KENTUCKY RETIREMENT SYSTEMS
BOARD OF TRUSTEES
REGULAR QUARTERLY MEETING
DECEMBER 7, 2017 AT 10:00 A.M., ET
1270 LOUISVILLE ROAD, FRANKFORT, KENTUCKY 40601

1. Roll Call
2. Approval of Minutes – November 13, 2017*
3. Public Comment
4. Actuarial Valuations- GRS/KRS
   - Approval of GRS Actuarial Valuations for Year Ending June 30, 2017*
   - Fiscal Year 2019 Contribution Rates for CERS HAZ and CERS Non-HAZ*
   - Recommended Bi-annum Budget Contribution Rates – KERS and SPRS*
5. Retiree Health Care Committee Report- Mr. Vince Lang
   - Humana Medicare Eligible Plan Pharmacy Formulary Review Highlights
   - Medicare Secondary Payer Act*
6. Audit Committee Report- Mr. John Chilton/ Ms. Karen Roggenkamp
   - Approval of Audited Financial Statements for Year Ending June 30, 2017*
   - Comprehensive Annual Report (CAFR) for Year Ending June 30, 2017*
   - Approval of Hazardous Duty Positions*
   - Informational Reports:
     - Quarterly Financial Statements as of September 30, 2017 (unaudited)
     - Net Position Cash Flows (KERS Non-HAZ, CERS Non-HAZ, and SPRS)
     - KRS Administrative Expenses
7. Board Educational Requirements- Mr. David Eager*
8. Investment Committee and Investment Portfolio Quarterly Report- Mr. David Harris
9. Legislative Issues Update-Mr. David Eager / Joe Bowman
10. KRS Retirement Trends/Informational Update-Mr. David Eager
11. Pending Litigation (Closed Session)
12. Adjourn

**Board Action required*

MINUTES OF MEETING #413
BOARD OF TRUSTEES KENTUCKY RETIREMENT SYSTEMS
MEETING NOVEMBER 13, 2017 AT 10:00A.M.
1270 LOUISVILLE ROAD, FRANKFORT, KENTUCKY 40601

At the Meeting of the Board of Trustees held on November 13, 2017, the following members were present: John Farris (Chair), John Chilton, William Cook, Thomas Elliott (non-voting), Kelly Downard, JT Fulkerson, David Gallagher, David Harris, Vince Lang, Matthew Monteiro, Keith Peercy, Betty Pendergrass, Mary Helen Peter, Jerry Powell, Neil Ramsey, David Rich, and Secretary Thomas Stephens. Staff members present were David Eager, Karen Roggenkamp, Erin Surratt, Rich Robben, Connie Davis, Connie Pettyjohn, Shawn Sparks, Katherine Rupinen, Joseph Bowman, Shaun Case, Ann Case, Brian Huffman, and Alane Foley. Also present were Larry Totten, Tammy Godbey, Eric Kennedy, Rebecca Heckler, Bo Cracraft, Tom Loftus, Michele Hill, Adam Beam, John Cheves, Jacqueline Pitts, Shellie Hampton, Alfred Miller, Steve Starkweather, Fred Nett and Rose Nett. Danny White, Janie Shaw and Joe Newton were present from GRS.

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Ms. Alane Foley called roll.

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Mr. Farris introduced the agenda item *Introduction and Swearing in of New Trustee*. Ms. Foley, as Notary, administered the Oath of Office to Mr. David Rich.

***

Mr. Farris introduced agenda item *Approval of Minutes – September14, 2017.* Mr. Lang moved and was seconded by Ms. Peter to approve the minutes after the following corrections were made: Mr. Kelly Downard needs to be listed as present at the September 14, 2017 meeting and Mr. Vince Lang made the motion to approve the Hazard Position requests, not Mr. Thomas Elliott. The corrections were made and the motion passed unanimously.

***

Mr. Farris introduced the agenda item *Actuarial Valuation for year end June 30, 2017.* Mr. Danny White, Ms. Janie Shaw and Mr. Joe Newton from GRS provided a detailed overview on the valuations for all plans. The Board had a lengthy discussion regarding the valuations presented. This was provided for informational purposes only.

***

Mr. Farris introduced agenda item *Actuarial Analysis of Pension Reform Bill.* Mr. John Chilton updated the Board on the Pension Reform Bill. This was for informational purposes only.

***

Mr. Farris introduced agenda item *Other Business- David Eager*. Mr. David Eager and Mr. Joseph Bowman provided an update to the Board regarding the 2017 Senate Bill 104 modifications to existing pension spiking law requiring amendments to administrative regulation 105 KAR 1:140. This was provided for informational purposes only.

Mr. David Eager updated the Board on retirements, Board training and KRS internal staffing.

***

There being no further business, the meeting adjourned at 11:05 a.m. to meet on December 07, 2017 or upon the call of the Interim Executive Director or the Chair of the Board of Trustees.

***

Copies of all documents presented are incorporated as part of the Minutes of the Board of Trustees as of November 13, 2017.

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CERTIFICATION

I do certify that I was present at this meeting, and I have recorded the above actions of the Directors on the various items considered by it at this meeting. Further, I certify that all requirements of KRS 61.805-61.850 were met in conjunction with this meeting.

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Recording Secretary

We, the Chair of the Board of Directors of the Kentucky Retirement Systems and Executive Director of the Kentucky Retirement Systems, do certify that the Minutes of Meeting Number 413, held on November 13, 2017, were approved on December 07, 2017.

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Chair of the Board of Directors

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Interim Executive Director

I have reviewed the Minutes of the November 13, 2017 Board of Trustees Meeting for content, form, and legality.

____

Executive Director
Office of Legal Services

KENTUCKY RETIREMENT SYSTEMS

David L. Eager, Interim Executive Director

Perimeter Park West • 1260 Louisville Road • Frankfort, Kentucky 40601

kyret.ky.gov • Phone: 502-696-8800 • Fax: 502-696-8822

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MEMORANDUM

Date: December 7, 2017

To: KRS Board of Trustees

From: Karen Roggenkamp
Executive Director, Office of Operations

Re: **Actuarial Information**

Danny White, Joe Newton, and Janie Shaw from GRS Retirement Consulting were at the November 13, 2017 Board meeting. They presented an overview of the 2017 Pension and Insurance valuations by Plan. Based on questions and feedback from the Board, GRS has provided updated information for the Board meeting. To assist in your review, below is a summary of changes from November 13:

Executive Summary:

1. Added schedule of expected Employer Contributions (in Millions) by plan.
2. Included Projection Information Charts for the Health Funds.

Valuations:

1. Added clarification language to KERS and SPRS in valuation summary regarding level dollar funding related to payroll growth assumption.
2. Removed "DRAFT" from valuations. GRS considers these final.
3. Completed sensitivity analysis schedules by Plan.
4. Provided a schedule of twenty (20) year projections as required by KRS 61.670 (1) (b).

Mr. White and Ms. Shaw will be joining the meeting by video conference to briefly comment on these updates and answer any additional questions.

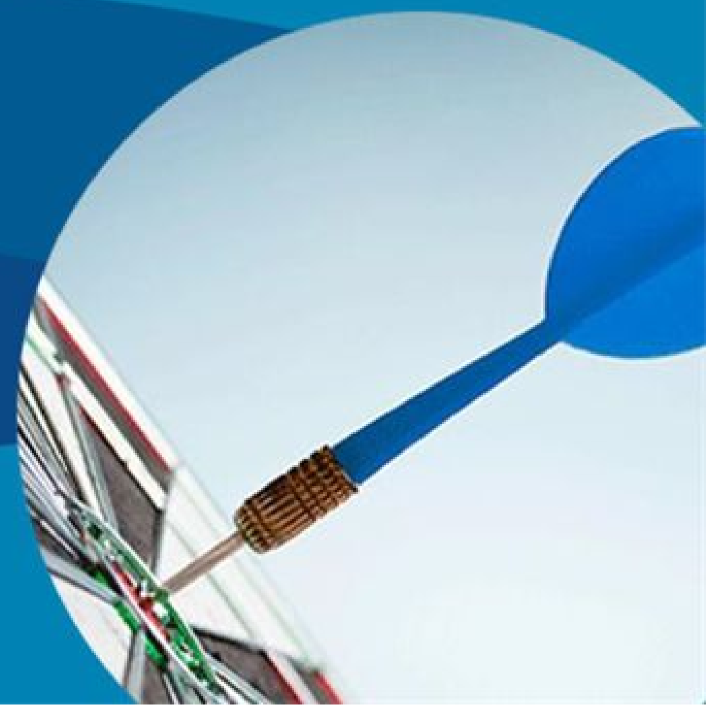
GRS Retirement Consulting

Kentucky Retirement Systems

2017 Actuarial Valuation Results

December 7, 2017

Joe Newton, FSA, EA, MAAA
Janie Shaw, ASA, MAAA
Danny White, FSA, EA, MAAA



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Agenda

- Summary of Valuation Results
  - Comments on valuation results
  - Contribution rates
  - Funded status
- Projection Information for Pension Funds
  - Unfunded liability and funded ratio
  - Contribution dollars and rate of pay
- Closing Remarks

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Comments on Valuation Results

- Imperative for the employer contribution rate for the KERS Non-Hazardous Retirement Fund to increase to the amount disclosed in the 2017 valuation report.
- Current assets cover two years of benefit payments
  - June 30, 2017 assets were $2,057 million (excluding the 401(h) assets)
  - Benefit payments for the 2017 fiscal year were $960 million
- Contribution rate for the 2019 fiscal year is expected to result in the fund being external cash flow positive (*slightly*)
  - Total Projected member and employer contributions are $1,164 million for the 2019 fiscal year.

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Comments on Valuation Results (continued)

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- There were no benefit changes since the prior valuation
- The 2017 valuation based on updated economic assumptions (inflation, investment return, and payroll growth rate)
  - Comparison to the prior year is difficult for certain measures
- Investment return was 12.9% to 13.8% (return varies by fund)
  - $887 million more in plan assets than expected (all funds combined)
  - Recognized in the contribution rates over the next five-years

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Comments on Valuation Results (continued)

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- Covered payroll for the KERS Hazardous and CERS Hazardous systems increase by approximately 10% and SPRS increased by 6.6%
  - Resulted in some larger than expected liability increases, but also lowered the contribution rate (expressed as a percentage of payroll)
- Health insurance premiums for 2018 were lower than expected
  - resulting in liability gains and slightly lower than forecasted contribution rates

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Employer Contribution Rates (%) – Comparison to the FY 2019 Budget

4.1

	2017 Valuation Effective for FY 2018/2019			FY 2018/2019 Budget Forecast[1]		
Item	Pension	Insurance	Combined	Pension	Insurance	Combined
(1)	(2)	(3)	(4)	(5)	(6)	(7)
KERS Non-Hazardous	71.03%	12.40%	**83.43%**	70.68%	13.38%	**84.06%**
KERS Hazardous	34.39%	2.46%	**36.85%**	36.52%	4.60%	**41.12%**
CERS Non-Hazardous	21.84%	6.21%	**28.05%**	21.82%	7.04%	**28.86%**
CERS Hazardous	35.69%	12.17%	**47.86%**	35.76%	14.91%	**50.67%**
SPRS	119.05%	27.23%	**146.28%**	119.95%	34.15%	**154.10%**

[1] Letters dated August 11 and August 23.

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Employer Contribution Requirements ($ in Millions) – Compared to FY 2019 Budget

4.1

Item	2017 Valuation Effective for FY 2018/2019			FY 2018/2019 Budget Forecast[1]			
	Pension	Insurance	Combined	Pension	Insurance	Combined	Increase (4) – (7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
KERS Non-Hazardous	$1,101	$191	**$1,292**	$1,081	$204	**$1,285**	**$7**
KERS Hazardous	57	4	**61**	54	7	**61**	**0**
CERS Non-Hazardous	546	154	**700**	524	169	**693**	**7**
CERS Hazardous	192	65	**257**	180	75	**255**	**2**
SPRS	58	13	**71**	55	15	**70**	**1**

[1] Letters dated August 11 and August 23.

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Employer Contribution Rates (%) – Comparison to the 2016 Actuarial Valuation

4.1

	2017 Valuation Effective FY 2018/2019			2016 Valuation Effective FY 2017/2018[1]		
Item	Pension	Insurance	Combined	Pension	Insurance	Combined
(1)	(2)	(3)	(4)	(5)	(6)	(7)
KERS Non-Hazardous	71.03%	12.40%	**83.43%**	41.98%	8.41%	**50.39%**
KERS Hazardous	34.39%	2.46%	**36.85%**	20.48%	1.34%	**21.82%**
CERS Non-Hazardous	21.84%	6.21%	**28.05%**	14.48%	4.70%	**19.18%**
CERS Hazardous	35.69%	12.17%	**47.86%**	22.20%	9.35%	**31.55%**
SPRS	119.05%	27.23%	**146.28%**	71.57%	18.10%	**89.67%**

[1] Effective for FY 2017/2018 for CERS only. KERS and SPRS are on a biennial contribution rate schedule.

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Expected Employer Contribution Requirements ($ in Millions) – FY 2018 and FY 2019

	FY 2018/2019 2017 Valuation			FY 2017/2018 Current Board Certified Rates			
Item	Pension	Insurance	Combined	Pension	Insurance	Combined	Increase (4) – (7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
KERS Non-Hazardous	$1,101	$191	**$1,292**	$716	$128	**$844**	**$448**
KERS Hazardous	57	4	**61**	45	4	**49**	**12**
CERS Non-Hazardous	546	154	**700**	355	114	**469**	**231**
CERS Hazardous	192	65	**257**	120	51	**171**	**86**
SPRS	58	13	**71**	45	9	**54**	**17**

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Unfunded Actuarial Accrued Liability – Actuarial Value of Asset Basis ($ in Billions)

4.1

	2017 Valuation			2016 Valuation			
Item	Pension	Insurance	Combined	Pension	Insurance	Combined	Change In UAAL
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
KERS Non-Hazardous	$13.47	$1.86	$15.33	$11.11	$1.71	$12.83	**$2.50**
KERS Hazardous	0.51	(0.07)	0.44	0.38	(0.10)	0.28	**$0.16**
CERS Non-Hazardous	6.04	1.13	7.17	4.54	0.91	5.44	**$1.73**
CERS Hazardous	2.41	0.59	3.00	1.57	0.42	1.99	**$1.01**
SPRS	0.71	0.10	0.81	0.54	0.09	0.63	**$0.18**
Total	**$23.14**	**$3.61**	**$26.75**	**$18.14**	**$3.03**	**$21.17**	**$5.58**

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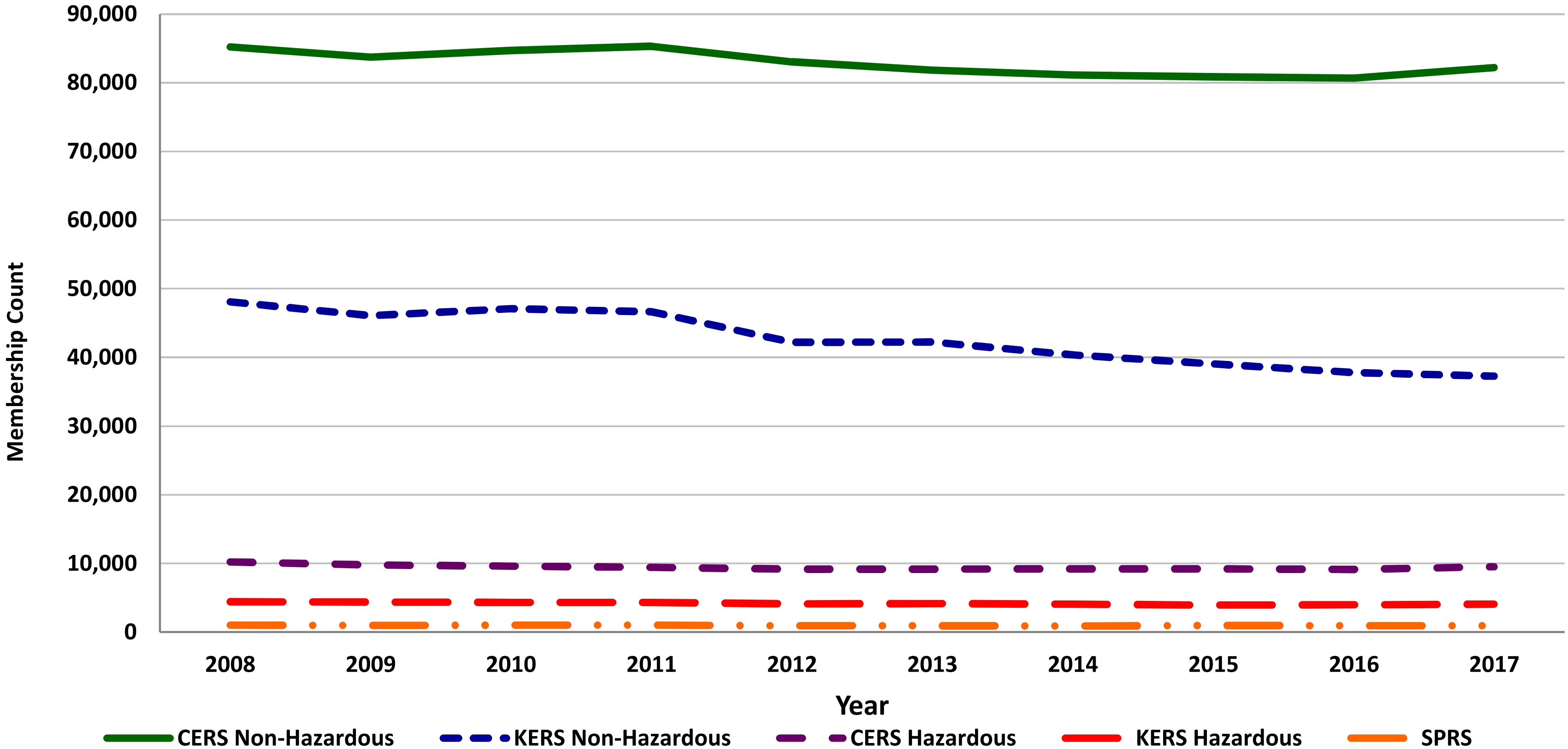
Active Membership Count



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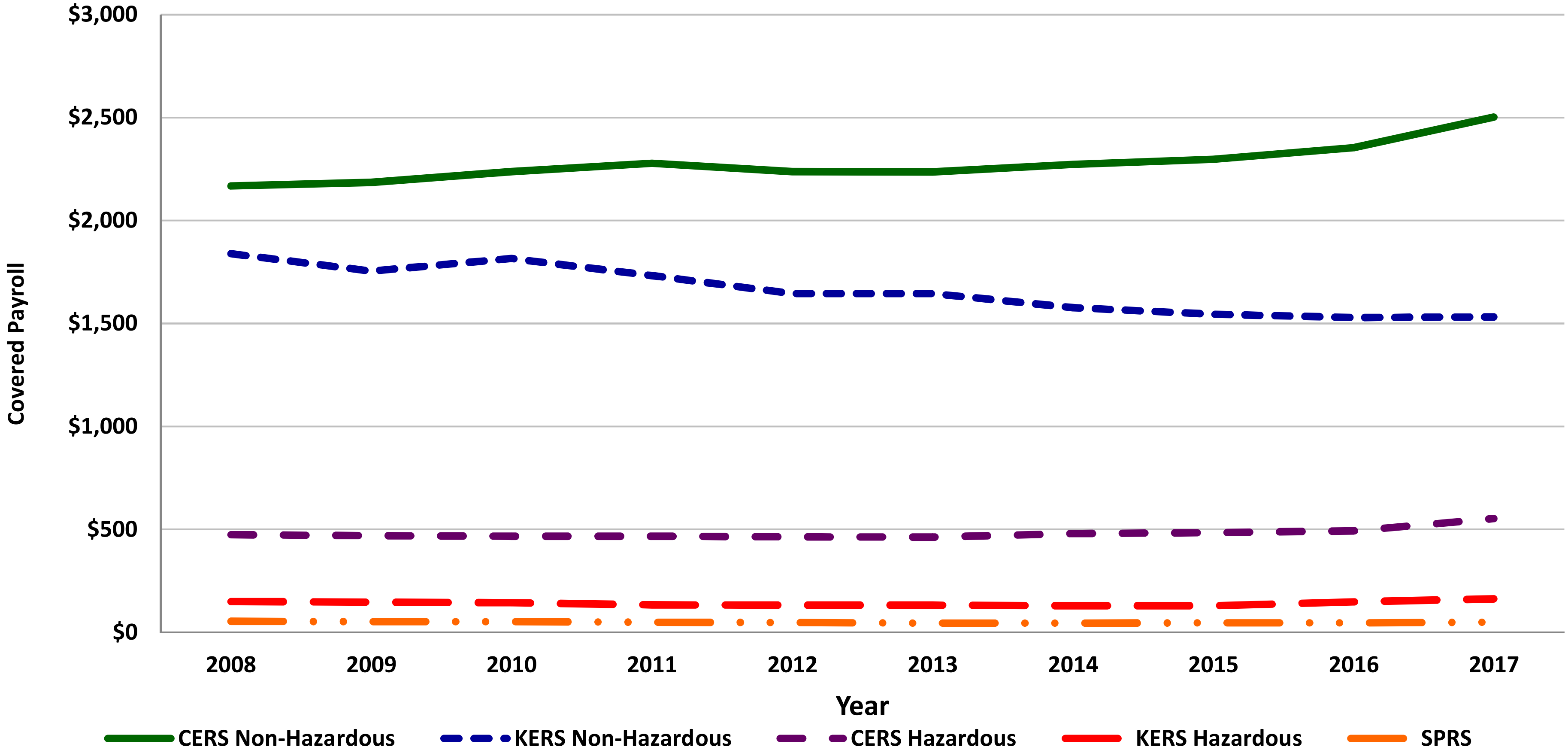
Covered Payroll ($ in Millions)



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Retired Membership Count

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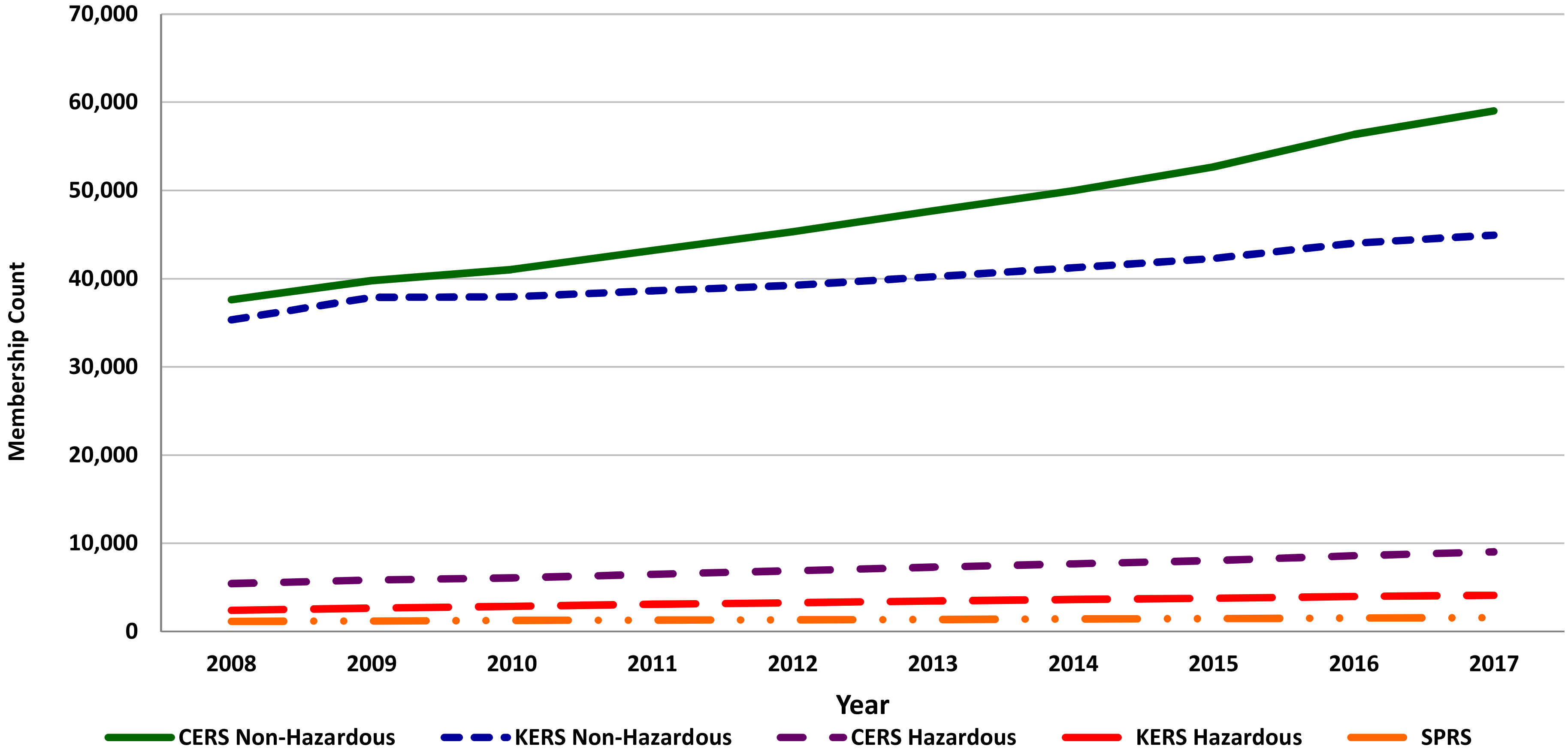

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Benefit Distributions ($ in Millions)

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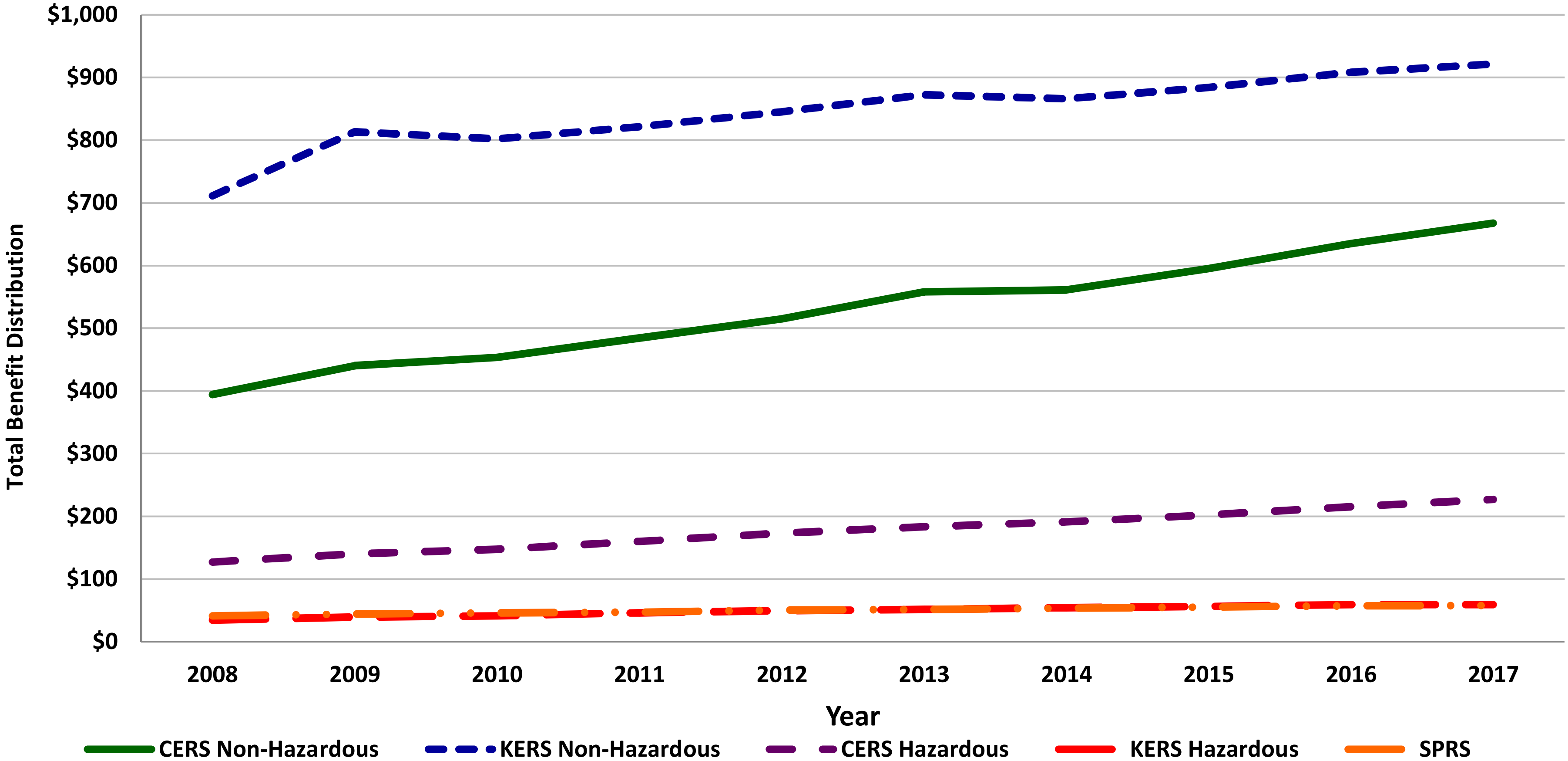

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Funding Results – KERS Non-Hazardous

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Item	Pension 2017	Pension 2016	Insurance 2017	Insurance 2016
(1)	(2)	(3)	(4)	(5)
Total Normal Cost Rate	12.45%	9.25%	3.06%	2.51%
Member Rate	(5.00%)	(5.00%)	(0.35%)	(0.32%)
Employer Normal Cost Rate	7.45%	4.25%	2.71%	2.19%
Administrative Expenses	0.72%	0.68%	0.06%	0.05%
Amortization Cost	62.86%	37.05%	9.63%	6.17%
Total Employer Contribution Rate	**71.03%**	**41.98%**	**12.40%**	**8.41%**
Actuarial Accrued Liability	$15,592	$13,225	$2,683	$2,457
Actuarial Value of Assets	2,124	2,112	824	743
Unfunded Actuarial Accrued Liability	**$13,468**	**$11,113**	**$1,860**	**$1,714**
Funded Ratio	**13.6%**	**16.0%**	**30.7%**	**30.3%**
Covered Payroll	**$1,532**	**$1,529**	**$1,532**	**$1,529**

$ in millions

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Funding Results – KERS Hazardous

4.1

	Pension		Insurance	
Item	2017	2016	2017	2016
(1)	(2)	(3)	(4)	(5)
Total Normal Cost Rate	17.1%	13.85%	6.40%	5.29%
Member Rate	(8.00%)	(8.00%)	(0.52%)	(0.46%)
Employer Normal Cost Rate	9.10%	5.85%	5.88%	4.83%
Administrative Expenses	0.57%	0.59%	0.06%	0.07%
Amortization Cost	24.72%	14.04%	(3.48%)	(3.56%)
Total Employer Contribution Rate	**34.39%**	**20.48%**	**2.46%**	**1.34%**
Actuarial Accrued Liability	$1,121	$937	$419	$378
Actuarial Value of Assets	607	559	493	473
Unfunded Actuarial Accrued Liability	**$514**	**$378**	**($74)**	**($95)**
Funded Ratio	**54.1%**	**59.7%**	**117.6%**	**125.3%**
Covered Payroll	**$162**	**$148**	**$162**	**$148**

$ in millions

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Funding Results – CERS Non-Hazardous

4.1

Item	Pension 2017	Pension 2016	Insurance 2017	Insurance 2016
(1)	(2)	(3)	(4)	(5)
Total Normal Cost Rate	10.01%	7.92%	3.57%	2.90%
Member Rate	(5.00%)	(5.00%)	(0.41%)	(0.36%)
Employer Normal Cost Rate	5.05%	2.92%	3.16%	2.54%
Administrative Expenses	0.80%	0.78%	0.03%	0.03%
Amortization Cost	15.99%	10.78%	3.02%	2.13%
Total Employer Contribution Rate	**21.84%**	**14.48%**	**6.21%**	**4.70%**
Actuarial Accrued Liability	$12,804	$11,076	$3,355	$2,988
Actuarial Value of Assets	6,765	6,535	2,227	2,080
Unfunded Actuarial Accrued Liability	**$6,039**	**$4,541**	**$1,128**	**$908**
Funded Ratio	**52.8%**	**59.0%**	**66.4%**	**69.6%**
Covered Payroll	**$2,452**	**$2,353**	**$2,452**	**$2,353**

$ in millions

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Funding Results – CERS Hazardous

4.1

Item	Pension 2017	Pension 2016	Insurance 2017	Insurance 2016
(1)	(2)	(3)	(4)	(5)
Total Normal Cost Rate	14.52%	12.13%	5.38%	4.85%
Member Rate	(8.00%)	(8.00%)	(0.35%)	(0.30%)
Employer Normal Cost Rate	6.52%	4.13%	5.03%	4.55%
Administrative Expenses	0.26%	0.27%	0.07%	0.07%
Amortization Cost	28.91%	17.80%	7.07%	4.73%
Total Employer Contribution Rate	**35.69%**	**22.20%**	**12.17%**	**9.35%**
Actuarial Accrued Liability	$4,649	$3,704	$1,788	$1,559
Actuarial Value of Assets	2,238	2,139	1,197	1,136
Unfunded Actuarial Accrued Liability	**$2,411**	**$1,565**	**$592**	**$423**
Funded Ratio	**48.1%**	**57.7%**	**66.9%**	**72.9%**
Covered Payroll	**$542**	**$493**	**$542**	**$493**

$ in millions

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Funding Results – SPRS

Item	Pension 2017	Pension 2016	Insurance 2017	Insurance 2016
(1)	(2)	(3)	(4)	(5)
Total Normal Cost Rate	23.84%	18.79%	11.48%	8.01%
Member Rate	(8.00%)	(8.00%)	(0.30%)	(0.27%)
Employer Normal Cost Rate	15.84%	10.79%	11.18%	7.74%
Administrative Expenses	0.37%	0.37%	0.14%	0.14%
Amortization Cost	102.84%	60.41%	15.91%	10.22%
Total Employer Contribution Rate	**119.05%**	**71.57%**	**27.23%**	**18.10%**
Actuarial Accrued Liability	$967	$775	277	257
Actuarial Value of Assets	261	235	180	173
Unfunded Actuarial Accrued Liability	**$706**	**$540**	**$96**	**$84**
Funded Ratio	**27.0%**	**30.3%**	**65.2%**	**67.1%**
Covered Payroll	**$49**	**$46**	**$49**	**$46**

$ in millions

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Projection Information
Pension Funds

KERS Non-Hazardous - Pension

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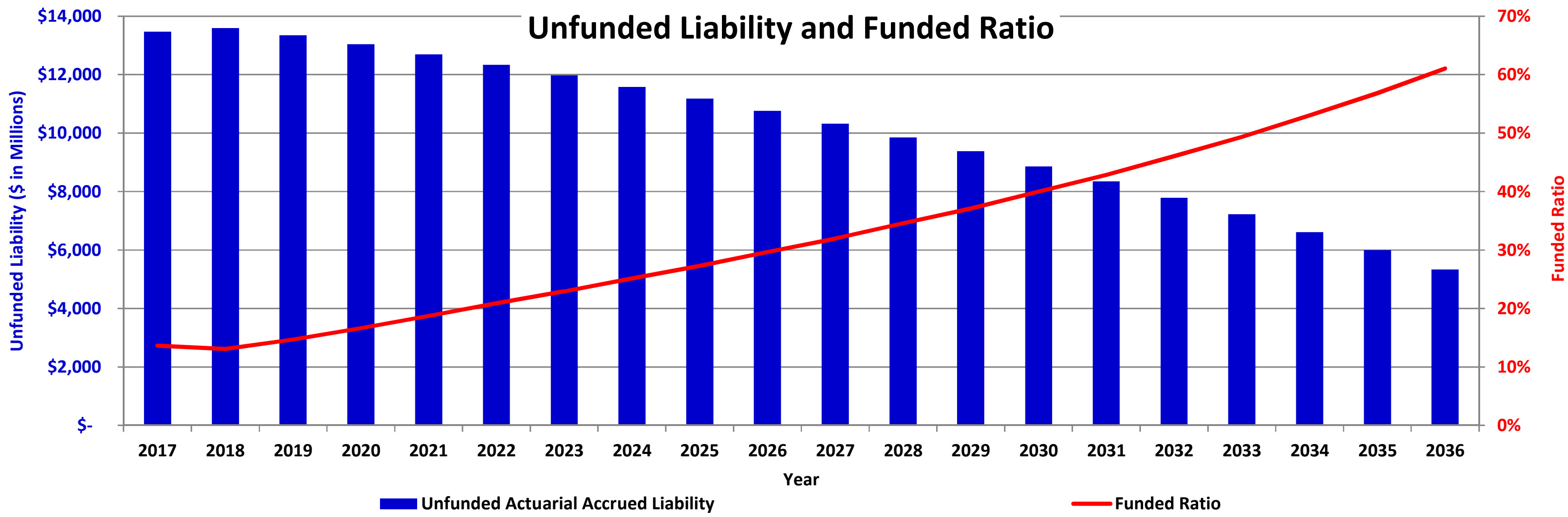

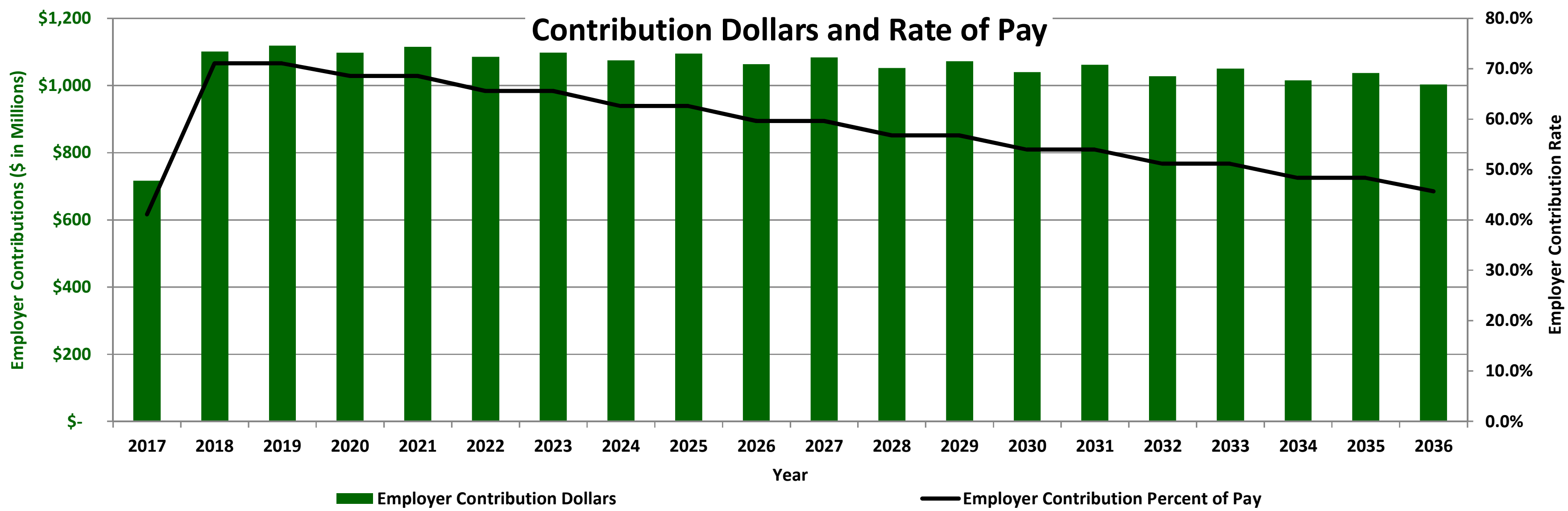

KERS Hazardous - Pension

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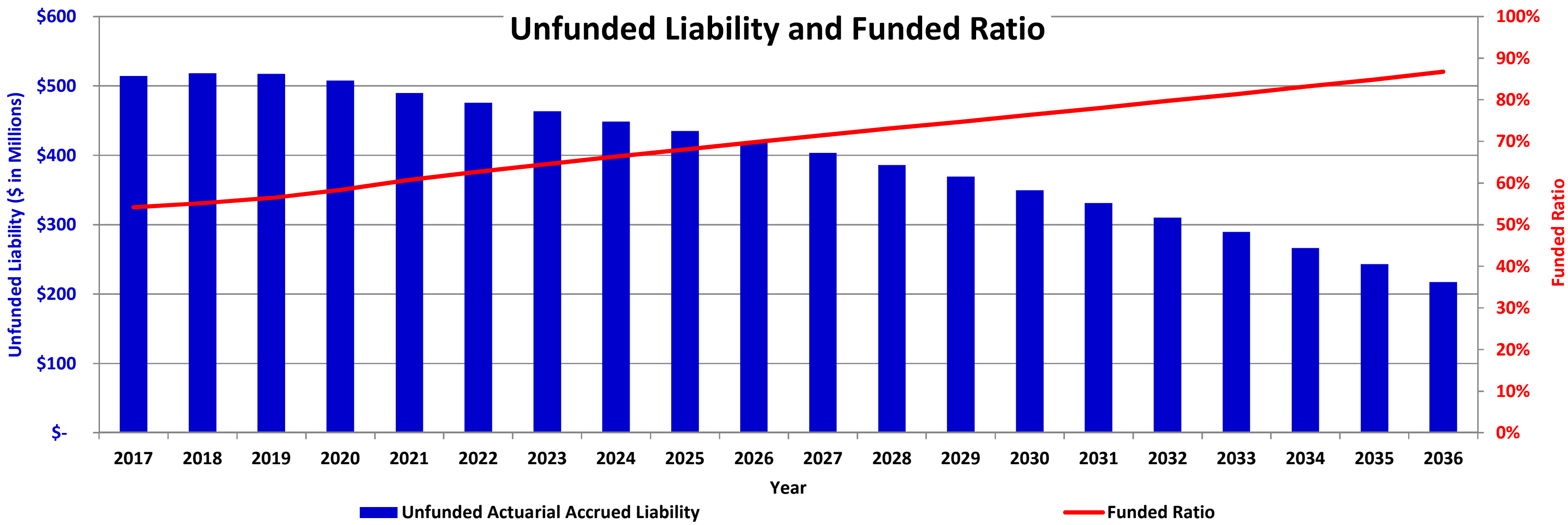

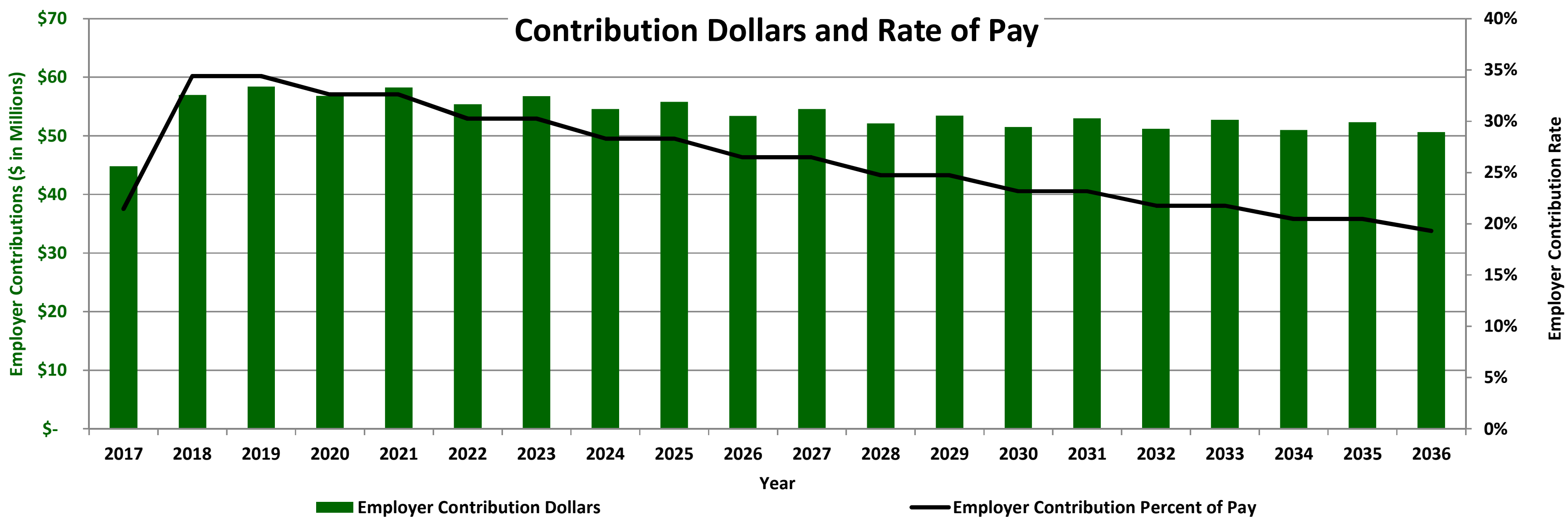

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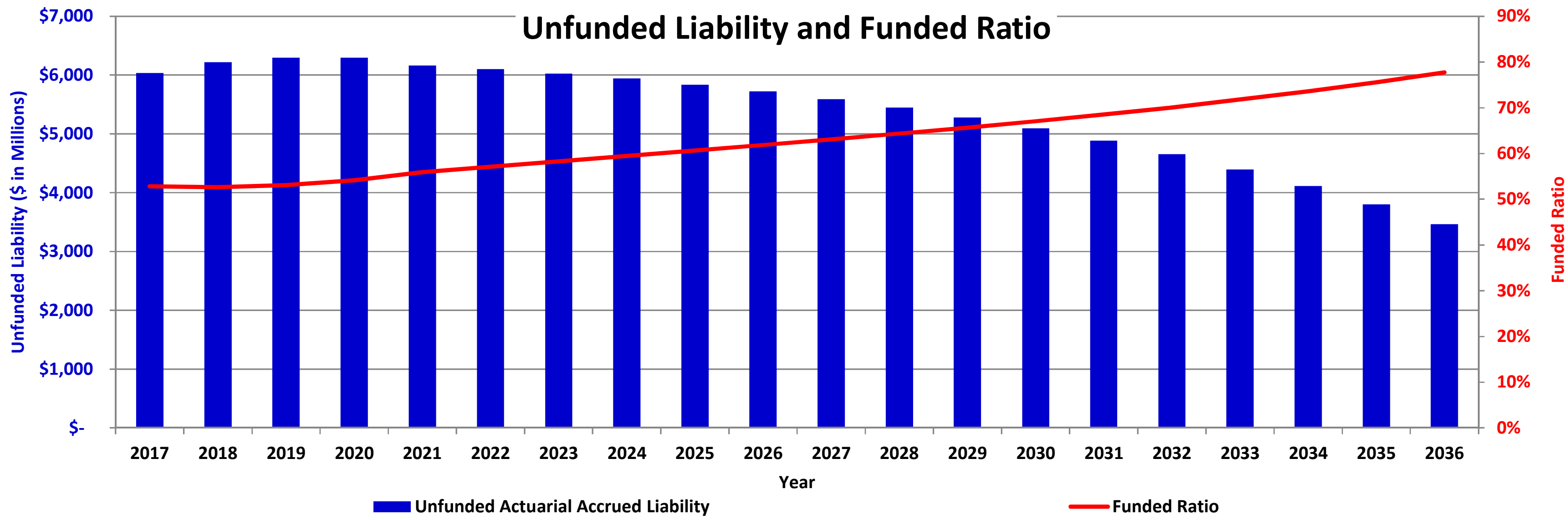
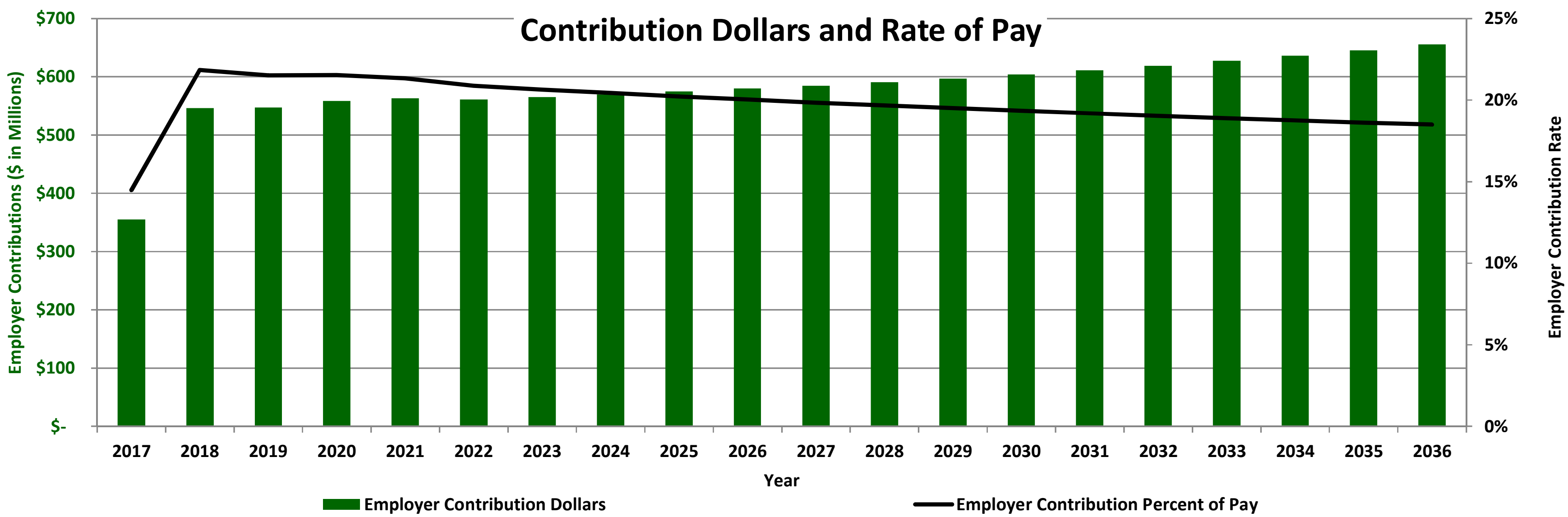
CERS Non-Hazardous - Pension





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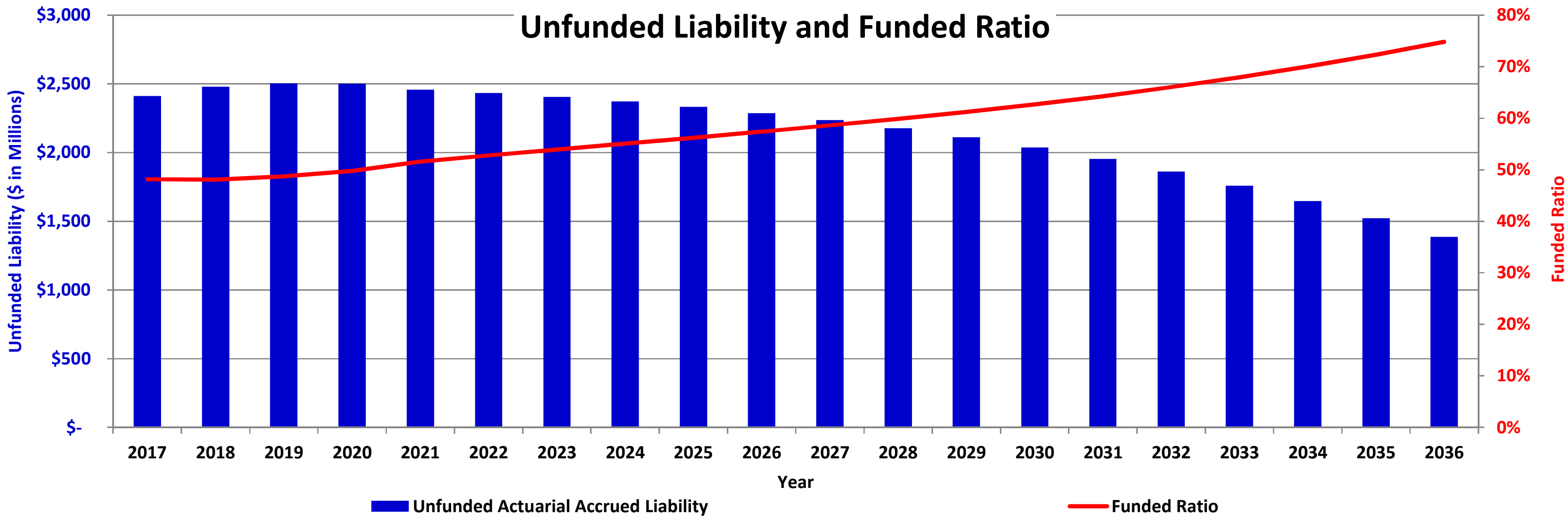
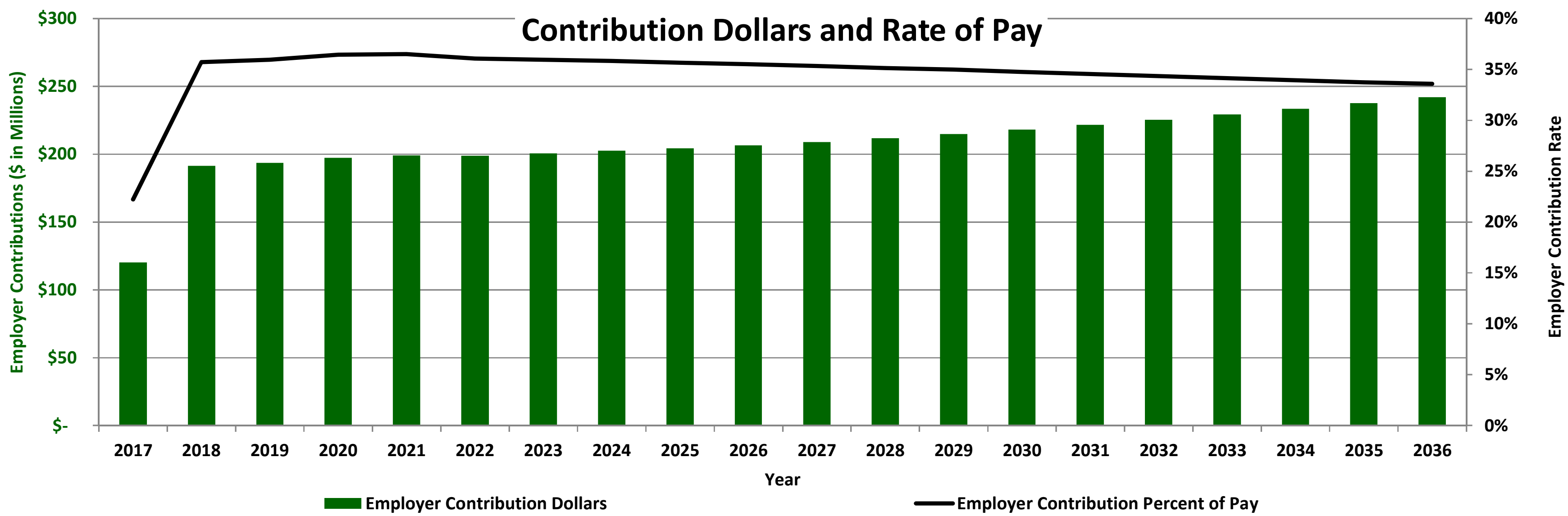
CERS Hazardous - Pension





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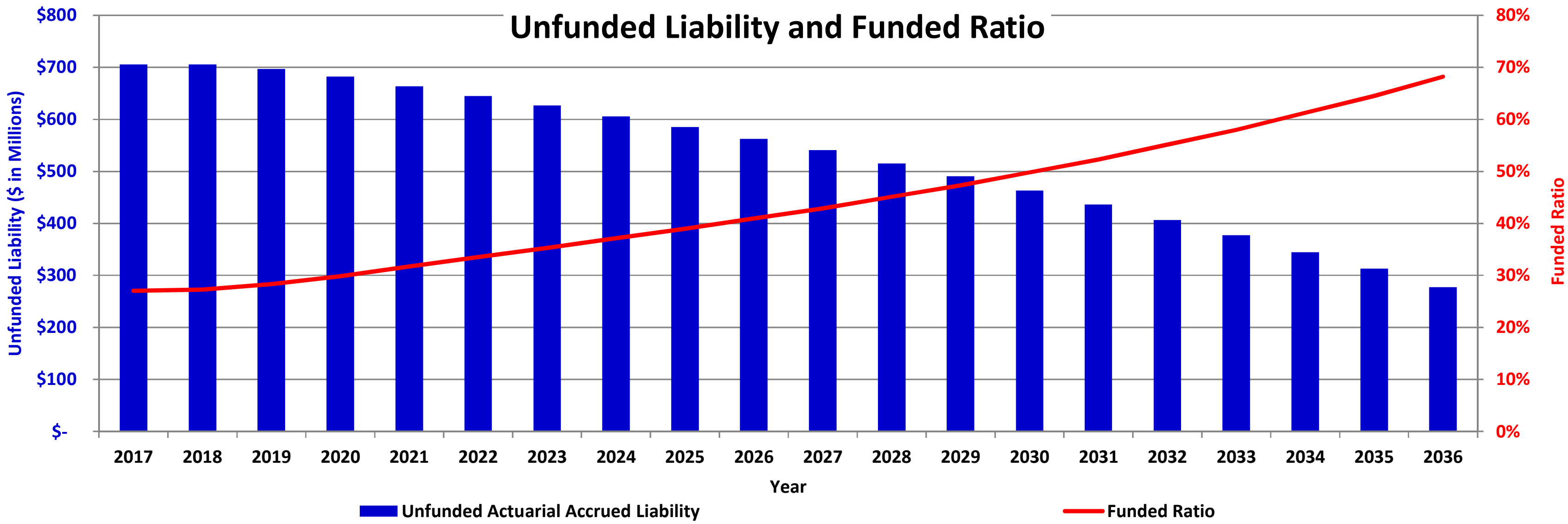
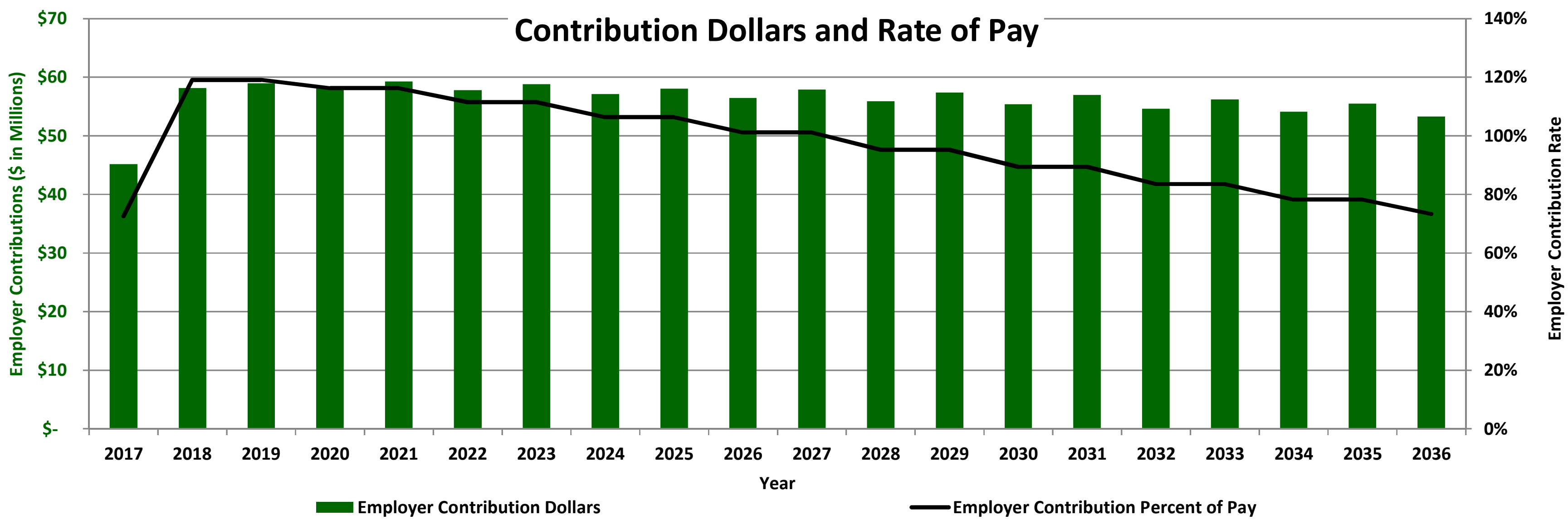
SPRS - Pension





Projection Information
Health Insurance Funds

KERS Non-Hazardous - Health Insurance

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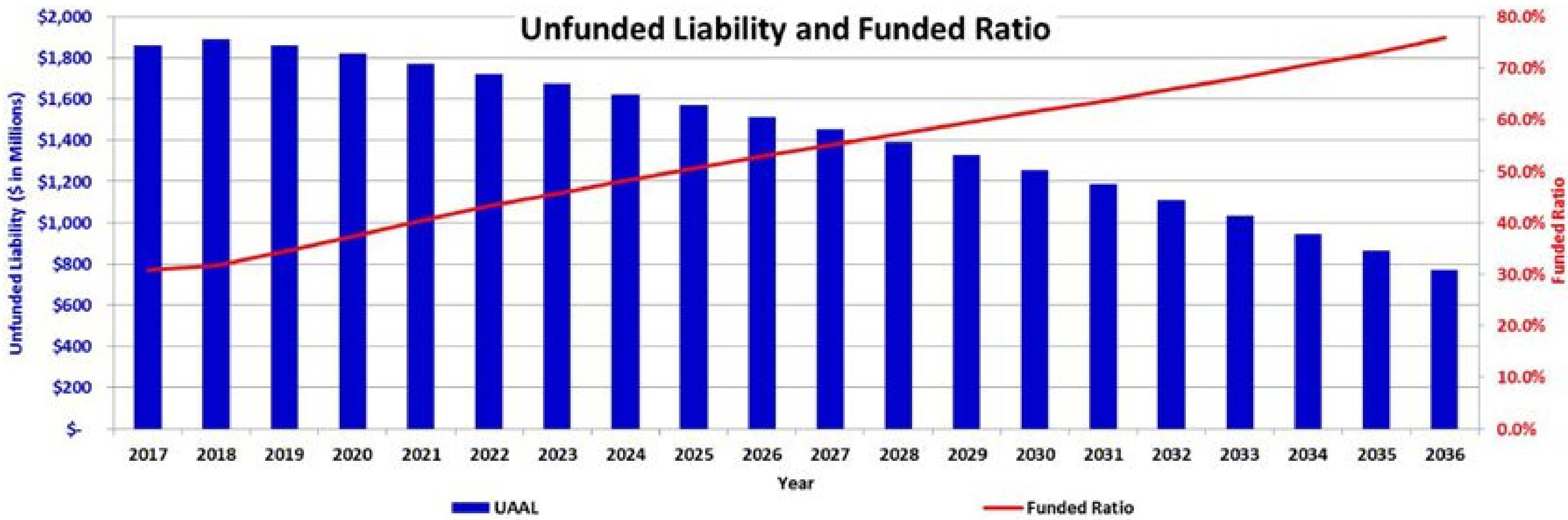

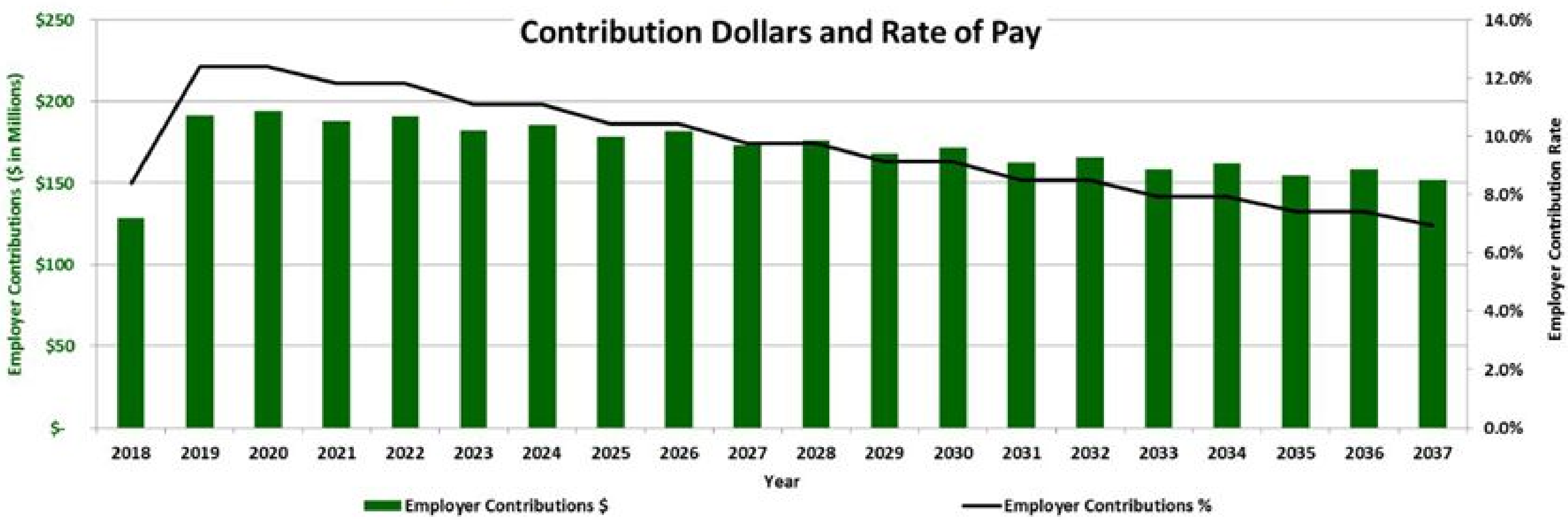

KERS Hazardous - Health Insurance

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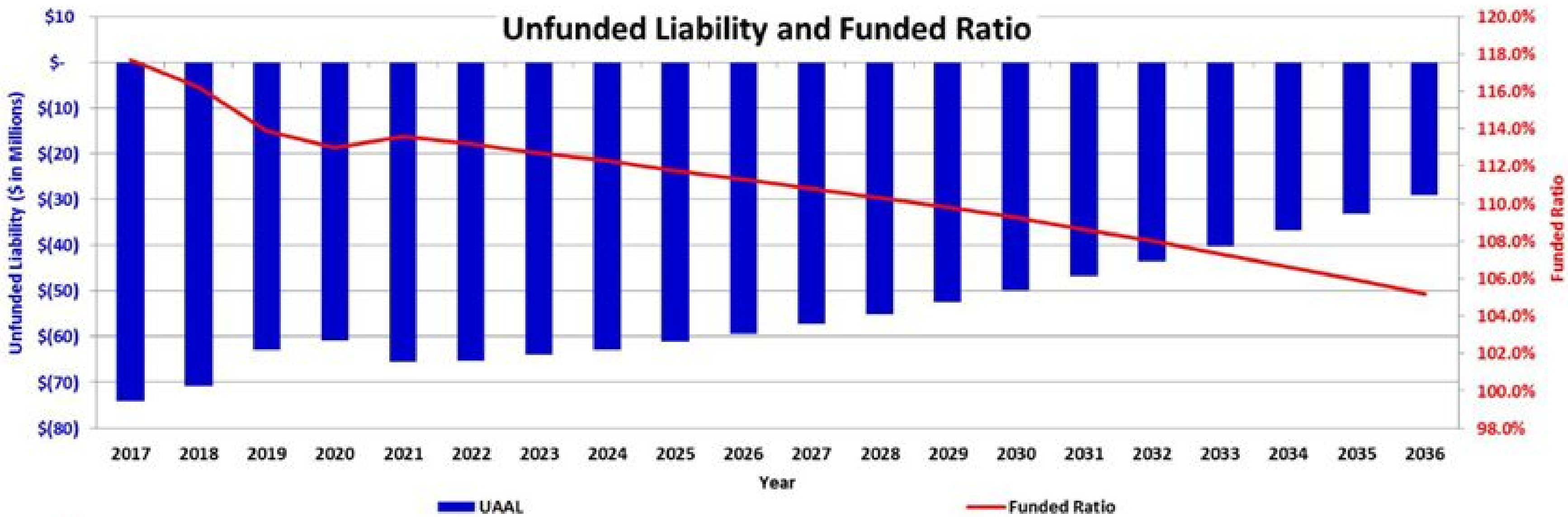

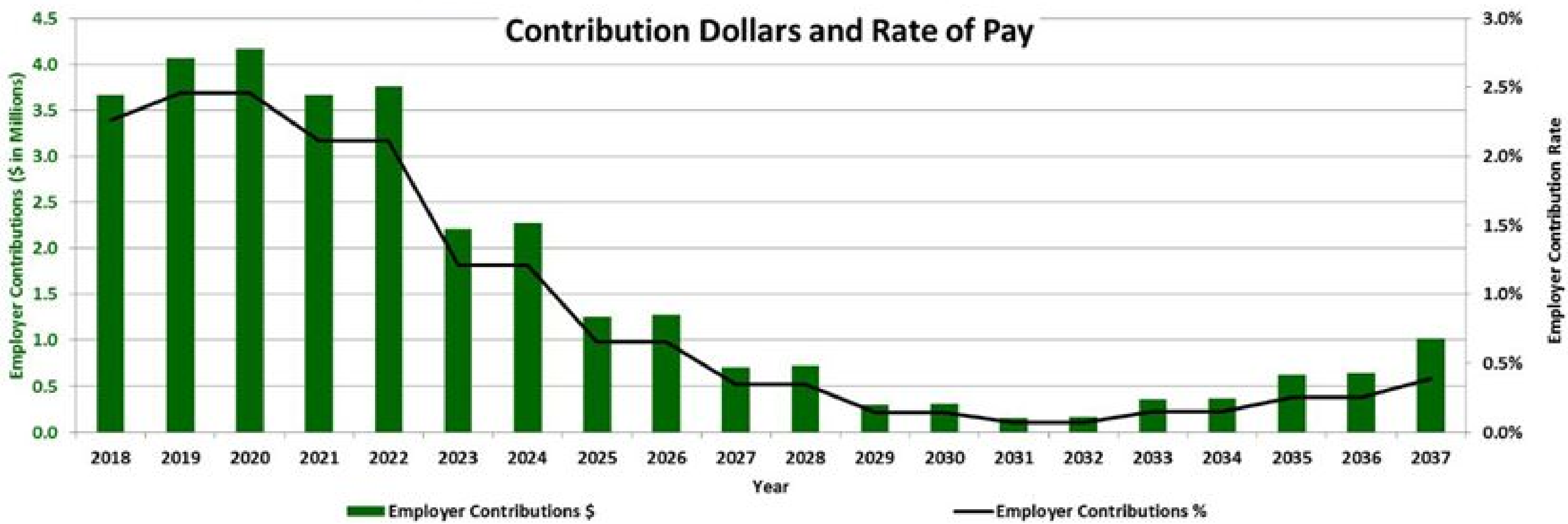

CERS Non-Hazardous - Health Insurance

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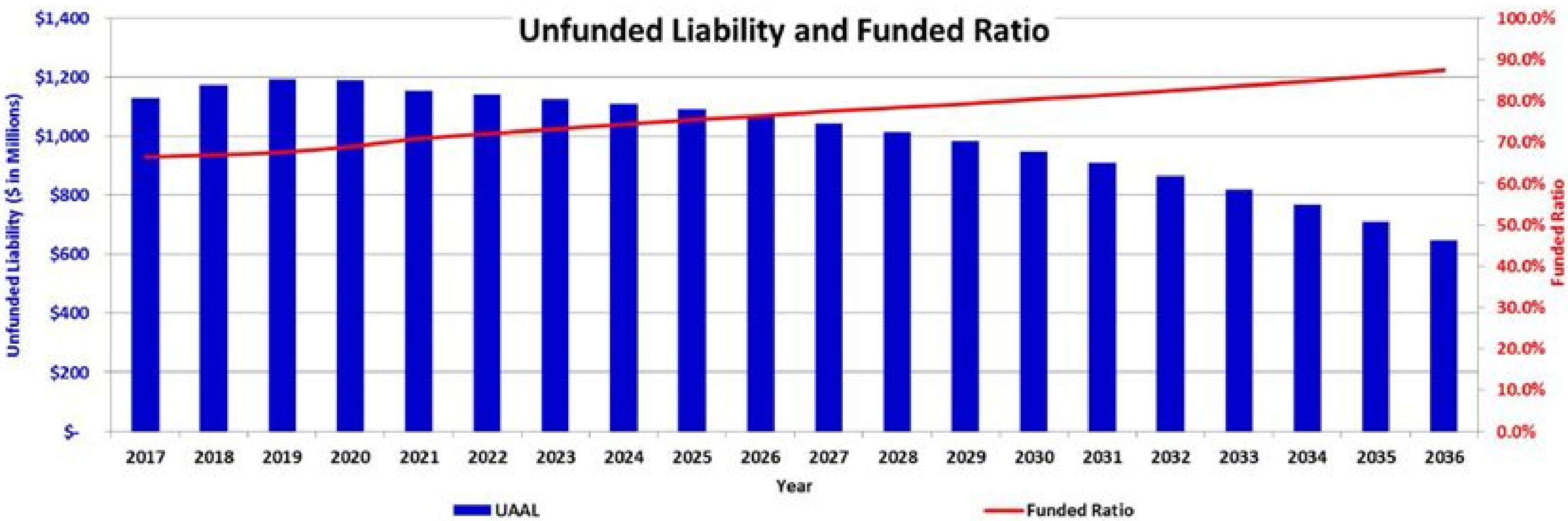

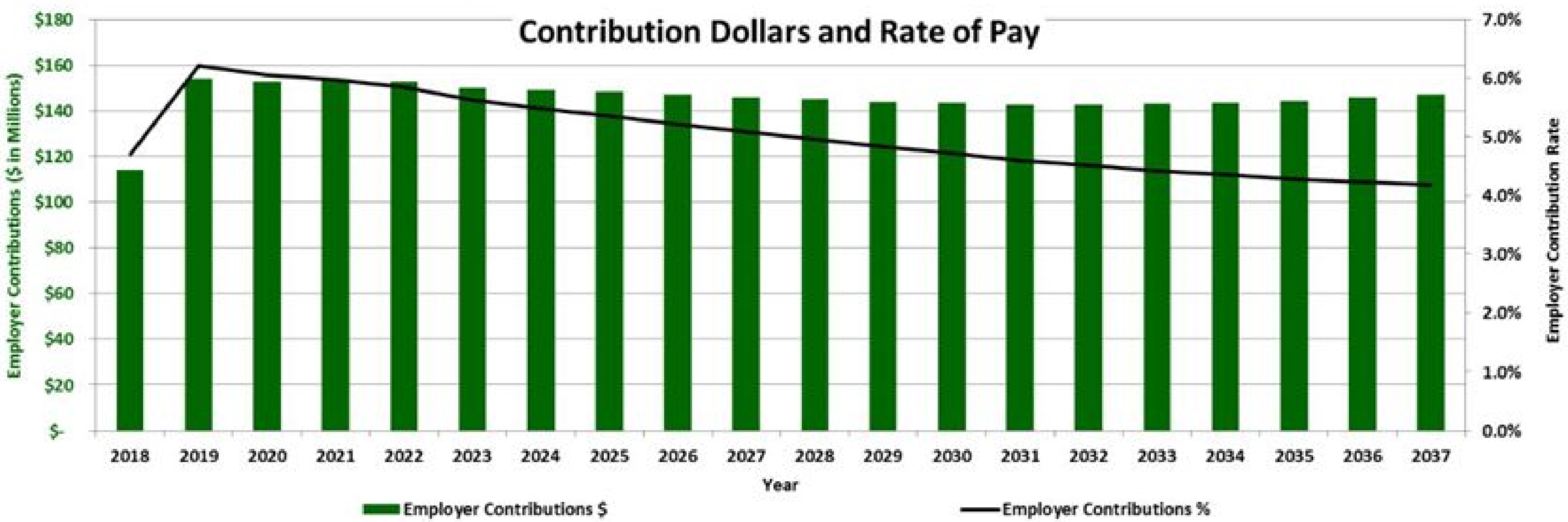

CERS Hazardous - Health Insurance

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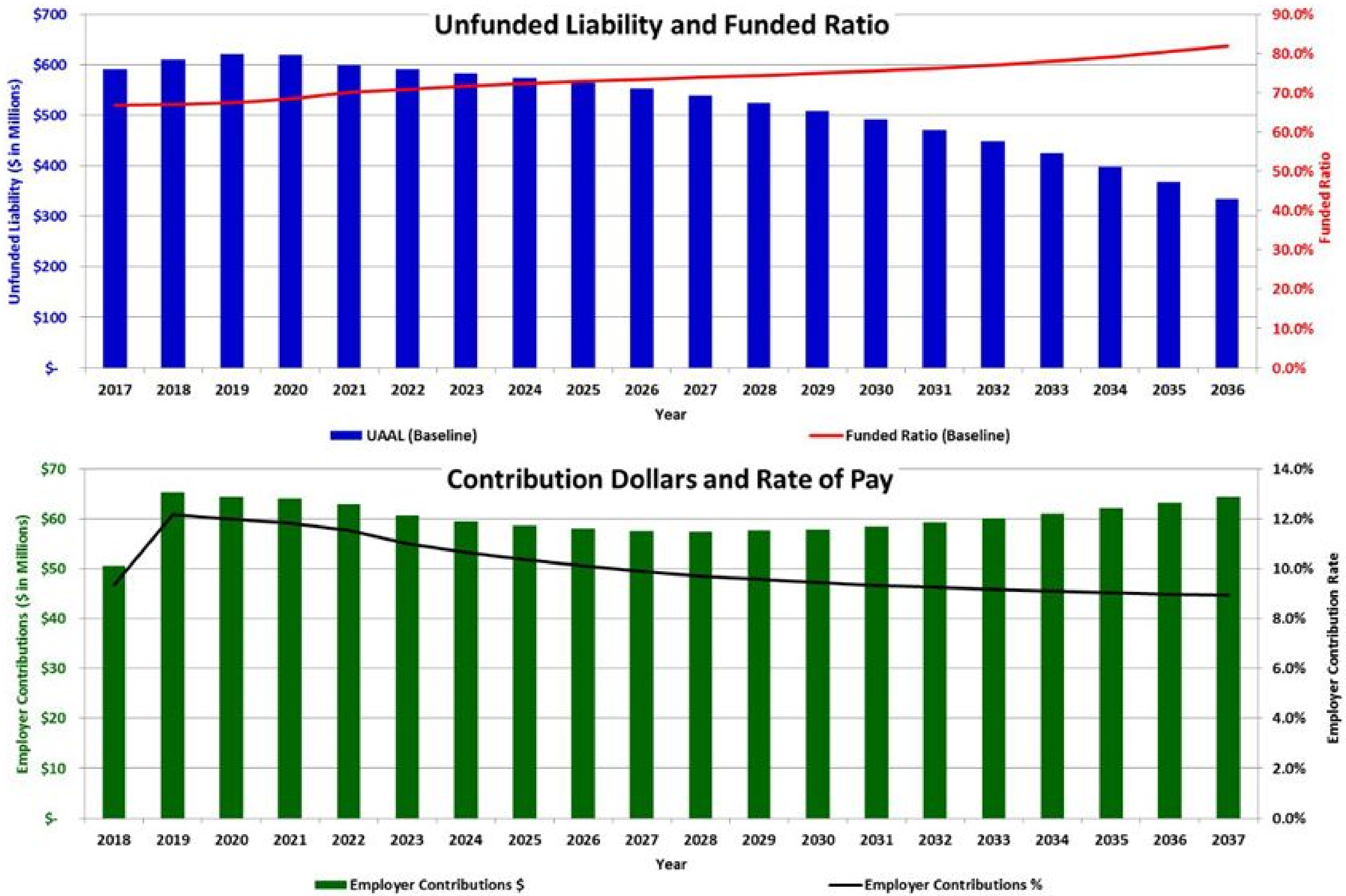

SPRS - Health Insurance

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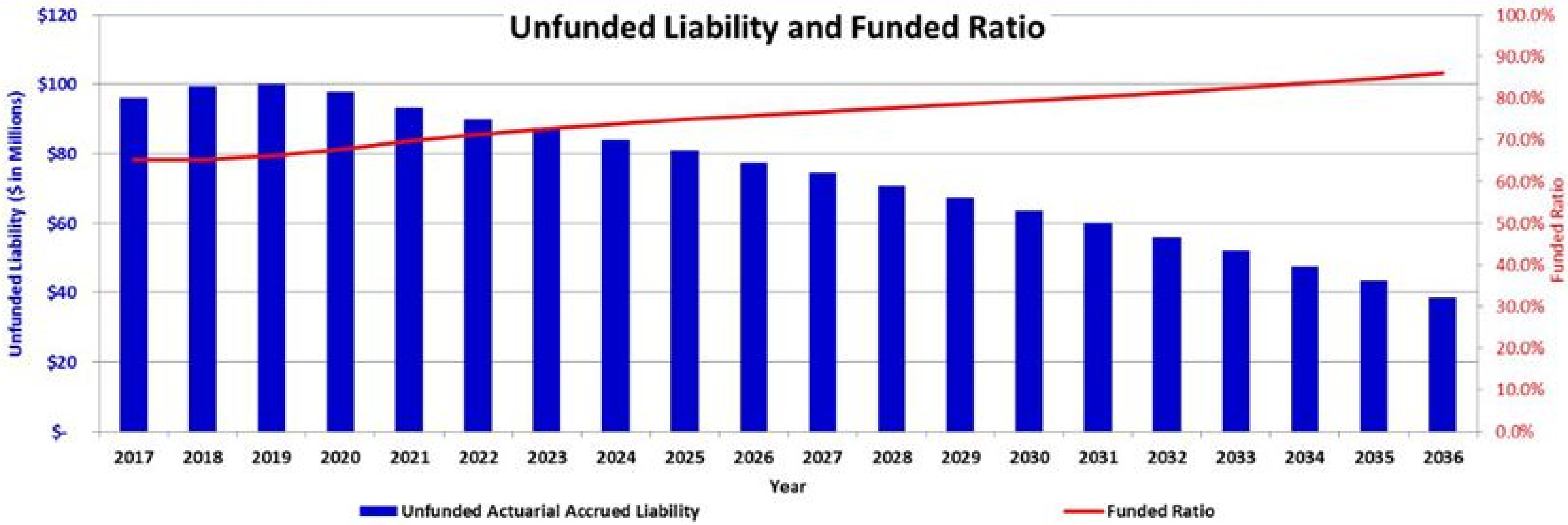

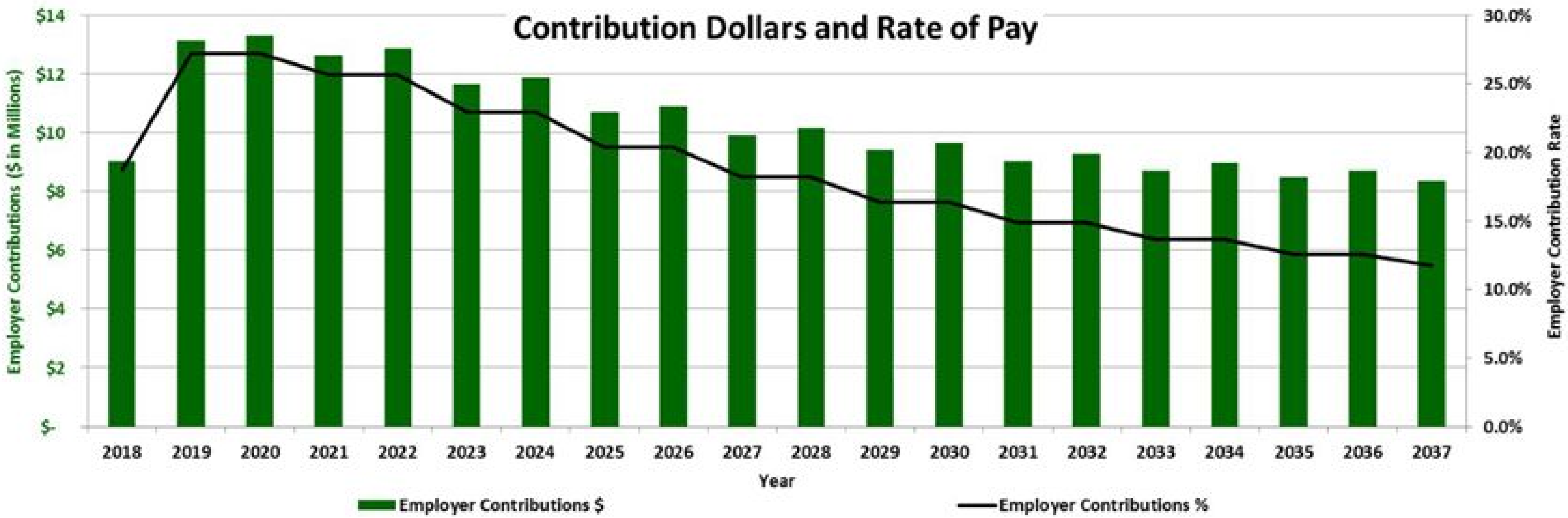

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Closing Comments

- It is imperative the State and participating employers in the Systems contribute the actuarial determined contribution in future years to improve the financial security of the systems
- The economic assumptions that were adopted for use in the 2017 actuarial valuation will increase the likelihood that contribution requirements will remain more stable in future years (due to investment and covered payroll growth experience)
- An experience study will be conducted for the 5-year period ending June 30, 2018 which will determine actuarial assumptions for use in the June 30, 2019 valuation

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Disclaimers

4.1

- This presentation is intended to be used in conjunction with the actuarial valuations as of June 30, 2017. This presentation should not be relied on for any purpose other than the purpose described in the valuation report.
- Readers are cautioned to examine original source materials and to consult with subject matter experts before making decisions related to the subject matter of this presentation.
- This presentation shall not be construed to provide tax advice, legal advice or investment advice.

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December 4, 2017

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

Subject: Certification of the June 30, 2017 Actuarial Valuation Results

Dear Trustees of the Board:

Enclosed are the June 30, 2017 actuarial valuation reports for the Kentucky Employees Retirement System (KERS), the County Employees Retirement System (CERS), and the State Police Retirement System (SPRS). These reports provide the current actuarial and financial condition of the Kentucky Retirement Systems (KRS), as well as communicate the actuarially determined employer contribution rates.

Under Kentucky Statute, the Board of Trustees must approve the employer contribution rates. For KERS and CERS, these certified contribution rates will be effective for the two-year period beginning July 1, 2018 and ending June 30, 2020. The certified contribution rates for CERS will be effective for the fiscal year beginning July 1, 2018 and ending June 30, 2019.

These contribution rates are calculated based on the membership data and plan assets as of June 30, 2017. These calculations are also based on the benefit provisions in effect as of June 30, 2017. If new legislation is enacted between the valuation date and the date the contribution rates become effective, the Board may adjust the calculated rates to reflect this new legislation. Such adjustments are based on information supplied by the actuary.

FINANCING OBJECTIVES AND FUNDING POLICY

KRS administers a pension and health insurance fund to provide for monthly retirement income and retiree health insurance benefits. The total employer contribution rate is comprised of a contribution to each respective fund.

The contribution rate for each fund consists of a normal cost that is net of employee contributions and an amortization payment on the unfunded actuarial accrued liability (UAAL). In accordance with Section 61.565 of Kentucky Statute, the amortization payment is based on a closed thirty-year amortization period beginning July 1, 2013. As a result, the amortization period used in the 2017 actuarial valuation is 26 years. The amortization period used in subsequent actuarial valuations will decrease by one each future year.

Board of Trustees
December 4, 2017
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Due to changes in certain economic assumptions adopted by the Board for use in the June 30, 2017 actuarial valuation, the contribution rates for the retirement and health insurance funds have sustainably increased from those in currently in effect. However, the contribution rates determined under these new assumptions are more likely to remain stable, as a percentage of payroll in future years (absent benefit improvements and experience losses).

PROGRESS TOWARDS REALIZATION OF FUNDING OBJECTIVES

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

The funded ratio as June 30, 2016 for the retirement and health insurance funds of each System are as follows:

	Funded Ratio (AVA / AAL)	
System	Retirement Fund	Health Insurance Fund
KERS Non-Hazardous	13.6%	30.7%
KERS Hazardous	54.1%	117.6%
CERS Non-Hazardous	52.8%	66.4%
CERS Hazardous	48.1%	66.9%
SPRS	27.0%	65.2%

The funding levels for the retirement funds have decreased since the prior year primarily due to the decrease in the assumed rate of return assumption (discussed in more detail later) for use in the June 30, 2017 actuarial valuation. The future improvement of the financial health of these systems will be very dependent on the employers paying the actuarially determined contribution rates in all future years.

In particular, during the last fiscal year KERS non-hazardous pension fund distributed $960 million in benefit payments and received $858 million in employer and employee contributions (excluding contributions to the 401(h)). As of June 30, 2017, the market value of assets for this system was $2,057 million (excluding assets in the 401(h)). To stabilize the financial condition of this system and reduce the likelihood that plan assets will become exhausted, it is imperative that contributions to the system exceed the benefit payments. The employer contribution rate to the retirement fund that is documented in the KERS is projected increase the total employer and member contributions to $1,164 million for each of the next two fiscal years (i.e. FY 2018-19 and FY 2019-20). If these employer contributions are not made to this system, then the financial condition of this retirement system is expected to continue to deteriorate and there will be a significant risk of plan assets being exhausted.

Board of Trustees
December 4, 2017
Page 3

Assumptions and Methods

Kentucky Statutes requires that an actuarial investigation be performed at least every five years to review the economic and demographic assumptions. An experience study was conducted as of June 30, 2013 and the next experience study will be conducted as of June 30, 2018. However, the Board has the authority to review the assumptions on a more frequent basis and adopt new assumptions prior to the next scheduled experience study.

Since the last actuarial valuation the Board adopted changes to certain economic assumptions for KERS, CERS and SPRS. Specifically, the Board decreased the price inflation assumption to 2.30% for all funds. The assumed rate of return was decreased to 5.25% for the KERS non-hazardous retirement fund and the SPRS retirement fund. The assumed rate of return was decreased to 6.25% for the KERS hazardous retirement fund, CERS (non-hazardous and hazardous) retirement funds, and all the insurance funds for KERS, CERS, and SPRS. Furthermore, the Board decreased the payroll growth assumption to 2.00% for all the CERS funds (retirement and health insurance) and adopted a 0.00% payroll growth assumption for calculating the amortization payment for all the KERS and SPRS funds (retirement and health insurance).

It is our opinion that the current assumptions are internally consistent and reasonably reflect the anticipated future experience of the System.

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

Benefit Provisions

The benefit provisions reflected in this valuation are those which were in effect on June 30, 2017. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

Data

Member data for retired, active and inactive members was supplied as of June 30, 2017, by the KRS staff. The staff also supplied asset information as of June 30, 2017. 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 KRS.

Board of Trustees
December 4, 2017
Page 4

CERTIFICATION

We certify that the information presented herein is accurate and fairly portrays the actuarial position of KERS as of June 30, 2017.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. Mr. Newton and Mr. White are Enrolled Actuaries. All three of the undersigned are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries. All of the undersigned are experienced in performing valuations for large public retirement systems.

Sincerely,

Gabriel, Roeder, Smith & Co.

Joseph P. Newton, FSA, MAAA, EA
Senior Consultant

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

Janie Shaw, ASA, MAAA
Consultant

Summary of June 30, 2017 Actuarial Valuation Results

	KERS Non-Hazardous	KERS Hazardous	CERS Non-Hazardous	CERS Hazardous	SPRS
Contributions for next fiscal year:					
Pension Fund Contribution	71.03%	34.39%	21.84%	35.69%	119.05%
Insurance Fund Contribution	12.40%	2.46%	6.21%	12.17%	27.23%
Total Recommended Employer Contribution	83.43%	36.85%	28.05%	47.86%	146.28%
Assets:					
Retirement					
• Actuarial value (AVAR)	$2,123,623,157	$607,158,871	$6,764,873,113	$2,238,320,330	$261,320,225
• Market value (MVAR)	$2,056,869,899	$601,528,922	$6,687,237,095	$2,217,996,136	$255,736,583
• Ratio of actuarial to market value of assets	103.2%	100.9%	101.2%	100.9%	102.2%
Insurance					
• Actuarial value (AVAI)	$823,917,560	$493,458,367	$2,227,401,268	$1,196,779,877	$180,463,820
• Market value (MVAI)	$817,369,841	$488,838,463	$2,212,535,662	$1,189,001,387	$178,838,260
• Ratio of actuarial to market value of assets	100.8%	100.9%	100.7%	100.7%	100.9%
Funded Status:					
Retirement					
• Actuarial accrued liability	$15,591,641,083	$1,121,419,836	$12,803,509,449	$4,649,046,764	$967,144,667
• Unfunded accrued liability on AVAR	$13,468,017,926	$514,260,965	$6,038,636,336	$2,410,726,434	$705,824,442
• Funded ratio on AVAR	13.6%	54.1%	52.8%	48.1%	27.0%
• Unfunded accrued liability on MVAR	$13,534,771,184	$519,890,914	$6,116,272,354	$2,431,050,628	$711,408,084
• Funded ratio on MVAR	13.2%	53.6%	52.2%	47.7%	26.4%
Insurance					
• Actuarial accrued liability	$2,683,496,055	$419,439,652	$3,355,151,286	$1,788,432,768	$276,641,361
• Unfunded accrued liability on AVAI	$1,859,578,495	($74,018,715)	$1,127,750,018	$591,652,891	$96,177,541
• Funded ratio on AVAI	30.7%	117.6%	66.4%	66.9%	65.2%
• Unfunded accrued liability on MVAI	$1,866,126,214	($69,398,811)	$1,142,615,624	$599,431,381	$97,803,101
• Funded ratio on MVAI	30.5%	116.5%	65.9%	66.5%	64.6%
Membership:					
• Number of					
- Active Members	37,234	4,047	82,198	9,495	903
- Retirees and Beneficiaries	44,916	4,093	59,013	8,998	1,536
- Inactive Members	49,658	5,298	85,031	3,198	480
- Total	131,808	13,438	226,242	21,691	2,919
• Projected payroll of active members	$1,531,534,820	$162,418,070	$2,452,407,113	$541,632,946	$48,598,296
• Average salary of active members	$41,133	$40,133	$29,835	$57,044	$53,819

4.2

Kentucky Employees Retirement System (KERS)

Actuarial Valuation Report as of June 30, 2017

GRS

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December 4, 2017

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

Subject: Actuarial Valuation as of June 30, 2017

Dear Trustees of the Board:

This report describes the current actuarial condition of the Kentucky Employees Retirement System (KERS), determines the required employer contribution rates, and analyzes changes in the System's financial condition. In addition, the report 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 KRS. This report was prepared at the request of the Board of Trustees of the Kentucky Retirement System (Board) and is intended for use by the KRS staff and those designated or approved by the Board.

Financing Objectives and Funding Policy

The employer contribution rate is determined in accordance with Section 61.565 of Kentucky Statute. As specified by the Statute, the employer contribution rate is determined based on a closed thirty-year amortization period beginning July 1, 2013. As a result, the amortization period used in the 2017 actuarial valuation is 26 years. The contribution rate determined by this actuarial valuation becomes effective twelve months after the valuation date and is effective for two fiscal years. In other words, the contribution rate determined by this June 30, 2017 actuarial valuation will be used by the Board to certify the Commonwealth's contribution rates for the biennium period beginning July 1, 2018 and ending June 30, 2020.

If new legislation is enacted between the valuation date and the date the contribution rate becomes effective, the Board may adjust the calculated rate before certifying them, in order to reflect this new legislation. Such adjustments are based on information supplied by the actuary.

Assumptions and Methods

Kentucky Statutes also requires that an actuarial investigation be performed at least every five years to review the economic and demographic assumptions. An experience study was conducted

as of June 30, 2013 and the next experience study will be conducted as of June 30, 2018. However, the Board has the authority to review the assumptions on a more frequent basis and adopt new assumptions prior to the next scheduled experience study. Subsequent to the last actuarial valuation the Board decreased the price inflation assumption to 2.30% and changed the amortization of the unfunded actuarial accrued liability for the KERS Non-Hazardous and Hazardous Systems (Retirement and Health Insurance) to be based on a 0.00% payroll growth assumption (i.e. on a level dollar basis), but employers will continue to contribute to the System as a percentage of covered payroll. Additionally, the assumed rate of return was decreased to 6.25% for the KERS Hazardous Retirement and both KERS Health Insurance Funds, and the assumed rate of return was decreased to 5.25% for the KERS Non-Hazardous Retirement Fund. It is our opinion that the current assumptions are internally consistent and reasonably reflect the anticipated future experience of the System.

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

BENEFIT PROVISIONS

The benefit provisions reflected in this valuation are those which were in effect on June 30, 2017. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

DATA

Member data for retired, active and inactive members was supplied as of June 30, 2017, by the KRS staff. The staff also supplied asset information as of June 30, 2017. 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 KRS.

CERTIFICATION

We certify that the information presented herein is accurate and fairly portrays the actuarial position of KERS as of June 30, 2017.

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.

Kentucky Retirement System
December 4, 2017
Page 3

The undersigned are independent actuaries and consultants. Mr. Newton and Mr. White are Enrolled Actuaries. All three of the undersigned are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries. All of the undersigned are experienced in performing valuations for large public retirement systems.

Sincerely,

Gabriel, Roeder, Smith & Co.

Joseph P. Newton, FSA, MAAA, EA
Senior Consultant

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

Janie Shaw, ASA, MAAA
Consultant

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SECTION 1

EXECUTIVE SUMMARY

4.2

Summary of Principal Results

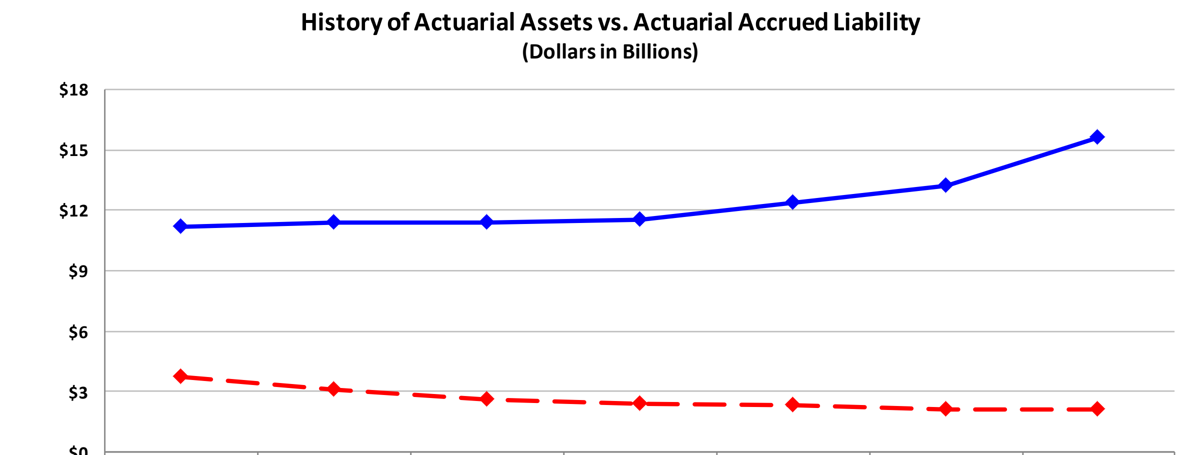
(Dollar amounts expressed in thousands)

	Non-Hazardous		Hazardous		Total	
	June 30, 2017	June 30, 2016	June 30, 2017	June 30, 2016	June 30, 2017	June 30, 2016
Contributions for next fiscal year:						
Retirement	71.03%	41.98%	34.39%	20.48%		
Insurance	12.40%	8.41%	2.46%	1.34%		
Total	83.43%	50.39%	36.85%	21.82%	N/A	N/A
Assets:						
Retirement						
• Actuarial value (AVAR)	$2,123,623	$2,112,286	$607,159	$559,487	$2,730,782	$2,671,774
• Market value (MVAR)	$2,056,870	$1,953,422	$601,529	$524,679	$2,658,399	$2,478,101
• Ratio of actuarial to market value of assets	103.2%	108.1%	100.9%	106.6%	102.7%	107.8%
Insurance						
• Actuarial value (AVAI)	$823,918	$743,270	$493,458	$473,160	$1,317,376	$1,216,430
• Market value (MVAI)	$817,370	$695,189	$488,838	$440,596	$1,306,208	$1,135,785
• Ratio of actuarial to market value of assets	100.8%	106.9%	100.9%	107.4%	100.9%	107.1%
Funded Status:						
Retirement						
• Actuarial accrued liability	$15,591,641	$13,224,698	$1,121,420	$936,706	$16,713,061	$14,161,405
• Unfunded accrued liability on AVAR	$13,468,018	$11,112,412	$514,261	$377,219	$13,982,279	$11,489,631
• Funded ratio on AVAR	13.6%	16.0%	54.1%	59.7%	16.3%	18.9%
• Unfunded accrued liability on MVAR	$13,534,771	$11,271,276	$519,891	$412,027	$14,054,662	$11,683,304
• Funded ratio on MVAR	13.2%	14.8%	53.6%	56.0%	15.9%	17.5%
Insurance						
• Actuarial accrued liability	$2,683,496	$2,456,678	$419,439	$377,745	$3,102,935	$2,834,423
• Unfunded accrued liability on AVAI	$1,859,578	$1,713,408	($74,019)	($95,415)	$1,785,559	$1,617,993
• Funded ratio on AVAI	30.7%	30.3%	117.6%	125.3%	42.5%	42.9%
• Unfunded accrued liability on MVAI	$1,866,126	$1,761,489	($69,399)	($62,851)	$1,796,727	$1,698,638
• Funded ratio on MVAI	30.5%	28.3%	116.5%	116.6%	42.1%	40.1%
Membership:						
• Number of						
- Active Members	37,234	37,779	4,047	3,959	41,281	41,738
- Retirees and Beneficiaries	44,916	44,004	4,093	3,966	49,009	47,970
- Inactive Members	49,658	49,040	5,298	4,925	54,956	53,965
- Total	131,808	130,823	13,438	12,850	145,246	143,673
• Projected payroll of active members	$1,531,535	$1,529,249	$162,418	$147,563	$1,693,953	$1,676,812
• Average salary of active members	$41,133	$40,479	$40,133	$37,273	$41,035	$40,175

Executive Summary (Continued)

Non-Hazardous Retirement Fund

The unfunded actuarial accrued liability for the non-hazardous retirement fund increased by $2.356 billion since the prior year's valuation to $13.468 billion. The largest source of this increase is the $2.158 billion due to a decrease in the assumed rate of investment return. Below is a chart with the historical actuarial value of assets and actuarial accrued liability for the non-hazardous fund. The divergence in the assets and liability over the last seven years has generally been due to a combination of: (i) actual contribution rates being insufficient to completely finance the interest on the unfunded actuarial accrued liability, (ii) the actual investment experience being less than the return assumption, and (iii) a decrease in the assumed rate of return in 2015, 2016 and again in 2017.



	2011	2012	2013	2014	2015	2016	2017
AAL	11.2	11.4	11.4	11.6	12.4	13.2	15.6
AVA	3.7	3.1	2.6	2.4	2.4	2.1	2.1

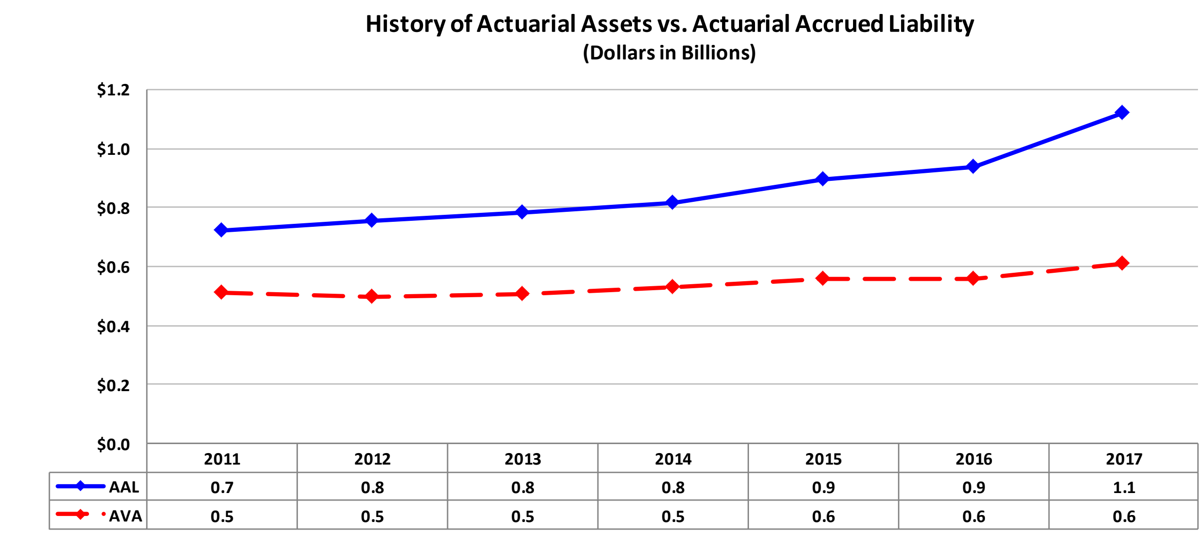
For FY2016-17, the KERS non-hazardous pension system distributed $960 million in benefit payments and received $858 million in employer and employee contributions (excluding contributions to the 401(h)). As of June 30, 2017, the market value of assets for this system was $2,057 million (excluding assets in the 401(h)). To stabilize the financial condition of this system and reduce the likelihood that plan assets will become exhausted, it is imperative that contributions to the system exceed the benefit payments. The 71.03% of pay employer contribution rate to the pension plan that is documented in this report is projected to increase the total employer and member contributions to $1,164 million for each of the next two fiscal years (i.e. FY 2018-19 and FY 2019-20). If these employer contributions are not made to this system, then the financial condition of this retirement system is expected to continue to deteriorate and there will be a significant risk of plan assets being exhausted.

Executive Summary (Continued)

4.2

Hazardous Retirement Fund

The unfunded actuarial accrued liability for the hazardous retirement fund increased by $137 million since the prior year's valuation to $514 million. The largest source of this increase is the $130 million due to a decrease in the assumed rate of investment return. Below is a chart with the historical actuarial value of assets and actuarial accrued liability for the hazardous retirement fund. The divergence in the assets and liability over the last seven years has generally been due to a combination of: (i) actual contribution rates being insufficient to finance, or pay down the unfunded actuarial accrued liability, (ii) the actual investment experience being less than the fund's expected investment return assumption, and (iii) a decrease in the assumed rate of return in 2015 and again in 2017.



	2011	2012	2013	2014	2015	2016	2017
AAL	0.7	0.8	0.8	0.8	0.9	0.9	1.1
AVA	0.5	0.5	0.5	0.5	0.6	0.6	0.6

SECTION 2

DISCUSSION

Discussion

The Kentucky Employees Retirement System (KERS) is a defined benefit pension fund that provides pensions and health care coverage for employees of state government, non-teaching staff at regional state supported universities, local health departments, regional mental health/mental retardation agencies, and other quasi-state agencies. KERS includes both non-hazardous and hazardous duty benefits. This report presents the result of the June 30, 2017 actuarial funding valuation for both the Retirement and Insurance Funds.

The primary purposes of the valuation report are to depict the current financial condition of the System, determine the annual required contribution, and analyze changes in the System's financial condition. In addition, the report provides various summaries of the data.

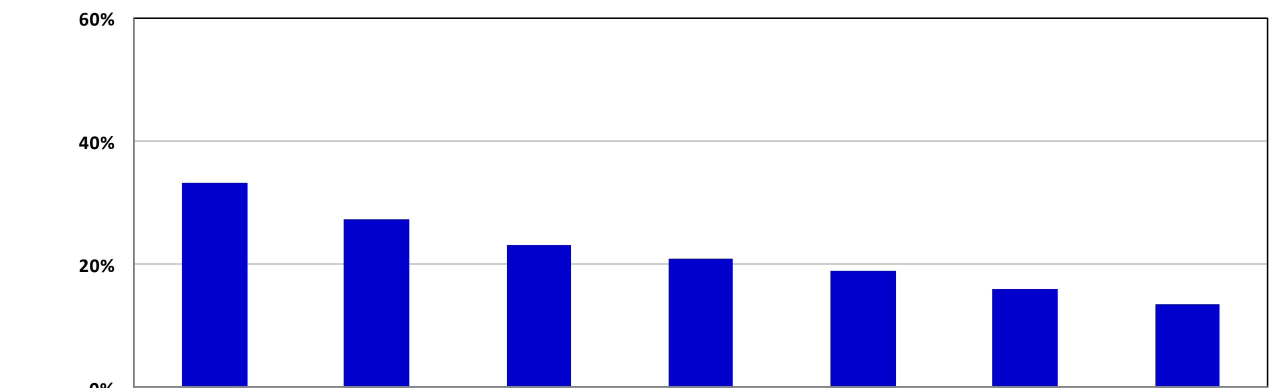
The actuarially determined contribution rates consist of two components: a normal cost rate and an amortization cost to finance the unfunded actuarial accrued liability. The normal cost rate is the theoretical amount which would be required to pay the members' benefits, based on the current plan provisions, 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 is should cost to provide the benefits for an average new member. Since members contribute to the fund, only the excess of the normal rate over the member contribution rate is included in the employer contribution rate. The amortization cost is the amount, expressed as a percentage of payroll, necessary to amortize the unfunded actuarial accrued liability. The payroll growth rate and discount rate assumptions are selected by the Board. The funding period is specified in Section 61.565 of Kentucky Statute.

All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides member data and statistical information. 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 seven-year history of the funds' funded ratio (i.e. the Actuarial Value of Assets divided by the Actuarial Accrued Liability). The decline in the funded ratio over the last seven years for the retirement funds has generally been due to a combination of: (i) actual contribution rates being insufficient to completely finance, or pay down, the unfunded actuarial accrued liability, (ii) the actual investment experience being less than assumed, and (iii) a decrease in the assumed rate of return in 2015, 2016 and again in 2017.

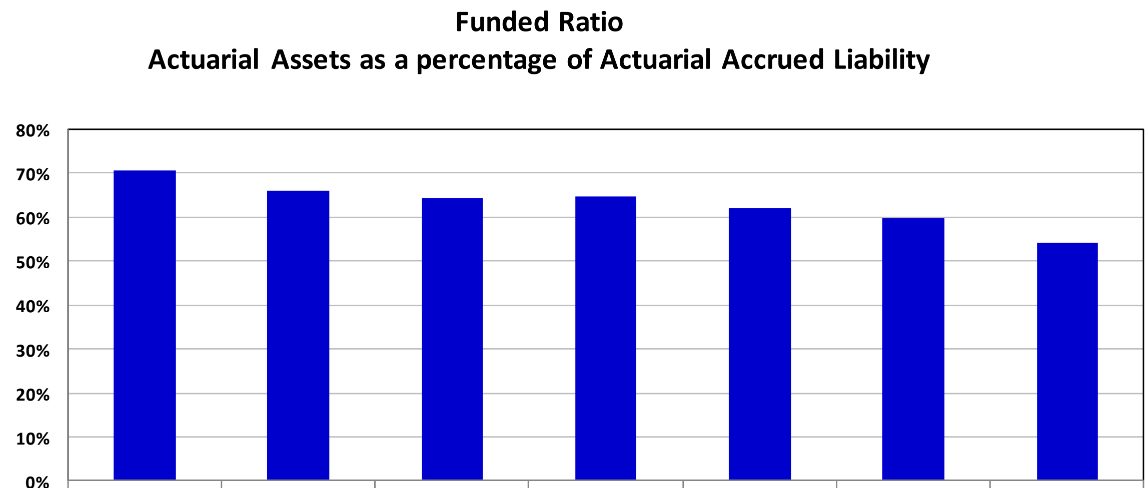
Non-Hazardous Retirement Fund



	2011	2012	2013	2014	2015	2016	2017
Funded Ratio	33.3%	27.3%	23.2%	21.0%	19.0%	16.0%	13.6%

Funding Progress (Continued)

Hazardous Retirement Fund



	2011	2012	2013	2014	2015	2016	2017
Funded Ratio	70.8%	66.1%	64.5%	64.6%	62.2%	59.7%	54.1%

Assuming the actuarial determined contributions are actually paid in future years, then absent future unfavorable investment or demographic experience we expect the funded ratio to begin improving. Also, the dollar amount of the unfunded actuarial accrued liability, or the difference between the actuarial accrued liability and the actuarial value of assets, is expected to decrease after those higher contribution rates become effective. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the Retirement System.

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 returns are computed net of investment expenses. The actuarial value of assets for the non-hazardous retirement fund slightly increased from $2.112 billion to $2.124 billion since the prior valuation. Table 7 in the following section of the report provides the development of the actuarial value of assets.

The rate of return on the market value of assets on a dollar-weighted basis for fiscal year 2017 was 11.4% for the non-hazardous retirement fund which is greater than the 6.75% expected annual return during that fiscal year. The return on an actuarial (smoothed) asset value was 6.1%. 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 $0.067 billion less than the actuarial value of assets, which signifies that the retirement system is in a position of deferred losses. Therefore, unless the System experiences investment returns in excess of the assumed rate of return in an amount that is at least equal to the outstanding deferred losses, the future recognition of these deferred losses is expected to increase the unfunded actuarial accrued liability.

Table 6 in the following section of this report provides asset information that was included in the annual financial statements of the System. Also, Tables 6 and 7 show the estimated yield on a market value basis and on the actuarial asset valuation method.

Actuarial Gains/ (Losses)

The annual actuarial valuation is a snapshot analysis of the benefit liabilities, assets and funded position of the System 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 the 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 actuarial gains / (loss) 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, changes in plan provisions, etc.

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	$ 11,112,412	$ 377,219
2. Normal cost and administrative expenses	157,499	22,423
3. Less: contributions for the year	(857,664)	(70,498)
4. Interest accrual	726,457	26,489
5. Expected UAAL (Sum of Items 1 - 4)	$ 11,138,704	$ 355,633
6. Actual UAAL as of June 30,2017	$ 13,468,018	$ 514,261
7. Total gain (loss) for the year (Item 5 - Item 6)	$ (2,329,314)	$ (158,628)
B. Source of gains and losses		
8. Asset gain (loss) for the year	$ (13,806)	$ (765)
9. Liability experience gain (loss) for the year	(157,852)	(27,643)
10. Assumption change	(2,157,656)	(130,220)
11. Total	$ (2,329,314)	$ (158,628)

The accrued liability for the non-hazardous retirement fund was about 1% higher than expected, resulting in a $158 million liability loss. The accrued liability for the hazardous retirement fund was about 3% higher than expected, resulting in a $28 million liability loss, primarily due to higher than expected salary increases during the past year.

4.2

Actuarial Gains/ (Losses) (Continued)

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

		Non-Hazardous		Hazardous
A. Calculation of total actuarial gain or loss				
1. Unfunded actuarial accrued liability (UAAL), previous year	$	1,713,408	$	(95,415)
2. Normal cost and administrative expenses		39,632		8,539
3. Less: contributions for the year		(157,511)		(6,431)
4. Interest accrual		124,085		(7,077)
5. Expected UAAL (Sum of Items 1 - 4)	$	1,719,614	$	(100,384)
6. Actual UAAL as of June 30,2017	$	1,859,578	$	(74,019)
7. Total gain (loss) for the year (Item 5 - Item 6)	$	(139,964)	$	(26,365)
B. Source of gains and losses				
8. Asset gain (loss) for the year	$	(3,451)	$	(3,431)
9. Liability experience gain (loss) for the year		139,085		26,833
10. Assumption change		(275,598)		(49,767)
11. Total	$	(139,964)	$	(26,365)

The 2018 premiums were known at the time of the valuation and were incorporated into the liability measurement. Premiums were lower than expected and resulted in a $132 million liability experience gain for the non-hazardous insurance fund and a $24 million liability experience gain for the hazardous insurance fund.

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. An experience study was conducted as of June 30, 2013 and the next experience study will be conducted as of June 30, 2018. However, the Board has the authority to review the assumptions on a more frequent basis and adopt new assumptions prior to the next scheduled experience study. Since the last actuarial valuation, the Board made the following changes in assumptions:

- Decrease the assumed rate of return to 5.25% for the non-hazardous retirement fund.
- Decrease the assumed rate of return to 6.25% for the hazardous retirement fund and both health insurance funds.
- Decrease the price inflation assumption to 2.30% for the retirement and health insurance funds.
- Amortize the unfunded accrued liability for the retirement and health insurance funds based on a 0.00% payroll growth assumption (i.e. on a level dollar basis), but employers will continue contributing the contribution rate determined as a percentage of the expected covered payroll.
- Decrease in the individual salary increase assumption and health care trend assumption that corresponds with the 0.95% decrease in the price inflation assumption.

Appendix A includes a summary of the actuarial assumptions and methods used in this valuation. It is our opinion that the assumptions are internally consistent, reasonable, and reflect anticipated future experience of the System. The next experience study will be conducted no later than as of June 30, 2018.

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 benefit provisions for KERS. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

This valuation reflects all benefits promised to KERS members, either by the statutes or by the Board. There are no ancillary benefits that might be deemed a KERS liability if continued beyond the availability of funding by the current funding source.

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, 2017	
		Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members	$ 1,531,535	$ 162,418
2.	Present value of future pay	$ 12,869,356	$ 1,364,081
3.	Normal cost rate		
	a. Total normal cost rate	12.45%	17.10%
	b. Less: member contribution rate	-5.00%	-8.00%
	c. Employer normal cost rate	7.45%	9.10%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 5,514,500	$ 592,881
	b. Less: present value of future normal costs	(1,531,205)	(217,811)
	c. Actuarial accrued liability	$ 3,983,295	$ 375,070
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 11,120,669	$ 712,284
	b. Inactive members	487,677	34,066
	c. Active members (Item 4c)	3,983,295	375,070
	d. Total	$ 15,591,641	$ 1,121,420
6.	Actuarial value of assets	$ 2,123,623	$ 607,159
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 13,468,018	$ 514,261
8.	Funded Ratio	13.6%	54.1%

4.2

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

		June 30, 2017	
		Non-Hazardous (1)	Hazardous (2)
1.	Active members		
	a. Service retirement	$ 5,027,645	$ 538,918
	b. Deferred termination benefits and refunds	355,339	41,227
	c. Survivor benefits	28,322	3,260
	d. Disability benefits	103,194	9,476
	e. Total	$ 5,514,500	$ 592,881
2.	Retired members		
	a. Service retirement	$ 10,203,322	$ 656,827
	b. Disability retirement	292,992	16,391
	c. Beneficiaries	624,355	39,066
	d. Total	$ 11,120,669	$ 712,284
3.	Inactive members		
	a. Vested terminations	$ 422,927	$ 26,360
	b. Nonvested terminations	64,750	7,706
	c. Total	$ 487,677	$ 34,066
4.	Total actuarial present value of future benefits	$ 17,122,846	$ 1,339,231

Development of Required Contribution Rate
Retirement Benefits

		June 30, 2017	
		Non-Hazardous (1)	Hazardous (2)
1.	Total normal cost rate		
	a. Service retirement	9.82%	13.98%
	b. Deferred termination benefits and refunds	2.18%	2.57%
	c. Survivor benefits	0.07%	0.15%
	d. Disability benefits	0.38%	0.40%
	e. Total	12.45%	17.10%
2.	Less: member contribution rate	-5.00%	-8.00%
3.	Total employer normal cost rate	7.45%	9.10%
4.	Administrative expenses	0.72%	0.57%
5.	Net employer normal cost rate	8.17%	9.67%
6.	UAAL amortization contribution	62.86%	24.72%
7.	Total recommended employer contribution	71.03%	34.39%

Actuarial Balance Sheet

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)

		June 30, 2017		June 30, 2016	
		(1)		(2)	
1.	Assets - Present and Expected Future Resources				
	a. Current assets (actuarial value)	$	2,123,623	$	2,112,286
	b. Present value of future member contributions	$	643,468	$	695,862
	c. Present value of future employer contributions				
	i. Normal cost contributions	$	887,737	$	556,170
	ii. Unfunded accrued liability contributions		13,468,018		11,112,412
	iii. Total future employer contributions	$	14,355,755	$	11,668,582
	d. Total assets	$	17,122,846	$	14,476,730
2.	Liabilities - Present Value of Expected Future Benefit Payments				
	a. Active members				
	i. Present value of future normal costs	$	1,531,205	$	1,252,032
	ii. Accrued liability		3,983,295		3,214,530
	iii. Total present value of future benefits	$	5,514,500	$	4,466,562
	b. Present value of benefits payable on account of current retired members and beneficiaries	$	11,120,669	$	9,600,528
	c. Present value of benefits payable on account of current inactive members	$	487,677	$	409,640
	d. Total liabilities	$	17,122,846	$	14,476,730

Actuarial Balance Sheet

Hazardous Members Retirement

(Dollar amounts expressed in thousands)

		June 30, 2017 (1)		June 30, 2016 (2)
1. Assets - Present and Expected Future Resources				
a. Current assets (actuarial value)	$	607,159	$	559,487
b. Present value of future member contributions	$	109,126	$	107,587
c. Present value of future employer contributions				
i. Normal cost contributions	$	108,685	$	71,148
ii. Unfunded accrued liability contributions		514,261		377,219
iii. Total future employer contributions	$	622,946	$	448,367
d. Total assets	$	1,339,231	$	1,115,441
2. Liabilities - Present Value of Expected Future Benefit Payments				
a. Active members				
i. Present value of future normal costs	$	217,811	$	178,735
ii. Accrued liability		375,070		288,224
iii. Total present value of future benefits	$	592,881	$	466,959
b. Present value of benefits payable on account of current retired members and beneficiaries	$	712,284	$	618,592
c. Present value of benefits payable on account of current inactive members	$	34,066	$	29,890
d. Total liabilities	$	1,339,231	$	1,115,441

Reconciliation of Retirement Net Assets
(Dollar amounts expressed in thousands)

	Year Ending	
	June 30, 2017	June 30, 2017
	(1)	(2)
	Non-Hazardous	**Hazardous**
1. Value of assets at beginning of year	$ 1,953,422	$ 524,679
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 100,543	$ 17,524
ii. Employer contributions	644,804	37,630
iii. Other contributions (less 401h)	112,317	15,344
iii. Total	$ 857,664	$ 70,498
b. Income		
i. Interest, dividends, and other income	$ 66,528	$ 16,321
ii. Investment expenses	(15,600)	(4,267)
iii. Net	$ 50,928	$ 12,054
c. Net realized and unrealized gains (losses)	166,122	58,554
d. Total revenue	$ 1,074,714	$ 141,106
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 11,819	$ 2,106
ii. Regular annuity benefits	948,490	61,231
iii. Other benefit payments	0	0
iv. Transfers to other systems	0	0
v. Total	$ 960,309	$ 63,338
b. Administrative expenses and depreciation	10,957	919
c. Total expenditures	$ 971,266	$ 64,257
4. Increase in net assets (Item 2. - Item 3.)	$ 103,447	$ 76,850
5. Value of assets at end of year (Item 1. + Item 4.)	$ 2,056,870	$ 601,529
6. Net external cash flow		
a. Dollar amount	$ (113,602)	$ 6,242
b. Percentage of market value	-5.7%	1.1%
7. Estimated annual return on net assets	11.4%	13.4%

Development of Actuarial Value of Assets

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2017
1.	Actuarial value of assets at beginning of year	$	2,112,286
2.	Market value of assets at beginning of year	$	1,953,422
3.	Net new investments		
	a. Contributions	$	857,664
	b. Benefit payments		(960,309)
	c. Administrative expenses		(10,957)
	d. Subtotal	$	(113,602)
4.	Market value of assets at end of year	$	2,056,870
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	217,050
6.	Assumed investment return rate for fiscal year		6.75%
7.	Expected return for immediate recognition	$	128,022
8.	Excess return for phased recognition	$	89,028

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2017	$	89,028	$	17,806
b.	2016		(183,443)		(36,689)
c.	2015		(142,444)		(28,489)
d.	2014		145,338		29,068
e.	2013		76,106		15,221
f.	Total			$	(3,083)

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	2,123,623
11.	Ratio of actuarial value to market value		103.2%
12.	Estimated annual return on actuarial value of assets		6.1%

* Amounts may not add due to rounding

4.2

Development of Actuarial Value of Assets

Hazardous Members Retirement

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2017
1.	Actuarial value of assets at beginning of year	$	559,487
2.	Market value of assets at beginning of year	$	524,679
3.	Net new investments		
	a. Contributions	$	70,498
	b. Benefit payments		(63,338)
	c. Administrative expenses		(919)
	d. Subtotal	$	6,242
4.	Market value of assets at end of year	$	601,529
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	70,608
6.	Assumed investment return rate for fiscal year		7.50%
7.	Expected return for immediate recognition	$	39,585
8.	Excess return for phased recognition	$	31,023

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2017	$	31,023	$	6,205
b.	2016		(42,195)		(8,439)
c.	2015		(33,972)		(6,794)
d.	2014		42,286		8,457
e.	2013		12,081		2,416
f.	Total			$	1,845

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	607,159
11.	Ratio of actuarial value to market value		100.9%
12.	Estimated annual return on actuarial value of assets		7.4%

* Amounts may not add due to rounding

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

June 30,	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annual Covered Payroll	UAAL as % of Payroll (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Non-Hazardous Members			
2011	$ 3,726,986	$ 11,182,142	$ 7,455,156	33.3%	$ 1,731,633	430.5%
2012	3,101,317	11,361,048	8,259,731	27.3%	1,644,897	502.1%
2013	2,636,123	11,386,602	8,750,479	23.2%	1,644,409	532.1%
2014	2,423,957	11,550,110	9,126,154	21.0%	1,577,496	578.5%
2015	2,350,990	12,359,673	10,008,683	19.0%	1,544,234	648.1%
2016	2,112,286	13,224,698	11,112,412	16.0%	1,529,249	726.7%
2017	2,123,623	15,591,641	13,468,018	13.6%	1,531,535	879.4%
			Hazardous Members			
2011	$ 510,749	$ 721,293	$ 210,545	70.8%	$ 133,054	158.2%
2012	497,226	752,699	255,473	66.1%	131,977	193.6%
2013	505,657	783,981	278,324	64.5%	132,015	210.8%
2014	527,897	816,850	288,953	64.6%	129,076	223.9%
2015	556,688	895,433	338,746	62.2%	128,680	263.2%
2016	559,487	936,706	377,219	59.7%	147,563	255.6%
2017	607,159	1,121,420	514,261	54.1%	162,418	316.6%
			Total KERS Members			
2011	$ 4,237,735	$ 11,903,435	$ 7,665,700	35.6%	$ 1,864,687	411.1%
2012	3,598,543	12,113,747	8,515,204	29.7%	1,776,874	479.2%
2013	3,141,780	12,170,583	9,028,803	25.8%	1,776,424	508.3%
2014	2,951,854	12,366,960	9,415,106	23.9%	1,706,572	551.7%
2015	2,907,678	13,255,106	10,347,428	21.9%	1,672,914	618.5%
2016	2,671,773	14,161,404	11,489,631	18.9%	1,676,812	685.2%
2017	2,730,782	16,713,061	13,982,279	16.3%	1,693,953	825.4%

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, 2017	June 30, 2017
Actuarial cost method:	Entry Age Normal	Entry Age Normal
Amortization method:	Level percentage of payroll (0% payroll growth assumed)	Level percentage of payroll (0% payroll growth assumed)
Amortization period for contribution rate:	26-year closed period	26-year closed period
Asset valuation method:	5-Year Smoothed Market	5-Year Smoothed Market
Actuarial assumptions:		
Investment rate of return	5.25%	6.25%
Projected salary increases	3.55% to 15.55% (varies by service)	3.55% to 19.55% (varies by service)
Inflation	2.30%	2.30%
Post-retirement benefit adjustments	0.00%	0.00%
Retiree Mortality	RP-2000 Combined Mortality Table for Males and Females, projected using scale BB to 2013 (set back one year for females).	RP-2000 Combined Mortality Table for Males and Females, projected using scale BB to 2013 (set back one year for females).

4.2

Solvency Test
Retirement Benefits
(Dollar amounts expressed in thousands)

June 30,	Actuarial Accrued Liability: Active Member Contributions	Actuarial Accrued Liability: Retired Members & Beneficiaries	Actuarial Accrued Liability: Active Members (Employer Financed)	Valuation Assets	Portion of Aggregate Accrued Liabilities Covered by Assets: Active	Portion of Aggregate Accrued Liabilities Covered by Assets: Retired	Portion of Aggregate Accrued Liabilities Covered by Assets: ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Non-Hazardous Members				
2008	$ 875,178	$ 7,162,497	$ 2,092,015	$ 5,318,793	100.0%	62.0%	0.0%
2009	793,575	8,205,156	1,659,819	4,794,611	100.0%	48.8%	0.0%
2010	869,484	8,329,758	1,805,553	4,210,216	100.0%	40.1%	0.0%
2011	916,569	8,482,714	1,782,859	3,726,986	100.0%	33.1%	0.0%
2012	885,137	8,708,536	1,767,375	3,101,317	100.0%	25.4%	0.0%
2013	922,928	8,709,324	1,754,351	2,636,123	100.0%	19.7%	0.0%
2014	928,558	8,870,693	1,750,860	2,423,957	100.0%	16.9%	0.0%
2015	925,934	9,437,468	1,996,271	2,350,990	100.0%	15.1%	0.0%
2016	920,120	10,010,168	2,294,410	2,112,286	100.0%	11.9%	0.0%
2017	934,559	11,608,346	3,048,736	2,123,623	100.0%	10.2%	0.0%
			Hazardous Members				
2008	$ 89,591	$ 355,772	$ 172,648	$ 502,132	100.0%	100.0%	32.9%
2009	87,780	413,972	172,659	502,503	100.0%	100.0%	0.4%
2010	88,511	441,657	157,981	502,729	100.0%	93.8%	0.0%
2011	86,614	490,395	144,284	510,749	100.0%	86.5%	0.0%
2012	82,101	521,689	148,910	497,226	100.0%	79.6%	0.0%
2013	82,146	545,597	156,238	505,657	100.0%	77.6%	0.0%
2014	83,664	581,231	151,955	527,897	100.0%	76.4%	0.0%
2015	83,606	633,189	178,638	556,688	100.0%	74.7%	0.0%
2016	86,705	648,482	201,519	559,487	100.0%	72.9%	0.0%
2017	93,350	746,350	281,720	607,159	100.0%	68.8%	0.0%

4.2

INSURANCE BENEFITS

ACTUARIAL TABLES

Development of Unfunded Actuarial Accrued Liability
Insurance Benefits

(Dollar amounts expressed in thousands)

		June 30, 2017	
		Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members	$ 1,531,535	$ 162,418
2.	Present value of future pay	$ 11,971,740	$ 1,360,355
3.	Normal cost rate		
	a. Total normal cost rate	3.06%	6.40%
	b. Less: member contribution rate	-0.35%	-0.52%
	c. Employer normal cost rate	2.71%	5.88%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 1,444,863	$ 246,482
	b. Less: present value of future normal costs	(336,661)	(70,859)
	c. Actuarial accrued liability	$ 1,108,202	$ 175,623
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 1,452,876	$ 233,808
	b. Inactive members	122,418	10,008
	c. Active members (Item 4c)	1,108,202	175,623
	d. Total	$ 2,683,496	$ 419,439
6.	Actuarial value of assets	$ 823,918	$ 493,458
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 1,859,578	$ (74,019)
8.	Funded Ratio	30.7%	117.6%

Development of Required Contribution Rate
Insurance Benefits

		June 30, 2017	
		Non-Hazardous (1)	Hazardous (2)
1.	Total normal cost rate	3.06%	6.40%
2.	Less: member contribution rate	-0.35%	-0.52%
3.	Total employer normal cost rate	2.71%	5.88%
4.	Administrative expenses	0.06%	0.06%
5.	Net employer normal cost rate	2.77%	5.94%
6.	UAAL amortization contribution	9.63%	-3.48%
7.	Total recommended employer contribution	12.40%	2.46%

Actuarial Balance Sheet

Non-Hazardous Members Insurance

(Dollar amounts expressed in thousands)

	June 30, 2017 (1)	June 30, 2016 (2)
1. Assets - Present and Expected Future Resources		
a. Current assets (actuarial value)	$ 823,918	$ 743,270
b. Present value of future member contributions	$ 53,847	$ 48,293
c. Present value of future employer contributions		
i. Normal cost contributions	$ 282,814	$ 243,915
ii. Unfunded accrued liability contributions	1,859,578	1,713,408
iii. Total future employer contributions	$ 2,142,392	$ 1,957,323
d. Total assets	$ 3,020,157	$ 2,748,886
2. Liabilities - Present Value of Expected Future Benefit Payments		
a. Active members		
i. Present value of future normal costs	$ 336,661	$ 292,208
ii. Accrued liability	1,108,202	973,042
iii. Total present value of future benefits	$ 1,444,863	$ 1,265,250
b. Present value of benefits payable on account of current retired members and beneficiaries	$ 1,452,876	$ 1,352,227
c. Present value of benefits payable on account of current inactive members	$ 122,418	$ 131,409
d. Total liabilities	$ 3,020,157	$ 2,748,886

Actuarial Balance Sheet

Hazardous Members Insurance

(Dollar amounts expressed in thousands)

		June 30, 2017		June 30, 2016
		(1)		(2)
1. Assets - Present and Expected Future Resources				
a. Current assets (actuarial value)	$	493,458	$	473,160
b. Present value of future member contributions	$	9,088	$	7,276
c. Present value of future employer contributions				
i. Normal cost contributions	$	61,771	$	47,365
ii. Unfunded accrued liability contributions		(74,019)		(95,415)
iii. Total future employer contributions	$	(12,248)	$	(48,050)
d. Total assets	$	490,298	$	432,386
2. Liabilities - Present Value of Expected Future Benefit Payments				
a. Active members				
i. Present value of future normal costs	$	70,859	$	54,641
ii. Accrued liability		175,623		149,384
iii. Total present value of future benefits	$	246,482	$	204,025
b. Present value of benefits payable on account of current retired members and beneficiaries	$	233,808	$	217,753
c. Present value of benefits payable on account of current inactive members	$	10,008	$	10,608
d. Total liabilities	$	490,298	$	432,386

Reconciliation of Insurance Net Assets

(Dollar amounts expressed in thousands)

	Year Ending June 30, 2017 (1) Non-Hazardous	Year Ending June 30, 2017 (2) Hazardous
1. Value of assets at beginning of year	$ 695,189	$ 440,596
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 5,156	$ 811
ii. Employer contributions	133,024	4,688
iii. Other contributions	19,332	932
iii. Total	$ 157,511	$ 6,431
b. Income		
i. Interest, dividends, and other income	$ 19,834	$ 13,191
ii. Investment expenses	(4,227)	(3,402)
iii. Net	$ 15,608	$ 9,789
c. Net realized and unrealized gains (losses)	79,244	49,786
d. Total revenue	$ 252,363	$ 66,006
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 0	$ 0
ii. Healthcare premium subsidies	127,648	17,562
iii. Other benefit payments	1,673	97
iv. Transfers to other systems	0	0
v. Total	$ 129,321	$ 17,659
b. Administrative expenses and depreciation	861	105
c. Total expenditures	$ 130,182	$ 17,764
4. Increase in net assets (Item 2. - Item 3.)	$ 122,181	$ 48,242
5. Value of assets at end of year (Item 1. + Item 4.)	$ 817,370	$ 488,838
6. Net external cash flow		
a. Dollar amount	$ 27,330	$ (11,333)
b. Percentage of market value	3.6%	-2.4%
7. Estimated annual return on net assets	13.4%	13.7%

Development of Actuarial Value of Assets

Non-Hazardous Members Insurance
(Dollar amounts expressed in thousands)*

	Year Ending	June 30, 2017
1.	Actuarial value of assets at beginning of year	$ 743,270
2.	Market value of assets at beginning of year	$ 695,189
3.	Net new investments	
	a. Contributions	$ 157,511
	b. Benefit payments	(129,321)
	c. Administrative expenses	(861)
	d. Subtotal	$ 27,330
4.	Market value of assets at end of year	$ 817,370
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$ 94,851
6.	Assumed investment return rate for fiscal year	7.50%
7.	Expected return for immediate recognition	$ 53,164
8.	Excess return for phased recognition	$ 41,687

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

	Fiscal Year Ending June 30,	Excess Return	Recognized Amount
a.	2017	$ 41,687	$ 8,337
b.	2016	(55,901)	(11,180)
c.	2015	(43,387)	(8,677)
d.	2014	54,989	10,998
e.	2013	3,380	676
f.	Total		$ 154

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$ 823,918
11.	Ratio of actuarial value to market value	100.8%
12.	Estimated annual return on actuarial value of assets	7.0%

* Amounts may not add due to rounding

Development of Actuarial Value of Assets

Hazardous Members Insurance

(Dollar amounts expressed in thousands)*

			June 30, 2017
	Year Ending		
1.	Actuarial value of assets at beginning of year	$	473,160
2.	Market value of assets at beginning of year	$	440,596
3.	Net new investments		
	a. Contributions	$	6,431
	b. Benefit payments		(17,659)
	c. Administrative expenses		(105)
	d. Subtotal	$	(11,333)
4.	Market value of assets at end of year	$	488,838
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	59,575
6.	Assumed investment return rate for fiscal year		7.50%
7.	Expected return for immediate recognition	$	32,619
8.	Excess return for phased recognition	$	26,956
9.	Phased-in recognition, 20% of excess return on assets for prior years:		

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2017	$	26,956	$	5,391
b.	2016		(33,995)		(6,799)
c.	2015		(25,896)		(5,179)
d.	2014		22,857		4,571
e.	2013		5,137		1,027
f.	Total			$	(988)

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	493,458
11.	Ratio of actuarial value to market value		100.9%
12.	Estimated annual return on actuarial value of assets		6.8%

* Amounts may not add due to rounding

4.2

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						
2011	$ 451,620	$ 4,280,090	$ 3,828,469	10.6%	$ 1,731,633	221.1%
2012	446,081	3,125,330	2,679,250	14.3%	1,644,897	162.9%
2013	497,584	2,128,754	1,631,170	23.4%	1,644,409	99.2%
2014	621,237	2,226,760	1,605,523	27.9%	1,577,496	101.8%
2015	695,018	2,413,705	1,718,687	28.8%	1,544,234	111.3%
2016	743,270	2,456,678	1,713,408	30.3%	1,529,249	112.0%
2017	823,918	2,683,496	1,859,578	30.7%	1,531,535	121.4%
Hazardous Members						
2011	$ 329,962	$ 507,059	$ 177,097	65.1%	$ 133,054	133.1%
2012	345,574	384,592	39,018	89.9%	131,977	29.6%
2013	370,774	385,518	14,743	96.2%	132,015	11.2%
2014	419,396	396,987	(22,409)	105.6%	129,076	-17.4%
2015	451,514	374,904	(76,610)	120.4%	128,680	-59.5%
2016	473,160	377,745	(95,415)	125.3%	147,563	-64.7%
2017	493,458	419,439	(74,019)	117.6%	162,418	-45.6%
Total KERS Members						
2011	$ 781,582	$ 4,787,149	$ 4,005,567	16.3%	$ 1,864,687	214.8%
2012	791,655	3,509,922	2,718,267	22.6%	1,776,874	153.0%
2013	868,358	2,514,272	1,645,914	34.5%	1,776,424	92.7%
2014	1,040,633	2,623,747	1,583,114	39.7%	1,706,572	92.8%
2015	1,146,532	2,788,609	1,642,077	41.1%	1,672,914	98.2%
2016	1,216,430	2,834,423	1,617,993	42.9%	1,676,812	96.5%
2017	1,317,376	3,102,935	1,785,559	42.5%	1,693,953	105.4%

4.2

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							
2008	$ -	$ 2,788,190	$ 2,643,310	$ 603,198	100.0%	21.6%	0.0%
2009	-	2,861,867	1,645,458	534,173	100.0%	18.7%	0.0%
2010	-	2,744,534	1,721,602	471,342	100.0%	17.2%	0.0%
2011	-	2,568,003	1,712,087	451,620	100.0%	17.6%	0.0%
2012	-	1,924,069	1,201,262	446,081	100.0%	23.2%	0.0%
2013	-	1,338,773	789,981	497,584	100.0%	37.2%	0.0%
2014	-	1,425,605	801,155	621,237	100.0%	43.6%	0.0%
2015	-	1,428,350	985,355	695,018	100.0%	48.7%	0.0%
2016	-	1,483,636	973,042	743,270	100.0%	50.1%	0.0%
2017	-	1,575,294	1,108,202	823,918	100.0%	52.3%	0.0%
Hazardous Members							
2008	$ -	$ 228,835	$ 312,822	$ 288,162	100.0%	100.0%	19.0%
2009	-	242,123	249,009	301,635	100.0%	100.0%	23.9%
2010	-	268,511	224,787	314,427	100.0%	100.0%	20.4%
2011	-	285,540	221,519	329,962	100.0%	100.0%	20.1%
2012	-	196,579	188,013	345,574	100.0%	100.0%	79.2%
2013	-	202,032	183,486	370,774	100.0%	100.0%	92.0%
2014	-	206,477	190,509	419,396	100.0%	100.0%	100.0%
2015	-	221,115	153,789	451,514	100.0%	100.0%	100.0%
2016	-	228,361	149,384	473,160	100.0%	100.0%	100.0%
2017	-	243,816	175,623	493,458	100.0%	100.0%	100.0%

SECTION 4

MEMBERSHIP INFORMATION

Membership Tables

4.2

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

		Non-Hazardous June 30, 2017 (1)	Hazardous June 30, 2017 (2)	Total June 30, 2017 (3)
1.	Active members			
	a. Males	14,183	2,808	16,991
	b. Females	23,051	1,239	24,290
	c. Total members	37,234	4,047	41,281
	d. Total annualized prior year salaries	$ 1,531,535	$ 162,418	$ 1,693,953
	e. Average salary	$ 41,133	$ 40,133	$ 41,035
	f. Average age	45.4	40.3	44.9
	g. Average service	10.9	7.6	10.6
	h. Member contributions with interest	$ 934,559	$ 93,350	$ 1,027,910
	i. Average contributions with interest	$ 25,100	$ 23,066	$ 24,900
2.	Vested inactive members			
	a. Number	10,794	505	11,299
	b. Total annual deferred benefits	$ 69,704	$ 3,363	$ 73,067
	c. Average annual deferred benefit	$ 6,458	$ 6,659	$ 6,467
	d. Average age at the valuation date	48.8	45.1	N/A
3.	Nonvested inactive members			
	a. Number	38,864	4,793	43,657
	b. Total member contributions with interest	$ 64,750	$ 7,706	$ 72,457
	c. Average contributions with interest	$ 1,666	$ 1,608	$ 1,660
4.	Service retirees			
	a. Number	38,170	3,505	41,675
	b. Total annual benefits	$ 828,249	$ 53,647	$ 881,896
	c. Average annual benefit	$ 21,699	$ 15,306	$ 21,161
	d. Average age at the valuation date	68.8	64.5	68.5
5.	Disabled retirees			
	a. Number	1,978	159	2,137
	b. Total annual benefits	$ 25,776	$ 1,407	$ 27,183
	c. Average annual benefit	$ 13,031	$ 8,849	$ 12,720
	d. Average age at the valuation date	65.2	59.5	64.8
6.	Beneficiaries			
	a. Number	4,768	429	5,197
	b. Total annual benefits	$ 67,277	$ 4,108	$ 71,385
	c. Average annual benefit	$ 14,110	$ 9,576	$ 13,736
	d. Average age at the valuation date	71.0	66.2	70.6

Summary of Historical Active Membership

	Active Members		Covered Payroll[1]		Average Annual Pay	
June 30,	Number	Percent Increase /(Decrease)	Amount in Thousands	Percent Increase /(Decrease)	Amount	Percent Increase /(Decrease)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous Members						
2011	46,617		$ 1,731,633		$ 37,146	-3.6%
2012	42,196	-9.5%	1,644,897	-5.0%	38,982	4.9%
2013	42,226	0.1%	1,644,409	0.0%	38,943	-0.1%
2014	40,365	-4.4%	1,577,496	-4.1%	39,081	0.4%
2015	39,056	-3.2%	1,544,234	-2.1%	39,539	1.2%
2016	37,779	-3.3%	1,529,249	-1.0%	40,479	2.4%
2017	37,234	-1.4%	1,531,535	0.1%	41,133	1.6%
Hazardous Members						
2011	4,291		$ 133,054		$ 31,008	-7.3%
2012	4,086	-4.8%	131,977	-0.8%	32,300	4.2%
2013	4,127	1.0%	132,015	0.0%	31,988	-1.0%
2014	4,024	-2.5%	129,076	-2.2%	32,077	0.3%
2015	3,886	-3.4%	128,680	-0.3%	33,114	3.2%
2016	3,959	1.9%	147,563	14.7%	37,273	12.6%
2017	4,047	2.2%	162,418	10.1%	40,133	7.7%

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

4.2

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	20	0	1	0	0	0	0	0	0	0	0	0	21
	$18,022	$0	$34,204	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,793
20-24	426	224	124	57	7	3	0	0	0	0	0	0	841
	$22,750	$30,422	$30,159	$29,946	$28,139	$31,984	$0	$0	$0	$0	$0	$0	$26,452
25-29	623	657	545	387	283	367	8	0	0	0	0	0	2,870
	$25,204	$31,813	$32,994	$32,931	$34,154	$34,250	$30,421	$0	$0	$0	$0	$0	$31,292
30-34	411	418	429	339	363	1,394	341	15	0	0	0	0	3,710
	$26,132	$35,183	$35,597	$33,933	$36,162	$38,767	$38,951	$39,395	$0	$0	$0	$0	$35,920
35-39	356	336	326	266	267	1,301	1,384	531	35	0	0	0	4,802
	$27,671	$38,151	$34,602	$35,351	$37,439	$39,959	$43,413	$43,161	$50,506	$0	$0	$0	$39,589
40-44	305	304	242	225	192	946	1,175	1,351	405	38	2	0	5,185
	$28,010	$36,398	$34,686	$34,238	$39,015	$39,901	$44,443	$47,258	$49,502	$59,097	$83,546	$0	$42,328
45-49	292	274	243	192	195	916	1,019	1,148	962	336	40	0	5,617
	$28,223	$35,464	$34,656	$34,085	$35,782	$39,998	$44,566	$46,471	$51,721	$53,093	$68,288	$0	$43,729
50-54	187	210	181	211	163	831	929	913	788	516	166	17	5,112
	$28,042	$36,046	$35,598	$35,282	$35,054	$39,806	$42,759	$45,493	$51,399	$54,307	$60,489	$61,460	$44,281
55-59	178	142	118	128	122	728	905	899	619	375	155	31	4,400
	$27,572	$37,687	$35,102	$34,770	$36,529	$38,596	$42,166	$44,802	$47,909	$52,687	$60,243	$65,765	$43,326
60-64	82	84	75	70	93	577	695	690	425	241	95	44	3,171
	$31,260	$54,536	$41,599	$37,602	$39,283	$41,087	$42,090	$45,725	$47,363	$54,107	$60,828	$70,778	$45,135
65 & Over	43	38	37	35	34	268	354	343	164	109	46	34	1,505
	$37,827	$63,557	$36,987	$45,942	$35,558	$39,158	$44,452	$46,968	$50,997	$56,433	$65,165	$71,243	$46,845
Total	2,923	2,687	2,321	1,910	1,719	7,331	6,810	5,890	3,398	1,615	504	126	37,234
	$26,504	$35,705	$34,553	$34,419	$36,350	$39,347	$43,189	$45,870	$50,095	$53,905	$61,615	$68,413	$41,133

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	0	0	0	0	0	0	0	0	0	0	0	0	0
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
20-24	148	78	45	2	0	0	0	0	0	0	0	0	273
	$25,971	$38,449	$37,348	$31,005	$0	$0	$0	$0	$0	$0	$0	$0	$31,448
25-29	158	137	109	100	75	52	0	0	0	0	0	0	631
	$27,771	$35,894	$38,425	$38,060	$39,770	$40,278	$0	$0	$0	$0	$0	$0	$35,462
30-34	73	74	69	55	49	201	48	1	0	0	0	0	570
	$28,533	$37,772	$38,989	$38,650	$40,049	$39,919	$45,216	$42,641	$0	$0	$0	$0	$38,409
35-39	48	37	36	24	34	144	186	31	0	0	0	0	540
	$26,832	$39,720	$37,001	$37,922	$37,059	$41,392	$43,673	$43,649	$0	$0	$0	$0	$40,179
40-44	35	40	32	24	29	98	137	140	18	1	0	0	554
	$25,005	$34,889	$38,317	$40,167	$36,700	$43,398	$44,417	$48,122	$55,037	$79,550	$0	$0	$42,727
45-49	36	39	22	19	25	92	127	117	54	12	0	0	543
	$29,765	$36,942	$39,476	$37,459	$38,227	$40,887	$47,659	$48,081	$53,683	$56,652	$0	$0	$44,322
50-54	25	30	31	22	14	84	87	79	29	16	3	0	420
	$25,653	$35,465	$38,463	$36,740	$41,143	$40,670	$43,816	$46,851	$51,542	$64,509	$60,026	$0	$42,663
55-59	13	16	7	17	15	45	49	52	19	5	2	0	240
	$27,350	$40,343	$42,181	$36,343	$32,722	$41,046	$44,804	$47,864	$52,845	$70,328	$82,597	$0	$43,572
60-64	7	4	9	9	14	49	61	45	8	4	1	0	211
	$29,352	$40,919	$34,410	$36,271	$38,805	$40,090	$42,050	$45,678	$50,553	$61,256	$34,006	$0	$41,787
65 & Over	1	2	1	2	3	11	25	13	2	3	2	0	65
	$23,352	$84,786	$26,409	$43,111	$34,256	$35,069	$42,816	$47,927	$72,713	$61,307	$59,686	$0	$45,173
Total	544	457	361	274	258	776	720	478	130	41	8	0	4,047
	$27,160	$37,331	$38,254	$38,023	$38,519	$40,859	$44,548	$47,337	$53,371	$62,734	$62,331	$0	$40,133

4.2

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	481	$ 11,751	128	$ 1,753	454	$ 5,167	1,063	$ 18,671
50 - 54	1,644	44,975	171	2,547	183	2,216	1,998	49,738
55 - 59	4,011	105,459	281	3,804	323	4,412	4,615	113,675
60 - 64	7,055	172,764	418	5,802	493	7,442	7,966	186,008
65 - 69	9,426	206,490	388	4,926	592	10,133	10,406	221,549
70 - 74	6,810	141,009	253	3,043	646	10,347	7,709	154,399
75 - 79	4,089	75,976	190	2,364	613	9,860	4,892	88,200
80 - 84	2,455	39,493	100	1,063	569	8,209	3,124	48,765
85 - 89	1,440	21,180	38	405	489	5,670	1,967	27,255
90 And Over	759	9,153	11	69	406	3,821	1,176	13,043
Total	**38,170**	**$ 828,249**	**1,978**	**$ 25,776**	**4,768**	**$ 67,277**	**44,916**	**$ 921,302**

4.2

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	198	$ 3,741	28	$ 354	47	$ 358	273	$ 4,453
50 - 54	347	6,752	25	241	19	226	391	7,219
55 - 59	514	9,387	27	233	44	496	585	10,116
60 - 64	679	11,151	28	235	63	708	770	12,094
65 - 69	880	12,460	31	243	64	711	975	13,414
70 - 74	518	6,864	9	67	69	590	596	7,521
75 - 79	228	2,205	6	14	62	546	296	2,765
80 - 84	97	696	5	21	37	308	139	1,025
85 - 89	36	218	0	-	18	95	54	313
90 And Over	8	174	0	-	6	70	14	244
Total	**3,505**	**$ 53,647**	**159**	**$ 1,407**	**429**	**$ 4,108**	**4,093**	**$ 59,162**

4.2

Non-Hazardous Retired Lives Summary

	Male Lives			Female Lives			Total		
Form of Payment	Number		Monthly Benefit Amount	Number		Monthly Benefit Amount	Number		Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	4,000	$	7,199,431	11,597	$	17,003,936	15,597	$	24,203,367
Joint & Survivor:									
100% to Beneficiary	2,249		4,141,025	1,028		1,293,678	3,277		5,434,703
66 2/3% to Beneficiary	808		2,294,297	515		1,028,783	1,323		3,323,080
50% to Beneficiary	1,133		2,876,489	1,452		2,898,594	2,585		5,775,084
Pop-up Option	3,958		9,681,044	3,606		7,034,454	7,564		16,715,498
Social Security Option:									
Age 62 Basic	403		860,926	963		1,577,120	1,366		2,438,046
Age 62 Survivorship	795		1,592,322	610		979,920	1,405		2,572,242
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	1		6,328	0		0	1		6,328
10 Years Certain & Life	962		1,690,766	2,183		3,285,276	3,145		4,976,042
15 Years Certain & Life	427		683,208	594		901,118	1,021		1,584,326
20 Years Certain & Life	420		921,839	613		966,051	1,033		1,887,890
Refund	0		0	0		0	0		0
Partial Lump Sum Option (PLSO):									
12 Month Basic	81		133,879	289		441,461	370		575,340
24 Month Basic	33		40,038	155		199,100	188		239,138
36 Month Basic	141		125,618	396		301,140	537		426,758
12 Month Survivor	102		212,746	102		174,084	204		386,830
24 Month Survivor	79		126,121	76		111,082	155		237,203
36 Month Survivor	222		252,145	155		134,743	377		386,888
Total:	15,814	$	32,838,222	24,334	$	38,330,539	40,148	$	71,168,761

4.2

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	604	$ 681,533	472	$ 504,082	1,076	$ 1,185,615
Joint & Survivor:						
100% to Beneficiary	305	357,738	36	40,460	341	398,198
66 2/3% to Beneficiary	106	139,673	28	32,358	134	172,032
50% to Beneficiary	159	240,641	63	96,308	222	336,949
Pop-up Option	846	1,267,739	169	218,329	1,015	1,486,069
Social Security Option:						
Age 62 Basic	58	67,088	33	29,788	91	96,877
Age 62 Survivorship	136	179,507	18	15,181	154	194,688
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	47	63,141	12	15,204	59	78,345
10 Years Certain & Life	111	133,256	73	64,413	184	197,669
15 Years Certain & Life	46	57,774	23	23,952	69	81,726
20 Years Certain & Life	58	79,865	32	41,978	90	121,843
Refund	0	0	0	0	0	0
Partial Lump Sum Option (PLSO):						
12 Month Basic	10	10,601	13	10,878	23	21,479
24 Month Basic	15	15,175	9	7,948	24	23,123
36 Month Basic	44	37,923	23	20,016	67	57,939
12 Month Survivor	20	26,786	6	5,151	26	31,937
24 Month Survivor	19	27,991	9	11,029	28	39,020
36 Month Survivor	46	45,660	15	18,695	61	64,355
Total:	2,630	$ 3,432,092	1,034	$ 1,155,770	3,664	$ 4,587,862

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	15	$ 8,685	31	$ 33,721	46	$ 42,406
Joint & Survivor:						
100% to Beneficiary	411	373,818	1,426	1,526,485	1,837	1,900,303
66 2/3% to Beneficiary	81	101,018	307	358,426	388	459,444
50% to Beneficiary	175	131,945	425	330,193	600	462,137
Pop-up Option	231	395,789	647	1,049,103	878	1,444,892
Social Security Option:						
Age 62 Basic	0	0	10	9,527	10	9,527
Age 62 Survivorship	83	119,325	289	491,116	372	610,441
Partial Deferred (Old Plan)	0	0	0	0	0	0
Widows Age 60	0	0	3	1,475	3	1,475
5 Years Certain	43	58,509	41	34,945	84	93,455
10 Years Certain	96	69,175	95	73,455	191	142,630
10 Years Certain & Life	28	24,922	40	37,513	68	62,435
15 Years Certain & Life	12	17,463	44	46,676	56	64,139
20 Years Certain & Life	21	35,928	62	112,428	83	148,356
Refund	0	0	0	0	0	0
Partial Lump Sum Option (PLSO):						
12 Month Basic	0	0	1	1,792	1	1,792
24 Month Basic	0	0	0	0	0	0
36 Month Basic	0	0	2	3,357	2	3,357
12 Month Survivor	7	14,743	20	34,246	27	48,990
24 Month Survivor	12	13,730	25	23,881	37	37,611
36 Month Survivor	25	17,183	60	55,825	85	73,008
Total:	1,240	$ 1,382,234	3,528	$ 4,224,163	4,768	$ 5,606,397

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	2	$ 1,052	6	$ 4,264	8	$ 5,316
Joint & Survivor:						
100% to Beneficiary	25	17,918	129	92,927	154	110,845
66 2/3% to Beneficiary	1	368	18	8,555	19	8,922
50% to Beneficiary	7	5,153	28	9,884	35	15,037
Pop-up Option	19	18,849	87	84,606	106	103,455
Social Security Option:	0	0	0	0		
Age 62 Basic	0	0	0	0	0	0
Age 62 Survivorship	8	9,889	29	29,500	37	39,389
Partial Deferred (Old Plan)	0	0	0	0	0	0
Widows Age 60	0	0	0	0	0	0
5 Years Certain	1	635	6	5,089	7	5,723
10 Years Certain	5	5,823	14	12,003	19	17,826
10 Years Certain & Life	6	3,889	3	2,535	9	6,425
15 Years Certain & Life	3	2,044	4	2,627	7	4,670
20 Years Certain & Life	0	0	7	5,460	7	5,460
Refund	0	0	0	0	0	0
Partial Lump Sum Option (PLSO):	0	0	0	0		
12 Month Basic	0	0	0	0	0	0
24 Month Basic	0	0	0	0	0	0
36 Month Basic	0	0	1	126	1	126
12 Month Survivor	0	0	4	4,145	4	4,145
24 Month Survivor	1	995	3	2,022	4	3,017
36 Month Survivor	3	1,640	9	10,330	12	11,970
Total:	81	$ 68,254	348	$ 274,072	429	$ 342,327

4.2

Schedule of Retirants Added to And Removed from Rolls

(Dollar amounts except average allowance expressed in thousands)

Year Ended	Added to Rolls Number	Removed from Rolls Number	Rolls End of the Year Number	Rolls End of the Year Annual Benefits	% Increase in Annual Benefit	Average Annual Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Non-Hazardous			
2011	1,592	940	38,597	$ 821,197		$ 21,276
2012	1,707	1,078	39,226	844,881	2.9%	21,539
2013	1,982	1,014	40,194	872,140	3.2%	21,698
2014	2,067	1,038	41,223	866,047	-0.7%	21,009
2015	2,140	1,094	42,269	883,578	2.0%	20,904
2016	2,441	706	44,004	934,930	5.8%	21,246
2017	2,181	1,269	44,916	921,302	-1.5%	20,512
			Hazardous			
2011	288	59	3,064	$ 45,609		$ 14,885
2012	243	54	3,253	49,231	7.9%	15,134
2013	229	52	3,430	51,122	3.8%	14,904
2014	256	66	3,620	54,272	6.2%	14,992
2015	203	65	3,758	56,431	4.0%	15,016
2016	237	29	3,966	59,001	4.6%	14,877
2017	206	79	4,093	59,162	0.3%	14,454

APPENDIX A

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Methods and Assumptions

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

In general, the assumptions and methods used in the valuation are based on the actuarial experience study for the five-year period ending June 30, 2013, submitted April 30, 2014, and adopted by the Board on December 4, 2014. The investment return, price inflation, and payroll growth assumption were adopted by the Board in May and July 2017 for use with the June 30, 2017 valuation in order to reflect future economic expectations.

Investment return rate:

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

Price Inflation:

Assumed annual rate of 2.30%

Rates of Annual Salary Increase:

Assumed rates of annual salary increases are shown below.

Service Years	Annual Rates of Salary Increases				
	Merit & Seniority		Price Inflation & Productivity	Total Increase	
	Non-Hazardous	Hazardous		Non-Hazardous	Hazardous
0	12.50%	16.50%	3.05%	15.55%	19.55%
1	4.50%	4.50%	3.05%	7.55%	7.55%
2	2.00%	2.50%	3.05%	5.05%	5.55%
3	1.50%	2.00%	3.05%	4.55%	5.05%
4	1.50%	1.50%	3.05%	4.55%	4.55%
5	1.50%	1.00%	3.05%	4.55%	4.05%
6	1.00%	0.50%	3.05%	4.05%	3.55%
7	1.00%	0.50%	3.05%	4.05%	3.55%
8	1.00%	0.50%	3.05%	4.05%	3.55%
9	0.50%	0.50%	3.05%	3.55%	3.55%
10 & Over	0.50%	0.50%	3.05%	3.55%	3.55%

Retirement rates:

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

	Non-Hazardous			Hazardous	
Age	Members participating before 9/1/2008[1]	Members participating on or after 9/1/2008[2]	Service	Members participating before 9/1/2008[3]	Members participating on or after 9/1/2008[4]
55	8.0%		20	40.0%	
56	8.0%		21	40.0%	
57	8.0%		22	40.0%	
58	8.0%		23	40.0%	
59	8.0%		24	40.0%	
60	10.0%	10.0%	25	47.0%	40.0%
61	20.0%	20.0%	26	47.0%	40.0%
62	20.0%	20.0%	27	47.0%	40.0%
63	20.0%	20.0%	28	47.0%	40.0%
64	20.0%	20.0%	29	47.0%	40.0%
65	20.0%	25.0%	30	47.0%	47.0%
66	20.0%	25.0%	31	47.0%	47.0%
67	20.0%	25.0%	32	50.0%	47.0%
68	20.0%	25.0%	33	50.0%	47.0%
69	20.0%	25.0%	34	50.0%	47.0%
70	20.0%	25.0%	35	60.0%	47.0%
71	20.0%	25.0%	36	60.0%	47.0%
72	20.0%	25.0%	37	60.0%	50.0%
73	20.0%	25.0%	38	60.0%	50.0%
74	20.0%	25.0%	39	60.0%	50.0%
75	100.0%	100.0%	40	60.0%	60.0%

[1] If service is at least 27 years, the rate is 35%.
[2] If age plus service is at least 87, the rate is 35%.
[3] The annual rate of service retirement is 100% at age 65.
[4] The annual rate of service retirement is 100% at age 60.

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Disability rates:

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

Age	Non-Hazardous		Hazardous	
	Male	Female	Male	Female
20	0.02%	0.02%	0.03%	0.03%
30	0.03%	0.03%	0.05%	0.05%
40	0.07%	0.07%	0.10%	0.10%
50	0.19%	0.19%	0.28%	0.28%
60	0.49%	0.49%	0.73%	0.73%

Withdrawal rates (for causes other than death, disability or retirement):

Assumed annual rates of withdrawal are shown below.

Service Years	Annual Rates of Withdrawal	
	Non-Hazardous	Hazardous
0	22.50%	25.00%
1	15.50%	10.50%
2	12.50%	7.50%
3	10.50%	6.50%
4	9.00%	5.50%
5	6.50%	4.50%
6	5.50%	3.00%
7	5.00%	3.00%
8	4.50%	3.00%
9	4.50%	2.50%
10	4.00%	2.50%
11-12	4.00%	2.00%
13-14	3.50%	2.00%
15 & Over	3.00%	2.00%

Mortality Assumption:

Pre-retirement mortality: RP-2000 Combined Mortality Table projected with Scale BB to 2013. Male mortality rates are multiplied by 50% and female mortality rates are multiplied by 30%.

Post-retirement mortality (non-disabled): RP-2000 Combined Mortality Table projected with Scale BB to 2013. Female mortality rates are set back one year.

Post-retirement mortality (disabled): RP-2000 Combined Disabled Mortality Table projected with Scale BB to 2013. Male mortality rates are set back four years.

At the time of the last experience study, performed as of June 30, 2013, this mortality assumption provided 37% and 19% margin for future improvement for males and females, respectively.

Marital status:

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

Line of Duty Disability

0% of disabilities are assumed to occur in the line of duty

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 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[1]:

January 1	Non-Medicare Plans	Medicare Plans	Dollar Contribution[2]
2019	7.25%	5.10%	1.50%
2020	7.00%	5.00%	1.50%
2021	6.75%	4.90%	1.50%
2022	6.50%	4.80%	1.50%
2023	6.25%	4.70%	1.50%
2024	6.00%	4.60%	1.50%
2025	5.75%	4.50%	1.50%
2026	5.50%	4.40%	1.50%
2027	5.25%	4.30%	1.50%
2028	5.00%	4.20%	1.50%
2029	4.75%	4.10%	1.50%
2030	4.50%	4.05%	1.50%
2031	4.25%	4.05%	1.50%
2032 & Beyond	4.05%	4.05%	1.50%

[1]All increases are assumed to occur on January 1. The 2018 premiums were known at the time of the valuation and were incorporated into the liability measurement using a trend of 1.232% for Non-Medicare plans and a trend of 0.00% for Medicare plans at January 1, 2018.

[2]Applies to members participating on or after July 1, 2003

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- 15 years from the valuation

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:

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- 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 between 7/1/2003 and 9/1/2008	Members participating after 9/1/2008
Under 10	50%	100%	100%
10-14	75%	100%	100%
15-19	90%	100%	100%
Over 20	100%	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	June 30, 2017 Participation*
Medical Only	7%
Essential	8%
Premium	84%

* May not add due to rounding

Non-Medicare Plan	June 30, 2017 Participation
Standard PPO	14%
Standard CDHP	2%
LivingWell CDHP	22%
LivingWell PPO	62%

- 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 with non-hazardous service are assumed to begin health coverage at age 55 for members participating before September 1, 2008, and at age 60 for members participating on or after September 1, 2008. Deferred vested members with hazardous service are assumed to begin health coverage at age 50.

- 50% of future retirees, with hazardous service, are assumed to elect spouse health care coverage. No dependent coverage is assumed for members who only have non-hazardous service. 100% of spouses with health care coverage are assumed to continue coverage after the member's death.

Excise ("Cadillac") Tax:

For taxable years beginning after December 31, 2019, a 40% excise tax will be required to be paid (by the employer and/or insurer) on the aggregate cost of the health plan in excess of certain legislated thresholds. For 2018, the thresholds are $850 per month for individual coverage and $2,292 per month for family coverage.

Both Actuarial Standard of Practice No. 6 and GASB Statement Nos. 74 and 75 reference this tax, and, in accordance with these standards an estimate of the impact of the Cadillac tax has been included in this valuation.

Assumptions and methods used to determine the impact of the Cadillac Tax include:

- 2018 thresholds of $850/$2,292 were indexed annually by 2.30%.
- Premium data submitted was not adjusted for permissible exclusions to the Cadillac Tax.
- There were no special adjustments to the dollar limit other than those permissible for non-Medicare retirees over 55.

In this valuation, the impact of the Cadillac Tax has been calculated by increasing the employer paid premiums for Non-Medicare retirees, who became participants before July 1, 2003, by 3.6%. Non-Medicare retirees who became participants after July 1, 2003 receive dollar subsidies per year of service, which are not expected to exceed the overall Non-Medicare premiums. As a result, the costs attributable to the Cadillac Tax for members who became participants after July 1, 2003 will be paid by the retirees.

Changes in Assumptions since the prior valuation:

1. The assumed investment return was changed from 6.75% to 5.25% for the non-hazardous retirement fund and from 7.50% to 6.25% for the hazardous retirement fund and both insurance funds.
2. The price inflation assumption was changed from 3.25% to 2.30%, which also resulted in a 0.95% decrease in the salary increase assumption at all years of service and a 0.95% decrease in the health care cost trend rates.
3. The amortization method for unfunded accrued liabilities was changed to a level dollar basis (which is then converted to a percentage of expected covered payroll) from a level percentage of pay basis.

Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2017, 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 $862.64 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 KRS pays 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 KRS 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 to KRS which include the liabilities associated with the implicit rate subsidy.

For those not eligible for Medicare		
Age	Member	Spouse/Dependents
<65	$711.22	$862.64

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2017, 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	$208.66	$196.81
75	244.13	238.22
85	258.16	261.20

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

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

Mehdi Riazi

Mehdi Riazi, FSA, EA, MAAA

APPENDIX B

BENEFIT PROVISIONS

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

KERS Non-Hazardous Employees

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

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

KERS Non-Hazardous Employees (continued)

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

Normal Retirement Eligibility: Age 65 with at least 5 years of service; or Rule of 87 (Age 57 or older if age plus service equals 87)

Benefit Amount: The monthly benefit is equal to the applicable benefit multiplier times final average compensation times years of service.

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

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

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

Early Retirement Eligibility: Age 60 with at least 10 years of service

Early Retirement Reduction: Normal Retirement benefit reduced 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member's retirement date precedes the member's normal retirement eligibility.

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

Normal Retirement Eligibility: Age 65 with at least 5 years of service; or Rule of 87 (Age 57 or older if age plus service equals 87)

Benefit Amount: Each year that the member is active, a 4.00% employer pay credit and the employee's 5.00% contribution will be credited to each member's hypothetical cash balance account. The hypothetical account will earn interest at a minimum rate of 4%, annually. If the System's geometric average net investment return for the previous five years exceeds 4%, then the hypothetical account will be credited with an additional amount of interest in that year equal to 75% of the amount of the return which exceeds 4%. All interest credits will be applied to the hypothetical account balance on June 30 based on the account balance as of June 30 of the previous year.

At retirement, the member's hypothetical account balance may be converted into an annuity based on an actuarial factor.

Early Retirement Eligibility: N/A

KERS Non-Hazardous Employees (continued)

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

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

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

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

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

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

Disability Retirement: Participation before 8/1/2004

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

KERS Non-Hazardous Employees (continued)

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

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

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

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

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 rate of pay. Additionally, each eligible dependent child will receive 10% of the member's monthly final rate of pay up to a maximum of 40%.

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.

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 25% of the deceased member's final monthly rate of pay. A spouse may also elect the non-line of duty death benefit.
Child Benefit	Each eligible dependent child will receive 10% of the member's final monthly rate of pay up to a maximum of 40%.

KERS Non-Hazardous Employees (continued)

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

Changes since the Prior Valuation

None.

KERS Hazardous Employees

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

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

KERS Hazardous Employees (continued)

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

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

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

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

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

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

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

KERS Hazardous Employees (continued)

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

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

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

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

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

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

Disability Retirement: Participation before 8/1/2004

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

KERS Hazardous Employees (continued)

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

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

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

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

Line of Duty Disability Benefit

Disability Benefit	If the disability is a direct result of an act in the line of duty, the benefit shall not be less than 25% of the member's final monthly rate of pay. Additionally, each eligible dependent child will receive 10% of the member's monthly final rate of pay up to a maximum of 40%.

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.

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 25% of the deceased member's final monthly rate of pay. 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	Each eligible dependent child will receive 10% of the member's final monthly rate of pay up to a maximum of 40%.

KERS Hazardous Employees (continued)

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

Changes since the Prior Valuation

None.

Summary of Main Retiree Insurance Benefit Provisions

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

Benefit Eligibility Recipient of a retirement allowance

Benefit Amount

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

The percentage paid by the retirement system is applied to the ‘contribution’ plan selected by the KRS 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 100% of the maximum contribution. This benefit is provided to members in the Non-hazardous and Hazardous plans alike.

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

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

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

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

Benefit Eligibility	Recipient of a retirement allowance with at least 120 months of service at retirement
Non-Hazardous Subsidy	Monthly contribution of $10 for each year of earned service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2017, the Non-Hazardous monthly contribution was $13.18/year of service. Upon the retiree's death, the surviving spouse may continue coverage (if in receipt of a retirement allowance) but will be 100% responsible for the premiums.
Hazardous Subsidy	Monthly contribution of $15 for each year of earned hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2017, the Non-Hazardous monthly contribution was $19.77/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($13.18 as of July 1, 2017) for each year of hazardous service.
Duty Disability Retirement	If disability was a result of injuries sustained while in the line of duty, the member receives a benefit equal to at least 20 times the Non-Hazardous monthly contribution. 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 benefit equal to at least 20 times the Non-Hazardous monthly contribution. This benefit is provided to members in the Non-hazardous and Hazardous plans alike.
Non-Duty Death in Service	If the surviving spouse is in receipt of a pension allowance, he or she is eligible for continued health coverage. The percentage of the premium paid for by the retirement system is based on the member's years of hazardous service at the time of death.

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

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

Monthly Health Plan Premiums – Effective January 1, 2018

Non-Medicare Plan Options					
Plan Option	Single	Parent Plus	Couple	Family	Family X-Ref
LivingWell PPO*	$729.34	$1,037.08	$1,589.10	$1,767.60	$876.68
LivingWell CDHP	709.46	978.50	1,325.64	1,479.76	818.96
Standard PPO	685.38	975.90	1,497.18	1,666.26	824.54
Standard CDHP	682.80	940.64	1,450.02	1,615.30	800.94

Medicare Plan Options	
Kentucky Retirement Systems - Medical Only Plan	$165.01
Kentucky Retirement Systems – Medicare Advantage/Essential Plan	75.56
Kentucky Retirement Systems – Medicare Advantage/Premium Plan*	252.21

*For 2018, the contribution plans selected by the KRS Board were the LivingWell PPO plan option for non-Medicare retirees and the Medicare Advantage Premium plan option for Medicare retirees.

Dollar Contribution Amount for Insurance Tier 2 and Tier 3

Monthly contribution amounts per year of service as of July 1, 2017.

Non-Hazardous Service	Hazardous Service
$13.18	$19.77

APPENDIX C

GLOSSARY

Glossary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

GASB: Governmental Accounting Standards Board.

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

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

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

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

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

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

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County Employees Retirement System (CERS)

Actuarial Valuation Report as of June 30, 2017

GRS Retirement Consulting

P: 469.524.0000 | F: 469.524.0003 | www.grsconsulting.com

4.2

December 4, 2017

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

Subject: **Actuarial Valuation as of June 30, 2017**

Dear Trustees of the Board:

This report describes the current actuarial condition of the County Employees Retirement System (CERS), determines the required employer contribution rates, and analyzes changes in the System's financial condition. In addition, the report 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 KRS. This report was prepared at the request of the Board of Trustees of the Kentucky Retirement System (Board) and is intended for use by the KRS staff and those designated or approved by the Board.

Financing Objectives and Funding Policy

The employer contribution rate is determined in accordance with Section 61.565 of Kentucky Statute. As specified by the Statute, the employer contribution rate is determined based on a closed thirty-year amortization period beginning July 1, 2013. As a result, the amortization period used in the 2017 actuarial valuation is 26 years. The contribution rate determined by this actuarial valuation becomes effective twelve months after the valuation date. In other words, the contribution rate determined by this June 30, 2017 actuarial valuation will be used by the Board to certify the participating employer's contribution rates for the fiscal year July 1, 2018 and ending June 30, 2019.

If new legislation is enacted between the valuation date and the date the contribution rate becomes effective, the Board may adjust the calculated rate before certifying them, in order to reflect this new legislation. Such adjustments are based on information supplied by the actuary.

Assumptions and Methods

Kentucky Statutes also requires that an actuarial investigation be performed at least every five years to review the economic and demographic assumptions. An experience study was conducted

as of June 30, 2013 and the next experience study will be conducted as of June 30, 2018. However, the Board has the authority to review the assumptions on a more frequent basis and adopt new assumptions prior to the next scheduled experience study. Subsequent to the last actuarial valuation the Board decreased the price inflation assumption to 2.30% and the payroll growth assumption to 2.00% for the CERS Non-Hazardous and Hazardous Systems (Retirement and Health Insurance). Additionally, the assumed rate of return was decreased to 6.25% for the CERS Non-Hazardous and Hazardous Systems (Retirement and Health Insurance). It is our opinion that the current assumptions are internally consistent and reasonably reflect the anticipated future experience of the System.

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

Benefit Provisions

The benefit provisions reflected in this valuation are those which were in effect on June 30, 2017. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

Data

Member data for retired, active and inactive members was supplied as of June 30, 2017, by the KRS staff. The staff also supplied asset information as of June 30, 2017. 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 KRS.

Certification

We certify that the information presented herein is accurate and fairly portrays the actuarial position of CERS as of June 30, 2017.

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.

Kentucky Retirement System
December 4, 2017
Page 3

The undersigned are independent actuaries and consultants. Mr. Newton and Mr. White are Enrolled Actuaries. All three of the undersigned are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries. All of the undersigned are experienced in performing valuations for large public retirement systems.

Sincerely,

Gabriel, Roeder, Smith & Co.

Joseph P. Newton, FSA, MAAA, EA
Senior Consultant

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

Janie Shaw, ASA, MAAA
Consultant

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SECTION 1

EXECUTIVE SUMMARY

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Summary of Principal Results

(Dollar amounts expressed in thousands)

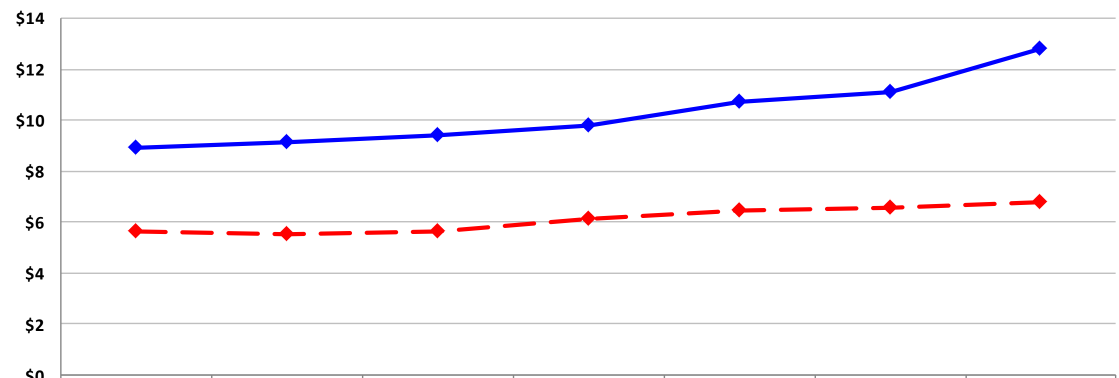
	Non-Hazardous		Hazardous		Total	
	June 30, 2017	June 30, 2016	June 30, 2017	June 30, 2016	June 30, 2017	June 30, 2016
Contributions for next fiscal year:						
Retirement	21.84%	14.48%	35.69%	22.20%		
Insurance	6.21%	4.70%	12.17%	9.35%		
Total	28.05%	19.18%	47.86%	31.55%	N/A	N/A
Assets:						
Retirement						
• Actuarial value (AVAR)	$6,764,873	$6,535,372	$2,238,320	$2,139,119	$9,003,193	$8,674,492
• Market value (MVAR)	$6,687,237	$6,106,187	$2,217,996	$2,003,669	$8,905,233	$8,109,856
• Ratio of actuarial to market value of assets	101.2%	107.0%	100.9%	106.8%	101.1%	107.0%
Insurance						
• Actuarial value (AVAI)	$2,227,401	$2,079,811	$1,196,780	$1,135,784	$3,424,181	$3,215,595
• Market value (MVAI)	$2,212,536	$1,943,757	$1,189,001	$1,062,602	$3,401,537	$3,006,359
• Ratio of actuarial to market value of assets	100.7%	107.0%	100.7%	106.9%	100.7%	107.0%
Funded Status:						
Retirement						
• Actuarial accrued liability	$12,803,510	$11,076,457	$4,649,047	$3,704,456	$17,452,557	$14,780,913
• Unfunded accrued liability on AVAR	$6,038,637	$4,541,084	$2,410,727	$1,565,337	$8,449,364	$6,106,421
• Funded ratio on AVAR	52.8%	59.0%	48.1%	57.7%	51.6%	58.7%
• Unfunded accrued liability on MVAR	$6,116,273	$4,970,270	$2,431,051	$1,700,787	$8,547,324	$6,671,057
• Funded ratio on MVAR	52.2%	55.1%	47.7%	54.1%	51.0%	54.9%
Insurance						
• Actuarial accrued liability	$3,355,151	$2,988,121	$1,788,433	$1,558,818	$5,143,584	$4,546,939
• Unfunded accrued liability on AVAI	$1,127,750	$908,310	$591,653	$423,034	$1,719,403	$1,331,344
• Funded ratio on AVAI	66.4%	69.6%	66.9%	72.9%	66.6%	70.7%
• Unfunded accrued liability on MVAI	$1,142,615	$1,044,364	$599,432	$496,216	$1,742,047	$1,540,580
• Funded ratio on MVAI	65.9%	65.0%	66.5%	68.2%	66.1%	66.1%
Membership:						
• Number of						
- Active Members	82,198	80,664	9,495	9,084	91,693	89,748
- Retirees and Beneficiaries	59,013	56,339	8,998	8,563	68,011	64,902
- Inactive Members	85,031	82,292	3,198	2,830	88,229	85,122
- Total	226,242	219,295	21,691	20,477	247,933	239,772
• Projected payroll of active members	$2,452,407	$2,352,762	$541,633	$492,851	$2,994,040	$2,845,612
• Average salary of active members	$29,835	$29,167	$57,044	$54,255	$32,653	$31,707

Executive Summary (Continued)

Non-Hazardous Retirement Fund

The unfunded actuarial accrued liability for the non-hazardous retirement fund increased by $1.498 billion since the prior year's valuation to $6.039 billion. The largest source of this increase is the result of the decrease in the assumed rate of investment return which resulted in a $1.406 billion increase in the unfunded liability. Below is a chart with the historical actuarial value of assets and actuarial accrued liability for the non-hazardous fund. The divergence in the assets and liability over the last seven years has generally been due to a combination of the actual investment experience being less than the fund's expected investment return assumption, and a decrease in the assumed rate of return in 2015 and again in 2017.

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



	2011	2012	2013	2014	2015	2016	2017
AAL	8.9	9.1	9.4	9.8	10.7	11.1	12.8
AVA	5.6	5.5	5.6	6.1	6.5	6.5	6.8

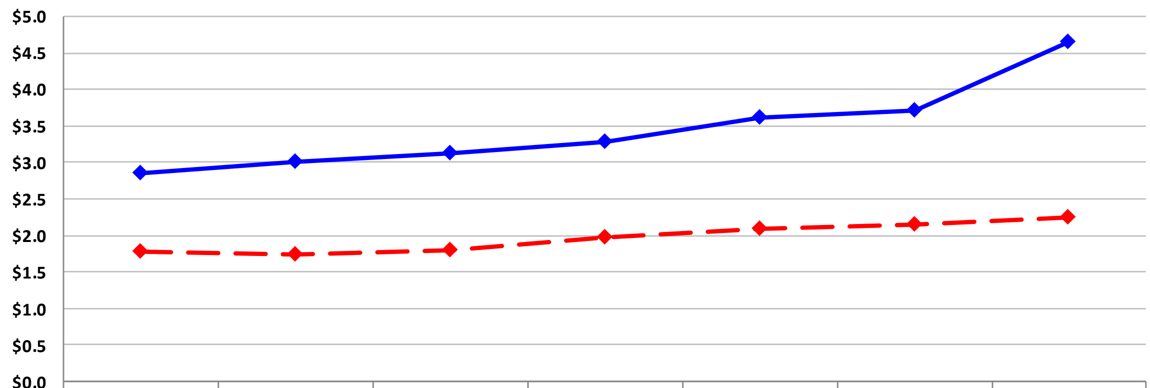
Executive Summary (Continued)

4.2

Hazardous Retirement Fund

The unfunded actuarial accrued liability for the hazardous retirement fund increased by $0.845 billion since the prior year's valuation to $2.411 billion. The largest source of this increase is the result of the decrease in the assumed rate of investment return which resulted in a $0.540 billion increase in the unfunded liability. Below is a chart with the historical actuarial value of assets and actuarial accrued liability for the hazardous retirement fund. The divergence in the assets and liability over the last seven years has generally been due to a combination of the actual contribution rates being less than the fund's expected investment return assumption, and a decrease in the assumed rate of return in 2015 and again in 2017.

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



	2011	2012	2013	2014	2015	2016	2017
AAL	2.9	3.0	3.1	3.3	3.6	3.7	4.6
AVA	1.8	1.7	1.8	2.0	2.1	2.1	2.2

SECTION 2

DISCUSSION

Discussion

The County Employees Retirement System (CERS) is a defined benefit pension fund that provides pensions and health care coverage for employees of state government, non-teaching staff at regional state supported universities, local health departments, regional mental health/mental retardation agencies, and other quasi-state agencies. CERS includes both non-hazardous and hazardous duty benefits. This report presents the result of the June 30, 2017 actuarial funding valuation for both the Retirement and Insurance Funds.

The primary purposes of the valuation report are to depict the current financial condition of the System, determine the annual required contribution, and analyze changes in the System's financial condition. In addition, the report provides various summaries of the data.

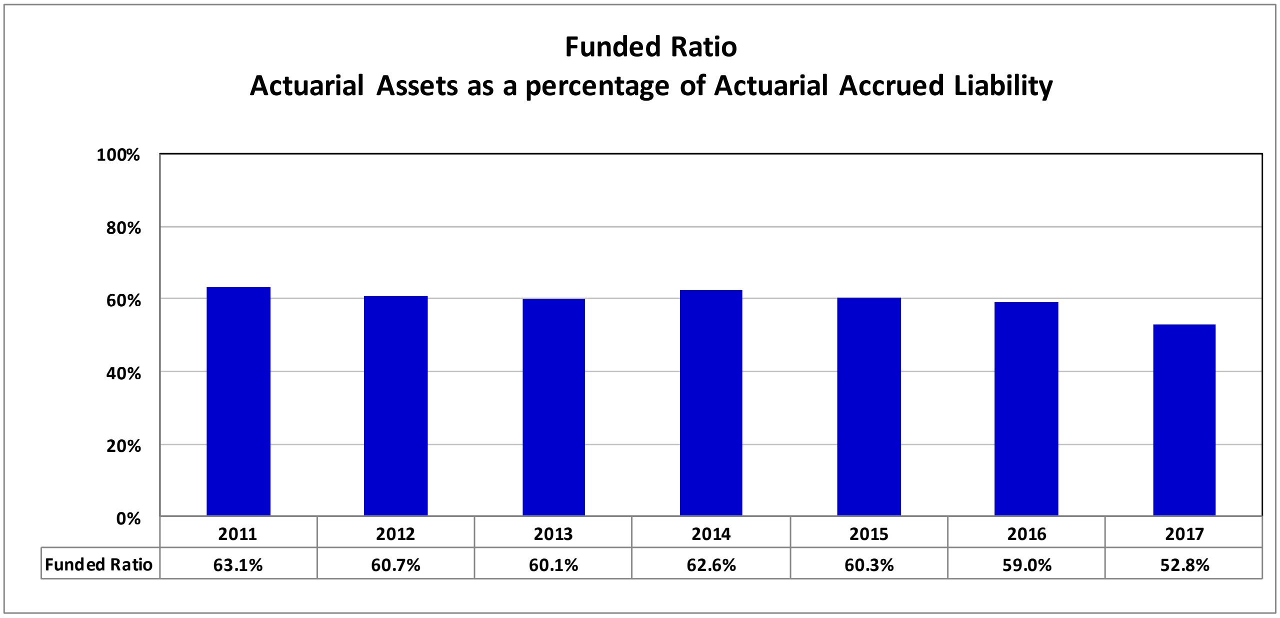
The actuarially determined contribution rates consist of two components: a normal cost rate and an amortization cost to finance the unfunded actuarial accrued liability. The normal cost rate is the theoretical amount which would be required to pay the members' benefits, based on the current plan provisions, 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 is should cost to provide the benefits for an average new member. Since members contribute to the fund, only the excess of the normal rate over the member contribution rate is included in the employer contribution rate. The amortization cost is the amount, expressed as a percentage of payroll, necessary to amortize the unfunded actuarial accrued liability. The payroll growth rate and discount rate assumptions are selected by the Board. The funding period is specified in Section 61.565 of Kentucky Statute.

All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides member data and statistical information. 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 seven-year history of the funds' funded ratio (i.e. the Actuarial Value of Assets divided by the Actuarial Accrued Liability). The decline in the funded ratio over the last seven years for the retirement funds has generally been due to actual investment experience being less than the investment return assumption, and a decrease in the assumed rate of return in 2015 and again in 2017.

Non-Hazardous Retirement Fund

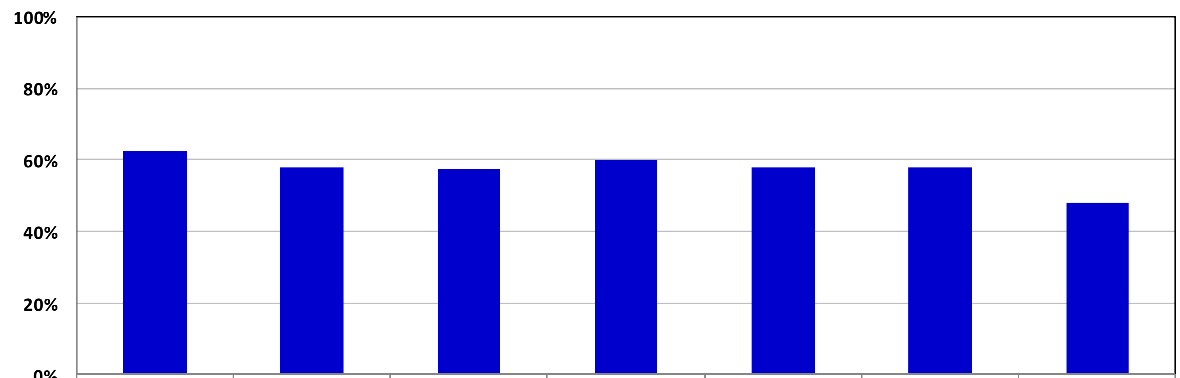


	2011	2012	2013	2014	2015	2016	2017
Funded Ratio	63.1%	60.7%	60.1%	62.6%	60.3%	59.0%	52.8%

Funding Progress (Continued)

Hazardous Retirement Fund

Funded Ratio
Actuarial Assets as a percentage of Actuarial Accrued Liability



	2011	2012	2013	2014	2015	2016	2017
Funded Ratio	62.2%	58.1%	57.7%	59.8%	58.0%	57.7%	48.1%

Assuming the actuarial determined contributions are actually paid in future years, then absent future unfavorable investment or demographic experience we expect the funded ratio to begin improving. Also, the dollar amount of the unfunded actuarial accrued liability, or the difference between the actuarial accrued liability and the actuarial value of assets, is expected to decrease after those higher contribution rates become effective. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the Retirement System.

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 returns are computed net of investment expenses. The actuarial value of assets for the Non-Hazardous Retirement Fund increased from $6.535 billion to $6.765 billion since the prior valuation. Table 7 in the following section of the report provides the development of the actuarial value of assets.

The rate of return on the market value of assets on a dollar-weighted basis for fiscal year 2017 was a 13.7% for the non-hazardous retirement fund which is greater than the 7.50% expected annual return during that fiscal year. The return on an actuarial (smoothed) asset value was 7.3%. 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 $0.078 billion less than the actuarial value of assets, which signifies that the retirement system is in a position of deferred losses. Therefore, unless the System experiences investment returns in excess of the assumed rate of return in an amount that is at least equal to the outstanding deferred losses, the future recognition of these deferred losses is expected to increase the unfunded actuarial accrued liability.

Table 6 in the following section of this report provides asset information that was included in the annual financial statements of the System. Also, Tables 6 and 7 shows the estimated yield on a market value basis and on the actuarial asset valuation method.

Actuarial Gains/ (Losses)

The annual actuarial valuation is a snapshot analysis of the benefit liabilities, assets and funded position of the System 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 the 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 actuarial gains / (loss) 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, changes in plan provisions, etc.

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	$ 4,541,084	$ 1,565,337
2. Normal cost and administrative expenses	215,394	60,296
3. Less: contributions for the year	(484,268)	(176,048)
4. Interest accrual	330,499	113,060
5. Expected UAAL (Sum of Items 1 - 4)	$ 4,602,709	$ 1,562,645
6. Actual UAAL as of June 30,2017	$ 6,038,637	$ 2,410,727
7. Total gain (loss) for the year (Item 5 - Item 6)	$ (1,435,928)	$ (848,082)
B. Source of gains and losses		
8. Asset gain (loss) for the year	$ (14,524)	$ (4,511)
9. Liability experience gain (loss) for the year	(15,568)	(303,768)
10. Assumption change	(1,405,836)	(539,803)
11. Total	$ (1,435,928)	$ (848,082)

The accrued liability for the non-hazardous retirement fund was less than 1% higher than expected, resulting in a $16 million liability loss. This $16 million increase is comprised of a $230 million decrease due to differences in liability calculations between GRS and the fund's prior actuary and a $246 million increase due the fund's experience during the last year. The accrued liability for the hazardous retirement fund was about 8% higher than expected, resulting in a $304 million liability loss. This $304 million increase is comprised of a $113 million increase due to differences in liability calculations between GRS and the fund's prior actuary and a $191 million increase due the fund's experience during the last year. The experience loss for both funds is primarily due to higher than expected salary increases during the past year.

Actuarial Gains/ (Losses) (Continued)

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

		Non-Hazardous		Hazardous
A. Calculation of total actuarial gain or loss				
1. Unfunded actuarial accrued liability (UAAL), previous year	$	908,310	$	423,034
2. Normal cost and administrative expenses		71,947		24,437
3. Less: contributions for the year		(129,870)		(53,245)
4. Interest accrual		65,951		30,647
5. Expected UAAL (Sum of Items 1 - 4)	$	916,338	$	424,873
6. Actual UAAL as of June 30,2017	$	1,127,750	$	591,653
7. Total gain (loss) for the year (Item 5 - Item 6)	$	(211,412)	$	(166,780)
B. Source of gains and losses				
8. Asset gain (loss) for the year	$	(10,030)	$	(5,509)
9. Liability experience gain (loss) for the year		157,234		59,536
10. Assumption change		(358,616)		(220,807)
11. Total	$	(211,412)	$	(166,780)

The 2018 premiums were known at the time of the valuation and were incorporated into the liability measurement. Premiums were lower than expected and resulted in a $155 million liability experience gain for the non-hazardous insurance fund and a $118 million liability experience gain for the hazardous insurance fund.

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. An experience study was conducted as of June 30, 2013 and the next experience study will be conducted as of June 30, 2018. However, the Board has the authority to review the assumptions on a more frequent basis and adopt new assumptions prior to the next scheduled experience study. Since the last actuarial valuation, the Board made the following changes in assumptions:

- Decrease the assumed rate of return to 6.25% for the retirement and health insurance funds.
- Decrease the price inflation assumption to 2.30% for the retirement and health insurance funds.
- Decrease the payroll growth assumption (used for amortizing the unfunded accrued liability) to 2.00% for retirement and health insurance funds.
- Decrease in the individual salary increase assumption and health care trend assumption that corresponds with the 0.95% decrease in the price inflation assumption.

Appendix A includes a summary of the actuarial assumptions and methods used in this valuation. It is our opinion that the assumptions are internally consistent, reasonable, and reflect anticipated future experience of the System. The next experience study will be conducted no later than as of June 30, 2018.

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 benefit provisions for CERS. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

This valuation reflects all benefits promised to CERS members, either by the statutes or by the Board. There are no ancillary benefits that might be deemed a CERS liability if continued beyond the availability of funding by the current funding source.

SECTION 3

ACTUARIAL TABLES

Actuarial Tables

RETIREMENT BENEFITS

ACTUARIAL TABLES

4.2

Development of Unfunded Actuarial Accrued Liability
Retirement Benefits

(Dollar amounts expressed in thousands)

		June 30, 2017	
		Non-Hazardous (1)	Hazardous (2)
1.	Projected payroll of active members	$ 2,452,407	$ 541,633
2.	Present value of future pay	$ 19,236,003	$ 3,404,412
3.	Normal cost rate		
	a. Total normal cost rate	10.05%	14.52%
	b. Less: member contribution rate	-5.00%	-8.00%
	c. Employer normal cost rate	5.05%	6.52%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 6,904,473	$ 2,204,933
	b. Less: present value of future normal costs	(1,832,645)	(466,487)
	c. Actuarial accrued liability	$ 5,071,828	$ 1,738,446
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 7,313,076	$ 2,851,704
	b. Inactive members	418,606	58,897
	c. Active members (Item 4c)	5,071,828	1,738,446
	d. Total	$ 12,803,510	$ 4,649,047
6.	Actuarial value of assets	$ 6,764,873	$ 2,238,320
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 6,038,637	$ 2,410,727
8.	Funded Ratio	52.8%	48.1%

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

		June 30, 2017	
		Non-Hazardous (1)	Hazardous (2)
1.	Active members		
	a. Service retirement	$ 6,359,838	$ 1,881,864
	b. Deferred termination benefits and refunds	355,125	261,612
	c. Survivor benefits	47,123	10,337
	d. Disability benefits	142,387	51,120
	e. Total	$ 6,904,473	$ 2,204,933
2.	Retired members		
	a. Service retirement	$ 6,424,305	$ 2,588,548
	b. Disability retirement	479,815	108,370
	c. Beneficiaries	408,956	154,786
	d. Total	$ 7,313,076	$ 2,851,704
3.	Inactive members		
	a. Vested terminations	$ 339,599	$ 51,652
	b. Nonvested terminations	79,007	7,245
	c. Total	$ 418,606	$ 58,897
4.	Total actuarial present value of future benefits	$ 14,636,155	$ 5,115,534

4.2

Development of Required Contribution Rate
Retirement Benefits

	June 30, 2017	
	Non-Hazardous (1)	Hazardous (2)
1. Total normal cost rate		
a. Service retirement	7.91%	8.94%
b. Deferred termination benefits and refunds	1.72%	4.91%
c. Survivor benefits	0.08%	0.11%
d. Disability benefits	0.34%	0.56%
e. Total	10.05%	14.52%
2. Less: member contribution rate	-5.00%	-8.00%
3. Total employer normal cost rate	5.05%	6.52%
4. Administrative expenses	0.80%	0.26%
5. Net employer normal cost rate	5.85%	6.78%
6. UAAL amortization contribution	15.99%	28.91%
7. Total recommended employer contribution	21.84%	35.69%

Actuarial Balance Sheet

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)

		June 30, 2017 (1)	June 30, 2016 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 6,764,873	$ 6,535,372
	b. Present value of future member contributions	$ 961,800	$ 1,002,005
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 870,845	$ 525,861
	ii. Unfunded accrued liability contributions	6,038,637	4,541,085
	iii. Total future employer contributions	$ 6,909,482	$ 5,066,946
	d. Total assets	$ 14,636,155	$ 12,604,323
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 1,832,645	$ 1,527,866
	ii. Accrued liability	5,071,828	4,290,927
	iii. Total present value of future benefits	$ 6,904,473	$ 5,818,793
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 7,313,076	$ 6,410,537
	c. Present value of benefits payable on account of current inactive members	$ 418,606	$ 374,993
	d. Total liabilities	$ 14,636,155	$ 12,604,323

Actuarial Balance Sheet

Hazardous Members Retirement

(Dollar amounts expressed in thousands)

		June 30, 2017 (1)	June 30, 2016 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 2,238,320	$ 2,139,119
	b. Present value of future member contributions	$ 272,353	$ 281,802
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 194,134	$ 98,917
	ii. Unfunded accrued liability contributions	2,410,727	1,565,338
	iii. Total future employer contributions	$ 2,604,861	$ 1,664,255
	d. Total assets	$ 5,115,534	$ 4,085,176
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 466,487	$ 380,719
	ii. Accrued liability	1,738,446	1,315,745
	iii. Total present value of future benefits	$ 2,204,933	$ 1,696,464
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 2,851,704	$ 2,338,063
	c. Present value of benefits payable on account of current inactive members	$ 58,897	$ 50,649
	d. Total liabilities	$ 5,115,534	$ 4,085,176

Reconciliation of Retirement Net Assets

(Dollar amounts expressed in thousands)

	Year Ending June 30, 2017 (1) Non-Hazardous	Year Ending June 30, 2017 (2) Hazardous
1. Value of assets at beginning of year	$ 6,106,187	$ 2,003,669
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 150,715	$ 60,101
ii. Employer contributions	331,492	114,316
iii. Other contributions (less 401h)	2,061	1,632
iii. Total	$ 484,268	$ 176,048
b. Income		
i. Interest, dividends, and other income	$ 185,883	$ 60,591
ii. Investment expenses	(48,166)	(15,765)
iii. Net	$ 137,717	$ 44,825
c. Net realized and unrealized gains (losses)	680,564	224,173
d. Total revenue	$ 1,302,550	$ 445,047
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 14,430	$ 2,315
ii. Regular annuity benefits	687,461	226,984
iii. Other benefit payments	0	0
iv. Transfers to other systems	0	0
v. Total	$ 701,891	$ 229,299
b. Administrative expenses and depreciation	19,609	1,421
c. Total expenditures	$ 721,500	$ 230,720
4. Increase in net assets (Item 2. - Item 3.)	$ 581,050	$ 214,327
5. Value of assets at end of year (Item 1. + Item 4.)	$ 6,687,237	$ 2,217,996
6. Net external cash flow		
a. Dollar amount	$ (237,231)	$ (54,672)
b. Percentage of market value	-3.7%	-2.6%
7. Estimated annual return on net assets	13.7%	13.6%

4.2

Development of Actuarial Value of Assets

Non-Hazardous Members Retirement

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2017
1.	Actuarial value of assets at beginning of year	$	6,535,372
2.	Market value of assets at beginning of year	$	6,106,187
3.	Net new investments		
	a. Contributions	$	484,268
	b. Benefit payments		(701,891)
	c. Administrative expenses		(19,609)
	d. Subtotal	$	(237,231)
4.	Market value of assets at end of year	$	6,687,237
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	818,281
6.	Assumed investment return rate for fiscal year		7.50%
7.	Expected return for immediate recognition	$	449,068
8.	Excess return for phased recognition	$	369,213

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2017	$	369,213	$	73,843
b.	2016		(515,652)		(103,130)
c.	2015		(386,073)		(77,215)
d.	2014		454,067		90,813
e.	2013		166,764		33,353
f.	Total			$	17,664

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	6,764,873
11.	Ratio of actuarial value to market value		101.2%
12.	Estimated annual return on actuarial value of assets		7.3%

* 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, 2017
1.	Actuarial value of assets at beginning of year			$ 2,139,119
2.	Market value of assets at beginning of year			$ 2,003,669
3.	Net new investments			
	a. Contributions			$ 176,048
	b. Benefit payments			(229,299)
	c. Administrative expenses			(1,421)
	d. Subtotal			$ (54,672)
4.	Market value of assets at end of year			$ 2,217,996
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)			$ 268,999
6.	Assumed investment return rate for fiscal year			7.50%
7.	Expected return for immediate recognition			$ 148,225
8.	Excess return for phased recognition			$ 120,774
9.	Phased-in recognition, 20% of excess return on assets for prior years:			
		Fiscal Year Ending June 30,	Excess Return	Recognized Amount
	a.	2017	$ 120,774	$ 24,155
	b.	2016	(162,540)	(32,508)
	c.	2015	(122,554)	(24,511)
	d.	2014	148,014	29,603
	e.	2013	44,546	8,909
	f.	Total		$ 5,648
10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)			$ 2,238,320
11.	Ratio of actuarial value to market value			100.9%
12.	Estimated annual return on actuarial value of assets			7.3%

* Amounts may not add due to rounding

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

June 30,	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annual Covered Payroll	UAAL as % of Payroll (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous Members						
2011	$ 5,629,611	$ 8,918,085	$ 3,288,474	63.1%	$ 2,276,596	144.4%
2012	5,547,236	9,139,568	3,592,332	60.7%	2,236,546	160.6%
2013	5,637,094	9,378,876	3,741,782	60.1%	2,236,277	167.3%
2014	6,117,134	9,772,523	3,655,389	62.6%	2,272,270	160.9%
2015	6,474,849	10,740,325	4,265,477	60.3%	2,296,716	185.7%
2016	6,535,372	11,076,457	4,541,084	59.0%	2,352,762	193.0%
2017	6,764,873	12,803,510	6,038,637	52.8%	2,452,407	246.2%
Hazardous Members						
2011	$ 1,779,545	$ 2,859,041	$ 1,079,496	62.2%	$ 466,964	231.2%
2012	1,747,379	3,009,992	1,262,613	58.1%	464,229	272.0%
2013	1,801,691	3,124,206	1,322,514	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%
Total CERS Members						
2011	$ 7,409,156	$ 11,777,126	$ 4,367,970	62.9%	$ 2,743,560	159.2%
2012	7,294,615	12,149,560	4,854,945	60.0%	2,700,775	179.8%
2013	7,438,785	12,503,082	5,064,297	59.5%	2,697,950	187.7%
2014	8,084,774	13,061,349	4,976,575	61.9%	2,751,434	180.9%
2015	8,571,632	14,353,633	5,782,001	59.7%	2,780,357	208.0%
2016	8,674,491	14,780,913	6,106,422	58.7%	2,845,613	214.6%
2017	9,003,193	17,452,557	8,449,364	51.6%	2,994,040	282.2%

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, 2017	June 30, 2017
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:	26-year closed period	26-year closed period
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 11.55% (varies by service)	3.05% to 18.55% (varies by service)
Inflation	2.30%	2.30%
Post-retirement benefit adjustments	0.00%	0.00%
Retiree Mortality	RP-2000 Combined Mortality Table for Males and Females, projected using scale BB to 2013 (set back one year for females).	RP-2000 Combined Mortality Table for Males and Females, projected using scale BB to 2013 (set back one year for females).

4.2

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				
2008	$ 963,214	$ 4,058,767	$ 2,282,237	$ 5,731,502	100.0%	100.0%	31.1%
2009	991,629	4,542,483	2,378,802	5,650,790	100.0%	100.0%	4.9%
2010	1,063,747	4,890,659	2,504,616	5,546,857	100.0%	91.7%	0.0%
2011	1,110,967	5,209,784	2,597,334	5,629,611	100.0%	86.7%	0.0%
2012	1,117,549	5,416,933	2,605,085	5,547,236	100.0%	81.8%	0.0%
2013	1,149,611	5,638,371	2,590,894	5,637,094	100.0%	79.6%	0.0%
2014	1,204,383	5,873,279	2,694,860	6,117,134	100.0%	83.6%	0.0%
2015	1,216,585	6,489,863	3,033,878	6,474,849	100.0%	81.0%	0.0%
2016	1,231,027	6,785,530	3,059,900	6,535,372	100.0%	78.2%	0.0%
2017	1,277,432	7,731,682	3,794,396	6,764,873	100.0%	71.0%	0.0%
			Hazardous Members				
2008	$ 338,324	$ 1,406,982	$ 657,815	$ 1,750,867	100.0%	100.0%	0.8%
2009	350,309	1,540,263	687,873	1,751,488	100.0%	91.0%	0.0%
2010	369,613	1,622,684	679,855	1,749,464	100.0%	85.0%	0.0%
2011	382,072	1,768,512	708,457	1,779,545	100.0%	79.0%	0.0%
2012	381,672	1,889,884	738,435	1,747,379	100.0%	72.3%	0.0%
2013	390,471	1,988,030	745,705	1,801,691	100.0%	71.0%	0.0%
2014	415,070	2,077,517	796,239	1,967,640	100.0%	74.7%	0.0%
2015	422,359	2,297,703	893,246	2,096,783	100.0%	72.9%	0.0%
2016	428,713	2,388,712	887,031	2,139,119	100.0%	71.6%	0.0%
2017	458,808	2,910,601	1,279,638	2,238,320	100.0%	61.1%	0.0%

INSURANCE BENEFITS

ACTUARIAL TABLES

Development of Unfunded Actuarial Accrued Liability
Insurance Benefits

(Dollar amounts expressed in thousands)

		June 30, 2017			
		Non-Hazardous (1)		Hazardous (2)	
1.	Projected payroll of active members	$	2,452,407	$	541,633
2.	Present value of future pay	$	19,055,637	$	3,402,207
3.	Normal cost rate				
	a. Total normal cost rate		3.57%		5.38%
	b. Less: member contribution rate		-0.41%		-0.35%
	c. Employer normal cost rate		3.16%		5.03%
4.	Actuarial accrued liability for active members				
	a. Present value of future benefits	$	2,390,844	$	944,509
	b. Less: present value of future normal costs		(639,131)		(150,840)
	c. Actuarial accrued liability	$	1,751,713	$	793,669
5.	Total actuarial accrued liability				
	a. Retirees and beneficiaries	$	1,445,497	$	973,103
	b. Inactive members		157,941		21,661
	c. Active members (Item 4c)		1,751,713		793,669
	d. Total	$	3,355,151	$	1,788,433
6.	Actuarial value of assets	$	2,227,401	$	1,196,780
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$	1,127,750	$	591,653
8.	Funded Ratio		66.4%		66.9%

4.2

Development of Required Contribution Rate
Insurance Benefits

		June 30, 2017	
		Non-Hazardous	Hazardous
		(1)	(2)
1.	Total normal cost rate	3.57%	5.38%
2.	Less: member contribution rate	-0.41%	-0.35%
3.	Total employer normal cost rate	3.16%	5.03%
4.	Administrative expenses	0.03%	0.07%
5.	Net employer normal cost rate	3.19%	5.10%
6.	UAAL amortization contribution	3.02%	7.07%
7.	Total recommended employer contribution	6.21%	12.17%

Actuarial Balance Sheet

Non-Hazardous Members Insurance

(Dollar amounts expressed in thousands)

		June 30, 2017 (1)	June 30, 2016 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 2,227,401	$ 2,079,811
	b. Present value of future member contributions	$ 94,725	$ 79,503
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 544,406	$ 441,836
	ii. Unfunded accrued liability contributions	1,127,750	908,310
	iii. Total future employer contributions	$ 1,672,156	$ 1,350,146
	d. Total assets	$ 3,994,282	$ 3,509,460
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 639,131	$ 521,339
	ii. Accrued liability	1,751,713	1,503,184
	iii. Total present value of future benefits	$ 2,390,844	$ 2,024,523
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 1,445,497	$ 1,326,305
	c. Present value of benefits payable on account of current inactive members	$ 157,941	$ 158,632
	d. Total liabilities	$ 3,994,282	$ 3,509,460

Actuarial Balance Sheet

Hazardous Members Insurance

(Dollar amounts expressed in thousands)

	June 30, 2017 (1)	June 30, 2016 (2)
1. Assets - Present and Expected Future Resources		
a. Current assets (actuarial value)	$ 1,196,780	$ 1,135,784
b. Present value of future member contributions	$ 16,300	$ 13,096
c. Present value of future employer contributions		
i. Normal cost contributions	$ 134,540	$ 124,881
ii. Unfunded accrued liability contributions	591,653	423,034
iii. Total future employer contributions	$ 726,193	$ 547,915
d. Total assets	$ 1,939,273	$ 1,696,795
2. Liabilities - Present Value of Expected Future Benefit Payments		
a. Active members		
i. Present value of future normal costs	$ 150,840	$ 137,977
ii. Accrued liability	793,669	679,458
iii. Total present value of future benefits	$ 944,509	$ 817,435
b. Present value of benefits payable on account of current retired members and beneficiaries	$ 973,103	$ 855,273
c. Present value of benefits payable on account of current inactive members	$ 21,661	$ 24,087
d. Total liabilities	$ 1,939,273	$ 1,696,795

4.2

Reconciliation of Insurance Net Assets
(Dollar amounts expressed in thousands)

	Year Ending June 30, 2017 (1) Non-Hazardous	Year Ending June 30, 2017 (2) Hazardous
1. Value of assets at beginning of year	$ 1,943,757	$ 1,062,602
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 9,158	$ 1,708
ii. Employer contributions	117,310	50,743
iii. Other contributions	3,402	794
iii. Total	$ 129,870	$ 53,245
b. Income		
i. Interest, dividends, and other income	$ 58,208	$ 32,002
ii. Investment expenses	(16,245)	(8,992)
iii. Net	$ 41,963	$ 23,010
c. Net realized and unrealized gains (losses)	225,241	121,393
d. Total revenue	$ 397,074	$ 197,648
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 0	$ 0
ii. Healthcare premium subsidies	124,573	70,407
iii. Other benefit payments	2,934	461
iv. Transfers to other systems	0	0
v. Total	$ 127,506	$ 70,868
b. Administrative expenses and depreciation	789	381
c. Total expenditures	$ 128,295	$ 71,249
4. Increase in net assets (Item 2. - Item 3.)	$ 268,779	$ 126,399
5. Value of assets at end of year (Item 1. + Item 4.)	$ 2,212,536	$ 1,189,001
6. Net external cash flow		
a. Dollar amount	$ 1,574	$ (18,004)
b. Percentage of market value	0.1%	-1.6%
7. Estimated annual return on net assets	13.7%	13.7%

Development of Actuarial Value of Assets

Non-Hazardous Members Insurance

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2017
1.	Actuarial value of assets at beginning of year	$	2,079,811
2.	Market value of assets at beginning of year	$	1,943,757
3.	Net new investments		
	a. Contributions	$	129,870
	b. Benefit payments		(127,506)
	c. Administrative expenses		(789)
	d. Subtotal	$	1,574
4.	Market value of assets at end of year	$	2,212,536
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	267,205
6.	Assumed investment return rate for fiscal year		7.50%
7.	Expected return for immediate recognition	$	145,841
8.	Excess return for phased recognition	$	121,364

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2017	$	121,364	$	24,273
b.	2016		(147,421)		(29,484)
c.	2015		(110,970)		(22,194)
d.	2014		104,420		20,884
e.	2013		33,482		6,696
f.	Total			$	175

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	2,227,401
11.	Ratio of actuarial value to market value		100.7%
12.	Estimated annual return on actuarial value of assets		7.0%

* Amounts may not add due to rounding

4.2

Development of Actuarial Value of Assets
Hazardous Members Insurance
(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2017
1.	Actuarial value of assets at beginning of year	$	1,135,784
2.	Market value of assets at beginning of year	$	1,062,602
3.	Net new investments		
	a. Contributions	$	53,245
	b. Benefit payments		(70,868)
	c. Administrative expenses		(381)
	d. Subtotal	$	(18,004)
4.	Market value of assets at end of year	$	1,189,001
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	144,403
6.	Assumed investment return rate for fiscal year		7.50%
7.	Expected return for immediate recognition	$	79,020
8.	Excess return for phased recognition	$	65,383

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2017	$	65,383	$	13,077
b.	2016		(78,507)		(15,701)
c.	2015		(60,152)		(12,030)
d.	2014		55,401		11,080
e.	2013		17,771		3,554
f.	Total			$	(21)

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	1,196,780
11.	Ratio of actuarial value to market value		100.7%
12.	Estimated annual return on actuarial value of assets		7.0%

* Amounts may not add due to rounding

4.2

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			
2011	$ 1,433,451	$ 3,073,973	$ 1,640,522	46.6%	$ 2,276,596	72.1%
2012	1,512,854	2,370,771	857,917	63.8%	2,236,546	38.4%
2013	1,628,244	2,443,894	815,650	66.6%	2,236,277	36.5%
2014	1,831,199	2,616,915	785,715	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%
			Hazardous Members			
2011	$ 770,790	$ 1,647,703	$ 876,912	46.8%	$ 466,964	187.8%
2012	829,041	1,364,843	535,802	60.7%	464,229	115.4%
2013	892,774	1,437,333	544,558	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%
			Total CERS Members			
2011	$ 2,204,241	$ 4,721,676	$ 2,517,435	46.7%	$ 2,743,560	91.8%
2012	2,341,895	3,735,614	1,393,719	62.7%	2,700,775	51.6%
2013	2,521,018	3,881,227	1,360,209	65.0%	2,697,950	50.4%
2014	2,828,932	4,110,779	1,281,847	68.8%	2,751,434	46.6%
2015	3,085,163	4,411,842	1,326,679	69.9%	2,780,357	47.7%
2016	3,215,595	4,546,939	1,331,344	70.7%	2,845,613	46.8%
2017	3,424,181	5,143,584	1,719,403	66.6%	2,994,040	57.4%

4.2

Solvency Test
Insurance Benefits
(Dollar amounts expressed in thousands)

	Actuarial Accrued Liability				Portion of Aggregate Accrued Liabilities Covered by Assets		
June 30,	Active Member Contributions	Retired Members & Beneficiaries	Active Members (Employer Financed)	Valuation Assets	Active	Retired	ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-Hazardous Members							
2008	$ -	$ 1,521,450	$ 2,061,743	$ 1,168,883	100.0%	76.8%	0.0%
2009	-	1,478,783	1,591,603	1,216,632	100.0%	82.3%	0.0%
2010	-	1,526,533	1,631,807	1,293,039	100.0%	84.7%	0.0%
2011	-	1,460,808	1,613,165	1,433,451	100.0%	98.1%	0.0%
2012	-	1,146,908	1,223,864	1,512,854	100.0%	100.0%	29.9%
2013	-	1,205,599	1,238,295	1,628,244	100.0%	100.0%	34.1%
2014	-	1,318,183	1,298,732	1,831,199	100.0%	100.0%	39.5%
2015	-	1,372,597	1,535,231	1,997,456	100.0%	100.0%	40.7%
2016	-	1,484,937	1,503,184	2,079,811	100.0%	100.0%	39.6%
2017	-	1,603,438	1,751,713	2,227,401	100.0%	100.0%	35.6%
Hazardous Members							
2008	$ -	$ 722,435	$ 1,047,348	$ 613,526	100.0%	84.9%	0.0%
2009	-	725,900	867,648	651,131	100.0%	89.7%	0.0%
2010	-	814,300	860,403	692,770	100.0%	85.1%	0.0%
2011	-	771,631	876,071	770,790	100.0%	99.9%	0.0%
2012	-	575,099	789,744	829,041	100.0%	100.0%	32.2%
2013	-	660,955	776,377	892,774	100.0%	100.0%	29.9%
2014	-	700,312	793,553	997,733	100.0%	100.0%	37.5%
2015	-	790,714	713,301	1,087,707	100.0%	100.0%	41.6%
2016	-	879,360	679,458	1,135,784	100.0%	100.0%	37.7%
2017	-	994,764	793,669	1,196,780	100.0%	100.0%	25.5%

SECTION 4

MEMBERSHIP INFORMATION

4.2

Membership Tables

Summary of Membership Data

(Total dollar amounts expressed in thousands)

		Non-Hazardous June 30, 2017	Hazardous June 30, 2017	Total June 30, 2017
		(1)	(2)	(3)
1.	Active members			
	a. Males	29,300	8,355	37,655
	b. Females	52,898	1,140	54,038
	c. Total members	82,198	9,495	91,693
	d. Total annualized prior year salaries	$ 2,452,407	$ 541,633	$ 2,994,040
	e. Average salary	$ 29,835	$ 57,044	$ 32,653
	f. Average age	47.9	39.2	47.0
	g. Average service	9.4	10.5	9.5
	h. Member contributions with interest	$ 1,277,432	$ 458,808	$ 1,736,240
	i. Average contributions with interest	$ 15,541	$ 48,321	$ 18,935
2.	Vested inactive members			
	a. Number	14,563	795	15,358
	b. Total annual deferred benefits	$ 61,920	$ 7,090	$ 69,010
	c. Average annual deferred benefit	$ 4,252	$ 8,918	$ 4,493
	d. Average age at the valuation date	51.0	43.5	N/A
3.	Nonvested inactive members			
	a. Number	70,468	2,403	72,871
	b. Total member contributions with interest	$ 79,007	$ 7,245	$ 86,252
	c. Average contributions with interest	$ 1,121	$ 3,015	$ 1,184
4.	Service retirees			
	a. Number	49,575	7,402	56,977
	b. Total annual benefits	$ 574,210	$ 202,267	$ 776,476
	c. Average annual benefit	$ 11,583	$ 27,326	$ 13,628
	d. Average age at the valuation date	70.2	61.8	69.1
5.	Disabled retirees			
	a. Number	4,089	551	4,640
	b. Total annual benefits	$ 45,906	$ 9,102	$ 55,008
	c. Average annual benefit	$ 11,227	$ 16,519	$ 11,855
	d. Average age at the valuation date	64.9	56.1	63.8
6.	Beneficiaries			
	a. Number	5,349	1,045	6,394
	b. Total annual benefits	$ 47,352	$ 15,312	$ 62,664
	c. Average annual benefit	$ 8,852	$ 14,653	$ 9,800
	d. Average age at the valuation date	68.7	57.6	66.9

4.2

Summary of Historical Active Membership

	Active Members		Covered Payroll		Average Annual Pay	
June 30,	Number	Percent Increase /(Decrease)	Amount in Thousands	Percent Increase /(Decrease)	Amount	Percent Increase /(Decrease)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous Members						
2011	85,285		$ 2,276,596		$ 26,694	1.1%
2012	83,052	-2.6%	2,236,546	-1.8%	26,929	0.9%
2013	81,815	-1.5%	2,236,277	0.0%	27,333	1.5%
2014	81,115	-0.9%	2,272,270	1.6%	28,013	2.5%
2015	80,852	-0.3%	2,296,716	1.1%	28,406	1.4%
2016	80,664	-0.2%	2,352,762	2.4%	29,167	2.7%
2017	82,198	1.9%	2,452,407	4.2%	29,835	2.3%
Hazardous Members						
2011	9,407		$ 466,964		$ 49,640	1.7%
2012	9,130	-2.9%	464,229	-0.6%	50,847	2.4%
2013	9,123	-0.1%	461,673	-0.6%	50,605	-0.5%
2014	9,194	0.8%	479,164	3.8%	52,117	3.0%
2015	9,172	-0.2%	483,641	0.9%	52,730	1.2%
2016	9,084	-1.0%	492,851	1.9%	54,255	2.9%
2017	9,495	4.5%	541,633	9.9%	57,044	5.1%

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	116	7	1	1	0	0	0	0	0	0	0	0	125
	$14,326	$20,495	$25,247	$15,310	$0	$0	$0	$0	$0	$0	$0	$0	$14,767
20-24	1,351	612	266	123	47	18	3	0	0	0	0	0	2,420
	$17,383	$22,843	$23,709	$26,240	$29,907	$25,874	$16,613	$0	$0	$0	$0	$0	$20,215
25-29	1,582	1,109	790	501	352	582	16	0	1	1	0	0	4,934
	$19,345	$23,682	$27,440	$29,359	$30,263	$33,560	$38,969	$0	$1,200	$81,174	$0	$0	$25,161
30-34	1,283	1,014	818	576	430	1,498	531	15	1	0	0	0	6,166
	$19,226	$23,836	$26,668	$29,352	$30,813	$34,525	$38,953	$41,565	$51,262	$0	$0	$0	$28,201
35-39	1,278	1,020	835	611	516	1,809	1,301	552	20	1	0	0	7,943
	$19,047	$23,701	$24,171	$26,175	$26,741	$33,253	$39,101	$43,592	$51,552	$41,188	$0	$0	$29,542
40-44	1,059	888	857	602	546	2,128	1,651	1,251	402	17	0	0	9,401
	$18,791	$23,316	$24,911	$25,920	$26,785	$30,914	$35,728	$43,282	$49,477	$55,976	$0	$0	$31,054
45-49	1,007	826	760	624	544	2,421	2,273	1,805	934	215	17	0	11,426
	$20,234	$23,468	$25,262	$26,974	$26,008	$29,657	$32,898	$38,637	$46,954	$55,357	$67,469	$0	$31,784
50-54	853	695	630	490	477	2,208	2,395	2,586	1,315	508	116	9	12,282
	$19,382	$23,427	$25,908	$27,947	$27,997	$29,404	$31,373	$32,917	$39,261	$50,616	$59,930	$73,413	$31,454
55-59	661	583	596	432	447	1,926	2,353	2,625	1,812	652	138	48	12,273
	$20,195	$23,952	$25,332	$25,256	$26,217	$29,067	$31,559	$32,162	$35,606	$42,975	$54,148	$62,781	$31,185
60-64	491	361	422	340	353	1,707	1,698	1,777	1,299	586	133	54	9,221
	$16,295	$22,479	$23,690	$25,346	$24,708	$27,935	$32,639	$33,653	$34,327	$40,617	$50,505	$61,433	$30,885
65 & Over	385	295	330	218	248	1,263	1,340	908	528	337	91	64	6,007
	$14,237	$16,715	$20,233	$18,403	$19,458	$23,624	$29,223	$31,674	$32,543	$35,438	$41,754	$53,298	$26,639
Total	10,066	7,410	6,305	4,518	3,960	15,560	13,561	11,519	6,312	2,317	495	175	82,198
	$18,716	$23,227	$25,162	$26,676	$26,894	$30,070	$33,181	$35,305	$38,458	$44,218	$52,703	$59,444	$29,835

4.2

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	3	0	0	0	1	0	0	0	0	0	0	0	4
	$32,735	$0	$0	$0	$44,742	$0	$0	$0	$0	$0	$0	$0	$35,737
20-24	218	116	39	12	6	1	0	0	0	0	0	0	392
	$31,003	$39,289	$45,030	$44,626	$40,612	$35,991	$0	$0	$0	$0	$0	$0	$35,427
25-29	225	240	215	214	170	218	2	0	0	0	0	0	1,284
	$33,707	$43,742	$48,733	$47,619	$48,478	$53,071	$47,869	$0	$0	$0	$0	$0	$45,683
30-34	127	115	143	123	166	729	263	1	0	0	0	0	1,667
	$34,262	$44,426	$49,280	$51,712	$50,189	$56,473	$59,511	$78,551	$0	$0	$0	$0	$52,848
35-39	60	46	57	51	75	429	707	225	18	1	0	0	1,669
	$34,233	$45,393	$47,850	$48,995	$53,001	$56,157	$61,242	$65,500	$79,916	$51,518	$0	$0	$58,095
40-44	31	29	23	24	22	228	453	639	198	12	0	0	1,659
	$32,514	$42,658	$48,240	$48,336	$45,818	$54,912	$60,684	$68,155	$75,959	$90,285	$0	$0	$63,416
45-49	26	25	22	15	24	141	280	521	321	55	7	0	1,437
	$29,061	$43,628	$41,978	$48,781	$48,469	$54,823	$57,217	$64,009	$77,251	$85,461	$90,942	$0	$63,952
50-54	17	11	8	13	14	97	163	204	116	103	15	0	761
	$31,956	$40,026	$44,821	$40,538	$48,595	$56,610	$60,409	$64,701	$70,819	$79,994	$89,348	$0	$64,233
55-59	2	12	7	2	6	51	101	92	54	25	13	1	366
	$45,805	$41,635	$42,363	$55,669	$37,587	$55,263	$58,958	$60,316	$62,812	$77,335	$99,484	$116,630	$60,880
60-64	3	3	1	1	1	31	63	34	20	14	6	6	183
	$50,435	$59,964	$59,368	$31,649	$35,411	$52,091	$57,870	$63,589	$69,574	$80,378	$69,058	$98,627	$62,312
65 & Over	1	1	1	1	0	7	31	23	1	3	3	1	73
	$27,189	$39,776	$22,217	$42,993	$0	$45,213	$54,424	$65,878	$44,373	$41,976	$90,783	$121,853	$57,747
Total	713	598	516	456	485	1,932	2,063	1,739	728	213	44	8	9,495
	$32,852	$43,043	$48,019	$48,663	$49,379	$55,567	$59,957	$65,636	$74,614	$81,030	$89,928	$103,781	$57,044

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	276	$ 6,258	213	$ 2,578	605	$ 4,743	1,094	$ 13,579
50 - 54	1,208	28,709	313	4,114	240	2,148	1,761	34,971
55 - 59	4,139	72,231	702	8,721	408	4,126	5,249	85,078
60 - 64	8,320	114,696	904	10,600	596	6,021	9,820	131,317
65 - 69	12,190	141,556	821	9,118	764	7,691	13,775	158,365
70 - 74	9,753	96,987	550	5,542	740	7,020	11,043	109,549
75 - 79	6,764	61,869	368	3,508	741	6,511	7,873	71,888
80 - 84	4,007	32,317	166	1,394	568	4,645	4,741	38,356
85 - 89	1,990	14,382	46	291	408	2,856	2,444	17,529
90 And Over	928	5,204	6	39	279	1,591	1,213	6,834
Total	**49,575**	**$ 574,210**	**4,089**	**$ 45,906**	**5,349**	**$ 47,352**	**59,013**	**$ 667,468**

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	830	$ 26,495	164	$ 2,943	256	$ 1,918	1,250	$ 31,356
50 - 54	1,167	37,679	99	1,725	68	1,169	1,334	40,573
55 - 59	1,193	34,754	89	1,506	103	1,587	1,385	37,847
60 - 64	1,398	37,634	96	1,391	132	2,087	1,626	41,112
65 - 69	1,387	34,980	66	982	143	2,674	1,596	38,636
70 - 74	806	17,744	27	415	147	2,557	980	20,716
75 - 79	397	8,215	2	25	95	1,751	494	9,991
80 - 84	158	3,217	7	95	60	899	225	4,211
85 - 89	56	1,341	0	-	35	551	91	1,892
90 And Over	10	207	1	20	6	119	17	346
Total	**7,402**	**$ 202,267**	**551**	**$ 9,102**	**1,045**	**$ 15,312**	**8,998**	**$ 226,680**

4.2

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	5,433	$	5,654,324	19,324	$	14,240,228	24,757	$	19,894,552
Joint & Survivor:									
100% to Beneficiary	3,081		3,496,419	1,680		1,056,228	4,761		4,552,647
66 2/3% to Beneficiary	817		1,516,140	612		653,305	1,429		2,169,445
50% to Beneficiary	1,144		1,857,408	1,603		1,863,468	2,747		3,720,877
Pop-up Option	4,111		6,488,014	3,697		3,906,152	7,808		10,394,165
Social Security Option:									
Age 62 Basic	257		448,542	535		553,209	792		1,001,752
Age 62 Survivorship	598		1,057,324	355		350,888	953		1,408,212
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	1		3,007	1		236	2		3,243
10 Years Certain & Life	1,424		1,460,646	3,480		2,649,787	4,904		4,110,433
15 Years Certain & Life	649		662,254	859		650,927	1,508		1,313,181
20 Years Certain & Life	482		651,052	745		565,567	1,227		1,216,619
Refund	0		0	0		0	0		0
Partial Lump Sum Option (PLSO):									
12 Month Basic	96		114,040	365		312,783	461		426,822
24 Month Basic	59		40,600	243		194,946	302		235,546
36 Month Basic	253		124,069	708		322,323	961		446,392
12 Month Survivor	144		176,456	92		93,158	236		269,615
24 Month Survivor	89		91,577	60		40,491	149		132,067
36 Month Survivor	390		254,202	277		126,566	667		380,768
Total:	19,028	$	24,096,075	34,636	$	27,580,261	53,664	$	51,676,336

4.2

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	1,095	$ 2,239,751	328	$ 503,186	1,423	$ 2,742,937
Joint & Survivor:						
100% to Beneficiary	898	1,900,096	39	49,096	937	1,949,192
66 2/3% to Beneficiary	325	816,348	13	27,475	338	843,823
50% to Beneficiary	467	1,129,014	43	96,969	510	1,225,984
Pop-up Option	3,090	7,872,075	147	289,025	3,237	8,161,100
Social Security Option:						
Age 62 Basic	108	173,877	13	13,278	121	187,155
Age 62 Survivorship	292	467,388	19	32,804	311	500,192
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	85	145,525	5	5,333	90	150,858
10 Years Certain & Life	225	469,925	66	119,374	291	589,299
15 Years Certain & Life	91	175,897	17	28,006	108	203,903
20 Years Certain & Life	156	324,566	29	45,859	185	370,425
Refund	0	0	0	0	0	0
Partial Lump Sum Option (PLSO):						
12 Month Basic	23	37,037	9	12,127	32	49,164
24 Month Basic	20	42,799	6	6,336	26	49,135
36 Month Basic	53	85,377	20	23,431	73	108,808
12 Month Survivor	57	146,314	4	8,080	61	154,394
24 Month Survivor	68	110,450	2	2,220	70	112,670
36 Month Survivor	134	208,725	6	6,249	140	214,973
Total:	7,187	$ 16,345,163	766	$ 1,268,848	7,953	$ 17,614,011

Non-Hazardous Beneficiary Lives Summary

	Male Lives		Female Lives		Total	
Form of Payment	Number	Monthly Benefit Amount	Number	Monthly Benefit Amount	Number	Monthly Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Basic	16	$ 4,408	42	$ 25,711	58	$ 30,119
Joint & Survivor:						
100% to Beneficiary	534	320,572	1,578	1,073,177	2,112	1,393,748
66 2/3% to Beneficiary	86	54,726	242	189,302	328	244,028
50% to Beneficiary	154	60,896	412	235,493	566	296,389
Pop-up Option	260	232,093	675	682,333	935	914,425
Social Security Option:						
Age 62 Basic	0	0	5	4,806	5	4,806
Age 62 Survivorship	44	49,846	147	176,382	191	226,228
Partial Deferred (Old Plan)	0	0	0	0	0	0
Widows Age 60	0	0	0	0	0	0
5 Years Certain	94	64,720	109	72,951	203	137,671
10 Years Certain	142	86,298	172	141,416	314	227,714
10 Years Certain & Life	58	39,911	79	59,000	137	98,910
15 Years Certain & Life	41	38,912	68	55,007	109	93,919
20 Years Certain & Life	55	37,304	62	62,091	117	99,395
Refund	0	0	0	0	0	0
Partial Lump Sum Option (PLSO):						
12 Month Basic	0	0	1	395	1	395
24 Month Basic	0	0	0	0	0	0
36 Month Basic	1	149	1	152	2	301
12 Month Survivor	11	7,150	46	46,720	57	53,869
24 Month Survivor	15	14,462	30	28,682	45	43,144
36 Month Survivor	48	24,467	121	56,451	169	80,918
Total:	1,559	$ 1,035,914	3,790	$ 2,910,068	5,349	$ 3,945,982

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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	11	$	5,268	40	$	30,031	51	$	35,299
Joint & Survivor:									
100% to Beneficiary	43		37,391	229		285,889	272		323,280
66 2/3% to Beneficiary	10		9,658	51		70,709	61		80,367
50% to Beneficiary	17		13,273	68		66,619	85		79,892
Pop-up Option	62		75,205	259		415,988	321		491,193
Social Security Option:	0		0	0		0			
Age 62 Basic	0		0	1		310	1		310
Age 62 Survivorship	7		12,994	101		136,037	108		149,031
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	3		2,669	3		2,669
5 Years Certain	2		2,495	0		0	2		2,495
10 Years Certain	29		24,957	9		7,349	38		32,306
10 Years Certain & Life	5		3,627	7		5,858	12		9,485
15 Years Certain & Life	3		998	5		1,440	8		2,438
20 Years Certain & Life	5		2,742	11		9,683	16		12,424
Refund	0		0	0		0	0		0
Partial Lump Sum Option (PLSO):	0		0	0		0			
12 Month Basic	0		0	1		2,192	1		2,192
24 Month Basic	0		0	1		1,467	1		1,467
36 Month Basic	2		562	3		1,619	5		2,181
12 Month Survivor	1		579	6		4,611	7		5,189
24 Month Survivor	2		1,468	10		7,091	12		8,560
36 Month Survivor	10		8,827	31		26,389	41		35,215
Total:	209	$	200,043	836	$	1,075,951	1,045	$	1,275,994

4.2

Schedule of Retirants Added to And Removed from Rolls

(Dollar amounts except average allowance expressed in thousands)

Year Ended	Added to Rolls Number	Removed from Rolls Number	Rolls End of the Year Number	Rolls End of the Year Annual Benefits	% Increase in Annual Benefit	Average Annual Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Hazardous						
2011	3,250	1,077	43,211	$ 483,594		$ 11,191
2012	3,300	1,207	45,304	515,008	6.5%	11,368
2013	3,570	1,198	47,676	557,979	8.3%	11,704
2014	3,480	1,221	49,935	582,958	4.5%	11,674
2015	4,020	1,304	52,651	617,551	5.9%	11,729
2016	4,409	721	56,339	661,217	7.1%	11,736
2017	4,141	1,467	59,013	667,468	0.9%	11,311
Hazardous						
2011	502	102	6,468	$ 160,259		$ 24,777
2012	483	73	6,878	173,221	8.1%	25,185
2013	519	104	7,293	182,635	5.4%	25,043
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	226,681	5.3%	25,192

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, 2013, submitted April 30, 2014, and adopted by the Board on December 4, 2014. The investment return, price inflation, and payroll growth assumption were adopted by the Board in May and July 2017 for use with the June 30, 2017 valuation in order to reflect future economic expectations.

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 Increases				
	Merit & Seniority		Price Inflation & Productivity	Total Increase	
	Non-Hazardous	Hazardous		Non-Hazardous	Hazardous
0	8.50%	15.50%	3.05%	11.55%	18.55%
1	5.00%	6.00%	3.05%	8.05%	9.05%
2	1.50%	2.00%	3.05%	4.55%	5.05%
3	1.50%	1.25%	3.05%	4.55%	4.30%
4	1.00%	1.00%	3.05%	4.05%	4.05%
5	1.00%	0.50%	3.05%	4.05%	3.55%
6	0.75%	0.00%	3.05%	3.80%	3.05%
7	0.75%	0.00%	3.05%	3.80%	3.05%
8	0.50%	0.00%	3.05%	3.55%	3.05%
9	0.50%	0.00%	3.05%	3.55%	3.05%
10 & Over	0.25%	0.00%	3.05%	3.30%	3.05%

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	
Age	Members participating before 9/1/2008[1]	Members participating on or after 9/1/2008[2]	Service	Members participating before 9/1/2008[3]	Members participating on or after 9/1/2008[4]
55	5.0%		20	22.5%	
56	6.0%		21	22.5%	
57	7.0%		22	22.5%	
58	7.0%		23	22.5%	
59	8.0%		24	30.0%	
60	9.0%	9.0%	25	33.0%	22.5%
61	15.0%	15.0%	26	33.0%	22.5%
62	18.0%	18.0%	27	36.0%	22.5%
63	18.0%	18.0%	28	39.0%	22.5%
64	18.0%	18.0%	29	55.0%	30.0%
65	18.0%	18.0%	30	33.0%	33.0%
66	18.0%	18.0%	31	33.0%	33.0%
67	18.0%	18.0%	32	50.0%	36.0%
68	18.0%	18.0%	33	40.0%	39.0%
69	18.0%	18.0%	34	40.0%	55.0%
70	18.0%	18.0%	35	40.0%	33.0%
71	18.0%	18.0%	36	40.0%	33.0%
72	18.0%	18.0%	37	40.0%	50.0%
73	18.0%	18.0%	38	40.0%	40.0%
74	18.0%	18.0%	39	40.0%	40.0%
75	100.0%	100.0%	40	40.0%	40.0%

[1] If service is at least 27 years, the rate is 30%.
[2] If age plus service is at least 87, the rate is 30%.
[3] The annual rate of service retirement is 100% at age 62.
[4] The annual rate of service retirement is 100% at age 60.

Disability rates:

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

Age	Non-Hazardous		Hazardous	
	Male	Female	Male	Female
20	0.02%	0.02%	0.05%	0.05%
30	0.03%	0.03%	0.09%	0.09%
40	0.07%	0.07%	0.20%	0.20%
50	0.19%	0.19%	0.56%	0.56%
60	0.49%	0.49%	1.46%	1.46%

Withdrawal rates (for causes other than death, disability or retirement):

Assumed annual rates of withdrawal are shown below.

Service Years	Annual Rates of Withdrawal	
	Non-Hazardous	Hazardous
0	28.00%	20.50%
1	16.00%	13.00%
2	12.00%	10.50%
3	10.00%	9.00%
4	8.00%	8.00%
5	6.00%	7.00%
6	5.00%	7.00%
7	5.00%	6.00%
8-13	4.00%	6.00%
14 & Over	3.00%	6.00%

Mortality Assumption:

Pre-retirement mortality: RP-2000 Combined Mortality Table projected with Scale BB to 2013. Male mortality rates are multiplied by 50% and female mortality rates are multiplied by 30%.

Post-retirement mortality (non-disabled): RP-2000 Combined Mortality Table projected with Scale BB to 2013. Female mortality rates are set back one year.

Post-retirement mortality (disabled): RP-2000 Combined Disabled Mortality Table projected with Scale BB to 2013. Male mortality rates are set back four years.

At the time of the last experience study, performed as of June 30, 2013, this mortality assumption provided 37% and 19% margin for future improvement for males and females, respectively. *Marital status*:

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

Line of Duty Disability

0% of disabilities are assumed to occur in the line of duty

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 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[1]:

January 1	Non-Medicare Plans	Medicare Plans	Dollar Contribution[2]
2019	7.25%	5.10%	1.50%
2020	7.00%	5.00%	1.50%
2021	6.75%	4.90%	1.50%
2022	6.50%	4.80%	1.50%
2023	6.25%	4.70%	1.50%
2024	6.00%	4.60%	1.50%
2025	5.75%	4.50%	1.50%
2026	5.50%	4.40%	1.50%
2027	5.25%	4.30%	1.50%
2028	5.00%	4.20%	1.50%
2029	4.75%	4.10%	1.50%
2030	4.50%	4.05%	1.50%
2031	4.25%	4.05%	1.50%
2032 & Beyond	4.05%	4.05%	1.50%

[1]All increases are assumed to occur on January 1. The 2018 premiums were known at the time of the valuation and were incorporated into the liability measurement using a trend of 1.232% for Non-Medicare plans and a trend of 0.00% for Medicare plans at January 1, 2018.

[2]Applies to members participating on or after July 1, 2003

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- 15 years from the valuation

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:

- 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 between 7/1/2003 and 9/1/2008	Members participating after 9/1/2008
Under 10	50%	100%	100%
10-14	75%	100%	100%
15-19	90%	100%	100%
Over 20	100%	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	June 30, 2017 Participation*
Medical Only	7%
Essential	8%
Premium	84%

* May not add due to rounding

Non-Medicare Plan	June 30, 2017 Participation
Standard PPO	14%
Standard CDHP	2%
LivingWell CDHP	22%
LivingWell PPO	62%

- 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 with non-hazardous service are assumed to begin health coverage at age 55 for members participating before September 1, 2008, and at age 60 for members participating on or after September 1, 2008. Deferred vested members with hazardous service are assumed to begin health coverage at age 50.

- 50% of future retirees, with hazardous service, are assumed to elect spouse health care coverage. No dependent coverage is assumed for members who only have non-hazardous service. 100% of spouses with health care coverage are assumed to continue coverage after the member's death.

Excise ("Cadillac") Tax:

For taxable years beginning after December 31, 2019, a 40% excise tax will be required to be paid (by the employer and/or insurer) on the aggregate cost of the health plan in excess of certain legislated thresholds. For 2018, the thresholds are $850 per month for individual coverage and $2,292 per month for family coverage.

Both Actuarial Standard of Practice No. 6 and GASB Statement Nos. 74 and 75 reference this tax, and, in accordance with these standards an estimate of the impact of the Cadillac tax has been included in this valuation.

Assumptions and methods used to determine the impact of the Cadillac Tax include:

- 2018 thresholds of $850/$2,292 were indexed annually by 2.30%.
- Premium data submitted was not adjusted for permissible exclusions to the Cadillac Tax.
- There were no special adjustments to the dollar limit other than those permissible for non-Medicare retirees over 55.

In this valuation, the impact of the Cadillac Tax has been calculated by increasing the employer paid premiums for Non-Medicare retirees, who became participants before July 1, 2003, by 3.6%. Non-Medicare retirees who became participants after July 1, 2003 receive dollar subsidies per year of service, which are not expected to exceed the overall Non-Medicare premiums. As a result, the costs attributable to the Cadillac Tax for members who became participants after July 1, 2003 will be paid by the retirees.

Changes in Assumptions since the prior valuation:

1. The assumed investment return was changed from 7.50% to 6.25%.
2. The price inflation assumption was changed from 3.25% to 2.30%, which also resulted in a 0.95% decrease in the salary increase assumption at all years of service and a 0.95% decrease in the health care cost trend rates.
3. The payroll growth assumption (used for the amortization of unfunded actuarial accrued liabilities) was changed from 4.00% to 2.00%.

Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2017, 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 $862.64 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 KRS pays 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 KRS 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 to KRS which include the liabilities associated with the implicit rate subsidy.

For those not eligible for Medicare		
Age	Member	Spouse/Dependents
<65	$711.22	$862.64

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2017, 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	$208.66	$196.81
75	244.13	238.22
85	258.16	261.20

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

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

Mehdi Riazi

Mehdi Riazi, FSA, EA, 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.

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 rate of pay. Additionally, each eligible dependent child will receive 10% of the member's monthly final rate of pay up to a maximum of 40%.

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.

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 25% of the deceased member's final monthly rate of pay. A spouse may also elect the non-line of duty death benefit.
Child Benefit	Each eligible dependent child will receive 10% of the member's final monthly rate of pay up to a maximum of 40%.

CERS Non-Hazardous Employees (continued)

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

Changes since the Prior Valuation

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 rate of pay. Additionally, each eligible dependent child will receive 10% of the member's monthly final rate of pay up to a maximum of 40%.

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.

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 25% of the deceased member's final monthly rate of pay. 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	Each eligible dependent child will receive 10% of the member's final monthly rate of pay up to a maximum of 40%.

CERS Hazardous Employees (continued)

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

Changes since the Prior Valuation

None.

Summary of Main Retiree Insurance Benefit Provisions

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

Benefit Eligibility Recipient of a retirement allowance

Benefit Amount

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

The percentage paid by the retirement system is applied to the 'contribution' plan selected by the KRS 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 100% of the maximum contribution. This benefit is provided to members in the Non-hazardous and Hazardous plans alike.

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

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

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

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

Benefit Eligibility

Recipient of a retirement allowance with at least 120 months of service at retirement

Non-Hazardous Subsidy

Monthly contribution of $10 for each year of earned service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2017, the Non-Hazardous monthly contribution was $13.18/year of service. Upon the retiree's death, the surviving spouse may continue coverage (if in receipt of a retirement allowance) but will be 100% responsible for the premiums.

Hazardous Subsidy

Monthly contribution of $15 for each year of earned hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2017, the Non-Hazardous monthly contribution was $19.77/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($13.18 as of July 1, 2017) for each year of hazardous service.

Duty Disability Retirement

If disability was a result of injuries sustained while in the line of duty, the member receives a benefit equal to at least 20 times the Non-Hazardous monthly contribution. 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 benefit equal to at least 20 times the Non-Hazardous monthly contribution. This benefit is provided to members in the Non-hazardous and Hazardous plans alike.

Non-Duty Death in Service

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

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

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

Monthly Health Plan Premiums – Effective January 1, 2018

Non-Medicare Plan Options					
Plan Option	Single	Parent Plus	Couple	Family	Family X-Ref
LivingWell PPO*	$729.34	$1,037.08	$1,589.10	$1,767.60	$876.68
LivingWell CDHP	709.46	978.50	1,325.64	1,479.76	818.96
Standard PPO	685.38	975.90	1,497.18	1,666.26	824.54
Standard CDHP	682.80	940.64	1,450.02	1,615.30	800.94

Medicare Plan Options	
Kentucky Retirement Systems - Medical Only Plan	$165.01
Kentucky Retirement Systems – Medicare Advantage/Essential Plan	75.56
Kentucky Retirement Systems – Medicare Advantage/Premium Plan*	252.21

*For 2018, the contribution plans selected by the KRS Board were the LivingWell PPO plan option for non-Medicare retirees and the Medicare Advantage Premium plan option for Medicare retirees.

Dollar Contribution Amount for Insurance Tier 2 and Tier 3

Monthly contribution amounts per year of service as of July 1, 2017.

Non-Hazardous Service	Hazardous Service
$13.18	$19.77

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.

4.2

State Police Retirement System (SPRS)

Actuarial Valuation Report as of June 30, 2017

GRS Retirement Consulting

P: 469.524.0000 | F: 469.524.0003 | www.grsconsulting.com

December 4, 2017

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

Subject: Actuarial Valuation as of June 30, 2017

Dear Trustees of the Board:

This report describes the current actuarial condition of the State Police Retirement System (SPRS), determines the required employer contribution rates, and analyzes changes in the System's financial condition. In addition, the report 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 KRS. This report was prepared at the request of the Board of Trustees of the Kentucky Retirement System (Board) and is intended for use by the KRS staff and those designated or approved by the Board.

Financing Objectives and Funding Policy

The employer contribution rate is determined in accordance with Section 61.565 of Kentucky Statute. As specified by the Statute, the employer contribution rate is determined based on a closed thirty-year amortization period beginning July 1, 2013. As a result, the amortization period used in the 2017 actuarial valuation is 26 years. The contribution rate determined by this actuarial valuation becomes effective twelve months after the valuation date and is effective for two fiscal years. In other words, the contribution rate determined by this June 30, 2017 actuarial valuation will be used by the Board to certify the Commonwealth's contribution rates for the fiscal year July 1, 2018 and ending June 30, 2020.

If new legislation is enacted between the valuation date and the date the contribution rate becomes effective, the Board may adjust the calculated rate before certifying them, in order to reflect this new legislation. Such adjustments are based on information supplied by the actuary.

Assumptions and Methods

Kentucky Statutes also requires that an actuarial investigation be performed at least every five years to review the economic and demographic assumptions. An experience study was conducted

as of June 30, 2013 and the next experience study will be conducted as of June 30, 2018. However, the Board has the authority to review the assumptions on a more frequent basis and adopt new assumptions prior to the next scheduled experience study. Subsequent to the last actuarial valuation the Board decreased the price inflation assumption to 2.30%, and decreased the assumed rate of return to 5.25% for the Retirement Fund and to 6.25% for the Health Insurance Fund. Finally, the amortization of the unfunded actuarial accrued liability will be based on a 0.00% payroll growth assumption (i.e. amortized on a level dollar basis) for the Retirement and Health Insurance funds, but employers will continue to contribute to the System as a percentage of expected covered payroll. It is our opinion that the current assumptions are internally consistent and reasonably reflect the anticipated future experience of the System.

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

Benefit Provisions

The benefit provisions reflected in this valuation are those which were in effect on June 30, 2017. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

Data

Member data for retired, active and inactive members was supplied as of June 30, 2017, by the KRS staff. The staff also supplied asset information as of June 30, 2017. 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 KRS.

Certification

We certify that the information presented herein is accurate and fairly portrays the actuarial position of SPRS as of June 30, 2017.

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.

4.2

Kentucky Retirement System
December 4, 2017
Page 3

The undersigned are independent actuaries and consultants. Mr. Newton and Mr. White are Enrolled Actuaries. All three of the undersigned are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries. All of the undersigned are experienced in performing valuations for large public retirement systems.

Sincerely,

Gabriel, Roeder, Smith & Co.

Joseph P. Newton, FSA, MAAA, EA
Senior Consultant

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

Janie Shaw, ASA, MAAA
Consultant

Table of Contents

SECTION 1

EXECUTIVE SUMMARY

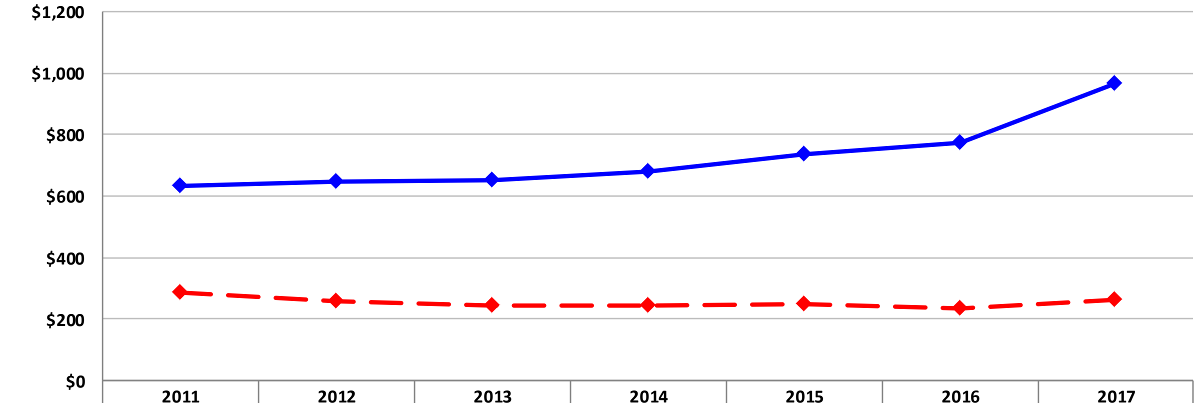
Summary of Principal Results

(Dollar amounts expressed in thousands)

	SPRS	
	June 30, 2017	June 30, 2016
Contributions for next fiscal year:		
Retirement	119.05%	71.57%
Insurance	27.23%	18.10%
Total	146.28%	89.67%
Assets:		
Retirement		
• Actuarial value (AVAR)	$261,320	$234,568
• Market value (MVAR)	$255,737	$217,594
• Ratio of actuarial to market value of assets	102.2%	107.8%
Insurance		
• Actuarial value (AVAI)	$180,464	$172,704
• Market value (MVAI)	$178,838	$161,366
• Ratio of actuarial to market value of assets	100.9%	107.0%
Funded Status:		
Retirement		
• Actuarial accrued liability	$967,145	$775,160
• Unfunded accrued liability on AVAR	$705,825	$540,593
• Funded ratio on AVAR	27.0%	30.3%
• Unfunded accrued liability on MVAR	$711,408	$557,566
• Funded ratio on MVAR	26.4%	28.1%
Insurance		
• Actuarial accrued liability	$276,641	$257,197
• Unfunded accrued liability on AVAI	$96,177	$84,494
• Funded ratio on AVAI	65.2%	67.1%
• Unfunded accrued liability on MVAI	$97,803	$95,831
• Funded ratio on MVAI	64.6%	62.7%
Membership:		
• Number of		
- Active Members	903	908
- Retirees and Beneficiaries	1,536	1,515
- Inactive Members	480	455
- Total	2,919	2,878
• Projected payroll of active members	$48,598	$45,551
• Average salary of active members	$53,818	$50,166

Executive Summary (Continued)

The unfunded actuarial accrued liability increased by $165.2 million since the prior year's valuation to $705.8 million. The largest source of this increase is the result of the decrease in the assumed rate of investment return which resulted in a $136.6 million increase in the unfunded 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 seven years has generally been due to a combination of the actual investment experience being less than the fund's expected investment return assumption, a decrease in the assumed rate of return in 2015, 2016 and again in 2017, and contributions that were insufficient to amortize the unfunded actuarial accrued liability.



	2011	2012	2013	2014	2015	2016	2017
AAL	634.4	647.7	651.6	681.1	734.2	775.2	967.1
AVA	285.6	259.8	241.8	242.7	248.4	234.6	261.3

SECTION 2

DISCUSSION

Discussion

The State Police Retirement System (SPRS) is a defined benefit pension fund that provides pensions and health care coverage for uniformed state police officers. SPRS includes both non-hazardous and hazardous duty benefits. This report presents the result of the June 30, 2017 actuarial funding valuation for both the Retirement Plan and Insurance Funds.

The primary purposes of the valuation report are to depict the current financial condition of the System, determine the annual required contribution, and analyze changes in the System's financial condition. In addition, the report provides various summaries of the data.

The actuarially determined contribution rates 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 is should cost to provide the benefits for an average new member. Since members contribute to the fund, only the excess of the normal rate over the member contribution rate is included in the employer contribution rate. The amortization cost is the amount, expressed as a percentage of payroll, necessary to amortize the unfunded actuarial accrued liability. The payroll growth rate and discount rate assumptions are selected by the Board. The funding period is specified in Section 61.565 of Kentucky Statute.

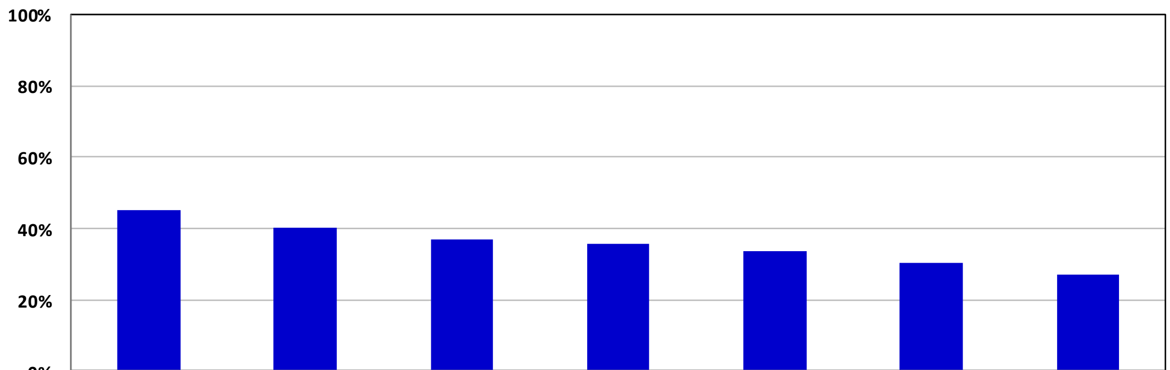
All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides member data and statistical information. Appendices A and B provide summaries of the principle actuarial assumptions and methods and plan provisions. Finally, Appendix C provides a glossary of technical terms that are used throughout this report.

Funding Progress

4.2

The following charts provide a seven-year history of the funds' funded ratio (i.e. the Actuarial Value of Assets divided by the Actuarial Accrued Liability). The decline in the funded ratio over the last seven years for the retirement funds has generally been due to actual contributions being insufficient to finance the unfunded actuarial accrued liability, actual investment experience being less than the investment return assumption, a decrease in the assumed rate of return in 2015, 2016 and again in 2017.

Funded Ratio
Actuarial Assets as a percentage of Actuarial Accrued Liability



	2011	2012	2013	2014	2015	2016	2017
Funded Ratio	45.0%	40.1%	37.1%	35.6%	33.8%	30.3%	27.0%

Assuming the actuarial determined contributions are actually paid in future years, then absent future unfavorable experience we expect the funded ratio to begin improving. Also, the dollar amount of the unfunded actuarial accrued liability, or the difference between the actuarial accrued liability and the actuarial value of assets, is expected to decrease after the higher contribution rates determined by the actuarial valuation become effective. Table 9, Schedule of Funding Progress, in the following section of the report provides additional detail regarding the funding progress of the Retirement System.

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 returns are computed net of investment expenses. The actuarial value of assets for the retirement fund increased from $234.6 million to $261.3 million since the prior valuation. Table 7 in the following section of the report provides the development of the actuarial value of assets.

The rate of return on the market value of assets on a dollar-weighted basis for fiscal year 2017 was a 12.0% which is greater than the 6.75% expected annual return during that fiscal year. The return on an actuarial (smoothed) asset value was 6.4%. 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 $5.6 million less than the actuarial value of assets, which signifies that the retirement fund is in a position of deferred losses. Therefore, unless the fund experiences investment returns in excess of the assumed rate of return in an amount that is at least equal to the outstanding deferred losses, the future recognition of these deferred losses is expected to increase the unfunded actuarial accrued liability.

Table 6 in the following section of this report provides asset information that was included in the annual financial statements of the System. Also, Tables 6 and 7 shows the estimated yield on a market value basis and on the actuarial asset valuation method.

Actuarial Gains/ (Losses)

The annual actuarial valuation is a snapshot analysis of the benefit liabilities, assets and funded position of the System 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 the 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 actuarial gains / (loss) 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, changes in plan provisions, etc.

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

	Retirement		Insurance	
A. Calculation of total actuarial gain or loss				
1. Unfunded actuarial accrued liability (UAAL), previous year	$	540,593	$	84,494
2. Normal cost and administrative expenses		8,653		4,886
3. Less: contributions for the year		(68,587)		(9,353)
4. Interest accrual		34,467		6,169
5. Expected UAAL (Sum of Items 1 - 4)	$	515,126	$	86,196
6. Actual UAAL as of June 30,2017	$	705,825	$	96,177
7. Total gain (loss) for the year (Item 5 - Item 6)	$	(190,699)	$	(9,981)
B. Source of gains and losses				
8. Asset gain (loss) for the year	$	(914)	$	(839)
9. Liability experience gain (loss) for the year		(53,157)		24,070
10. Assumption change		(136,628)		(33,212)
11. Total	$	(190,699)	$	(9,981)

The accrued liability for the retirement fund was about 7% higher than expected, resulting in a $53 million liability loss. This $53 million increase is comprised of a $29 million increase due to differences in liability calculations between GRS and the fund's prior actuary and a $24 million increase due to the fund's experience during the last year. The experience loss is primarily due to higher than expected salary increases during the past year. The 2018 insurance premiums were known at the time of the valuation and were incorporated into the liability measurement. Premiums were lower than expected and resulted in a $19 million liability experience gain for the insurance fund.

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. An experience study was conducted as of June 30, 2013 and the next experience study will be conducted as of June 30, 2018. However, the Board has the authority to review the assumptions on a more frequent basis and adopt new assumptions prior to the next scheduled experience study. Since the last actuarial valuation, the Board made the following changes in assumptions:

- Decrease the assumed rate of return to 5.25% for the retirement fund and to 6.25% for the health insurance fund.
- Decrease the price inflation assumption to 2.30% for the retirement and health insurance funds.
- Amortize the unfunded actuarial accrued liability for the retirement and health insurance funds on a level dollar basis, converted to a percentage of the expected covered payroll.
- Decrease in the individual salary increase assumption and health care trend assumption that corresponds with the 0.95% decrease in the price inflation assumption.

Appendix A includes a summary of the actuarial assumptions and methods used in this valuation. It is our opinion that the assumptions are internally consistent, reasonable, and reflect anticipated future experience of the System. The next experience study will be conducted no later than as of June 30, 2018.

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 benefit provisions for SPRS. There were no legislative changes enacted since the previous valuation that had a measurable effect on the current valuation.

This valuation reflects all benefits promised to SPRS members, either by the statutes or by the Board. There are no ancillary benefits that might be deemed a SPRS liability if continued beyond the availability of funding by the current funding source.

SECTION 3

ACTUARIAL TABLES

Actuarial Tables

Development of Unfunded Actuarial Accrued Liability

(Dollar amounts expressed in thousands)

		June 30, 2017	
		Retirement (1)	Insurance (2)
1.	Projected payroll of active members	$ 48,598	$ 48,164
2.	Present value of future pay	$ 424,190	$ 390,888
3.	Normal cost rate		
	a. Total normal cost rate	23.84%	11.48%
	b. Less: member contribution rate	-8.00%	-0.30%
	c. Employer normal cost rate	15.84%	11.18%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits	$ 286,843	$ 122,992
	b. Less: present value of future normal costs	(93,680)	(32,741)
	c. Actuarial accrued liability	$ 193,163	$ 90,251
5.	Total actuarial accrued liability		
	a. Retirees and beneficiaries	$ 766,899	$ 183,156
	b. Inactive members	7,083	3,234
	c. Active members (Item 4c)	193,163	90,251
	d. Total	$ 967,145	$ 276,641
6.	Actuarial value of assets	$ 261,320	$ 180,464
7.	Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	$ 705,825	$ 96,177
8.	Funded Ratio	27.0%	65.2%

Actuarial Present Value of Future Benefits

(Dollar amounts expressed in thousands)

		June 30, 2017	
		Retirement (1)	Insurance (2)
1.	Active members		
	a. Service retirement	$ 264,685	
	b. Deferred termination benefits and refunds	14,923	
	c. Survivor benefits	1,266	
	d. Disability benefits	5,969	
	e. Total	$ 286,843	$ 122,992
2.	Retired members		
	a. Service retirement	$ 701,038	
	b. Disability retirement	12,152	
	c. Beneficiaries	53,709	
	d. Total	$ 766,899	$ 183,156
3.	Inactive members		
	a. Vested terminations	$ 6,563	$ 3,234
	b. Nonvested terminations	520	N/A
	c. Total	$ 7,083	$ 3,234
4.	Total actuarial present value of future benefits	$ 1,060,825	$ 309,382

Development of Required Contribution Rate

		June 30, 2017	
		Retirement (1)	Insurance (2)
1.	Total normal cost rate		
	a. Service retirement	20.08%	
	b. Deferred termination benefits and refunds	2.82%	
	c. Survivor benefits	0.16%	
	d. Disability benefits	0.78%	
	e. Total	23.84%	11.48%
2.	Less: member contribution rate	-8.00%	-0.30%
3.	Total employer normal cost rate	15.84%	11.18%
4.	Administrative expenses	0.37%	0.14%
5.	Net employer normal cost rate	16.21%	11.32%
6.	UAAL amortization contribution	102.84%	15.91%
7.	Total recommended employer contribution	119.05%	27.23%

Actuarial Balance Sheet

Retirement Benefits

(Dollar amounts expressed in thousands)

		June 30, 2017 (1)	June 30, 2016 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 261,320	$ 234,568
	b. Present value of future member contributions	$ 33,935	$ 34,858
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 59,745	$ 41,787
	ii. Unfunded accrued liability contributions	705,825	540,592
	iii. Total future employer contributions	$ 765,570	$ 582,379
	d. Total assets	$ 1,060,825	$ 851,805
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 93,680	$ 76,645
	ii. Accrued liability	193,163	138,661
	iii. Total present value of future benefits	$ 286,843	$ 215,306
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 766,899	$ 630,842
	c. Present value of benefits payable on account of current inactive members	$ 7,083	$ 5,657
	d. Total liabilities	$ 1,060,825	$ 851,805

Actuarial Balance Sheet

Insurance Benefits

(Dollar amounts expressed in thousands)

		June 30, 2017 (1)	June 30, 2016 (2)
1.	Assets - Present and Expected Future Resources		
	a. Current assets (actuarial value)	$ 180,464	$ 172,704
	b. Present value of future member contributions	$ 1,905	$ 1,699
	c. Present value of future employer contributions		
	i. Normal cost contributions	$ 30,836	$ 21,316
	ii. Unfunded accrued liability contributions	96,177	84,494
	iii. Total future employer contributions	$ 127,013	$ 105,810
	d. Total assets	$ 309,382	$ 280,213
2.	Liabilities - Present Value of Expected Future Benefit Payments		
	a. Active members		
	i. Present value of future normal costs	$ 32,741	$ 23,015
	ii. Accrued liability	90,251	80,103
	iii. Total present value of future benefits	$ 122,992	$ 103,118
	b. Present value of benefits payable on account of current retired members and beneficiaries	$ 183,156	$ 171,155
	c. Present value of benefits payable on account of current inactive members	$ 3,234	$ 5,940
	d. Total liabilities	$ 309,382	$ 280,213

Reconciliation of System Net Assets
(Dollar amounts expressed in thousands)

	June 30, 2017 (1) **Retirement**	June 30, 2017 (2) **Insurance**
1. Value of assets at beginning of year	$ 217,594	$ 161,366
2. Revenue for the year		
a. Contributions		
i. Member contributions	$ 5,348	$ 131
ii. Employer contributions	38,029	9,222
iii. Other contributions (less 401h)	25,210	0
iii. Total	$ 68,587	$ 9,353
b. Income		
i. Interest, dividends, and other income	$ 7,263	$ 4,896
ii. Investment expenses	(1,722)	(1,362)
iii. Net	$ 5,540	$ 3,533
c. Net realized and unrealized gains (losses)	21,156	18,135
d. Total revenue	$ 95,284	$ 31,021
3. Expenditures for the year		
a. Disbursements		
i. Refunds	$ 26	$ 0
ii. Regular annuity benefits	56,934	13,405
iii. Other benefit payments	0	78
iv. Transfers to other systems	0	0
v. Total	$ 56,960	$ 13,483
b. Administrative expenses and depreciation	181	66
c. Total expenditures	$ 57,141	$ 13,549
4. Increase in net assets (Item 2. - Item 3.)	$ 38,143	$ 17,472
5. Value of assets at end of year (Item 1. + Item 4.)	$ 255,737	$ 178,838
6. Net external cash flow		
a. Dollar amount	$ 11,446	$ (4,196)
b. Percentage of market value	4.8%	-2.5%
7. Estimated annual return on net assets	12.0%	13.6%

Development of Actuarial Value of Assets

Retirement Benefits

(Dollar amounts expressed in thousands)*

		June 30, 2017
	Year Ending	June 30, 2017
1.	Actuarial value of assets at beginning of year	$ 234,568
2.	Market value of assets at beginning of year	$ 217,594
3.	Net new investments	
	a. Contributions	$ 68,587
	b. Benefit payments	(56,960)
	c. Administrative expenses	(181)
	d. Subtotal	$ 11,446
4.	Market value of assets at end of year	$ 255,737
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$ 26,697
6.	Assumed investment return rate for fiscal year	6.75%
7.	Expected return for immediate recognition	$ 15,074
8.	Excess return for phased recognition	$ 11,623

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

	Fiscal Year Ending June 30,	Excess Return	Recognized Amount
a.	2017	$ 11,623	$ 2,325
b.	2016	(21,455)	(4,291)
c.	2015	(16,122)	(3,224)
d.	2014	22,202	4,440
e.	2013	4,918	984
f.	Total		$ 233

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$ 261,320
11.	Ratio of actuarial value to market value	102.2%
12.	Estimated annual return on actuarial value of assets	6.4%

* Amounts may not add due to rounding

Development of Actuarial Value of Assets

Insurance Benefits

(Dollar amounts expressed in thousands)*

	Year Ending		June 30, 2017
1.	Actuarial value of assets at beginning of year	$	172,704
2.	Market value of assets at beginning of year	$	161,366
3.	Net new investments		
	a. Contributions	$	9,353
	b. Benefit payments		(13,483)
	c. Administrative expenses		(66)
	d. Subtotal	$	(4,196)
4.	Market value of assets at end of year	$	178,838
5.	Net earnings (Item 4. - Item 2. - Item 3.d.)	$	21,668
6.	Assumed investment return rate for fiscal year		7.50%
7.	Expected return for immediate recognition	$	11,945
8.	Excess return for phased recognition	$	9,723

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

	Fiscal Year Ending June 30,		Excess Return		Recognized Amount
a.	2017	$	9,723	$	1,945
b.	2016		(12,288)		(2,458)
c.	2015		(9,762)		(1,952)
d.	2014		9,368		1,874
e.	2013		3,015		603
f.	Total			$	11

10.	Actuarial value of assets as of June 30, 2017 (Item 1. + Item 3.d. + Item 7.+ Item 9.f.)	$	180,464
11.	Ratio of actuarial value to market value		100.9%
12.	Estimated annual return on actuarial value of assets		7.0%

* Amounts may not add due to rounding

4.2

Schedule of Funding Progress
(Dollar amounts expressed in thousands)

June 30, (1)	Actuarial Value of Assets (AVA) (2)	Actuarial Accrued Liability (AAL) (3)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2) (4)	Funded Ratio (2)/(3) (5)	Annual Covered Payroll (6)	UAAL as % of Payroll (4)/(6) (7)
Retirement						
2011	$ 285,581	$ 634,379	$ 348,799	45.0%	$ 48,693	716.3%
2012	259,792	647,689	387,897	40.1%	48,373	801.9%
2013	241,800	651,581	409,780	37.1%	45,256	905.5%
2014	242,742	681,118	438,377	35.6%	44,616	982.6%
2015	248,388	734,156	485,769	33.8%	45,765	1061.4%
2016	234,568	775,160	540,593	30.3%	45,551	1186.8%
2017	261,320	967,145	705,825	27.0%	48,598	1452.4%
Insurance						
2011	$ 123,687	$ 438,428	$ 314,741	28.2%	$ 48,693	646.4%
2012	124,372	333,904	209,532	37.2%	48,373	433.2%
2013	136,321	222,327	86,006	61.3%	45,256	190.0%
2014	155,595	234,271	78,676	66.4%	44,616	176.3%
2015	167,775	254,839	87,064	65.8%	45,765	190.2%
2016	172,704	257,197	84,493	67.1%	45,551	185.5%
2017	180,464	276,641	96,177	65.2%	48,598	197.9%

Summary of Principal Assumptions and Methods

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

Valuation date:	June 30, 2017
Actuarial cost method:	Entry Age Normal
Amortization method:	Level percentage of payroll (0% payroll growth assumed)
Amortization period for contribution rate:	26-year closed period
Asset valuation method:	5-Year Smoothed Market
Actuarial assumptions:	
Investment rate of return	5.25%
Projected salary increases	3.05% to 15.55% (varies by service)
Inflation	2.30%
Post-retirement benefit adjustments	0.00%
Retiree Mortality	RP-2000 Combined Mortality Table for Males and Females, projected using scale BB to 2013 (set back one year for females).

4.2

Solvency Test

(Dollar amounts expressed in thousands)

June 30,	Actuarial Accrued Liability: Active Member Contributions	Actuarial Accrued Liability: Retired Members & Beneficiaries	Actuarial Accrued Liability: Active Members (Employer Financed)	Valuation Assets	Portion of Aggregate Accrued Liabilities Covered by Assets: Active	Retired	ER Financed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Retirement							
2008	$ 41,391	$ 426,311	$ 119,426	$ 350,891	100.0%	72.6%	0.0%
2009	41,664	459,585	101,079	329,967	100.0%	62.7%	0.0%
2010	42,012	475,893	94,541	304,577	100.0%	55.2%	0.0%
2011	43,574	499,194	91,611	285,581	100.0%	48.5%	0.0%
2012	41,139	523,017	83,533	259,792	100.0%	41.8%	0.0%
2013	39,788	535,720	76,072	241,800	100.0%	37.7%	0.0%
2014	41,831	563,011	76,276	242,742	100.0%	35.7%	0.0%
2015	41,567	605,855	86,734	248,388	100.0%	34.1%	0.0%
2016	41,871	636,499	96,791	234,568	100.0%	30.3%	0.0%
2017	44,798	773,982	148,365	261,320	100.0%	28.0%	0.0%
Insurance							
2008	$ -	$ 178,655	$ 266,452	$ 123,961	100.0%	69.4%	0.0%
2009	-	167,091	196,940	123,527	100.0%	73.9%	0.0%
2010	-	253,581	181,380	121,175	100.0%	47.8%	0.0%
2011	-	252,440	185,988	123,687	100.0%	49.0%	0.0%
2012	-	190,259	143,645	124,372	100.0%	65.4%	0.0%
2013	-	139,509	82,818	136,321	100.0%	97.7%	0.0%
2014	-	143,402	90,869	155,595	100.0%	100.0%	13.4%
2015	-	170,447	84,392	167,775	100.0%	98.4%	0.0%
2016	-	177,094	80,103	172,704	100.0%	97.5%	0.0%
2017	-	186,390	90,251	180,464	100.0%	96.8%	0.0%

SECTION 4

MEMBERSHIP INFORMATION

Membership Tables

4.2

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

			June 30, 2017
			(1)
1.	Active members		
	a. Males		873
	b. Females		30
	c. Total members		903
	d. Total annualized prior year salaries	$	48,598
	e. Average salary	$	53,819
	f. Average age		37.5
	g. Average service		10.6
	h. Member contributions with interest	$	44,798
	i. Average contributions with interest	$	49,610
2.	Vested inactive members		
	a. Number		86
	b. Total annual deferred benefits	$	762
	c. Average annual deferred benefit	$	8,860
	d. Average age at the valuation date		42.5
3.	Nonvested inactive members		
	a. Number		394
	b. Total member contributions with interest	$	520
	c. Average contributions with interest	$	1,320
4.	Service retirees		
	a. Number		1,279
	b. Total annual benefits	$	50,871
	c. Average annual benefit	$	39,774
	d. Average age at the valuation date		62.7
5.	Disabled retirees		
	a. Number		53
	b. Total annual benefits	$	968
	c. Average annual benefit	$	18,264
	d. Average age at the valuation date		59.2
6.	Beneficiaries		
	a. Number		204
	b. Total annual benefits	$	5,414
	c. Average annual benefit	$	26,539
	d. Average age at the valuation date		65.6

4.2

Summary of Historical Active Membership

	Active Members		Covered Payroll		Average Annual Pay	
June 30,	Number	Percent Increase /(Decrease)	Amount in Thousands	Percent Increase /(Decrease)	Amount	Percent Increase /(Decrease)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2011	965		$ 48,693		$ 50,459	-5.9%
2012	907	-6.0%	48,373	-0.7%	53,333	5.7%
2013	902	-0.6%	45,256	-6.4%	50,173	-5.9%
2014	855	-5.2%	44,616	-1.4%	52,182	4.0%
2015	937	9.6%	45,765	2.6%	48,842	-6.4%
2016	908	-3.1%	45,551	-0.5%	50,166	2.7%
2017	903	-0.6%	48,598	6.7%	53,818	7.3%

4.2

Distribution of Active Members by Age and by Years of Service

SPRS 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	0	0	0	0	0	0	0	0	0	0	0	0	0
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
20-24	0	12	6	0	0	0	0	0	0	0	0	0	18
	$0	$40,371	$43,380	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,374
25-29	25	18	55	0	25	17	0	0	0	0	0	0	140
	$22,825	$40,529	$44,672	$0	$48,998	$51,062	$0	$0	$0	$0	$0	$0	$41,787
30-34	20	6	29	1	22	100	10	0	0	0	0	0	188
	$16,057	$40,948	$45,202	$39,698	$47,655	$51,068	$56,122	$0	$0	$0	$0	$0	$45,925
35-39	9	0	6	0	3	49	80	26	0	0	0	0	173
	$22,827	$0	$45,436	$0	$49,809	$49,915	$56,411	$60,343	$0	$0	$0	$0	$52,920
40-44	2	0	5	0	5	30	51	81	27	2	0	0	203
	$22,149	$0	$45,211	$0	$48,158	$51,595	$56,493	$64,186	$72,557	$69,627	$0	$0	$60,283
45-49	2	0	1	0	0	4	25	51	42	9	0	0	134
	$22,149	$0	$64,883	$0	$0	$50,882	$54,766	$63,631	$75,548	$81,048	$0	$0	$65,892
50-54	0	0	0	0	0	4	8	6	9	6	0	0	33
	$0	$0	$0	$0	$0	$51,067	$58,215	$66,255	$75,995	$77,682	$0	$0	$67,199
55-59	0	0	0	0	0	1	5	3	0	0	1	0	10
	$0	$0	$0	$0	$0	$50,718	$55,218	$57,405	$0	$0	$93,660	$0	$59,268
60-64	0	0	0	0	0	0	0	0	1	0	1	1	3
	$0	$0	$0	$0	$0	$0	$0	$0	$76,333	$0	$93,357	$80,489	$83,393
65 & Over	0	0	0	0	0	0	0	0	0	0	0	1	1
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$87,068	$87,068
Total	58	36	102	1	55	205	179	167	79	17	2	2	903
	$20,445	$40,546	$45,016	$39,698	$48,428	$50,864	$56,236	$63,371	$74,586	$78,517	$93,509	$83,779	$53,819

4.2

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

	Retirement		Disability		Survivors & Beneficiaries		Total	
Current Age	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount	Number of Annuitants	Total Annual Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Under 50	180	$ 6,808	15	$ 300	31	$ 442	226	$ 7,550
50 - 54	169	6,693	6	92	7	112	182	6,897
55 - 59	159	6,625	6	111	12	278	177	7,014
60 - 64	190	8,004	9	111	22	511	221	8,626
65 - 69	280	11,130	6	135	30	798	316	12,063
70 - 74	151	5,969	6	111	38	1,122	195	7,202
75 - 79	84	2,909	2	45	19	691	105	3,645
80 - 84	41	1,577	3	64	24	784	68	2,425
85 - 89	21	918	0	-	17	580	38	1,498
90 And Over	4	238	0	-	4	95	8	333
Total	**1,279**	**$ 50,871**	**53**	**$ 968**	**204**	**$ 5,414**	**1,536**	**$ 57,253**

Retired Lives Summary

Form of Payment	Male Lives		Female Lives		Total	
	Number	Monthly Benefit Amount	Number	Monthly Benefit Amount	Number	Monthly Benefit Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Basic	145	$ 435,328	15	$ 46,122	160	$ 481,450
Joint & Survivor:						
100% to Beneficiary	140	456,888	1	4,814	141	461,702
66 2/3% to Beneficiary	87	332,233	2	7,542	89	339,775
50% to Beneficiary	82	294,980	1	2,605	83	297,585
Pop-up Option	582	2,063,324	4	10,805	586	2,074,130
Social Security Option:						
Age 62 Basic	30	75,359	0	0	30	75,359
Age 62 Survivorship	121	232,365	1	5,287	122	237,652
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	5	16,014	0	0	5	16,014
10 Years Certain & Life	34	112,610	3	6,759	37	119,369
15 Years Certain & Life	17	47,678	1	3,919	18	51,597
20 Years Certain & Life	38	117,233	2	3,979	40	121,211
Refund	0	0	0	0	0	0
Partial Lump Sum Option (PLSO):						
12 Month Basic	0	0	0	0	0	0
24 Month Basic	0	0	0	0	0	0
36 Month Basic	0	0	2	466	2	466
12 Month Survivor	6	20,781	0	0	6	20,781
24 Month Survivor	4	5,953	0	0	4	5,953
36 Month Survivor	9	16,914	0	0	9	16,914
Total:	1,300	$ 4,227,662	32	$ 92,297	1,332	$ 4,319,959

4.2

Beneficiary Lives Summary

Form of Payment	Male Lives Number		Male Lives Monthly Benefit Amount	Female Lives Number		Female Lives Monthly Benefit Amount	Total Number		Total Monthly Benefit Amount
(1)	(2)		(3)	(4)		(5)	(6)		(7)
Basic	2	$	820	7	$	5,405	9	$	6,225
Joint & Survivor:									
100% to Beneficiary	7		8,333	58		153,735	65		162,068
66 2/3% to Beneficiary	3		2,775	11		22,098	14		24,874
50% to Beneficiary	3		6,341	16		22,951	19		29,292
Pop-up Option	7		19,746	36		96,976	43		116,722
Social Security Option:									
Age 62 Basic	0		0	2		2,281	2		2,281
Age 62 Survivorship	1		3,897	41		80,941	42		84,838
Partial Deferred (Old Plan)	0		0	0		0	0		0
Widows Age 60	0		0	0		0	0		0
5 Years Certain	0		0	0		0	0		0
10 Years Certain	1		2,038	1		2,038	2		4,076
10 Years Certain & Life	0		0	1		389	1		389
15 Years Certain & Life	0		0	1		721	1		721
20 Years Certain & Life	1		6,686	4		5,611	5		12,297
Refund	0		0	0		0	0		0
Partial Lump Sum Option (PLSO):									
12 Month Basic	0		0	0		0	0		0
24 Month Basic	0		0	0		0	0		0
36 Month Basic	0		0	0		0	0		0
12 Month Survivor	0		0	0		0	0		0
24 Month Survivor	0		0	1		7,351	1		7,351
36 Month Survivor	0		0	0		0	0		0
Total:	25	$	50,636	179	$	400,499	204	$	451,135

4.2

Schedule of Retirants Added to And Removed from Rolls

(Dollar amounts except average allowance expressed in thousands)

Year Ended	Added to Rolls Number	Removed from Rolls Number	Rolls End of the Year Number	Rolls End of the Year Annual Benefits	% Increase in Annual Benefit	Average Annual Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2011	52	12	1,263	$ 47,467		$ 37,583
2012	52	16	1,299	49,887	5.1%	38,404
2013	63	16	1,346	50,906	2.0%	37,820
2014	95	28	1,413	53,432	5.0%	37,815
2015	62	15	1,460	54,930	2.8%	37,623
2016	65	10	1,515	56,650	3.1%	37,393
2017	30	9	1,536	57,253	1.1%	37,274

APPENDIX A

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Methods and Assumptions

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

In general, the assumptions and methods used in the valuation are based on the actuarial experience study for the five-year period ending June 30, 2013, submitted April 30, 2014, and adopted by the Board on December 4, 2014. The investment return, price inflation, and payroll growth assumption were adopted by the Board in May and July 2017 for use with the June 30, 2017 valuation in order to reflect future economic expectations.

Investment return rate:

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

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

Price Inflation:

Assumed annual rate of 2.30%

Rates of Annual Salary Increase:

Assumed rates of annual salary increases are shown below.

	Annual Rates of Salary Increases		
Service Years	Merit & Seniority	Price Inflation & Productivity	Total Increase
0	12.50%	3.05%	15.55%
1	7.50%	3.05%	10.55%
2	5.50%	3.05%	8.55%
3	4.50%	3.05%	7.55%
4	3.50%	3.05%	6.55%
5	2.50%	3.05%	5.55%
6	2.00%	3.05%	5.05%
7	2.00%	3.05%	5.05%
8	1.00%	3.05%	4.05%
9	0.50%	3.05%	3.55%
10 & Over	0.00%	3.05%	3.05%

Retirement rates:

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

Service	Members participating before 9/1/2008[1]	Members participating on or after 9/1/2008[2]
20	22.0%	
21	22.0%	
22	22.0%	
23	28.0%	
24	28.0%	
25	28.0%	22.0%
26	28.0%	22.0%
27	28.0%	22.0%
28	44.0%	28.0%
29	44.0%	28.0%
30	44.0%	28.0%
31	58.0%	28.0%
32	58.0%	28.0%
33	58.0%	44.0%
34	58.0%	44.0%
35	58.0%	44.0%
36	58.0%	58.0%
37	58.0%	58.0%
38	58.0%	58.0%
39	58.0%	58.0%
40	58.0%	58.0%

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

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

Disability rates:

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

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

Withdrawal rates (for causes other than death, disability or retirement):

Assumed annual rates of withdrawal are shown below.

Service	Annual Rates of Withdrawal
0	20.00%
1	7.00%
2-8	3.00%
9 & Over	2.50%

Mortality Assumption:

Pre-retirement mortality: RP-2000 Combined Mortality Table projected with Scale BB to 2013. Male mortality rates are multiplied by 50% and female mortality rates are multiplied by 30%.

Post-retirement mortality (non-disabled): RP-2000 Combined Mortality Table projected with Scale BB to 2013. Female mortality rates are set back one year.

Post-retirement mortality (disabled): RP-2000 Combined Disabled Mortality Table projected with Scale BB to 2013. Male mortality rates are set back four years.

At the time of the last experience study performed as of June 30, 2013, this mortality assumption provided 37% and 19% margin for future improvement for males and females, respectively.

Marital status:

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

Line of Duty Disability

0% of disabilities are assumed to occur in the line of duty

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 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[1]:

Year	Non-Medicare Plans	Medicare Plans	Dollar Contribution[2]
2019	7.25%	5.10%	1.50%
2020	7.00%	5.00%	1.50%
2021	6.75%	4.90%	1.50%
2022	6.50%	4.80%	1.50%
2023	6.25%	4.70%	1.50%
2024	6.00%	4.60%	1.50%
2025	5.75%	4.50%	1.50%
2026	5.50%	4.40%	1.50%
2027	5.25%	4.30%	1.50%
2028	5.00%	4.20%	1.50%
2029	4.75%	4.10%	1.50%
2030	4.50%	4.05%	1.50%
2031	4.25%	4.05%	1.50%
2032 & Beyond	4.05%	4.05%	1.50%

[1]All increases are assumed to occur on January 1. The 2018 premiums were known at the time of the valuation and were incorporated into the liability measurement using a trend of 1.232% for Non-Medicare plans and a trend of 0.00% for Medicare plans at January 1, 2018.

[2]Applies to members participating on or after July 1, 2003

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- 15 years from the valuation

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:

4.2

- 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 between 7/1/2003 and 9/1/2008	Members participating after 9/1/2008
Under 10	50%	100%	100%
10-14	75%	100%	100%
15-19	90%	100%	100%
Over 20	100%	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	June 30, 2017Participation*
Medical Only	7%
Essential	8%
Premium	84%

* May not add due to rounding

Non-Medicare Plan	June 30, 2017 Participation
Standard PPO	14%
Standard CDHP	2%
LivingWell CDHP	22%
LivingWell PPO	62%

- 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 with non-hazardous service are assumed to begin health coverage at age 55 for members participating before September 1, 2008, and at age 60 for members participating on or after September 1, 2008. Deferred vested members with hazardous service are assumed to begin health coverage at age 50.

- 50% of future retirees, with hazardous service, are assumed to elect spouse health care coverage. No dependent coverage is assumed for members who only have non-hazardous service. 100% of spouses with health care coverage are assumed to continue coverage after the member's death.

Excise ("Cadillac") Tax:

For taxable years beginning after December 31, 2019, a 40% excise tax will be required to be paid (by the employer and/or insurer) on the aggregate cost of the health plan in excess of certain legislated thresholds. For 2018, the thresholds are $850 per month for individual coverage and $2,292 per month for family coverage.

Both Actuarial Standard of Practice No. 6 and GASB Statement Nos. 74 and 75 reference this tax, and, in accordance with these standards an estimate of the impact of the Cadillac tax has been included in this valuation.

Assumptions and methods used to determine the impact of the Cadillac Tax include:

- 2018 thresholds of $850/$2,292 were indexed annually by 2.30%.
- Premium data submitted was not adjusted for permissible exclusions to the Cadillac Tax.
- There were no special adjustments to the dollar limit other than those permissible for non-Medicare retirees over 55.

In this valuation, the impact of the Cadillac Tax has been calculated by increasing the employer paid premiums for Non-Medicare retirees, who became participants before July 1, 2003, by 3.6%. Non-Medicare retirees who became participants after July 1, 2003 receive dollar subsidies per year of service, which are not expected to exceed the overall Non-Medicare premiums. As a result, the costs attributable to the Cadillac Tax for members who became participants after July 1, 2003 will be paid by the retirees.

Changes in Assumptions since the prior valuation:

1. The assumed investment return was changed from 6.75% to 5.25% for the retirement fund and from 7.50% to 6.25% for the insurance fund.
2. The price inflation assumption was changed from 3.25% to 2.30%, which also resulted in a 0.95% decrease in the salary increase assumption at all years of service and a 0.95% decrease in the health care cost trend rates.
3. The amortization method for unfunded accrued liabilities was changed to a level dollar basis (which is then converted to a percentage of expected covered payroll) from a level percentage of pay basis.

Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2017, 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 $862.64 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 KRS pays 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 KRS 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 to KRS which include the liabilities associated with the implicit rate subsidy.

For those not eligible for Medicare		
Age	Member	Spouse/Dependents
<65	$711.22	$862.64

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2017, 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	$208.66	$196.81
75	244.13	238.22
85	258.16	261.20

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

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

Mehdi Riazi

Mehdi Riazi, FSA, EA, MAAA

APPENDIX B

BENEFIT PROVISIONS

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

SPRS Employees

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

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

SPRS Employees (continued)

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

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

Years of Service	Benefit Multiplier
10 or less	1.10%
10-20	1.30%
20-25	1.50%
Greater than 25*	2.00%

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

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

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

Normal Retirement Eligibility	Age 60 with at least 5 years of service; or Any age with at least 25 years of service
Benefit Amount	Each year that the member is active, a 7.50% employer pay credit and the employee's 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

SPRS Employees (continued)

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

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

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

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

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

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

Disability Retirement: Participation before 8/1/2004

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

SPRS Employees (continued)

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

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

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

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

Line of Duty Disability Benefit

Disability Benefit	If the disability is a direct result of an act in the line of duty, the benefit shall not be less than 25% of the member's final monthly rate of pay. Additionally, each eligible dependent child will receive 10% of the member's monthly final rate of pay up to a maximum of 40%.

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.

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 25% of the deceased member's final monthly rate of pay. 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	Each eligible dependent child will receive 10% of the member's final monthly rate of pay up to a maximum of 40%.

SPRS Employees (continued)

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

Changes since the Prior Valuation

None.

Summary of Main Retiree Insurance Benefit Provisions

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

Benefit Eligibility Recipient of a retirement allowance

Benefit Amount

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

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

Duty Disability Retirement If disability was a result of injuries sustained while in the line of duty, the member receives 100% of the maximum contribution for the member and dependents.

Duty Death in Service If an active employee's death was a result of injuries sustained while in the line of duty, the member's spouse and children receive 100% of the maximum contribution.

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

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

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

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

Benefit Eligibility	Recipient of a retirement allowance with at least 120 months of service at retirement
Non-Hazardous Subsidy	Monthly contribution of $10 for each year of earned non-hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2017, the Non-Hazardous monthly contribution was $13.18/year of service. Upon the retiree's death, the surviving spouse may continue coverage (if in receipt of a retirement allowance) but will be 100% responsible for the premiums.
Hazardous Subsidy	Monthly contribution of $15 for each year of earned hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2017, the Non-Hazardous monthly contribution was $19.77/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($13.18 as of July 1, 2017) for each year of hazardous service.
Duty Disability Retirement	If disability was a result of injuries sustained while in the line of duty, the member receives a benefit equal to at least 20 times the Non-Hazardous monthly contribution.
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 benefit equal to at least 20 times the Non-Hazardous monthly contribution.
Non-Duty Death in Service	If the surviving spouse is in receipt of a pension allowance, he or she is eligible for continued health coverage. The percentage of the premium paid for by the retirement system is based on the member's years of hazardous service at the time of death.

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

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

Monthly Health Plan Premiums – Effective January 1, 2018

Non-Medicare Plan Options					
Plan Option	Single	Parent Plus	Couple	Family	Family X-Ref
LivingWell PPO*	$729.34	$1,037.08	$1,589.10	$1,767.60	$876.68
LivingWell CDHP	709.46	978.50	1,325.64	1,479.76	818.96
Standard PPO	685.38	975.90	1,497.18	1,666.26	824.54
Standard CDHP	682.80	940.64	1,450.02	1,615.30	800.94

Medicare Plan Options	
Kentucky Retirement Systems - Medical Only Plan	$165.01
Kentucky Retirement Systems – Medicare Advantage/Essential Plan	75.56
Kentucky Retirement Systems – Medicare Advantage/Premium Plan*	252.21

*For 2018, the contribution plans selected by the KRS Board were the LivingWell PPO plan option for non-Medicare retirees and the Medicare Advantage Premium plan option for Medicare retirees.

Dollar Contribution Amount for Insurance Tier 2 and Tier 3

Monthly contribution amounts per year of service as of July 1, 2017.

Non-Hazardous Service	Hazardous Service
$13.18	$19.77

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

APPENDIX C

GLOSSARY

Glossary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

GASB: Governmental Accounting Standards Board.

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

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

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

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

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

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

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December 4, 2017

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

Re: Sensitivity Analysis Based on Results of the June 30, 2017 Actuarial Valuation

Dear Members of the Board:

Per Kentucky State Statute 61.670, we are providing this supplemental information regarding the sensitivity of the valuation results to changes in some of the economic assumptions. Specifically, the attached tables show the impact for the KERS retirement system due to changes in the investment return assumption, the inflation rate assumption, or the payroll growth rate assumption.

Background

Investment Assumption

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

Inflation Assumption

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

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December 4, 2017
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Payroll Growth Assumption

Participating employers of KERS 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 less money than expected to finance the unfunded liability, which means the contribution rates in future years will be required to increase in order to finance the unfunded liability over the same time period. The current payroll growth assumption is 0.00% for all the KERS retirement and insurance funds. The analysis shows the impact of a 1.00% increase and a 1.00% decrease in the payroll growth assumption. Please note that the payroll growth assumption does not impact the valuation liabilities, unfunded liability, and funded status of the system. Rather, this assumption only impacts the amortization rate for financing the existing unfunded actuarial accrued liability and the recommended 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 report compliments the information provided in the June 30, 2017 actuarial valuation report. Please refer to the June 30, 2017 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 discount rate.

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December 4, 2017
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The undersigned are independent actuaries and consultants. Mr. Newton and Mr. White are Enrolled Actuaries. All three of the undersigned are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries. All 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,

Joseph P. Newton, FSA, EA, MAAA
Pension Market Leader and Actuary

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

Janie Shaw, ASA, MAAA
Consultant

GRS Retirement Consulting

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

	Decrease Discount Rate	Valuation Results	Increase Discount Rate
(1)	(2)	(3)	(4)
Payroll Growth Rate	0.00%	0.00%	0.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	4.25%	5.25%	6.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 17,501,838	$ 15,591,641	$ 14,002,077
Actuarial Value of Assets	2,123,623	2,123,623	2,123,623
Unfunded Actuarial Accrued Liability	15,378,215	13,468,018	11,878,454
Funded Ratio	12.1%	13.6%	15.2%
Total Recommended Contribution Rate	76.70%	71.03%	66.43%
Insurance			
Actuarial Accrued Liability	$ 3,027,049	$ 2,683,496	$ 2,398,595
Actuarial Value of Assets	823,918	823,918	823,918
Unfunded Actuarial Accrued Liability	2,203,131	1,859,578	1,574,677
Funded Ratio	27.2%	30.7%	34.4%
Total Recommended Contribution Rate	14.10%	12.40%	10.94%
Combined Non-Hazardous			
Actuarial Accrued Liability	$ 20,528,887	$ 18,275,137	$ 16,400,672
Actuarial Value of Assets	2,947,541	2,947,541	2,947,541
Unfunded Actuarial Accrued Liability	17,581,346	15,327,596	13,453,131
Funded Ratio	14.4%	16.1%	18.0%
Total Recommended Contribution Rate	90.80%	83.43%	77.37%

4.3

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

	Decrease Inflation Rate	Valuation Results	Increase Inflation Rate
(1)	(2)	(3)	(4)
Payroll Growth Rate	-0.25%	0.00%	0.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	5.00%	5.25%	5.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 16,002,991	$ 15,591,641	$ 15,198,200
Actuarial Value of Assets	2,123,623	2,123,623	2,123,623
Unfunded Actuarial Accrued Liability	13,879,368	13,468,018	13,074,577
Funded Ratio	13.3%	13.6%	14.0%
Total Recommended Contribution Rate	73.51%	71.03%	68.66%
Insurance			
Actuarial Accrued Liability	$ 2,699,129	$ 2,683,496	$ 2,668,652
Actuarial Value of Assets	823,918	823,918	823,918
Unfunded Actuarial Accrued Liability	1,875,211	1,859,578	1,844,734
Funded Ratio	30.5%	30.7%	30.9%
Total Recommended Contribution Rate	12.57%	12.40%	12.24%
Combined Non-Hazardous			
Actuarial Accrued Liability	$ 18,702,120	$ 18,275,137	$ 17,866,852
Actuarial Value of Assets	2,947,541	2,947,541	2,947,541
Unfunded Actuarial Accrued Liability	15,754,579	15,327,596	14,919,311
Funded Ratio	15.8%	16.1%	16.5%
Total Recommended Contribution Rate	86.08%	83.43%	80.90%

4.3

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%	0.00%	1.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	5.25%	5.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 15,591,641	$ 15,591,641	$ 15,591,641
Actuarial Value of Assets	2,123,623	2,123,623	2,123,623
Unfunded Actuarial Accrued Liability	13,468,018	13,468,018	13,468,018
Funded Ratio	13.6%	13.6%	13.6%
Total Recommended Contribution Rate	77.81%	71.03%	64.70%
Insurance			
Actuarial Accrued Liability	$ 2,683,496	$ 2,683,496	$ 2,683,496
Actuarial Value of Assets	823,918	823,918	823,918
Unfunded Actuarial Accrued Liability	1,859,578	1,859,578	1,859,578
Funded Ratio	30.7%	30.7%	30.7%
Total Recommended Contribution Rate	13.39%	12.40%	11.47%
Combined Non-Hazardous			
Actuarial Accrued Liability	$ 18,275,137	$ 18,275,137	$ 18,275,137
Actuarial Value of Assets	2,947,541	2,947,541	2,947,541
Unfunded Actuarial Accrued Liability	15,327,596	15,327,596	15,327,596
Funded Ratio	16.1%	16.1%	16.1%
Total Recommended Contribution Rate	91.20%	83.43%	76.17%

4.3

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

	Decrease Discount Rate	Valuation Results	Increase Discount Rate
(1)	(2)	(3)	(4)
Payroll Growth Rate	0.00%	0.00%	0.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	6.25%	7.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 1,259,563	$ 1,121,420	$ 1,006,780
Actuarial Value of Assets	607,159	607,159	607,159
Unfunded Actuarial Accrued Liability	652,404	514,261	399,621
Funded Ratio	48.2%	54.1%	60.3%
Total Recommended Contribution Rate	42.70%	34.39%	27.07%
Insurance			
Actuarial Accrued Liability	$ 474,187	$ 419,439	$ 374,457
Actuarial Value of Assets	493,458	493,458	493,458
Unfunded Actuarial Accrued Liability	(19,271)	(74,019)	(119,001)
Funded Ratio	104.1%	117.6%	131.8%
Total Recommended Contribution Rate	7.19%	2.46%	-1.86%
Combined Hazardous			
Actuarial Accrued Liability	$ 1,733,750	$ 1,540,859	$ 1,381,237
Actuarial Value of Assets	1,100,617	1,100,617	1,100,617
Unfunded Actuarial Accrued Liability	633,133	440,242	280,620
Funded Ratio	63.5%	71.4%	79.7%
Total Recommended Contribution Rate	49.89%	36.85%	25.21%

4.3

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

(1)	Decrease Inflation Rate (2)	Valuation Results (3)	Increase Inflation Rate (4)
Payroll Growth Rate	-0.25%	0.00%	0.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	6.00%	6.25%	6.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 1,150,681	$ 1,121,420	$ 1,093,448
Actuarial Value of Assets	607,159	607,159	607,159
Unfunded Actuarial Accrued Liability	543,522	514,261	486,289
Funded Ratio	52.8%	54.1%	55.5%
Total Recommended Contribution Rate	36.49%	34.39%	32.38%
Insurance			
Actuarial Accrued Liability	$ 422,418	$ 419,439	$ 416,625
Actuarial Value of Assets	493,458	493,458	493,458
Unfunded Actuarial Accrued Liability	(71,040)	(74,019)	(76,833)
Funded Ratio	116.8%	117.6%	118.4%
Total Recommended Contribution Rate	2.84%	2.46%	2.12%
Combined Hazardous			
Actuarial Accrued Liability	$ 1,573,099	$ 1,540,859	$ 1,510,073
Actuarial Value of Assets	1,100,617	1,100,617	1,100,617
Unfunded Actuarial Accrued Liability	472,482	440,242	409,456
Funded Ratio	70.0%	71.4%	72.9%
Total Recommended Contribution Rate	39.33%	36.85%	34.50%

4.3

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%	0.00%	1.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	6.25%	6.25%	6.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 1,121,420	$ 1,121,420	$ 1,121,420
Actuarial Value of Assets	607,159	607,159	607,159
Unfunded Actuarial Accrued Liability	514,261	514,261	514,261
Funded Ratio	54.1%	54.1%	54.1%
Total Recommended Contribution Rate	36.94%	34.39%	32.00%
Insurance			
Actuarial Accrued Liability	$ 419,439	$ 419,439	$ 419,439
Actuarial Value of Assets	493,458	493,458	493,458
Unfunded Actuarial Accrued Liability	(74,019)	(74,019)	(74,019)
Funded Ratio	117.6%	117.6%	117.6%
Total Recommended Contribution Rate	2.11%	2.46%	2.80%
Combined Hazardous			
Actuarial Accrued Liability	$ 1,540,859	$ 1,540,859	$ 1,540,859
Actuarial Value of Assets	1,100,617	1,100,617	1,100,617
Unfunded Actuarial Accrued Liability	440,242	440,242	440,242
Funded Ratio	71.4%	71.4%	71.4%
Total Recommended Contribution Rate	39.05%	36.85%	34.80%

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4.3

December 4, 2017

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

Re: Sensitivity Analysis Based on Results of the June 30, 2017 Actuarial Valuation

Dear Members of the Board:

Per Kentucky State Statute 61.670, we are providing this supplemental information regarding the sensitivity of the valuation results to changes in some of the economic assumptions. Specifically, the attached tables show the impact for the CERS retirement system due to changes in the investment return assumption, the inflation rate assumption, or 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 in the inflation assumption results in a corresponding change in the investment return assumption, the payroll growth rate assumption, and the healthcare trend assumption that is used in the valuation of the health insurance funds.

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Board of Trustees
December 4, 2017
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4.3

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 less money 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, and funded status of the system. Rather, this assumption only impacts the amortization rate for financing the existing unfunded actuarial accrued liability and the recommended 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 report compliments the information provided in the June 30, 2017 actuarial valuation report. Please refer to the June 30, 2017 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.

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Board of Trustees
December 4, 2017
Page 3

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Joseph P. Newton, FSA, EA, MAAA
Pension Market Leader and Actuary

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

Janie Shaw, ASA, MAAA
Consultant

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

(1)	Decrease Discount Rate (2)	Valuation Results (3)	Increase Discount Rate (4)
Payroll Growth Rate	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	$ 14,361,475	$ 12,803,510	$ 11,499,054
Actuarial Value of Assets	6,764,873	6,764,873	6,764,873
Unfunded Actuarial Accrued Liability	7,596,602	6,038,637	4,734,181
Funded Ratio	47.1%	52.8%	58.8%
Total Recommended Contribution Rate	26.58%	21.84%	17.67%
Insurance			
Actuarial Accrued Liability	$ 3,798,688	$ 3,355,151	$ 2,987,083
Actuarial Value of Assets	2,227,401	2,227,401	2,227,401
Unfunded Actuarial Accrued Liability	1,571,287	1,127,750	759,682
Funded Ratio	58.6%	66.4%	74.6%
Total Recommended Contribution Rate	8.03%	6.21%	4.62%
Combined Non-Hazardous			
Actuarial Accrued Liability	$ 18,160,163	$ 16,158,661	$ 14,486,137
Actuarial Value of Assets	8,992,274	8,992,274	8,992,274
Unfunded Actuarial Accrued Liability	9,167,889	7,166,387	5,493,863
Funded Ratio	49.5%	55.6%	62.1%
Total Recommended Contribution Rate	34.61%	28.05%	22.29%

4.3

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

(1)	Decrease Inflation Rate (2)	Valuation Results (3)	Increase Inflation Rate (4)
Payroll Growth Rate	1.75%	2.00%	2.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	6.00%	6.25%	6.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 13,121,425	$ 12,803,510	$ 12,498,722
Actuarial Value of Assets	6,764,873	6,764,873	6,764,873
Unfunded Actuarial Accrued Liability	6,356,552	6,038,637	5,733,849
Funded Ratio	51.6%	52.8%	54.1%
Total Recommended Contribution Rate	23.04%	21.84%	20.69%
Insurance			
Actuarial Accrued Liability	$ 3,382,139	$ 3,355,151	$ 3,329,648
Actuarial Value of Assets	2,227,401	2,227,401	2,227,401
Unfunded Actuarial Accrued Liability	1,154,738	1,127,750	1,102,247
Funded Ratio	65.9%	66.4%	66.9%
Total Recommended Contribution Rate	6.40%	6.21%	6.04%
Combined Non-Hazardous			
Actuarial Accrued Liability	$ 16,503,564	$ 16,158,661	$ 15,828,370
Actuarial Value of Assets	8,992,274	8,992,274	8,992,274
Unfunded Actuarial Accrued Liability	7,511,290	7,166,387	6,836,096
Funded Ratio	54.5%	55.6%	56.8%
Total Recommended Contribution Rate	29.44%	28.05%	26.73%

4.3

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

	Decrease Payroll Growth	Valuation Results	Increase Payroll Growth
(1)	(2)	(3)	(4)
Payroll Growth Rate	1.00%	2.00%	3.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	6.25%	6.25%	6.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 12,803,510	$ 12,803,510	$ 12,803,510
Actuarial Value of Assets	6,764,873	6,764,873	6,764,873
Unfunded Actuarial Accrued Liability	6,038,637	6,038,637	6,038,637
Funded Ratio	52.8%	52.8%	52.8%
Total Recommended Contribution Rate	23.61%	21.84%	20.19%
Insurance			
Actuarial Accrued Liability	$ 3,355,151	$ 3,355,151	$ 3,355,151
Actuarial Value of Assets	2,227,401	2,227,401	2,227,401
Unfunded Actuarial Accrued Liability	1,127,750	1,127,750	1,127,750
Funded Ratio	66.4%	66.4%	66.4%
Total Recommended Contribution Rate	6.55%	6.21%	5.90%
Combined Non-Hazardous			
Actuarial Accrued Liability	$ 16,158,661	$ 16,158,661	$ 16,158,661
Actuarial Value of Assets	8,992,274	8,992,274	8,992,274
Unfunded Actuarial Accrued Liability	7,166,387	7,166,387	7,166,387
Funded Ratio	55.6%	55.6%	55.6%
Total Recommended Contribution Rate	30.16%	28.05%	26.09%

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

(1)	Decrease Discount Rate (2)	Valuation Results (3)	Increase Discount Rate (4)
Payroll Growth Rate	2.00%	2.00%	2.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	6.25%	7.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 5,253,887	$ 4,649,047	$ 4,149,262
Actuarial Value of Assets	2,238,320	2,238,320	2,238,320
Unfunded Actuarial Accrued Liability	3,015,567	2,410,727	1,910,942
Funded Ratio	42.6%	48.1%	53.9%
Total Recommended Contribution Rate	43.30%	35.69%	29.11%
Insurance			
Actuarial Accrued Liability	$ 2,026,503	$ 1,788,433	$ 1,593,138
Actuarial Value of Assets	1,196,780	1,196,780	1,196,780
Unfunded Actuarial Accrued Liability	829,723	591,653	396,358
Funded Ratio	59.1%	66.9%	75.1%
Total Recommended Contribution Rate	15.77%	12.17%	8.98%
Combined Hazardous			
Actuarial Accrued Liability	$ 7,280,390	$ 6,437,480	$ 5,742,400
Actuarial Value of Assets	3,435,100	3,435,100	3,435,100
Unfunded Actuarial Accrued Liability	3,845,290	3,002,380	2,307,300
Funded Ratio	47.2%	53.4%	59.8%
Total Recommended Contribution Rate	59.07%	47.86%	38.09%

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	$ 4,775,734	$ 4,649,047	$ 4,528,024
Actuarial Value of Assets	2,238,320	2,238,320	2,238,320
Unfunded Actuarial Accrued Liability	2,537,414	2,410,727	2,289,704
Funded Ratio	46.9%	48.1%	49.4%
Total Recommended Contribution Rate	37.77%	35.69%	33.70%
Insurance			
Actuarial Accrued Liability	$ 1,798,060	$ 1,788,433	$ 1,779,274
Actuarial Value of Assets	1,196,780	1,196,780	1,196,780
Unfunded Actuarial Accrued Liability	601,280	591,653	582,494
Funded Ratio	66.6%	66.9%	67.3%
Total Recommended Contribution Rate	12.41%	12.17%	11.94%
Combined Hazardous			
Actuarial Accrued Liability	$ 6,573,794	$ 6,437,480	$ 6,307,298
Actuarial Value of Assets	3,435,100	3,435,100	3,435,100
Unfunded Actuarial Accrued Liability	3,138,694	3,002,380	2,872,198
Funded Ratio	52.3%	53.4%	54.5%
Total Recommended Contribution Rate	50.18%	47.86%	45.64%

4.3

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	$ 4,649,047	$ 4,649,047	$ 4,649,047
Actuarial Value of Assets	2,238,320	2,238,320	2,238,320
Unfunded Actuarial Accrued Liability	2,410,727	2,410,727	2,410,727
Funded Ratio	48.1%	48.1%	48.1%
Total Recommended Contribution Rate	38.90%	35.69%	32.70%
Insurance			
Actuarial Accrued Liability	$ 1,788,433	$ 1,788,433	$ 1,788,433
Actuarial Value of Assets	1,196,780	1,196,780	1,196,780
Unfunded Actuarial Accrued Liability	591,653	591,653	591,653
Funded Ratio	66.9%	66.9%	66.9%
Total Recommended Contribution Rate	12.95%	12.17%	11.44%
Combined Hazardous			
Actuarial Accrued Liability	$ 6,437,480	$ 6,437,480	$ 6,437,480
Actuarial Value of Assets	3,435,100	3,435,100	3,435,100
Unfunded Actuarial Accrued Liability	3,002,380	3,002,380	3,002,380
Funded Ratio	53.4%	53.4%	53.4%
Total Recommended Contribution Rate	51.85%	47.86%	44.14%

GRS Retirement Consulting

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December 4, 2017

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

Re: Sensitivity Analysis Based on Results of the June 30, 2017 Actuarial Valuation

Dear Members of the Board:

Per Kentucky State Statute 61.670, we are providing this supplemental information regarding the sensitivity of the valuation results to changes in some of the economic assumptions. Specifically, the attached tables show the impact for the SPRS retirement system due to changes in the investment return assumption, the inflation rate assumption, or the payroll growth rate assumption.

Background

Investment Assumption

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

Inflation Assumption

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

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

Board of Trustees
December 4, 2017
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Payroll Growth Assumption

Participating employers of SPRS make contributions to the system as a percentage of the covered payroll. Therefore, as payroll changes over time these amortization payments will also change. If actual covered payroll increases at a rate that is less than assumed, then the retirement system receives less money than expected to finance the unfunded liability, which means the contribution rates in future years will be required to increase in order to finance the unfunded liability over the same time period. The current payroll growth assumption is 0.00% for the SPRS retirement and insurance funds. The analysis shows the impact of a 1.00% increase and a 1.00% decrease in the payroll growth assumption. Please note that the payroll growth assumption does not impact the valuation liabilities, unfunded liability, and funded status of the system. Rather, this assumption only impacts the amortization rate for financing the existing unfunded actuarial accrued liability and the recommended 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 report compliments the information provided in the June 30, 2017 actuarial valuation report. Please refer to the June 30, 2017 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 discount rate.

Board of Trustees
December 4, 2017
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4.3

The undersigned are independent actuaries and consultants. Mr. Newton and Mr. White are Enrolled Actuaries. All three of the undersigned are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries. All 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,

Joseph P. Newton, FSA, EA, MAAA
Pension Market Leader and Actuary

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

Janie Shaw, ASA, MAAA
Consultant

4.3

Sensitivity Analysis - Discount Rate

(Dollar amounts expressed in thousands)

(1)	Decrease Discount Rate (2)	Valuation Results (3)	Increase Discount Rate (4)
Payroll Growth Rate	0.00%	0.00%	0.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	4.25%	5.25%	6.25%
Discount Rate - Insurance	5.25%	6.25%	7.25%
Retirement			
Actuarial Accrued Liability	$ 1,089,826	$ 967,145	$ 866,311
Actuarial Value of Assets	261,320	261,320	261,320
Unfunded Actuarial Accrued Liability	828,506	705,825	604,991
Funded Ratio	24.0%	27.0%	30.2%
Total Recommended Contribution Rate	132.59%	119.05%	107.52%
Insurance			
Actuarial Accrued Liability	$ 311,618	$ 276,641	$ 247,763
Actuarial Value of Assets	180,464	180,464	180,464
Unfunded Actuarial Accrued Liability	131,154	96,177	67,299
Funded Ratio	57.9%	65.2%	72.8%
Total Recommended Contribution Rate	34.45%	27.23%	20.79%
Combined			
Actuarial Accrued Liability	$ 1,401,444	$ 1,243,786	$ 1,114,074
Actuarial Value of Assets	441,784	441,784	441,784
Unfunded Actuarial Accrued Liability	959,660	802,002	672,290
Funded Ratio	31.5%	35.5%	39.7%
Total Recommended Contribution Rate	167.04%	146.28%	128.31%

4.3

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

(1)	Decrease Inflation Rate (2)	Valuation Results (3)	Increase Inflation Rate (4)
Payroll Growth Rate	-0.25%	0.00%	0.25%
Inflation Rate	2.05%	2.30%	2.55%
Discount Rate - Retirement	5.00%	5.25%	5.50%
Discount Rate - Insurance	6.00%	6.25%	6.50%
Retirement			
Actuarial Accrued Liability	$ 994,172	$ 967,145	$ 941,392
Actuarial Value of Assets	261,320	261,320	261,320
Unfunded Actuarial Accrued Liability	732,852	705,825	680,072
Funded Ratio	26.3%	27.0%	27.8%
Total Recommended Contribution Rate	124.15%	119.05%	114.20%
Insurance			
Actuarial Accrued Liability	$ 277,760	$ 276,641	$ 275,568
Actuarial Value of Assets	180,464	180,464	180,464
Unfunded Actuarial Accrued Liability	97,296	96,177	95,104
Funded Ratio	65.0%	65.2%	65.5%
Total Recommended Contribution Rate	27.61%	27.23%	26.88%
Combined			
Actuarial Accrued Liability	$ 1,271,932	$ 1,243,786	$ 1,216,960
Actuarial Value of Assets	441,784	441,784	441,784
Unfunded Actuarial Accrued Liability	830,148	802,002	775,176
Funded Ratio	34.7%	35.5%	36.3%
Total Recommended Contribution Rate	151.76%	146.28%	141.08%

4.3

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

	Decrease Payroll Growth	Valuation Results	Increase Payroll Growth
(1)	(2)	(3)	(4)
Payroll Growth Rate	-1.00%	0.00%	1.00%
Inflation Rate	2.30%	2.30%	2.30%
Discount Rate - Retirement	5.25%	5.25%	5.25%
Discount Rate - Insurance	6.25%	6.25%	6.25%
Retirement			
Actuarial Accrued Liability	$ 967,145	$ 967,145	$ 967,145
Actuarial Value of Assets	261,320	261,320	261,320
Unfunded Actuarial Accrued Liability	705,825	705,825	705,825
Funded Ratio	27.0%	27.0%	27.0%
Total Recommended Contribution Rate	130.15%	119.05%	108.69%
Insurance			
Actuarial Accrued Liability	$ 276,641	$ 276,641	$ 276,641
Actuarial Value of Assets	180,464	180,464	180,464
Unfunded Actuarial Accrued Liability	96,177	96,177	96,177
Funded Ratio	65.2%	65.2%	65.2%
Total Recommended Contribution Rate	28.87%	27.23%	25.69%
Combined			
Actuarial Accrued Liability	$ 1,243,786	$ 1,243,786	$ 1,243,786
Actuarial Value of Assets	441,784	441,784	441,784
Unfunded Actuarial Accrued Liability	802,002	802,002	802,002
Funded Ratio	35.5%	35.5%	35.5%
Total Recommended Contribution Rate	159.02%	146.28%	134.38%

Projected Cost of the Retirement and Insurance Current Plan - Non-hazardous

4.3

Kentucky Retirement Systems
KERS Non-Hazardous Retirement Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 15,592	$ 2,124	$ 13,468	14%	$ 629	$ 77	$ 1,532	41.06%	41.98%
2018	15,629	2,038	13,591	13%	1,101	78	1,551	71.03%	71.03%
2019	15,645	2,296	13,349	15%	1,118	79	1,574	71.03%	69.79%
2020	15,643	2,601	13,042	17%	1,097	80	1,601	68.54%	68.54%
2021	15,624	2,924	12,700	19%	1,116	81	1,628	68.54%	67.18%
2022	15,587	3,253	12,334	21%	1,086	83	1,656	65.54%	65.54%
2023	15,535	3,556	11,979	23%	1,105	84	1,686	65.54%	64.13%
2024	15,466	3,886	11,580	25%	1,075	86	1,718	62.57%	62.57%
2025	15,383	4,193	11,190	27%	1,095	88	1,751	62.57%	61.15%
2026	15,285	4,530	10,755	30%	1,064	89	1,785	59.60%	59.60%
2027	15,172	4,845	10,327	32%	1,084	91	1,819	59.60%	58.21%
2028	15,052	5,199	9,853	35%	1,052	93	1,854	56.71%	56.71%
2029	14,918	5,533	9,385	37%	1,072	95	1,891	56.71%	55.37%
2030	14,769	5,901	8,868	40%	1,040	96	1,929	53.90%	53.90%
2031	14,609	6,254	8,355	43%	1,062	99	1,970	53.90%	52.59%
2032	14,440	6,649	7,791	46%	1,028	101	2,012	51.10%	51.10%
2033	14,262	7,033	7,229	49%	1,051	103	2,056	51.10%	49.82%
2034	14,077	7,463	6,614	53%	1,015	105	2,101	48.33%	48.33%
2035	13,884	7,884	6,000	57%	1,038	107	2,147	48.33%	47.09%
2036	13,689	8,358	5,331	61%	1,003	110	2,198	45.62%	45.62%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.
The employer contribution amount shown does not include the $87 million additional contribution budgeted to be paid in fiscal year beginning 2017.

Kentucky Retirement Systems
CERS Non-Hazardous Retirement Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 12,804	$ 6,765	$ 6,039	53%	$ 355	$ 123	$ 2,452	14.48%	14.48%
2018	13,121	6,902	6,219	53%	546	125	2,500	21.84%	21.84%
2019	13,421	7,122	6,299	53%	548	127	2,547	21.50%	21.50%
2020	13,704	7,412	6,292	54%	558	130	2,594	21.53%	21.53%
2021	13,970	7,805	6,165	56%	563	132	2,642	21.33%	21.33%
2022	14,218	8,119	6,099	57%	561	135	2,690	20.86%	20.86%
2023	14,445	8,419	6,026	58%	565	137	2,740	20.64%	20.64%
2024	14,652	8,711	5,941	59%	570	140	2,790	20.43%	20.43%
2025	14,836	8,996	5,840	61%	575	142	2,842	20.22%	20.22%
2026	14,998	9,273	5,725	62%	580	145	2,894	20.03%	20.03%
2027	15,136	9,541	5,595	63%	585	147	2,948	19.84%	19.84%
2028	15,259	9,813	5,446	64%	591	150	3,003	19.67%	19.67%
2029	15,359	10,079	5,280	66%	597	153	3,062	19.50%	19.50%
2030	15,438	10,344	5,094	67%	604	156	3,124	19.34%	19.34%
2031	15,496	10,611	4,885	68%	611	159	3,187	19.18%	19.18%
2032	15,536	10,882	4,654	70%	619	163	3,254	19.03%	19.03%
2033	15,558	11,161	4,397	72%	627	166	3,323	18.88%	18.88%
2034	15,565	11,450	4,115	74%	636	170	3,394	18.74%	18.74%
2035	15,556	11,753	3,803	76%	645	173	3,467	18.61%	18.61%
2036	15,535	12,073	3,462	78%	655	177	3,545	18.49%	18.49%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.

4.3

Kentucky Retirement Systems
KERS Non-Hazardous Insurance Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 2,683	$ 824	$ 1,859	31%	$ 128	$ 5	$ 1,524	8.41%	8.41%
2018	2,760	874	1,886	32%	191	6	1,541	12.40%	12.40%
2019	2,837	975	1,862	34%	194	7	1,564	12.40%	12.09%
2020	2,907	1,087	1,820	37%	188	8	1,590	11.81%	11.81%
2021	2,972	1,202	1,770	40%	191	9	1,617	11.81%	11.50%
2022	3,032	1,311	1,721	43%	182	10	1,645	11.09%	11.09%
2023	3,085	1,411	1,674	46%	186	10	1,675	11.09%	10.77%
2024	3,133	1,512	1,621	48%	178	11	1,706	10.44%	10.44%
2025	3,174	1,604	1,570	51%	181	12	1,738	10.44%	10.12%
2026	3,208	1,698	1,510	53%	173	13	1,772	9.76%	9.76%
2027	3,235	1,781	1,454	55%	176	14	1,806	9.76%	9.47%
2028	3,254	1,864	1,390	57%	168	15	1,841	9.13%	9.13%
2029	3,264	1,937	1,327	59%	171	15	1,877	9.13%	8.82%
2030	3,265	2,010	1,255	62%	162	16	1,915	8.48%	8.48%
2031	3,259	2,072	1,187	64%	166	17	1,956	8.48%	8.23%
2032	3,248	2,139	1,109	66%	158	18	1,998	7.92%	7.92%
2033	3,233	2,200	1,033	68%	162	19	2,041	7.92%	7.68%
2034	3,215	2,268	947	71%	155	20	2,085	7.42%	7.42%
2035	3,195	2,332	863	73%	158	20	2,132	7.42%	7.20%
2036	3,175	2,406	769	76%	151	21	2,183	6.94%	6.94%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.

Kentucky Retirement Systems
CERS Non-Hazardous Insurance Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 3,355	$ 2,227	$ 1,128	66%	$ 114	$ 10	$ 2,429	4.70%	4.70%
2018	3,514	2,343	1,171	67%	154	11	2,477	6.21%	6.21%
2019	3,667	2,475	1,192	67%	153	13	2,524	6.06%	6.06%
2020	3,813	2,623	1,190	69%	154	14	2,572	5.98%	5.98%
2021	3,951	2,798	1,153	71%	153	15	2,619	5.84%	5.84%
2022	4,081	2,941	1,140	72%	150	17	2,668	5.62%	5.62%
2023	4,202	3,077	1,125	73%	149	18	2,718	5.48%	5.48%
2024	4,315	3,206	1,109	74%	148	19	2,768	5.35%	5.35%
2025	4,419	3,330	1,089	75%	147	20	2,820	5.21%	5.21%
2026	4,514	3,447	1,067	76%	146	22	2,873	5.08%	5.08%
2027	4,600	3,558	1,042	77%	145	23	2,926	4.96%	4.96%
2028	4,676	3,663	1,013	78%	144	24	2,982	4.83%	4.83%
2029	4,745	3,763	982	79%	144	26	3,040	4.72%	4.72%
2030	4,807	3,860	947	80%	143	27	3,102	4.60%	4.60%
2031	4,862	3,954	908	81%	143	28	3,166	4.51%	4.51%
2032	4,912	4,047	865	82%	143	29	3,232	4.42%	4.42%
2033	4,958	4,140	818	84%	144	31	3,301	4.35%	4.35%
2034	5,002	4,236	766	85%	144	32	3,372	4.28%	4.28%
2035	5,045	4,336	709	86%	146	33	3,445	4.23%	4.23%
2036	5,089	4,443	646	87%	147	34	3,522	4.18%	4.18%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.

4.3

Projected Cost of the Retirement and Insurance
Current Plan - Hazardous

4.3

Kentucky Retirement Systems
KERS Hazardous Retirement Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 1,121	$ 607	$ 514	54%	$ 35	$ 13	$ 162	21.44%	20.48%
2018	1,155	637	518	55%	57	13	166	34.39%	34.39%
2019	1,186	669	517	56%	58	14	170	34.39%	33.30%
2020	1,217	709	508	58%	57	14	174	32.60%	32.60%
2021	1,247	757	490	61%	58	14	179	32.60%	31.64%
2022	1,276	801	475	63%	55	15	183	30.23%	30.23%
2023	1,305	841	464	64%	57	15	188	30.23%	29.28%
2024	1,333	884	449	66%	55	15	193	28.30%	28.30%
2025	1,360	925	435	68%	56	16	197	28.30%	27.39%
2026	1,386	967	419	70%	53	16	202	26.47%	26.47%
2027	1,410	1,007	403	71%	55	16	206	26.47%	25.63%
2028	1,434	1,048	386	73%	52	17	211	24.72%	24.72%
2029	1,456	1,087	369	75%	53	17	216	24.72%	23.96%
2030	1,478	1,128	350	76%	51	18	222	23.16%	23.16%
2031	1,500	1,169	331	78%	53	18	229	23.16%	22.48%
2032	1,524	1,214	310	80%	51	19	236	21.75%	21.75%
2033	1,549	1,260	289	81%	53	19	242	21.75%	21.14%
2034	1,576	1,310	266	83%	51	20	249	20.47%	20.47%
2035	1,605	1,362	243	85%	52	20	256	20.47%	19.91%
2036	1,634	1,417	217	87%	51	21	263	19.29%	19.29%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.
The employer contribution amount shown does not include the $10 million additional contribution budgeted to be paid in fiscal year beginning 2017.

4.3

Kentucky Retirement Systems
CERS Hazardous Retirement Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 4,649	$ 2,238	$ 2,411	48%	$ 120	$ 43	$ 542	22.20%	22.20%
2018	4,771	2,293	2,478	48%	192	43	537	35.69%	35.69%
2019	4,880	2,376	2,504	49%	193	43	538	35.95%	35.95%
2020	4,978	2,478	2,500	50%	197	43	542	36.42%	36.42%
2021	5,066	2,610	2,456	52%	199	44	546	36.48%	36.48%
2022	5,145	2,712	2,433	53%	199	44	551	36.06%	36.06%
2023	5,214	2,809	2,405	54%	201	45	558	35.95%	35.95%
2024	5,274	2,902	2,372	55%	202	45	565	35.81%	35.81%
2025	5,325	2,992	2,333	56%	204	46	573	35.66%	35.66%
2026	5,367	3,079	2,288	57%	207	47	582	35.49%	35.49%
2027	5,400	3,164	2,236	59%	209	47	592	35.32%	35.32%
2028	5,426	3,248	2,178	60%	212	48	602	35.14%	35.14%
2029	5,444	3,333	2,111	61%	215	49	614	34.96%	34.96%
2030	5,457	3,420	2,037	63%	218	50	628	34.75%	34.75%
2031	5,466	3,512	1,954	64%	222	51	642	34.54%	34.54%
2032	5,472	3,611	1,861	66%	225	53	657	34.33%	34.33%
2033	5,478	3,719	1,759	68%	229	54	672	34.12%	34.12%
2034	5,483	3,837	1,646	70%	233	55	688	33.92%	33.92%
2035	5,489	3,967	1,522	72%	238	56	705	33.73%	33.73%
2036	5,495	4,110	1,385	75%	242	58	721	33.56%	33.56%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.

4.3

Kentucky Retirement Systems
SPRS Retirement Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 967	$ 261	$ 706	27%	$ 35	$ 4	$ 49	72.47%	71.57%
2018	970	264	706	27%	58	4	49	119.05%	119.05%
2019	972	275	697	28%	59	4	50	119.05%	117.69%
2020	972	290	682	30%	58	4	50	116.24%	116.24%
2021	972	308	664	32%	59	4	51	116.24%	114.50%
2022	970	325	645	34%	58	4	52	111.48%	111.48%
2023	967	341	626	35%	59	4	53	111.48%	109.03%
2024	964	358	606	37%	57	4	54	106.31%	106.31%
2025	959	373	586	39%	58	4	55	106.31%	103.75%
2026	953	390	563	41%	56	4	56	101.12%	101.12%
2027	946	405	541	43%	58	5	57	101.12%	98.44%
2028	938	423	515	45%	56	5	59	95.24%	95.24%
2029	930	440	490	47%	57	5	60	95.24%	92.43%
2030	922	459	463	50%	55	5	62	89.36%	89.36%
2031	914	477	437	52%	57	5	64	89.36%	86.61%
2032	905	499	406	55%	55	5	65	83.53%	83.53%
2033	897	519	378	58%	56	5	67	83.53%	81.10%
2034	888	544	344	61%	54	6	69	78.24%	78.24%
2035	880	567	313	64%	55	6	71	78.24%	75.87%
2036	872	595	277	68%	53	6	73	73.29%	73.29%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.
The employer contribution amount shown does not include the $10 million additional contribution budgeted to be paid in fiscal year beginning 2017.

Kentucky Retirement Systems
KERS Hazardous Insurance Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarial Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 419	$ 493	$ (74)	118%	$ 4	$ 1	$ 162	2.26%	1.34%
2018	436	507	(71)	116%	4	1	165	2.46%	2.46%
2019	453	516	(63)	114%	4	1	169	2.46%	2.15%
2020	468	529	(61)	113%	4	1	174	2.11%	2.11%
2021	482	548	(66)	114%	4	1	178	2.11%	1.84%
2022	494	559	(65)	113%	2	1	183	1.21%	1.21%
2023	504	568	(64)	113%	2	1	187	1.21%	0.91%
2024	513	575	(62)	112%	1	1	192	0.65%	0.65%
2025	520	581	(61)	112%	1	2	197	0.65%	0.50%
2026	525	585	(60)	111%	1	2	201	0.35%	0.35%
2027	530	587	(57)	111%	1	2	206	0.35%	0.25%
2028	534	589	(55)	110%	0	2	210	0.14%	0.14%
2029	537	590	(53)	110%	0	2	216	0.14%	0.09%
2030	540	590	(50)	109%	0	2	222	0.07%	0.07%
2031	543	590	(47)	109%	0	2	228	0.07%	0.10%
2032	546	590	(44)	108%	0	2	235	0.15%	0.15%
2033	550	590	(40)	107%	0	2	242	0.15%	0.20%
2034	554	591	(37)	107%	1	2	249	0.25%	0.25%
2035	559	592	(33)	106%	1	3	255	0.25%	0.31%
2036	565	594	(29)	105%	1	3	262	0.39%	0.39%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.

4.3

Kentucky Retirement Systems
CERS Hazardous Insurance Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 1,788	$ 1,197	$ 591	67%	$ 51	$ 2	$ 541	9.35%	9.35%
2018	1,853	1,243	610	67%	65	2	536	12.17%	12.17%
2019	1,912	1,290	622	67%	64	3	538	11.97%	11.97%
2020	1,962	1,343	619	68%	64	3	541	11.83%	11.83%
2021	2,005	1,405	600	70%	63	3	546	11.52%	11.52%
2022	2,038	1,446	592	71%	61	4	551	11.00%	11.00%
2023	2,061	1,478	583	72%	59	4	558	10.66%	10.66%
2024	2,075	1,501	574	72%	59	4	565	10.37%	10.37%
2025	2,081	1,517	564	73%	58	5	573	10.12%	10.12%
2026	2,078	1,526	552	73%	58	5	582	9.89%	9.89%
2027	2,068	1,528	540	74%	57	5	591	9.71%	9.71%
2028	2,052	1,527	525	74%	58	5	602	9.57%	9.57%
2029	2,031	1,522	509	75%	58	6	614	9.43%	9.43%
2030	2,008	1,517	491	76%	59	6	627	9.33%	9.33%
2031	1,982	1,511	471	76%	59	6	641	9.24%	9.24%
2032	1,954	1,506	448	77%	60	6	656	9.16%	9.16%
2033	1,927	1,503	424	78%	61	7	672	9.09%	9.09%
2034	1,899	1,502	397	79%	62	7	688	9.03%	9.03%
2035	1,873	1,506	367	80%	63	7	704	8.98%	8.98%
2036	1,849	1,515	334	82%	64	7	721	8.93%	8.93%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.

4.3

Kentucky Retirement Systems
SPRS Insurance Fund
Current Plan
($ in Millions)

Fiscal Year Beginning July 1,	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Actuarial Accrued Liability	Funded Ratio (3) / (2)	Employer Contribution	Member Contribution	Covered Payroll	Employer Contribution as % of Covered Payroll	Employer Actuarially Determined Contribution Rate
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2017	$ 277	$ 180	$ 97	65%	$ 9	$ 0	$ 48	18.77%	18.10%
2018	286	186	100	65%	13	0	48	27.23%	27.23%
2019	295	195	100	66%	13	0	49	27.23%	26.34%
2020	302	205	97	68%	13	0	49	25.64%	25.64%
2021	309	216	93	70%	13	0	50	25.64%	24.57%
2022	314	224	90	71%	12	0	51	22.92%	22.92%
2023	319	231	88	72%	12	0	52	22.92%	21.70%
2024	321	237	84	74%	11	0	53	20.35%	20.35%
2025	322	241	81	75%	11	0	54	20.35%	19.25%
2026	322	244	78	76%	10	0	55	18.17%	18.17%
2027	320	246	74	77%	10	0	56	18.17%	17.28%
2028	318	247	71	78%	9	0	57	16.37%	16.37%
2029	314	247	67	79%	10	1	59	16.37%	15.65%
2030	310	246	64	79%	9	1	61	14.90%	14.90%
2031	305	245	60	80%	9	1	62	14.90%	14.30%
2032	300	244	56	81%	9	1	64	13.64%	13.64%
2033	294	242	52	82%	9	1	66	13.64%	13.13%
2034	288	241	47	84%	9	1	68	12.58%	12.58%
2035	283	239	44	84%	9	1	69	12.58%	12.18%
2036	277	238	39	86%	8	1	71	11.77%	11.77%

Notes and assumptions:
The projection is based on the results of the June 30, 2017 actuarial valuation.
The employer actuarially determined contribution rate for a particular year is determined by the prior year's actuarial valuation.

4.4

KENTUCKY RETIREMENT SYSTEMS

David L. Eager, Interim Executive Director

Perimeter Park West • 1260 Louisville Road • Frankfort, Kentucky 40601

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MEMORANDUM

Date: December 7, 2017

To: John Farris
Chairman, KRS Board of Trustees

From: David Eager
Interim Executive Director

Re: **Employer Contribution Rates – Fiscal Years 2019/2020**

Our actuaries, Gabriel Roeder Smith, Consultants & Actuaries (GRS), have finalized the actuarial valuations by Plan for the Year Ending June 30, 2017. They included changes and clarifications requested by the Board and KRS staff from the November 13, 2017 meeting, including the total dollar amount of required contributions and projection information on the insurance plans. Included in the valuations are recommended employer contributions rates as follows:

Employer Contribution Rates

Plan	Pension	Insurance	Combined
KERS Non-Hazardous	71.03%	12.40%	83.43%
KERS Hazardous	34.39%	2.46%	36.85%
SPRS	119.05%	27.23%	146.28%
CERS Non-Hazardous	21.84%	6.21%	28.05%
CERS Hazardous	35.69%	12.17%	47.86%

The Kentucky Retirement Systems Board of Trustees is required by KRS 61.565 and 61.702 to determine the employer contribution rates for the KERS and SPRS systems based on an annual actuarial valuation. Additionally, these rates then require approval by the Kentucky General Assembly in the biennial Executive Branch bill. For the CERS systems, the rates are determined by the annual valuation and set annually by the Board. KRS is required to notify CERS employers prior to July 1, 2018 of the 2019 actuarially required contribution rates.

Recommendations: **1.** The Board accept the 2017 valuations as prepared by GRS. **2.** The Board adopt the KERS and SPRS rates and recommend to the Kentucky General Assembly as contained in the table above for fiscal years 2019 and 2020. **3.** The Board adopt the CERS rates as contained in the table above for fiscal year 2019.

5

KENTUCKY RETIREMENT SYSTEMS

TO: Members of the of the Kentucky Retirement Systems Board of Trustees

FROM: Retiree Health Plan Committee

DATE: December 7, 2017

SUBJECT: Retiree Health Plan Committee Report

The Retiree Health Plan Committee met on Tuesday, November 14, 2017, and reviewed a presentation from Humana regarding the following: KRS Medicare Eligible Pharmacy Review, CMS Star Ratings Performance and Plan Performance Highlights for Utilization and Clinical Programs. The 4 star rating will assist Humana in maintaining a lower premium for 2019 by resulting in increased payment from CMS. Retiree participation has increased in clinical programs offered by Humana. The Utilization for Medical cost has decreased 0.2% and the Pharmacy cost is up 4.5% from the previous year. Inpatient Hospital admissions are down 3.9% and the net paid is down 7.3% from the previous year.

With the assistance of outside Health Insurance Counsel, Frost Brown Todd, LLC, it was recommended that continued administration of the Medicare Secondary Payer (MSP) Act limit coverage to those Medicare-eligible retirees reemployed with a participating employer of Kentucky Retirement Systems offering a Group Health Plan (GHP). Those retirees would not be able to enroll in health insurance through Kentucky Retirement Systems. Retirees reemploying with employers that do not participate in Kentucky Retirement Systems are unaffected. The Committee voted to adopt the recommendation.

Recommendation: The RHP Committee recommends that the Board of Trustees ratify the RHP Committee Action.

6

KENTUCKY RETIREMENT SYSTEMS

TO: Members of the Board

FROM: John E. Chilton
Audit Committee Chair

David L. Eager
Interim Executive Director

DATE: December 4, 2017
SUBJECT: Special Called Meeting of the Audit Committee

The Audit Committee held a special called meeting on December 4, 2017. The purpose of the meeting was to review and discuss the following:

1. **The Audit Committee approved the August 24, 2017, Audit Committee meeting minutes.**

2. **The Audit Committee approved the draft copy of the Fiscal Year Ended June 30, 2017, External Audit Report.**

   Mr. Simon Keemer and Mr. Joseph Overhults from Dean, Dorton, Allen, Ford, PPLC, presented the report to the Audit Committee. Mr. Keemer and Mr. Overhults will present the audit report to the Board.

3. **The Audit Committee approved the draft copy of the Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2017, with suggested changes to be made, and for KRS to publish the CAFR prior to December 31, 2017.**

   Ms. Karen Roggenkamp presented the CAFR to the Audit Committee.

4. **The following quarterly reports were presented to the Audit Committee:**

   Mr. Brian Huffman reported on the Disclosure of Assets, Liabilities, and Contingencies for the fiscal year ended June 30, 2017. He reported that management was unaware of any assets, liabilities and contingencies not reported in the fiscal year ended 2017 financial statements.

Ms. Connie Davis presented a review of the quarterly ended September 30, 2017, Financial Statements for both Pension and Insurance. The discussion included the net increase in fund assets due to increased contributions and investment returns. Also, discussed was the increase in benefit payments due to increases in retirements, and the increase in health insurance premiums.

Ms. Ann Case presented a review of cash flows. She noted that cash flows were included for all five pension and insurance plans. Ms. Case presented the highlights for the KERS Non-Hazardous, CERS Non-Hazardous and SPRS Pension Plans.

Ms. Karen Roggenkamp presented the Administrative Expenses – YTD. KRS administrative expenses are lower than budget due to lower than expected salary and benefit expense.

Mr. Brian Huffman presented the Investment Compliance Report. He discussed the reason for the noncompliance due to the changes in the investment allocation and that these would continue until KRS is able to reallocate the money. The reallocation may take twelve to eighteen months.

Committee action: None – for informational purposes only.

5. **Hazardous Duty Plans.**

Ms. Karen Roggenkamp presented the hazardous duty plans. The discussion involved the requirements of statute to determine a hazardous duty position. All positions met the requirements.

T**he Audit Committee approved the Hazardous Duty Plans.**

Ms. Karen Roggenkamp presented the Compliance Review Status. The discussion included the process management was using to verify hazardous duty positions. There was no committee action on this item.

Members of the Board
December 4, 2017
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6. **The following new business was discussed with the Audit Committee:**

   Mr. Brian Huffman presented the Dean, Dorton, Allen, Ford, PPLC, final results of the CERS Summer/Fall Election. The results determined Mr. David Rich as the winner of the election.

   Mr. Brian Huffman presented the update on the Kentucky Employees Retirement System (KERS) election. At the September 14, 2017, Board meeting, the Board nominated six candidates to be placed on the KERS election ballot. Since then, Mr. Larry Totten removed himself from the ballot. KRS did not received any petitions by the November 30 cut - off date. Therefore, five candidates will be placed on the ballot (see attached letter). The ballots will be prepared and mailed by January 20, 2018.

   Mr. David Eager provided an update on the Assistant Director of Internal Audit process. He also announced Mr. Huffman's resignation. He discussed possible plans for the Internal Audit Department staffing requirements.

   Mr. Brian Huffman presented the 2018 Audit Committee Meeting Dates. The start time for the meetings was determined to be 10am.

   The annual review of the Charters of the Audit Committee, Division of Internal Audit, and the Audit Procedures Manual is targeted for the February 2018 meeting date. This is to give the Assistant Director of Internal Audit once hired time to review.

Committee action: None – for informational purposes only.

Professional articles presented for informational purposes only.

RECOMMENDATION: The Audit Committee requests that the Board ratify the actions taken by the Audit Committee.

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KENTUCKY RETIREMENT SYSTEMS

David L. Eager, Interim Executive Director

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MEMORANDUM

To: Members of the Audit Committee
From: D'Juan Surratt
Date: 11/28/2017
Subject: Hazardous Position Classification

AGENCIES ARE ASKING FOR HAZARDOUS DUTY COVERAGE FOR THE FOLLOWING POSITIONS:

Agency	Position	Effective Date
City of Scottsville	Chief of Police	1/1/2018
City of Scottsville	Deputy Chief	1/1/2018
City of Scottsville	Detective	1/1/2018
City of Scottsville	Detective - Narcotics	1/1/2018
City of Scottsville	Captain	1/1/2018
City of Scottsville	Sergeant	1/1/2018
City of Scottsville	Police Officer	1/1/2018
City of Erlanger*	Fire/EMS Deputy Chief - EMS	1/1/2018
City of Erlanger*	Fire/EMS Deputy Chief – Training	1/1/2018
City of Erlanger*	Fire/EMS Deputy Chief – Fire Prevention	1/1/2018
City of Richmond	Master Police Officer	1/1/2018
City of Simpsonville	Police Chief	1/1/2018
City of Simpsonville	Police Sergeant	1/1/2018
City of Simpsonville	Police Officer	1/1/2018
City of Maysville	Fire Chief	1/1/2018
City of Maysville	Assistant Fire Chief	1/1/2018
City of Maysville	Fire Officer	1/1/2018
City of Maysville	Police Chief	1/1/2018
City of Maysville	Assistant Police Chief	1/1/2018
City of Maysville	Police Officer	1/1/2018

KRS Staff has reviewed the above requests and concur that these requests meet statutory guidelines for Hazardous coverage. Position Questionnaires and Job Descriptions are included in the December 4, 2017 Audit Committee (Tab 5).

*The City of Erlanger positions perform administrative duties but also perform firefighter duties and are recommended for approval based on KRS 61.315 (1)(b).

MEMORANDUM

Date: November 2, 2017

To: Audit Committee

From: Karen Roggenkamp
Executive Director of Operations

6.4

Re: **FY 2018 Financial Highlights**

KENTUCKY RETIREMENT SYSTEMS							
Net Position Comparison – Pension Fund							
	KERS	**KHAZ**	**CERS**	**CHAZ**	**SPRS**		**TOTAL**
First Quarter of FY 2018	**$2,127,205,795**	**$628,805,552**	**$6,934,047,669**	**$2,305,492,799**	**$265,578,435**		**$12,261,130,250**
FY 2017 End of Period (6/30/17)	**$2,092,779,477**	**$605,922,606**	**$6,739,139,226**	**$2,227,676,107**	**$256,383,087**		**$11,921,900,504**
Change in Net Position	**$34,426,319**	**$22,882,945**	**$194,908,443**	**$77,816,692**	**$9,195,348**		**$339,229,746**

FY 2018 Summary (period ending September 30):

Total Pension Net Assets were $12.3 Billion at the end of the first quarter, compared to $11.9 Billion at the end of Fiscal Year (FY) 2017. The primary factors of $339 Million (2.8%) increase were higher employer contributions and positive investment performance.

Comments & Comparisons to Prior Year:

- Total **Contributions** were $424 Million which is an increase of $16.3 Million from the first quarter of FY17. The following were the major drivers of the increase in contributions:
    - Member contributions increased by $6.7M due to an increase in covered payroll (CERS, CERS Haz, KERS Haz and SPRS).
    - Employer contributions increased by $8.5M due to an increase in the contribution rates For KERS, CERS, CERS Haz and SPRS.
    - The inflow of $21.9M as appropriated by the General Fund (ARC+ during last year's legislative session).
- Overall **Investment Income** was $441.2M compared to $428.4M last year. The major drivers of the increase in Investment Income were:
    - The net appreciation in the FV of Investments increased from $359.5M in FY17 to $380.4M in FY18. The increase in FV for FY18 is made up of realized gains of $216.6M and unrealized gains of $163.8M
    - There was a slight decrease in Interest and Dividends earned in during the first quarter of FY18, $86.4M compared to $94.6M in the prior fiscal year.
    - Investment expenses remained constant with $26.1M in FY18 compared to $26.4M in FY17.
- Total **Deductions** were $526.4M (up $18.0M from 2017). Benefits/Refunds totaled $516.6M for the first quarter. The 3.9% increase was due to higher retirements across all plans. Pension administrative expenses were $9.8M compared to $11.0M for same period last year.

KENTUCKY RETIREMENT SYSTEMS							
Net Position Comparison – Insurance Fund							
	KERS	**KHAZ**	**CERS**	**CHAZ**	**SPRS**		**TOTAL**
First Quarter of FY 2018	**$811,856,156**	**$499,503,863**	**$2,240,242,954**	**$1,221,967,114**	**$184,204,199**		**$4,957,774,287**
FY 2017 End of Period (6/30/17)	**$781,409,307**	**$484,441,007**	**$2,160,551,392**	**$1,179,314,304**	**$178,190,585**		**$4,783,906,595**
Change in Net Position	**$30,446,849**	**$15,062,856**	**$79,691,562**	**$42,652,810**	**$6,013,614**		**$173,867,692**

6.4

FY 2018 Summary (period ending September 30):

Total Insurance Net Assets were $4.8 Billion at the end of Fiscal Year (FY) 2017 and increased by 3.6% to $5.0 Billion, resulting in an overall increase in assets of $173.4M. Total contributions and net investment income of $266.8M offset deductions of $93.0M, resulting in an increase in net position of $173.9M.

Comments & Comparisons to Prior Year:

- Total **Contributions** were $84.8M ($1.7M higher than 2017) due to an increase in required employer contributions credited to the insurance fund across four of the five plans (KERS, CERS, CERS Haz, and SPRS).
- Overall **Investment Income** was $182.0M compared to a $167.2M in 2017. The major drivers of Investment Income were:
  - The net appreciation in the FV of Investments was $163.4M compared to $143.2M in 2017. The increase in FV for FY18 is made up of realized gains of $74.8M and unrealized gains of $88.6M.
  - There was a slight decrease in Interest and Dividends earned for the first quarter of FY18, $30.0M compared to $33.2M in the prior fiscal year.
  - Investment expenses were $11.6M compared to $9.4M in FY17. Investment Fees increased due to an increase in performance fees from Private Equity.
- Total **Deductions** were $93.0M (higher by $3.4M compared to 2017). An increase in Healthcare Premiums accounted for increase.

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KENTUCKY RETIREMENT SYSTEMS
COMBINING STATEMENTS OF NET POSITION
PENSION FUNDS
As of September 30, 2017
(Unaudited)(In Whole Dollars)

	KERS	CERS	SPRS	CHAZ	KHAZ	2018	2017		
ASSETS									
Cash and Short-term Investments									
Cash Deposits	$ 1,238,611	$ 1,005,023	$ 139,978	$ 748,218	$ 145,059	$ 3,276,889	$ 3,517,972	-6.9%	
Short-term Investments	$ 137,273,116	$ 400,388,594	$ 19,703,812	$ 149,577,145	$ 40,304,028	$ 747,246,695	$ 278,569,999	168.2%	1
Total Cash and Short-term Investments	$ 138,511,727	$ 401,393,617	$ 19,843,790	$ 150,325,363	$ 40,449,087	$ 750,523,584	$ 282,087,971		
RECEIVABLES									
Accounts Receivable	$ 74,640,791	$ 47,591,848	$ 14,717,889	$ 18,315,860	$ 7,684,124	$ 162,950,512	$ 151,111,101	7.8%	
Accounts Receivable - Investments	$ 44,312,177	$ 118,788,427	$ 4,711,821	$ 38,067,209	$ 11,124,226	$ 217,003,860	$ 253,451,434	-14.4%	2
Accounts - Alternate Participation	$ -	$ -	$ -	$ 86,855	$ -	$ 86,855	$ 94,335	-7.9%	
Total Receivables	$ 118,952,968	$ 166,380,276	$ 19,429,709	$ 56,469,924	$ 18,808,350	$ 380,041,226	$ 404,656,871		
INVESTMENTS, AT FAIR VALUE									
Fixed Income	$ 323,490,881	$ 616,003,291	$ 30,165,005	$ 198,734,626	$ 52,352,852	$ 1,220,746,655	$ 1,134,884,483	7.6%	
Public Equities	$ 818,099,789	$ 3,632,900,160	$ 119,719,825	$ 1,198,425,845	$ 326,743,068	$ 6,095,888,687	$ 5,690,246,073	7.1%	
Private Equities	$ 371,405,455	$ 845,588,918	$ 31,161,503	$ 284,794,368	$ 78,608,866	$ 1,611,559,111	$ 1,384,431,064	16.4%	3
Derivatives	$ 3,125,290	$ 13,546,124	$ 432,855	$ 4,488,481	$ 1,225,610	$ 22,818,359	$ 18,965,359	20.3%	4
Absolute Return	$ 148,384,504	$ 462,473,766	$ 15,630,274	$ 146,548,987	$ 38,801,505	$ 811,839,037	$ 1,099,379,558	-26.2%	5
Real Return	$ 162,574,160	$ 595,189,320	$ 22,181,497	$ 202,417,926	$ 55,053,897	$ 1,037,416,801	$ 914,625,212	13.4%	6
Real Estate	$ 89,391,777	$ 319,490,765	$ 12,106,073	$ 102,065,854	$ 29,854,192	$ 552,908,660	$ 519,543,015	6.4%	
Total Investments, at Fair Value	$ 1,916,471,856	$ 6,485,192,345	$ 231,397,032	$ 2,137,476,086	$ 582,639,989	$ 11,353,177,309	$ 10,762,074,764		
FIXED/INTANGIBLE ASSETS									
Fixed Assets	$ 929,074	$ 1,700,704	$ 11,003	$ 153,235	$ 91,375	$ 2,885,391	$ 2,885,391		
Intangible Assets	$ 5,919,584	$ 9,960,922	$ 100,005	$ 826,734	$ 493,581	$ 17,300,826	$ 17,300,826		
Accumulated Depreciation	$ (827,607)	$ (1,517,667)	$ (9,654)	$ (136,905)	$ (81,712)	$ (2,573,545)	$ (2,466,369)		
Accumulated Amortization	$ (4,038,627)	$ (6,757,821)	$ (80,920)	$ (569,014)	$ (330,861)	$ (11,777,244)	$ (9,920,176)		
Total Fixed Assets	$ 1,982,423	$ 3,386,139	$ 20,433	$ 274,049	$ 172,383	$ 5,835,428	$ 7,799,671	-25.2%	7
Total Assets	$ 2,175,918,975	$ 7,056,352,377	$ 270,690,965	$ 2,344,545,422	$ 642,069,809	$ 12,489,577,548	$ 11,456,619,277		
LIABILITIES									
Accounts Payable	$ 2,534,699	$ 4,772,536	$ 461,625	$ 1,722,510	$ 2,360,290	$ 11,851,659	$ 12,028,080	-1.5%	
Investment Accounts Payable	$ 46,178,481	$ 117,532,172	$ 4,650,906	$ 37,330,113	$ 10,903,967	$ 216,595,638	$ 238,703,175	-9.3%	
Total Liabilities	$ 48,713,179	$ 122,304,708	$ 5,112,530	$ 39,052,623	$ 13,264,257	$ 228,447,298	$ 250,731,255		
Total Plan Net Assets	$ 2,127,205,795	$ 6,934,047,669	$ 265,578,435	$ 2,305,492,799	$ 628,805,552	$ 12,261,130,250	$ 11,205,888,022		

NOTE - Variance Explanation

1 *Short Term Investments is primarily comprised of the cash that is on hand with the custodial bank along with any small amounts of cash managers and brokers may have; therefore, the variance is driven by cash flow. The balance is unusually high because of an equity reduction at the end of September. Negotiations are currently underway to invest these funds.*

2 *Variance is a result of transactions activity which is based on each individual manager.*

3 *The increase in Private Equity is a result of appreciation in assets during FY17 and additional capital invested.*

4 *Derivatives include currency forwards/futures as permitted by KRS investment policy. Derivative income increases as the hedging investment offsets the strong USD.*

5 *During FY17 KRS Board of Trustees voted to reduce the amount invested in Absolute Return Strategies.*

6 *The increase in Real Return is a result of appreciation in assets during FY17 and additional capital invested in the internal TIPS portfolio.*

7 *The increase in Real Return is a result of appreciation in assets during FY17 and additional capital invested in the internal TIPS portfolio.*

6.4

KENTUCKY RETIREMENT SYSTEMS
COMBINING STATEMENTS OF CHANGES IN NET POSITION
PENSION FUNDS
For the Quarter Ended September 30, 2017
(Unaudited)(In Whole Dollars)

	KERS	CERS	SPRS	CHAZ	KHAZ	2018	2017		
ADDITIONS									
Member Contributions	$ 25,952,309	$ 38,455,033	$ 1,605,589	$ 18,119,697	$ 4,724,234	$ 88,856,861	$ 82,128,575	8.2%	
Employer Contributions	$ 166,061,500	$ 84,909,972	$ 10,829,186	$ 34,491,498	$ 9,090,423	$ 305,382,578	$ 296,925,651	2.8%	
General Fund Appropriations	$ 16,893,600	$ -	$ 2,500,000	$ -	$ 2,500,000	$ 21,893,600	$ 24,548,250	-10.8%	1
Pension Spiking Contributions	$ 640,830	$ 1,025,033	$ 211,594	$ 1,236,307	$ 402,358	$ 3,516,122	$ 460,164	664.1%	2
Health Insurance Contributions (HB1)	$ 1,441,658	$ 2,495,095	$ 39,206	$ 560,334	$ 218,620	$ 4,754,913	$ 4,018,949	18.3%	3
Total Contributions	$ 210,989,897	$ 126,885,133	$ 15,185,574	$ 54,407,837	$ 16,935,635	$ 424,404,075	$ 408,081,589		
INVESTMENT INCOME									
From Investing Activities									
Net Appreciation in FV of Investments	$ 58,216,081	$ 221,641,612	$ 7,284,567	$ 73,336,269	$ 19,889,060	$ 380,367,588	$ 359,471,921	5.8%	
Interest/Dividends	$ 14,946,485	$ 49,227,598	$ 1,774,086	$ 16,084,571	$ 4,334,371	$ 86,367,111	$ 94,587,197	-8.7%	
Total Investing Activities Income	$ 73,162,566	$ 270,869,210	$ 9,058,653	$ 89,420,840	$ 24,223,431	$ 466,734,699	$ 454,059,118		
Investment Advisory Fees	$ 2,493,029	$ 9,261,493	$ 321,486	$ 2,953,074	$ 821,302	$ 15,850,384	$ 26,411,544		
Performance Fees	$ 1,721,475	$ 5,852,457	$ 173,781	$ 2,022,803	$ 529,308	$ 10,299,824			
Net Income from Investing Activities	$ 68,948,062	$ 255,755,260	$ 8,563,386	$ 84,444,962	$ 22,872,822	$ 440,584,491	$ 427,647,573	3.0%	
From Securities Lending Activities									
Securities Lending Income	$ 222,035	$ 844,886	$ 28,862	$ 279,742	$ 75,210	$ 1,450,734	$ 1,159,876		
Securities Lending Bororower Rebates	$ 106,802	$ 440,592	$ 14,745	$ 145,259	$ 38,925	$ 746,323	$ 247,770		
Securities Lending Agent Fee	$ 17,271	$ 60,584	$ 2,115	$ 20,151	$ 5,437	$ 105,558	$ 136,816		
Net Income from Securities Lending	$ 97,962	$ 343,710	$ 12,001	$ 114,332	$ 30,848	$ 598,853	$ 775,290		
Total Investment Income	$ 69,046,024	$ 256,098,970	$ 8,575,387	$ 84,559,294	$ 22,903,669	$ 441,183,344	$ 428,422,863	3.0%	
Total Additions	$ 280,035,921	$ 382,984,102	$ 23,760,961	$ 138,967,130	$ 39,839,304	$ 865,587,419	$ 836,504,452		
DEDUCTIONS									
Benefit Payments	$ 238,805,035	$ 178,269,757	$ 14,507,676	$ 59,388,329	$ 16,006,832	$ 506,977,630	$ 487,913,731	3.9%	
Refunds	$ 3,671,363	$ 3,981,616	$ -	$ 1,304,249	$ 654,238	$ 9,611,465	$ 9,303,877	3.3%	
Administrative Expenses	$ 3,133,204	$ 5,824,286	$ 57,937	$ 457,861	$ 295,290	$ 9,768,578	$ 11,017,636	-11.3%	4
Capital Project Expenses	$ -	$ -	$ -	$ -	$ -	$ -	$ 133,672	-100.0%	
Total Deductions	$ 245,609,602	$ 188,075,660	$ 14,565,613	$ 61,150,439	$ 16,956,360	$ 526,357,673	$ 508,368,916		
Net Increase(Decrease) in Plan Net Assets	$ 34,426,319	$ 194,908,443	$ 9,195,348	$ 77,816,692	$ 22,882,945	$ 339,229,746	$ 328,135,536		
PLAN NET ASSETS HELD IN TRUST FOR PENSION BENEFITS									
Beginning of Period	$ 2,092,779,477	$ 6,739,139,224	$ 256,383,097	$ 2,227,676,107	$ 605,922,608	$ 11,921,900,513	$ 10,877,752,495		
End of Period	$ 2,127,205,795	$ 6,934,047,667	$ 265,578,445	$ 2,305,492,799	$ 628,805,552	$ 12,261,130,258	$ 11,205,888,031		

NOTE - Variance Explanation

1 *The General Fund appropriation amount decreased for FY 2018.*
2 *Pension Spiking contributions increased due to an increase in Pension Spiking billings for the quarter.*
3 *The increase in Health Insurance Contributions is due to an increase in Tier 3 employees. NOTE: Health Insurance Contributions will be moved to the Insurance Fund at the end of the fiscal year. We will continue to report them on the Pension statements for comparison purposes.*
4 *Decrease is due to a change in processing of Insurance Admin Fees.*

6.4

KENTUCKY RETIREMENT SYSTEMS
COMBINING STATEMENTS OF NET POSITION
INSURANCE FUNDS
As of September 30, 2017
(Unaudited)(In Whole Dollars)

	KERS	CERS	SPRS	CHAZ	KHAZ	2018	2017		
ASSETS									
Cash and Short-Term Investments									
Cash Deposits	$ 241,390	$ 493,056	$ 22,960	$ 58,556	$ 51,294	$ 867,255	$ 177,479	388.7%	1
Short-term Investments	$ 55,103,550	$ 110,993,627	$ 9,259,106	$ 59,575,454	$ 24,102,656	$ 259,034,392	$ 97,275,705	166.3%	2
Total Cash and Short-term Investments	$ 55,344,940	$ 111,486,683	$ 9,282,066	$ 59,634,010	$ 24,153,949	$ 259,901,648	$ 97,453,184		
RECEIVABLES									
Accounts Receivable	$ 13,118,101	$ 12,007,788	$ 892,940	$ 4,813,987	$ 508,256	$ 31,341,072	$ 30,538,063	2.6%	
Investment Accounts Receivable	$ 12,868,243	$ 36,233,118	$ 3,036,932	$ 19,835,552	$ 8,304,524	$ 80,278,369	$ 124,345,787	-35.4%	3
Total Receivables	$ 25,986,345	$ 48,240,906	$ 3,929,872	$ 24,649,539	$ 8,812,780	$ 111,619,442	$ 154,883,850		
INVESTMENTS, AT FAIR VALUE									
Fixed Income	$ 78,940,690	$ 177,868,646	$ 14,428,730	$ 95,824,941	$ 41,134,261	$ 408,197,268	$ 375,522,970	8.7%	
Public Equities	$ 439,573,220	$ 1,172,940,155	$ 96,375,867	$ 642,090,087	$ 270,321,760	$ 2,621,301,089	$ 2,397,255,976	9.3%	
Private Equities	$ 68,516,578	$ 305,998,961	$ 26,170,594	$ 171,129,974	$ 60,930,931	$ 632,747,040	$ 476,149,994	32.9%	4
Derivatives	$ 1,586,093	$ 4,424,737	$ 364,530	$ 2,419,059	$ 993,822	$ 9,788,241	$ 7,263,770	34.8%	5
Absolute Return	$ 51,460,809	$ 146,062,678	$ 12,804,408	$ 81,812,025	$ 34,149,438	$ 326,289,358	$ 435,699,940	-25.1%	6
Real Return	$ 71,650,183	$ 203,167,425	$ 14,496,423	$ 105,589,393	$ 42,689,034	$ 437,592,459	$ 356,592,488	22.7%	7
Alternative Investment	$ 32,551,154	$ 106,391,105	$ 9,341,612	$ 58,344,185	$ 24,534,492	$ 231,162,547	$ 211,713,858	9.2%	
Total Investments, at Fair Value	$ 744,278,727	$ 2,116,853,708	$ 173,982,165	$ 1,157,209,664	$ 474,753,738	$ 4,667,078,002	$ 4,260,198,996		
Total Assets	$ 825,610,012	$ 2,276,581,297	$ 187,194,102	$ 1,241,493,212	$ 507,720,468	$ 5,038,599,091	$ 4,512,536,031		
LIABILITIES									
Accounts Payable	$ 244,384	$ 653,051	$ 10,640	$ 96,664	$ 19,946	$ 1,024,684	$ 1,134,792	-9.7%	
Investment Accounts Payable	$ 13,509,472	$ 35,685,292	$ 2,979,263	$ 19,429,434	$ 8,196,658	$ 79,800,120	$ 119,280,655	-33.1%	8
Total Liabilities	$ 13,753,856	$ 36,338,342	$ 2,989,903	$ 19,526,098	$ 8,216,604	$ 80,824,804	$ 120,415,447		
Total Plan Net Assets	$ 811,856,156	$ 2,240,242,954	$ 184,204,199	$ 1,221,967,114	$ 499,503,863	$ 4,957,774,287	$ 4,392,120,583		

NOTE - Variance Explanation

1 *Variance is a result of continuous fluctuation of deposits and transactions that flow through the cash account.*
2 *Short Term Investments is primarily comprised of the cash that is on hand with the custodial bank along with any small amounts of cash managers and brokers may have; therefore, the variance is driven by cash flow. The balance is unusually high because of an equity reduction at the end of September. Negotiations are currently underway to invest these funds.*
3 *Variance is a result of transactions activity which is based on each individual manager.*
4 *The increase in Private Equity is a result of appreciation in assets during FY17 and additional capital invested.*
5 *Derivatives include currency forwards/futures as permitted by KRS investment policy. Derivative income increases as the hedging investment offsets the strong USD.*
6 *During FY17 KRS Board of Trustrees voted to reduce the amount invested in Absolute Return Strategies.*
7
The increase in Real Return is a result of appreciation in assets during FY17 and additional capital invested in the internal TIPS portfolio
8 *Variance is a result of transactions activity which is based on each individual manager.*

KENTUCKY RETIREMENT SYSTEMS
COMBINING STATEMENTS OF CHANGES IN NET POSITION
INSURANCE FUNDS
For the Quarter Ended September 30, 2017
(Unaudited)(In Whole Dollars)

	KERS	CERS	SPRS	CHAZ	KHAZ	2018	2017		
ADDITIONS									
Employer Contributions	$ 33,876,691	$ 29,098,303	$ 2,595,681	$ 15,167,236	$ 1,049,639	$ 81,787,550	$ 80,313,403	1.8%	
Medicare Drug Reimbursement	$ 3,434	$ 1,517	$ -	$ -	$ -	$ 4,951	$ -		
Insurance Premiums	$ 54,702	$ 160,131	$ (1,233)	$ (19,916)	$ (4,727)	$ 188,957	$ 211,488	-10.7%	1
Retired Reemployed Healthcare	$ 1,010,777	$ 1,374,406	$ 361	$ 214,501	$ 235,173	$ 2,835,218	$ 2,616,859	8.3%	
Total Contributions	$ 34,945,604	$ 30,634,358	$ 2,594,808	$ 15,361,821	$ 1,280,085	$ 84,816,676	$ 83,141,749		
INVESTMENT INCOME									
From Investing Activities									
Net Appreciation in FV of Investments	$ 24,881,161	$ 74,693,405	$ 6,220,675	$ 41,131,225	$ 16,468,537	$ 163,395,003	$ 143,192,051	14.1%	2
Interest/Dividends	$ 4,751,655	$ 13,644,997	$ 1,115,767	$ 7,424,603	$ 3,018,267	$ 29,955,290	$ 33,216,625	-9.8%	
Total From Investing Activities	$ 29,632,816	$ 88,338,403	$ 7,336,442	$ 48,555,828	$ 19,486,805	$ 193,350,293	$ 176,408,676		
Investment Advisory Fees	$ 897,464	$ 3,196,810	$ 267,248	$ 1,752,271	$ 673,869	$ 6,787,662	$ 9,440,807		
Performance Fees	$ 436,458	$ 2,360,417	$ 196,855	$ 1,336,956	$ 454,428	$ 4,785,114			
Net Income from Investing Activities	$ 28,298,893	$ 82,781,176	$ 6,872,340	$ 45,466,600	$ 18,358,508	$ 181,777,517	$ 166,967,869	8.9%	
From Securities Lending									
Securities Lending Income	$ 95,326	$ 263,533	$ 21,383	$ 143,552	$ 59,240	$ 583,034	$ 344,017		
Security Lending Borrower Rebates	$ 48,670	$ 136,091	$ 11,426	$ 75,130	$ 30,900	$ 302,217	$ 59,004		
Security Lending Agent Fees	$ 6,987	$ 19,085	$ 1,491	$ 10,247	$ 4,244	$ 42,053	$ 42,752		
Net Income from Securities Lending	$ 39,669	$ 108,357	$ 8,465	$ 58,176	$ 24,097	$ 238,764	$ 242,261	-1.4%	
Total Net Income from Investments	$ 28,338,562	$ 82,889,532	$ 6,880,805	$ 45,524,776	$ 18,382,605	$ 182,016,280	$ 167,210,130		
Total Additions	$ 63,284,166	$ 113,523,890	$ 9,475,613	$ 60,886,597	$ 19,662,690	$ 266,832,957	$ 250,351,879		
DEDUCTIONS									
Healthcare Premiums Subsidies	$ 32,147,872	$ 32,474,630	$ 3,439,272	$ 18,051,683	$ 4,551,714	$ 90,665,172	$ 87,625,730	3.5%	
Administrative Expense	$ 221,025	$ 210,742	$ 17,391	$ 100,750	$ 27,976	$ 577,883	$ 555,064	4.1%	
Self Funded Healthcare Costs	$ 468,430	$ 1,146,957	$ 5,335	$ 81,353	$ 20,144	$ 1,722,219	$ 1,359,673	26.7%	3
Total Deductions	$ 32,837,327	$ 33,832,329	$ 3,461,998	$ 18,233,786	$ 4,599,834	$ 92,965,274	$ 89,540,467		
Net Increase(Decrease) in Plan Net Assets	$ 30,446,839	$ 79,691,561	$ 6,013,615	$ 42,652,811	$ 15,062,856	$ 173,867,682	$ 160,811,413		
NET PLAN ASSETS HELD IN TRUST FOR INSURANCE BENEFITS									
Beginning of Period	$ 781,409,307	$ 2,160,551,392	$ 178,190,585	$ 1,179,314,304	$ 484,441,007	$ 4,783,906,595	$ 4,231,309,161		
End of Period	$ 811,856,146	$ 2,240,242,953	$ 184,204,200	$ 1,221,967,114	$ 499,503,863	$ 4,957,774,277	$ 4,392,120,573		

NOTE - Variance Explanation

1 *The decrease in Insurance Premiums is due to an increase in direct pay billing refunds to hazardous duty retirees.*
2 *Favorable market conditions resulting in appreciation of assets.*
3 *Increase in Self Funded Healthcare costs is a result of an increase in claims paid by Humana/billed to KRS.*

6.4

Kentucky Retirement Systems

First Quarter Cash Flows

December 4, 2017

KERS NON-HAZARDOUS

6.4

FY17-FY18

Inflows increased by 3.91%

Outflows increased by 1.16%

CASH FLOW – PENSION

($ in Thousands)

Contributions	FY17	FY18
Member Contributions	$24,555	$25,952
Employer Contributions	162,648	166,062
General Fund Appropriations	14,548	16,894
Pension Spiking Contributions	68	641
Health Insurance Contributions (HB1)	1,227	1,442
Employer Cessation Contributions	-	-
Contribution Inflow	**203,046**	**210,990**
Benefit Payments	233,971	238,805
Refunds	3,567	3,671
Administrative Expenses	3,702	3,133
Capital Project Expenses	45	-
Investment Expense (Includes Securities)	5,794	4,339
Contribution Outflow	**247,079**	**249,948**
Net Contributions	**(44,033)**	**(38,958)**
Investment Income	21,093	15,168
Realized Gain/(Loss)	29,699	34,828
Unrealized Gain/(Loss)	24,806	23,388
Total Net Position	**$31,565**	**$34,426**

Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

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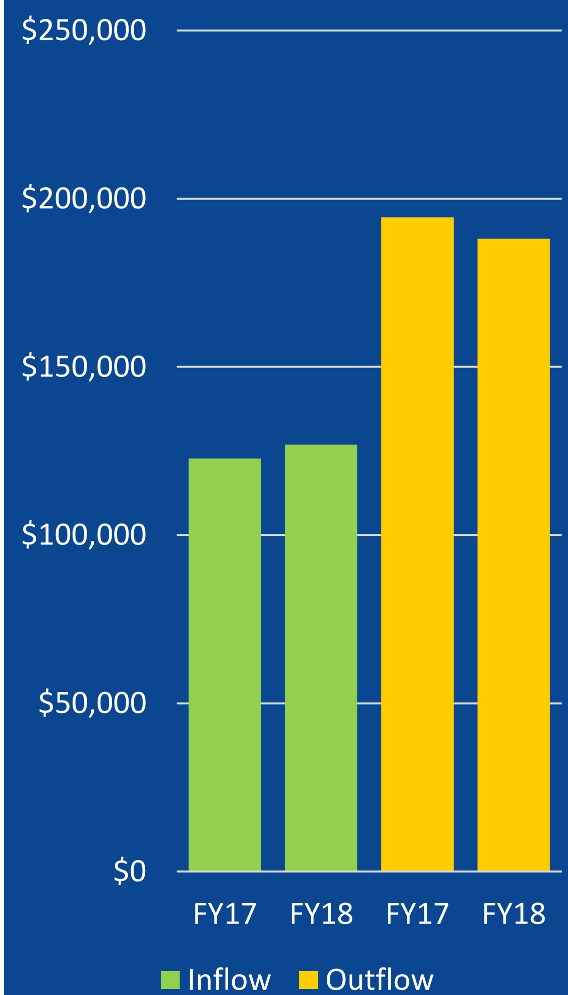
CERS NON-HAZARDOUS

6.4

FY17-FY18

Inflows increased by 3.37%

Outflows increased by 3.29%



CASH FLOW – PENSION

($ in Thousands)

Contributions	FY17	FY18
Member Contributions	$36,648	$38,455
Employer Contributions	83,696	84,910
General Fund Appropriations	-	-
Pension Spiking Contributions	250	1,025
Health Insurance Contributions (HB1)	2,151	2,495
Contribution Inflow	**122,744**	**126,885**
Benefit Payments	169,219	178,270
Refunds	4,280	3,982
Administrative Expenses	6,467	5,824
Capital Project Expenses	77	-
Investment Expense (Includes Securities)	14,428	15,615
Contribution Outflow	**194,471**	**203,691**
Net Contributions	**(71,727)**	**(76,806)**
Investment Income	51,404	50,072
Realized Gain/(Loss)	113,979	124,584
Unrealized Gain/(Loss)	98,576	97,057
Total Net Position	**$192,232**	**$194,908**

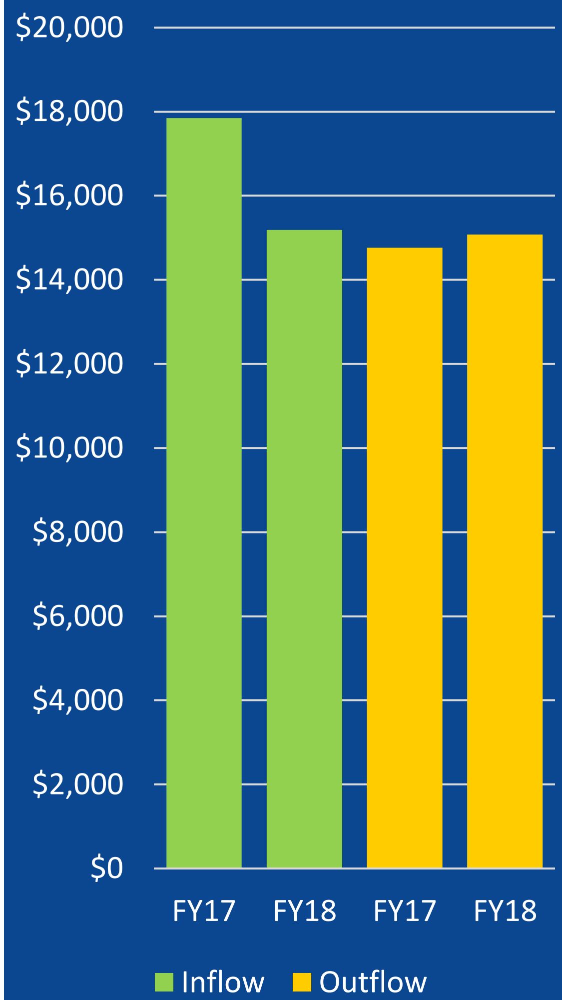
Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

6.4

FY17-FY18

Inflows decreased by 14.90%

Outflows increased by 2.13%



CASH FLOW – PENSION

($ in Thousands)

Contributions	FY17	FY18
Member Contributions	$1,549	$1,606
Employer Contributions	10,011	10,829
General Fund Appropriations	6,250	2,500
Pension Spiking Contributions		212
Health Insurance Contributions (HB1)	34	39
Contribution Inflow	**17,844**	**15,186**
Benefit Payments	14,144	14,508
Refunds	1	
Administrative Expenses	64	58
Capital Project Expenses	1	
Investment Expense (Includes Securities)	554	512
Contribution Outflow	**14,764**	**15,078**
Net Contributions	**3,080**	**108**
Investment Income	2,048	1,803
Realized Gain/(Loss)	3,675	4,045
Unrealized Gain/(Loss)	2,327	3,239
Total Net Position	**$11,130**	**$9,195**

Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

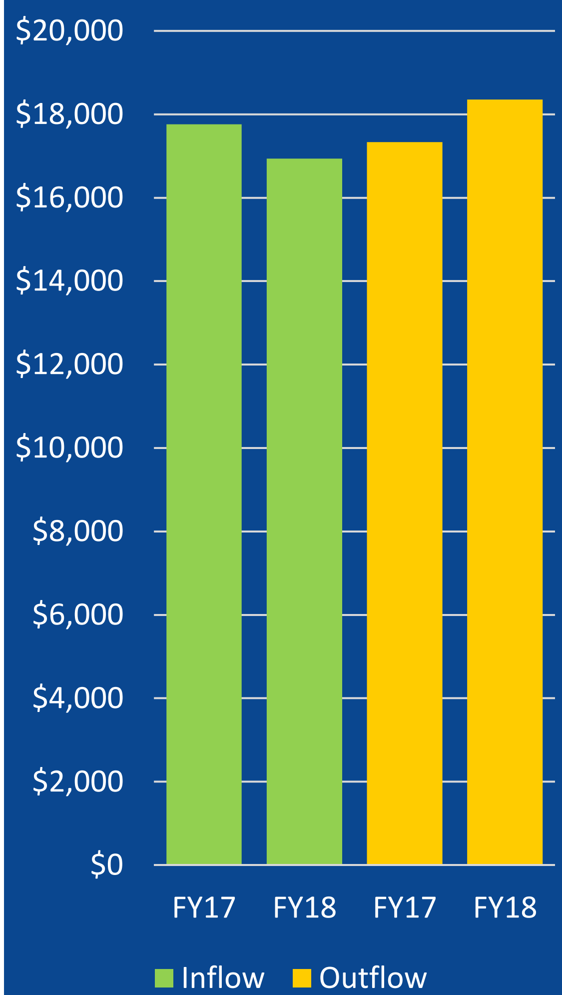
KERS HAZARDOUS

6.4

FY17-FY18

Inflows decreased by 4.66%

Outflows increased by 5.84%



CASH FLOW – PENSION
($ in Thousands)

Contributions	FY17	FY18
Member Contributions	$4,124	$4,724
Employer Contributions	9,698	9,090
General Fund Appropriations	3,750	2,500
Pension Spiking Contributions	11	402
Health Insurance Contributions (HB1)	179	219
Contribution Inflow	**17,762**	**16,935**
Benefit Payments	15,169	16,007
Refunds	544	654
Administrative Expenses	310	295
Capital Project Expenses	4	-
Investment Expense (Includes Securities)	1,311	1,395
Contribution Outflow	**17,338**	**18,351**
Net Contributions	**424**	**(1,416)**
Investment Income	4,566	4,409
Realized Gain/(Loss)	9,691	11,182
Unrealized Gain/(Loss)	7,370	8,707
Total Net Position	**$22,051**	**$22,883**

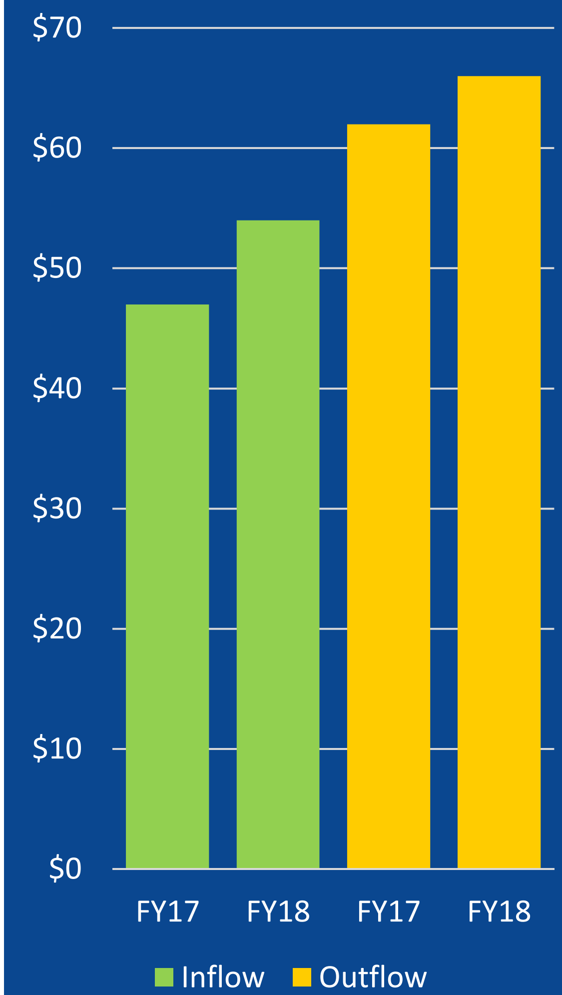
Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

CERS HAZARDOUS

FY17-FY18

Inflows increased by 16.55%

Outflows increased by 7.77%



6.4

CASH FLOW – PENSION

($ in Thousands)

Contributions	FY17	FY18
Member Contributions	$15,253	$18,120
Employer Contributions	30,872	34,491
General Fund Appropriations	-	-
Pension Spiking Contributions	131	1,236
Health Insurance Contributions (HB1)	429	560
Contribution Inflow	**46,684**	**54,408**
Benefit Payments	55,411	59,388
Refunds	912	1,304
Administrative Expenses	474	458
Capital Project Expenses	7	-
Investment Expense (Includes Securities)	4,708	5,141
Contribution Outflow	**61,512**	**66,291**
Net Contributions	**(14,828)**	**(11,883)**
Investment Income	16,636	16,364
Realized Gain/(Loss)	37,032	41,953
Unrealized Gain/(Loss)	32,317	31,383
Total Net Position	**$71,157**	**$77,817**

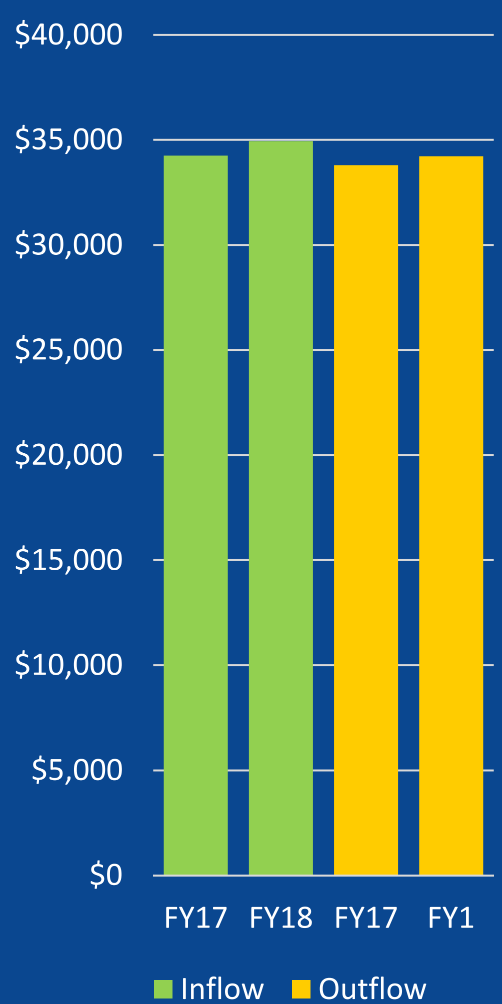
Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

KERS NON-HAZARDOUS

FY17-FY18

Inflows increased by 2.03%

Outflows increased by 1.27%



CASH FLOW – INSURANCE
($ in Thousands)

Contributions	FY17	FY18
Employer Contributions	$33,256	$33,877
Medicare Drug Reimbursement		3
Insurance Premiums	53	55
Retired Reemployed Healthcare	942	1,011
Employer Cessation Contributions	-	-
Contribution Inflow	**34,251**	**34,946**
Healthcare Premium Subsidies	32,018	32,148
Administrative Expense	220	221
Self Funded Healthcare Costs	347	468
Excise Tax Insurance	-	-
Investment Expense (Includes Securities)	1,214	1,390
Contribution Outflow	**33,799**	**34,227**
Net Contributions	**452**	**719**
Investment Income	5,295	4,847
Realized Gain/(Loss)	14,164	10,248
Unrealized Gain/(Loss)	8,696	14,633
Total Net Position	**$28,607**	**$30,447**

Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

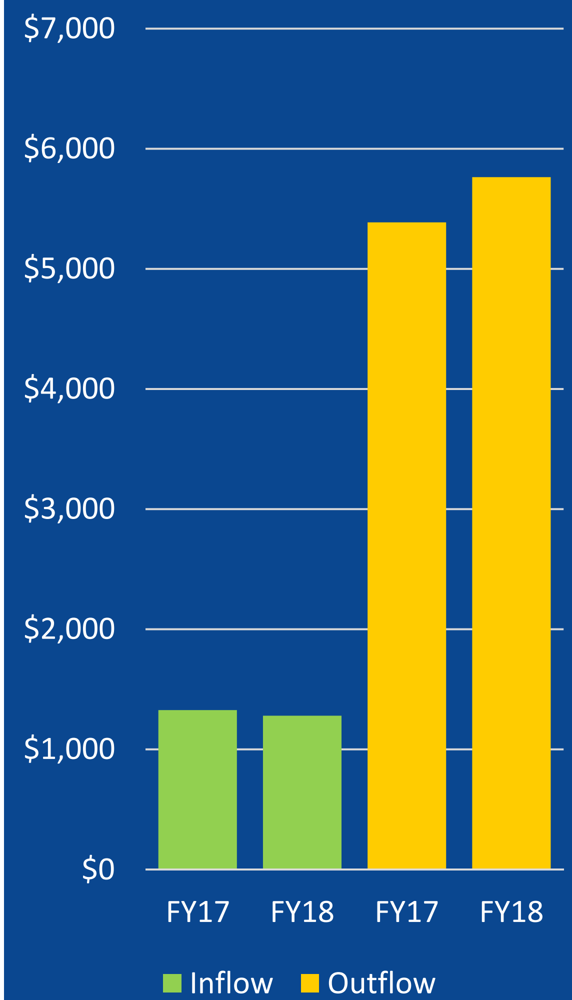
6.4

6.4

KERS HAZARDOUS

FY17-FY18

Inflows decreased by 3.61%
Outflows increased by 6.96%



CASH FLOW – INSURANCE
($ in Thousands)

Contributions	FY17	FY18
Employer Contributions	$1,093	$1,050
Medicare Drug Reimbursement		-
Insurance Premiums	4	(5)
Retired Reemployed Healthcare	232	235
Employer Cessation Contributions		
Contribution Inflow	**1,328**	**1,280**
Healthcare Premium Subsidies	4,393	4,552
Administrative Expense	26	28
Self Funded Healthcare Costs	18	20
Excise Tax Insurance		
Investment Expense (Includes Securities)	951	1,163
Contribution Outflow	**5,388**	**5,763**
Net Contributions	**(4,060)**	**(4,483)**
Investment Income	3,492	3,078
Realized Gain/(Loss)	9,212	7,428
Unrealized Gain/(Loss)	5,530	9,040
Total Net Position	**$14,174**	**$15,063**

Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

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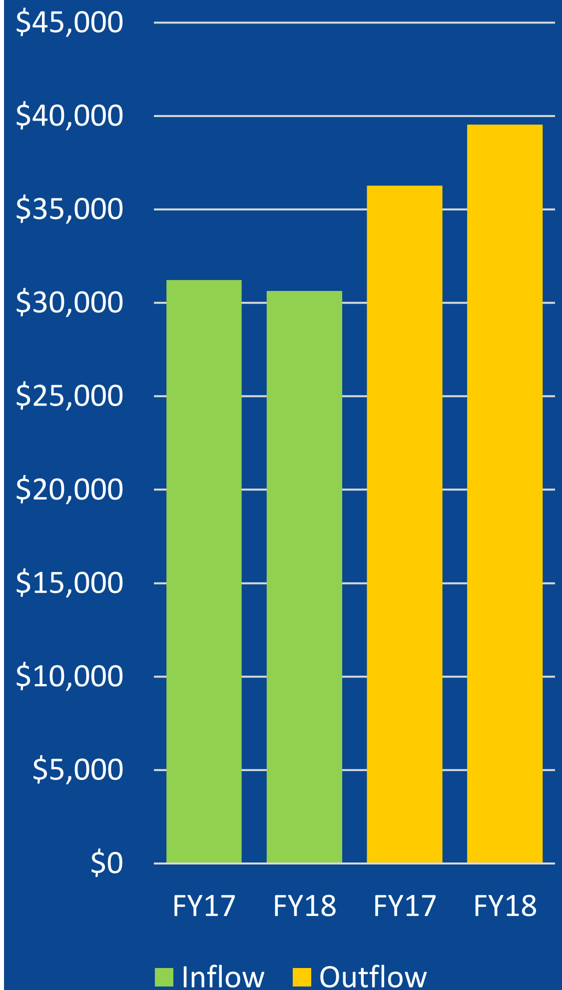
6.4

CERS NON-HAZARDOUS

FY17-FY18

Inflows decreased by 1.88%

Outflows increased by 9.02%



CASH FLOW – INSURANCE

($ in Thousands)

Contributions	FY17	FY18
Employer Contributions	$29,839	$29,098
Medicare Drug Reimbursement		1,517
Insurance Premiums	153	160,131
Retired Reemployed Healthcare	1,227	1,374
Employer Cessation Contributions		-
Contribution Inflow	**31,220**	**30,634**
Healthcare Premium Subsidies	30,616	32,475
Administrative Expense	198	211
Self Funded Healthcare Costs	959	1,147
Excise Tax Insurance		-
Investment Expense (Includes Securities)	4,500	5,712
Contribution Outflow	**36,273**	**39,545**
Net Contributions	**(5,053)**	**(8,911)**
Investment Income	15,128	13,909
Realized Gain/(Loss)	39,771	34,842
Unrealized Gain/(Loss)	*24,796*	*39,852*
Total Net Position	**$74,642**	**$79,692**

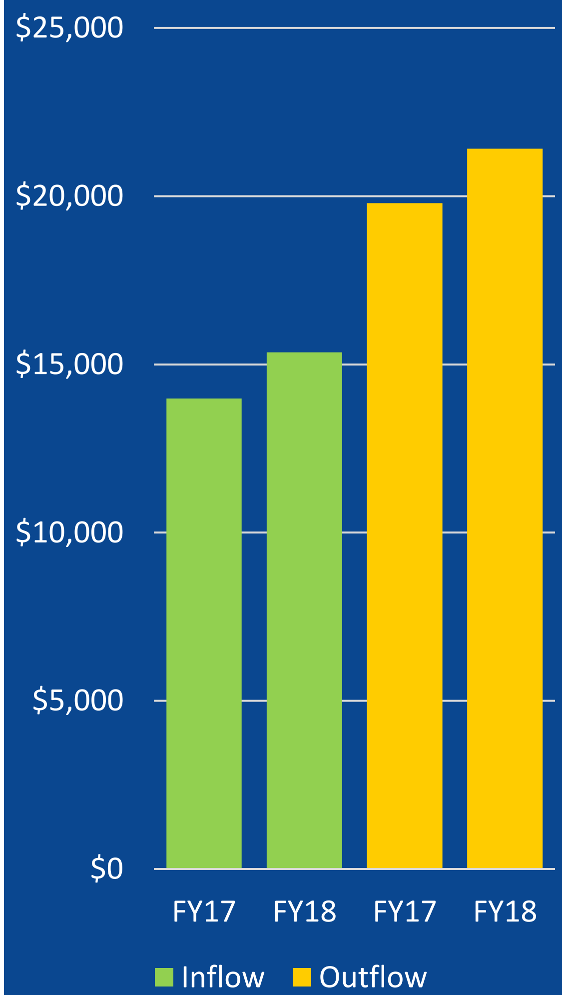
Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

CERS HAZARDOUS

FY17-FY18

Inflows increased by 9.85%

Outflows increased by 8.14%



CASH FLOW – INSURANCE

($ in Thousands)

Contributions	FY17	FY18
Employer Contributions	$13,767	$15,167
Medicare Drug Reimbursement		
Insurance Premiums	1	(20)
Retired Reemployed Healthcare	216	215
Employer Cessation	-	-
Contribution Inflow	**13,984**	**15,362**
Healthcare Premium Subsidies	17,182	18,052
Administrative Expense	93	101
Self Funded Healthcare Costs	30	81
Excise Tax Insurance		-
Investment Expense (Includes Securities)	2,492	3,175
Contribution Outflow	**19,797**	**21,409**
Net Contributions	**(5,813)**	**(6,047)**
Investment Income	8,341	7,568
Realized Gain/(Loss)	21,945	19,411
Unrealized Gain/(Loss)	13,680	21,721
Total Net Position	**$38,153**	**$42,653**

Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

6.4

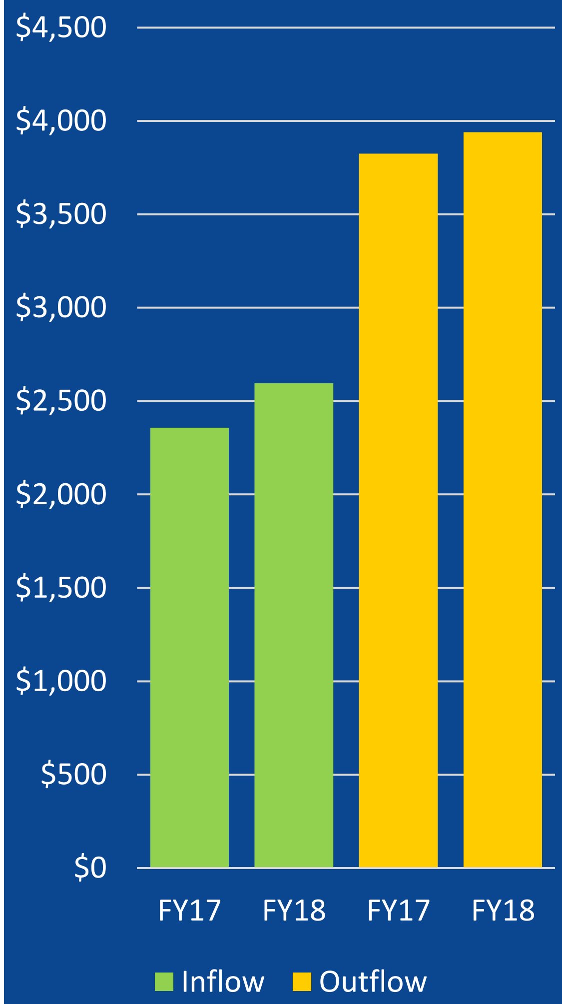
SPRS

6.4

FY17-FY18

Inflows increased by 10.05%

Outflows increased by 2.98%



CASH FLOW – INSURANCE

($ in Thousands)

Contributions	FY17	FY18
Employer Contributions	$2,358	$2,596
Medicare Drug Reimbursement		-
Insurance Premiums		(1,233)
Retired Reemployed Healthcare		361
Employer Cessation		-
Contribution Inflow	**2,358**	**2,595**
Healthcare Premium Subsidies	3,417	3,440
Administrative Expense	17	17
Self Funded Healthcare Costs	6	5
Excise Tax Insurance		-
Investment Expense (Includes Securities)	385	477
Contribution Outflow	**3,825**	**3,939**
Net Contributions	**(1,467)**	**(1,344)**
Investment Income	1,304	1,137
Realized Gain/(Loss)	3,314	2,885
Unrealized Gain/(Loss)	2,084	3,335
Total Net Position	**$5,235**	**$6,013**

Note: HB1 Contributions are included in the Pension Trusts by statute as a 401(h) plan.

6.4

KRS ADMINISTRATIVE BUDGET FY 2018

FIRST QUARTER BUDGET-TO-ACTUAL ANALYSIS

For Period Ending September 30, 2017

Acct #	Account Name	Budgeted	Actual Expenditures	Remaining	% Remaining
	PERSONNEL				
111	Salaries	$14,350,000	$4,035,196	$10,314,804	71.88%
113	Casual Labor	$0	$0	$0	
114	Wages (Per Diem)	$56,000	$0	$56,000	100.00%
115	Wages (Overtime)	$450,000	$144,411	$305,589	67.91%
119	Wages (Block 50)	$100,000	$22,023	$77,977	77.98%
121	Emp Paid FICA	$1,131,879	$304,259	$827,620	73.12%
122	Emp Paid Retirement	$7,149,659	$1,943,942	$5,205,717	72.81%
123	Emp Paid Health Ins	$2,470,921	$664,392	$1,806,529	73.11%
124	Emp Paid Life Ins	$4,003	$961	$3,042	75.99%
125	Emp Paid HRA	$0	$0	$0	
126	Health Insurance Admin Fee	$26,400	$0	$26,400	100.00%
127	HRA Adm Fee	$13,000	$0	$13,000	100.00%
128	Emp Paid Sick Leave	$40,000	$16,831	$23,169	57.92%
129	Adoption Assistance Benefit	$0	$0	$0	
111A	Escrow For Admin Fees	$0	$0	$0	
131	Workers Compensation	$50,400	$50,422	($22)	-0.04%
132	Unemployment	$10,000	$0	$10,000	100.00%
133	Tuition Assistance	$35,000	$2,858	$32,142	91.83%
133I	Investment Tuition Assistance	$5,000	$0	$5,000	100.00%
133T	Audit Tuition Assistance	$2,500	$0	$2,500	100.00%
135	Bonds	$3,000	$51	$2,949	98.30%
141	**LEGAL & AUDITING SERVICES**				
141A	Legal Hearing Officers	$350,000	$45,548	$304,452	86.99%
141B	Legal (Stoll, Keenon)	$250,000	$45,619	$204,381	81.75%
141C	Polsinelli Shugart	$100,000	$3,875	$96,125	96.13%
141E	Reinhart	$500,000	$0	$500,000	100.00%
141F	Ice Miller	$500,000	$32,416	$467,584	93.52%
141L	Legal Expense	$0	$40	($40)	
142	Auditing	$250,000	$32,313	$217,688	87.08%
146	**CONSULTING SERVICES**				
146A	Medical Reviewers	$380,000	$18,895	$361,105	95.03%
146B	Medical Reports	$10,000	$0	$10,000	100.00%
146C	Medical Exams	$35,000	$3,380	$31,620	90.34%
146E	Escrow for Actuary Fees	$0	$0		
150	**CONTRACTUAL SERVICES**				
150C	Miscellaneous Contracts	$275,000	$6,410	$268,590	97.67%
150D	Health Consultant	$125,000	$0	$125,000	100.00%
150E	Banking	$9,000	$0	$9,000	100.00%
150F	PBI	$9,000	$0	$9,000	100.00%
150G	Human Resources Consulting	$100,000	$0	$100,000	100.00%
150H	Health Insurance Admin Fee	$2,500,000	$579,179	$1,920,821	76.83%
150I	Investment Consulting	$600,000	$0	$600,000	100.00%
150J	Medical Claims TPA	$1,545,972	$0	$1,545,972	100.00%
150K	Pharmacy Claims TPA	$1,048,000	$0	$1,048,000	100.00%
159	Actuarial Services	$700,000	$60,242	$639,758	91.39%
162	Facility Security Charges	$3,300	$5,101	($1,801)	-54.58%
	PERSONNEL SUBTOTAL	**$35,188,034**	**$8,018,363**	**$27,169,671**	**77.21%**

6.4

Acc't #	Account Name	Budgeted	Actual Expenditures	Remaining	% Remaining
	OPERATIONAL				
211	Natural Gas	$25,000	$747	$24,253	97.01%
212	Electric	$190,000	$30,898	$159,102	83.74%
221	Rent-NonState Building	$33,500	$2,724	$30,776	91.87%
222	Rent -State Owned Building	$723,000	$180,725	$542,275	75.00%
223	Equipment Rental	$12,000	$0	$12,000	100.00%
224	Copier Rental	$100,000	$11,645	$88,355	88.36%
226	Rental Carpool	$0	$824	($824)	
232	Vehicle/Equip. Mainten.	$29,000	$0	$29,000	100.00%
241	Postage	$525,000	$14	$524,986	100.00%
242	Freight	$1,200	$110	$1,090	90.83%
251	Printing (State)	$1,000	$0	$1,000	100.00%
252	Printing (non-state)	$300,000	$96,103	$203,897	67.97%
254	Insurance	$85,000	$3,138	$81,862	96.31%
256	Garbage Collection	$15,000	$3,466	$11,534	76.89%
259	Conference Expense	$40,000	$1,888	$38,112	95.28%
259I	Conference Exp. Investment	$12,600	$2,500	$10,100	80.16%
259T	Conference Exp. Audit	$1,500	$0	$1,500	100.00%
300	MARS Usage	$35,000	$6,775	$28,225	80.64%
321	Office Supplies	$150,000	$6,250	$143,750	95.83%
331	Data Processing Supplies	$150,000	$13	$149,987	99.99%
343	Motor Fuels & Lubricants	$3,000	$550	$2,450	81.65%
346	Furniture & Office Equipment	$350,000	$0	$350,000	100.00%
361	Travel (In-State)	$75,000	$4,597	$70,403	93.87%
361I	Travel (In-State) Investment	$1,500	$0	$1,500	100.00%
361T	Travel (In-State) Audit	$500	$0	$500	100.00%
362	Travel (Out of State)	$20,000	$5,339	$14,661	73.31%
362I	Travel (Out of State) Invest	$50,000	$3,777	$46,223	92.45%
362T	Travel (Out of State) Audit	$2,500	$0	$2,500	100.00%
381	Dues & Subscriptions	$85,000	$7,649	$77,351	91.00%
381I	Dues & Subscriptions Invest	$15,000	$868	$14,132	94.21%
381T	Dues & Subscriptions Audit	$5,000	$175	$4,825	96.50%
399	Miscellaneous	$75,066	$1,389	$73,677	98.15%
399I	Miscellaneous Investment	$20,000	$99	$19,901	99.51%
399T	Miscellaneous Audit	$2,000	$0	$2,000	100.00%
601	Capital Outlay	$0	$0	$0	
802	COT Charges	$90,000	$0	$90,000	100.00%
814	Telephone - Wireless	$8,000	$986	$7,014	87.68%
815	Telephone - Other	$250,000	$11,587	$238,413	95.37%
847	Computer Equip./Software	$4,100,000	$281,670	$3,818,330	93.13%
847I	Comp. Equip./Software Invest	$190,000	$0	$190,000	100.00%
847T	Comp. Equip/Software Audit	$1,000	$0	$1,000	100.00%
	OPERATIONAL SUBTOTAL	**$7,772,366**	**$666,506**	**$7,105,860**	**91.42%**
	TOTALS	**$42,960,400**	**$8,684,869**	**$34,275,531**	**79.78%**

KENTUCKY RETIREMENT SYSTEMS

David L. Eager, Interim Executive Director

Perimeter Park West • 1260 Louisville Road • Frankfo rt, Kentucky 4060 I

kyret.ky.gov. Phone: 502-696-8800. Fax: 502-696-8822

6.5

MEMORANDUM

Date: October 25, 2017
To: KRS Board of Trustees

From: David Eager,
Interim Executive Director

Through: Brian Huffman
Internal Auditor

Subject: KERS Winter/Spring Election 2018

In accordance with the Board of Trustees Election Policy and Procedures (Nomination Procedures, Section 4), and in accordance with Kentucky Revised Statute 61.645(4)(a), I hereby certify that the following nominees for the two Kentucky Employees Retirement System (KERS) Board Seats were nominated by the Board of Directors at the quarterly Board Meeting held on September 14, 2017:

Mr. Cary Brandon Bishop
Mr. Raymond Campbell Connell
Ms. Sherry Lynn Kremer
Mr. George Vincent Lang
Ms. Mary Helen Peter
Mr. Larry Parker Totten (Withdrawn October 24, 2017)

The nominees were properly nominated in accordance with the aforementioned statue. I also certify that I witnessed and observed the nomination process. Thirteen applications, resumes, and background checks were received on, or before the July 31, 2017, deadline date. No applicants were determined to be constitutionally ineligible. Candidate Larry Parker Totten withdrew from the election by written consent on October 24, 2017.

The following Board Members cast their nomination ballots:

1.) Mr. John Farris
2.) Mr. John Chilton
3.) Mr. William Cook
4.) Mr. Kelly Downard
5.) Mr. J.T. Fulkerson
6.) Mr. David M Gallagher
7.) Mr. Vince Lang
8.) Mr. Matthew Montiero
9.) Mr. Keith Peercy

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David Eager
October 25, 2017
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10.) Ms. Betty Pendergrass
11.) Ms. Mary Helen Peter
12.) Mr. Jerry Powell
13.) Mr. Neil Ramsey
14.) Mr. David Rich
15.) Secretary Thomas Stephens

Mr. Thomas Elliott was present, but didn't cast a ballot. Mr. Joe Brothers and Mr. David Harris were not present to cast a ballot.

Nomination Procedure

KERS members may nominate candidates by filing a petition with the Executive Director or his designee no later than November 30, 2017, or four months prior to the expiration of the term of office. The petition must bear the names, last four digits of Social Security numbers, and signatures for no less than one-tenth of the number of members voting in the last KERS election (12,713 ballots were counted and certified by the Board's contracted auditing firm in 2014: therefore, in accordance with KRS 61.645 (4) (b), at least 1,271 signatures are required to nominate a candidate by petition).

Election Procedure

After the deadline for petitions is past, the Executive Director or his designee is required to prepare an official ballot. The ballot will contain the name of each individual nominated by the Board and by petition. An optional photograph of each candidate and biographical information shall be included with the ballot. Candidates' position on the ballot shall be determined by random lottery. The candidates' biographical information will follow the same order as the candidates' positions on the ballot. The ballot allows for write-in votes. The ballot will be distributed to the eligible voters as of December 31, 2017, by mail to their last known address. ***Only one ballot will be mailed to each eligible voter. Duplicate ballots will not be produced or mailed.*** Eligible voters will return the ballots to a post office box accessible by the Board's external auditor, who will count the ballots and document the results. The candidates receiving the most votes for the positions to be elected shall be designated as the winners.

Election Timetable

DATE	EVENT	STATUTORY REFERENCE
November 30, 2017	Last day to file Petition	KRS 61.645 (4) (b)
December 31, 2017	Ballots prepared	KRS. 61.645 (4) (c)
January 20, 2018	Ballots mailed to KERS Membership	KRS 61.645 (4) (d)
March 1, 2018	Last day to postmark ballot	KRS 61.645 (4) (f)
March 15, 2018	Election results certified by External Auditor	KRS 61.645 (4) (e) (a)

z:/Audit Committee/ KERS W-S 2018 ballot nominations 16 Memo.doc

7

Kentucky Retirement Systems

TRUSTEE EDUCATION PROGRAM

December 7, 2017
David Eager
Interim Executive Director

Topics Approved for Training

7

1. Retirement Benefits
2. Benefits Administration
3. Investment Concepts
4. Investment Policies
5. Administration of Retirement Systems Investments
6. Statutes Governing KERS, CERS, and SPRS

7

Topics Approved for Training

7. Administrative Regulations Governing KERS, CERS, and SPRS

8. Bylaws of the Board

9. Case Law, Statutes, Administrative Regulations, or Other Applicable Authority Regarding Being a Fiduciary

10. Actuarial and Financial Concepts of Governmental Retirement Systems

11. HIPAA

7

APPROVED TYPES OF TRAINING

1. Presentations by the Executive Director and/or KRS staff

2. Formal training at a program offered by someone knowledgeable of the related subject matter

3. Attendance at meetings where a related subject matter (e.g. PPOB, Board, Committee, etc.) is discussed or presented

4. Workshops and conferences

5. Review of educational material related to pensions and investments

NEW TRUSTEE ORIENTATION PROGRAM

7

1. Initially 8 Hours of TRUSTEE EDUCATION Within 12 Months
2. All 11 Topics
    - Emphasis on Legal and Fiduciary Issues
    - Operations of KRS by Staff
3. Certify Attendance to Executive Director for Approval Within 60 Days
4. Executive Director Reports Fulfillment of Responsibilities
5. Hours Credited Toward Ongoing 12 Hours Per Year Requirement.

ANNUAL REQUIRED TRAINING

7

1. 12 Hours Every "EDUCATION YEAR"
   - Starts on Your Anniversary of Appointment
2. Executive Director to Make Available TRUSTEE EDUCATION Activities
   - Notebook
   - Articles
   - Off-sites
3. Certify Completion to the Executive Director Within 60 Days
4. Executive Director Reports Status

6

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KENTUCKY RETIREMENT SYSTEMS
TRUSTEES EDUCATION PROGRAM

Adopted: November 20, 2008
Amended: December _____, 2017

Chapter 1
Credit for Training

1) Credit for training will be given for any of the following types of activities related to the subjects in Chapter 2, Section 2:

   a) Presentations by the Executive Director and/or KRS staff;

   b) Formal training at a program offered by someone knowledgeable of the related subject matter;

   c) Attendance at meetings where a related subject matter (e.g. PPOB, Board, Committee, etc.) is discussed or presented;

   d) Workshops and conferences; and

   e) Review of educational material related to pensions and investments.

Chapter 2
Definitions

1) "Approved Education Activity" or "Approved Activity" is a Trustee Education Activity that has been approved for required credit hours of training by the Board or the Executive Director.

2) "Trustee Education Activity" is any educational activity or program which provides instruction in one or more of the following areas:

   a) retirement benefits;

   b) benefits administration;

   c) investment concepts;

   d) investment policies;

   e) administration of retirement systems investments;

   f) statutes governing Kentucky Employees Retirement System (KERS), County Employees Retirement System (CERS), and State Police Retirement System (SPRS);

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g) administrative regulations governing KERS, CERS, and SPRS

(h) Bylaws of the Board;

(I) case law, statutes, administrative regulations, or other applicable authority regarding being a fiduciary;

j) actuarial and financial concepts of governmental retirement systems

k) HIPAA

3) "Program" is the Kentucky Retirement Systems Trustees Education Program incorporated by reference in 105 KAR 1:440.

4) "Board" is the Board of Trustees of Kentucky Retirement Systems.

5) "Executive Director" is the Executive Director of Kentucky Retirement Systems or designee.

6) "Credit hour" is sixty (60) minutes of actual time spent on Trustee Education Activities, which may be accrued in increments of not less than fifteen (15) minutes.

7) "Education Year" is the twelve (12) months commencing on their date of appointment and on the anniversary of that date thereafter.

Chapter 3
New Trustee Orientation Program

1) After a new Trustee is sworn in as a member of the Board, the new Trustee (New Trustee) shall be required to complete a total of eight (8) credit hours of Trustee Education Activities (New Trustee Education Program) during his or her first Education Year. The Executive Director shall make available Trustee Education Activities and may approve other education activities for fulfilling the requirements of this Program.

2) The New Trustee Orientation Program shall include training in each of the categories listed in Chapter 2, Section 2 of this Program. The New Trustee Orientation Program shall emphasize legal and fiduciary responsibilities of Trustees, including, but not limited to, presentations on these topics by independent third party experts. New Trustees shall also be informed about the operations of Kentucky Retirement Systems through presentations by any of the following: Executive Director, the Chief Investment Officer, the Chief Benefits Officer, the Chief Operations Officer, the General Counsel, the Senior Health Advisor, the Internal Audit Director, the Information Security Officer, and other qualified staff members designated by the Executive Director.

3) If a new Trustee fails to complete the New Trustee Orientation Program within one (1) year following the date the new Trustee is sworn in, the retirement system shall withhold payment

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of all per diems and travel expenses due to the Trustee (or which subsequently may come due) until such time as the Trustee completes the New Trustee Orientation Program.

4) Each Trustee attending an Approved Activity for the New Trustee Orientation Program shall certify to the Executive Director that the Trustee attended the Approved Activity and the total number of hours earned. The Executive Director shall provide a certification form.

5) Certification of completion of the New Trustee Orientation Program must be received by the Executive Director not later than sixty (60) days after completion of the Approved Activity; provided that for Approved Activities completed during a new Trustee's initial Education Year that began on or after November 1, 2016, and not previously submitted or approved by the Executive Director, may be submitted for approval not later than sixty (60) days after November 1, 2017. A certification of completion form received more than sixty (60) days after the required deadline will not be approved

6) The Executive Director shall maintain a record of all Trustee Education Activities attended and/or performed by each Trustee. Within one (1) year following the date that the new Trustee is sworn in as a member of the Board of Trustees of Kentucky Retirement Systems, the Executive Director shall report in writing to each new Trustee whether the new Trustee has complied with the requirements of this Program. The report shall include the number of credit hours earned and any remaining credit hours that need to be earned to fulfill the requirements of this Program.

Chapter 4
Annual Required Training

1) For every Education Year, Trustees shall complete a minimum of twelve (12) hours of Trustee Education Activities. [Note: The eight (8) hours of New Trustee Orientation Program credit shall be applied to the annual Trustee twelve (12) hour requirement.]

2) The Executive Director shall make available Trustee Education Activities and may approve other education activities for fulfilling the requirements of this Program.

3) Each Trustee attending an Approved Activity shall certify to the Executive Director that the Trustee attended the Approved Activity and the total number of hours earned. The Executive Director will provide a certification form.

4) Certification of completion of Approved Education Activities must be received by the Executive Director not later than sixty (60) days after completion of the Approved Activity; provided that for Approved Activities completed during a Trustee's Education Year that began on or after November 1, 2016, and not previously submitted or approved by the Executive Director, may be submitted for approval not later than sixty (60) days after November 1, 2017. A certification of completion form received more than sixty (60) days after the required deadline will not be approved.

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5) If a Trustee fails to complete the annual required training the retirement system shall withhold payment of all per diems and travel expenses due to the Trustee (or which subsequently may come due) until such time as the Trustee completes the annual required training.

6) The Executive Director shall maintain a record of all Trustee Education Activities attended by each Trustee. At the end of each Trustee's Education Year, the Executive Director shall report in writing to each Trustee the number of credit hours earned by the Trustee during the Education Year.

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* * * * *

This is to confirm that, in accordance with the provisions of KRS 61.645(18), the Board of Trustees of Kentucky Retirement Systems adopted the Kentucky Retirement Systems Trustees Education Program at its meeting held on December 7, 2017.

____
John Farris, Chair
Board of Trustees of Kentucky Retirement Systems

____
David Eager, Interim Executive Director
Kentucky Retirement Systems

Attest: ______________________________
Alane Foley, Recording Secretary

KENTUCKY RETIREMENT SYSTEMS
INVESTMENTS

To: KRS Board of Trustees

From: Richard Robben, Interim Executive Director of Investments

Date: December 7th , 2017

Subject: Summary of Investment Committee Activity

New Investments

At the direction of the Investment Committee, KRS established an investment in an Indexed Collective Trust Fund offered by Blackrock earlier in 2017. This fund is used to provide “beta” exposure to intermediate-term US corporate credit risk in a very cost effective fashion. While we had every intention of using this Blackrock fund exclusively going forward, we realized that due to a statutory limitation of 15% on the amount of KRS assets any one investment manager can hold, we could not make any new deposits to this vehicle. In order to find another provider of the same exposure, staff worked with Wilshire to identify potential alternatives. Collective trusts generally provide the lowest cost way to access the desired risk, and 3 of the largest providers in the space are Blackrock, State Street Global Advisors, and BNY Mellon Asset Management. A Request for Quotation was sent to both State Street and BNY Mellon requesting pricing, liquidity terms of their vehicles, and estimated time to establish the account. At the November 13th meeting, the Investment Committee approved an investment in the BNY Mellon Asset Management EB Intermediate Credit Bond Index Fund. The quoted fee for a $300MM deposit was 2.8bps per annum. Staff made the initial deposit of $300MM to this fund on November 30th, 2017.

Wilshire Integration

Staff has been actively engaged with our new investment consultant, Wilshire, as they collect data and begin to assess the portfolios. Once the contract for services was executed with Wilshire in early October, staff began the process of notifying all of our investment managers of the change in consultants. At the same time, Wilshire began to reach out to our managers to gather historical fund data. Our Director of Real Return and Real Estate, Mr. Andy Kiehl, met with Wilshire in their Pittsburgh office to introduce Mr. Ed Schwartz from ORG to the Wilshire Real Estate team and review our real estate investments. On November 3rd, Staff held an initial conference call with Wilshire to learn about their Investment Structure review process. This is the process Wilshire uses to evaluate the mandates within each asset class and determine the optimal mix of managers and strategies. We expect to begin work on this project shortly, starting with our Absolute Return portfolio and managers, then moving on to our Public Equity managers.

At the November meeting, the Investment Committee asked staff and Wilshire to begin a review of each individual plan’s performance benchmark, and the benchmarks for the overall Pension and Insurance funds. Wilshire provided a presentation to the IC explaining the process they use to construct appropriate benchmarks for their clients, and staff identified several concerns for Wilshire to address in their review. This project is expected to be completed during the first quarter of 2018.

Senate Bill 2 Implementation

At the November meeting, the Investment Committee received a presentation from staff on the implementation of Senate Bill 2. This bill, passed in March of this year, placed several new requirements upon KRS and our investment managers. To date, we have posted investment contracts from 32 different managers, the majority of those within the Equity and Fixed Income public securities sectors. Our roster of managers in those 2 sectors are now fully compliant with SB2.

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At the beginning of October 2017, we began to reach out to our Real Estate and Real Return managers. To date, we have contacted all 25 of our external managers in these sectors. 11 managers have expressed concern with the SB2 requirement to adhere to CFA Codes of Conduct and Ethics. KRS' investment with each of these managers is part of a commingled vehicle, and the managers have expressed concern that the CFA guidelines may be inconsistent with the standards of care imbedded in the investment funds, and that adherence to the CFA Codes for KRS alone would be unworkable for the manager of a fund with multiple investors. We have also encountered one manager who is claiming that the entirety of the investment contract is proprietary and a trade secret, and is requesting that we do not post. Staff has been discussing the situation with internal counsel, and we are working to refine our approach going forward as we contact our Private Equity and Absolute Return managers; we anticipate significant issues with the implementation of SB2 among these managers because of the private nature of the investments.

Asset Class	Number of Managers	Number of Funds	Managers Contacted	Documents Posted	CFA Code Acknowledgement	Object to CFA Codes
Public Equity	11	11	11	11	11	0
Fixed Income	8	8	8	8	8	0
Private Equity	39	67	2	0	0	0
Real Estate	12	16	12	16	4	8
Real Return	9	11	9	10	8	2
Absolute Return	27	27	2	0	0	1

For all new investments, KRS has developed a list of "Gating Items" that is presented to any prospective manager prior to formal discussions. This spells out the requirements of SB2 as it relates to posting of investment contracts on our website, as well as the required acknowledgement of the CFA codes of conduct. Prospective managers are encouraged to have their counsel review this list so that they understand what will be required of them. To date, we have had one instance where a potential manager couldn't get comfortable with the new requirements, and declined to work with KRS on that particular mandate.

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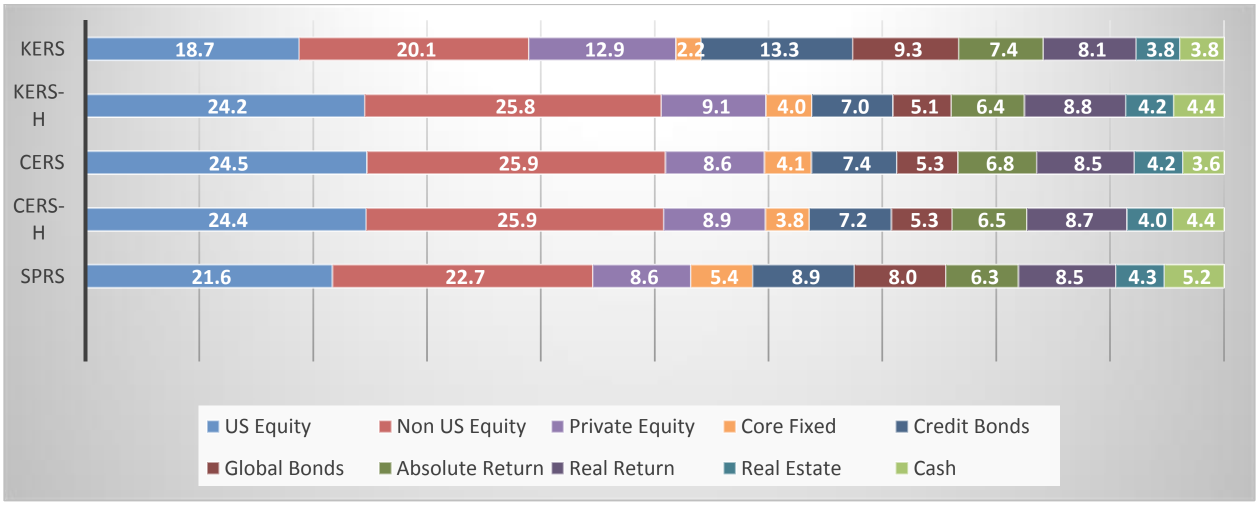
Performance & Allocations

Both Pension and Insurance plans have posted positive performance for the current fiscal year. Through the end of October, 2017 the returns for the plans are as follows:

PENSION (Net of Fees)					
	Oct-17	FYTD	1Yr	3Yr	5Yr
Total Pension Fund	**0.90%**	**4.71%**	**15.42%**	**6.65%**	**8.15%**
Benchmark	**1.11%**	**4.89%**	**15.50%**	**6.89%**	**8.48%**
	-0.21%	**-0.18%**	**-0.08%**	**-0.24%**	**-0.33%**
KERS	0.75%	4.23%	13.50%	6.00%	7.82%
Benchmark	0.96%	4.45%	13.71%	6.53%	8.21%
	-0.21%	**-0.22%**	**-0.21%**	**-0.53%**	**-0.39%**
KERS-HAZ	0.92%	4.78%	15.71%	6.76%	8.21%
Benchmark	1.15%	5.10%	16.02%	6.76%	8.42%
	-0.23%	**-0.32%**	**-0.31%**	**0.00%**	**-0.21%**
CERS	0.93%	4.81%	15.86%	6.78%	8.21%
Benchmark	1.15%	5.10%	16.07%	6.74%	8.41%
	-0.22%	**-0.29%**	**-0.21%**	**0.04%**	**-0.20%**
CERS-HAZ	0.93%	4.80%	15.78%	6.81%	8.22%
Benchmark	1.15%	5.10%	16.05%	6.74%	8.41%
	-0.22%	**-0.30%**	**-0.27%**	**0.07%**	**-0.19%**
SPRS	0.82%	4.37%	14.40%	5.83%	7.67%
Benchmark	1.02%	4.68%	14.66%	6.41%	8.19%
	-0.20%	**-0.31%**	**-0.26%**	**-0.58%**	**-0.52%**



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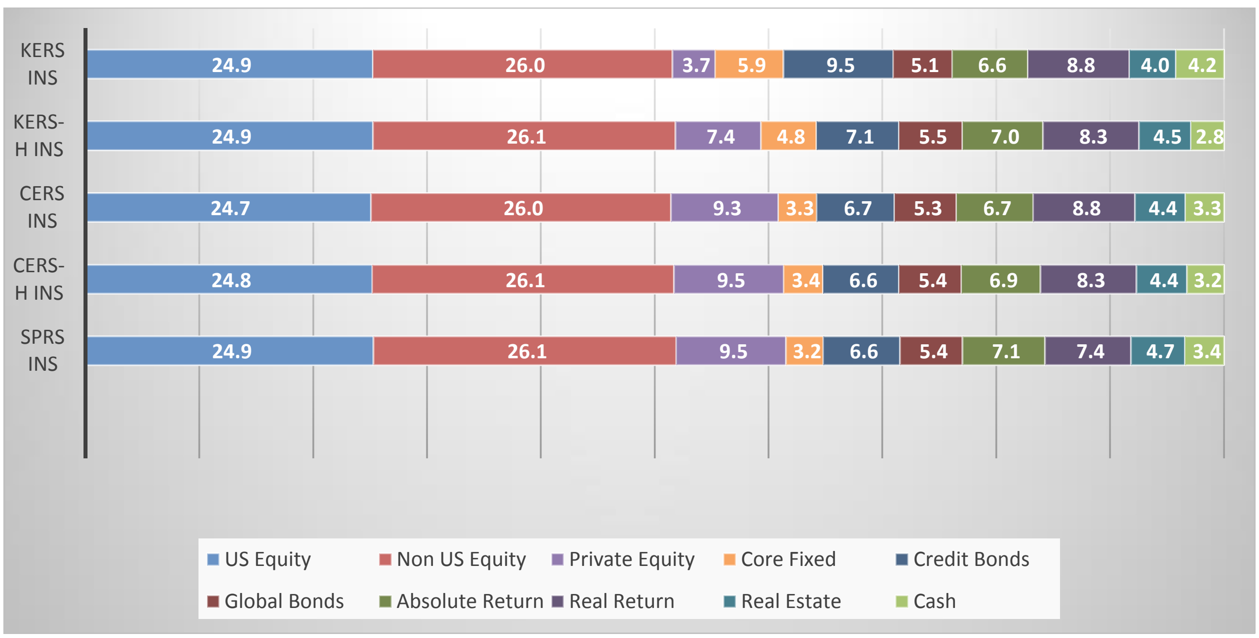
INSURANCE (Net of Fees)

	Oct-17	FYTD	1Yr	3Yr	5Yr
Total Insurance Fund	**0.95%**	**4.83%**	**15.91%**	**6.90%**	**8.01%**
Benchmark	1.16%	5.05%	16.00%	7.23%	8.68%
	-0.21%	**-0.22%**	**-0.09%**	**-0.33%**	**-0.67%**
KERS-INS	0.98%	4.67%	15.76%	6.58%	7.71%
Benchmark	1.16%	5.12%	16.37%	6.87%	8.46%
	-0.18%	**-0.45%**	**-0.61%**	**-0.29%**	**-0.75%**
KERSH-INS	0.96%	4.80%	15.96%	6.83%	8.02%
Benchmark	1.16%	5.13%	16.24%	6.93%	8.50%
	-0.20%	**-0.33%**	**-0.28%**	**-0.10%**	**-0.48%**
CERS-INS	0.95%	4.84%	15.90%	6.94%	8.06%
Benchmark	1.16%	5.13%	16.14%	6.97%	8.53%
	-0.21%	**-0.29%**	**-0.24%**	**-0.03%**	**-0.47%**
CERSH-INS	0.95%	4.86%	15.94%	7.00%	8.09%
Benchmark	1.16%	5.13%	16.14%	6.97%	8.53%
	-0.21%	**-0.27%**	**-0.20%**	**0.03%**	**-0.44%**
SPRS-INS	0.95%	4.87%	15.94%	6.96%	8.07%
Benchmark	1.16%	5.13%	16.13%	6.99%	8.54%
	-0.21%	**-0.26%**	**-0.19%**	**-0.03%**	**-0.47%**



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KENTUCKY RETIREMENT SYSTEMS

David L. Eager, Interim Executive Director
Perimeter Park West • 1260 Louisville Road • Frankfort, Kentucky 40601
kyret.ky.gov • Phone: 502-696-8800 • Fax: 502-696-8822

To: Board of Trustees of Kentucky Retirement Systems,
David L. Eager, Interim Executive Director

From: Joseph P. Bowman, Special Detail General Counsel

Re: Administrative Regulation 105 KAR 1:140

Date: December 7th, 2017

****

Dear Trustees:

The Legal Division previously provided you a draft version of amended regulation 105 KAR 1:140. Changes were required as a result of passage of Senate Bill 104 during the 2017 regular session of the Kentucky General Assembly. Examples include, but are not limited to, an exemption to pension spikes because of unpaid leave and an exemption to pension spikes for overtime earned attributable to a state of emergency.

As with the prior version of the regulation, it is necessary to file this amended regulation under the "emergency" classification in KRS 13A.190 to give immediate effect commensurate with the relevant retirement date provided in the amended statute (January 1, 2018). It shall later be replaced by an ordinary amendment to the regulation.

Upon your voting approval today, Kentucky Retirement Systems will file the amended regulation with LRC on or before December 15, 2017. Please let me know if I can answer any questions.

Thank you.

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Kentucky Retirement Systems

KRS RETIREMENT TRENDS

10

INITIAL RETIREMENTS FISCAL YEAR 2014 (*JULY 1 – JUNE 30*)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
KERS	233	497	196	173	152	129	254	137	147	150	155	145	**2,368**
CERS	675	609	333	311	273	226	478	225	242	237	239	305	**4,153**
SPRS	1	42	4	6	6	5	3	3	-	2	1	1	**74**
TOTAL	**909**	**1,148**	**533**	**490**	**431**	**360**	**735**	**365**	**389**	**389**	**395**	**451**	**6,595**

INITIAL RETIREMENTS FISCAL YEAR 2015 (*JULY 1 – JUNE 30*)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
KERS	226	483	206	176	159	144	289	133	102	145	142	144	**2,349**
CERS	942	591	349	320	277	216	691	284	232	234	264	332	**4,732**
SPRS	1	30	2	4	3	3	5	1	-	1	1	3	**54**
TOTAL	**1,169**	**1,104**	**557**	**500**	**439**	**363**	**985**	**418**	**334**	**380**	**407**	**479**	**7,135**

INITIAL RETIREMENTS FISCAL YEAR 2016 (*JULY 1 – JUNE 30*)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
KERS	195	512	192	168	131	134	294	136	127	138	144	152	**2,323**
CERS	875	764	341	341	267	213	520	261	243	272	223	423	**4,743**
SPRS	-	31	5	5	2	1	3	1	1	-	1	-	**50**
TOTAL	**1,070**	**1,307**	**538**	**514**	**400**	**348**	**817**	**398**	**371**	**410**	**368**	**575**	**7,116**

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INITIAL RETIREMENTS FISCAL YEAR 2017

JULY 1 – JUNE 30

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
KERS	172	571	183	160	151	135	266	153	141	151	119	490	**2,692**
CERS	785	719	355	389	296	237	550	278	250	260	198	146	**4,463**
SPRS	-	8	5	2	4	1	3	4	1	-	1	-	**29**
TOTAL	**957**	**1,298**	**543**	**551**	**451**	**373**	**819**	**435**	**392**	**411**	**318**	**636**	**7,183**

INITIAL RETIREMENTS FISCAL YEAR 2018

JULY 1 – JUNE 30

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
KERS	160	686	279	261	209								**1,386**
CERS	806	719	461	411	369								**2,397**
SPRS	-	37	6	5	5								**48**
TOTAL	**966**	**1,442**	**746**	**677**	**583**								**4,414**

NOTE: Monthly total reflect the number of members who received their first retirement payment in the given month.

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WHEREAS, the retirement benefits have been set forth and promised to current and retired employees in KERS, CERS and SPRS on the day they began work and cannot be amended thereafter, thus constituting an inviolable contract between the Commonwealth of Kentucky and the employees and retirees; and

WHEREAS, the state has a legal, moral and ethical obligation to keep the promises made to employees and retirees regarding their retirement benefits;

NOW, THEREFORE, BE IT RESOLVED by the Kentucky Retirement Systems Board of Trustees that we urge Governor Matt Bevin and the Kentucky General Assembly to, first and foremost, honor and fulfill the retirement benefits promised as part of the inviolable contracts to all public employees in all retirement systems in the Commonwealth of Kentucky; and

BE IT FURTHER RESOLVED by the Kentucky Retirement Systems Board of Trustees that we urge Governor Matt Bevin and the Kentucky General Assembly to fund KERS and SPRS going forward at the actuarially determined required levels.

Done this the 14th day of September 2017.

____

John Farris, Chair

Kentucky Retirement Systems Board of Trustees