Kentucky Employees Retirement System (KERS)

Actuarial Valuation Report as of June 30, 2022

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October 31, 2022

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

Subject: Actuarial Valuation as of June 30, 2022

Dear Trustees of the Board:

This report describes the current actuarial condition of the Kentucky Employees Retirement System (KERS), provides the actuarially determined employer contribution, analyzes changes in KERS's financial condition and provides various summaries of the data. The results of this actuarial valuation, including the calculated employer contribution rates will be used by the Board and stakeholders for informational purposes only as the employer contribution for the fiscal years ending June 30, 2023 and June 30, 2024 were certified in the June 30, 2021 actuarial valuation, which was adopted by the Board and incorporated in the Commonwealth's budget for the biennium period.

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 Systems (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 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 (27 years remaining as of June 30, 2022). 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 specified the method for allocating and collecting contributions 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.

HB 1 and HB 604 were enacted in the 2022 legislative session and provided an additional $135 million and $105 million in appropriations to finance the unfunded actuarial accrued liability in the KERS non-hazardous retirement fund in FY 2023 and FY 2024. The appropriations for FY 2023 have been reflected in the contribution requirement in this year's valuation.

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 the same as the prior year and are based on an experience study conducted with experience through June 30, 2018.

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 contributions, 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, 2022. Senate Bill 209 passed during the 2022 legislative session and provided increased retiree medical benefits for members hired after July 1, 2003 that meet certain eligibility requirements at retirement. 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, 2022, by KPPA staff. The staff also supplied asset information as of June 30, 2022. 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, 2022.

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, 2022	June 30, 2021	June 30, 2022	June 30, 2021	June 30, 2022	June 30, 2021
Contribution Rate, payable on covered payroll[1]:						
Retirement	7.74%	7.82%	30.12%	31.82%		
Insurance	1.86%	2.15%	0.00%	0.00%		
Total	9.60%	9.97%	30.12%	31.82%	N/A	N/A
Amortization Cost to be allocated amongst employers	$905,893	$994,422	N/A	N/A	N/A	N/A
Assets:						
Retirement						
• Actuarial value (AVAR)	$3,065,263	$2,735,876	$832,436	$782,496	$3,897,699	$3,518,372
• Market value (MVAR)	$3,013,845	$3,018,660	$810,978	$866,140	$3,824,823	$3,884,800
• Ratio of actuarial to market value of assets	101.7%	90.6%	102.6%	90.3%	101.9%	90.6%
Insurance						
• Actuarial value (AVAI)	$1,409,553	$1,291,472	$597,701	$575,025	$2,007,254	$1,866,497
• Market value (MVAI)	$1,364,419	$1,419,477	$588,162	$633,677	$1,952,581	$2,053,154
• Ratio of actuarial to market value of assets	103.3%	91.0%	101.6%	90.7%	102.8%	90.9%
Funded Status:						
Retirement						
• Actuarial accrued liability	$16,576,631	$16,321,372	$1,316,825	$1,295,243	$17,893,456	$17,616,615
• Unfunded accrued liability on AVAR	$13,511,368	$13,585,496	$484,389	$512,747	$13,995,757	$14,098,243
• Funded ratio on AVAR	18.5%	16.8%	63.2%	60.4%	21.8%	20.0%
• Unfunded accrued liability on MVAR	$13,562,786	$13,302,712	$505,847	$429,103	$14,068,633	$13,731,815
• Funded ratio on MVAR	18.2%	18.5%	61.6%	66.9%	21.4%	22.1%
Insurance						
• Actuarial accrued liability	$1,782,386	$2,574,112	$347,044	$424,455	$2,129,430	$2,998,567
• Unfunded accrued liability on AVAI	$372,833	$1,282,640	($250,657)	($150,570)	$122,176	$1,132,070
• Funded ratio on AVAI	79.1%	50.2%	172.2%	135.5%	94.3%	62.2%
• Unfunded accrued liability on MVAI	$417,967	$1,154,635	($241,118)	($209,222)	$176,849	$945,413
• Funded ratio on MVAI	76.6%	55.1%	169.5%	149.3%	91.7%	68.5%
Membership:						
• Number of						
- Active Members	29,551	30,186	3,617	3,827	33,168	34,013
- Retirees and Beneficiaries	48,195	47,700	4,850	4,726	53,045	52,426
- Inactive Members	55,510	54,522	8,154	7,680	63,664	62,202
- Total	133,256	132,408	16,621	16,233	149,877	148,641
• Projected payroll of active members	$1,355,267	$1,349,330	$165,637	$162,836	$1,520,904	$1,512,166
• Average salary of active members	$45,862	$44,701	$45,794	$42,549	$45,855	$44,458

[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.

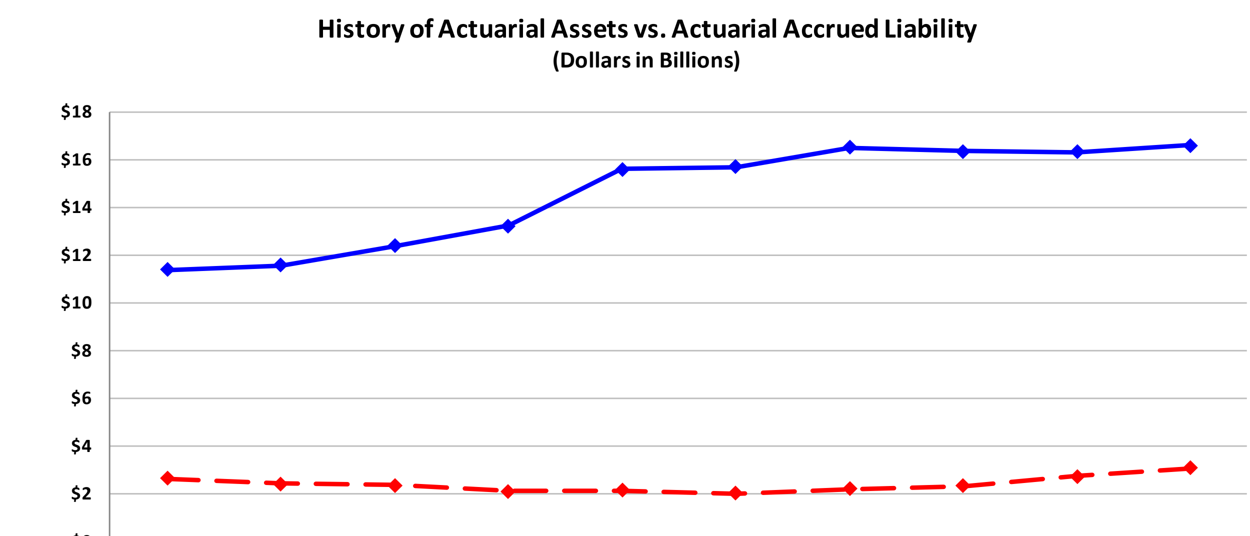
Executive Summary (Continued)

Non-Hazardous Retirement Fund

The unfunded actuarial accrued liability of the non-hazardous retirement fund decreased by $74 million since the prior year's valuation to $13.511 billion. This decrease was approximately $273 million less than expected, due to higher liabilities.

For FYE 2022, the non-hazardous retirement fund distributed $1,049 million in benefit payments and administrative expenses, and received $1,206 million in employer and employee contributions. As of June 30, 2022, plan assets for this system were $3,014 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 at the beginning of the ten-year period was generally due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return.



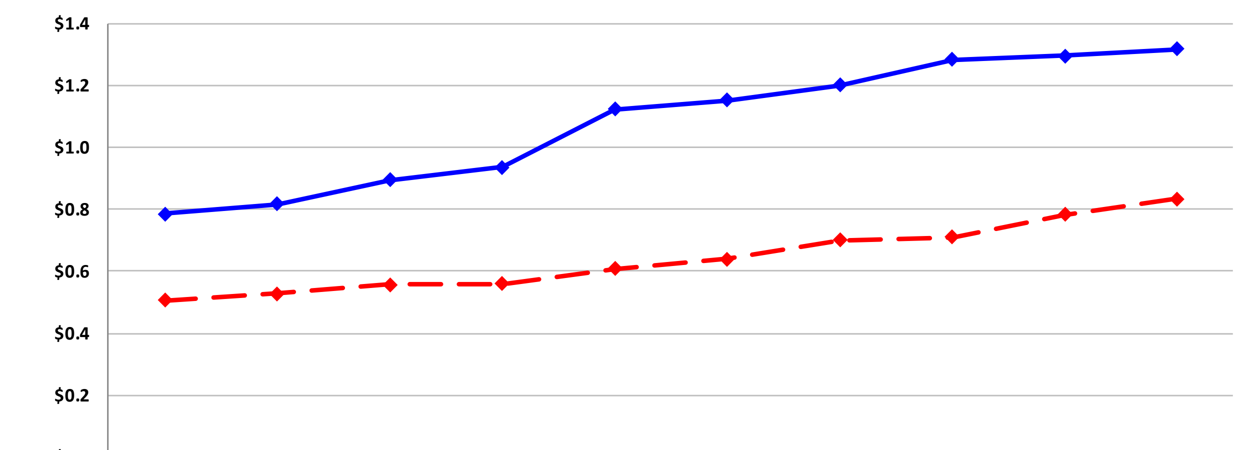
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AAL	11.4	11.6	12.4	13.2	15.6	15.7	16.5	16.3	16.3	16.6
AVA	2.6	2.4	2.4	2.1	2.1	2.0	2.2	2.3	2.7	3.1

Executive Summary (Continued)

Hazardous Retirement Fund

The unfunded actuarial accrued liability of the hazardous retirement fund decreased by $28 million since the prior year's valuation to $484 million. This decrease was approximately $6 million more than expected, primarily due to slightly favorable investment (on an actuarial value of asset basis) and liability experience.

Below is a chart with the historical actuarial value of assets and actuarial accrued liability. The divergence in the assets and liability at the beginning of the ten-year period was generally due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return.



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AAL	0.8	0.8	0.9	0.9	1.1	1.2	1.2	1.3	1.3	1.3
AVA	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8

Executive Summary (Continued)

Summary of Change in Financial Condition of the Insurance Funds

There was a large decrease in the liability and the contribution requirement in this year's actuarial valuation of the insurance fund due to a significant decrease in the 2023 Medicare premiums. On average, the 2023 Medicare premiums were 61% lower than expected. The premiums for the two Medicare Advantage plans decreased from $227.03 in 2022 to $89.28 in 2023 (Premium Plan) and from $49.25 to $0.00 (Essential Plan). In conjunction with the review of the healthcare per capita claims cost, the assumed increase in future healthcare costs, or trend assumption, is also reviewed on an annual basis. The trend assumption for the Medicare Plans was increased as a result of our review.

The decrease in the Medicare premiums was the primary reason for the $905 million and $99 million liability experience gain for the non-hazardous and hazardous insurance funds, respectively. As a result, the corresponding funded ratio increased from 50.2% in the prior year's valuation to 79.1% at June 30, 2022 for the non-hazardous plan. Similarly, the funded ratio for the hazardous plan increased from 135.5% in the prior year's valuation to 172.2% at June 30, 2022.

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, 2022 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, analyze 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 cost 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 in accordance with Statutes enacted with 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.

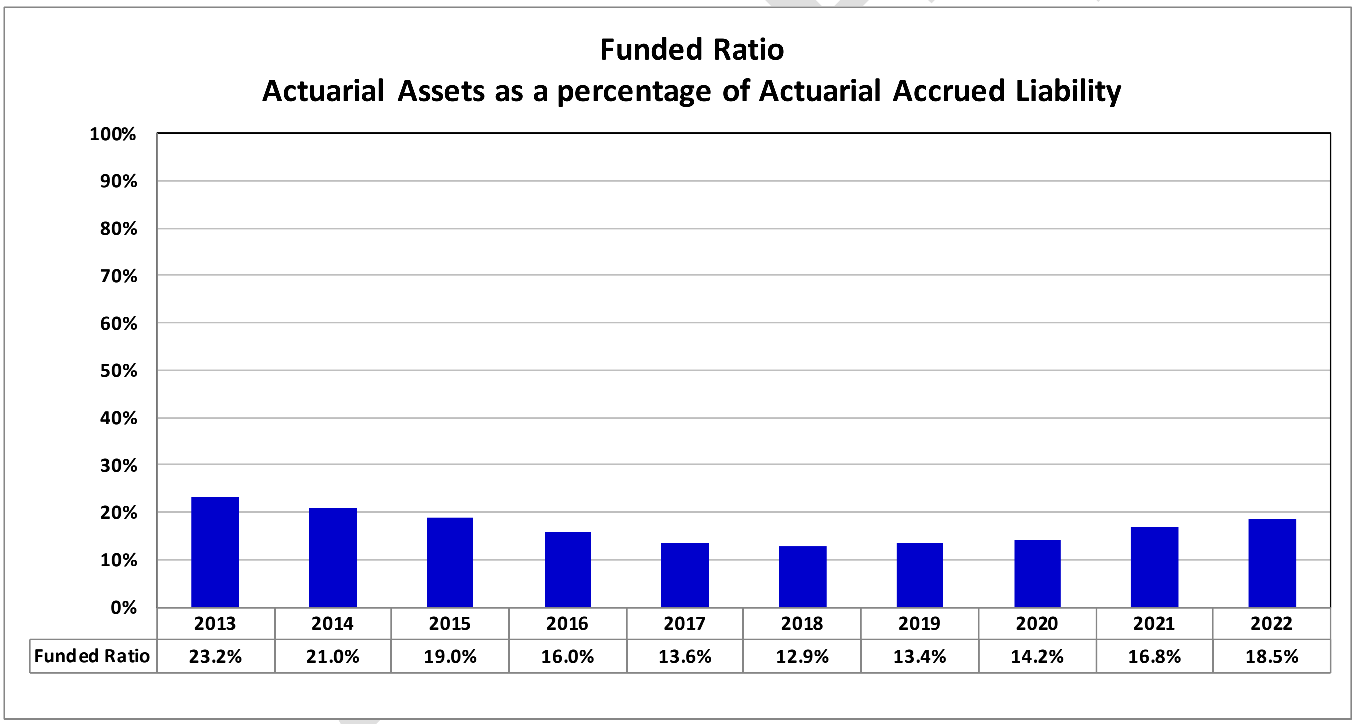
Again, the results of this actuarial valuation, including the calculated employer contribution rates will be used by the Board and stakeholders for informational purposes only as the employer contribution for the fiscal years ending June 30, 2023 and June 30, 2024 were certified in the June 30, 2021 actuarial valuation, which was adopted by the Board and incorporated in the Commonwealth's budget for the biennium period.

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 in the first half of this ten-year period was generally due to: (1) actual contributions being insufficient to finance the unfunded actuarial accrued liability, and (2) decreases in the assumed rate of return.

The funded ratio has been gradually increasing for the past several years for both the non-hazardous and hazardous funds. Assuming the full actuarially determined contributions are paid in future years and absent material 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 a decreasing trend. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the retirement funds.

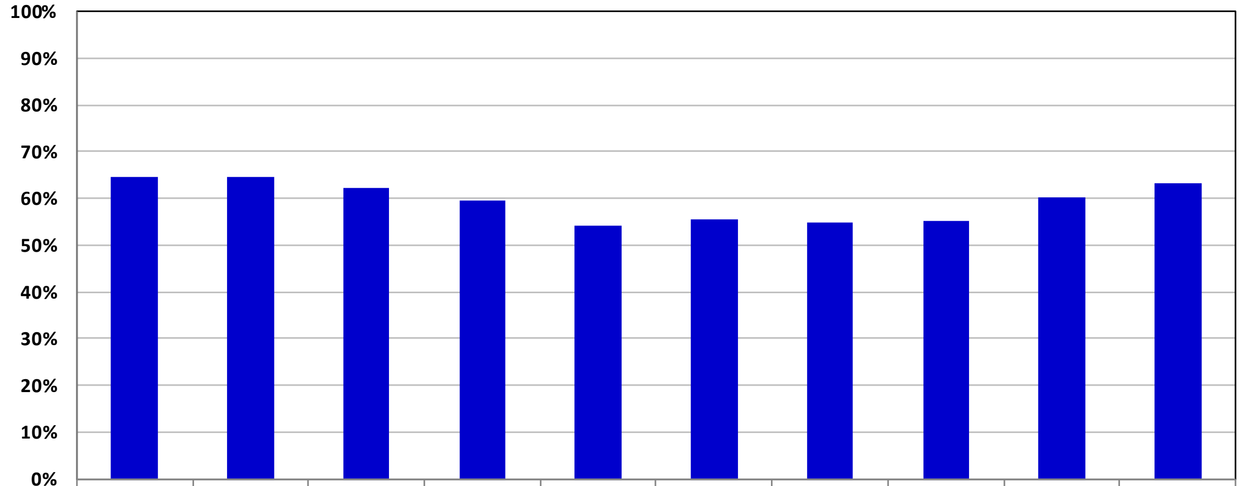
Non-Hazardous Retirement Fund



Funding Progress (Continued)

Hazardous Retirement Fund

Funded Ratio
Actuarial Assets as a percentage of Actuarial Accrued Liability



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Funded Ratio	64.5%	64.6%	62.2%	59.7%	54.1%	55.5%	54.8%	55.3%	60.4%	63.2%

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 $2.736 billion to $3.065 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 -5.2% which is less than the 5.25% expected annual return. The return on an actuarial (smoothed) asset value was 6.1%, which resulted in a $24 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 $51 million less than the actuarial value of assets, which signifies that the retirement fund is in a position of net deferred investment losses to be realized in future years.

Hazardous Retirement Fund

Likewise, the actuarial value of assets for the hazardous retirement fund increased from $782 million to $832 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 -5.9% which is less than the 6.25% expected annual return. The return on an actuarial (smoothed) asset value was 6.9%, which resulted in a $5 million gain for the fiscal year. The market value of assets is $21 million less than the actuarial value of assets, which signifies that the retirement fund is in a position of net deferred investment losses 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	$ 13,585,496	$ 512,747
2. Normal cost and administrative expenses	172,984	27,324
3. Less: contributions for the year	(1,206,476)	(79,643)
4. Interest accrual	686,109	30,412
5. Expected UAAL (Sum of Items 1 - 4)	$ 13,238,113	$ 490,840
6. Actual UAAL as of June 30,2022	$ 13,511,368	$ 484,389
7. Total gain (loss) for the year (Item 5 - Item 6)	$ (273,255)	$ 6,451
B. Source of gains and losses		
8. Asset gain (loss) for the year	$ 23,970	$ 4,999
9. Liability experience gain (loss) for the year	(297,225)	1,452
10. Plan Change	—	—
11. Assumption change	—	—
12. Total	$ (273,255)	$ 6,451

The liability experience for the non-hazardous fund includes a $304 million loss due to the inclusion of retirees that have benefits payable from both the non-hazardous fund and the hazardous fund since they have earned benefits in each fund. The other sources of the liability experience for both the non-hazardous fund and hazardous fund were negligible for the prior year.

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	$	1,282,640	$	(150,570)
2.	Normal cost and administrative expenses		34,826		7,344
3.	Less: contributions for the year		(147,241)		(2,508)
4.	Interest accrual		76,652		(9,260)
5.	Expected UAAL (Sum of Items 1 - 4)		1,246,877		(154,994)
6.	Actual UAAL as of June 30,2022	$	372,833		(250,657)
7.	Total gain (loss) for the year (Item 5 - Item 6)	$	874,044	$	95,663
B.	Source of gains and losses				
8.	Asset gain (loss) for the year	$	2,362	$	4,872
9.	Liability experience gain (loss) for the year		904,522		99,446
10.	Plan Change		(32,840)		(8,655)
11.	Assumption change		—		—
12.	Total	$	874,044	$	95,663

The liability experience gains shown above for both the non-hazardous and hazardous insurance fund is primarily due to a significant decrease in the Medicare premiums from 2022 to 2023. 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 increased during the select period in this valuation as a result of our review. All other assumptions were adopted by the Board and are based on an experience study conducted based on experience through June 30, 2018.

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 209 passed during the 2022 legislative session and increased the insurance dollar contribution for members hired on or after July 1, 2003 by $5 for each year of service a member attains over certain thresholds, depending on a member's retirement eligibility requirement. This increase in the insurance dollar contribution does not increase by 1.5% annually and is only payable for non-Medicare retirees. Additionally, it is only payable when the member's applicable insurance fund is at least 90% funded. The increase is first payable January 1, 2023 as long as the insurance fund is at least 90% funded on an actuarial valuation of asset basis as of the last actuarial valuation.

Senate Bill 209 also allows members receiving the insurance dollar contribution to participate in a medical insurance reimbursement plan that would provide the reimbursement of premiums for health plans other than those administered by KPPA.

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, 2022	
		Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members	$ 1,355,267	$ 165,637
2.	Present value of future pay	$ 10,510,183	$ 1,259,150
3.	Normal cost rate		
	a. Total normal cost rate	11.76%	15.72%
	b. Less: member contribution rate	-5.00%	-8.00%
	c. Employer normal cost rate	6.76%	7.72%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 5,046,464	$ 559,102
	b. Less: present value of future normal costs	(1,170,428)	(188,605)
	c. Actuarial accrued liability	$ 3,876,036	$ 370,497
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 11,991,589	$ 889,452
	b. Inactive members	709,006	56,876
	c. Active members (Item 4c)	3,876,036	370,497
	d. Total	$ 16,576,631	$ 1,316,825
6.	Actuarial value of assets	$ 3,065,263	$ 832,436
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 13,511,368	$ 484,389
8.	Funded Ratio	18.5%	63.2%

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

			June 30, 2022	
			Non-Hazardous (1)	Hazardous (2)
1.	Active members			
	a.	Service retirement	$ 4,486,489	$ 496,615
	b.	Deferred termination benefits and refunds	336,971	39,896
	c.	Survivor benefits	68,908	5,244
	d.	Disability benefits	154,096	17,347
	e.	Total	$ 5,046,464	$ 559,102
2.	Retired members			
	a.	Service retirement	$ 10,928,978	$ 813,953
	b.	Disability retirement	251,199	17,842
	c.	Beneficiaries	811,412	57,657
	d.	Total	$ 11,991,589	$ 889,452
3.	Inactive members			
	a.	Vested terminations	$ 658,297	$ 45,141
	b.	Nonvested terminations	50,709	11,735
	c.	Total	$ 709,006	$ 56,876
4.	Total actuarial present value of future benefits		$ 17,747,059	$ 1,505,430

Development of Actuarially Determined Contribution Rate
Retirement Benefits

	June 30, 2022	
	Non-Hazardous (1)	Hazardous (2)
1. Total normal cost rate		
a. Service retirement	7.93%	11.09%
b. Deferred termination benefits and refunds	2.89%	3.64%
c. Survivor benefits	0.33%	0.29%
d. Disability benefits	0.61%	0.70%
e. Total	11.76%	15.72%
2. Less: member contribution rate	-5.00%	-8.00%
3. Total employer normal cost rate	6.76%	7.72%
4. Administrative expenses	0.98%	0.88%
5. Net employer normal cost rate	7.74%	8.60%
6. UAAL amortization contribution rate	N/A	21.52%
7. Total calculated employer contribution payable as a percentage of covered payroll	7.74%	30.12%
8. Total amortization cost to be allocated amongst employers	$ 900,701	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, 2022 (1)		June 30, 2021 (2)
1. Assets - Present and Expected Future Resources				
a. Current assets (actuarial value)	$	3,065,263	$	2,735,876
b. Present value of future member contributions	$	525,509	$	524,281
c. Present value of future employer contributions				
i. Normal cost contributions	$	644,919	$	666,494
ii. Unfunded accrued liability contributions		13,511,368		13,585,496
iii. Total future employer contributions	$	14,156,287	$	14,251,990
d. Total assets	$	17,747,059	$	17,512,147
2. Liabilities - Present Value of Expected Future Benefit Payments				
a. Active members				
i. Present value of future normal costs	$	1,170,428	$	1,190,775
ii. Accrued liability		3,876,036		3,895,421
iii. Total present value of future benefits	$	5,046,464	$	5,086,196
b. Present value of benefits payable on account of current retired members and beneficiaries	$	11,991,589	$	11,736,267
c. Present value of benefits payable on account of current inactive members	$	709,006	$	689,684
d. Total liabilities	$	17,747,059	$	17,512,147

Actuarial Balance Sheet

Hazardous Members Retirement

(Dollar amounts expressed in thousands)

		June 30, 2022 (1)	June 30, 2021 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 832,436	$ 782,496
	b. Present value of future member contributions	$ 100,732	$ 98,186
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 87,873	$ 89,019
	ii. Unfunded accrued liability contributions	484,389	512,747
	iii. Total future employer contributions	$ 572,262	$ 601,766
	d. Total assets	$ 1,505,430	$ 1,482,448
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 188,605	$ 187,205
	ii. Accrued liability	370,497	378,812
	iii. Total present value of future benefits	$ 559,102	$ 566,017
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 889,452	$ 864,939
	c. Present value of benefits payable on account of current inactive members	$ 56,876	$ 51,492
	d. Total liabilities	$ 1,505,430	$ 1,482,448

Reconciliation of Retirement Net Assets

(Dollar amounts expressed in thousands)[1]

	Year Ending			
	June 30, 2022		June 30, 2022	
	(1)		(2)	
	Non-Hazardous		**Hazardous**	
1. Value of assets at beginning of year	$	3,018,660	$	866,140
2. Revenue for the year				
a. Contributions				
i. Member contributions	$	89,607	$	20,588
ii. Employer contributions		1,053,732		59,052
iii. Other contributions (less 401h)		63,137		3
iv. Total	$	1,206,476	$	79,643
b. Income				
i. Interest, dividends, and other income	$	75,363	$	24,282
ii. Investment expenses		(22,683)		(9,171)
iii. Net	$	52,681	$	15,111
c. Net realized and unrealized gains (losses)		(215,141)		(66,429)
d. Total revenue	$	1,044,016	$	28,325
3. Expenditures for the year				
a. Disbursements				
i. Refunds	$	12,116	$	4,976
ii. Regular annuity benefits		1,023,375		77,047
iii. Other benefit payments		0		0
iv. Transfers to other systems		0		0
v. Total	$	1,035,491	$	82,023
b. Administrative expenses and depreciation		13,339		1,465
c. Total expenditures	$	1,048,830	$	83,488
4. Increase in net assets (Item 2. - Item 3.)	$	(4,814)	$	(55,163)
5. Value of assets at end of year (Item 1. + Item 4.)	$	3,013,845	$	810,978
6. Net external cash flow				
a. Dollar amount	$	157,646	$	(3,845)
b. Percentage of market value		5.2%		-0.5%
7. Estimated annual return on net assets		-5.2%		-5.9%

[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, 2022
1.	Actuarial value of assets at beginning of year	$	2,735,876
2.	Market value of assets at beginning of year	$	3,018,660
3.	Net new investments		
	a. Contributions	$	1,206,476
	b. Benefit payments		(1,035,491)
	c. Administrative expenses		(13,339)
	d. Subtotal	$	157,646
4.	Market value of assets at end of year	$	3,013,845
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(162,460)
6.	Assumed investment return rate for fiscal year		5.25%
7.	Expected return for immediate recognition	$	162,618
8.	Excess return for phased recognition	$	(325,078)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(325,078)	$	(65,016)
b.	2021		389,946		77,989
c.	2020		(65,343)		(13,069)
d.	2019		4,070		814
e.	2018		42,022		8,404
f.	Total			$	9,123

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	3,065,263
11.	Ratio of actuarial value to market value		101.7%
12.	Estimated annual return on actuarial value of assets		6.1%

* 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, 2022
1. Actuarial value of assets at beginning of year	$	782,496
2. Market value of assets at beginning of year	$	866,140
3. Net new investments		
a. Contributions	$	79,643
b. Benefit payments		(82,023)
c. Administrative expenses		(1,465)
d. Subtotal	$	(3,845)
4. Market value of assets at end of year	$	810,978
5. Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(51,318)
6. Assumed investment return rate for fiscal year		6.25%
7. Expected return for immediate recognition	$	54,014
8. Excess return for phased recognition	$	(105,331)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(105,331)	$	(21,066)
b.	2021		129,924		25,985
c.	2020		(35,903)		(7,181)
d.	2019		(3,933)		(787)
e.	2018		14,102		2,820
f.	Total			$	(228)

10. Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	832,436
11. Ratio of actuarial value to market value		102.6%
12. Estimated annual return on actuarial value of assets		6.9%

* 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			
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%
2022	3,065,263	16,576,631	13,511,368	18.5%	1,355,267	997.0%
			Hazardous Members			
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%
2022	832,436	1,316,825	484,389	63.2%	165,637	292.4%
			Total KERS Members			
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%
2022	3,897,699	17,893,456	13,995,757	21.8%	1,520,904	920.2%

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, 2022	June 30, 2022
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)

	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				
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%
2022	859,591	12,700,595	3,016,445	3,065,263	100.0%	17.4%	0.0%
			Hazardous Members				
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%
2022	94,538	946,328	275,959	832,436	100.0%	78.0%	0.0%

INSURANCE BENEFITS

ACTUARIAL TABLES

Development of Unfunded Actuarial Accrued Liability
Insurance Benefits

(Dollar amounts expressed in thousands)

		June 30, 2022	
		Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members	$ 1,355,267	$ 165,637
2.	Present value of future pay	$ 9,779,702	$ 1,255,614
3.	Normal cost rate		
	a. Total normal cost rate	2.29%	4.07%
	b. Less: member contribution rate	-0.49%	-0.70%
	c. Employer normal cost rate	1.80%	3.37%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 1,025,417	$ 160,456
	b. Less: present value of future normal costs	(210,082)	(45,997)
	c. Actuarial accrued liability	$ 815,335	$ 114,459
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 881,211	$ 223,706
	b. Inactive members	85,840	8,879
	c. Active members (Item 4c)	815,335	114,459
	d. Total	$ 1,782,386	$ 347,044
6.	Actuarial value of assets	$ 1,409,553	$ 597,701
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 372,833	$ (250,657)
8.	Funded Ratio	79.1%	172.2%

Development of Actuarially Determined Contribution Rate
Insurance Benefits

		June 30, 2022	
		Non-Hazardous (1)	Hazardous (2)
1.	Total normal cost rate	2.29%	4.07%
2.	Less: member contribution rate	-0.49%	-0.70%
3.	Total employer normal cost rate	1.80%	3.37%
4.	Administrative expenses	0.06%	0.08%
5.	Net employer normal cost rate	1.86%	3.45%
6.	UAAL amortization contribution rate	N/A	-13.39%
7.	Total calculated employer contribution payable as a percentage of covered payroll Max (0%, item 5. + item6.)	1.86%	0.00%
8.	Total amortization cost to be allocated amongst employers	$ 5,192	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, 2022 (1)	June 30, 2021 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 1,409,553	$ 1,291,472
	b. Present value of future member contributions	$ 58,444	$ 54,640
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 151,638	$ 167,446
	ii. Unfunded accrued liability contributions	372,833	1,282,640
	iii. Total future employer contributions	$ 524,471	$ 1,450,086
	d. Total assets	$ 1,992,468	$ 2,796,198
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 210,082	$ 222,086
	ii. Accrued liability	815,335	964,337
	iii. Total present value of future benefits	$ 1,025,417	$ 1,186,423
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 881,211	$ 1,461,617
	c. Present value of benefits payable on account of current inactive members	$ 85,840	$ 148,158
	d. Total liabilities	$ 1,992,468	$ 2,796,198

Actuarial Balance Sheet

Hazardous Members Insurance

(Dollar amounts expressed in thousands)

		June 30, 2022 (1)	June 30, 2021 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 597,701	$ 575,025
	b. Present value of future member contributions	$ 10,480	$ 9,821
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 35,517	$ 35,870
	ii. Unfunded accrued liability contributions	(250,657)	(150,570)
	iii. Total future employer contributions	$ (215,140)	$ (114,700)
	d. Total assets	$ 393,041	$ 470,146
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 45,997	$ 45,691
	ii. Accrued liability	114,459	136,441
	iii. Total present value of future benefits	$ 160,456	$ 182,132
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 223,706	$ 276,981
	c. Present value of benefits payable on account of current inactive members	$ 8,879	$ 11,033
	d. Total liabilities	$ 393,041	$ 470,146

Reconciliation of Insurance Net Assets

(Dollar amounts expressed in thousands)[1]

	Year Ending June 30, 2022 (1) Non-Hazardous	Year Ending June 30, 2022 (2) Hazardous
1. Value of assets at beginning of year	$ 1,419,477	$ 633,677
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 6,547	$ 1,227
ii. Employer contributions	133,248	1
iii. Other contributions (less 401h)	7,446	1,279
iv. Total	$ 147,241	$ 2,508
b. Income		
i. Interest, dividends, and other income	$ 34,284	$ 17,583
ii. Investment expenses	(14,262)	(8,113)
iii. Net	$ 20,022	$ 9,470
c. Net realized and unrealized gains (losses)	(109,021)	(37,399)
d. Total revenue	$ 58,242	$ (25,422)
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 0	$ 0
ii. Healthcare premium subsidies	118,451	20,355
iii. Other benefit payments[2]	(5,971)	(387)
iv. Transfers to other systems	0	0
v. Total	$ 112,480	$ 19,968
b. Administrative expenses and depreciation	820	125
c. Total expenditures	$ 113,300	$ 20,093
4. Increase in net assets (Item 2. - Item 3.)	$ (55,058)	$ (45,515)
5. Value of assets at end of year (Item 1. + Item 4.)	$ 1,364,419	$ 588,162
6. Net external cash flow		
a. Dollar amount	$ 33,940	$ (17,586)
b. Percentage of market value	2.4%	-2.9%
7. Estimated annual return on net assets	-6.2%	-4.5%

[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, 2022
1.	Actuarial value of assets at beginning of year		$	1,291,472
2.	Market value of assets at beginning of year		$	1,419,477
3.	Net new investments			
	a. Contributions		$	147,241
	b. Benefit payments			(112,480)
	c. Administrative expenses			(820)
	d. Subtotal		$	33,940
4.	Market value of assets at end of year		$	1,364,419
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)		$	(88,998)
6.	Assumed investment return rate for fiscal year			6.25%
7.	Expected return for immediate recognition		$	89,778
8.	Excess return for phased recognition		$	(178,776)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(178,776)	$	(35,755)
b.	2021		201,770		40,354
c.	2020		(52,052)		(10,410)
d.	2019		(11,768)		(2,354)
e.	2018		12,636		2,527
f.	Total			$	(5,638)

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	1,409,553
11.	Ratio of actuarial value to market value		103.3%
12.	Estimated annual return on actuarial value of assets		6.4%

* 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, 2022
1.	Actuarial value of assets at beginning of year	$	575,025
2.	Market value of assets at beginning of year	$	633,677
3.	Net new investments		
	a. Contributions	$	2,508
	b. Benefit payments		(19,968)
	c. Administrative expenses		(125)
	d. Subtotal	$	(17,586)
4.	Market value of assets at end of year	$	588,162
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(27,929)
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	39,055
8.	Excess return for phased recognition	$	(66,985)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(66,985)	$	(13,397)
b.	2021		96,144		19,229
c.	2020		(32,268)		(6,454)
d.	2019		(3,651)		(730)
e.	2018		12,794		2,559
f.	Total			$	1,207

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	597,701
11.	Ratio of actuarial value to market value		101.6%
12.	Estimated annual return on actuarial value of assets		7.1%

* 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			
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%
2022	1,409,553	1,782,386	372,833	79.1%	1,355,267	27.5%
			Hazardous Members			
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%
2022	597,701	347,044	(250,657)	172.2%	165,637	-151.3%
			Total KERS Members			
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%
2022	2,007,254	2,129,430	122,176	94.3%	1,520,904	8.0%

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				
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%
2022	-	967,051	815,335	1,409,553	100.0%	100.0%	54.3%
			Hazardous Members				
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%
2022	-	232,585	114,459	597,701	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, 2022	Payments for FYE 2024	Funding Period at June 30, 2022
June 30, 2019	$ 14,260,148	$ 13,730,760	$ 938,364	27
June 30, 2020	(153,145)	(31,845)	(2,708)	18
June 30, 2021	(342,123)	(360,083)	(29,636)	19
June 30, 2022	172,536	172,536	(5,319)	20
Total		$ 13,511,368	$ 900,701	

Projected Payroll for FYE 2024	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, 2022	Payments for FYE 2024	Funding Period at June 30, 2022
June 30, 2019	$ 554,548	$ 535,389	$ 40,306	27
June 30, 2020	24,023	18,692	1,706	18
June 30, 2021	(49,498)	(50,661)	(4,491)	19
June 30, 2022	(19,031)	(19,031)	(1,878)	20
Total		$ 484,389	$ 35,643	

Projected Payroll for FYE 2024	$ 165,637
Amortization Payments as a Percentage of Payroll	21.52%

Note:
Budgeted contribution rates for FYE 2023 were known at the time of the June 30, 2022 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, 2022	Payments for FYE 2024	Funding Period at June 30, 2022
June 30, 2019	$ 1,741,638	$ 1,669,657	$ 125,697	27
June 30, 2020	(246,890)	(244,331)	(22,305)	18
June 30, 2021	(159,148)	(169,095)	(14,990)	19
June 30, 2022	(883,398)	(883,398)	(83,210)	20
Total		$ 372,833	$ 5,192	

Projected Payroll for FYE 2024	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, 2022	Payments for FYE 2024	Funding Period at June 30, 2022
June 30, 2019	$ (98,611)	$ (99,034)	$ (7,456)	27
June 30, 2020	(9,508)	(10,362)	(946)	18
June 30, 2021	(39,458)	(44,116)	(3,911)	19
June 30, 2022	(97,145)	(97,145)	(9,756)	20
Total		$ (250,657)	$ (22,069)	

Projected Payroll for FYE 2024	$ 164,788
Amortization Payments as a Percentage of Payroll	-13.39%

Note:
Budgeted contribution rates for FYE 2023 were known at the time of the June 30, 2022 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, 2022 (1)	Hazardous June 30, 2022 (2)	Total June 30, 2022 (3)	Total June 30, 2021 (4)
1.	Active members				
	a. Males	11,155	2,503	13,658	14,213
	b. Females	18,396	1,114	19,510	19,800
	c. Total members	29,551	3,617	33,168	34,013
	d. Total annualized prior year salaries	$ 1,355,267	$ 165,637	$ 1,520,904	$ 1,512,165
	e. Average salary[3]	$ 45,862	$ 45,794	$ 45,855	$ 44,458
	f. Average age	46.0	40.0	45.4	45.4
	g. Average service	11.4	7.6	11.0	11.2
	h. Member contributions with interest	$ 859,591	$ 94,538	$ 954,129	$ 974,701
	i. Average contributions with interest[3]	$ 29,088	$ 26,137	$ 28,767	$ 28,657
2.	Vested inactive members[2]				
	a. Number	31,606	2,309	33,915	33,853
	b. Total annual deferred benefits	$ 89,654	$ 5,165	$ 94,819	$ 93,181
	c. Average annual deferred benefit[3]	$ 2,837	$ 2,237	$ 2,796	$ 2,753
	d. Average age at the valuation date	53.0	48.1	52.7	52.2
3.	Nonvested inactive members[2]				
	a. Number	23,904	5,845	29,749	28,349
	b. Total member contributions with interest	$ 49,060	$ 11,623	$ 60,683	$ 56,480
	c. Average contributions with interest[3]	$ 2,052	$ 1,989	$ 2,040	$ 1,992
4.	Service retirees[1]				
	a. Number	41,286	4,151	45,437	44,907
	b. Total annual benefits	$ 877,873	$ 66,493	$ 944,366	$ 935,283
	c. Average annual benefit[3]	$ 21,263	$ 16,019	$ 20,784	$ 20,827
	d. Average age at the valuation date	70.3	65.6	69.9	69.6
5.	Disabled retirees[1]				
	a. Number	1,703	158	1,861	1,931
	b. Total annual benefits	$ 22,514	$ 1,534	$ 24,048	$ 25,043
	c. Average annual benefit[3]	$ 13,220	$ 9,709	$ 12,922	$ 12,969
	d. Average age at the valuation date	67.0	60.8	66.5	66.0
6.	Beneficiaries[1]				
	a. Number	5,206	541	5,747	5,588
	b. Total annual benefits	$ 80,981	$ 5,662	$ 86,643	$ 82,911
	c. Average annual benefit[3]	$ 15,555	$ 10,466	$ 15,076	$ 14,837
	d. Average age at the valuation date	70.4	67.4	70.1	70.1

[1] 2,428 members receiving benefits in both the non-hazardous and hazardous fund. Members' headcounts and hazardous benefits included in the hazardous summary above. Members' additional $25,332,000 in non-hazardous annual benefits not included in summary above.

[2] 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.

[3] 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)
Non-Hazardous Members						
2013	42,226		$ 1,644,409		$ 38,943	
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%
2022	29,551	-2.1%	1,355,267	0.4%	45,862	2.6%
Hazardous Members						
2013	4,127		$ 132,015		$ 31,988	
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%
2022	3,617	-5.5%	165,637	1.7%	45,794	7.6%

[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	13	0	0	0	0	0	0	0	0	0	0	0	13
	$22,562	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,562
20-24	466	218	67	22	6	6	0	0	0	0	0	0	785
	$24,994	$34,418	$35,526	$32,347	$37,790	$37,467	$0	$0	$0	$0	$0	$0	$28,909
25-29	592	373	348	269	182	287	0	0	0	0	0	0	2,051
	$28,405	$35,575	$37,498	$38,384	$38,691	$41,324	$0	$0	$0	$0	$0	$0	$35,281
30-34	407	254	249	239	232	1,106	218	5	0	0	0	0	2,710
	$28,293	$38,203	$38,483	$37,352	$41,626	$43,870	$46,154	$53,440	$0	$0	$0	$0	$39,939
35-39	334	184	200	222	192	992	929	249	13	0	0	0	3,315
	$29,586	$36,571	$40,488	$41,667	$41,224	$45,914	$49,071	$49,442	$49,999	$0	$0	$0	$44,033
40-44	315	177	206	184	138	784	916	1,060	457	40	0	0	4,277
	$29,781	$37,704	$40,467	$42,077	$44,626	$45,683	$49,921	$52,304	$52,500	$51,668	$0	$0	$47,074
45-49	273	139	179	159	149	678	663	905	1,073	281	7	1	4,507
	$28,895	$37,849	$41,703	$41,184	$41,765	$45,150	$48,803	$53,815	$55,406	$59,423	$77,831	$100,060	$49,223
50-54	222	142	129	162	121	655	629	740	918	514	89	12	4,333
	$30,124	$40,190	$42,254	$43,683	$38,623	$44,135	$48,333	$52,483	$53,060	$59,896	$61,954	$70,378	$49,295
55-59	198	97	126	114	91	524	537	671	628	389	114	39	3,528
	$30,584	$41,029	$41,339	$40,069	$43,511	$42,676	$47,650	$50,275	$52,497	$59,903	$66,771	$74,206	$48,819
60-64	92	47	80	86	81	383	445	545	483	241	67	46	2,596
	$33,326	$39,936	$47,966	$43,329	$42,157	$42,406	$45,448	$48,238	$50,732	$55,204	$63,149	$64,718	$47,647
65 & Over	48	35	32	25	44	215	291	308	218	118	52	50	1,436
	$35,474	$40,866	$59,249	$60,903	$36,936	$47,839	$48,739	$49,094	$55,210	$54,672	$61,456	$71,184	$50,841
Total	2,960	1,666	1,616	1,482	1,236	5,630	4,628	4,483	3,790	1,583	329	148	29,551
	$28,694	$37,295	$40,411	$40,754	$41,177	$44,472	$48,429	$51,462	$53,380	$58,502	$64,126	$70,100	$45,862

Distribution of Active Members by Age and by Years of Service

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	1	0	0	0	0	0	0	0	0	0	0	0	1
	$15,246	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,246
20-24	186	58	28	6	2	1	0	0	0	0	0	0	281
	$30,461	$42,971	$49,382	$46,580	$36,671	$55,327	$0	$0	$0	$0	$0	$0	$35,405
25-29	146	104	107	48	45	63	0	0	0	0	0	0	513
	$32,032	$43,570	$44,187	$48,614	$44,987	$52,407	$0	$0	$0	$0	$0	$0	$42,096
30-34	97	53	70	47	49	226	35	0	0	0	0	0	577
	$31,016	$42,515	$42,469	$46,554	$45,598	$48,687	$50,718	$0	$0	$0	$0	$0	$44,082
35-39	50	24	32	25	24	145	132	41	0	0	0	0	473
	$33,041	$40,719	$46,029	$49,839	$40,712	$49,235	$50,441	$55,997	$0	$0	$0	$0	$47,396
40-44	47	24	29	11	22	94	95	151	13	0	0	0	486
	$26,235	$45,856	$46,830	$41,200	$45,157	$48,477	$50,465	$55,123	$50,672	$0	$0	$0	$48,295
45-49	40	18	18	20	17	89	61	116	50	3	0	0	432
	$31,010	$41,030	$46,125	$45,026	$45,079	$45,008	$52,535	$52,561	$54,614	$52,859	$0	$0	$47,854
50-54	30	16	20	17	11	77	66	89	28	10	0	0	364
	$31,927	$36,411	$47,496	$52,244	$41,280	$48,782	$50,900	$54,191	$56,453	$58,226	$0	$0	$49,270
55-59	15	11	20	11	9	70	61	67	22	10	4	0	300
	$29,544	$48,651	$42,683	$47,857	$53,764	$48,263	$48,182	$55,444	$50,122	$55,953	$67,478	$0	$49,356
60-64	7	4	6	10	4	31	26	26	9	1	0	0	124
	$34,904	$38,771	$53,116	$56,899	$46,866	$44,857	$51,689	$52,580	$55,327	$56,106	$0	$0	$49,437
65 & Over	4	0	1	0	2	19	15	19	5	1	0	0	66
	$19,197	$0	$23,272	$0	$39,740	$55,650	$43,487	$53,404	$50,702	$50,845	$0	$0	$48,609
Total	623	312	331	195	185	815	491	509	127	25	4	0	3,617
	$30,841	$42,840	$44,986	$48,124	$44,723	$48,643	$50,360	$54,295	$53,735	$56,293	$67,478	$0	$45,794

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	$ 9,188	65	$ 848	524	$ 6,246	989	$ 16,282
50 - 54	1,417	35,422	119	1,756	213	2,907	1,749	40,085
55 - 59	3,206	77,680	220	3,299	289	3,971	3,715	84,950
60 - 64	5,841	133,617	308	4,226	497	7,190	6,646	145,034
65 - 69	9,346	197,661	356	4,835	688	10,657	10,390	213,152
70 - 74	9,535	202,548	299	3,665	817	14,905	10,651	221,118
75 - 79	6,046	125,577	169	1,971	779	13,378	6,994	140,926
80 - 84	3,187	60,065	105	1,220	620	10,751	3,912	72,037
85 - 89	1,534	24,914	52	586	460	7,329	2,046	32,829
90 And Over	774	11,202	10	107	319	3,647	1,103	14,956
Total	**41,286**	**$ 877,873**	**1,703**	**$ 22,514**	**5,206**	**$ 80,981**	**48,195**	**$ 981,369**

*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	275	$ 5,787	24	$ 313	67	$ 688	366	$ 6,789
50 - 54	420	7,842	20	224	28	400	468	8,465
55 - 59	522	9,610	33	342	33	373	588	10,325
60 - 64	660	11,383	27	215	65	779	752	12,376
65 - 69	773	11,948	23	194	90	1,036	886	13,178
70 - 74	829	12,018	19	172	89	1,042	937	13,232
75 - 79	435	5,800	5	49	74	591	514	6,440
80 - 84	166	1,562	4	8	51	422	221	1,992
85 - 89	57	393	3	16	29	198	89	608
90 And Over	14	150	0	0	15	133	29	283
Total	**4,151**	**$ 66,493**	**158**	**$ 1,534**	**541**	**$ 5,662**	**4,850**	**$ 73,689**

*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	4,494	$	7,896,903	13,523	$	19,390,074	18,017	$	27,286,977
Joint & Survivor:									
100% to Beneficiary	2,890		5,167,948	1,666		2,117,118	4,556		7,285,066
66 2/3% to Beneficiary	797		2,202,424	644		1,207,896	1,441		3,410,321
50% to Beneficiary	1,104		2,758,505	1,616		3,127,064	2,720		5,885,569
Pop-up Option	4,074		9,768,315	3,971		7,636,179	8,045		17,404,493
Social Security Option:									
Age 62 Basic	368		751,360	902		1,530,290	1,270		2,281,649
Age 62 Survivorship	691		1,418,499	581		923,814	1,272		2,342,314
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	999		1,753,328	2,358		3,557,288	3,357		5,310,616
15 Years Certain & Life	464		736,094	702		1,024,499	1,166		1,760,593
20 Years Certain & Life	450		976,780	695		1,087,885	1,145		2,064,665
Total:	16,331	$	33,430,156	26,658	$	41,602,106	42,989	$	75,032,262

Hazardous Retired 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	753	$ 838,122	615	$ 691,578	1,368	$ 1,529,700
Joint & Survivor:						
100% to Beneficiary	503	627,669	83	99,545	586	727,215
66 2/3% to Beneficiary	136	195,260	36	46,471	172	241,731
50% to Beneficiary	185	292,585	79	121,163	264	413,748
Pop-up Option	983	1,554,751	218	307,361	1,201	1,862,111
Social Security Option:						
Age 62 Basic	58	67,085	32	27,503	90	94,588
Age 62 Survivorship	137	167,787	20	21,670	157	189,457
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	56	104,574	17	24,532	73	129,106
10 Years Certain & Life	117	151,844	86	85,488	203	237,332
15 Years Certain & Life	54	64,674	35	33,247	89	97,921
20 Years Certain & Life	69	95,201	37	50,780	106	145,981
Total:	3,051	$ 4,159,553	1,258	$ 1,509,338	4,309	$ 5,668,891

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	29	$	21,235	51	$	69,994	80	$	91,228
Joint & Survivor:									
100% to Beneficiary	373		336,489	1,611		1,940,695	1,984		2,277,184
66 2/3% to Beneficiary	72		74,063	310		424,922	382		498,984
50% to Beneficiary	177		159,090	482		424,667	659		583,757
Pop-up Option	250		395,295	911		1,649,872	1,161		2,045,166
Social Security Option:									
Age 62 Basic	1		1,293	12		11,412	13		12,705
Age 62 Survivorship	76		107,592	347		605,436	423		713,028
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	2		611	2		611
5 Years Certain	40		40,049	60		56,934	100		96,984
10 Years Certain	84		84,585	95		71,708	179		156,293
10 Years Certain & Life	38		41,850	47		50,150	85		92,000
15 Years Certain & Life	21		25,878	44		37,158	65		63,036
20 Years Certain & Life	17		27,862	56		89,610	73		117,473
Total:	1,178	$	1,315,281	4,028	$	5,433,169	5,206	$	6,748,450

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	3	$	1,399	13	$	9,660	16	$	11,059
Joint & Survivor:									
100% to Beneficiary	17		12,258	178		134,416	195		146,674
66 2/3% to Beneficiary	1		481	21		10,944	22		11,425
50% to Beneficiary	5		2,972	45		20,219	50		23,191
Pop-up Option	14		15,673	150		169,738	164		185,411
Social Security Option:									
Age 62 Basic	0		0	1		18	1		18
Age 62 Survivorship	2		801	53		53,346	55		54,146
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	1		3,247	6		4,658	7		7,905
10 Years Certain	2		2,253	7		7,564	9		9,816
10 Years Certain & Life	0		0	5		2,415	5		2,415
15 Years Certain & Life	2		3,644	2		1,468	4		5,113
20 Years Certain & Life	2		4,048	11		10,623	13		14,672
Total:	49	$	46,776	492	$	425,069	541	$	471,845

Schedule of Retirees Added to And Removed from Rolls

(Dollar amounts except average allowance expressed in thousands)

	Added to Rolls	Removed from Rolls	Rolls End of the Year		% Increase	Average
Year Ended	Number	Number	Number	Annual Benefits	in Annual Benefit	Annual Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Non-Hazardous			
2013	1,982	1,014	40,194	$ 872,140		$ 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
2022	2,471	1,976	48,195	981,369	0.9%	20,362
			Hazardous			
2013	229	52	3,430	$ 51,122		$ 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
2022	300	176	4,850	73,689	4.1%	15,194

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:

- <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 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,				
	2022	2021	2020	2019	2018	2022	2021	2020	2019	2018
Ratio of the market value of assets to total payroll	2.22	2.24	1.66	1.55	1.36	1.01	1.05	0.76	0.69	0.61
Ratio of actuarial accrued liability to payroll	12.23	12.10	11.78	11.45	10.65	1.32	1.91	1.85	1.90	1.66
Ratio of net cash flow to market value of assets	5.2%	7.3%	1.0%	5.5%	-9.7%	2.4%	7.1%	5.2%	6.2%	1.1%
Percentage of Expected Contribution Actually Received	100% [1]	94%	93%	91%	93%	100% [1]	99%	96%	95%	99%
Ratio of actives to retirees and beneficiaries	0.61	0.63	0.67	0.71	0.76					

[1] Expected contribution for FYE2022 based on the actuarially determined contribution from the June 30, 2020 valuation.

KERS Hazardous

	Retirement Fund					Insurance Fund				
	June 30,					June 30,				
	2022	2021	2020	2019	2018	2022	2021	2020	2019	2018
Ratio of the market value of assets to total payroll	4.90	5.32	4.04	4.53	4.08	3.55	3.89	3.05	3.55	3.28
Ratio of actuarial accrued liability to payroll	7.95	7.95	7.52	8.15	7.28	2.10	2.61	2.51	2.84	2.49
Ratio of net cash flow to market value of assets	-0.5%	0.3%	0.4%	-0.1%	-1.2%	-2.9%	-2.8%	-2.5%	-2.5%	-2.5%
Percentage of Expected Contribution Actually Received	108% [1]	101%	114%	102%	95%	N/A [1]	N/A [1]	N/A [1]	96%	190%
Ratio of actives to retirees and beneficiaries	0.75	0.81	0.88	0.82	0.90					

[1] Expected contribution for FYE2022 based on the actuarially determined contribution rate of 33.43% from the June 30, 2020 valuation, and expected compensation based on census data from the June 30, 2021 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		Hazardous	
	Male	Female	Male	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]
2024	6.20%	9.00%	1.50%
2025	6.10%	8.50%	1.50%
2026	6.00%	8.00%	1.50%
2027	5.80%	8.00%	1.50%
2028	5.60%	8.00%	1.50%
2029	5.40%	7.50%	1.50%
2030	5.20%	7.00%	1.50%
2031	5.00%	6.50%	1.50%
2032	4.80%	6.00%	1.50%
2033	4.60%	5.50%	1.50%
2034	4.40%	5.00%	1.50%
2035	4.20%	4.50%	1.50%
2036	4.05%	4.05%	1.50%
2037 & Beyond	4.05%	4.05%	1.50%

[1]All increases are assumed to occur on January 1. The 2023 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	Non-Medicare Plan	Participation Percentage
Medical Only[1]	5%	LivingWell Basic	2%
Essential Plan	8%	LivingWell CDHP	35%
Premium Plan	87%	LivingWell PPO	63%

[1] Includes Medicare Advantage Mirror Plans

- 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.

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

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:

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 increased during the select period in this valuation as a result of our review.

Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2023, 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 $1,010.20 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	$ 816.02	$ 1,010.20

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2023, 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	$78.14	$73.71
75	91.43	89.21
85	96.68	97.82

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

Piotr Krekora 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.

Piotr Krekora, ASA, 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.

Change in Retirement Plan Benefits for Non-Hazardous Members since the Prior Valuation

None.

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

KERS 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.

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.

Change in Retirement Plan Benefits for Hazardous Members since the Prior Valuation

None.

Summary of Main Retiree Insurance Benefit Provisions

Insurance: 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: Participation began on or after 7/1/2003

Benefit Eligibility

Recipient of a retirement allowance with at least 120 months of service at retirement (180 months if participation began on or after 9/1/2008)

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, 2022, the Non-Hazardous monthly contribution was $14.20/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.

Effective January 1, 2023, members will receive an additional dollar contribution of $5 for every year of non-hazardous service a member attains over 27 years. This additional dollar contribution does not increase by 1.5% annually and is only payable for non-Medicare retirees. Also, it is only payable when the applicable insurance fund is at least 90% funded on an actuarial value of asset basis as of the last actuarial valuation.

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, 2022, the Hazardous monthly contribution was $21.30/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($14.20 as of July 1, 2022) for each year of hazardous service.

Effective January 1, 2023, members will receive an additional dollar contribution of $5 for every year of hazardous service a Tier 1 member attains over 20 years and a Tier 2 member attains 25 years. This additional dollar contribution does not increase by 1.5% annually and is only payable for non-Medicare retirees. Also, it is only payable when the applicable insurance fund is at least 90% funded on an actuarial value of asset basis as of the last actuarial valuation.

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.

Monthly Health Plan Premiums – Effective January 1, 2023

Non-Medicare Plan Options					
Plan Option	Single	Parent Plus	Couple	Family	Family X-Ref
LivingWell PPO[1]	$833.64	$1,177.30	$1,792.42	$1,988.62	$998.02
LivingWell CDHP	813.02	1,117.34	1,608.24	1,794.34	936.90
LivingWell Basic	783.92	1,078.16	1,650.78	1,837.42	919.72

Medicare Plan Options	
Medical Only Plan	$180.14
Medicare Advantage Mirror Essential Plan	221.12
Medicare Advantage Mirror Premium Plan	320.25
Kentucky Retirement Systems – Essential Plan[2]	0.00
Kentucky Retirement Systems – Premium Plan[3]	89.28

[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 Participation on or after 7/1/2003

Monthly contribution amounts per year of service as of July 1, 2022.

Non-Hazardous Service	Hazardous Service
$14.20	$21.30

Changes in Health Insurance Benefits since the Prior Valuation

Senate Bill 209 passed during the 2022 legislative session and increased the insurance dollar contribution for members hired on or after July 1, 2003 by $5 for each year of service a member attains over certain thresholds, depending on a member's retirement eligibility requirement. It also allowed members receiving the insurance dollar contribution to participate in a medical insurance reimbursement plan that would provide the reimbursement of premiums for health plans other than those administered by KPPA.

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

Note: The following employer contributions are provided for informational purposes only as the employer contributions were certified in the June 30, 2021 actuarial valuation for the fiscal years ending June 30, 2023 and June 30, 2024.

		Fixed Percentage of the Total Amortization Cost				Components of Required Contribution for FYE 2024	
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 (FYE2023)	Amortization Cost Remains Level until Actuarial Investigation[3]	Normal Cost (% of Pay)	Amortization Cost
(1)	(2)	(3)	(4) = (3) / $18,813M	(5)	(6), per KRS 61.565(1)(d)1d	(7) = 9.60% of pay for all employers	(8) = (4) x $906M[4]
LEGISLATIVE BRANCH AGENCIES	LEGISLATIVE BRANCH	343,338,931	1.82505%	18,070,756	No	9.60%	16,244,748
JUDICIAL BRANCH AGENCIES	JUDICIAL BRANCH	471,819,378	2.50801%	24,833,094	No	9.60%	22,323,767
EXECUTIVE BRANCH AGENCIES	EXECUTIVE BRANCH	14,661,188,769	77.93303%	772,046,864	No	9.60%	693,680,964
LEX FAYETTE CO HLTH DEPT	Health Departments	87,677,599	0.46606%	4,766,461	Yes	9.60%	4,766,461
LAKE CUMBERLAND DISTRICT	Health Departments	73,620,021	0.39134%	4,002,276	Yes	9.60%	4,002,276
BARREN RVR DIST HLTH DEPT	Health Departments	68,379,065	0.36348%	3,717,357	Yes	9.60%	3,717,357
GREEN RVR DIST HLTH DEPT	Health Departments	81,739,718	0.43450%	4,443,692	Yes	9.60%	4,443,692
NORTHERN KY DIST HLTH DEP	Health Departments	54,194,473	0.28808%	2,946,205	Yes	9.60%	2,946,205
LINCOLN TRL DIST HLTH DEP	Health Departments	66,500,206	0.35349%	3,615,244	Yes	9.60%	3,615,244
KY RIVER DIST HEALTH DEPT	Health Departments	70,220,607	0.37327%	3,817,495	Yes	9.60%	3,817,495
MADISON CO HEALTH DEP	Health Departments	53,457,239	0.28416%	2,906,171	Yes	9.60%	2,906,171
CUMBERLAND VLY DIST HEALT	Health Departments	89,949,862	0.47814%	4,889,995	Yes	9.60%	4,889,995
WEDCO DIST HEALTH DEPT	Health Departments	28,173,710	0.14976%	1,531,594	Yes	9.60%	1,531,594
FRANKLIN CO HEALTH DEPT	Health Departments	22,299,718	0.11854%	1,212,256	Yes	9.60%	1,212,256
WHITLEY CO HEALTH DEPT	Health Departments	28,890,387	0.15357%	1,570,588	Yes	9.60%	1,570,588
PIKE CO HEALTH DEPT	Health Departments	24,182,977	0.12855%	1,314,681	Yes	9.60%	1,314,681
THREE RIVERS DIST HLTH	Health Departments	22,852,018	0.12147%	1,242,308	Yes	9.60%	1,242,308
KNOX CO HEALTH DEPT	Health Departments	28,079,768	0.14926%	1,526,499	Yes	9.60%	1,526,499
PURCHASE DIST HLTH DEPT	Health Departments	43,960,371	0.23368%	2,389,886	Yes	9.60%	2,389,886
CLARK CO HEALTH DEPT	Health Departments	16,463,623	0.08751%	894,998	Yes	9.60%	894,998
GATEWAY DIST HEALTH DEPT	Health Departments	29,474,251	0.15667%	1,602,304	Yes	9.60%	1,602,304
N CENTRAL DIST HLTH DEPT	Health Departments	21,562,812	0.11462%	1,172,222	Yes	9.60%	1,172,222
BREATHITT CO HEALTH DEPT	Health Departments	18,123,824	0.09634%	985,257	Yes	9.60%	985,257
PENNYRILE DIST HLTH DEPT	Health Departments	15,661,674	0.08325%	851,429	Yes	9.60%	851,429
MARSHALL CO HEALTH DEPT	Health Departments	15,263,463	0.08113%	829,800	Yes	9.60%	829,800
CHRISTIAN CO HEALTH DEPT	Health Departments	13,360,854	0.07102%	726,335	Yes	9.60%	726,335
MONTGOMERY CO HEALTH DEPT	Health Departments	10,699,698	0.05688%	581,692	Yes	9.60%	581,692
HOPKINS CO HEALTH DEPT	Health Departments	17,815,060	0.09470%	968,516	Yes	9.60%	968,516
JOHNSON CO HEALTH DEPT	Health Departments	15,484,079	0.08231%	841,758	Yes	9.60%	841,758
FLOYD CO HEALTH CENTER	Health Departments	12,298,013	0.06537%	668,519	Yes	9.60%	668,519
ASHLAND BOYD CO HEALTH DP	Health Departments	17,566,824	0.09338%	954,998	Yes	9.60%	954,998
LAUREL CO HEALTH DEPT	Health Departments	14,475,341	0.07695%	786,958	Yes	9.60%	786,958
BULLITT CO HEALTH DEPT	Health Departments	13,823,739	0.07348%	751,499	Yes	9.60%	751,499
BELL CO HEALTH DEPT	Health Departments	10,731,667	0.05705%	583,459	Yes	9.60%	583,459
GREENUP CO HLTH DEPT	Health Departments	11,509,071	0.06118%	625,677	Yes	9.60%	625,677
JESSAMINE CO HEALTH DEPT	Health Departments	8,409,539	0.04470%	457,222	Yes	9.60%	457,222
GRAVES CO HEALTH CENTER	Health Departments	6,110,503	0.03248%	332,232	Yes	9.60%	332,232
HARLAN CO HEALTH DEPT	Health Departments	7,218,470	0.03837%	392,439	Yes	9.60%	392,439
OLDHAM CO HEALTH DEPT	Health Departments	10,480,598	0.05571%	569,733	Yes	9.60%	569,733
ALLEN CO HEALTH DEPT	Health Departments	7,911,333	0.04205%	430,082	Yes	9.60%	430,082
BUFFALO TRACE HEALTH DEPT	Health Departments	10,788,599	0.05735%	586,475	Yes	9.60%	586,475
MUHLENBERG CO.HEALTH DEPT	Health Departments	7,886,100	0.04192%	428,730	Yes	9.60%	428,730
MERCER CO HEALTH DEPT	Health Departments	8,877,255	0.04719%	482,594	Yes	9.60%	482,594
LAWRENCE CO HEALTH DEPT	Health Departments	3,868,705	0.02056%	210,362	Yes	9.60%	210,362
WOODFORD CO HEALTH DEPT	Health Departments	5,453,322	0.02899%	296,461	Yes	9.60%	296,461
CALLOWAY CO HEALTH DEPT	Health Departments	4,137,638	0.02199%	224,919	Yes	9.60%	224,919
MAGOFFIN CO HEALTH DEPT	Health Departments	6,467,092	0.03438%	351,573	Yes	9.60%	351,573
MARTIN CO HEALTH DEPT	Health Departments	5,286,010	0.02810%	287,414	Yes	9.60%	287,414
BOYLE CO HEALTH DEPT	Health Departments	6,346,920	0.03374%	345,022	Yes	9.60%	345,022
BOURBON CO HEALTH CENTER	Health Departments	7,775,901	0.04133%	422,699	Yes	9.60%	422,699
ANDERSON CO HEALTH DEPT	Health Departments	5,076,042	0.02698%	275,976	Yes	9.60%	275,976
LEWIS CO HEALTH DEPT	Health Departments	3,061,131	0.01627%	166,376	Yes	9.60%	166,376
ESTILL CO HEALTH DEPT	Health Departments	5,579,547	0.02966%	303,324	Yes	9.60%	303,324
LINCOLN CO HEALTH DEPT	Health Departments	4,897,375	0.02603%	266,201	Yes	9.60%	266,201
BRECKINRIDGE CO HEALTH BD	Health Departments	7,704,261	0.04095%	418,851	Yes	9.60%	418,851
GRAYSON COUNTY HEALTH DEPT	Health Departments	4,598,067	0.02444%	249,980	Yes	9.60%	249,980
GARRARD COUNTY HEALTH DPT	Health Departments	3,926,271	0.02087%	213,481	Yes	9.60%	213,481
TODD CO HEALTH DEPT	Health Departments	4,687,868	0.02492%	254,867	Yes	9.60%	254,867

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

Note: The following employer contributions are provided for informational purposes only as the employer contributions were certified in the June 30, 2021 actuarial valuation for the fiscal years ending June 30, 2023 and June 30, 2024.

		Fixed Percentage of the Total Amortization Cost				Components of Required Contribution for FYE 2024	
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 (FYE2023)	Amortization Cost Remains Level until Actuarial Investigation[3]	Normal Cost (% of Pay)	Amortization Cost
(1)	(2)	(3)	(4) = (3) / $18,813M	(5)	(6), per KRS 61.565(1)(d)1d	(7) = 9.60% of pay for all employers	(8) = (4) x $906M[4]
FLEMING CO HEALTH DEP	Health Departments	4,386,549	0.02332%	238,437	Yes	9.60%	238,437
MONROE CO HEALTH DEPT	Health Departments	3,137,459	0.01668%	170,535	Yes	9.60%	170,535
BRACKEN CO HEALTH DEPT	Health Departments	2,410,616	0.01281%	131,021	Yes	9.60%	131,021
POWELL CO HEALTH DEPT	Health Departments	4,200,545	0.02233%	228,351	Yes	9.60%	228,351
CARTER CO HEALTH DEPT	Health Departments	5,555,239	0.02953%	301,972	Yes	9.60%	301,972
KY HIGHER ED STUD LN CORP	Non-P1 State Assoc/Corp.	81,896,904	0.43533%	4,310,426	No	9.60%	3,874,867
CSG HEADQUARTERS	Non-P1 State Assoc/Corp.	19,274,916	0.10246%	1,014,509	No	9.60%	911,995
KET FOUNDATION	Non-P1 State Assoc/Corp.	15,066,238	0.08009%	793,012	No	9.60%	712,880
ASST OF COMMONWEALTH ATTY	Non-P1 State Assoc/Corp.	5,807,856	0.03087%	305,660	No	9.60%	274,773
HIGHSCHOOL ATHLETIC ASSOC	Non-P1 State Assoc/Corp.	1,413,847	0.00752%	74,459	No	9.60%	66,935
O A S I S	Non-P1 State Agencies	2,304,549	0.01225%	125,302	Yes	9.60%	125,302
KDVA	Non-P1 State Agencies	2,431,059	0.01292%	132,165	Yes	9.60%	132,165
B.R.A.S.S.	Non-P1 State Agencies	2,132,362	0.01133%	115,943	Yes	9.60%	115,943
BLUEGRASS RAPE CRISIS CTR	Non-P1 State Agencies	2,744,493	0.01459%	149,218	Yes	9.60%	149,218
SAFE HARBOR	Non-P1 State Agencies	1,312,696	0.00698%	71,334	Yes	9.60%	71,334
SANCTUARY INC	Non-P1 State Agencies	2,510,255	0.01334%	136,428	Yes	9.60%	136,428
LOTUS	Non-P1 State Agencies	1,074,054	0.00571%	58,440	Yes	9.60%	58,440
BETHANY HOUSE ABUSE SHELT	Non-P1 State Agencies	1,675,224	0.00890%	91,091	Yes	9.60%	91,091
SPRINGHAVEN INC	Non-P1 State Agencies	1,527,812	0.00812%	83,084	Yes	9.60%	83,084
KASAP	Non-P1 State Agencies	943,862	0.00502%	51,265	Yes	9.60%	51,265
SILVERLEALF	Non-P1 State Agencies	2,017,711	0.01073%	109,704	Yes	9.60%	109,704
WOMEN AWARE	Non-P1 State Agencies	975,811	0.00519%	53,032	Yes	9.60%	53,032
D.O.V.E.S.	Non-P1 State Agencies	1,319,147	0.00701%	71,750	Yes	9.60%	71,750
NURSING HOME OMBUDSMAN	Non-P1 State Agencies	879,808	0.00468%	46,339	No	9.60%	41,657
HOPE HARBOR INC	Non-P1 State Agencies	824,202	0.00438%	44,818	Yes	9.60%	44,818
CHILD WATCH ADVOCACY CTR	Non-P1 State Agencies	718,149	0.00382%	38,994	Yes	9.60%	38,994
FRANKLIN CO COUNCIL AGING	Non-P1 State Agencies	2,147,140	0.01141%	112,976	No	9.60%	101,560
JUDI'S PLACE FOR KIDS, INC.	Non-P1 State Agencies	777,468	0.00413%	42,218	Yes	9.60%	42,218
CUMBERLAND V C A CENTER	Non-P1 State Agencies	821,917	0.00437%	44,714	Yes	9.60%	44,714
KY ASSOC OF REGIONAL PROG	Non-P1 State Agencies	1,817,343	0.00966%	98,786	Yes	9.60%	98,786
BARREN RIVER CHILD ADVOCA	Non-P1 State Agencies	406,450	0.00216%	22,045	Yes	9.60%	22,045
CHILD ADV CTR OF GRN RVR	Non-P1 State Agencies	572,517	0.00304%	31,091	Yes	9.60%	31,091
MUN ELEC POW ASSOC OF KY	Non-P1 State Agencies	1,745,743	0.00928%	91,886	No	9.60%	82,601
KY RIVER CHILD ADVOCACY	Non-P1 State Agencies	290,885	0.00155%	15,806	Yes	9.60%	15,806
PENNYRILE CHILD ADV CTR	Non-P1 State Agencies	460,162	0.00245%	25,060	Yes	9.60%	25,060
LAKE CUMB CHILD ADV CTR	Non-P1 State Agencies	545,959	0.00290%	29,636	Yes	9.60%	29,636
BUFFALO TR CHILD ADV INC	Non-P1 State Agencies	252,189	0.00134%	13,726	Yes	9.60%	13,726
NEW VISTA OF THE BLUEGRASS, INC.	Reg Mental Hlth Units	183,780,745	0.97691%	9,991,080	Yes	9.60%	9,991,080
CUMBERLAND RIVER MHMR	Reg Mental Hlth Units	98,252,502	0.52227%	5,341,394	Yes	9.60%	5,341,394
LIFESKILLS INC	Reg Mental Hlth Units	129,215,562	0.68686%	7,024,702	Yes	9.60%	7,024,702
COMMUNICARE INC	Reg Mental Hlth Units	66,572,026	0.35387%	3,619,091	Yes	9.60%	3,619,091
ADANTA/BEHAVIORAL HLTH SR	Reg Mental Hlth Units	89,012,578	0.47316%	4,839,042	Yes	9.60%	4,839,042
MOUNTAIN COMP CARE CENTER	Reg Mental Hlth Units	45,808,460	0.24350%	2,490,335	Yes	9.60%	2,490,335
GREEN RVR REG MHMR BD	Reg Mental Hlth Units	29,849,717	0.15867%	1,622,789	Yes	9.60%	1,622,789
NORTHERN KY REG MHMR BD	Reg Mental Hlth Units	57,271,755	0.30443%	3,113,517	Yes	9.60%	3,113,517
WESTERN KY REG MHMR ADV	Reg Mental Hlth Units	35,526,557	0.18885%	1,931,416	Yes	9.60%	1,931,416
COMPREHEND INC REG MHMR B	Reg Mental Hlth Units	29,064,447	0.15450%	1,580,051	Yes	9.60%	1,580,051
SEVEN CO SERVICES INC	Reg Mental Hlth Units	154,213,520	0.81974%	8,383,681	Yes	9.60%	8,383,681
KY RIVER COMM CARE INC	Reg Mental Hlth Units	26,687,511	0.14186%	1,450,798	Yes	9.60%	1,450,798
EASTERN KY UNIV	Universities	239,031,382	1.27060%	12,580,858	No	9.60%	11,309,595
KCTCS	Universities	156,197,124	0.83028%	8,220,992	No	9.60%	7,390,312
WESTERN KENTUCKY UNIV	Universities	180,798,950	0.96106%	9,515,948	No	9.60%	8,554,383
MURRAY STATE UNIV	Universities	132,693,175	0.70534%	6,983,851	No	9.60%	6,278,223
MOREHEAD STATE UNIVERSITY	Universities	120,999,617	0.64319%	6,368,494	No	9.60%	5,725,026
KENTUCKY STATE UNIVERSITY	Universities	44,391,511	0.23597%	2,336,460	No	9.60%	2,100,366
ALLEN COUNTY ATTORNEY	County Attorneys	1,658,981	0.00882%	87,331	No	9.60%	78,507
ANDERSON COUNTY ATTORNEY	County Attorneys	1,971,500	0.01048%	103,768	No	9.60%	93,282
BARREN COUNTY ATTORNEY	County Attorneys	2,875,029	0.01528%	151,295	No	9.60%	136,007
BATH COUNTY ATTORNEY	County Attorneys	2,729	0.00001%	99	No	9.60%	89

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

Note: The following employer contributions are provided for informational purposes only as the employer contributions were certified in the June 30, 2021 actuarial valuation for the fiscal years ending June 30, 2023 and June 30, 2024.

		Fixed Percentage of the Total Amortization Cost				Components of Required Contribution for FYE 2024	
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 (FYE2023)	Amortization Cost Remains Level until Actuarial Investigation[3]	Normal Cost (% of Pay)	Amortization Cost
(1)	(2)	(3)	(4) = (3) / \$18,813M	(5)	(6), per KRS 61.565(1)(d)1d	(7) = 9.60% of pay for all employers	(8) = (4) x \$906M[4]
BELL COUNTY ATTORNEY	County Attorneys	1,931,690	0.01027%	101,689	No	9.60%	91,413
BOONE COUNTY ATTORNEY	County Attorneys	5,092,956	0.02707%	268,034	No	9.60%	240,950
BOYLE COUNTY ATTORNEY	County Attorneys	155,378	0.00083%	8,218	No	9.60%	7,388
BRECKINRIDGE CO ATTORNEY	County Attorneys	1,029,674	0.00547%	54,161	No	9.60%	48,688
BULLITT COUNTY ATTORNEY	County Attorneys	703,350	0.00374%	37,032	No	9.60%	33,290
CALLOWAY COUNTY ATTORNEY	County Attorneys	54,643	0.00029%	2,871	No	9.60%	2,581
CARROLL COUNTY ATTORNEY	County Attorneys	873,614	0.00464%	45,943	No	9.60%	41,301
CASEY COUNTY ATTORNEY	County Attorneys	947,428	0.00504%	49,904	No	9.60%	44,861
CHILD SUPPORT ENCORCEMENT	County Attorneys	255,979	0.00136%	13,466	No	9.60%	12,105
CHRISTIAN COUNTY ATTORNEY	County Attorneys	984,086	0.00523%	51,785	No	9.60%	46,552
CLARK COUNTY ATTORNEY	County Attorneys	1,322,750	0.00703%	69,608	No	9.60%	62,574
CRITTENDEN CO ATTORNEY	County Attorneys	365,437	0.00194%	19,209	No	9.60%	17,268
DAVIESS COUNTY ATTORNEY	County Attorneys	1,578,350	0.00839%	83,074	No	9.60%	74,679
EDMONSON COUNTY ATTORNEY	County Attorneys	474,886	0.00252%	24,952	No	9.60%	22,430
FAYETTE CO ATTORNEY OFF	County Attorneys	3,136,743	0.01667%	165,058	No	9.60%	148,379
FLOYD COUNTY ATTORNEY	County Attorneys	1,121,075	0.00596%	59,013	No	9.60%	53,050
FRANKLIN COUNTY ATTORNEY	County Attorneys	4,833,960	0.02570%	254,469	No	9.60%	228,755
GARRARD COUNTY ATTORNEY	County Attorneys	988,761	0.00526%	52,082	No	9.60%	46,819
GRANT COUNTY CHILD SUPPOR	County Attorneys	363,477	0.00193%	19,110	No	9.60%	17,179
GRAVES COUNTY ATTORNEY	County Attorneys	3,272,663	0.01740%	172,286	No	9.60%	154,877
HANCOCK COUNTY ATTORNEY	County Attorneys	386,098	0.00205%	20,298	No	9.60%	18,247
HARRISON COUNTY ATTORNEY	County Attorneys	114,873	0.00061%	6,040	No	9.60%	5,430
HICKMAN COUNTY ATTORNEY	County Attorneys	1,028,593	0.00547%	54,161	No	9.60%	48,688
HOPKINS COUNTY ATTORNEY	County Attorneys	1,751,470	0.00931%	92,183	No	9.60%	82,868
JACKSON COUNTY ATTORNEY	County Attorneys	700,551	0.00372%	36,834	No	9.60%	33,112
JEFFERSON CO ATTORNEY	County Attorneys	17,081,131	0.09080%	899,042	No	9.60%	808,210
JOHNSON COUNTY ATTORNEY	County Attorneys	230,506	0.00123%	12,179	No	9.60%	10,948
KENTON COUNTY ATTORNEY	County Attorneys	1,021,997	0.00543%	53,765	No	9.60%	48,332
KNOTT COUNTY ATTORNEY	County Attorneys	900,207	0.00479%	47,428	No	9.60%	42,636
KNOX COUNTY ATTORNEY	County Attorneys	5,454	0.00003%	297	No	9.60%	267
LARUE COUNTY ATTORNEY	County Attorneys	1,041,769	0.00554%	54,854	No	9.60%	49,311
LAUREL COUNTY ATTORNEY	County Attorneys	353,526	0.00188%	18,615	No	9.60%	16,734
LAWRENCE COUNTY ATTORNEY	County Attorneys	144	0.00000%	-	No	9.60%	-
LEE COUNTY ATTORNEY	County Attorneys	888,298	0.00472%	46,735	No	9.60%	42,013
LOGAN COUNTY ATTORNEY	County Attorneys	1,781,059	0.00947%	93,767	No	9.60%	84,292
MADISON COUNTY ATTORNEY	County Attorneys	6,471,517	0.03440%	340,612	No	9.60%	306,194
MAGOFFIN CO ATTORNEY	County Attorneys	195,563	0.00104%	10,298	No	9.60%	9,257
MCCRACKEN COUNTY ATTORNEY	County Attorneys	1,092,697	0.00581%	57,528	No	9.60%	51,715
MCCREARY COUNTY ATTORNEY	County Attorneys	1,920,823	0.01021%	101,094	No	9.60%	90,879
MEADE COUNTY ATTORNEY	County Attorneys	1,485,282	0.00790%	78,222	No	9.60%	70,318
MENIFEE COUNTY ATTORNEY	County Attorneys	568,840	0.00302%	29,903	No	9.60%	26,881
MERCER COUNTY ATTORNEY	County Attorneys	507,084	0.00270%	26,734	No	9.60%	24,033
MONROE CO ATTORNEY	County Attorneys	617,699	0.00328%	32,477	No	9.60%	29,195
MONTGOMERY CO ATTORNEY	County Attorneys	1,684,951	0.00896%	88,718	No	9.60%	79,753
MORGAN COUNTY ATTORNEY	County Attorneys	1,815,404	0.00965%	95,550	No	9.60%	85,895
OLDHAM COUNTY ATTORNEY	County Attorneys	1,690,959	0.00899%	89,015	No	9.60%	80,020
OWEN COUNTY ATTORNEY	County Attorneys	490,212	0.00261%	25,843	No	9.60%	23,232
PENDLETON COUNTY ATTORNEY	County Attorneys	155,600	0.00083%	8,218	No	9.60%	7,388
POWELL COUNTY ATTORNEY	County Attorneys	26,895	0.00014%	1,386	No	9.60%	1,246
PULASKI COUNTY ATTORNEY	County Attorneys	1,602,159	0.00852%	84,361	No	9.60%	75,836
ROCKCASTLE CO ATTORNEY	County Attorneys	774,276	0.00412%	40,794	No	9.60%	36,672
ROWAN COUNTY ATTORNEY	County Attorneys	820,120	0.00436%	43,171	No	9.60%	38,808
SHELBY COUNTY ATTORNEY	County Attorneys	400,120	0.00213%	21,090	No	9.60%	18,959
SIMPSON COUNTY ATTORNEY	County Attorneys	521,989	0.00277%	27,427	No	9.60%	24,656
SPENCER COUNTY ATTORNEY	County Attorneys	1,200,709	0.00638%	63,172	No	9.60%	56,788
TRIGG COUNTY ATTORNEY	County Attorneys	933,350	0.00496%	49,112	No	9.60%	44,149
TRIMBLE COUNTY ATTORNEY	County Attorneys	749,934	0.00399%	39,507	No	9.60%	35,515
UNION COUNTY ATTORNEY	County Attorneys	293,278	0.00156%	15,446	No	9.60%	13,886
WAYNE COUNTY ATTORNEY	County Attorneys	668,657	0.00355%	35,150	No	9.60%	31,599

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

Note: The following employer contributions are provided for informational purposes only as the employer contributions were certified in the June 30, 2021 actuarial valuation for the fiscal years ending June 30, 2023 and June 30, 2024.

		Fixed Percentage of the Total Amortization Cost				Components of Required Contribution for FYE 2024	
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 (FYE2023)	Amortization Cost Remains Level until Actuarial Investigation[3]	Normal Cost (% of Pay)	Amortization Cost
(1)	(2)	(3)	(4) = (3) / $18,813M	(5)	(6), per KRS 61.565(1)(d)1d	(7) = 9.60% of pay for all employers	(8) = (4) x $906M[4]
WEBSTER COUNTY ATTORNEY	County Attorneys	1,413,256	0.00751%	74,360	No	9.60%	66,846
WHITLEY COUNTY ATTORNEY	County Attorneys	2,013,956	0.01071%	106,045	No	9.60%	95,330
OHIO COUNTY ATTORNEY	County Attorneys	-	0.00000%	-	No	9.60%	-
	Total	**18,812,529,777**	**100.00000%**	**994,421,476**	**N/A**	**9.60%**	**905,892,818**
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%**	**994,421,476**	**N/A**	**9.60%**	**905,892,818**

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 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.

[4] 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 $905,892,818 for the fiscal year ending 2024.

State Police Retirement System (SPRS)

Actuarial Valuation Report as of June 30, 2022

P: 469.524.0000 | www.grsconsulting.com

October 31, 2022

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

Subject: Actuarial Valuation as of June 30, 2022

Dear Trustees of the Board:

This report describes the current actuarial condition of the State Police Retirement System (SPRS), provides the actuarially determined employer contribution rate, analyzes changes in SPRS's financial condition, and provides various summaries of the data. The results of this actuarial valuation, including the calculated employer contribution rates will be used by the Board and stakeholders for informational purposes only as the employer contribution rate for the fiscal years ending June 30, 2023 and June 30, 2024 were certified in the June 30, 2021 actuarial valuation, which was adopted by the Board and incorporated in the Commonwealth's budget for the biennium period.

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 Systems (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 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 (27 years remaining as of June 30, 2022). Gains and losses incurring in years after June 30, 2019 are amortized as separate closed 20-year amortization bases.

5605 North MacArthur Boulevard | Suite 870 | Irving, Texas 75038-2631

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 the same as the prior year and are based on an experience study conducted with experience through June 30, 2018.

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, 2022. Senate Bill 209 passed during the 2022 legislative session and provided increased retiree medical benefits for members hired after July 1, 2003 that meet certain eligibility requirements at retirement.

House Bill 259 was also passed during the 2022 legislative session and provides that at each June 30, Tier 3 members with at least five years of service credit will receive a pay credit based on their unused sick leave in excess of 480 hours. This legislation also provides an employer pay credit based on the member's balance of unused sick leave at their time of termination of employment. 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, 2022, by KPPA staff. The staff also supplied asset information as of June 30, 2022. 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, 2022.

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

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

Janie Shaw

Janie Shaw, ASA, EA, MAAA
Consultant

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SECTION 1

EXECUTIVE SUMMARY

Summary of Principal Results

(Dollar amounts expressed in thousands)

	SPRS	
	June 30, 2022	June 30, 2021
Actuarially Determined Contribution:		Amended
Retirement	85.39%	85.32%
Insurance	3.68%	14.11%
Total	89.07%	99.43%
Contribution Rate for Next Fiscal Year[1]	99.43%	99.43%
Assets:		
Retirement		
• Actuarial value (AVAR)	$559,973	$323,250
• Market value (MVAR)	$551,699	$356,346
• Ratio of actuarial to market value of assets	101.5%	90.7%
Insurance		
• Actuarial value (AVAI)	$234,239	$223,251
• Market value (MVAI)	$231,242	$247,318
• Ratio of actuarial to market value of assets	101.3%	90.3%
Funded Status:		
Retirement		
• Actuarial accrued liability	$1,067,447	$1,053,259
• Unfunded accrued liability on AVAR	$507,474	$730,009
• Funded ratio on AVAR	52.5%	30.7%
• Unfunded accrued liability on MVAR	$515,748	$696,913
• Funded ratio on MVAR	51.7%	33.8%
Insurance		
• Actuarial accrued liability	$232,798	$272,406
• Unfunded accrued liability on AVAI	($1,441)	$49,155
• Funded ratio on AVAI	100.6%	82.0%
• Unfunded accrued liability on MVAI	$1,556	$25,088
• Funded ratio on MVAI	99.3%	90.8%
Membership:		
• Number of		
- Active Members	844	775
- Retirees and Beneficiaries	1,702	1,673
- Inactive Members	667	634
- Total	3,213	3,082
• Projected payroll of active members	$47,885	$45,338
• Average salary of active members	$56,736	$58,501

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

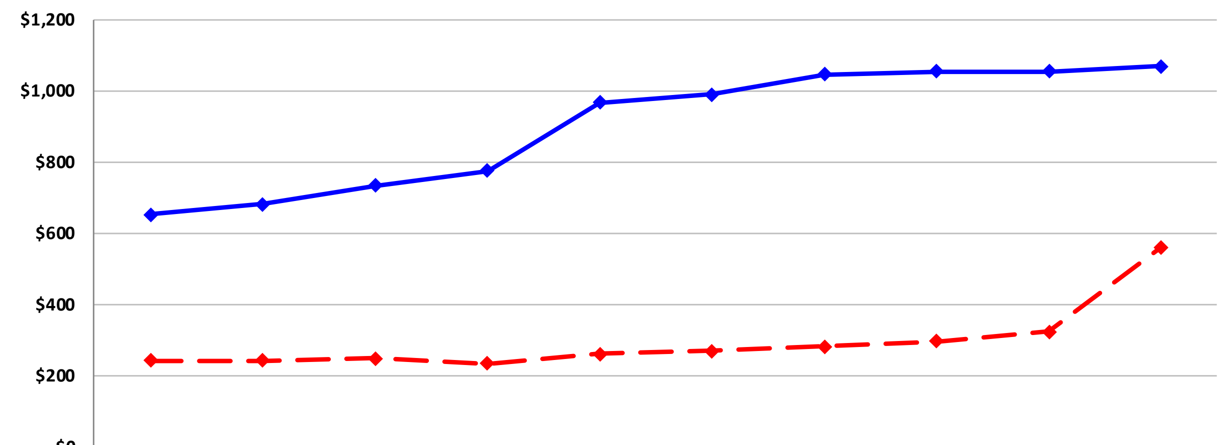
Executive Summary (Continued)

Retirement Fund

The unfunded actuarial accrued liability of the retirement fund decreased by $223 million since the prior year's valuation to $507 million. The increase in plan assets and decrease in the unfunded liability is due to a one-time $215 million appropriation made by the Commonwealth to the fund in the last quarter of FY 2022.

Below is a chart with the historical actuarial value of assets and actuarial accrued liability.

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



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AAL	652	681	734	775	967	990	1,045	1,053	1,053	1,067
AVA	242	243	248	235	261	268	282	296	323	560

Insurance Fund

There was a large decrease in the liability and the contribution requirement in this year's actuarial valuation of the insurance fund due to a significant decrease in the 2023 Medicare premiums. On average, the 2023 Medicare premiums were 61% lower than expected. The premiums for the two Medicare Advantage plans decreased from $227.03 in 2022 to $89.28 in 2023 (Premium Plan) and from $49.25 to $0.00 (Essential Plan). In conjunction with the review of the healthcare per capita claims cost, the assumed increase in future healthcare costs, or trend assumption, is also reviewed on an annual basis. The trend assumption for the Medicare Plans was increased as a result of our review.

The decrease in the Medicare premiums was the primary reason for the $50 million liability experience gain for the insurance fund. As a result, the corresponding funded ratio increased from 82.0% in the prior year's valuation to 100.6% at June 30, 2022.

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, 2022 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, analyze 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 cost 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.

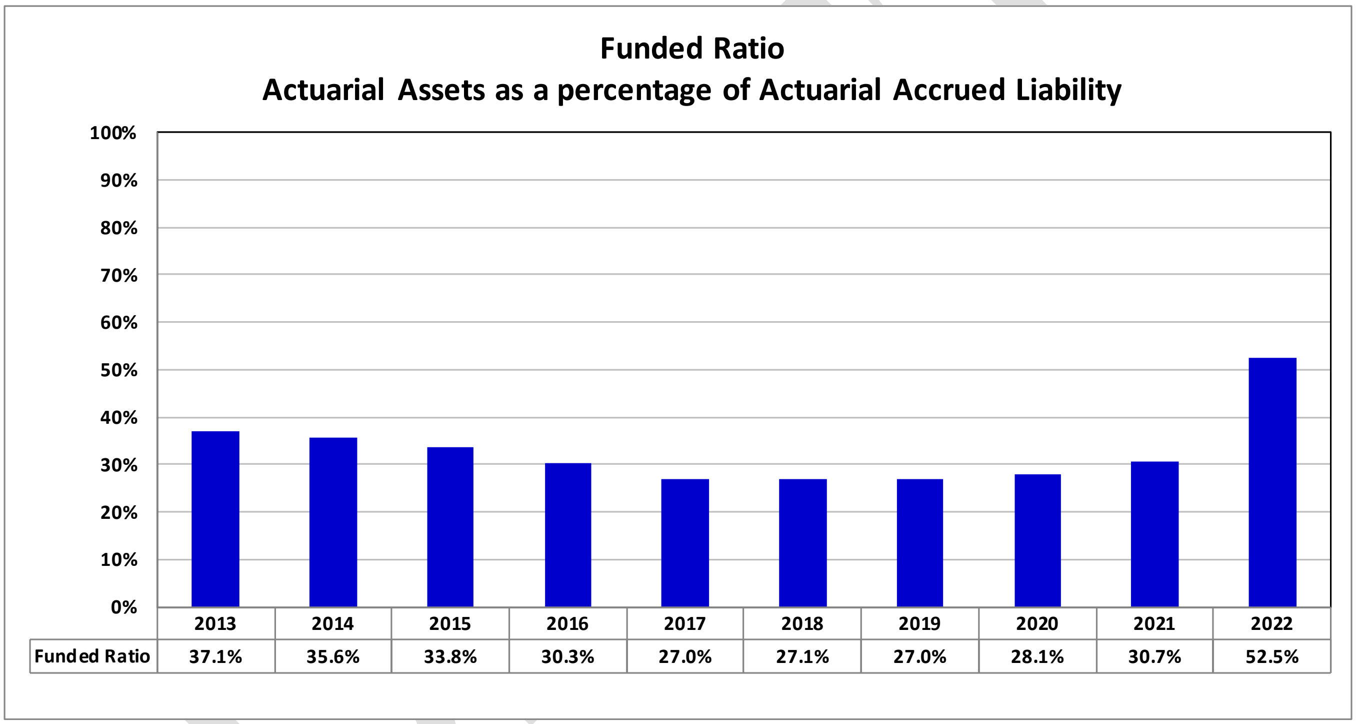
All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides additional details related to the calculation of the amortization of the unfunded actuarial accrued liability. Section 5 provides member data and statistical information. 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.

Again, the results of this actuarial valuation, including the calculated employer contribution rates will be used by the Board and stakeholders for informational purposes only as the employer contribution rate for the fiscal years ending June 30, 2023 and June 30, 2024 were certified in the June 30, 2021 actuarial valuation, which was adopted by the Board and incorporated in the Commonwealth's budget for the biennium period.

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 significant increase in the funded ratio from 2021 to 2022 is due to a $215 million appropriation made by the Commonwealth in fiscal year 2022.

Assuming the full actuarially determined contributions are paid in future years and absent material 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 a decreasing trend. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the retirement fund.



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 $323 million to $560 million since the prior valuation, primarily due to a $215 million appropriation during the year. The rate of return on the market value of assets on a dollar-weighted basis for the prior fiscal year was -4.7% which is less than the 5.25% expected annual return. The return on an actuarial (smoothed) asset value was 5.9%, which resulted in a $2.2 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 $8 million less than the actuarial value of assets, which signifies that the retirement fund is in a position of net deferred investment losses 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	$ 730,009	$ 49,155
2. Normal cost and administrative expenses	12,060	3,423
3. Less: contributions for the year	(282,114)	(9,012)
4. Interest accrual	36,880	2,898
5. Expected UAAL (Sum of Items 1 - 4)	$ 496,835	$ 46,464
6. Actual UAAL as of June 30,2022	$ 507,474	$ (1,441)
7. Total gain (loss) for the year (Item 5 - Item 6)	$ (10,639)	$ 47,905
B. Source of gains and losses		
8. Asset gain (loss) for the year	$ 2,248	$ 2,426
9. Liability experience gain (loss) for the year	(9,779)	49,856
10. Plan Change	(3,108)	(4,377)
11. Assumption change	—	—
12. Total	$ (10,639)	$ 47,905

The liability loss due for the retirement plan is primarily due to salary increases being greater than assumed. The liability experience gain shown for the insurance fund is due to a significant decrease in the Medicare premiums from 2022 to 2023. 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.

Due to the enactment of HB 259, this valuation includes a new assumption for unused sick leave that will be converted to cash balance pay credits for Tier 3 members, which is documented in Appendix A.

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 increased during the select period in this valuation as a result of our review. All other assumptions were adopted by the Board and are based on an experience study conducted based on experience through June 30, 2018.

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. The following is a summary of two material changes in benefits enacted since the last actuarial valuation.

Senate Bill 209 passed during the 2022 legislative session and increased the insurance dollar contribution for members hired on or after July 1, 2003 by $5 for each year of service a member attains over certain thresholds, depending on a member's retirement eligibility requirement. This increase in the insurance dollar contribution does not increase by 1.5% annually and is only payable for non-Medicare retirees. Additionally, it is only payable when the member's applicable insurance fund is at least 90% funded. The increase is first payable January 1, 2023 as long as the insurance fund is at least 90% funded on an actuarial valuation of asset basis as of the last actuarial valuation.

Senate Bill 209 also allows members receiving the insurance dollar contribution to participate in a medical insurance reimbursement plan that would provide the reimbursement of premiums for health plans other than those administered by KPPA.

House Bill 259 was also passed during the 2022 legislative session and provides that at each June 30, Tier 3 members with at least five years of service credit will receive a pay credit based on their unused sick leave in excess of 480 hours. This legislation also provides an employer pay credit based on the member's balance of unused sick leave at their time of termination of employment.

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

Annual Cost of Tier 3 Pay Credit for Unused Sick Leave (HB 259 Enacted in the 2022 Legislative Session)

Effective July 1, 2023, members earning benefits in the Tier 3 cash balance plan with five or more years of service credit will receive an additional employer pay credit equal to an amount by multiplying the member's unused sick leave in excess of 480 hours (i.e. 60 days) by the member's hourly base pay. Tier 3 members who retire from the State Police Retirement System will receive an additional employer pay credit equal to an amount by multiplying the member's hours of accumulated sick leave upon termination of employment by the member's hourly base pay.

Section KRS 7A.255 was also amended to require the Department of State Police and the Kentucky Public Pensions Authority to jointly report to the Public Pension Oversight Board on the costs and effectiveness of this benefit provided to the Tier 3 members. The increase in the Tier 3 normal cost rate due to this benefit enhancement is 6.07% of pay. As a result, the dollar amount of this benefit enhancement for FY 2024 is $843,000 which is equal to the increase in the Tier 3 normal cost rate multiplied by the $13,886,000 Tier 3 payroll.

The incremental difference in the Tier 3 normal cost rate will remain relatively unchanged in future years, however the amount of the dollar cost of this benefit enhancement will increase over time as the number of members (and covered payroll) increase as new members enter the System and earn Tier 3 benefits.

SECTION 3

ACTUARIAL TABLES

Actuarial Tables

Development of Unfunded Actuarial Accrued Liability

(Dollar amounts expressed in thousands)

		June 30, 2022	
		Retirement (1)	Insurance (2)
1.	Projected payroll of active members	$ 47,885	$ 47,885
2.	Present value of future pay	$ 488,375	$ 450,286
3.	Normal cost rate		
	a. Total normal cost rate	26.92%	7.03%
	b. Less: member contribution rate	-8.00%	-0.52%
	c. Employer normal cost rate	18.92%	6.51%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 318,550	$ 84,978
	b. Less: present value of future normal costs	(121,303)	(24,844)
	c. Actuarial accrued liability	$ 197,247	$ 60,134
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 859,688	$ 169,471
	b. Inactive members	10,512	3,193
	c. Active members (Item 4c)	197,247	60,134
	d. Total	$ 1,067,447	$ 232,798
6.	Actuarial value of assets	$ 559,973	$ 234,239
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 507,474	$ (1,441)
8.	Funded Ratio	52.5%	100.6%

Actuarial Present Value of Future Benefits

(Dollar amounts expressed in thousands)

		June 30, 2022	
		Retirement (1)	Insurance (2)
1.	Active members		
	a. Service retirement	$ 302,475	
	b. Deferred termination benefits and refunds	4,219	
	c. Survivor benefits	2,344	
	d. Disability benefits	9,512	
	e. Total	$ 318,550	$ 84,978
2.	Retired members		
	a. Service retirement	$ 777,004	
	b. Disability retirement	12,316	
	c. Beneficiaries	70,368	
	d. Total	$ 859,688	$ 169,471
3.	Inactive members		
	a. Vested terminations	$ 10,036	$ 3,193
	b. Nonvested terminations	476	N/A
	c. Total	$ 10,512	$ 3,193
4.	Total actuarial present value of future benefits	$ 1,188,750	$ 257,642

Development of Actuarially Determined Contribution Rate

		June 30, 2022	
		Retirement (1)	Insurance (2)
1.	Total normal cost rate		
	a. Service retirement	24.22%	
	b. Deferred termination benefits and refunds	1.10%	
	c. Survivor benefits	0.34%	
	d. Disability benefits	1.26%	
	e. Total	26.92%	7.03%
2.	Less: member contribution rate	-8.00%	-0.52%
3.	Total employer normal cost rate	18.92%	6.51%
4.	Administrative expenses	0.57%	0.15%
5.	Net employer normal cost rate	19.49%	6.66%
6.	UAAL amortization contribution rate	65.90%	-2.98%
7.	Total calculated employer contribution	85.39%	3.68%

Actuarial Balance Sheet

Retirement Benefits

(Dollar amounts expressed in thousands)

			June 30, 2022 (1)	June 30, 2021 (2)
1.	Assets - Present and Expected Future Resources			
	a.	Current assets (actuarial value)	$ 559,973	$ 323,250
	b.	Present value of future member contributions	$ 39,070	$ 35,221
	c.	Present value of future employer contributions		
		i. Normal cost contributions	$ 82,233	$ 66,249
		ii. Unfunded accrued liability contributions	507,474	730,009
		iii. Total future employer contributions	$ 589,707	$ 796,258
	d.	Total assets	$ 1,188,750	$ 1,154,729
2.	Liabilities - Present Value of Expected Future Benefit Payments			
	a.	Active members		
		i. Present value of future normal costs	$ 121,303	$ 101,470
		ii. Accrued liability	197,247	192,458
		iii. Total present value of future benefits	$ 318,550	$ 293,928
	b.	Present value of benefits payable on account of current retired members and beneficiaries	$ 859,688	$ 850,336
	c.	Present value of benefits payable on account of current inactive members	$ 10,512	$ 10,465
	d.	Total liabilities	$ 1,188,750	$ 1,154,729

Actuarial Balance Sheet

Insurance Benefits

(Dollar amounts expressed in thousands)

		June 30, 2022 (1)	June 30, 2021 (2)
1.	Assets - Present and Expected Future Resources		
a.	Current assets (actuarial value)	$ 234,239	$ 223,251
b.	Present value of future member contributions	$ 3,535	$ 2,970
c.	Present value of future employer contributions		
	i. Normal cost contributions	$ 21,309	$ 17,797
	ii. Unfunded accrued liability contributions	(1,441)	49,155
	iii. Total future employer contributions	$ 19,868	$ 66,952
d.	Total assets	$ 257,642	$ 293,173
2.	Liabilities - Present Value of Expected Future Benefit Payments		
a.	Active members		
	i. Present value of future normal costs	$ 24,844	$ 20,767
	ii. Accrued liability	60,134	65,699
	iii. Total present value of future benefits	$ 84,978	$ 86,466
b.	Present value of benefits payable on account of current retired members and beneficiaries	$ 169,471	$ 202,737
c.	Present value of benefits payable on account of current inactive members	$ 3,193	$ 3,970
d.	Total liabilities	$ 257,642	$ 293,173

Reconciliation of Net Assets

(Dollar amounts expressed in thousands)[1]

	Year Ending	
	June 30, 2022	June 30, 2022
	(1)	(2)
	Retirement	**Insurance**
1. Value of assets at beginning of year	$ 356,346	$ 247,318
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 4,773	$ 230
ii. Employer contributions	62,341	8,782
iii. Other contributions (less 401h)	215,000	0
iv. Total	$ 282,114	$ 9,012
b. Income		
i. Interest, dividends, and other income	$ 9,241	$ 6,887
ii. Investment expenses	(2,894)	(3,255)
iii. Net	$ 6,347	$ 3,632
c. Net realized and unrealized gains (losses)	(28,434)	(14,480)
d. Total revenue	$ 260,027	$ (1,836)
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 280	$ 0
ii. Regular annuity benefits / Healthcare premiums	64,120	14,461
iii. Other benefit payments[2]	0	(294)
iv. Transfers to other systems	0	0
v. Total	$ 64,400	$ 14,167
b. Administrative expenses and depreciation	273	73
c. Total expenditures	$ 64,674	$ 14,241
4. Increase in net assets (Item 2. - Item 3.)	$ 195,353	$ (16,076)
5. Value of assets at end of year (Item 1. + Item 4.)	$ 551,699	$ 231,242
6. Net external cash flow		
a. Dollar amount	$ 217,440	$ (5,229)
b. Percentage of market value	47.9%	-2.2%
7. Estimated annual return on net assets	-4.7%	-4.4%

[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)*

	Year Ending		June 30, 2022
1.	Actuarial value of assets at beginning of year	$	323,250
2.	Market value of assets at beginning of year	$	356,346
3.	Net new investments		
	a. Contributions	$	282,114
	b. Benefit payments		(64,400)
	c. Administrative expenses		(273)
	d. Subtotal	$	217,440
4.	Market value of assets at end of year	$	551,699
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(22,087)
6.	Assumed investment return rate for fiscal year		5.25%
7.	Expected return for immediate recognition	$	18,772
8.	Excess return for phased recognition	$	(40,859)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(40,859)	$	(8,172)
b.	2021		46,279		9,256
c.	2020		(8,720)		(1,744)
d.	2019		669		134
e.	2018		5,183		1,037
f.	Total			$	510

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	559,973
11.	Ratio of actuarial value to market value		101.5%
12.	Estimated annual return on actuarial value of assets		5.9%

* Amounts may not add due to rounding

Development of Actuarial Value of Assets

Insurance Benefits

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2022
1.	Actuarial value of assets at beginning of year	$	223,251
2.	Market value of assets at beginning of year	$	247,318
3.	Net new investments		
	a. Contributions	$	9,012
	b. Benefit payments		(14,167)
	c. Administrative expenses		(73)
	d. Subtotal	$	(5,229)
4.	Market value of assets at end of year	$	231,242
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(10,847)
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	15,294
8.	Excess return for phased recognition	$	(26,141)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(26,141)	$	(5,228)
b.	2021		37,840		7,568
c.	2020		(11,419)		(2,284)
d.	2019		(1,099)		(220)
e.	2018		5,431		1,086
f.	Total			$	922

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	234,239
11.	Ratio of actuarial value to market value		101.3%
12.	Estimated annual return on actuarial value of assets		7.3%

* 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			
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%
2022	559,973	1,067,447	507,474	52.5%	47,885	1059.8%
			Insurance			
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%
2022	234,239	232,798	(1,441)	100.6%	47,885	-3.0%

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, 2022
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, (1)	Actuarial Accrued Liability: Active Member Contributions (2)	Retired Members & Beneficiaries (3)	Active Members (Employer Financed) (4)	Valuation Assets (5)	Portion of Aggregate Accrued Liabilities Covered by Assets: Active (6)	Retired (7)	ER Financed (8)
Retirement							
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%
2022	42,027	870,200	155,220	559,973	100.0%	59.5%	0.0%
Insurance							
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%
2022	-	172,664	60,134	234,239	100.0%	100.0%	100.0%

SECTION 4

AMORTIZATION BASES

Amortization of Unfunded Liability

Retirement

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2022	Payments for FYE 2024	Funding Period at June 30, 2022
June 30, 2019	$ 763,156	$ 729,480	$ 49,853	27
June 30, 2020	3,748	4,942	420	18
June 30, 2021	(231,783)	(243,256)	(20,021)	19
June 30, 2022	16,308	16,308	1,305	20
Total		$ 507,474	$ 31,557	

Projected Payroll for FYE 2024	$ 47,885
Amortization Payments as a Percentage of Payroll	65.90%

Insurance

Valuation Year Base Established	Original Amortization Base	Remaining at June 30, 2022	Payments for FYE 2024	Funding Period at June 30, 2022
June 30, 2019	$ 79,414	$ 73,008	$ 5,496	27
June 30, 2020	(5,896)	(6,259)	(571)	18
June 30, 2021	(18,445)	(19,654)	(1,742)	19
June 30, 2022	(48,536)	(48,536)	(4,606)	20
Total		$ (1,441)	$ (1,423)	

Projected Payroll for FYE 2024	$ 47,820
Amortization Payments as a Percentage of Payroll	-2.98%

Note:
Budgeted contribution rates for FYE 2023 were known at the time of the June 30, 2022 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, 2022 (1)	June 30, 2021 (4)
1.	Active members		
	a. Males	820	758
	b. Females	24	17
	c. Total members	844	775
	d. Total annualized prior year salaries	$ 47,885	$ 45,338
	e. Average salary[2]	$ 56,736	$ 58,501
	f. Average age	36.5	37.7
	g. Average service	10.1	11.1
	h. Member contributions with interest	$ 42,027	$ 42,035
	i. Average contributions with interest[2]	$ 49,795	$ 54,239
2.	Vested inactive members[1]		
	a. Number	318	313
	b. Total annual deferred benefits	$ 1,120	$ 1,134
	c. Average annual deferred benefit[2]	$ 3,522	$ 3,623
	d. Average age at the valuation date	44.6	44.2
3.	Nonvested inactive members[1]		
	a. Number	349	321
	b. Total member contributions with interest	$ 474	$ 459
	c. Average contributions with interest[2]	$ 1,358	$ 1,430
4.	Service retirees		
	a. Number	1,397	1,375
	b. Total annual benefits	$ 55,549	$ 54,771
	c. Average annual benefit[2]	$ 39,763	$ 39,833
	d. Average age at the valuation date	63.7	63.5
5.	Disabled retirees		
	a. Number	55	54
	b. Total annual benefits	$ 929	$ 913
	c. Average annual benefit[2]	$ 16,891	$ 16,907
	d. Average age at the valuation date	57.6	57.0
6.	Beneficiaries		
	a. Number	250	244
	b. Total annual benefits	$ 7,302	$ 7,016
	c. Average annual benefit[2]	$ 29,208	$ 28,754
	d. Average age at the valuation date	68.1	67.4

[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		Covered Payroll[1]		Average Annual Pay	
	Number	Percent Increase /(Decrease)	Amount in Thousands	Percent Increase /(Decrease)	Amount	Percent Increase /(Decrease)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2013	902		$ 45,256		$ 50,173	
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%
2022	844	8.9%	47,885	5.6%	56,736	-3.0%

[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

SPRS 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	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	69	20	0	4	0	0	0	0	0	0	0	0	93
	$24,179	$45,951	$0	$46,885	$0	$0	$0	$0	$0	$0	$0	$0	$29,838
25-29	33	13	3	41	18	12	0	0	0	0	0	0	120
	$30,113	$46,819	$45,938	$47,619	$52,762	$54,607	$0	$0	$0	$0	$0	$0	$44,146
30-34	12	3	5	16	11	90	15	0	0	0	0	0	152
	$32,680	$45,732	$46,959	$47,421	$52,503	$54,768	$60,118	$0	$0	$0	$0	$0	$52,180
35-39	6	1	0	6	1	50	80	10	0	0	0	0	154
	$31,150	$46,786	$0	$48,762	$51,702	$54,985	$60,051	$69,772	$0	$0	$0	$0	$57,331
40-44	2	0	1	1	0	14	46	71	11	2	0	0	148
	$21,248	$0	$45,378	$51,083	$0	$55,614	$58,679	$73,644	$77,176	$91,870	$0	$0	$66,744
45-49	0	0	0	1	1	9	22	36	34	5	1	0	109
	$0	$0	$0	$45,022	$54,533	$59,698	$61,754	$71,876	$80,468	$92,862	$81,069	$0	$72,149
50-54	0	0	0	0	0	2	4	17	19	7	1	0	50
	$0	$0	$0	$0	$0	$63,940	$61,135	$69,867	$83,238	$88,664	$134,371	$0	$77,934
55-59	0	0	0	0	0	0	3	4	1	4	3	0	15
	$0	$0	$0	$0	$0	$0	$61,393	$72,250	$77,862	$97,420	$95,262	$0	$81,767
60-64	0	0	0	0	0	0	0	3	0	0	0	0	3
	$0	$0	$0	$0	$0	$0	$0	$62,327	$0	$0	$0	$0	$62,327
65 & Over	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
Total	122	37	9	69	31	177	170	141	65	18	5	0	844
	$26,915	$46,261	$46,443	$47,643	$52,693	$55,239	$59,955	$72,182	$80,681	$92,132	$100,245	$0	$56,736

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	156	$ 5,805	16	$ 262	34	$ 507	206	$ 6,574
50 - 54	226	9,128	9	194	13	263	248	9,585
55 - 59	187	7,381	7	120	7	160	201	7,661
60 - 64	165	6,815	5	79	19	529	189	7,424
65 - 69	191	7,960	9	111	25	639	225	8,710
70 - 74	251	9,976	4	73	49	1,660	304	11,710
75 - 79	129	5,186	4	66	47	1,476	180	6,728
80 - 84	65	2,213	1	24	20	685	86	2,921
85 - 89	20	711	0	0	23	865	43	1,576
90 And Over	7	374	0	0	13	517	20	891
Total	**1,397**	**$ 55,549**	**55**	**$ 929**	**250**	**$ 7,302**	**1,702**	**$ 63,780**

*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	162	$	487,713	17	$	42,925	179	$	530,638
Joint & Survivor:									
100% to Beneficiary	184		545,285	2		9,093	186		554,378
66 2/3% to Beneficiary	93		342,990	2		7,542	95		350,532
50% to Beneficiary	77		276,011	2		7,515	79		283,525
Pop-up Option	674		2,374,787	6		11,214	680		2,386,000
Social Security Option:									
Age 62 Basic	24		61,477	0		0	24		61,477
Age 62 Survivorship	100		189,545	1		4,416	101		193,960
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		124,977	3		6,759	40		131,736
15 Years Certain & Life	17		46,210	2		9,579	19		55,789
20 Years Certain & Life	39		127,530	2		3,979	41		131,509
Total:	1,415	$	4,603,477	37	$	103,021	1,452	$	4,706,499

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	8	$	10,995	10	$	11,815
Joint & Survivor:									
100% to Beneficiary	8		12,812	63		179,193	71		192,005
66 2/3% to Beneficiary	3		1,678	21		52,196	24		53,874
50% to Beneficiary	1		989	21		33,803	22		34,793
Pop-up Option	2		843	60		183,265	62		184,108
Social Security Option:									
Age 62 Basic	0		0	2		2,281	2		2,281
Age 62 Survivorship	2		934	47		99,112	49		100,047
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	5		6,092	6		12,777
Total:	20	$	26,801	230	$	581,676	250	$	608,477

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)
2013	63	16	1,346	$ 50,906		$ 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
2022	76	47	1,702	63,780	1.7%	37,473

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,				
	2022	2021	2020	2019	2018	2022	2021	2020	2019	2018
Ratio of the market value of assets to total payroll	11.52	7.86	6.37	5.99	5.48	4.83	5.45	4.36	4.21	3.91
Ratio of actuarial accrued liability to payroll	22.29	23.23	22.82	21.89	20.27	4.86	6.01	5.98	5.80	5.37
Ratio of net cash flow to market value of assets	47.9%	0.2%	0.5%	1.4%	-2.5%	-2.2%	-1.9%	-0.5%	-0.2%	-2.4%
Percentage of Expected Contribution Actually Received	107% [1]	104%	103%	101%	101%	107% [1]	102%	101%	100%	103%
Ratio of actives to retirees and beneficiaries	0.50	0.46	0.48	0.54	0.55					

[1] Expected contribution for FYE2022 based on the actuarially determined contribution rate of 146.06% from the June 30, 2020 valuation and expected compensation based on census data from the June 30, 2021 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]
2024	6.20%	9.00%	1.50%
2025	6.10%	8.50%	1.50%
2026	6.00%	8.00%	1.50%
2027	5.80%	8.00%	1.50%
2028	5.60%	8.00%	1.50%
2029	5.40%	7.50%	1.50%
2030	5.20%	7.00%	1.50%
2031	5.00%	6.50%	1.50%
2032	4.80%	6.00%	1.50%
2033	4.60%	5.50%	1.50%
2034	4.40%	5.00%	1.50%
2035	4.20%	4.50%	1.50%
2036	4.05%	4.05%	1.50%
2037 & Beyond	4.05%	4.05%	1.50%

[1]All increases are assumed to occur on January 1. The 2023 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	Non-Medicare Plan	Participation Percentage
Medical Only[1]	5%	LivingWell Basic	2%
Essential Plan	8%	LivingWell CDHP	35%
Premium Plan	87%	LivingWell PPO	63%

[1] Includes Medicare Advantage Mirror Plans

- 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. Cash Balance Credit for Unused Sick Leave (annual and at retirement): It is assumed Tier 3 members will receive an additional 7.5% of pay employer pay credit each year due to the conversion of unused sick leave after the member attains five years of service. It is also assumed the Tier 3 members will have fund 480 hours of unused sick leave to convert to pay credit at the time of their retirement. It is assumed that the General Assembly will fund this benefit in all future years.

9. 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.

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

11. 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.

12. 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.

13. 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.

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

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:

1. Due to the enactment of HB 259, this valuation includes an assumption for unused sick leave that will be converted to cash balance pay credits for Tier 3 members.

2. 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 increased during the select period in this valuation as a result of our review.

Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2023, 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 $1,010.20 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	$816.02	$1,010.20

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2023, 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	$78.14	$73.71
75	91.43	89.21
85	96.68	97.82

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

Piotr Krekora 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.

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Piotr Krekora, ASA, 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.

Each June 30 (beginning June 30, 2023), members with at least five years of service credit will receive an employer pay credit based on their unused sick leave in excess of 480 hours. Members will also receive an employer pay credit based on their balance of unused sick leave upon termination of employment.

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 in Retirement Benefits since the Prior Valuation

House Bill 259 passed during the 2022 legislative session and provided that at each June 30, Tier 3 members with at least five years of service credit will receive a pay credit based on their unused sick leave in excess of 480 hours. It also provided an employer pay credit based on the member's balance of unused sick leave at their time of termination of employment.

Summary of Main Retiree Insurance Benefit Provisions

Insurance: 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: Participation began on or after 7/1/2003

Benefit Eligibility

Recipient of a retirement allowance with at least 120 months of service at retirement (180 months if participation began on or after 9/1/2008)

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, 2022, the Non-Hazardous monthly contribution was $14.20/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.

Effective January 1, 2023, members will receive an insurance dollar contribution of $5 for every year of non-hazardous service a member attains over 27 years. This additional dollar contribution does not increase by 1.5% annually and is only payable for non-Medicare retirees. Also, it is only payable when the applicable insurance fund is at least 90% funded on an actuarial value of asset basis as of the last actuarial valuation.

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, 2022, the hazardous monthly contribution was $21.30/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($14.20 as of July 1, 2022) for each year of hazardous service.

Effective January 1, 2023, members will receive an insurance dollar contribution of $5 for every year of hazardous service a Tier 1 member attains over 20 years and a Tier 2 member attains over 25 years. This additional dollar contribution does not increase by 1.5% annually and is only payable for non-Medicare retirees. Also, it is only payable when the applicable insurance fund is at least 90% funded on an actuarial value of asset basis as of the last actuarial valuation.

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.

Monthly Health Plan Premiums – Effective January 1, 2023

	Non-Medicare Plan Options				
Plan Option	Single	Parent Plus	Couple	Family	Family X-Ref
LivingWell PPO[1]	$833.64	$1,177.30	$1,792.42	$1,988.62	$998.02
LivingWell CDHP	813.02	1,117.34	1,608.24	1,794.34	936.90
LivingWell Basic	783.92	1,078.16	1,650.78	1,837.42	919.72

Medicare Plan Options	
Medical Only Plan	$180.14
Medicare Advantage Mirror Essential Plan	221.12
Medicare Advantage Mirror Premium Plan	320.25
Kentucky Retirement Systems – Essential Plan[2]	0.00
Kentucky Retirement Systems – Premium Plan[3]	89.28

[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 Participation on or after 7/1/2003

Monthly contribution amounts per year of service as of July 1, 2022.

Non-Hazardous Service	Hazardous Service
$14.20	$21.30

Note: Non-Hazardous benefits are applicable to SPRS members with prior service in a Non-Hazardous System.

Changes in Health Insurance Benefits since the Prior Valuation

Senate Bill 209 passed during the 2022 legislative session and increased the insurance dollar contribution for members hired on or after July 1, 2003 by $5 for each year of service a member attains over certain thresholds, depending on a member's retirement eligibility requirement. It also allowed members receiving the insurance dollar contribution to participate in a medical insurance reimbursement plan that would provide the reimbursement of premiums for health plans other than those administered by KPPA.

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.

Kentucky Public Pensions Authority
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 (excluding Appropriations)	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)
2022	$ 16,577	$ 3,065	$ 13,512	19%	$ 1,012	$ 68	$ 1,355	7.82%	$ 906
2023	16,550	3,504	13,046	21%	1,012	68	1,355	7.82%	906
2024	16,500	3,941	12,559	24%	981	68	1,355	7.47%	880
2025	16,427	4,122	12,305	25%	981	68	1,355	7.47%	880
2026	16,333	4,216	12,117	26%	974	68	1,355	6.99%	880
2027	16,218	4,367	11,851	27%	974	68	1,355	6.99%	880
2028	16,082	4,512	11,570	28%	975	68	1,355	6.54%	886
2029	15,926	4,657	11,269	29%	975	68	1,355	6.54%	886
2030	15,751	4,800	10,951	31%	969	68	1,355	6.14%	886
2031	15,560	4,943	10,617	32%	969	68	1,355	6.14%	886
2032	15,354	5,088	10,266	33%	964	68	1,355	5.78%	886
2033	15,142	5,246	9,896	35%	964	68	1,355	5.78%	886
2034	14,917	5,410	9,507	36%	960	68	1,355	5.47%	886
2035	14,681	5,584	9,097	38%	960	68	1,355	5.47%	886
2036	14,437	5,771	8,666	40%	956	68	1,355	5.20%	886
2037	14,188	5,976	8,212	42%	956	68	1,355	5.20%	886
2038	13,937	6,204	7,733	45%	954	68	1,355	5.01%	886
2039	13,688	6,457	7,231	47%	954	68	1,355	5.01%	886
2040	13,442	6,741	6,701	50%	955	68	1,355	4.87%	889
2041	13,200	7,059	6,141	54%	984	68	1,355	4.87%	918
2042	12,964	7,442	5,522	57%	988	68	1,355	4.76%	924
2043	12,734	7,869	4,865	62%	1,009	68	1,355	4.76%	944
2044	12,510	8,359	4,151	67%	1,007	68	1,355	4.67%	944
2045	12,293	8,893	3,400	72%	1,008	68	1,355	4.67%	945
2046	12,084	9,474	2,610	78%	1,001	68	1,355	4.59%	939
2047	11,884	10,100	1,784	85%	1,001	68	1,355	4.59%	938
2048	11,692	10,777	915	92%	1,000	68	1,355	4.52%	938
2049	11,510	11,510	-	100%	61	68	1,355	4.50%	-
2050	11,340	11,340	-	100%	61	68	1,355	4.48%	-
2051	11,182	11,182	-	100%	60	68	1,355	4.46%	-

Notes and assumptions:

The projection is based on the results of the June 30, 2022 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.

Per HB 1 and HB 604 (passed in the 2022 legislative session), $240 million in additional appropriations is assumed to be received in both FYE 2023 and FYE 2024

Kentucky Public Pensions Authority
KERS Hazardous Retirement Fund
($ in Millions)

Fiscal Year Beginning July 1, (1)	Actuarial Accrued Liability (2)	Actuarial Value of Assets (3)	Unfunded Actuarial Accrued Liability (4)	Funded Ratio (3) / (2) (5)	Employer Contribution (6)	Member Contribution (7)	Covered Payroll (8)	Employer Contribution as % of Covered Payroll (9)	Employer Actuarially Determined Contribution (10)
2022	$ 1,317	$ 832	$ 485	63%	$ 53	$ 13	$ 166	31.82%	31.82%
2023	1,345	866	479	64%	53	13	166	31.82%	30.12%
2024	1,371	899	472	66%	49	13	166	29.84%	29.84%
2025	1,396	935	461	67%	49	13	166	29.84%	29.77%
2026	1,419	945	474	67%	48	13	166	29.27%	29.27%
2027	1,441	974	467	68%	48	13	166	29.27%	30.29%
2028	1,461	1,002	459	69%	50	13	166	30.13%	30.13%
2029	1,480	1,031	449	70%	50	13	166	30.13%	29.92%
2030	1,498	1,061	437	71%	49	13	166	29.76%	29.76%
2031	1,517	1,092	425	72%	49	13	166	29.76%	29.64%
2032	1,536	1,124	412	73%	49	13	166	29.55%	29.55%
2033	1,558	1,159	399	74%	49	13	166	29.55%	29.48%
2034	1,581	1,196	385	76%	49	13	166	29.41%	29.41%
2035	1,605	1,235	370	77%	49	13	166	29.41%	29.35%
2036	1,630	1,276	354	78%	48	13	166	29.26%	29.26%
2037	1,655	1,317	338	80%	48	13	166	29.26%	29.19%
2038	1,680	1,360	320	81%	48	13	166	29.09%	29.09%
2039	1,705	1,404	301	82%	48	13	166	29.09%	28.98%
2040	1,730	1,449	281	84%	46	13	166	27.85%	27.85%
2041	1,755	1,494	261	85%	46	13	166	27.85%	30.50%
2042	1,780	1,540	240	87%	53	13	166	31.82%	31.82%
2043	1,806	1,596	210	88%	53	13	166	31.82%	31.71%
2044	1,833	1,653	180	90%	52	13	166	31.50%	31.50%
2045	1,860	1,712	148	92%	52	13	166	31.50%	31.73%
2046	1,887	1,774	113	94%	50	13	166	30.48%	30.48%
2047	1,914	1,835	79	96%	50	13	166	30.48%	30.40%
2048	1,940	1,899	41	98%	50	13	166	30.40%	30.40%
2049	1,966	1,966	-	100%	10	13	166	6.09%	6.09%
2050	1,991	1,991	-	100%	10	13	166	6.10%	6.10%
2051	2,015	2,015	-	100%	10	13	166	6.12%	6.12%

Notes and assumptions:

The projection is based on the results of the June 30, 2022 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 Public Pensions Authority
SPRS Retirement Fund
($ in Millions)

Fiscal Year Beginning July 1, (1)	Actuarial Accrued Liability (2)	Actuarial Value of Assets (3)	Unfunded Actuarial Accrued Liability (4)	Funded Ratio (3) / (2) (5)	Employer Contribution (6)	Member Contribution (7)	Covered Payroll (8)	Employer Contribution as % of Covered Payroll (9)	Employer Actuarially Determined Contribution (10)
2022	$ 1,067	$ 560	$ 507	53%	$ 41	$ 4	$ 48	85.32%	85.32%
2023	1,070	568	502	53%	41	4	48	85.32%	85.39%
2024	1,071	573	498	54%	41	4	48	84.95%	84.95%
2025	1,070	580	490	54%	41	4	48	84.95%	84.65%
2026	1,068	576	492	54%	40	4	48	83.98%	83.98%
2027	1,065	580	485	55%	40	4	48	83.98%	85.11%
2028	1,061	584	477	55%	41	4	48	84.82%	84.82%
2029	1,057	587	470	56%	41	4	48	84.82%	84.43%
2030	1,052	591	461	56%	40	4	48	84.06%	84.06%
2031	1,046	595	451	57%	40	4	48	84.06%	83.79%
2032	1,041	599	442	58%	40	4	48	83.56%	83.56%
2033	1,036	604	432	58%	40	4	48	83.56%	83.38%
2034	1,031	610	421	59%	40	4	48	83.23%	83.23%
2035	1,026	616	410	60%	40	4	48	83.23%	83.08%
2036	1,021	623	398	61%	40	4	48	82.89%	82.89%
2037	1,016	630	386	62%	40	4	48	82.89%	82.70%
2038	1,011	638	373	63%	39	4	48	82.48%	82.48%
2039	1,006	647	359	64%	39	4	48	82.48%	82.25%
2040	1,001	656	345	66%	39	4	48	81.16%	81.16%
2041	996	665	331	67%	39	4	48	81.16%	122.81%
2042	990	675	315	68%	59	4	48	123.44%	123.44%
2043	985	706	279	72%	59	4	48	123.44%	123.19%
2044	979	740	239	76%	59	4	48	122.90%	122.90%
2045	973	774	199	80%	59	4	48	122.90%	123.02%
2046	966	810	156	84%	58	4	48	121.43%	121.43%
2047	958	848	110	89%	58	4	48	121.43%	121.30%
2048	951	887	64	93%	58	4	48	121.28%	121.28%
2049	942	942	-	100%	8	4	48	17.20%	17.20%
2050	933	933	-	100%	8	4	48	17.21%	17.21%
2051	924	924	-	100%	8	4	48	17.24%	17.24%

Notes and assumptions:

The projection is based on the results of the June 30, 2022 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 Public Pensions Authority
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)
2022	$ 1,782	$ 1,410	$ 372	79%	$ 117	$ 6	$ 1,346	2.15%	$ 88
2023	1,835	1,519	316	83%	117	7	1,346	2.15%	88
2024	1,884	1,631	253	87%	24	8	1,346	1.77%	-
2025	1,928	1,663	265	86%	24	8	1,346	1.77%	-
2026	1,968	1,648	320	84%	22	9	1,346	1.60%	-
2027	2,002	1,661	341	83%	22	9	1,346	1.60%	-
2028	2,029	1,667	362	82%	21	10	1,346	1.40%	3
2029	2,048	1,667	381	81%	21	10	1,346	1.40%	3
2030	2,061	1,658	403	80%	19	11	1,346	1.21%	3
2031	2,067	1,642	425	79%	19	11	1,346	1.21%	3
2032	2,069	1,620	449	78%	17	11	1,346	1.05%	3
2033	2,067	1,592	475	77%	17	12	1,346	1.05%	3
2034	2,061	1,560	501	76%	15	12	1,346	0.92%	3
2035	2,053	1,523	530	74%	15	12	1,346	0.92%	3
2036	2,044	1,484	560	73%	14	13	1,346	0.81%	3
2037	2,036	1,443	593	71%	14	13	1,346	0.81%	3
2038	2,029	1,402	627	69%	13	13	1,346	0.74%	3
2039	2,025	1,362	663	67%	13	13	1,346	0.74%	3
2040	2,024	1,322	702	65%	34	13	1,346	0.70%	25
2041	2,026	1,306	720	65%	49	13	1,346	0.70%	40
2042	2,032	1,308	724	64%	132	13	1,346	0.67%	123
2043	2,042	1,399	643	69%	139	13	1,346	0.67%	130
2044	2,054	1,505	549	73%	138	13	1,346	0.64%	129
2045	2,069	1,619	450	78%	138	13	1,346	0.64%	129
2046	2,086	1,741	345	84%	134	13	1,346	0.63%	126
2047	2,103	1,866	237	89%	134	13	1,346	0.63%	126
2048	2,119	1,997	122	94%	134	13	1,346	0.60%	126
2049	2,134	2,134	-	100%	8	13	1,346	0.59%	-
2050	2,148	2,148	-	100%	8	13	1,346	0.58%	-
2051	2,160	2,160	-	100%	8	13	1,346	0.57%	-

Notes and assumptions:

The projection is based on the results of the June 30, 2022 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 Public Pensions Authority
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)
2022	$ 347	$ 598	$ (251)	172%	$ -	$ 1	$ 165	0.00%	0.00%
2023	355	614	(259)	173%	-	1	165	0.00%	0.00%
2024	361	630	(269)	175%	-	1	165	0.00%	0.00%
2025	367	652	(285)	178%	-	1	165	0.00%	0.00%
2026	371	654	(283)	176%	-	1	165	0.00%	0.00%
2027	373	671	(298)	180%	-	1	165	0.00%	0.00%
2028	376	687	(311)	183%	-	1	165	0.00%	0.00%
2029	377	704	(327)	187%	-	2	165	0.00%	0.00%
2030	378	721	(343)	191%	-	2	165	0.00%	0.00%
2031	379	740	(361)	195%	-	2	165	0.00%	0.00%
2032	380	759	(379)	200%	-	2	165	0.00%	0.00%
2033	381	780	(399)	205%	-	2	165	0.00%	0.00%
2034	382	803	(421)	210%	-	2	165	0.00%	0.00%
2035	384	827	(443)	215%	-	2	165	0.00%	0.00%
2036	386	854	(468)	221%	-	2	165	0.00%	0.00%
2037	389	882	(493)	227%	-	2	165	0.00%	0.00%
2038	393	913	(520)	232%	-	2	165	0.00%	0.00%
2039	398	947	(549)	238%	-	2	165	0.00%	0.00%
2040	404	984	(580)	244%	-	2	165	0.00%	0.00%
2041	410	1,023	(613)	250%	-	2	165	0.00%	0.00%
2042	417	1,065	(648)	255%	-	2	165	0.00%	0.00%
2043	425	1,110	(685)	261%	-	2	165	0.00%	0.00%
2044	434	1,158	(724)	267%	-	2	165	0.00%	0.00%
2045	442	1,208	(766)	273%	-	2	165	0.00%	0.00%
2046	451	1,261	(810)	280%	-	2	165	0.00%	0.00%
2047	460	1,317	(857)	286%	-	2	165	0.00%	0.00%
2048	468	1,376	(908)	294%	-	2	165	0.00%	0.00%
2049	476	1,437	(961)	302%	-	2	165	0.00%	0.00%
2050	483	1,502	(1,019)	311%	-	2	165	0.00%	0.00%
2051	490	1,569	(1,079)	320%	-	2	165	0.00%	0.00%

Notes and assumptions:

The projection is based on the results of the June 30, 2022 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 Public Pensions Authority
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)
2022	$ 233	$ 234	$ (1)	100%	$ 7	$ -	$ 48	14.11%	14.11%
2023	236	241	(5)	102%	7	-	48	14.11%	3.68%
2024	238	247	(9)	104%	1	-	48	2.12%	2.12%
2025	238	248	(10)	104%	1	-	48	2.12%	1.65%
2026	238	241	(3)	101%	-	-	48	0.75%	0.75%
2027	237	238	(1)	100%	-	-	48	0.75%	1.50%
2028	235	235	-	100%	1	-	48	1.31%	1.31%
2029	232	231	1	100%	1	-	48	1.31%	1.08%
2030	229	226	3	99%	-	-	48	0.86%	0.86%
2031	226	221	5	98%	-	-	48	0.86%	0.72%
2032	222	215	7	97%	-	-	48	0.60%	0.60%
2033	218	209	9	96%	-	-	48	0.60%	0.52%
2034	213	202	11	95%	-	-	48	0.47%	0.47%
2035	209	196	13	94%	-	-	48	0.47%	0.42%
2036	205	189	16	92%	-	-	48	0.38%	0.38%
2037	202	183	19	91%	-	-	48	0.38%	0.37%
2038	199	178	21	89%	-	-	48	0.35%	0.35%
2039	197	173	24	88%	-	-	48	0.35%	0.34%
2040	195	168	27	86%	1	-	48	1.54%	1.54%
2041	194	164	30	85%	1	-	48	1.54%	5.17%
2042	194	160	34	83%	7	-	48	15.13%	15.13%
2043	194	164	30	85%	7	-	48	15.13%	16.06%
2044	195	168	27	86%	8	-	48	16.16%	16.16%
2045	196	174	22	89%	8	-	48	16.16%	16.65%
2046	197	180	17	91%	7	-	48	15.61%	15.61%
2047	198	186	12	94%	7	-	48	15.61%	15.52%
2048	200	193	7	97%	7	-	48	15.47%	15.47%
2049	202	202	-	100%	2	-	48	3.96%	3.96%
2050	203	203	-	100%	2	-	48	3.91%	3.91%
2051	205	205	-	100%	2	-	48	3.87%	3.87%

Notes and assumptions:

The projection is based on the results of the June 30, 2022 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.

P: 469.524.0000 | www.grsconsulting.com

November 1, 2022

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

Re: Sensitivity Analysis Based on Results of the June 30, 2022 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.

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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, 2022 actuarial valuation report. Please refer to the June 30, 2022 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	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	$ 18,605,374	$ 16,576,631	$ 14,904,646
Actuarial Value of Assets	3,065,263	3,065,263	3,065,263
Unfunded Actuarial Accrued Liability	15,540,111	13,511,368	11,839,383
Funded Ratio	16.5%	18.5%	20.6%
Normal Cost Rate	11.17%	7.74%	5.39%
Amortization Cost	$ 967,268	$ 900,701	$ 842,975
Insurance			
Actuarial Accrued Liability	$ 2,009,314	$ 1,782,386	$ 1,594,762
Actuarial Value of Assets	1,409,553	1,409,553	1,409,553
Unfunded Actuarial Accrued Liability	599,761	372,833	185,209
Funded Ratio	70.2%	79.1%	88.4%
Normal Cost Rate	2.55%	1.86%	1.35%
Amortization Cost	$ 21,950	$ 5,192	$ 0
Combined			
Actuarial Accrued Liability	$ 20,614,688	$ 18,359,017	$ 16,499,408
Actuarial Value of Assets	4,474,816	4,474,816	4,474,816
Unfunded Actuarial Accrued Liability	16,139,872	13,884,201	12,024,592
Funded Ratio	21.7%	24.4%	27.1%
Normal Cost Rate	13.72%	9.60%	6.74%
Amortization Cost	$ 989,218	$ 905,893	$ 842,975

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

	Decrease Inflation Rate	Valuation Results	Increase Inflation Rate
(1)	(2)	(3)	(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	$ 17,017,839	$ 16,576,631	$ 16,155,624
Actuarial Value of Assets	3,065,263	3,065,263	3,065,263
Unfunded Actuarial Accrued Liability	13,952,576	13,511,368	13,090,361
Funded Ratio	18.0%	18.5%	19.0%
Normal Cost Rate	8.21%	7.74%	7.31%
Amortization Cost	$ 936,614	$ 900,701	$ 866,343
Insurance			
Actuarial Accrued Liability	$ 1,791,214	$ 1,782,386	$ 1,774,384
Actuarial Value of Assets	1,409,553	1,409,553	1,409,553
Unfunded Actuarial Accrued Liability	381,661	372,833	364,831
Funded Ratio	78.7%	79.1%	79.4%
Normal Cost Rate	1.92%	1.86%	1.81%
Amortization Cost	$ 6,041	$ 5,192	$ 4,417
Combined			
Actuarial Accrued Liability	$ 18,809,053	$ 18,359,017	$ 17,930,008
Actuarial Value of Assets	4,474,816	4,474,816	4,474,816
Unfunded Actuarial Accrued Liability	14,334,237	13,884,201	13,455,192
Funded Ratio	23.8%	24.4%	25.0%
Normal Cost Rate	10.13%	9.60%	9.12%
Amortization Cost	$ 942,655	$ 905,893	$ 870,760

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	$ 16,576,631	$ 16,576,631	$ 16,576,631
Actuarial Value of Assets	3,065,263	3,065,263	3,065,263
Unfunded Actuarial Accrued Liability	13,511,368	13,511,368	13,511,368
Funded Ratio	18.5%	18.5%	18.5%
Normal Cost Rate	7.74%	7.74%	7.74%
Amortization Cost	$ 991,402	$ 900,701	$ 814,777
Insurance			
Actuarial Accrued Liability	$ 1,782,386	$ 1,782,386	$ 1,782,386
Actuarial Value of Assets	1,409,553	1,409,553	1,409,553
Unfunded Actuarial Accrued Liability	372,833	372,833	372,833
Funded Ratio	79.1%	79.1%	79.1%
Normal Cost Rate	1.86%	1.86%	1.86%
Amortization Cost	$ 8,371	$ 5,192	$ 2,208
Combined			
Actuarial Accrued Liability	$ 18,359,017	$ 18,359,017	$ 18,359,017
Actuarial Value of Assets	4,474,816	4,474,816	4,474,816
Unfunded Actuarial Accrued Liability	13,884,201	13,884,201	13,884,201
Funded Ratio	24.4%	24.4%	24.4%
Normal Cost Rate	9.60%	9.60%	9.60%
Amortization Cost	$ 999,773	$ 905,893	$ 816,985

Sensitivity Analysis - Discount Rate
Hazardous Members
(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	5.25%	6.25%	7.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 1,479,275	$ 1,316,825	$ 1,185,036
Actuarial Value of Assets	832,436	832,436	832,436
Unfunded Actuarial Accrued Liability	646,839	484,389	352,600
Funded Ratio	56.3%	63.2%	70.2%
Actuarially Determined Contribution Rate	40.13%	30.12%	21.73%
Insurance			
Actuarial Accrued Liability	$ 389,542	$ 347,044	$ 312,133
Actuarial Value of Assets	597,701	597,701	597,701
Unfunded Actuarial Accrued Liability	(208,159)	(250,657)	(285,568)
Funded Ratio	153.4%	172.2%	191.5%
Actuarially Determined Contribution Rate	0.00%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 1,868,817	$ 1,663,869	$ 1,497,169
Actuarial Value of Assets	1,430,137	1,430,137	1,430,137
Unfunded Actuarial Accrued Liability	438,680	233,732	67,032
Funded Ratio	76.5%	86.0%	95.5%
Actuarially Determined Contribution Rate	40.13%	30.12%	21.73%

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	$ 1,351,348	$ 1,316,825	$ 1,284,002
Actuarial Value of Assets	832,436	832,436	832,436
Unfunded Actuarial Accrued Liability	518,912	484,389	451,566
Funded Ratio	61.6%	63.2%	64.8%
Actuarially Determined Contribution Rate	32.61%	30.12%	27.78%
Insurance			
Actuarial Accrued Liability	$ 350,203	$ 347,044	$ 344,111
Actuarial Value of Assets	597,701	597,701	597,701
Unfunded Actuarial Accrued Liability	(247,498)	(250,657)	(253,590)
Funded Ratio	170.7%	172.2%	173.7%
Actuarially Determined Contribution Rate	0.00%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 1,701,551	$ 1,663,869	$ 1,628,113
Actuarial Value of Assets	1,430,137	1,430,137	1,430,137
Unfunded Actuarial Accrued Liability	271,414	233,732	197,976
Funded Ratio	84.0%	86.0%	87.8%
Actuarially Determined Contribution Rate	32.61%	30.12%	27.78%

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	$ 1,316,825	$ 1,316,825	$ 1,316,825
Actuarial Value of Assets	832,436	832,436	832,436
Unfunded Actuarial Accrued Liability	484,389	484,389	484,389
Funded Ratio	63.2%	63.2%	63.2%
Actuarially Determined Contribution Rate	32.45%	30.12%	27.93%
Insurance			
Actuarial Accrued Liability	$ 347,044	$ 347,044	$ 347,044
Actuarial Value of Assets	597,701	597,701	597,701
Unfunded Actuarial Accrued Liability	(250,657)	(250,657)	(250,657)
Funded Ratio	172.2%	172.2%	172.2%
Actuarially Determined Contribution Rate	0.00%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 1,663,869	$ 1,663,869	$ 1,663,869
Actuarial Value of Assets	1,430,137	1,430,137	1,430,137
Unfunded Actuarial Accrued Liability	233,732	233,732	233,732
Funded Ratio	86.0%	86.0%	86.0%
Actuarially Determined Contribution Rate	32.45%	30.12%	27.93%

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November 1, 2022

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

Re: Sensitivity Analysis Based on Results of the June 30, 2022 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, 2022 actuarial valuation report. Please refer to the June 30, 2022 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)

(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	$ 1,206,062	$ 1,067,447	$ 954,604
Actuarial Value of Assets	559,973	559,973	559,973
Unfunded Actuarial Accrued Liability	646,089	507,474	394,631
Funded Ratio	46.4%	52.5%	58.7%
Actuarially Determined Contribution Rate	108.94%	85.39%	65.24%
Insurance			
Actuarial Accrued Liability	$ 258,767	$ 232,798	$ 211,182
Actuarial Value of Assets	234,239	234,239	234,239
Unfunded Actuarial Accrued Liability	24,528	(1,441)	(23,057)
Funded Ratio	90.5%	100.6%	110.9%
Actuarially Determined Contribution Rate	10.51%	3.68%	0.00%
Combined			
Actuarial Accrued Liability	$ 1,464,829	$ 1,300,245	$ 1,165,786
Actuarial Value of Assets	794,212	794,212	794,212
Unfunded Actuarial Accrued Liability	670,617	506,033	371,574
Funded Ratio	54.2%	61.1%	68.1%
Actuarially Determined Contribution Rate	119.45%	89.07%	65.24%

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	$ 1,098,450	$ 1,067,447	$ 1,037,993
Actuarial Value of Assets	559,973	559,973	559,973
Unfunded Actuarial Accrued Liability	538,477	507,474	478,020
Funded Ratio	51.0%	52.5%	53.9%
Actuarially Determined Contribution Rate	92.23%	85.39%	78.92%
Insurance			
Actuarial Accrued Liability	$ 234,228	$ 232,798	$ 231,453
Actuarial Value of Assets	234,239	234,239	234,239
Unfunded Actuarial Accrued Liability	(11)	(1,441)	(2,786)
Funded Ratio	100.0%	100.6%	101.2%
Actuarially Determined Contribution Rate	4.22%	3.68%	3.19%
Combined			
Actuarial Accrued Liability	$ 1,332,678	$ 1,300,245	$ 1,269,446
Actuarial Value of Assets	794,212	794,212	794,212
Unfunded Actuarial Accrued Liability	538,466	506,033	475,234
Funded Ratio	59.6%	61.1%	62.6%
Actuarially Determined Contribution Rate	96.45%	89.07%	82.11%

Sensitivity Analysis - Payroll Growth

(Dollar amounts expressed in thousands)

(1)	Decrease Payroll Growth (2)	Valuation Results (3)	Increase Payroll Growth (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	$ 1,067,447	$ 1,067,447	$ 1,067,447
Actuarial Value of Assets	559,973	559,973	559,973
Unfunded Actuarial Accrued Liability	507,474	507,474	507,474
Funded Ratio	52.5%	52.5%	52.5%
Actuarially Determined Contribution Rate	93.72%	85.39%	77.64%
Insurance			
Actuarial Accrued Liability	$ 232,798	$ 232,798	$ 232,798
Actuarial Value of Assets	234,239	234,239	234,239
Unfunded Actuarial Accrued Liability	(1,441)	(1,441)	(1,441)
Funded Ratio	100.6%	100.6%	100.6%
Actuarially Determined Contribution Rate	3.69%	3.68%	3.68%
Combined			
Actuarial Accrued Liability	$ 1,300,245	$ 1,300,245	$ 1,300,245
Actuarial Value of Assets	794,212	794,212	794,212
Unfunded Actuarial Accrued Liability	506,033	506,033	506,033
Funded Ratio	61.1%	61.1%	61.1%
Actuarially Determined Contribution Rate	97.41%	89.07%	81.32%