County Employees Retirement System (CERS)

Actuarial Valuation Report as of June 30, 2022

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December 5, 2022

Board of Trustees
County Employees Retirement System
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 County Employees Retirement System (CERS) and provides the actuarially determined employer contribution rates for fiscal year ending June 30, 2024. In addition, the report analyzes changes in CERS's financial condition and provides various summaries of the data.

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

Financing Objectives and Funding Policy

The contribution rates determined by these actuarial valuations are intended to become effective twelve months after the valuation date and, as such, are intended to be used by the Board for recommending required contribution rates effective July 1, 2023.

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.

House Bill 362 (passed during the 2018 legislative session) limits the increases to the employer contribution rates to 12% over the prior fiscal year through June 30, 2028. However, this legislation does not impact the contribution rates calculated in this actuarial valuation, effective for the 2024 fiscal year.

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. 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 CERS 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
Actuarially Determined Contribution:						
Retirement	23.34%	23.40%	41.11%	42.81%		
Insurance	0.00%	3.39%	2.58%	6.78%		
Total	23.34%	26.79%	43.69%	49.59%	N/A	N/A
Contribution Rate for Next Fiscal Year[1]	23.34%	26.79%	43.69%	49.59%		
Assets:						
Retirement						
• Actuarial value (AVAR)	$8,148,912	$7,715,883	$2,788,714	$2,628,621	$10,937,626	$10,344,504
• Market value (MVAR)	$7,963,586	$8,565,652	$2,718,234	$2,914,408	$10,681,820	$11,480,060
• Ratio of actuarial to market value of assets	102.3%	90.1%	102.6%	90.2%	102.4%	90.1%
Insurance						
• Actuarial value (AVAI)	$3,160,084	$2,947,312	$1,553,761	$1,475,635	$4,713,845	$4,422,947
• Market value (MVAI)	$3,079,984	$3,246,801	$1,522,671	$1,627,824	$4,602,655	$4,874,625
• Ratio of actuarial to market value of assets	102.6%	90.8%	102.0%	90.7%	102.4%	90.7%
Funded Status:						
Retirement						
• Actuarial accrued liability	$15,674,220	$14,894,906	$5,861,691	$5,629,458	$21,535,911	$20,524,364
• Unfunded accrued liability on AVAR	$7,525,308	$7,179,023	$3,072,977	$3,000,837	$10,598,285	$10,179,860
• Funded ratio on AVAR	52.0%	51.8%	47.6%	46.7%	50.8%	50.4%
• Unfunded accrued liability on MVAR	$7,710,634	$6,329,254	$3,143,457	$2,715,050	$10,854,091	$9,044,304
• Funded ratio on MVAR	50.8%	57.5%	46.4%	51.8%	49.6%	55.9%
Insurance						
• Actuarial accrued liability	$2,391,990	$3,450,484	$1,538,131	$1,751,203	$3,930,121	$5,201,687
• Unfunded accrued liability on AVAI	($768,094)	$503,172	($15,630)	$275,568	($783,724)	$778,740
• Funded ratio on AVAI	132.1%	85.4%	101.0%	84.3%	119.9%	85.0%
• Unfunded accrued liability on MVAI	($687,994)	$203,683	$15,460	$123,379	($672,534)	$327,062
• Funded ratio on MVAI	128.8%	94.1%	99.0%	93.0%	117.1%	93.7%
Membership:						
• Number of						
- Active Members	77,849	77,367	9,184	9,173	87,033	86,540
- Retirees and Beneficiaries	68,889	67,206	11,231	10,858	80,120	78,064
- Inactive Members	105,707	100,738	4,100	3,895	109,807	104,633
- Total	252,445	245,311	24,515	23,926	276,960	269,237
• Projected payroll of active members	$2,691,171	$2,528,735	$620,934	$578,355	$3,312,105	$3,107,090
• Average salary of active members	$34,569	$32,685	$67,610	$63,050	$38,056	$35,904

[1] Contribution rates reflect House Bill 362 (passed during the 2018 legislative session), which limits the increases to the employer contribution rates to 12% over the prior fiscal year through June 30, 2028. Contribution rates calculated with the June 30, 2022 valuation (June 30, 2021 valuation) are effective for fiscal year ending June 30, 2024 (June 30, 2023).

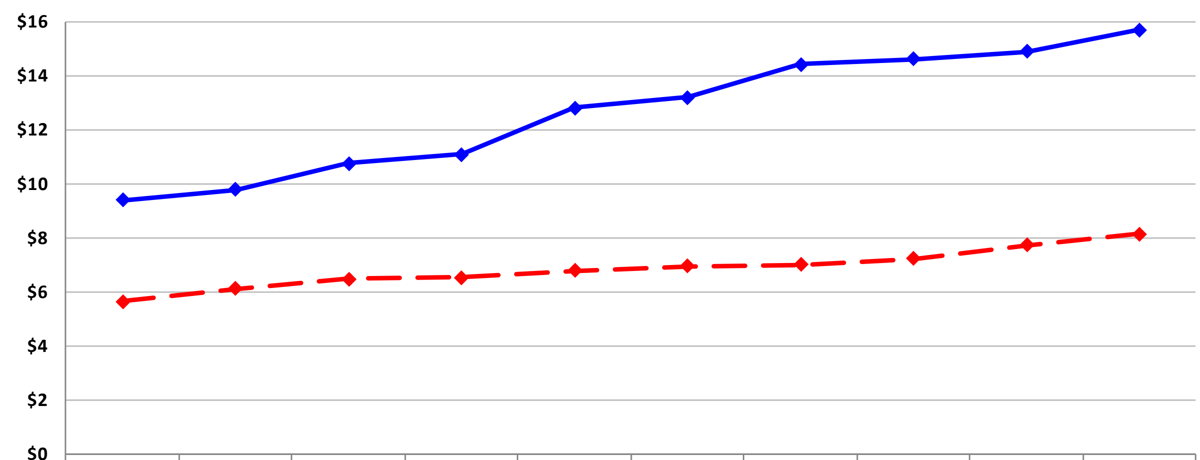
Executive Summary (Continued)

Non-Hazardous Retirement Fund

The unfunded actuarial accrued liability of the non-hazardous retirement fund increased by $346 million since the prior year's valuation to $7.525 billion. The unfunded liability was expected to decrease by $75 million so actual experience resulted in an unfunded liability that was approximately $421 million more than expected, due to higher than expected liability.

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

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



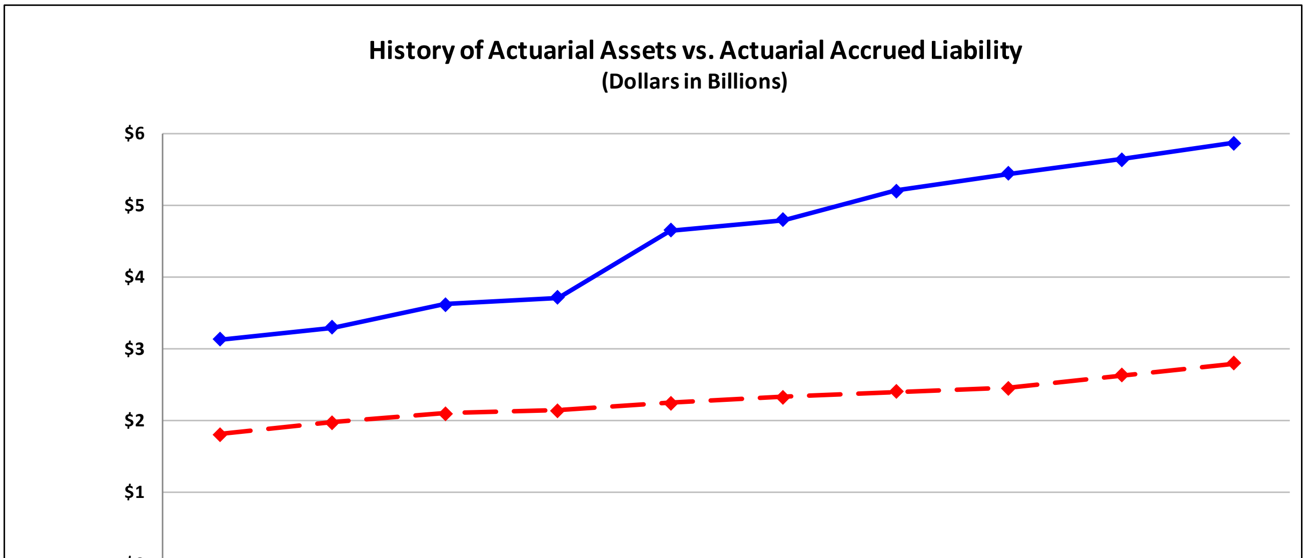
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AAL	9.4	9.8	10.7	11.1	12.8	13.2	14.4	14.6	14.9	15.7
AVA	5.6	6.1	6.5	6.5	6.8	7.0	7.0	7.2	7.7	8.1

Executive Summary (Continued)

Hazardous Retirement Fund

The unfunded actuarial accrued liability of the hazardous retirement fund increased by $72 million since the prior year's valuation to $3.073 billion. The unfunded liability was expected to decrease by $2 million so actual experience resulted in an unfunded liability that was approximately $74 million more than expected. The favorable investment experience was partially offset by liability losses, primarily due to higher than expected salary increases for active members.

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



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AAL	3.1	3.3	3.6	3.7	4.6	4.8	5.2	5.4	5.6	5.9
AVA	1.8	2.0	2.1	2.1	2.2	2.3	2.4	2.4	2.6	2.8

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 $1,284 million and $298 million liability experience gain for the non-hazardous and hazardous insurance funds, respectively. As a result, the corresponding funded ratio increased from 85.4% in the prior year's valuation to 132.1% at June 30, 2022 for the non-hazardous plan. Similarly, the funded ratio for the hazardous plan increased from 84.3% in the prior year's valuation to 101.0% at June 30, 2022.

SECTION 2

DISCUSSION

Discussion

The County Employees Retirement System (CERS) is a cost-sharing, multiple-employer defined benefit pension plan that provides coverage for regular full-time members employed by positions of each participating county, city, and school board, and any additional eligible local agencies electing to participate in CERS. CERS includes both non-hazardous and hazardous duty benefits. This report presents the results of the June 30, 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 CERS and provide the actuarially determined employer contribution rates for fiscal year ending June 30, 2024. In addition, the report analyzes changes in CERS's financial condition and provides various summaries of the data.

The actuarially determined contribution consist of two components: a normal cost rate and an amortization cost to finance the unfunded actuarial accrued liability. The normal cost rate is the theoretical amount which would be required to pay the members' benefits, based on the current plan provisions, if this amount had been contributed from each member's entry date and if the fund's experience exactly followed the actuarial assumptions. This is the amount that it should cost to provide the benefits for an average member. Since members contribute to the fund, only the excess of the normal 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 78.635 of Kentucky Statute.

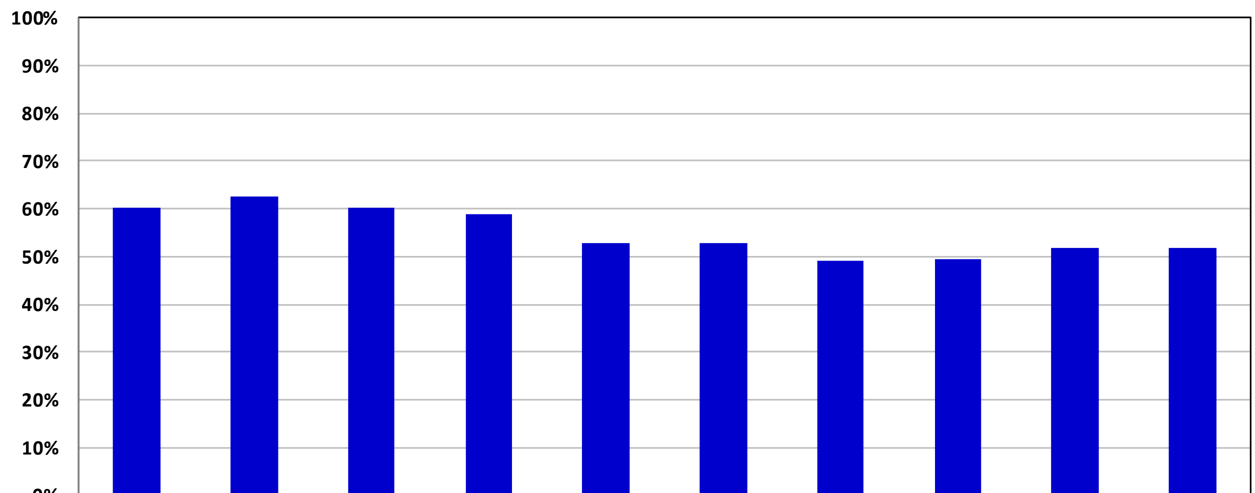
All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides additional details related to the calculation of the amortization of the unfunded actuarial accrued liability. Section 5 provides member data and statistical information.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

Funding Progress

The following charts provide a ten-year history of the retirement funds' funded ratio (i.e. the Actuarial Value of Assets divided by the Actuarial Accrued Liability). The decline in the funded ratio in the beginning 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 ratios for both the non-hazardous and hazardous funds have been slowly trending upward since 2019. Now that the full actuarially determined contributions have been fully phased-in and absent significant future unfavorable experience, the funded ratio is expected to continue trending upward. Also, the dollar amount of the unfunded actuarial accrued liability, or the difference between the actuarial accrued liability and the actuarial value of assets, is expected to begin decreasing in the next few years. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the Retirement Funds.

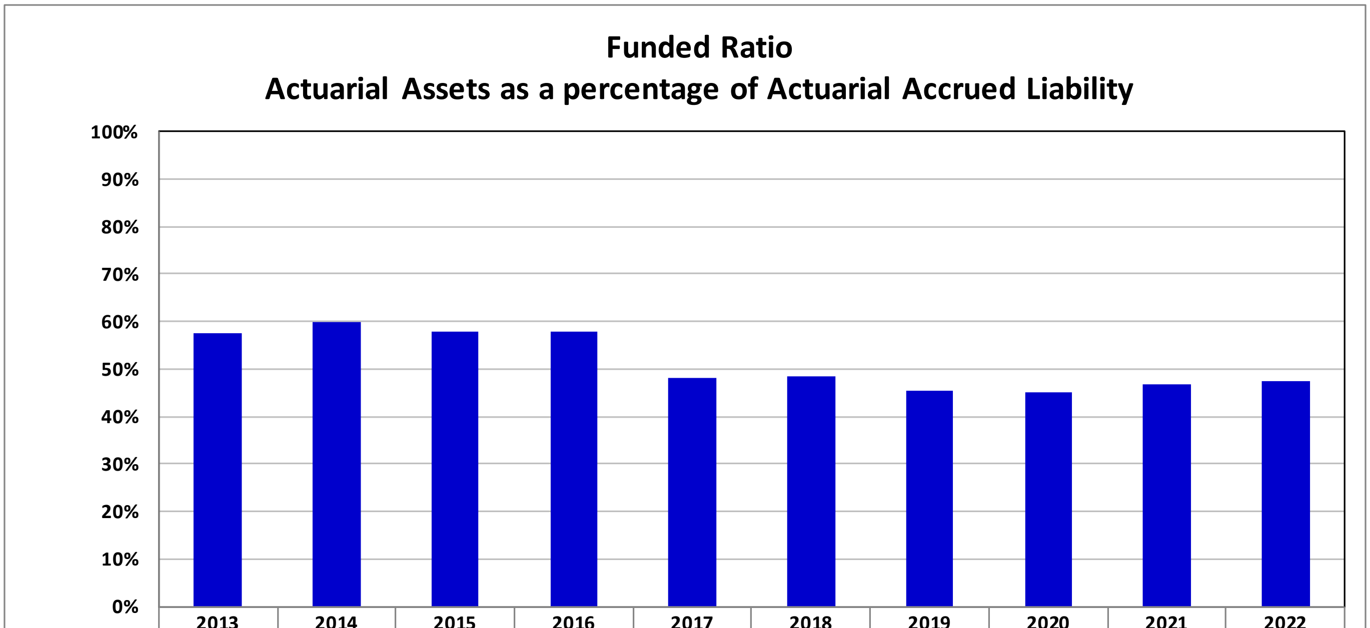
Non-Hazardous Retirement Fund



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Funded Ratio	60.1%	62.6%	60.3%	59.0%	52.8%	52.7%	49.1%	49.4%	51.8%	52.0%

Funding Progress (Continued)

Hazardous Retirement Fund



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Funded Ratio	57.7%	59.8%	58.0%	57.7%	48.1%	48.4%	45.3%	45.1%	46.7%	47.6%

Asset Gains/ (Losses)

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

Non-Hazardous Retirement Fund

The actuarial value of assets for the non-hazardous retirement fund increased from $7.716 billion to $8.149 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 -5.8% which is less than the 6.25% expected annual return. The return on an actuarial (smoothed) asset value was 7.1%, which resulted in a $61 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 $185 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 $2.629 billion to $2.789 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 -6.0% which is less than the 6.25% expected annual return. The return on an actuarial (smoothed) asset value was 7.0%, which resulted in a $18 million gain for the fiscal year. The market value of assets is $70 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	$ 7,179,023	$ 3,000,837
2. Normal cost and administrative expenses	285,747	108,210
3. Less: contributions for the year	(793,454)	(291,593)
4. Interest accrual	432,823	181,822
5. Expected UAAL (Sum of Items 1 - 4)	$ 7,104,139	$ 2,999,276
6. Actual UAAL as of June 30,2022	$ 7,525,308	$ 3,072,977
7. Total gain (loss) for the year (Item 5 - Item 6)	$ (421,169)	$ (73,701)
B. Source of gains and losses		
8. Asset gain (loss) for the year	$ 61,403	$ 18,448
9. Liability experience gain (loss) for the year	(482,572)	(92,149)
10. Plan Change	—	—
11. Assumption change	—	—
12. Total	$ (421,169)	$ (73,701)

The liability experience for the non-hazardous fund includes a $351 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 experience for both the non-hazardous fund and hazardous fund was primarily due to greater than expected salary increases for active members.

Actuarial Gains/ (Losses) (Continued)

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

	Non-Hazardous		Hazardous	
A. Calculation of total actuarial gain or loss				
1. Unfunded actuarial accrued liability (UAAL), previous year	$	503,172	$	275,568
2. Normal cost and administrative expenses		77,734		28,213
3. Less: contributions for the year		(139,292)		(63,558)
4. Interest accrual		29,525		16,118
5. Expected UAAL (Sum of Items 1 - 4)	$	471,139	$	256,341
6. Actual UAAL as of June 30,2022	$	(768,094)	$	(15,630)
7. Total gain (loss) for the year (Item 5 - Item 6)	$	1,239,233	$	271,971
B. Source of gains and losses				
8. Asset gain (loss) for the year	$	18,172	$	12,180
9. Liability experience gain (loss) for the year		1,284,156		297,662
10. Plan Change		(63,095)		(37,871)
11. Assumption change		—		—
12. Total	$	1,239,233	$	271,971

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. The following is a summary of a material change 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.

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	$ 2,691,171	$ 620,934
2.	Present value of future pay	$ 20,789,046	$ 5,532,094
3.	Normal cost rate		
	a. Total normal cost rate	10.22%	18.02%
	b. Less: member contribution rate	-5.00%	-8.00%
	c. Employer normal cost rate	5.22%	10.02%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 7,641,425	$ 2,869,843
	b. Less: present value of future normal costs	(1,988,550)	(924,116)
	c. Actuarial accrued liability	$ 5,652,875	$ 1,945,727
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 9,360,994	$ 3,836,616
	b. Inactive members	660,351	79,348
	c. Active members (Item 4c)	5,652,875	1,945,727
	d. Total	$ 15,674,220	$ 5,861,691
6.	Actuarial value of assets	$ 8,148,912	$ 2,788,714
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 7,525,308	$ 3,072,977
8.	Funded Ratio	52.0%	47.6%

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	$ 6,710,971	$ 2,596,824
	b. Deferred termination benefits and refunds	483,928	115,270
	c. Survivor benefits	131,863	24,714
	d. Disability benefits	314,663	133,035
	e. Total	$ 7,641,425	$ 2,869,843
2.	Retired members		
	a. Service retirement	$ 8,302,265	$ 3,478,283
	b. Disability retirement	468,631	117,403
	c. Beneficiaries	590,098	240,930
	d. Total	$ 9,360,994	$ 3,836,616
3.	Inactive members		
	a. Vested terminations	$ 578,087	$ 69,537
	b. Nonvested terminations	82,264	9,811
	c. Total	$ 660,351	$ 79,348
4.	Total actuarial present value of future benefits	$ 17,662,770	$ 6,785,807

Development of Actuarially Determined Contribution Rate
Retirement Benefits

		June 30, 2022	
		Non-Hazardous	Hazardous
		(1)	(2)
1.	Total normal cost rate		
	a. Service retirement	6.90%	14.15%
	b. Deferred termination benefits and refunds	2.25%	2.24%
	c. Survivor benefits	0.37%	0.29%
	d. Disability benefits	0.70%	1.34%
	e. Total	10.22%	18.02%
2.	Less: member contribution rate	-5.00%	-8.00%
3.	Total employer normal cost rate	5.22%	10.02%
4.	Administrative expenses	0.84%	0.32%
5.	Net employer normal cost rate	6.06%	10.34%
6.	UAAL amortization contribution rate	17.28%	30.77%
7.	Total calculated employer contribution	23.34%	41.11%

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)	$ 8,148,912	$ 7,715,883
b.	Present value of future member contributions	$ 1,039,452	$ 975,456
c.	Present value of future employer contributions		
	i. Normal cost contributions	$ 949,098	$ 934,733
	ii. Unfunded accrued liability contributions	7,525,308	7,179,023
	iii. Total future employer contributions	$ 8,474,406	$ 8,113,756
d.	Total assets	$ 17,662,770	$ 16,805,095
2.	Liabilities - Present Value of Expected Future Benefit Payments		
a.	Active members		
	i. Present value of future normal costs	$ 1,988,550	$ 1,910,189
	ii. Accrued liability	5,652,875	5,496,938
	iii. Total present value of future benefits	$ 7,641,425	$ 7,407,127
b.	Present value of benefits payable on account of current retired members and beneficiaries	$ 9,360,994	$ 8,774,177
c.	Present value of benefits payable on account of current inactive members	$ 660,351	$ 623,791
d.	Total liabilities	$ 17,662,770	$ 16,805,095

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)	$ 2,788,714	$ 2,628,621
	b. Present value of future member contributions	$ 442,568	$ 405,525
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 481,548	$ 460,225
	ii. Unfunded accrued liability contributions	3,072,977	3,000,837
	iii. Total future employer contributions	$ 3,554,525	$ 3,461,062
	d. Total assets	$ 6,785,807	$ 6,495,208
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 924,116	$ 865,750
	ii. Accrued liability	1,945,727	1,852,145
	iii. Total present value of future benefits	$ 2,869,843	$ 2,717,895
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 3,836,616	$ 3,699,392
	c. Present value of benefits payable on account of current inactive members	$ 79,348	$ 77,921
	d. Total liabilities	$ 6,785,807	$ 6,495,208

Reconciliation of Retirement 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	$ 8,565,652	$ 2,914,408
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 186,648	$ 69,565
ii. Employer contributions	606,771	221,968
iii. Other contributions (less 401h)	35	60
iv. Total	$ 793,454	$ 291,593
b. Income		
i. Interest, dividends, and other income	$ 240,654	$ 81,670
ii. Investment expenses	(103,886)	(33,016)
iii. Net	$ 136,769	$ 48,655
c. Net realized and unrealized gains (losses)	(631,569)	(222,871)
d. Total revenue	$ 298,654	$ 117,376
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 19,789	$ 5,766
ii. Regular annuity benefits	858,261	305,789
iii. Other benefit payments	0	0
iv. Transfers to other systems	0	0
v. Total	$ 878,050	$ 311,555
b. Administrative expenses and depreciation	22,670	1,995
c. Total expenditures	$ 900,720	$ 313,551
4. Increase in net assets (Item 2. - Item 3.)	$ (602,066)	$ (196,174)
5. Value of assets at end of year (Item 1. + Item 4.)	$ 7,963,586	$ 2,718,234
6. Net external cash flow		
a. Dollar amount	$ (107,266)	$ (21,958)
b. Percentage of market value	-1.3%	-0.8%
7. Estimated annual return on net assets	-5.8%	-6.0%

[1] Amounts may not add due to rounding

[1] Excludes 401h assets

Development of Actuarial Value of Assets

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2022
1.	Actuarial value of assets at beginning of year	$	7,715,883
2.	Market value of assets at beginning of year	$	8,565,652
3.	Net new investments		
	a. Contributions	$	793,454
	b. Benefit payments		(878,050)
	c. Administrative expenses		(22,670)
	d. Subtotal	$	(107,266)
4.	Market value of assets at end of year	$	7,963,586
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(494,801)
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	532,001
8.	Excess return for phased recognition	$	(1,026,802)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(1,026,802)	$	(205,360)
b.	2021		1,330,544		266,109
c.	2020		(385,418)		(77,084)
d.	2019		(40,218)		(8,044)
e.	2018		163,357		32,671
f.	Total			$	8,293

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	8,148,912
11.	Ratio of actuarial value to market value		102.3%
12.	Estimated annual return on actuarial value of assets		7.1%

* 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	$	2,628,621
2.	Market value of assets at beginning of year	$	2,914,408
3.	Net new investments		
	a. Contributions	$	291,593
	b. Benefit payments		(311,555)
	c. Administrative expenses		(1,995)
	d. Subtotal	$	(21,958)
4.	Market value of assets at end of year	$	2,718,234
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(174,217)
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	181,464
8.	Excess return for phased recognition	$	(355,681)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(355,681)	$	(71,136)
b.	2021		449,846		89,969
c.	2020		(133,383)		(26,677)
d.	2019		(12,449)		(2,490)
e.	2018		54,598		10,920
f.	Total			$	586

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	2,788,714
11.	Ratio of actuarial value to market value		102.6%
12.	Estimated annual return on actuarial value of assets		7.0%

* 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	$ 5,637,094	$ 9,378,876	$ 3,741,782	60.1%	$ 2,236,277	167.3%
2014	6,117,134	9,772,523	3,655,389	62.6%	2,272,270	160.9%
2015	6,474,849	10,740,325	4,265,476	60.3%	2,296,716	185.7%
2016	6,535,372	11,076,457	4,541,085	59.0%	2,352,762	193.0%
2017	6,764,873	12,803,510	6,038,637	52.8%	2,452,407	246.2%
2018	6,950,225	13,191,505	6,241,280	52.7%	2,466,801	253.0%
2019	7,049,527	14,356,113	7,306,586	49.1%	2,521,860	289.7%
2020	7,220,607	14,610,868	7,390,261	49.4%	2,565,391	288.1%
2021	7,715,883	14,894,906	7,179,023	51.8%	2,528,735	283.9%
2022	8,148,912	15,674,220	7,525,308	52.0%	2,691,171	279.6%
Hazardous Members						
2013	$ 1,801,691	$ 3,124,206	$ 1,322,515	57.7%	$ 461,673	286.5%
2014	1,967,640	3,288,826	1,321,186	59.8%	479,164	275.7%
2015	2,096,783	3,613,308	1,516,525	58.0%	483,641	313.6%
2016	2,139,119	3,704,456	1,565,337	57.7%	492,851	317.6%
2017	2,238,320	4,649,047	2,410,727	48.1%	541,633	445.1%
2018	2,321,721	4,792,548	2,470,827	48.4%	533,618	463.0%
2019	2,375,106	5,245,365	2,870,259	45.3%	559,353	513.1%
2020	2,447,885	5,431,299	2,983,414	45.1%	568,558	524.7%
2021	2,628,621	5,629,458	3,000,837	46.7%	578,355	518.9%
2022	2,788,714	5,861,691	3,072,977	47.6%	620,934	494.9%
Total CERS Members						
2013	$ 7,438,785	$ 12,503,082	$ 5,064,297	59.5%	$ 2,697,950	187.7%
2014	8,084,774	13,061,349	4,976,575	61.9%	2,751,434	180.9%
2015	8,571,632	14,353,633	5,782,001	59.7%	2,780,357	208.0%
2016	8,674,491	14,780,913	6,106,422	58.7%	2,845,613	214.6%
2017	9,003,193	17,452,557	8,449,364	51.6%	2,994,040	282.2%
2018	9,271,946	17,984,053	8,712,107	51.6%	3,000,419	290.4%
2019	9,424,633	19,601,478	10,176,845	48.1%	3,081,213	330.3%
2020	9,668,492	20,042,167	10,373,675	48.2%	3,133,949	331.0%
2021	10,344,504	20,524,364	10,179,860	50.4%	3,107,090	327.6%
2022	10,937,626	21,535,911	10,598,285	50.8%	3,312,105	320.0%

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:

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

Solvency Test
Retirement Benefits
(Dollar amounts expressed in thousands)

	Actuarial Accrued Liability				Portion of Aggregate Accrued Liabilities Covered by Assets		
June 30,	Active Member Contributions	Retired Members & Beneficiaries	Active Members (Employer Financed)	Valuation Assets	Active	Retired	ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-Hazardous Members							
2013	$ 1,149,611	$ 5,638,371	$ 2,590,894	$ 5,637,094	100.0%	79.6%	0.0%
2014	1,204,383	5,873,279	2,694,860	6,117,134	100.0%	83.6%	0.0%
2015	1,216,585	6,489,863	3,033,878	6,474,849	100.0%	81.0%	0.0%
2016	1,231,027	6,785,530	3,059,900	6,535,372	100.0%	78.2%	0.0%
2017	1,277,432	7,731,682	3,794,396	6,764,873	100.0%	71.0%	0.0%
2018	1,269,287	8,196,719	3,725,499	6,950,225	100.0%	69.3%	0.0%
2019	1,280,679	8,905,544	4,169,890	7,049,527	100.0%	64.8%	0.0%
2020	1,312,554	9,088,237	4,210,077	7,220,607	100.0%	65.0%	0.0%
2021	1,324,826	9,397,968	4,172,112	7,715,883	100.0%	68.0%	0.0%
2022	1,335,758	10,021,345	4,317,117	8,148,912	100.0%	68.0%	0.0%
Hazardous Members							
2013	$ 390,471	$ 1,988,030	$ 745,705	$ 1,801,691	100.0%	71.0%	0.0%
2014	415,070	2,077,517	796,239	1,967,640	100.0%	74.7%	0.0%
2015	422,359	2,297,703	893,246	2,096,783	100.0%	72.9%	0.0%
2016	428,713	2,388,712	887,031	2,139,119	100.0%	71.6%	0.0%
2017	458,808	2,910,601	1,279,638	2,238,320	100.0%	61.1%	0.0%
2018	442,637	3,151,058	1,198,853	2,321,721	100.0%	59.6%	0.0%
2019	458,559	3,399,954	1,386,852	2,375,106	100.0%	56.4%	0.0%
2020	454,801	3,606,091	1,370,407	2,447,885	100.0%	55.3%	0.0%
2021	457,391	3,777,313	1,394,754	2,628,621	100.0%	57.5%	0.0%
2022	468,325	3,915,964	1,477,402	2,788,714	100.0%	59.3%	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	$ 2,691,171	$ 620,934
2.	Present value of future pay	$ 20,228,008	$ 5,570,687
3.	Normal cost rate		
	a. Total normal cost rate	2.69%	4.50%
	b. Less: member contribution rate	-0.59%	-0.59%
	c. Employer normal cost rate	2.10%	3.91%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 1,872,211	$ 700,454
	b. Less: present value of future normal costs	(535,596)	(207,345)
	c. Actuarial accrued liability	$ 1,336,615	$ 493,109
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 977,116	$ 1,027,782
	b. Inactive members	78,259	17,240
	c. Active members (Item 4c)	1,336,615	493,109
	d. Total	$ 2,391,990	$ 1,538,131
6.	Actuarial value of assets	$ 3,160,084	$ 1,553,761
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ (768,094)	$ (15,630)
8.	Funded Ratio	132.1%	101.0%

Development of Actuarially Determined Contribution Rate
Insurance Benefits

		June 30, 2022	
		Non-Hazardous	Hazardous
		(1)	(2)
1.	Total normal cost rate	2.69%	4.50%
2.	Less: member contribution rate	-0.59%	-0.59%
3.	Total employer normal cost rate	2.10%	3.91%
4.	Administrative expenses	0.04%	0.08%
5.	Net employer normal cost rate	2.14%	3.99%
6.	UAAL amortization contribution rate	-3.01%	-1.41%
7.	Total calculated employer contribution	0.00%	2.58%

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)	$ 3,160,084	$ 2,947,312
	b. Present value of future member contributions	$ 140,458	$ 123,783
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 395,138	$ 416,881
	ii. Unfunded accrued liability contributions	(768,094)	503,172
	iii. Total future employer contributions	$ (372,956)	$ 920,053
	d. Total assets	$ 2,927,586	$ 3,991,148
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 535,596	$ 540,664
	ii. Accrued liability	1,336,615	1,614,750
	iii. Total present value of future benefits	$ 1,872,211	$ 2,155,414
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 977,116	$ 1,644,607
	c. Present value of benefits payable on account of current inactive members	$ 78,259	$ 191,127
	d. Total liabilities	$ 2,927,586	$ 3,991,148

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)	$ 1,553,761	$ 1,475,635
b. Present value of future member contributions	$ 43,624	$ 38,017
c. Present value of future employer contributions		
i. Normal cost contributions	$ 163,721	$ 151,296
ii. Unfunded accrued liability contributions	(15,630)	275,568
iii. Total future employer contributions	$ 148,091	$ 426,864
d. Total assets	$ 1,745,476	$ 1,940,516
2. Liabilities - Present Value of Expected Future Benefit Payments		
a. Active members		
i. Present value of future normal costs	$ 207,345	$ 189,313
ii. Accrued liability	493,109	533,676
iii. Total present value of future benefits	$ 700,454	$ 722,989
b. Present value of benefits payable on account of current retired members and beneficiaries	$ 1,027,782	$ 1,196,333
c. Present value of benefits payable on account of current inactive members	$ 17,240	$ 21,194
d. Total liabilities	$ 1,745,476	$ 1,940,516

Reconciliation of Insurance 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	$ 3,246,801	$ 1,627,824
2.	Revenue for the year		
	a. Contributions		
	i. Member contributions	$ 15,925	$ 3,654
	ii. Employer contributions	118,551	58,375
	iii. Other contributions (less 401h)	4,816	1,530
	iv. Total	$ 139,292	$ 63,558
	b. Income		
	i. Interest, dividends, and other income	$ 89,341	$ 45,452
	ii. Investment expenses	(37,708)	(20,634)
	iii. Net	$ 51,634	$ 24,817
	c. Net realized and unrealized gains (losses)	(228,529)	(104,485)
	d. Total revenue	$ (37,603)	$ (16,109)
3.	Expenditures for the year		
	a. Disbursements		
	i. Refunds	$ 0	$ 0
	ii. Healthcare premium subsidies	134,427	89,320
	iii. Other benefit payments[2]	(6,147)	(778)
	iv. Transfers to other systems	0	0
	v. Total	$ 128,281	$ 88,542
	b. Administrative expenses and depreciation	933	502
	c. Total expenditures	$ 129,214	$ 89,043
4.	Increase in net assets (Item 2. - Item 3.)	$ (166,817)	$ (105,153)
5.	Value of assets at end of year (Item 1. + Item 4.)	$ 3,079,984	$ 1,522,671
6.	Net external cash flow		
	a. Dollar amount	$ 10,078	$ (25,485)
	b. Percentage of market value	0.3%	-1.6%
7.	Estimated annual return on net assets	-5.4%	-4.9%

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

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

Development of Actuarial Value of Assets

Non-Hazardous Members Insurance

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2022
1.	Actuarial value of assets at beginning of year	$	2,947,312
2.	Market value of assets at beginning of year	$	3,246,801
3.	Net new investments		
	a. Contributions	$	139,292
	b. Benefit payments		(128,281)
	c. Administrative expenses		(933)
	d. Subtotal	$	10,078
4.	Market value of assets at end of year	$	3,079,984
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(176,895)
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	203,240
8.	Excess return for phased recognition	$	(380,135)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(380,135)	$	(76,027)
b.	2021		478,981		95,796
c.	2020		(151,527)		(30,305)
d.	2019		(13,849)		(2,770)
e.	2018		63,800		12,760
f.	Total			$	(546)

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	3,160,084
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

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	$	1,475,635
2.	Market value of assets at beginning of year	$	1,627,824
3.	Net new investments		
	a. Contributions	$	63,558
	b. Benefit payments		(88,542)
	c. Administrative expenses		(502)
	d. Subtotal	$	(25,485)
4.	Market value of assets at end of year	$	1,522,671
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	(79,668)
6.	Assumed investment return rate for fiscal year		6.25%
7.	Expected return for immediate recognition	$	100,943
8.	Excess return for phased recognition	$	(180,610)

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2022	$	(180,610)	$	(36,122)
b.	2021		244,967		48,993
c.	2020		(80,794)		(16,159)
d.	2019		(6,320)		(1,264)
e.	2018		36,099		7,220
f.	Total			$	2,668

10.	Actuarial value of assets as of June 30, 2022 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	1,553,761
11.	Ratio of actuarial value to market value		102.0%
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	$ 1,628,244	$ 2,443,894	$ 815,650	66.6%	$ 2,236,277	36.5%
2014	1,831,199	2,616,915	785,716	70.0%	2,272,270	34.6%
2015	1,997,456	2,907,827	910,371	68.7%	2,296,716	39.6%
2016	2,079,811	2,988,121	908,310	69.6%	2,352,762	38.6%
2017	2,227,401	3,355,151	1,127,750	66.4%	2,452,407	46.0%
2018	2,371,430	3,092,624	721,194	76.7%	2,466,801	29.2%
2019	2,523,249	3,567,947	1,044,698	70.7%	2,521,860	41.4%
2020	2,661,351	3,392,085	730,734	78.5%	2,565,391	28.5%
2021	2,947,312	3,450,484	503,172	85.4%	2,528,735	19.9%
2022	3,160,084	2,391,990	(768,094)	132.1%	2,691,171	-28.5%
Hazardous Members						
2013	$ 892,774	$ 1,437,333	$ 544,559	62.1%	$ 461,673	118.0%
2014	997,733	1,493,864	496,131	66.8%	479,164	103.5%
2015	1,087,707	1,504,015	416,308	72.3%	483,641	86.1%
2016	1,135,784	1,558,818	423,034	72.9%	492,851	85.8%
2017	1,196,780	1,788,433	591,653	66.9%	541,633	109.2%
2018	1,256,306	1,684,028	427,722	74.6%	533,618	80.2%
2019	1,313,659	1,732,879	419,220	75.8%	559,353	74.9%
2020	1,362,028	1,740,971	378,943	78.2%	568,558	66.6%
2021	1,475,635	1,751,203	275,568	84.3%	578,355	47.6%
2022	1,553,761	1,538,131	(15,630)	101.0%	620,934	-2.5%
Total CERS Members						
2013	$ 2,521,018	$ 3,881,227	$ 1,360,209	65.0%	$ 2,697,950	50.4%
2014	2,828,932	4,110,779	1,281,847	68.8%	2,751,434	46.6%
2015	3,085,163	4,411,842	1,326,679	69.9%	2,780,357	47.7%
2016	3,215,595	4,546,939	1,331,344	70.7%	2,845,613	46.8%
2017	3,424,181	5,143,584	1,719,403	66.6%	2,994,040	57.4%
2018	3,627,736	4,776,652	1,148,916	75.9%	3,000,419	38.3%
2019	3,836,908	5,300,826	1,463,918	72.4%	3,081,213	47.5%
2020	4,023,379	5,133,056	1,109,677	78.4%	3,133,949	35.4%
2021	4,422,947	5,201,687	778,740	85.0%	3,107,090	25.1%
2022	4,713,845	3,930,121	(783,724)	119.9%	3,312,105	-23.7%

Solvency Test
Insurance Benefits
(Dollar amounts expressed in thousands)

June 30,	Actuarial Accrued Liability: Active Member Contributions	Retired Members & Beneficiaries	Active Members (Employer Financed)	Valuation Assets	Portion of Aggregate Accrued Liabilities Covered by Assets: Active	Retired	ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-Hazardous Members							
2013	$ -	$ 1,205,599	$ 1,238,295	$ 1,628,244	100.0%	100.0%	34.1%
2014	-	1,318,183	1,298,732	1,831,199	100.0%	100.0%	39.5%
2015	-	1,372,597	1,535,231	1,997,456	100.0%	100.0%	40.7%
2016	-	1,484,937	1,503,184	2,079,811	100.0%	100.0%	39.6%
2017	-	1,603,438	1,751,713	2,227,401	100.0%	100.0%	35.6%
2018	-	1,525,323	1,567,301	2,371,430	100.0%	100.0%	54.0%
2019	-	1,830,692	1,737,255	2,523,249	100.0%	100.0%	39.9%
2020	-	1,746,159	1,645,926	2,661,351	100.0%	100.0%	55.6%
2021	-	1,835,734	1,614,750	2,947,312	100.0%	100.0%	68.8%
2022	-	1,055,375	1,336,615	3,160,084	100.0%	100.0%	100.0%
Hazardous Members							
2013	$ -	$ 660,955	$ 776,377	$ 892,774	100.0%	100.0%	29.9%
2014	-	700,312	793,553	997,733	100.0%	100.0%	37.5%
2015	-	790,714	713,301	1,087,707	100.0%	100.0%	41.6%
2016	-	879,360	679,458	1,135,784	100.0%	100.0%	37.7%
2017	-	994,764	793,669	1,196,780	100.0%	100.0%	25.5%
2018	-	1,001,717	682,311	1,256,306	100.0%	100.0%	37.3%
2019	-	1,072,861	660,018	1,313,659	100.0%	100.0%	36.5%
2020	-	1,154,389	586,582	1,362,028	100.0%	100.0%	35.4%
2021	-	1,217,527	533,676	1,475,635	100.0%	100.0%	48.4%
2022	-	1,045,022	493,109	1,553,761	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	$ 7,306,586	$ 7,443,983	$ 468,755	27
June 30, 2020	(43,634)	68,288	5,519	18
June 30, 2021	(333,595)	(314,119)	(24,483)	19
June 30, 2022	327,156	327,156	24,539	20
Total		$ 7,525,308	$ 474,330	
Projected Payroll for FYE 2024			$ 2,744,994	
Amortization Payments as a Percentage of Payroll			17.28%	

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	$ 2,870,259	$ 2,945,823	$ 185,501	27
June 30, 2020	41,583	110,828	8,956	18
June 30, 2021	(57,337)	(16,645)	(1,297)	19
June 30, 2022	32,971	32,971	1,712	20
Total		$ 3,072,977	$ 194,872	
Projected Payroll for FYE 2024			$ 633,353	
Amortization Payments as a Percentage of Payroll			30.77%	

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.

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	$ 1,044,698	$ 1,064,823	$ 67,053	27
June 30, 2020	(332,646)	(336,798)	(27,218)	18
June 30, 2021	(219,172)	(234,885)	(18,307)	19
June 30, 2022	(1,261,234)	(1,261,234)	(103,358)	20
Total		$ (768,094)	$ (81,830)	
Projected Payroll for FYE 2024			$ 2,716,057	
Amortization Payments as a Percentage of Payroll			-3.01%	

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	$ 419,220	$ 422,594	$ 26,611	27
June 30, 2020	(43,079)	(45,965)	(3,715)	18
June 30, 2021	(100,257)	(109,609)	(8,543)	19
June 30, 2022	(282,650)	(282,650)	(23,195)	20
Total		$ (15,630)	$ (8,842)	
Projected Payroll for FYE 2024			$ 629,069	
Amortization Payments as a Percentage of Payroll			-1.41%	

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)

		Non-Hazardous [1] June 30, 2022 (1)	Hazardous June 30, 2022 (2)	Total June 30, 2022 (3)	Total June 30, 2021 (4)
1.	Active members				
a.	Males	28,680	8,212	36,892	36,808
b.	Females	49,169	972	50,141	49,732
c.	Total members	77,849	9,184	87,033	86,540
d.	Total annualized prior year salaries	$ 2,691,171	$ 620,934	$ 3,312,105	$ 3,107,090
e.	Average salary[3]	$ 34,569	$ 67,610	$ 38,056	$ 35,904
f.	Average age	47.6	38.3	46.7	46.9
g.	Average service	9.1	10.0	9.2	9.5
h.	Member contributions with interest	$ 1,335,758	$ 468,325	$ 1,804,083	$ 1,782,217
i.	Average contributions with interest[3]	$ 17,158	$ 50,994	$ 20,729	$ 20,594
2.	Vested inactive members[2]				
a.	Number	50,594	1,816	52,410	52,534
b.	Total annual deferred benefits	$ 84,523	$ 8,468	$ 92,991	$ 91,309
c.	Average annual deferred benefit[3]	$ 1,671	$ 4,663	$ 1,774	$ 1,738
d.	Average age at the valuation date	54.1	46.5	53.8	53.3
3.	Nonvested inactive members[2]				
a.	Number	55,113	2,284	57,397	52,099
b.	Total member contributions with interest	$ 79,181	$ 9,402	$ 88,583	$ 75,178
c.	Average contributions with interest[3]	$ 1,437	$ 4,116	$ 1,543	$ 1,443
4.	Service retirees[1]				
a.	Number	58,631	9,244	67,875	66,069
b.	Total annual benefits	$ 712,071	$ 268,852	$ 980,923	$ 944,293
c.	Average annual benefit[3]	$ 12,145	$ 29,084	$ 14,452	$ 14,293
d.	Average age at the valuation date	71.1	62.7	69.9	69.8
5.	Disabled retirees[1]				
a.	Number	3,857	590	4,447	4,549
b.	Total annual benefits	$ 45,141	$ 10,006	$ 55,147	$ 55,924
c.	Average annual benefit[3]	$ 11,704	$ 16,959	$ 12,401	$ 12,294
d.	Average age at the valuation date	66.9	58.4	65.7	65.3
6.	Beneficiaries[1]				
a.	Number	6,401	1,397	7,798	7,446
b.	Total annual benefits	$ 63,466	$ 23,107	$ 86,573	$ 80,221
c.	Average annual benefit[3]	$ 9,915	$ 16,540	$ 11,102	$ 10,774
d.	Average age at the valuation date	68.5	59.6	66.9	66.8

[1] 3,898 members receiving benefits in both the non-hazardous and hazardous fund. Members' headcounts and hazardous benefits included in the hazardous summary above. Members' additional $29,075,000 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

June 30,	Active Members: Number	Active Members: Percent Increase /(Decrease)	Covered Payroll[1]: Amount in Thousands	Covered Payroll[1]: Percent Increase /(Decrease)	Average Annual Pay: Amount	Average Annual Pay: Percent Increase /(Decrease)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous Members						
2013	81,815		$ 2,236,277		$ 27,333	
2014	81,115	-0.9%	2,272,270	1.6%	28,013	2.5%
2015	80,852	-0.3%	2,296,716	1.1%	28,406	1.4%
2016	80,664	-0.2%	2,352,762	2.4%	29,167	2.7%
2017	82,198	1.9%	2,452,407	4.2%	29,835	2.3%
2018	81,818	-0.5%	2,466,801	0.6%	30,150	1.1%
2019	81,506	-0.4%	2,521,860	2.2%	30,941	2.6%
2020	81,250	-0.3%	2,565,391	1.7%	31,574	2.0%
2021	77,367	-4.8%	2,528,735	-1.4%	32,685	3.5%
2022	77,849	0.6%	2,691,171	6.4%	34,569	5.8%
Hazardous Members						
2013	9,123		$ 461,673		$ 50,605	
2014	9,194	0.8%	479,164	3.8%	52,117	3.0%
2015	9,172	-0.2%	483,641	0.9%	52,730	1.2%
2016	9,084	-1.0%	492,851	1.9%	54,255	2.9%
2017	9,495	4.5%	541,633	9.9%	57,044	5.1%
2018	9,263	-2.4%	533,618	-1.5%	57,607	1.0%
2019	9,474	2.3%	559,353	4.8%	59,041	2.5%
2020	9,419	-0.6%	568,558	1.6%	60,363	2.2%
2021	9,173	-2.6%	578,355	1.7%	63,050	4.5%
2022	9,184	0.1%	620,934	7.4%	67,610	7.2%

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

Distribution of Active Members by Age and by Years of Service

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	269	21	0	0	0	1	0	0	0	0	0	0	291
	$13,852	$19,965	$0	$0	$0	$31,078	$0	$0	$0	$0	$0	$0	$14,352
20-24	1,818	725	339	149	64	13	0	0	0	0	0	0	3,108
	$19,445	$26,189	$29,018	$31,520	$34,243	$33,780	$0	$0	$0	$0	$0	$0	$23,006
25-29	1,541	895	769	602	448	628	11	0	0	0	0	0	4,894
	$23,406	$28,400	$30,701	$32,249	$35,684	$40,885	$46,413	$0	$0	$0	$0	$0	$29,972
30-34	1,513	797	720	705	602	1,654	354	11	1	0	0	0	6,357
	$22,364	$27,524	$30,261	$32,980	$33,755	$39,014	$47,556	$48,973	$19,931	$0	$0	$0	$31,942
35-39	1,218	737	685	703	611	1,875	1,010	400	13	2	0	0	7,254
	$21,542	$28,037	$30,271	$30,970	$31,464	$38,617	$46,286	$52,007	$60,953	$86,446	$0	$0	$34,403
40-44	1,103	695	702	749	651	2,212	1,226	1,072	485	30	1	0	8,926
	$23,305	$28,716	$28,997	$30,626	$32,215	$35,097	$44,392	$49,791	$54,293	$72,655	$114,434	$0	$36,297
45-49	888	584	555	642	575	2,184	1,522	1,324	1,049	299	3	0	9,625
	$25,270	$31,334	$30,020	$31,483	$30,503	$34,664	$40,247	$46,000	$52,741	$63,612	$62,071	$0	$38,187
50-54	833	563	560	580	498	2,190	1,757	1,799	1,507	559	68	2	10,916
	$23,871	$28,727	$30,210	$33,183	$33,321	$34,789	$37,748	$41,225	$47,090	$58,946	$69,968	$91,090	$37,957
55-59	719	472	455	558	431	1,894	1,596	1,865	1,880	685	126	32	10,713
	$23,284	$27,439	$29,044	$32,766	$33,424	$33,970	$36,952	$38,768	$40,356	$49,238	$66,167	$72,255	$36,541
60-64	556	393	376	494	386	1,641	1,335	1,623	1,404	736	129	61	9,134
	$19,712	$25,054	$26,286	$28,264	$29,603	$33,033	$35,438	$37,232	$39,364	$44,080	$54,184	$61,636	$34,649
65 & Over	534	310	346	441	316	1,360	1,159	980	628	332	139	86	6,631
	$16,811	$19,661	$21,606	$24,096	$24,740	$28,229	$31,377	$36,763	$39,179	$44,519	$44,091	$59,055	$30,519
Total	10,992	6,192	5,507	5,623	4,582	15,652	9,970	9,074	6,967	2,643	466	181	77,849
	$21,828	$27,575	$29,141	$31,016	$31,968	$35,111	$38,992	$41,717	$44,377	$51,182	$56,897	$62,613	$34,569

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	10	1	0	0	0	0	0	0	0	0	0	0	11
	$31,344	$57,368	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$33,710
20-24	207	142	102	24	9	2	0	0	0	0	0	0	486
	$35,394	$49,838	$53,874	$59,789	$56,939	$45,119	$0	$0	$0	$0	$0	$0	$45,137
25-29	185	196	225	247	219	304	2	0	0	0	0	0	1,378
	$36,355	$54,080	$55,735	$60,577	$59,938	$62,225	$75,316	$0	$0	$0	$0	$0	$55,894
30-34	117	104	117	145	178	839	178	1	0	0	0	0	1,679
	$37,703	$54,043	$51,793	$58,284	$61,133	$65,756	$73,088	$66,962	$0	$0	$0	$0	$61,745
35-39	63	66	68	73	69	535	641	244	1	0	0	0	1,760
	$37,613	$51,248	$54,042	$58,096	$61,102	$67,592	$74,635	$79,119	$113,235	$0	$0	$0	$68,923
40-44	21	23	33	26	30	223	361	641	136	12	0	0	1,506
	$35,509	$50,201	$54,089	$55,323	$55,718	$65,568	$75,413	$81,159	$87,765	$110,477	$0	$0	$75,648
45-49	18	22	22	23	16	97	191	392	234	61	3	0	1,079
	$37,832	$50,289	$59,353	$55,686	$54,224	$62,456	$70,828	$81,041	$91,045	$94,933	$130,079	$0	$77,925
50-54	14	10	11	12	11	82	120	235	159	85	11	1	751
	$44,692	$57,716	$58,551	$62,875	$61,098	$61,909	$72,243	$76,231	$86,511	$103,011	$129,098	$133,912	$78,560
55-59	10	3	3	6	7	38	64	109	57	30	9	3	339
	$34,943	$106,481	$57,230	$60,852	$51,221	$56,585	$74,238	$77,383	$83,877	$89,971	$126,360	$102,981	$76,185
60-64	1	4	1	6	5	13	30	48	14	6	5	4	137
	$29,016	$45,930	$51,236	$61,007	$50,623	$61,108	$67,409	$71,482	$71,633	$81,168	$95,228	$131,532	$70,241
65 & Over	0	2	0	2	2	4	13	17	9	6	0	3	58
	$0	$38,847	$0	$53,312	$51,283	$67,158	$55,460	$67,980	$101,245	$95,282	$0	$86,322	$71,966
Total	646	573	582	564	546	2,137	1,600	1,687	610	200	28	11	9,184
	$36,497	$52,628	$54,515	$59,222	$59,820	$65,188	$73,698	$79,489	$88,204	$98,152	$122,275	$111,632	$67,610

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	268	$ 5,859	121	$ 1,383	737	$ 6,287	1,126	$ 13,530
50 - 54	1,200	24,768	260	3,445	287	2,665	1,747	30,877
55 - 59	3,848	67,763	442	5,792	424	4,391	4,714	77,946
60 - 64	8,426	124,471	825	10,541	720	8,447	9,971	143,458
65 - 69	13,616	171,505	848	9,848	856	9,034	15,320	190,387
70 - 74	13,356	150,903	656	7,338	1,079	11,214	15,091	169,455
75 - 79	9,025	89,435	393	4,009	890	9,165	10,308	102,609
80 - 84	5,336	49,242	220	2,044	724	7,000	6,280	58,286
85 - 89	2,535	20,691	71	603	444	3,624	3,050	24,918
90 And Over	1,021	7,433	21	139	240	1,639	1,282	9,211
Total	**58,631**	**$ 712,071**	**3,857**	**$ 45,141**	**6,401**	**$ 63,466**	**68,889**	**$ 820,678**

*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	980	$ 34,769	119	$ 2,122	317	$ 3,412	1,416	$ 40,303
50 - 54	1,398	47,480	117	2,118	101	1,653	1,616	51,251
55 - 59	1,616	51,788	103	1,916	119	2,250	1,838	55,954
60 - 64	1,406	39,977	87	1,447	148	2,588	1,641	44,013
65 - 69	1,504	39,468	85	1,248	205	3,771	1,794	44,488
70 - 74	1,262	31,953	53	770	191	3,728	1,506	36,451
75 - 79	663	14,523	21	325	154	3,030	838	17,878
80 - 84	294	6,239	1	7	93	1,670	388	7,916
85 - 89	103	2,156	4	52	52	777	159	2,985
90 And Over	18	500	0	0	17	227	35	727
Total	**9,244**	**$ 268,852**	**590**	**$ 10,006**	**1,397**	**$ 23,107**	**11,231**	**$ 301,966**

*Amounts may not add due to rounding

Non-Hazardous Retired Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	6,380	$	6,956,709	24,246	$	18,721,063	30,626	$	25,677,773
Joint & Survivor:									
100% to Beneficiary	4,342		5,274,727	2,939		2,036,727	7,281		7,311,454
66 2/3% to Beneficiary	904		1,751,599	830		916,976	1,734		2,668,575
50% to Beneficiary	1,268		2,136,001	2,025		2,381,228	3,293		4,517,229
Pop-up Option	4,308		7,171,814	4,482		4,868,696	8,790		12,040,511
Social Security Option:									
Age 62 Basic	236		419,442	555		652,016	791		1,071,458
Age 62 Survivorship	571		1,052,585	382		407,060	953		1,459,645
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	0		0	0		0	0		0
10 Years Certain & Life	1,529		1,781,698	4,102		3,375,199	5,631		5,156,897
15 Years Certain & Life	716		798,339	1,199		922,149	1,915		1,720,488
20 Years Certain & Life	515		734,693	959		742,309	1,474		1,477,002
Total:	20,769	$	28,077,607	41,719	$	35,023,424	62,488	$	63,101,031

Hazardous Retired Lives Summary

Form of Payment	Male Lives Number	Male Lives Monthly Benefit Amount	Female Lives Number	Female Lives Monthly Benefit Amount	Total Number	Total Monthly Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Basic	1,389	$ 2,932,018	438	$ 728,122	1,827	$ 3,660,140
Joint & Survivor:						
100% to Beneficiary	1,526	3,368,914	79	117,978	1,605	3,486,892
66 2/3% to Beneficiary	389	1,007,343	28	69,585	417	1,076,928
50% to Beneficiary	569	1,464,833	66	151,456	635	1,616,289
Pop-up Option	3,825	10,201,631	188	425,703	4,013	10,627,334
Social Security Option:						
Age 62 Basic	109	165,153	13	14,217	122	179,370
Age 62 Survivorship	304	549,572	24	43,587	328	593,160
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	121	366,561	5	12,118	126	378,679
10 Years Certain & Life	270	593,040	76	145,334	346	738,374
15 Years Certain & Life	133	276,389	25	52,480	158	328,869
20 Years Certain & Life	222	495,434	35	56,760	257	552,193
Total:	8,857	$ 21,420,889	977	$ 1,817,340	9,834	$ 23,238,228

Non-Hazardous Beneficiary Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	32	$	11,375	65	$	60,755	97	$	72,130
Joint & Survivor:									
100% to Beneficiary	582		362,055	2,127		1,600,145	2,709		1,962,200
66 2/3% to Beneficiary	89		52,664	303		265,271	392		317,935
50% to Beneficiary	209		97,093	438		261,285	647		358,378
Pop-up Option	295		273,632	1,039		1,184,312	1,334		1,457,944
Social Security Option:									
Age 62 Basic	1		1,291	5		4,806	6		6,097
Age 62 Survivorship	34		24,519	182		222,505	216		247,025
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	107		110,194	117		112,787	224		222,981
10 Years Certain	151		92,284	184		156,164	335		248,448
10 Years Certain & Life	72		55,545	98		90,509	170		146,054
15 Years Certain & Life	46		37,362	98		88,379	144		125,741
20 Years Certain & Life	46		29,213	81		94,675	127		123,888
Total:	1,664	$	1,147,229	4,737	$	4,141,593	6,401	$	5,288,822

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	16	$	9,332	90	$	103,928	106	$	113,260
Joint & Survivor:									
100% to Beneficiary	32		26,296	369		487,638	401		513,934
66 2/3% to Beneficiary	2		1,688	69		107,309	71		108,997
50% to Beneficiary	16		13,165	122		118,572	138		131,737
Pop-up Option	49		32,437	413		753,015	462		785,453
Social Security Option:									
Age 62 Basic	0		0	2		1,641	2		1,641
Age 62 Survivorship	0		0	113		153,825	113		153,825
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	2		1,469	2		1,469
5 Years Certain	7		11,404	7		11,764	14		23,168
10 Years Certain	14		17,953	26		26,670	40		44,623
10 Years Certain & Life	3		6,860	9		7,538	12		14,398
15 Years Certain & Life	6		5,127	7		7,842	13		12,969
20 Years Certain & Life	5		3,088	18		17,016	23		20,103
Total:	150	$	127,350	1,247	$	1,798,227	1,397	$	1,925,577

Schedule of Retirees Added to And Removed from Rolls

(Dollar amounts except average allowance expressed in thousands)

Year Ended	Added to Rolls	Removed from Rolls	Rolls End of the Year		% Increase in Annual Benefit	Average Annual Benefit
	Number	Number	Number	Annual Benefits		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous						
2013	3,570	1,198	47,676	$ 557,979		$ 11,704
2014	3,480	1,221	49,935	582,958	4.5%	11,674
2015	4,020	1,304	52,651	617,551	5.9%	11,729
2016	4,409	721	56,339	661,217	7.1%	11,736
2017	4,141	1,467	59,013	667,468	0.9%	11,311
2018	4,650	1,725	61,938	710,374	6.4%	11,469
2019	4,472	1,871	64,539	747,117	5.2%	11,576
2020	3,550	2,675	65,414	763,459	2.2%	11,671
2021	4,350	2,558	67,206	791,562	3.7%	11,778
2022	4,693	3,010	68,889	820,678	3.7%	11,913
Hazardous						
2013	519	104	7,293	$ 182,635		$ 25,042
2014	469	116	7,646	191,008	4.6%	24,981
2015	526	138	8,034	202,153	5.8%	25,162
2016	604	75	8,563	215,302	6.5%	25,143
2017	576	141	8,998	226,680	5.3%	25,192
2018	779	190	9,587	245,675	8.4%	25,626
2019	608	172	10,023	258,813	5.3%	25,822
2020	621	192	10,452	274,791	6.2%	26,291
2021	651	245	10,858	288,876	5.1%	26,605
2022	674	301	11,231	301,966	4.5%	26,887

SECTION 6

ASSESSMENT AND DISCLOSURE OF RISK

Risks Associated with Measuring the Accrued Liability And Actuarially Determined Contribution

(As Required by ASOP No. 51)

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

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

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

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

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

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

Employer Risk with Contribution Rates

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

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

Plan Specific Risk Measures

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

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

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

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

CERS Non-Hazardous

	Retirement Fund					Insurance Fund				
	June 30,					June 30,				
	2022	2021	2020	2019	2018	2022	2021	2020	2019	2018
Ratio of the market value of assets to total payroll	2.96	3.39	2.74	2.84	2.85	1.14	1.28	1.01	1.02	0.98
Ratio of actuarial accrued liability to payroll	5.82	5.89	5.70	5.69	5.35	0.89	1.36	1.32	1.41	1.25
Ratio of net cash flow to market value of assets	-1.3%	-2.9%	-2.7%	-3.5%	-3.5%	0.3%	0.8%	0.1%	0.7%	0.0%
Percentage of Expected Contribution Actually Received	99% [1]	76%	82%	72%	96%	110% [1]	88%	102%	87%	101%
Ratio of actives to retirees and beneficiaries	1.13	1.15	1.24	1.26	1.32					

[1] Expected contribution for FYE 2022 based on the actuarially determined contribution rate of 28.05% from the June 30, 2020 valuation and expected compensation based on census data from the June 30, 2021 valuation.

CERS 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	4.38	5.04	4.19	4.32	4.40	2.45	2.81	2.32	2.40	2.40
Ratio of actuarial accrued liability to payroll	9.44	9.73	9.55	9.38	8.98	2.48	3.03	3.06	3.10	3.16
Ratio of net cash flow to market value of assets	-0.8%	-2.3%	-2.1%	-2.8%	-2.7%	-1.6%	-1.4%	-1.6%	-1.0%	-1.4%
Percentage of Expected Contribution Actually Received	87% [1]	71%	80%	71%	100%	113% [1]	102%	104%	92%	104%
Ratio of actives to retirees and beneficiaries	0.82	0.84	0.90	0.95	0.97					

[1] Expected contribution for FYE2022 based on the actuarially determined contribution rate of 51.96% 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 County Employees Retirement System.

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

Investment return rate:

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

Price Inflation:

Assumed annual rate of 2.30%

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

Assumed annual rate of 2.00%

Rates of Annual Salary Increase:

Assumed rates of annual salary increases are shown below.

Service Years	Annual Rates of Salary Increase					
	Merit & seniority		Price Inflation & Productivity		Total Increase	
	Non-Hazardous	Hazardous	Non-Hazardous	Hazardous	Non-Hazardous	Hazardous
0	7.00%	15.50%	3.30%	3.55%	10.30%	19.05%
1	4.00%	4.00%	3.30%	3.55%	7.30%	7.55%
2	3.00%	2.00%	3.30%	3.55%	6.30%	5.55%
3	1.50%	1.25%	3.30%	3.55%	4.80%	4.80%
4	1.25%	1.00%	3.30%	3.55%	4.55%	4.55%
5	1.25%	1.00%	3.30%	3.55%	4.55%	4.55%
6	1.00%	1.00%	3.30%	3.55%	4.30%	4.55%
7	1.00%	0.50%	3.30%	3.55%	4.30%	4.05%
8	0.75%	0.50%	3.30%	3.55%	4.05%	4.05%
9	0.75%	0.00%	3.30%	3.55%	4.05%	3.55%
10	0.50%	0.00%	3.30%	3.55%	3.80%	3.55%
11	0.50%	0.00%	3.30%	3.55%	3.80%	3.55%
12	0.25%	0.00%	3.30%	3.55%	3.55%	3.55%
13	0.25%	0.00%	3.30%	3.55%	3.55%	3.55%
14	0.25%	0.00%	3.30%	3.55%	3.55%	3.55%
15 & Over	0.00%	0.00%	3.30%	3.55%	3.30%	3.55%

Retirement rates:

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

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

[1] The annual rate of retirement is 11% for male members and 12% for female members with 25-26 years of service.
[2] The annual rate of retirement is 100% at age 62.
[3] The annual rate of retirement is 100% at age 60.
Non-Hazardous System: For members hired after 7/1/2003, the rates shown above are multiplied by 80% if he member is under age 65 to reflect the different retiree health insurance benefit.
Hazardous System: For members hired after 7/1/2003 and prior to 9/1/2008, the rates shown above are multiplied by 80% if the member is under age 62 to reflect the different retiree health insurance benefit.

Disability rates:

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

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

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

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

Service Years	Annual Rates of Withdrawal	
	Non-Hazardous	Hazardous
1	20.00%	20.00%
2	15.58%	9.11%
3	12.48%	7.24%
4	10.66%	6.14%
5	9.37%	5.37%
6	8.37%	4.76%
7	7.56%	4.27%
8	6.87%	3.85%
9	6.27%	3.49%
10	5.74%	3.18%
11	5.27%	2.89%
12	4.84%	2.63%
13	4.45%	2.40%
14	4.09%	2.18%
15	3.76%	1.98%
16	3.45%	1.80%
17	3.16%	1.62%
18	2.89%	1.46%
19	2.64%	1.30%
20	2.39%	1.16%
21	2.16%	0.00%
22	1.94%	0.00%
23	1.74%	0.00%
24	1.54%	0.00%
25	1.35%	0.00%
26 & Over	0.00%	0.00%

Mortality Assumption:

Pre-retirement mortality: PUB-2010 General Mortality table, for the Non-Hazardous System, and the PUB-2010 Public Safety Mortality table for the Hazardous System, projected with the ultimate rates from the MP-2014 mortality improvement scale using a base year of 2010.

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

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

Life Expectancy for an Age 65 Retiree in Years					
Gender	**Year of Retirement**				
	2020	**2025**	**2030**	**2035**	**2040**
Male	21.0	21.4	21.8	22.2	22.6
Female	24.0	24.4	24.8	25.2	25.6

Post-retirement mortality (disabled): PUB-2010 Disabled Mortality table, with a 4-year set-forward for both male and female rates, projected with the ultimate rates from the MP-2014 mortality improvement scale using a base year of 2010.

Marital status:

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

Line of Duty/Duty-Related Disability

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

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

Line of Duty Death

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

Dependent Children:

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

Form of Payment:

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

Actuarial Cost Method:

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

Health Care Age Related Morbidity/Claims Utilization:

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

Health Care Cost Trend Rates:

Year	Non-Medicare Plans[1]	Medicare Plans[1]	Dollar Contribution[2]
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.

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

Other Assumptions

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

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

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

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

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

6. There will be no recoveries once disabled.

7. Cash Balance Provisions: The cash balance interest crediting rate while a member is an active employee is assumed to equal 5.6875% (based upon the 6.25% assumed investment return). The interest crediting rate after a member terminates employment is 4%.

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

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

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

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

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

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 herein.

Piotr Krekora, ASA, EA, MAAA

APPENDIX B

BENEFIT PROVISIONS

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

CERS Non-Hazardous Employees

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

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

CERS Non-Hazardous Employees (continued)

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

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

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

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

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

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

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

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

CERS Non-Hazardous Employees (continued)

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

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

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

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

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

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

Disability Retirement: Participation before 8/1/2004

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

CERS Non-Hazardous Employees (continued)

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

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

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

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

Duty-Related Disability Benefit

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

Pre-Retirement Death Benefit

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

CERS Non-Hazardous Employees (continued)

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

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

Post-Retirement Death Benefit

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

Member Contributions

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

Changes in Non-Hazardous Retirement Benefits since the Prior Valuation

None.

CERS Hazardous Employees

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

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

CERS Hazardous Employees (continued)

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

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

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

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

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

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

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

CERS Hazardous Employees (continued)

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

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

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

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

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

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

Disability Retirement: Participation before 8/1/2004

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

CERS Hazardous Employees (continued)

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

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

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

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

Line of Duty Disability Benefit

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

Pre-Retirement Death Benefit

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

CERS Hazardous Employees (continued)

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

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

Post-Retirement Death Benefit

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

Member Contributions

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

Changes in Hazardous Retirement Benefits 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 specified in State statute. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on a statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: Governmental Accounting Standards Board.

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

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

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

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

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

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

P: 469.524.0000 | www.grsconsulting.com

December 5, 2022

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

Re: Sensitivity Analysis Based on Results of the June 30, 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 **County Employees Retirement System (CERS)** due to changes in the investment return assumption, the inflation rate assumption, and the payroll growth rate assumption.

Background

Investment Assumption

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

Inflation Assumption

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

Payroll Growth Assumption

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

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

Certification

The information provided in this letter compliments the information provided in the June 30, 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	2.00%	2.00%	2.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	6.25%	7.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 17,539,982	$ 15,674,220	$ 14,127,391
Actuarial Value of Assets	8,148,912	8,148,912	8,148,912
Unfunded Actuarial Accrued Liability	9,391,070	7,525,308	5,978,479
Funded Ratio	46.5%	52.0%	57.7%
Actuarially Determined Contribution Rate	29.11%	23.34%	18.47%
Insurance			
Actuarial Accrued Liability	$ 2,718,439	$ 2,391,990	$ 2,123,373
Actuarial Value of Assets	3,160,084	3,160,084	3,160,084
Unfunded Actuarial Accrued Liability	(441,645)	(768,094)	(1,036,711)
Funded Ratio	116.2%	132.1%	148.8%
Actuarially Determined Contribution Rate	1.04%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 20,258,421	$ 18,066,210	$ 16,250,764
Actuarial Value of Assets	11,308,996	11,308,996	11,308,996
Unfunded Actuarial Accrued Liability	8,949,425	6,757,214	4,941,768
Funded Ratio	55.8%	62.6%	69.6%
Actuarially Determined Contribution Rate	30.15%	23.34%	18.47%

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	1.75%	2.00%	2.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	6.00%	6.25%	6.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 16,068,086	$ 15,674,220	$ 15,298,648
Actuarial Value of Assets	8,148,912	8,148,912	8,148,912
Unfunded Actuarial Accrued Liability	7,919,174	7,525,308	7,149,736
Funded Ratio	50.7%	52.0%	53.3%
Actuarially Determined Contribution Rate	24.86%	23.34%	21.90%
Insurance			
Actuarial Accrued Liability	$ 2,407,260	$ 2,391,990	$ 2,378,335
Actuarial Value of Assets	3,160,084	3,160,084	3,160,084
Unfunded Actuarial Accrued Liability	(752,824)	(768,094)	(781,749)
Funded Ratio	131.3%	132.1%	132.9%
Actuarially Determined Contribution Rate	0.00%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 18,475,346	$ 18,066,210	$ 17,676,983
Actuarial Value of Assets	11,308,996	11,308,996	11,308,996
Unfunded Actuarial Accrued Liability	7,166,350	6,757,214	6,367,987
Funded Ratio	61.2%	62.6%	64.0%
Actuarially Determined Contribution Rate	24.86%	23.34%	21.90%

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

(1)	Decrease Payroll Growth (2)	Valuation Results (3)	Increase Payroll Growth (4)
Payroll Growth Rate	1.00%	2.00%	3.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	6.25%	6.25%	6.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 15,674,220	$ 15,674,220	$ 15,674,220
Actuarial Value of Assets	8,148,912	8,148,912	8,148,912
Unfunded Actuarial Accrued Liability	7,525,308	7,525,308	7,525,308
Funded Ratio	52.0%	52.0%	52.0%
Actuarially Determined Contribution Rate	25.31%	23.34%	21.51%
Insurance			
Actuarial Accrued Liability	$ 2,391,990	$ 2,391,990	$ 2,391,990
Actuarial Value of Assets	3,160,084	3,160,084	3,160,084
Unfunded Actuarial Accrued Liability	(768,094)	(768,094)	(768,094)
Funded Ratio	132.1%	132.1%	132.1%
Actuarially Determined Contribution Rate	0.00%	0.00%	0.00%
Combined			
Actuarial Accrued Liability	$ 18,066,210	$ 18,066,210	$ 18,066,210
Actuarial Value of Assets	11,308,996	11,308,996	11,308,996
Unfunded Actuarial Accrued Liability	6,757,214	6,757,214	6,757,214
Funded Ratio	62.6%	62.6%	62.6%
Actuarially Determined Contribution Rate	25.31%	23.34%	21.51%

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	2.00%	2.00%	2.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	6.25%	7.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 6,629,771	$ 5,861,691	$ 5,236,943
Actuarial Value of Assets	2,788,714	2,788,714	2,788,714
Unfunded Actuarial Accrued Liability	3,841,057	3,072,977	2,448,229
Funded Ratio	42.1%	47.6%	53.3%
Actuarially Determined Contribution Rate	51.57%	41.11%	32.42%
Insurance			
Actuarial Accrued Liability	$ 1,717,230	$ 1,538,131	$ 1,389,908
Actuarial Value of Assets	1,553,761	1,553,761	1,553,761
Unfunded Actuarial Accrued Liability	163,469	(15,630)	(163,853)
Funded Ratio	90.5%	101.0%	111.8%
Actuarially Determined Contribution Rate	6.08%	2.58%	0.00%
Combined			
Actuarial Accrued Liability	$ 8,347,001	$ 7,399,822	$ 6,626,851
Actuarial Value of Assets	4,342,475	4,342,475	4,342,475
Unfunded Actuarial Accrued Liability	4,004,526	3,057,347	2,284,376
Funded Ratio	52.0%	58.7%	65.5%
Actuarially Determined Contribution Rate	57.65%	43.69%	32.42%

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

	Decrease Inflation Rate	Valuation Results	Increase Inflation Rate
(1)	(2)	(3)	(4)
Payroll Growth Rate	1.75%	2.00%	2.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	6.00%	6.25%	6.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 6,023,051	$ 5,861,691	$ 5,708,052
Actuarial Value of Assets	2,788,714	2,788,714	2,788,714
Unfunded Actuarial Accrued Liability	3,234,337	3,072,977	2,919,338
Funded Ratio	46.3%	47.6%	48.9%
Actuarially Determined Contribution Rate	43.80%	41.11%	38.56%
Insurance			
Actuarial Accrued Liability	$ 1,550,940	$ 1,538,131	$ 1,526,161
Actuarial Value of Assets	1,553,761	1,553,761	1,553,761
Unfunded Actuarial Accrued Liability	(2,821)	(15,630)	(27,600)
Funded Ratio	100.2%	101.0%	101.8%
Actuarially Determined Contribution Rate	2.92%	2.58%	2.27%
Combined			
Actuarial Accrued Liability	$ 7,573,991	$ 7,399,822	$ 7,234,213
Actuarial Value of Assets	4,342,475	4,342,475	4,342,475
Unfunded Actuarial Accrued Liability	3,231,516	3,057,347	2,891,738
Funded Ratio	57.3%	58.7%	60.0%
Actuarially Determined Contribution Rate	46.72%	43.69%	40.83%

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

(1)	Decrease Payroll Growth (2)	Valuation Results (3)	Increase Payroll Growth (4)
Payroll Growth Rate	1.00%	2.00%	3.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	6.25%	6.25%	6.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 5,861,691	$ 5,861,691	$ 5,861,691
Actuarial Value of Assets	2,788,714	2,788,714	2,788,714
Unfunded Actuarial Accrued Liability	3,072,977	3,072,977	3,072,977
Funded Ratio	47.6%	47.6%	47.6%
Actuarially Determined Contribution Rate	44.58%	41.11%	37.88%
Insurance			
Actuarial Accrued Liability	$ 1,538,131	$ 1,538,131	$ 1,538,131
Actuarial Value of Assets	1,553,761	1,553,761	1,553,761
Unfunded Actuarial Accrued Liability	(15,630)	(15,630)	(15,630)
Funded Ratio	101.0%	101.0%	101.0%
Actuarially Determined Contribution Rate	2.58%	2.58%	2.60%
Combined			
Actuarial Accrued Liability	$ 7,399,822	$ 7,399,822	$ 7,399,822
Actuarial Value of Assets	4,342,475	4,342,475	4,342,475
Unfunded Actuarial Accrued Liability	3,057,347	3,057,347	3,057,347
Funded Ratio	58.7%	58.7%	58.7%
Actuarially Determined Contribution Rate	47.16%	43.69%	40.48%