020	40,831	863,580	148,747	296,126	100.0%	29.6%	0.0%
2021	42,035	860,801	150,423	323,250	100.0%	32.7%	0.0%
Insurance							
2012	$ -	$ 190,259	$ 143,645	$ 124,372	100.0%	65.4%	0.0%
2013	-	139,509	82,818	136,321	100.0%	97.7%	0.0%
2014	-	143,402	90,869	155,595	100.0%	100.0%	13.4%
2015	-	170,447	84,392	167,775	100.0%	98.4%	0.0%
2016	-	177,094	80,103	172,704	100.0%	97.5%	0.0%
2017	-	186,390	90,251	180,464	100.0%	96.8%	0.0%
2018	-	183,151	78,937	187,535	100.0%	100.0%	5.6%
2019	-	199,959	76,850	197,395	100.0%	98.7%	0.0%
2020	-	207,638	68,506	207,018	100.0%	99.7%	0.0%
2021	-	206,707	65,699	223,251	100.0%	100.0%	25.2%

SECTION 4

AMORTIZATION BASES

Amortization of Unfunded Liability

Retirement

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 763,156	$ 741,687	$ 49,853	28
June 30, 2020	3,748	5,105	420	19
June 30, 2021	(16,783)	(16,783)	(1,397)	20
Total		$ 730,009	$ 48,876	
Projected Payroll for FYE 2023			$ 45,338	
Amortization Payments as a Percentage of Payroll			107.80%	

Insurance

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2021	Payments for FYE 2023	Funding Period at June 30, 2021
June 30, 2019	$ 79,414	$ 74,045	$ 5,496	28
June 30, 2020	(5,896)	(6,445)	(571)	19
June 30, 2021	(18,445)	(18,445)	(1,742)	20
Total		$ 49,155	$ 3,183	
Projected Payroll for FYE 2023			$ 45,338	
Amortization Payments as a Percentage of Payroll			7.02%	

Note:
Budgeted contribution rates for FYE 2022 were known at the time of the June 30, 2021 Valuation. Amortization bases established at this valuation date were adjusted accordingly.

SECTION 5

MEMBERSHIP INFORMATION

Membership Tables

Summary of Membership Data

(Total dollar amounts expressed in thousands)

			June 30, 2021 (1)		June 30, 2020 (4)
1.	Active members				
	a. Males		758		781
	b. Females		17		17
	c. Total members		775		798
	d. Total annualized prior year salaries	$	45,338	$	46,145
	e. Average salary[2]	$	58,501	$	57,826
	f. Average age		37.7		37.5
	g. Average service		11.1		10.7
	h. Member contributions with interest	$	42,035	$	40,831
	i. Average contributions with interest[2]	$	54,239	$	51,167
2.	Vested inactive members[1]				
	a. Number		313		300
	b. Total annual deferred benefits	$	1,134	$	966
	c. Average annual deferred benefit[2]	$	3,623	$	3,221
	d. Average age at the valuation date		44.2		43.9
3.	Nonvested inactive members[1]				
	a. Number		321		289
	b. Total member contributions with interest	$	459	$	372
	c. Average contributions with interest[2]	$	1,430	$	1,286
4.	Service retirees				
	a. Number		1,375		1,383
	b. Total annual benefits	$	54,771	$	54,996
	c. Average annual benefit[2]	$	39,833	$	39,766
	d. Average age at the valuation date		63.5		63.0
5.	Disabled retirees				
	a. Number		54		53
	b. Total annual benefits	$	913	$	927
	c. Average annual benefit[2]	$	16,907	$	17,498
	d. Average age at the valuation date		57.0		57.9
6.	Beneficiaries				
	a. Number		244		233
	b. Total annual benefits	$	7,016	$	6,509
	c. Average annual benefit[2]	$	28,754	$	27,936
	d. Average age at the valuation date		67.4		67.1

[1] Vested inactive member section includes Tier 1 members eligible for a benefit equal to the actuarially equivalent of two times the member's contribution balance.

[2] Average dollar amounts shown are expressed to the dollar.

Summary of Historical Active Membership

	Active Members		Covered Payroll[1]		Average Annual Pay	
June 30,	Number	Percent Increase /(Decrease)	Amount in Thousands	Percent Increase /(Decrease)	Amount	Percent Increase /(Decrease)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2012	907		$ 48,373		$ 53,332	
2013	902	-0.6%	45,256	-6.4%	50,173	-5.9%
2014	855	-5.2%	44,616	-1.4%	52,182	4.0%
2015	937	9.6%	45,765	2.6%	48,842	-6.4%
2016	908	-3.1%	45,551	-0.5%	50,167	2.7%
2017	903	-0.6%	48,598	6.7%	53,819	7.3%
2018	886	-1.9%	48,808	0.4%	55,088	2.4%
2019	883	-0.3%	47,752	-2.2%	54,079	-1.8%
2020	798	-9.6%	46,145	-3.4%	57,826	6.9%
2021	775	-2.9%	45,338	-1.7%	58,501	1.2%

[1] Covered payroll is the annualized, projected compensation for the following year and does not include payroll attributable to working retirees.

Distribution of Active Members by Age and by Years of Service

SPRS Members

	Years of Credited Service												
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	Total
Attained Age	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.
Under 20	0	0	0	0	0	0	0	0	0	0	0	0	0
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
20-24	24	2	14	0	0	0	0	0	0	0	0	0	40
	$38,359	$37,824	$45,308	$0	$0	$0	$0	$0	$0	$0	$0	$0	$40,764
25-29	12	2	36	25	0	31	0	0	0	0	0	0	106
	$38,112	$41,765	$44,977	$45,434	$0	$51,516	$0	$0	$0	$0	$0	$0	$46,159
30-34	3	4	12	6	23	74	27	0	0	0	0	0	149
	$37,989	$45,136	$44,938	$45,760	$49,364	$53,665	$55,963	$0	$0	$0	$0	$0	$51,852
35-39	1	0	6	1	9	44	65	25	0	0	0	0	151
	$38,046	$0	$45,237	$43,984	$48,349	$54,261	$57,720	$68,286	$0	$0	$0	$0	$57,186
40-44	0	1	0	0	2	22	31	83	20	2	0	0	161
	$0	$43,793	$0	$0	$52,071	$55,576	$56,783	$67,793	$79,647	$83,643	$0	$0	$65,329
45-49	0	0	1	1	0	13	13	35	32	7	2	0	104
	$0	$0	$43,418	$45,221	$0	$56,583	$58,993	$67,927	$77,698	$87,443	$100,990	$0	$69,894
50-54	0	0	0	0	1	0	3	17	12	10	2	0	45
	$0	$0	$0	$0	$49,347	$0	$57,562	$65,646	$78,948	$84,127	$80,044	$0	$73,039
55-59	0	0	0	0	0	0	3	7	2	3	1	0	16
	$0	$0	$0	$0	$0	$0	$59,507	$65,027	$76,241	$90,599	$99,241	$0	$72,327
60-64	0	0	0	0	0	0	1	0	1	0	0	0	2
	$0	$0	$0	$0	$0	$0	$53,395	$0	$67,836	$0	$0	$0	$60,616
65 & Over	0	0	0	0	0	0	0	0	0	0	0	1	1
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$101,381	$101,381
Total	40	9	69	33	35	184	143	167	67	22	5	1	775
	$38,249	$42,612	$45,037	$45,443	$49,257	$53,880	$57,305	$67,561	$78,313	$86,020	$92,261	$101,381	$58,501

Distribution of Annuitant Monthly Benefit by Status and Age
Retirees and Beneficiaries
(Dollar amounts expressed in thousands)

	Retirement		Disability		Survivors & Beneficiaries		Total	
Current Age	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Under 50	173	$ 6,532	18	$ 294	35	$ 560	226	$ 7,387
50 - 54	208	8,194	8	192	12	227	228	8,613
55 - 59	188	7,777	7	95	12	235	207	8,107
60 - 64	154	6,209	4	74	18	528	176	6,811
65 - 69	214	9,008	8	94	27	687	249	9,789
70 - 74	249	10,087	5	93	49	1,684	303	11,863
75 - 79	104	3,745	3	46	37	1,174	144	4,965
80 - 84	55	2,031	1	24	21	752	77	2,807
85 - 89	22	810	0	0	21	733	43	1,543
90 And Over	8	379	0	0	12	435	20	814
Total	**1,375**	**$ 54,771**	**54**	**$ 913**	**244**	**$ 7,016**	**1,673**	**$ 62,700**

*Amounts may not add due to rounding

Retired Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	160	$	478,955	17	$	47,149	177	$	526,104
Joint & Survivor:									
100% to Beneficiary	174		536,198	1		4,814	175		541,011
66 2/3% to Beneficiary	84		315,288	2		7,542	86		322,830
50% to Beneficiary	76		280,687	2		7,515	78		288,202
Pop-up Option	669		2,345,074	6		11,214	675		2,356,287
Social Security Option:									
Age 62 Basic	27		68,315	0		0	27		68,315
Age 62 Survivorship	105		197,461	1		4,416	106		201,876
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	8		26,954	0		0	8		26,954
10 Years Certain & Life	37		125,330	3		6,759	40		132,089
15 Years Certain & Life	17		50,621	1		3,919	18		54,539
20 Years Certain & Life	37		118,126	2		3,979	39		122,105
Total:	1,394	$	4,543,008	35	$	97,305	1,429	$	4,640,314

Beneficiary Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	2	$	820	9	$	11,392	11	$	12,213
Joint & Survivor:									
100% to Beneficiary	8		12,812	61		170,619	69		183,431
66 2/3% to Beneficiary	2		1,206	17		43,475	19		44,681
50% to Beneficiary	0		0	20		30,914	20		30,914
Pop-up Option	2		843	60		178,584	62		179,427
Social Security Option:									
Age 62 Basic	0		0	2		2,281	2		2,281
Age 62 Survivorship	2		934	48		100,222	50		101,157
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	1		2,038	2		14,018	3		16,056
10 Years Certain & Life	0		0	0		0	0		0
15 Years Certain & Life	0		0	1		721	1		721
20 Years Certain & Life	1		6,686	6		7,092	7		13,778
Total:	18	$	25,340	226	$	559,319	244	$	584,659

Schedule of Retirees Added to And Removed from Rolls

(Dollar amounts except average allowance expressed in thousands)

Year Ended	Added to Rolls Number	Removed from Rolls Number	Rolls End of the Year Number	Rolls End of the Year Annual Benefits	% Increase in Annual Benefit	Average Annual Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2012	52	16	1,299	$ 49,887		$ 38,404
2013	63	16	1,346	50,906	2.0%	37,820
2014	95	28	1,413	53,432	5.0%	37,815
2015	62	15	1,460	54,930	2.8%	37,624
2016	65	10	1,515	56,650	3.1%	37,393
2017	30	9	1,536	57,253	1.1%	37,274
2018	81	17	1,600	59,626	4.1%	37,266
2019	74	27	1,647	61,404	3.0%	37,282
2020	61	39	1,669	62,432	1.7%	37,407
2021	55	51	1,673	62,700	0.4%	37,477

SECTION 6

ASSESSMENT AND DISCLOSURE OF RISK

Risks Associated with Measuring the Accrued Liability And Actuarially Determined Contribution

(As Required by ASOP No. 51)

The determination of SPRS's accrued liability and actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. The risk measures illustrated in this section are intended to aid stakeholders in understanding the effects of future experience differing from the assumptions used in performing an actuarial valuation. These risk measures may also help with illustrating the potential volatility in the funded status and actuarially determined contributions that result from differences between actual experience and the expected experience based on the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience (economic and demographic) differing from the assumptions, changes in assumptions due to changing conditions, changes in contribution requirements due to modifications to the funding policy, and changes in the liability and cost due to changes in plan provisions or applicable law. The scope of this actuarial valuation does not include any analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the System's future financial condition include:

- Investment risk – actual investment returns may differ from expected returns;
- Longevity risk – members may live longer or shorter than expected and receive pensions for a time period different than assumed;
- Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future contributions differing from expected;
- Salary and payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liabilities or contributions differing from expected;
- Asset/Liability mismatch – changes in assets may be inconsistent with changes in liabilities, thereby altering the relative difference between the assets and liabilities which may alter the funded status and contribution requirements;
- Contribution risk – actual contributions may differ from expected future contributions (for example, actual contributions not being paid in accordance with the System's funding policy, withdrawal liability assessments or other anticipated payments to the plan are not being paid, or material changes occurring in the anticipated number of covered employees, covered payroll, or another relevant contribution base).

Effects of certain experience can generally be anticipated. For example, if investment returns since the most recent actuarial valuation are less (or more) than the assumed rate of return, then the funded status of the plan can be expected to decrease (or increase) more than anticipated.

The required contributions in this report were established in accordance with applicable Statutes and assumptions adopted by the Board. However, stakeholders should be aware that the scheduled contributions specified in State Code do not necessarily guarantee that the contribution requirements will not increase in a future year.

Employer Risk with Contribution Rates

Currently contributions are collected from the Commonwealth based on the total payroll of employees who are earning benefits in SPRS (i.e. covered payroll). The actuarially determined contribution rate is comprised of two components - the normal cost rate (to pay for the benefits accruing in the next year) and the unfunded amortization (to pay for the benefits accrued by members in previous years). The unfunded amortization is calculated by first determining the dollar amount necessary to pay for the unfunded liability based on SPRS's funding policy, and then by dividing that dollar amount by expected covered payroll to convert that contribution requirement to a percentage of payroll (i.e. a contribution rate).

As the contribution requirement, as a percentage of payroll, increases then there is increased incentive for participating employers to make deliberate business action to reduce their payroll reported to the System in order to reduce their pension cost.

Plan Specific Risk Measures

Risks faced by a pension plan evolve over time. A relatively new plan with virtually no assets and paying few benefits will experience lower investment risk than a mature plan with a significant amount of assets and large number of members receiving benefits. There are a few measures that can assist stakeholders in understanding and comparing the maturity of a plan to other systems, which include:

- <u>Ratio of market value of assets to payroll</u>: The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. If assets are approximately the same as covered payroll, an investment return that is 5% different than assumed would equal 5% of payroll. In another example, if the assets are approximately twice as large as covered payroll, an investment return that is 5% different than assumed would equal 10% of payroll. A ratio that increases over time generally indicates the potential of an increasing volatility in employer contribution rates as a percentage of payroll.
- <u>Ratio of actuarial accrued liability to payroll</u>: The ratio of actuarial accrued liability to payroll can be used as a measure to indicate the potential volatility of contributions due to volatility in the liability experience. For instance, if the actuarial accrued liability is 5 times the size of the covered payroll, then a change in the liability that is 2% different than expected would be a change in magnitude that is 10% of payroll. A ratio that increases over time generally indicates the potential of an increasing volatility in employer contribution rates as a percentage of payroll.
- <u>Percentage of Expected Contributions Actually Received</u>: This measure identifies the percentage difference between the contributions the fund expects to receive during the fiscal year to and actual contributions received by the fund during the fiscal year. A percentage that is less than 100% means that actual contributions the fund received were less than the expected contributions determined by a prior actuarial valuation. On the other hand, a percentage that is greater than 100% means that actual contributions the fund received were more than the expected contributions.

- Ratio of active to retired members: A relatively mature open plan is likely to have close to the same number of actives to retirees resulting in a ratio that is around 1.0. On the other hand, a super-mature plan, or a plan that is closed to new entrants will have more retirees than active members resulting in a ratio below 1.0. As this ratio declines, a larger portion of the total actuarial accrued liability in the System is attributable to retirees. This metric also typically moves in tandem with the liability to payroll metric, which provides an indication of potential contribution volatility.

The following tables provide a summary of these measures for SPRS for the current year and the prior four years so stakeholders can identify how these measures are trending. While ASOP No. 51 requires this disclosure with respect to only the retirement fund, we have included this information for the insurance fund for completeness.

SPRS										
	Retirement Fund					Insurance Fund				
	June 30,					June 30,				
	2021	2020	2019	2018	2017	2021	2020	2019	2018	2017
Ratio of the market value of assets to total payroll	7.86	6.37	5.99	5.48	5.26	5.45	4.36	4.21	3.91	3.68
Ratio of actuarial accrued liability to payroll	23.23	22.82	21.89	20.27	19.90	6.01	5.98	5.80	5.37	5.69
Ratio of net cash flow to market value of assets	0.2%	0.5%	1.4%	-2.5%	4.8%	-1.9%	-0.5%	-0.2%	-2.4%	-2.5%
Percentage of Expected Contribution Actually Received	104% [1]	103%	101%	101%	121%	102% [1]	101%	100%	103%	103%
Ratio of actives to retirees and beneficiaries	0.46	0.48	0.54	0.55	0.59					

[1] Expected contribution for FYE2021 based on the actuarially determined contribution rate of 143.48% from the June 30, 2019 valuation as amended by SB249, which reset the amortization period to 30 years, and expected compensation based on census data from the June 30, 2020 valuation.

APPENDIX A

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Methods and Assumptions

The following presents a summary of the actuarial assumptions and methods used in the valuation of the State Police Retirement System.

In general, the assumptions and methods used in the valuation are based on the actuarial experience study for the five-year period ending June 30, 2018 and adopted by the Board in April 2019.

Investment return rate:

Assumed annual rate of 5.25% net of investment expenses for the retirement fund

Assumed annual rate of 6.25% net of investment expenses for the insurance fund

Price Inflation:

Assumed annual rate of 2.30%

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

Assumed annual rate of 0.00%

Rates of Annual Salary Increase:

Assumed rates of annual salary increases are shown below.

Service Years	Annual Rates of Salary Increases		
	Merit & Seniority	Price Inflation & Productivity	Total Increase
0	12.50%	3.55%	16.05%
1	5.00%	3.55%	8.55%
2	4.00%	3.55%	7.55%
3	2.00%	3.55%	5.55%
4	2.00%	3.55%	5.55%
5	2.00%	3.55%	5.55%
6	2.00%	3.55%	5.55%
7	1.00%	3.55%	4.55%
8	1.00%	3.55%	4.55%
9	0.00%	3.55%	3.55%
10 & Over	0.00%	3.55%	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.

Service	Members participating Before 9/1/2008[1]	Members participating on or after 9/1/2008[2]	Members participating after 1/1/2014[2]
20	22.0%		
21	22.0%		
22	22.0%		
23	28.0%		
24	28.0%		
25	28.0%	17.6%	16.0%
26	28.0%	17.6%	16.0%
27	28.0%	17.6%	16.0%
28	44.0%	22.4%	16.0%
29	44.0%	22.4%	16.0%
30	44.0%	22.4%	100.0%
31	58.0%	22.4%	
32	58.0%	22.4%	
33	58.0%	35.2%	
34	58.0%	35.2%	
35	58.0%	35.2%	
36	58.0%	46.4%	
37	58.0%	46.4%	
38	58.0%	46.4%	
39	58.0%	46.4%	
40+	58.0%	46.4%	

[1] *The annual rate of service retirement is 100% at age 55.*

[2] *The annual rate of service retirement is 100% at age 60.*

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 the age of 55 to reflect the different retiree health insurance benefit.

Disability rates:

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

Age	Annual Rates of Disability	
	Male	Female
20	0.05%	0.05%
30	0.09%	0.09%
40	0.20%	0.20%
50	0.56%	0.56%
60	1.46%	1.46%

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	Annual Rates of Withdrawal
1	15.00%
2	4.82%
3	3.76%
4	3.15%
5	2.71%
6	2.37%
7	2.09%
8	1.86%
9	1.66%
10	1.48%
11	1.32%
12	1.17%
13	1.04%
14	0.92%
15	0.80%
16	0.70%
17	0.60%
18	0.51%
19	0.42%
20	0.34%
21 & Over	0.00%

Mortality Assumption:

Pre-retirement mortality: PUB-2010 Public Safety Mortality, projected with the ultimate rates from the MP-2014 mortality improvement scale using a base year of 2010.

Post-retirement mortality (non-disabled): System-specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from the MP-2014 mortality improvement scale using a base year of 2019.

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**				
	2020	**2025**	**2030**	**2035**	**2040**
Male	21.0	21.4	21.8	22.2	22.6
Female	24.0	24.4	24.8	25.2	25.6

Post-retirement mortality (disabled): PUB-2010 Disabled Mortality table, with a 4-year set-forward for both male and female rates, projected with the ultimate rates from the mortality improvement scale 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 Disability

70% 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 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 Age Related Morbidity/Claims Utilization:

To model the impact of aging on the underlying health care costs for Medicare retirees, the valuation relied on the Society of Actuaries' 2013 Study "Health Care Costs – From Birth to Death". Table 4 (Development of Plan Specific Medicare Age Curve) was used to model the impact of aging for ages 65 and over.

Health Care Cost Trend Rates:

Year	Non-Medicare Plans[1]	Medicare Plans[1]	Dollar Contribution[2]
2023	6.30%	6.30%	1.50%
2024	6.20%	6.20%	1.50%
2025	6.10%	6.10%	1.50%
2026	6.00%	6.00%	1.50%
2027	5.80%	5.80%	1.50%
2028	5.60%	5.60%	1.50%
2029	5.40%	5.40%	1.50%
2030	5.20%	5.20%	1.50%
2031	5.00%	5.00%	1.50%
2032	4.80%	4.80%	1.50%
2033	4.60%	4.60%	1.50%
2034	4.40%	4.40%	1.50%
2035	4.20%	4.20%	1.50%
2036 & Beyond	4.05%	4.05%	1.50%

[1]All increases are assumed to occur on January 1. The 2022 premiums were known at the time of the valuation and were incorporated into the liability measurement
[2]Applies to members participating on or after July 1, 2003. All increases are assumed to occur on July 1.

Health care trend assumptions are based on the model issued by the Society of Actuaries "Getzen model of Long-Run Medical Cost Trends for the SOA; Thomas E. Getzen, iHEA and Temple University 2014 © Society of Actuaries.

The underlying assumptions used to develop the health care trend rates include:

- A short run period-this is a period for which anticipated health care trend rates are manually set based on local information as well as plan-specific and carrier information.
- Long term real GDP growth – 1.75%
- Long term rate of inflation – 2.30%
- Long term nominal GDP growth – 4.05%
- Year that excess rate converges to 0 – 2036

Health care trend rates are thus the manually set rates for the short run period and rates which decline to an ultimate trend rate which equals the assumed nominal long-term GDP growth rate.

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	100%	100%
10-14	100%	100%
15-19	100%	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]	6%
Essential Plan	8%
Premium Plan	86%

[1] Includes Medicare Advantage Mirror Plans

Non-Medicare Plan	Participation Percentage
LivingWell Limited	4%
LivingWell Basic	2%
LivingWell CDHP	33%
LivingWell PPO	61%

- 100% of deferred vested members participating are assumed to elect health coverage at retirement.

- Deferred vested members 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. 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 terminated 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 4.9375% (based upon the 5.25% 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. Members hired prior to September 1, 2008 are assumed to retire at age 55 and members hired on or after September 1, 2008 are assumed to retire at age 60.

Participant Data

Participant data was supplied in electronic text files. There were separate files for (i) active and inactive members, and (ii) members and beneficiaries receiving benefits.

The data for active and terminated members included date of birth, gender, date of participation, benefit tier indicator, service with the current system, total vesting service, salary, employee contribution account balances, and employer pay credits for members participating in the cash balance plan. For retired members and beneficiaries, the data included date of birth, gender, spouse's date of birth (where applicable), amount of monthly benefit, date of retirement, and form of payment code.

Assumptions were made to correct for missing, bad, or inconsistent data. These had no material impact on the results presented.

Changes in assumptions since the prior valuation:

None

Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2022, and are used for both current and future retirees. An inherent assumption in this methodology is that the projected future retirees will have a similar distribution by plan type as the current retirees. The spouse/dependent premium of $926.73 for non-Medicare retirees is based on a blending of Family and Couple premiums for the current retirees that have over 4 years of hazardous service. The fully-insured premiums paid to the Kentucky Employees' Health Plan (KEHP) are blended rates based on the combined experience of active and retired members. Because the average cost of providing health care benefits to retirees under age 65 is higher than the average cost of providing health care benefits to active employees, there is an implicit rate subsidy for the non-Medicare eligible retirees. Actuarial Standard of Practice No. 6 (ASOP No. 6) requires aging subsidies (or implicit rate subsidies) to be recognized. However, the health insurance trusts are only used to reimburse KEHP for the employer's portion of the blended premiums. Said another way, the trusts are not used to fund the difference between the underlying retiree claims and the blended KEHP premiums. As a result, the retiree health care liabilities developed in this report for the non-Medicare retirees are based solely on the premiums charged by KEHP, without any age-adjustment. GASB Statements No. 74 and No. 75 prohibit such a deviation from ASOP No. 6. The liabilities developed in this report are solely for the purpose of funding the benefits paid by the health insurance funds and are not appropriate for financial statement disclosures required by GASB. GRS provides separate GASB reports which include the liabilities associated with the implicit rate subsidy.

For those not eligible for Medicare		
Age	Member	Spouse/Dependents
<65	$758.99	$926.73

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2022, and are used for both current and future retirees. An inherent assumption in this methodology is that the projected future retirees will have a similar distribution by plan type as the current retirees. Age graded and sex distinct premiums are utilized for retirees over the age of 65. These costs are appropriate for the unique age and sex distribution currently existing. Over the future years covered by this valuation, the age and sex distribution will most likely change. Therefore, our process "distributes" the average premium over all age/sex combinations and assigns a unique premium for each combination. The age/sex specific costs more accurately reflect the health care utilization and cost at that age.

For those eligible for Medicare		
Age	Male	Female
65	$188.91	$178.18
75	221.03	215.67
85	233.72	236.47

Appendix B of the report provides a full schedule of premiums.

Mehdi Riazi is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Mehdi Riazi

Mehdi Riazi, FSA, EA, FCA, MAAA

Appendix B

Benefit Provisions

Summary of Benefit Provisions for State Police Retirement System (SPRS)

SPRS Employees

Retirement: Tier 1, Participation before 9/1/2008

Normal Retirement Eligibility	Age 55 with at least 1 month of service credit; or Any age with at least 20 years of service
Benefit Amount	If a member has at least 60 months of service, the monthly benefit is 2.50% times final average compensation times years of service. If a member has less than 60 months of service, the monthly benefit is the actuarial equivalent of two times the member's contributions with interest. Final average compensation is based on the member's highest 3 years of compensation.
Early Retirement Eligibility	Age 50 with at least 15 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement eligibility precedes the member's normal retirement date.

SPRS Employees (continued)

Retirement: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Normal Retirement Eligibility	Age 60 with at least 5 years of service; or Any age with at least 25 years of service
Benefit Amount	The monthly benefit is equal to the applicable benefit multiplier times final average compensation times years of service.

Years of Service	Benefit Multiplier
10 or less	1.30%
10-20	1.50%
20-25	2.25%
Greater than 25	2.50%

Final compensation is based on the member's highest 3 years of compensation.

Early Retirement Eligibility	Age 50 with at least 15 years of service
Early Retirement Reduction	Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement date precedes the member's normal retirement eligibility.

Retirement: Tier 3, Participation on or after 1/1/2014

Normal Retirement Eligibility	Age 60 with at least 5 years of service; or Any age with at least 25 years of service
Benefit Amount	Each year that the member is active, a 7.50% employer pay credit and the employee's 8.00% contribution will be credited to each member's hypothetical cash balance account. The hypothetical account will earn interest at a minimum rate of 4%, annually. If the System's geometric average net investment return for the previous five years exceeds 4%, then the hypothetical account will be credited with an additional amount of interest in that year equal to 75% of the amount of the return which exceeds 4%. All interest credits will be applied to the hypothetical account balance on June 30 based on the account balance as of June 30 of the previous year. At retirement, the member's hypothetical account balance may be converted into an annuity based on an actuarial factor.
Early Retirement Eligibility	N/A

SPRS Employees (continued)

Deferred Vested Benefit: Tier 1, Participation before 9/1/2008

Eligibility	At least 1 month of service credit
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit: Tier 2, Participation on or after 9/1/2008 but before 1/1/2014

Eligibility	5 years of service
Benefit Amount	Normal retirement benefit deferred to normal retirement age, or a reduced retirement benefit at an early retirement age

Deferred Vested Benefit Tier 3, Participation on or after 1/1/2014

Eligibility	5 years of service
Benefit Amount	At termination of employment, members may choose to leave their account balance with the System and retire once they are eligible. The hypothetical account balance will earn 4% annual interest after termination. Members may also choose to withdrawal their entire accumulated balance. If a member does not have 5 years of service at termination, the member is eligible to receive a partial refund of their account balance. This refund includes the member's contributions with interest.

Disability Retirement: Participation before 8/1/2004

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	Disability benefits are calculated in the same manner as the normal retirement benefit with years of service and final compensation being determined as of the date of disability, except that if the member has less than 20 years of service at disability, service credit shall be added to the person's total service beginning with the last date of paid employment and continuing to the member's 55th birthday, with total service not exceeding 20 years. Total service credit added shall not be greater than the member's actual service at disability.

SPRS Employees (continued)

Disability Retirement: Participation on or after 8/1/2004 but before 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 25% of the member's final monthly rate of pay or the member's normal retirement benefit (without reduction for early retirement) with years and final compensation being determined as of the date of disability.

Disability Retirement: Participation on or after 1/1/2014

Eligibility	60 months of service (requirement is waived if line of duty disability)
Disability Benefit	The higher of 25% of the member's final monthly rate of pay or the member's retirement benefit calculated at the member's normal retirement date.

Line of Duty Disability Benefit

Disability Benefit	If the disability is a direct result of an act in the line of duty, the benefit shall not be less than 25% of the member's final monthly final rate of pay. If the disability is deemed to be Total and Permanent, then this benefit shall not be less than 75% of the member's monthly average pay.
Child Benefit	Additionally, each eligible dependent child will receive 10% of the member's monthly average pay up to a maximum of 40%. Member and dependent payment shall not exceed 100% of member's monthly average pay.

Pre-Retirement Death Benefit

Eligibility	Eligible for early or normal retirement; or Under age 55 with at least 60 months of service and actively working at the time of death; or At least 144 months of service, if no longer actively working
Spouse Benefit	The member's retirement benefit calculated in the same manner as if the member had retired on the day of the member's death and elected a 100% joint and survivor benefit. The benefit is actuarially reduced if the member dies prior to their normal retirement age.

SPRS Employees (continued)

Pre-Retirement Death Benefit (Death in the Line of Duty)

Eligibility	One month of service credit
Spouse Benefit	A $10,000 lump sum payment plus a monthly payment of 75% of the deceased member's final monthly average pay. Each dependent child will receive 10% of the final monthly average pay (not to exceed a total child benefit of 25% while the spouse is alive). A spouse may also elect the non-line of duty death benefit.
Non-Spouse Benefit	If the beneficiary is only one person who is a dependent receiving at least 50% of his or her support from the member, the beneficiary may elect a lump sum payment of $10,000.
Child Benefit	In the event there is no surviving spouse, the benefit is 50% of final monthly average pay for one child, 65% of final average pay for two children, or 75% of final average pay for three or more eligible children.

Post-Retirement Death Benefit

Eligibility	48 months of service, and in receipt of retirement benefits
Death Benefit	A $5,000 lump sum payment

Member Contributions

Tier 1, Participation before 9/1/2008	8% of creditable compensation. Members who do not receive a retirement benefit are entitled to a full refund of contributions with interest. The annual interest rate is set by the Board, not less than 2.0%.
Tier 2, Participation on or after 9/1/2008 but before 1/1/2014	8% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest. The annual interest rate is 2.5%.
Tier 3, Participation after 1/1/2014	8% of creditable compensation plus 1% of creditable compensation, which is deposited into the 401(h) account and is not refundable. Members who do not receive a retirement benefit are entitled to a refund of non-401(h) contributions with interest.

Changes since the Prior Valuation

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become "totally and permanently disabled" in the line of duty. The minimum disability benefit increased from 25% of the member's monthly final rate of pay to 75% of the member's monthly average pay.

Summary of Main Retiree Insurance Benefit Provisions

Insurance Tier 1: Participation began before 7/1/2003

Benefit Eligibility Recipient of a retirement allowance

Benefit Amount

Non-Hazardous Service	Percentage of Member Premium Paid by Retirement System	Hazardous Service	Percentage of Member & Dependent Premium Paid by Retirement System
Less than 4 years	0%	Less than 4 years	0%
4 – 9 years	25%	4 – 9 years	25%
10 – 14 years	50%	10 – 14 years	50%
15 – 19 years	75%	15 – 19 years	75%
20 or more years	100%	20 or more years	100%

The percentage paid by the retirement system is applied to the 'contribution' plan selected by the Board.

Duty Disability Retirement If disability was a result of injuries sustained while in the line of duty, the member receives 100% of the maximum contribution for the member and dependents.

Duty Death in Service If an active employee's death was a result of injuries sustained while in the line of duty, the member's spouse and children receive a fully subsidized health insurance benefit.

Non-Duty Death in Service If the surviving spouses is in receipt of a pension allowance, he or she is eligible for continued health coverage. The percentage of the premium paid for by the retirement system is based on the member's years of hazardous service at the time of death.

Surviving Spouse of a Retiree A surviving spouse of a retiree, who is in receipt of a pension allowance, will receive a premium subsidy based on the member's years of hazardous service.

Hazardous employees who retired prior to August 1, 1998 System's contribution for spouse and dependents is based on total service.

Insurance Tier 2: Participation began on or after 7/1/2003, but before 9/1/2008

Benefit Eligibility	Recipient of a retirement allowance with at least 120 months of service at retirement
Non-Hazardous Subsidy	Monthly contribution of $10 for each year of earned non-hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2021, the Non-Hazardous monthly contribution was $13.99/year of service. Upon the retiree's death, the surviving spouse may continue coverage (if in receipt of a retirement allowance) but will be 100% responsible for the premiums.
Hazardous Subsidy	Monthly contribution of $15 for each year of earned hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2021, the Hazardous monthly contribution was $20.99/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($13.99 as of July 1, 2021) for each year of hazardous service.
Duty Disability Retirement	If disability was a result of injuries sustained while in the line of duty or was duty-related, the member receives a benefit based on at least 20 years of service. This benefit is provided to members in the Non-Hazardous and Hazardous plans alike. If the disability is deemed to be Total and Permanent, the insurance premium for the member, the member's spouse, and the member's dependent children shall also be paid in full by the System. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.
Duty Death in Service	If an active employee's death was a result of injuries sustained while in the line of duty, the member's spouse and children receive a fully subsidized health insurance benefit.
Non-Duty Death in Service	If the surviving spouse is in receipt of a pension allowance, he or she is eligible for continued health coverage. The percentage of the premium paid for by the retirement system is based on the member's years of hazardous service at the time of death.

Insurance Tier 3: Participation began on or after 9/1/2008

Tier 3 insurance benefits are identical to Tier 2, except Tier 3 members are required to have at least 180 months of service in order to be eligible.

Monthly Health Plan Premiums – Effective January 1, 2022

	Non-Medicare Plan Options				
Plan Option	Single	Parent Plus	Couple	Family	Family X-Ref
LivingWell PPO[1]	$772.16	$1,101.08	$1,691.64	$1,883.60	$929.70
LivingWell CDHP	750.30	1,036.40	1,453.30	1,623.94	866.72
LivingWell Basic	721.54	994.72	1,537.72	1,713.58	846.38
Living Well Limited	642.02	914.78	1,407.32	1,566.78	772.32

Medicare Plan Options	
Medical Only Plan	$186.87
Medicare Advantage Mirror Essential Plan	228.12
Medicare Advantage Mirror Premium Plan	327.97
Kentucky Retirement Systems – Essential Plan[2]	49.25
Kentucky Retirement Systems – Premium Plan[3]	227.03

[1] Contribution plan selected by the Board was the LivingWell PPO plan option for non-Medicare retirees.
[2] Contribution rate for retirees selected by the Board remains at $75.56.
[3] Contribution rate for retirees selected by the Board remains at $252.51.

Dollar Contribution Amount for Insurance Tier 2 and Tier 3

Monthly contribution amounts per year of service as of July 1, 2021.

Non-Hazardous Service	Hazardous Service
$13.99	$20.99

Note: Non-Hazardous benefits are applicable to SPRS members with prior service in a Non-Hazardous System.

Changes since the Prior Valuation

Senate Bill 169 passed during the 2021 legislative session and increased the disability benefits for qualified members who become “totally and permanently disabled” in the line of duty or as a result of a duty-related disability. The insurance premium for the member, the member’s spouse, and the member’s dependent children shall be paid in full by the System.

APPENDIX C

GLOSSARY

Glossary

Actuarial Accrued Liability (AAL): That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

Actuarial Assumptions: Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

Actuarial Cost Method or ***Funding Method:*** A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

Actuarial Gain or ***Actuarial Loss:*** A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the fund's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)

b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and

c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.

Actuarial Valuation: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial valuation for a governmental retirement system typically also includes calculations that provide the financial information of the plan, such as the funded ratio, unfunded actuarial accrued liability and the ADC.

Actuarial Value of Assets or ***Valuation Assets:*** The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Actuarially Determined Contribution (ADC): The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ADC consists of the Employer Normal Cost and the Amortization Payment.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: The portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Closed Amortization Period: A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decrements: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: A retirement plan that is not a Defined Contribution Plan. Typically a defined benefit plan is one in which benefits are defined by a formula applied to the member's compensation and/or years of service.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Experience Study: A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Funding Period or ***Amortization Period:*** The term "Funding Period" is used two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period is specified in State statute. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on a statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: Governmental Accounting Standards Board.

GASB 67 and ***GASB 68***: Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting and reporting rules for public retirement systems and the employers that sponsor, participate in, or contribute to them. Statement No. 67 sets the accounting rules for the financial reporting of the retirement systems, while Statement No. 68 sets the rules for the employers that sponsor, participate in, or contribute to public retirement systems.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but may not decrease by exactly one year in the subsequent year's actuarial valuation. For instance, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year.

Unfunded Actuarial Accrued Liability: The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or Actuarial Valuation Date: The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

P: 469.524.0000 | www.grsconsulting.com

December 2, 2021

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

Re: Sensitivity Analysis Based on Results of the June 30, 2021 Actuarial Valuation

Dear Members of the Board:

Per Kentucky State Statute 61.670, we are providing this supplemental information regarding the sensitivity of the valuation results to changes in some of the economic assumptions. Specifically, the attached tables show the impact for the **State Police Retirement System (SPRS)** due to changes in the investment return assumption, the inflation rate assumption, and the payroll growth rate assumption.

Background

Investment Assumption

The investment return assumption is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plans. The lower the investment return assumption, the less the benefit payments are discounted and the higher the valuation liability. The current investment return assumption is 5.25% for the SPRS retirement fund and 6.25% for the SPRS insurance fund. The sensitivity analysis shows the financial impact of a 1.00% increase and a 1.00% decrease in the investment return assumption. For purposes of this sensitivity analysis, the inflation assumption and payroll growth assumption remain unchanged from the valuation assumption.

Inflation Assumption

The inflation assumption underlies most of the other economic assumptions, including the investment return, salary increases, and payroll growth rate. This is a macroeconomic assumption and as such the same assumption is used in the valuation of each of the retirement systems. The current assumption is 2.30% for all funds. The sensitivity analysis shows the financial impact of a 0.25% increase and a 0.25% decrease in the inflation assumption. Note, the change in the inflation assumption results in a corresponding change in the investment return assumption, the individual salary increase assumption for projecting members' benefit amounts, the payroll growth rate assumption, and the healthcare trend assumption that is used in the valuation of the health insurance funds.

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Payroll Growth Assumption

Participating employers of SPRS make contributions to the system as a percentage of the covered payroll. Therefore, as payroll changes over time these amortization payments will also change. If actual covered payroll increases at a rate that is less than assumed, then the retirement system receives fewer contribution dollars than expected to finance the unfunded liability, which means the contribution rates in future years will be required to increase in order to finance the unfunded liability over the same time period. The current payroll growth assumption is 0.00% for the SPRS retirement and insurance funds. The analysis shows the impact of a 1.00% increase and a 1.00% decrease in the payroll growth assumption.

Please note that the payroll growth assumption does not impact the valuation liabilities, unfunded liability, or funded status of the system. Rather, this assumption only impacts the amortization rate for financing the existing unfunded actuarial accrued liability and the actuarially determined employer contribution. For purposes of this analysis, the investment return assumption and the inflation assumption are held at their current valuation assumptions.

Certification

The information provided in this letter compliments the information provided in the June 30, 2021 actuarial valuation report. Please refer to the June 30, 2021 actuarial valuation report for additional discussion of the actuarial valuation, including the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

Actual results can, and almost certainly will, differ as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rate, and funding periods. The actuarial calculations are intended to provide information for rational decision making. The purpose of this information is to provide stakeholders the financial sensitivity of the unfunded liability and contribution rates to changes in the inflation, assumed rate of return, and payroll growth assumption.

The undersigned are independent actuaries and consultants. Both of the undersigned are Enrolled Actuaries, Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. Both of the undersigned are experienced in performing valuations for large public retirement systems. This communication shall not be construed to provide tax advice, legal advice or investment advice.

Sincerely,

Gabriel, Roeder, Smith & Company

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

Janie Shaw, ASA, EA, MAAA
Consultant

Sensitivity Analysis - Discount Rate

(Dollar amounts expressed in thousands)

	Decrease Discount Rate	Valuation Results	Increase Discount Rate
(1)	(2)	(3)	(4)
Payroll Growth Rate	0.00%	0.00%	0.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	4.25%	5.25%	6.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 1,190,256	$ 1,053,259	$ 941,901
Actuarial Value of Assets	323,250	323,250	323,250
Unfunded Actuarial Accrued Liability	867,006	730,009	618,651
Funded Ratio	27.2%	30.7%	34.3%
Actuarially Determined Contribution Rate	146.86%	126.40%	109.55%
Insurance			
Actuarial Accrued Liability	$ 307,759	$ 272,406	$ 243,660
Actuarial Value of Assets	223,251	223,251	223,251
Unfunded Actuarial Accrued Liability	84,508	49,155	20,409
Funded Ratio	72.5%	82.0%	91.6%
Actuarially Determined Contribution Rate	22.37%	14.11%	6.74%
Combined			
Actuarial Accrued Liability	$ 1,498,015	$ 1,325,665	$ 1,185,561
Actuarial Value of Assets	546,501	546,501	546,501
Unfunded Actuarial Accrued Liability	951,514	779,164	639,060
Funded Ratio	36.5%	41.2%	46.1%
Actuarially Determined Contribution Rate	169.23%	140.51%	116.29%

Sensitivity Analysis - Inflation Rate

(Dollar amounts expressed in thousands)

(1)	Decrease Inflation Rate (2)	Valuation Results (3)	Increase Inflation Rate (4)
Payroll Growth Rate	-0.25%	0.00%	0.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	5.00%	5.25%	5.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 1,083,871	$ 1,053,259	$ 1,024,174
Actuarial Value of Assets	323,250	323,250	323,250
Unfunded Actuarial Accrued Liability	760,621	730,009	700,924
Funded Ratio	29.8%	30.7%	31.6%
Actuarially Determined Contribution Rate	133.37%	126.40%	119.79%
Insurance			
Actuarial Accrued Liability	$ 273,930	$ 272,406	$ 270,960
Actuarial Value of Assets	223,251	223,251	223,251
Unfunded Actuarial Accrued Liability	50,679	49,155	47,709
Funded Ratio	81.5%	82.0%	82.4%
Actuarially Determined Contribution Rate	14.66%	14.11%	13.59%
Combined			
Actuarial Accrued Liability	$ 1,357,801	$ 1,325,665	$ 1,295,134
Actuarial Value of Assets	546,501	546,501	546,501
Unfunded Actuarial Accrued Liability	811,300	779,164	748,633
Funded Ratio	40.2%	41.2%	42.2%
Actuarially Determined Contribution Rate	148.03%	140.51%	133.38%

Sensitivity Analysis - Payroll Growth

(Dollar amounts expressed in thousands)

	Decrease Payroll Growth	Valuation Results	Increase Payroll Growth
(1)	(2)	(3)	(4)
Payroll Growth Rate	-1.00%	0.00%	1.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	5.25%	5.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 1,053,259	$ 1,053,259	$ 1,053,259
Actuarial Value of Assets	323,250	323,250	323,250
Unfunded Actuarial Accrued Liability	730,009	730,009	730,009
Funded Ratio	30.7%	30.7%	30.7%
Actuarially Determined Contribution Rate	138.72%	126.40%	114.92%
Insurance			
Actuarial Accrued Liability	$ 272,406	$ 272,406	$ 272,406
Actuarial Value of Assets	223,251	223,251	223,251
Unfunded Actuarial Accrued Liability	49,155	49,155	49,155
Funded Ratio	82.0%	82.0%	82.0%
Actuarially Determined Contribution Rate	14.99%	14.11%	13.28%
Combined			
Actuarial Accrued Liability	$ 1,325,665	$ 1,325,665	$ 1,325,665
Actuarial Value of Assets	546,501	546,501	546,501
Unfunded Actuarial Accrued Liability	779,164	779,164	779,164
Funded Ratio	41.2%	41.2%	41.2%
Actuarially Determined Contribution Rate	153.71%	140.51%	128.20%

Kentucky Retirement System
KERS Non-Hazardous Retirement Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll (Normal Cost)	Employer Contribution (Amortization Cost)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 16,321	$ 2,736	$ 13,585	17%	$ 1,027	$ 67	$ 1,349	7.90%	$ 920
2022	16,319	3,053	13,266	19%	1,012	67	1,349	7.82%	906
2023	16,293	3,337	12,956	21%	1,012	67	1,349	7.82%	906
2024	16,246	3,612	12,634	22%	991	67	1,349	7.29%	893
2025	16,178	3,878	12,300	24%	991	67	1,349	7.29%	893
2026	16,088	4,058	12,030	25%	971	67	1,349	6.82%	879
2027	15,978	4,218	11,760	26%	971	67	1,349	6.82%	879
2028	15,848	4,372	11,476	28%	965	67	1,349	6.38%	879
2029	15,698	4,520	11,178	29%	965	67	1,349	6.38%	879
2030	15,529	4,666	10,863	30%	959	67	1,349	5.97%	879
2031	15,344	4,812	10,532	31%	959	67	1,349	5.97%	879
2032	15,151	4,968	10,183	33%	954	67	1,349	5.62%	879
2033	14,944	5,128	9,816	34%	954	67	1,349	5.62%	879
2034	14,726	5,295	9,431	36%	950	67	1,349	5.31%	879
2035	14,497	5,472	9,025	38%	950	67	1,349	5.31%	879
2036	14,259	5,663	8,596	40%	947	67	1,349	5.05%	879
2037	14,017	5,871	8,146	42%	947	67	1,349	5.05%	879
2038	13,774	6,101	7,673	44%	944	67	1,349	4.86%	879
2039	13,533	6,358	7,175	47%	944	67	1,349	4.86%	879
2040	13,294	6,645	6,649	50%	945	67	1,349	4.72%	881
2041	13,061	6,966	6,095	53%	975	67	1,349	4.72%	911
2042	12,833	7,353	5,480	57%	980	67	1,349	4.62%	917
2043	12,610	7,784	4,826	62%	987	67	1,349	4.62%	924
2044	12,395	8,263	4,132	67%	992	67	1,349	4.52%	931
2045	12,187	8,793	3,394	72%	999	67	1,349	4.52%	938
2046	11,987	9,377	2,610	78%	998	67	1,349	4.45%	938
2047	11,795	10,011	1,784	85%	998	67	1,349	4.45%	938
2048	11,611	10,697	914	92%	997	67	1,349	4.38%	938
2049	11,438	11,438	-	100%	59	67	1,349	4.36%	-
2050	11,276	11,276	-	100%	59	67	1,349	4.34%	-

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 5.25%.
- New active members are assumed to be hired as current active members are assumed to terminate employment or retire.
- The total active population is assumed to decrease 2% each year for each of the next 30 years.
- Covered payroll is assumed to remain level throughout the entire projection.

The contribution rate established in the Commonwealth's biennium budget is assumed to be equal to the normal cost portion of the actuarially determined contribution.
- The full actuarially determined amortization cost is assumed to be allocated amongst employers each biennium.
- The second year of a biannual budget is assumed to take into account any expiring amortization bases.

Kentucky Retirement System
KERS Hazardous Retirement Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 1,295	$ 782	$ 513	60%	$ 54	$ 13	$ 163	33.43%	33.43%
2022	1,325	848	477	64%	52	13	163	31.82%	31.82%
2023	1,353	907	446	67%	52	13	163	31.82%	29.92%
2024	1,378	966	412	70%	46	13	163	28.18%	28.18%
2025	1,403	1,026	377	73%	46	13	163	28.18%	26.67%
2026	1,426	1,060	366	74%	40	13	163	24.68%	24.68%
2027	1,448	1,088	360	75%	40	13	163	24.68%	24.43%
2028	1,468	1,115	353	76%	39	13	163	24.16%	24.16%
2029	1,486	1,140	346	77%	39	13	163	24.16%	23.95%
2030	1,505	1,166	339	78%	39	13	163	23.79%	23.79%
2031	1,524	1,192	332	78%	39	13	163	23.79%	23.68%
2032	1,544	1,221	323	79%	38	13	163	23.58%	23.58%
2033	1,566	1,250	316	80%	38	13	163	23.58%	23.52%
2034	1,589	1,282	307	81%	38	13	163	23.45%	23.45%
2035	1,612	1,315	297	82%	38	13	163	23.45%	23.39%
2036	1,637	1,349	288	82%	38	13	163	23.31%	23.31%
2037	1,661	1,384	277	83%	38	13	163	23.31%	23.22%
2038	1,686	1,420	266	84%	38	13	163	23.11%	23.11%
2039	1,710	1,456	254	85%	38	13	163	23.11%	23.01%
2040	1,734	1,492	242	86%	36	13	163	21.86%	21.86%
2041	1,758	1,528	230	87%	36	13	163	21.86%	24.55%
2042	1,782	1,564	218	88%	43	13	163	26.28%	26.28%
2043	1,807	1,609	198	89%	43	13	163	26.28%	27.70%
2044	1,832	1,656	176	90%	47	13	163	29.07%	29.07%
2045	1,857	1,709	148	92%	47	13	163	29.07%	30.81%
2046	1,881	1,763	118	94%	50	13	163	30.97%	30.97%
2047	1,905	1,821	84	96%	50	13	163	30.97%	31.00%
2048	1,928	1,881	47	98%	50	13	163	31.01%	31.01%
2049	1,950	1,950	-	100%	10	13	163	6.29%	6.29%
2050	1,971	1,971	-	100%	10	13	163	6.29%	6.29%

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

New active members are assumed to be hired as current active members are assumed to terminate employment or retire.

The total active population is assumed to decrease 2% each year for each of the next 30 years.

Covered payroll is assumed to remain level throughout the entire projection.

The contribution rate established in the Commonwealth's biennium budget is assumed to be equal to the full actuarially determined contribution rate.

GRS

Kentucky Retirement System
SPRS Retirement Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 1,053	$ 323	$ 730	31%	$ 58	$ 4	$ 45	127.99%	127.99%
2022	1,055	348	707	33%	57	4	45	126.40%	126.40%
2023	1,055	371	684	35%	57	4	45	126.40%	123.44%
2024	1,054	392	662	37%	55	4	45	120.71%	120.71%
2025	1,051	413	638	39%	55	4	45	120.71%	118.30%
2026	1,046	424	622	41%	52	4	45	115.39%	115.39%
2027	1,040	432	608	42%	52	4	45	115.39%	114.66%
2028	1,034	441	593	43%	52	4	45	113.93%	113.93%
2029	1,026	448	578	44%	52	4	45	113.93%	113.26%
2030	1,018	457	561	45%	51	4	45	112.61%	112.61%
2031	1,009	465	544	46%	51	4	45	112.61%	112.16%
2032	1,000	474	526	47%	51	4	45	111.75%	111.75%
2033	990	483	507	49%	51	4	45	111.75%	111.46%
2034	981	494	487	50%	50	4	45	111.19%	111.19%
2035	972	506	466	52%	50	4	45	111.19%	110.91%
2036	962	518	444	54%	50	4	45	110.54%	110.54%
2037	952	531	421	56%	50	4	45	110.54%	110.14%
2038	942	545	397	58%	50	4	45	109.66%	109.66%
2039	931	560	371	60%	50	4	45	109.66%	109.17%
2040	920	576	344	63%	49	4	45	107.78%	107.78%
2041	908	592	316	65%	49	4	45	107.78%	110.49%
2042	896	609	287	68%	51	4	45	112.45%	112.45%
2043	883	630	253	71%	51	4	45	112.45%	114.18%
2044	871	652	219	75%	52	4	45	115.75%	115.75%
2045	857	678	179	79%	52	4	45	115.75%	117.70%
2046	844	704	140	83%	53	4	45	117.76%	117.76%
2047	830	734	96	88%	53	4	45	117.76%	117.73%
2048	816	766	50	94%	53	4	45	117.70%	117.70%
2049	801	801	-	100%	4	4	45	7.77%	7.77%
2050	787	787	-	100%	4	4	45	7.77%	7.77%

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 5.25%.

New active members are assumed to be hired as current active members are assumed to terminate employment or retire.

The total active population is assumed to decrease 2% each year for each of the next 30 years.

Covered payroll is assumed to remain level throughout the entire projection.

The contribution rate established in the Commonwealth's biennium budget is assumed to be equal to the full actuarially determined contribution rate.

Kentucky Retirement System
KERS Non-Hazardous Insurance Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll (Normal Cost)	Employer Contribution (Amortization Cost)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 2,574	$ 1,291	$ 1,283	50%	$ 132	$ 6	$ 1,339	2.20%	$ 102
2022	2,641	1,422	1,219	54%	117	7	1,339	2.15%	88
2023	2,706	1,535	1,171	57%	117	7	1,339	2.15%	88
2024	2,764	1,646	1,118	60%	107	8	1,339	1.92%	81
2025	2,816	1,754	1,062	62%	107	8	1,339	1.92%	81
2026	2,860	1,816	1,044	64%	96	9	1,339	1.67%	74
2027	2,896	1,863	1,033	64%	96	9	1,339	1.67%	74
2028	2,923	1,902	1,021	65%	93	10	1,339	1.41%	74
2029	2,941	1,932	1,009	66%	93	10	1,339	1.41%	74
2030	2,950	1,954	996	66%	89	11	1,339	1.16%	74
2031	2,951	1,969	982	67%	89	11	1,339	1.16%	74
2032	2,945	1,978	967	67%	87	11	1,339	0.95%	74
2033	2,934	1,983	951	68%	87	12	1,339	0.95%	74
2034	2,918	1,983	935	68%	85	12	1,339	0.80%	74
2035	2,898	1,980	918	68%	85	12	1,339	0.80%	74
2036	2,876	1,977	899	69%	83	13	1,339	0.68%	74
2037	2,854	1,975	879	69%	83	13	1,339	0.68%	74
2038	2,832	1,974	858	70%	82	13	1,339	0.60%	74
2039	2,810	1,976	834	70%	82	13	1,339	0.60%	74
2040	2,790	1,979	811	71%	103	13	1,339	0.54%	96
2041	2,772	2,009	763	73%	118	13	1,339	0.54%	111
2042	2,755	2,060	695	75%	121	13	1,339	0.50%	115
2043	2,741	2,120	621	77%	125	13	1,339	0.50%	118
2044	2,729	2,191	538	80%	128	13	1,339	0.47%	121
2045	2,718	2,272	446	84%	132	13	1,339	0.47%	126
2046	2,709	2,364	345	87%	132	13	1,339	0.44%	126
2047	2,699	2,462	237	91%	132	13	1,339	0.44%	126
2048	2,688	2,566	122	96%	131	13	1,339	0.43%	126
2049	2,677	2,677	-	100%	6	13	1,339	0.42%	-
2050	2,663	2,663	-	100%	5	13	1,339	0.41%	-

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

New active members are assumed to be hired as current active members are assumed to terminate employment or retire.

The total active population is assumed to decrease 2% each year for each of the next 30 years.

Covered payroll is assumed to remain level throughout the entire projection.

The contribution rate established in the Commonwealth's biennium budget is assumed to be equal to the normal cost portion of the actuarially determined contribution.

The full actuarially determined amortization cost is assumed to be allocated amongst employers each biennium.

The second year of a biannual budget is assumed to take into account any expiring amortization bases.

Kentucky Retirement System
KERS Hazardous Insurance Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 424	$ 575	$ (151)	136%	$ -	$ 1	$ 162	0.00%	0.00%
2022	437	608	(171)	139%	-	1	162	0.00%	0.00%
2023	447	639	(192)	143%	-	1	162	0.00%	0.00%
2024	456	669	(213)	147%	-	1	162	0.00%	0.00%
2025	464	705	(241)	152%	-	1	162	0.00%	0.00%
2026	470	722	(252)	154%	-	1	162	0.00%	0.00%
2027	475	739	(264)	156%	-	1	162	0.00%	0.00%
2028	479	755	(276)	158%	-	1	162	0.00%	0.00%
2029	482	772	(290)	160%	-	1	162	0.00%	0.00%
2030	485	788	(303)	163%	-	2	162	0.00%	0.00%
2031	487	806	(319)	166%	-	2	162	0.00%	0.00%
2032	488	824	(336)	169%	-	2	162	0.00%	0.00%
2033	491	844	(353)	172%	-	2	162	0.00%	0.00%
2034	493	864	(371)	175%	-	2	162	0.00%	0.00%
2035	495	887	(392)	179%	-	2	162	0.00%	0.00%
2036	498	911	(413)	183%	-	2	162	0.00%	0.00%
2037	501	937	(436)	187%	-	2	162	0.00%	0.00%
2038	505	965	(460)	191%	-	2	162	0.00%	0.00%
2039	510	995	(485)	195%	-	2	162	0.00%	0.00%
2040	515	1,027	(512)	199%	-	2	162	0.00%	0.00%
2041	520	1,061	(541)	204%	-	2	162	0.00%	0.00%
2042	526	1,098	(572)	209%	-	2	162	0.00%	0.00%
2043	533	1,137	(604)	213%	-	2	162	0.00%	0.00%
2044	540	1,178	(638)	218%	-	2	162	0.00%	0.00%
2045	547	1,222	(675)	223%	-	2	162	0.00%	0.00%
2046	554	1,268	(714)	229%	-	2	162	0.00%	0.00%
2047	561	1,317	(756)	235%	-	2	162	0.00%	0.00%
2048	567	1,367	(800)	241%	-	2	162	0.00%	0.00%
2049	573	1,420	(847)	248%	-	2	162	0.00%	0.00%
2050	578	1,476	(898)	255%	-	2	162	0.00%	0.00%

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

New active members are assumed to be hired as current active members are assumed to terminate employment or retire.

The total active population is assumed to decrease 2% each year for each of the next 30 years.

Covered payroll is assumed to remain level throughout the entire projection.

The contribution rate established in the Commonwealth's biennium budget is assumed to be equal to the full actuarially determined contribution rate.

Kentucky Retirement System
SPRS Insurance Fund
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2021	$ 272	$ 223	$ 49	82%	$ 8	$ -	$ 45	18.07%	18.07%
2022	278	238	40	86%	6	-	45	14.11%	14.11%
2023	282	250	32	89%	6	-	45	14.11%	11.65%
2024	285	261	24	92%	4	-	45	9.42%	9.42%
2025	286	271	15	95%	4	-	45	9.42%	7.54%
2026	287	273	14	95%	2	-	45	5.17%	5.17%
2027	287	272	15	95%	2	-	45	5.17%	4.75%
2028	286	271	15	95%	2	-	45	4.39%	4.39%
2029	284	268	16	94%	2	-	45	4.39%	4.12%
2030	282	265	17	94%	2	-	45	3.88%	3.88%
2031	279	262	17	94%	2	-	45	3.88%	3.73%
2032	275	258	17	94%	2	-	45	3.59%	3.59%
2033	272	253	19	93%	2	-	45	3.59%	3.51%
2034	268	249	19	93%	2	-	45	3.46%	3.46%
2035	264	244	20	92%	2	-	45	3.46%	3.41%
2036	261	239	22	92%	2	-	45	3.37%	3.37%
2037	258	235	23	91%	2	-	45	3.37%	3.35%
2038	255	231	24	91%	2	-	45	3.33%	3.33%
2039	252	227	25	90%	2	-	45	3.33%	3.31%
2040	250	224	26	90%	2	-	45	4.56%	4.56%
2041	248	221	27	89%	2	-	45	4.56%	8.39%
2042	247	219	28	89%	5	-	45	10.40%	10.40%
2043	246	220	26	89%	5	-	45	10.40%	11.96%
2044	246	221	25	90%	6	-	45	13.40%	13.40%
2045	246	224	22	91%	6	-	45	13.40%	15.27%
2046	246	228	18	93%	7	-	45	15.45%	15.45%
2047	246	233	13	95%	7	-	45	15.45%	15.50%
2048	246	238	8	97%	7	-	45	15.50%	15.50%
2049	246	246	-	100%	2	-	45	3.39%	3.39%
2050	246	246	-	100%	2	-	45	3.37%	3.37%

Notes and assumptions:

The projection is based on the results of the June 30, 2021 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

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The total active population is assumed to decrease 2% each year for each of the next 30 years.

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