# State Police Retirement System (SPRS)

## Actuarial Valuation Report
## as of June 30, 2022

P: 469.524.0000 | www.grsconsulting.com

December 1, 2022

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

**Subject: Actuarial Valuation as of June 30, 2022**

Dear Trustees of the Board:

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

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

#### FINANCING OBJECTIVES AND FUNDING POLICY

The employer contribution rate is determined in accordance with Section 61.565 of Kentucky Statute. As specified by the Statute, the employer contribution is comprised of a normal cost contribution and an actuarial accrued liability contribution. The actuarial accrued liability contribution is calculated by amortizing the unfunded accrued liability as of June 30, 2019 over a closed 30-year amortization period (27 years remaining as of June 30, 2022). Gains and losses incurring in years after June 30, 2019 are amortized as separate closed 20-year amortization bases.

### ASSUMPTIONS AND METHODS

The Board of Trustees, in consultation with the actuary, sets the actuarial assumptions and methods used in the actuarial valuation. Except where noted in this report, the assumptions used in this actuarial valuation were the same as the prior year and are based on an experience study conducted with experience through June 30, 2018.

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

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

### BENEFIT PROVISIONS

The benefit provisions reflected in these valuations are those which were in effect on June 30, 2022. Senate Bill 209 passed during the 2022 legislative session and provided increased retiree medical benefits for members hired after July 1, 2003 that meet certain eligibility requirements at retirement.

House Bill 259 was also passed during the 2022 legislative session and provides that at each June 30, Tier 3 members with at least five years of service credit will receive a pay credit based on their unused sick leave in excess of 480 hours. This legislation also provides an employer pay credit based on the member's balance of unused sick leave at their time of termination of employment. There were no other material benefit provision changes since the prior valuation.

### DATA

Member data for retired, active and inactive members was supplied as of June 30, 2022, by KPPA staff. The staff also supplied asset information as of June 30, 2022. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent with the prior year's data. GRS is not responsible for the accuracy or completeness of the information provided to us by KPPA.

**CERTIFICATION**

We certify that the information presented herein is accurate and fairly portrays the actuarial position of SPRS as of June 30, 2022.

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

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

Sincerely,

**Gabriel, Roeder, Smith & Company**

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

Janie Shaw, ASA, EA, MAAA
Consultant

# Table of Contents

# SECTION 1

## EXECUTIVE SUMMARY

## Summary of Principal Results

**(Dollar amounts expressed in thousands)**

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

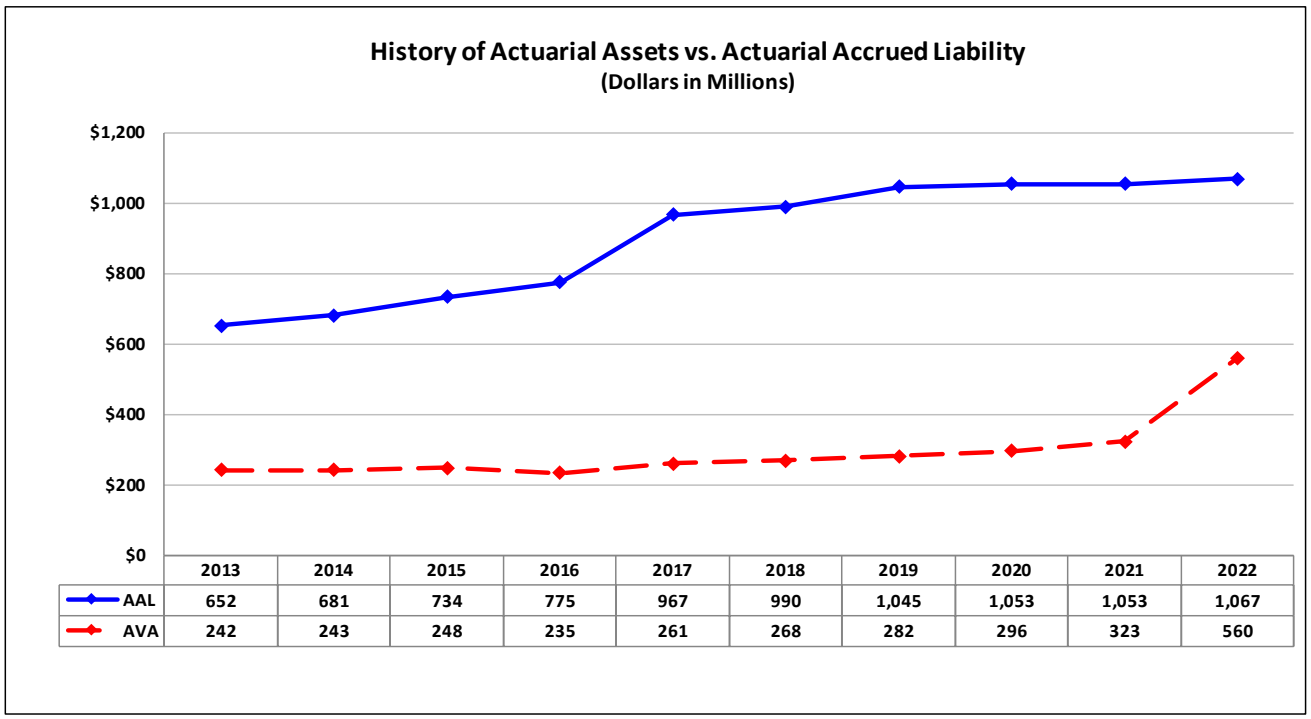
[1] Contribution rates calculated with the June 30, 2021 valuation are effective for fiscal years ending June 30, 2023 and June 30 2024.

# Executive Summary (Continued)

**Retirement Fund**

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

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




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

**Insurance Fund**

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

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

# SECTION 2

## DISCUSSION

# Discussion

The State Police Retirement System (SPRS) is a defined benefit pension plan that provides coverage for uniformed state police officers. SPRS includes hazardous duty benefits only. This report presents the results of the June 30, 2022 actuarial funding valuation for both the Retirement Fund and Insurance Fund.

The primary purposes of the valuation report are to describe the current actuarial condition of SPRS, analyze changes in SPRS's financial condition, and provides various summaries of the data.

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

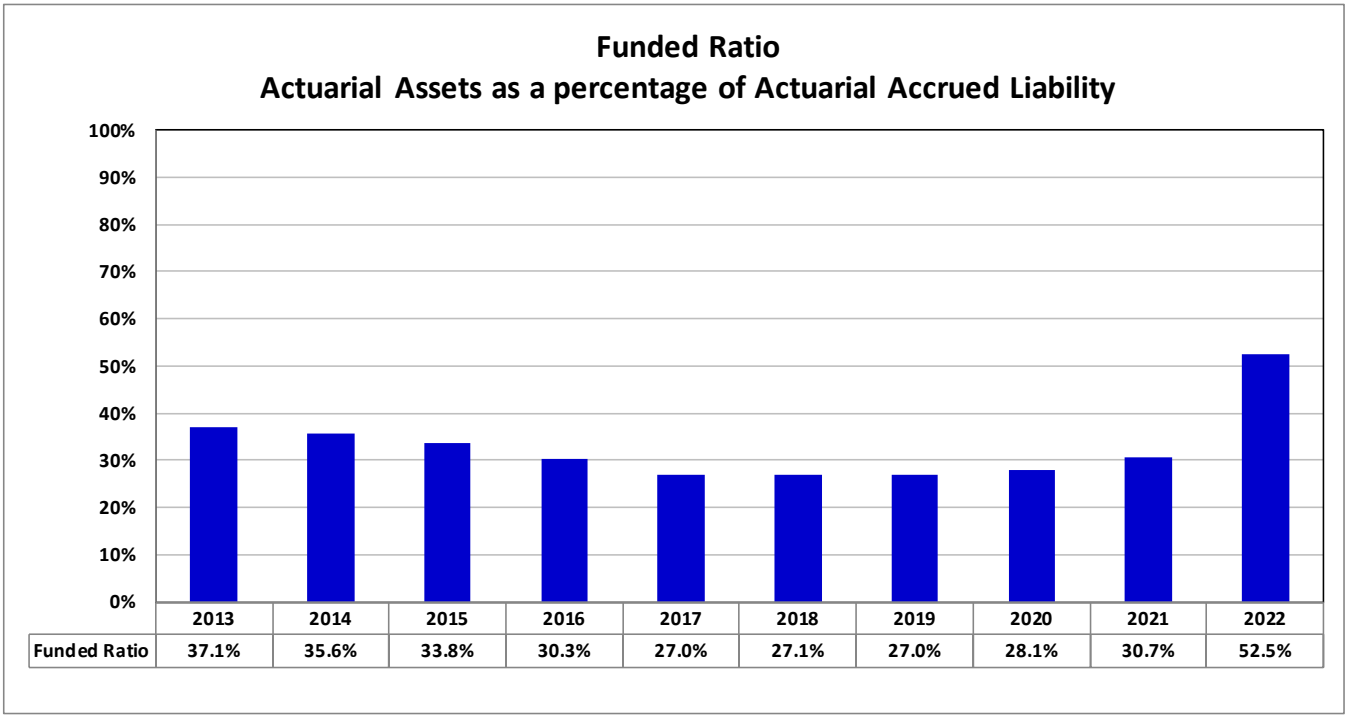
All of the actuarial and financial tables referenced by the other sections of this Report appear in Section 3. Section 4 provides additional details related to the calculation of the amortization of the unfunded actuarial accrued liability. Section 5 provides member data and statistical information.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

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

# Funding Progress

The following chart provides a ten-year history of the retirement fund's funded ratio (i.e. the Actuarial Value of Assets divided by the Actuarial Accrued Liability). The significant increase in the funded ratio from 2021 to 2022 is due to a $215 million appropriation made by the Commonwealth in fiscal year 2022.

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




| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| Funded Ratio | 37.1% | 35.6% | 33.8% | 30.3% | 27.0% | 27.1% | 27.0% | 28.1% | 30.7% | 52.5% |

# Asset Gains/ (Losses)

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

**Retirement Fund**

The actuarial value of assets for the retirement fund increased from $323 million to $560 million since the prior valuation, primarily due to a $215 million appropriation during the year. The rate of return on the market value of assets on a dollar-weighted basis for the prior fiscal year was -4.7% which is less than the 5.25% expected annual return. The return on an actuarial (smoothed) asset value was 5.9%, which resulted in a $2.2 million gain for the fiscal year. This difference in the estimated return on market value and actuarial value illustrates the smoothing effect of the asset valuation method. The market value of assets is $8 million less than the actuarial value of assets, which signifies that the retirement fund is in a position of net deferred investment losses to be realized in future years.

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

# Actuarial Gains/ (Losses)

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

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

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

| | Retirement | Insurance |
|---|---|---|
| A. Calculation of total actuarial gain or loss | | |
| 1. Unfunded actuarial accrued liability (UAAL), previous year | $ 730,009 | $ 49,155 |
| 2. Normal cost and administrative expenses | 12,060 | 3,423 |
| 3. Less: contributions for the year | (282,114) | (9,012) |
| 4. Interest accrual | 36,880 | 2,898 |
| 5. Expected UAAL (Sum of Items 1 - 4) | $ 496,835 | $ 46,464 |
| 6. Actual UAAL as of June 30,2022 | $ 507,474 | $ (1,441) |
| 7. Total gain (loss) for the year (Item 5 - Item 6) | $ (10,639) | $ 47,905 |
| B. Source of gains and losses | | |
| 8. Asset gain (loss) for the year | $ 2,248 | $ 2,426 |
| 9. Liability experience gain (loss) for the year | (9,779) | 49,856 |
| 10. Plan Change | (3,108) | (4,377) |
| 11. Assumption change | — | — |
| 12. Total | $ (10,639) | $ 47,905 |

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

# Actuarial Assumptions and Methods

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

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

In conjunction with the review of the healthcare per capita claims cost, the assumed increase in future healthcare costs, or trend assumption, is reviewed on an annual basis. The trend assumption was increased during the select period in this valuation as a result of our review. All other assumptions were adopted by the Board and are based on an experience study conducted based on experience through June 30, 2018.

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

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

# Benefit Provisions

Appendix B of this report includes a summary of the major benefit provisions for System. The following is a summary of two material changes in benefits enacted since the last actuarial valuation.

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

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

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

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

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

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

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

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

# SECTION 3

## ACTUARIAL TABLES

# Actuarial Tables

## Development of Unfunded Actuarial Accrued Liability

**(Dollar amounts expressed in thousands)**

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

## Actuarial Present Value of Future Benefits

**(Dollar amounts expressed in thousands)**

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

## Development of Actuarially Determined Contribution Rate

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

# Actuarial Balance Sheet

## Retirement Benefits

### (Dollar amounts expressed in thousands)

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

# Actuarial Balance Sheet

## Insurance Benefits

**(Dollar amounts expressed in thousands)**

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

## Reconciliation of Net Assets

**(Dollar amounts expressed in thousands)[1]**

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

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

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

# Development of Actuarial Value of Assets

## Retirement Benefits

**(Dollar amounts expressed in thousands)***

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

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

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

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

* Amounts may not add due to rounding

# Development of Actuarial Value of Assets

## Insurance Benefits

**(Dollar amounts expressed in thousands)***

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

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

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

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

* Amounts may not add due to rounding

## Schedule of Funding Progress

**(Dollar amounts expressed in thousands)**

| June 30, | 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) |
| | | | **Retirement** | | | |
| 2013 | $ 241,800 | $ 651,581 | $ 409,781 | 37.1% | $ 45,256 | 905.5% |
| 2014 | 242,742 | 681,118 | 438,376 | 35.6% | 44,616 | 982.6% |
| 2015 | 248,388 | 734,156 | 485,768 | 33.8% | 45,765 | 1061.4% |
| 2016 | 234,568 | 775,160 | 540,592 | 30.3% | 45,551 | 1186.8% |
| 2017 | 261,320 | 967,145 | 705,825 | 27.0% | 48,598 | 1452.4% |
| 2018 | 268,259 | 989,528 | 721,269 | 27.1% | 48,808 | 1477.8% |
| 2019 | 282,162 | 1,045,318 | 763,156 | 27.0% | 47,752 | 1598.2% |
| 2020 | 296,126 | 1,053,158 | 757,032 | 28.1% | 46,145 | 1640.6% |
| 2021 | 323,250 | 1,053,259 | 730,009 | 30.7% | 45,338 | 1610.1% |
| 2022 | 559,973 | 1,067,447 | 507,474 | 52.5% | 47,885 | 1059.8% |
| | | | **Insurance** | | | |
| 2013 | $ 136,321 | $ 222,327 | $ 86,006 | 61.3% | $ 45,256 | 190.0% |
| 2014 | 155,595 | 234,271 | 78,676 | 66.4% | 44,616 | 176.3% |
| 2015 | 167,775 | 254,839 | 87,064 | 65.8% | 45,765 | 190.2% |
| 2016 | 172,704 | 257,197 | 84,493 | 67.1% | 45,551 | 185.5% |
| 2017 | 180,464 | 276,641 | 96,177 | 65.2% | 48,598 | 197.9% |
| 2018 | 187,535 | 262,088 | 74,553 | 71.6% | 48,808 | 152.7% |
| 2019 | 197,395 | 276,809 | 79,414 | 71.3% | 47,752 | 166.3% |
| 2020 | 207,018 | 276,144 | 69,126 | 75.0% | 46,145 | 149.8% |
| 2021 | 223,251 | 272,406 | 49,155 | 82.0% | 45,338 | 108.4% |
| 2022 | 234,239 | 232,798 | (1,441) | 100.6% | 47,885 | -3.0% |

## Summary of Principal Assumptions and Methods

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

| | |
|---|---|
| Valuation date: | June 30, 2022 |
| Actuarial cost method: | Entry Age Normal |
| Amortization method: | Level percentage of payroll<br>(0% payroll growth assumed) |
| Amortization period for contribution rate: | 30-year closed period at June 30, 2019<br>Gains/losses incurring after 2019<br>will be amortized over separate closed<br>20-year amortization bases |
| Asset valuation method: | 5-Year Smoothed Market |
| Actuarial assumptions: | |
| Investment rate of return, retirement | 5.25% |
| Investment rate of return, insurance | 6.25% |
| Projected salary increases | 3.55% to 16.05% (varies by service) |
| Inflation | 2.30% |
| Post-retirement pension benefit adjustments | 0.00% |
| Retiree Mortality | System-specific mortality table<br>based on mortality experience<br>from 2013-2018, projected<br>with the ultimate rates from<br>MP-2014 mortality improvement<br>scale using a base year of 2019. |

# Solvency Test

**(Dollar amounts expressed in thousands)**

| June 30, | Actuarial Accrued Liability: Active Member Contributions | Actuarial Accrued Liability: Retired Members & Beneficiaries | Actuarial Accrued Liability: Active Members (Employer Financed) | Valuation Assets | Portion of Aggregate Accrued Liabilities Covered by Assets: Active | Portion of Aggregate Accrued Liabilities Covered by Assets: Retired | Portion of Aggregate Accrued Liabilities Covered by Assets: ER Financed |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **Retirement** | | | | | | | |
| 2013 | $ 39,788 | $ 535,720 | $ 76,072 | $ 241,800 | 100.0% | 37.7% | 0.0% |
| 2014 | 41,831 | 563,011 | 76,276 | 242,742 | 100.0% | 35.7% | 0.0% |
| 2015 | 41,567 | 605,855 | 86,734 | 248,388 | 100.0% | 34.1% | 0.0% |
| 2016 | 41,871 | 636,499 | 96,791 | 234,568 | 100.0% | 30.3% | 0.0% |
| 2017 | 44,798 | 773,982 | 148,365 | 261,320 | 100.0% | 28.0% | 0.0% |
| 2018 | 43,835 | 800,788 | 144,905 | 268,259 | 100.0% | 28.0% | 0.0% |
| 2019 | 41,948 | 848,397 | 154,973 | 282,162 | 100.0% | 28.3% | 0.0% |
| 2020 | 40,831 | 863,580 | 148,747 | 296,126 | 100.0% | 29.6% | 0.0% |
| 2021 | 42,035 | 860,801 | 150,423 | 323,250 | 100.0% | 32.7% | 0.0% |
| 2022 | 42,027 | 870,200 | 155,220 | 559,973 | 100.0% | 59.5% | 0.0% |
| **Insurance** | | | | | | | |
| 2013 | $ - | $ 139,509 | $ 82,818 | $ 136,321 | 100.0% | 97.7% | 0.0% |
| 2014 | - | 143,402 | 90,869 | 155,595 | 100.0% | 100.0% | 13.4% |
| 2015 | - | 170,447 | 84,392 | 167,775 | 100.0% | 98.4% | 0.0% |
| 2016 | - | 177,094 | 80,103 | 172,704 | 100.0% | 97.5% | 0.0% |
| 2017 | - | 186,390 | 90,251 | 180,464 | 100.0% | 96.8% | 0.0% |
| 2018 | - | 183,151 | 78,937 | 187,535 | 100.0% | 100.0% | 5.6% |
| 2019 | - | 199,959 | 76,850 | 197,395 | 100.0% | 98.7% | 0.0% |
| 2020 | - | 207,638 | 68,506 | 207,018 | 100.0% | 99.7% | 0.0% |
| 2021 | - | 206,707 | 65,699 | 223,251 | 100.0% | 100.0% | 25.2% |
| 2022 | - | 172,664 | 60,134 | 234,239 | 100.0% | 100.0% | 100.0% |

# SECTION 4

## AMORTIZATION BASES

# Amortization of Unfunded Liability

**Retirement**

| Valuation Year Base Established | Original Amortization Base | Remaining at June 30, 2022 | Payments for FYE 2024 | Funding Period at June 30, 2022 |
|---|---|---|---|---|
| June 30, 2019 | $ 763,156 | $ 729,480 | $ 49,853 | 27 |
| June 30, 2020 | 3,748 | 4,942 | 420 | 18 |
| June 30, 2021 | (231,783) | (243,256) | (20,021) | 19 |
| June 30, 2022 | 16,308 | 16,308 | 1,305 | 20 |
| Total | | $ 507,474 | $ 31,557 | |
| Projected Payroll for FYE 2024 | | | $ 47,885 | |
| Amortization Payments as a Percentage of Payroll | | | 65.90% | |

**Insurance**

| Valuation Year Base Established | Original Amortization Base | Remaining at June 30, 2022 | Payments for FYE 2024 | Funding Period at June 30, 2022 |
|---|---|---|---|---|
| June 30, 2019 | $ 79,414 | $ 73,008 | $ 5,496 | 27 |
| June 30, 2020 | (5,896) | (6,259) | (571) | 18 |
| June 30, 2021 | (18,445) | (19,654) | (1,742) | 19 |
| June 30, 2022 | (48,536) | (48,536) | (4,606) | 20 |
| Total | | $ (1,441) | $ (1,423) | |
| Projected Payroll for FYE 2024 | | | $ 47,820 | |
| Amortization Payments as a Percentage of Payroll | | | -2.98% | |

Note:
Budgeted contribution rates for FYE 2023 were known at the time of the June 30, 2022 Valuation.
Amortization bases established at this valuation date were adjusted accordingly.

# SECTION 5

## MEMBERSHIP INFORMATION

# Membership Tables

## Summary of Membership Data

**(Total dollar amounts expressed in thousands)**

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

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

2 Average dollar amounts shown are expressed to the dollar.

## Summary of Historical Active Membership

| | 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) |
| 2013 | 902 | | $ 45,256 | | $ 50,173 | |
| 2014 | 855 | -5.2% | 44,616 | -1.4% | 52,182 | 4.0% |
| 2015 | 937 | 9.6% | 45,765 | 2.6% | 48,842 | -6.4% |
| 2016 | 908 | -3.1% | 45,551 | -0.5% | 50,167 | 2.7% |
| 2017 | 903 | -0.6% | 48,598 | 6.7% | 53,819 | 7.3% |
| 2018 | 886 | -1.9% | 48,808 | 0.4% | 55,088 | 2.4% |
| 2019 | 883 | -0.3% | 47,752 | -2.2% | 54,079 | -1.8% |
| 2020 | 798 | -9.6% | 46,145 | -3.4% | 57,826 | 6.9% |
| 2021 | 775 | -2.9% | 45,338 | -1.7% | 58,501 | 1.2% |
| 2022 | 844 | 8.9% | 47,885 | 5.6% | 56,736 | -3.0% |

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

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

**SPRS Members**

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

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

| | Retirement | | Disability | | Survivors & Beneficiaries | | Total | |
|---|---|---|---|---|---|---|---|---|
| Current Age | Number of Annuitants | Total Annual Benefit Amount | Number of Annuitants | Total Annual Benefit Amount | Number of Annuitants | Total Annual Benefit Amount | Number of Annuitants | Total Annual Benefit Amount |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Under 50 | 156 | $ 5,805 | 16 | $ 262 | 34 | $ 507 | 206 | $ 6,574 |
| 50 - 54 | 226 | 9,128 | 9 | 194 | 13 | 263 | 248 | 9,585 |
| 55 - 59 | 187 | 7,381 | 7 | 120 | 7 | 160 | 201 | 7,661 |
| 60 - 64 | 165 | 6,815 | 5 | 79 | 19 | 529 | 189 | 7,424 |
| 65 - 69 | 191 | 7,960 | 9 | 111 | 25 | 639 | 225 | 8,710 |
| 70 - 74 | 251 | 9,976 | 4 | 73 | 49 | 1,660 | 304 | 11,710 |
| 75 - 79 | 129 | 5,186 | 4 | 66 | 47 | 1,476 | 180 | 6,728 |
| 80 - 84 | 65 | 2,213 | 1 | 24 | 20 | 685 | 86 | 2,921 |
| 85 - 89 | 20 | 711 | 0 | 0 | 23 | 865 | 43 | 1,576 |
| 90 And Over | 7 | 374 | 0 | 0 | 13 | 517 | 20 | 891 |
| **Total** | **1,397** | **$ 55,549** | **55** | **$ 929** | **250** | **$ 7,302** | **1,702** | **$ 63,780** |

*Amounts may not add due to rounding

## Retired Lives Summary

| Form of Payment | Male Lives Number | Male Lives Monthly Benefit Amount | Female Lives Number | Female Lives Monthly Benefit Amount | Total Number | Total Monthly Benefit Amount |
|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Basic | 162 | $ 487,713 | 17 | $ 42,925 | 179 | $ 530,638 |
| Joint & Survivor: | | | | | | |
| 100% to Beneficiary | 184 | 545,285 | 2 | 9,093 | 186 | 554,378 |
| 66 2/3% to Beneficiary | 93 | 342,990 | 2 | 7,542 | 95 | 350,532 |
| 50% to Beneficiary | 77 | 276,011 | 2 | 7,515 | 79 | 283,525 |
| Pop-up Option | 674 | 2,374,787 | 6 | 11,214 | 680 | 2,386,000 |
| Social Security Option: | | | | | | |
| Age 62 Basic | 24 | 61,477 | 0 | 0 | 24 | 61,477 |
| Age 62 Survivorship | 100 | 189,545 | 1 | 4,416 | 101 | 193,960 |
| Partial Deferred (Old Plan) | 0 | 0 | 0 | 0 | 0 | 0 |
| Widows Age 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 Years Certain | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 Years Certain | 8 | 26,954 | 0 | 0 | 8 | 26,954 |
| 10 Years Certain & Life | 37 | 124,977 | 3 | 6,759 | 40 | 131,736 |
| 15 Years Certain & Life | 17 | 46,210 | 2 | 9,579 | 19 | 55,789 |
| 20 Years Certain & Life | 39 | 127,530 | 2 | 3,979 | 41 | 131,509 |
| Total: | 1,415 | $ 4,603,477 | 37 | $ 103,021 | 1,452 | $ 4,706,499 |

## Beneficiary Lives Summary

| Form of Payment | Male Lives Number | Male Lives Monthly Benefit Amount | Female Lives Number | Female Lives Monthly Benefit Amount | Total Number | Total Monthly Benefit Amount |
|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Basic | 2 | $ 820 | 8 | $ 10,995 | 10 | $ 11,815 |
| Joint & Survivor: | | | | | | |
| 100% to Beneficiary | 8 | 12,812 | 63 | 179,193 | 71 | 192,005 |
| 66 2/3% to Beneficiary | 3 | 1,678 | 21 | 52,196 | 24 | 53,874 |
| 50% to Beneficiary | 1 | 989 | 21 | 33,803 | 22 | 34,793 |
| Pop-up Option | 2 | 843 | 60 | 183,265 | 62 | 184,108 |
| Social Security Option: | | | | | | |
| Age 62 Basic | 0 | 0 | 2 | 2,281 | 2 | 2,281 |
| Age 62 Survivorship | 2 | 934 | 47 | 99,112 | 49 | 100,047 |
| Partial Deferred (Old Plan) | 0 | 0 | 0 | 0 | 0 | 0 |
| Widows Age 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 Years Certain | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 Years Certain | 1 | 2,038 | 2 | 14,018 | 3 | 16,056 |
| 10 Years Certain & Life | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 Years Certain & Life | 0 | 0 | 1 | 721 | 1 | 721 |
| 20 Years Certain & Life | 1 | 6,686 | 5 | 6,092 | 6 | 12,777 |
| Total: | 20 | $ 26,801 | 230 | $ 581,676 | 250 | $ 608,477 |

## Schedule of Retirees Added to And Removed from Rolls

**(Dollar amounts except average allowance expressed in thousands)**

| Year Ended | Added to Rolls | Removed from Rolls | Rolls End of the Year | | % Increase in Annual Benefit | Average Annual Benefit |
|---|---|---|---|---|---|---|
| | Number | Number | Number | Annual Benefits | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| 2013 | 63 | 16 | 1,346 | $ 50,906 | | $ 37,820 |
| 2014 | 95 | 28 | 1,413 | 53,432 | 5.0% | 37,815 |
| 2015 | 62 | 15 | 1,460 | 54,930 | 2.8% | 37,624 |
| 2016 | 65 | 10 | 1,515 | 56,650 | 3.1% | 37,393 |
| 2017 | 30 | 9 | 1,536 | 57,253 | 1.1% | 37,274 |
| 2018 | 81 | 17 | 1,600 | 59,626 | 4.1% | 37,266 |
| 2019 | 74 | 27 | 1,647 | 61,404 | 3.0% | 37,282 |
| 2020 | 61 | 39 | 1,669 | 62,432 | 1.7% | 37,407 |
| 2021 | 55 | 51 | 1,673 | 62,700 | 0.4% | 37,477 |
| 2022 | 76 | 47 | 1,702 | 63,780 | 1.7% | 37,473 |

# SECTION 6

## ASSESSMENT AND DISCLOSURE OF RISK

# Risks Associated with Measuring the Accrued Liability And Actuarially Determined Contribution

**(As Required by ASOP No. 51)**

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

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

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

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

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

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

**Employer Risk with Contribution Rates**

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

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

**Plan Specific Risk Measures**

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

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

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

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

**SPRS**

| | Retirement Fund | | | | | Insurance Fund | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | June 30, | | | | | June 30, | | | | |
| | 2022 | 2021 | 2020 | 2019 | 2018 | 2022 | 2021 | 2020 | 2019 | 2018 |
| Ratio of the market value of assets to total payroll | 11.52 | 7.86 | 6.37 | 5.99 | 5.48 | 4.83 | 5.45 | 4.36 | 4.21 | 3.91 |
| Ratio of actuarial accrued liability to payroll | 22.29 | 23.23 | 22.82 | 21.89 | 20.27 | 4.86 | 6.01 | 5.98 | 5.80 | 5.37 |
| Ratio of net cash flow to market value of assets | 47.9% | 0.2% | 0.5% | 1.4% | -2.5% | -2.2% | -1.9% | -0.5% | -0.2% | -2.4% |
| Percentage of Expected Contribution Actually Received | 107% [1] | 104% | 103% | 101% | 101% | 107% [1] | 102% | 101% | 100% | 103% |
| Ratio of actives to retirees and beneficiaries | 0.50 | 0.46 | 0.48 | 0.54 | 0.55 | | | | | |

[1] Expected contribution for FYE2022 based on the actuarially determined contribution rate of 146.06% from the June 30, 2020 valuation and expected compensation based on census data from the June 30, 2021 valuation.

# APPENDIX A

## ACTUARIAL ASSUMPTIONS AND METHODS

# Summary of Actuarial Methods and Assumptions

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

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

*Investment return rate*:

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

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

*Price Inflation*:

Assumed annual rate of 2.30%

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

Assumed annual rate of 0.00%

*Rates of Annual Salary Increase:*

Assumed rates of annual salary increases are shown below.

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

*Retirement rates*:

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

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

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

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

*For members hired after 7/1/2003 and prior to 9/1/2008, the rates shown above are multiplied by 80% if the member is under the age of 55 to reflect the different retiree health insurance benefit.*

*Disability rates*:

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

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

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

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

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

*Mortality Assumption:*

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

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

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

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

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

*Marital status*:

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

*Line of Duty Disability*

70% of disabilities are assumed to occur in the line of duty (10% of which are assumed to be "total and permanent")

*Line of Duty Death*

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

*Dependent Children:*

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

*Form of Payment:*

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

*Actuarial Cost Method:*

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

*Health Care Age Related Morbidity/Claims Utilization:*

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

*Health Care Cost Trend Rates:*

| Year | Non-Medicare Plans[1] | Medicare Plans[1] | Dollar Contribution[2] |
|---|---|---|---|
| 2024 | 6.20% | 9.00% | 1.50% |
| 2025 | 6.10% | 8.50% | 1.50% |
| 2026 | 6.00% | 8.00% | 1.50% |
| 2027 | 5.80% | 8.00% | 1.50% |
| 2028 | 5.60% | 8.00% | 1.50% |
| 2029 | 5.40% | 7.50% | 1.50% |
| 2030 | 5.20% | 7.00% | 1.50% |
| 2031 | 5.00% | 6.50% | 1.50% |
| 2032 | 4.80% | 6.00% | 1.50% |
| 2033 | 4.60% | 5.50% | 1.50% |
| 2034 | 4.40% | 5.00% | 1.50% |
| 2035 | 4.20% | 4.50% | 1.50% |
| 2036 | 4.05% | 4.05% | 1.50% |
| 2037 & Beyond | 4.05% | 4.05% | 1.50% |

[1]All increases are assumed to occur on January 1. The 2023 premiums were known at the time of the valuation and were incorporated into the liability measurement
[2]Applies to members participating on or after July 1, 2003. All increases are assumed to occur on July 1.

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

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

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

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

*Health Care Participation Assumptions:*

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

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

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

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

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

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

[1] Includes Medicare Advantage Mirror Plans

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

- Deferred vested members are assumed to begin health coverage at age 50 for members participating before January 1, 2014 and at age 60 for members participating on or after January 1, 2014.

- 75% of future retirees, with hazardous service, are assumed to elect spouse health care coverage. 100% of spouses with health care coverage are assumed to continue coverage after the member's death.

*Other Assumptions*

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

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

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

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

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

6. There will be no recoveries once disabled.

7. Cash Balance Provisions: The cash balance interest crediting rate while a member is an active employee is assumed to equal 4.9375% (based upon the 5.25% assumed investment return). The interest crediting rate after a member terminates employment is 4%.

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

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

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

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

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

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

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

*Participant Data*

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

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

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

*Changes in assumptions since the prior valuation:*

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

2. In conjunction with the review of the healthcare per capita claims cost, the assumed increase in future healthcare costs, or trend assumption, is reviewed on an annual basis. The trend assumption was increased during the select period in this valuation as a result of our review.

## Development of Baseline Claims Cost

For non-Medicare retirees, the initial per capita costs were based on the plan premiums effective January 1, 2023, and are used for both current and future retirees. An inherent assumption in this methodology is that the projected future retirees will have a similar distribution by plan type as the current retirees. The spouse/dependent premium of $1,010.20 for non-Medicare retirees is based on a blending of Family and Couple premiums for the current retirees that have over 4 years of hazardous service. The fully-insured premiums paid to the Kentucky Employees' Health Plan (KEHP) are blended rates based on the combined experience of active and retired members. Because the average cost of providing health care benefits to retirees under age 65 is higher than the average cost of providing health care benefits to active employees, there is an implicit rate subsidy for the non-Medicare eligible retirees. Actuarial Standard of Practice No. 6 (ASOP No. 6) requires aging subsidies (or implicit rate subsidies) to be recognized. However, the health insurance trusts are only used to reimburse KEHP for the employer's portion of the blended premiums. Said another way, the trusts are not used to fund the difference between the underlying retiree claims and the blended KEHP premiums. As a result, the retiree health care liabilities developed in this report for the non-Medicare retirees are based solely on the premiums charged by KEHP, without any age-adjustment. GASB Statements No. 74 and No. 75 prohibit such a deviation from ASOP No. 6. The liabilities developed in this report are solely for the purpose of funding the benefits paid by the health insurance funds and are not appropriate for financial statement disclosures required by GASB. GRS provides separate GASB reports which include the liabilities associated with the implicit rate subsidy.

| For those not eligible for Medicare | | |
|---|---|---|
| Age | Member | Spouse/Dependents |
| <65 | $816.02 | $1,010.20 |

For Medicare retirees, the initial per capita costs were estimated based on the plan premiums effective January 1, 2023, and are used for both current and future retirees. An inherent assumption in this methodology is that the projected future retirees will have a similar distribution by plan type as the current retirees. Age graded and sex distinct premiums are utilized for retirees over the age of 65. These costs are appropriate for the unique age and sex distribution currently existing. Over the future years covered by this valuation, the age and sex distribution will most likely change. Therefore, our process "distributes" the average premium over all age/sex combinations and assigns a unique premium for each combination. The age/sex specific costs more accurately reflect the health care utilization and cost at that age.

| For those eligible for Medicare | | |
|---|---|---|
| Age | Male | Female |
| 65 | $78.14 | $73.71 |
| 75 | 91.43 | 89.21 |
| 85 | 96.68 | 97.82 |

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

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

Piotr Krekora, ASA, 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<br>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.<br><br>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.<br><br>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<br>Any age with at least 25 years of service |
| Benefit Amount | The monthly benefit is equal to the applicable benefit multiplier times final average compensation times years of service. |

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

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

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

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

| | |
|---|---|
| Normal Retirement Eligibility | Age 60 with at least 5 years of service; or<br>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.<br><br>Each June 30 (beginning June 30, 2023), members with at least five years of service credit will receive an employer pay credit based on their unused sick leave in excess of 480 hours. Members will also receive an employer pay credit based on their balance of unused sick leave upon termination of employment.<br><br>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 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. |

## SPRS Employees (continued)

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

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

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

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

*Line of Duty Disability Benefit*

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

*Pre-Retirement Death Benefit*

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

## SPRS Employees (continued)

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

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

*Post-Retirement Death Benefit*

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

*Member Contributions*

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

*Changes in Retirement Benefits since the Prior Valuation*

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

## Summary of Main Retiree Insurance Benefit Provisions

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

**Benefit Eligibility** Recipient of a retirement allowance

**Benefit Amount**

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

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

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

**Duty Death in Service** If an active employee's death was a result of injuries sustained while in the line of duty, the member's spouse and children receive a fully subsidized health insurance benefit.

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

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

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

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

**Benefit Eligibility**

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

**Non-Hazardous Subsidy**

Monthly contribution of $10 for each year of earned non-hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2022, the Non-Hazardous monthly contribution was $14.20/year of service. Upon the retiree's death, the surviving spouse may continue coverage (if in receipt of a retirement allowance) but will be 100% responsible for the premiums.

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

**Hazardous Subsidy**

Monthly contribution of $15 for each year of earned hazardous service. The monthly contribution is increased by 1.5% each July 1. As of July 1, 2022, the hazardous monthly contribution was $21.30/year of service. Upon the retiree's death, the surviving spouse of a hazardous duty member will receive a monthly contribution of $10 ($14.20 as of July 1, 2022) for each year of hazardous service.

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

**Duty Disability Retirement**

If disability was a result of injuries sustained while in the line of duty or was duty-related, the member receives a benefit based on at least 20 years of service. This benefit is provided to members in the Non-Hazardous and Hazardous plans alike.

If the disability is deemed to be Total and Permanent, the insurance premium for the member, the member's spouse, and the member's dependent children shall also be paid in full by the System. For non-hazardous members to be eligible for this benefit, they must be working in a position that could be certified as a hazardous position.

**Duty Death in Service**

If an active employee's death was a result of injuries sustained while in the line of duty, the member's spouse and children receive a fully subsidized health insurance benefit.

**Non-Duty Death in Service**

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

## Monthly Health Plan Premiums – Effective January 1, 2023

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

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

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

## Dollar Contribution Amount for Participation on or after 7/1/2003

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

| Non-Hazardous Service | Hazardous Service |
|---|---|
| $14.20 | $21.30 |

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

*Changes in Health Insurance Benefits since the Prior Valuation*

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

# APPENDIX C

## GLOSSARY

# Glossary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

***Amortization Method:*** A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay

method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

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

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

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

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

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

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

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

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

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

***GASB***: Governmental Accounting Standards Board.

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

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

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

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

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

P: 469.524.0000 | www.grsconsulting.com

December 1, 2022

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

**Re: Sensitivity Analysis Based on Results of the June 30, 2022 Actuarial Valuation**

Dear Members of the Board:

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

**Background**

Investment Assumption

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

Inflation Assumption

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

Payroll Growth Assumption

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

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

**Certification**

The information provided in this letter compliments the information provided in the June 30, 2022 actuarial valuation report. Please refer to the June 30, 2022 actuarial valuation report for additional discussion of the actuarial valuation, including the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

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

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

Sincerely,

**Gabriel, Roeder, Smith & Company**

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

Janie Shaw, ASA, EA, MAAA
Consultant

# Sensitivity Analysis - Discount Rate

**(Dollar amounts expressed in thousands)**

| (1) | Decrease Discount Rate (2) | Valuation Results (3) | Increase Discount Rate (4) |
|---|---|---|---|
| Payroll Growth Rate | 0.00% | 0.00% | 0.00% |
| Inflation Rate | 2.30% | 2.30% | 2.30% |
| Discount Rate - Retirement | 4.25% | 5.25% | 6.25% |
| Discount Rate - Insurance | 5.25% | 6.25% | 7.25% |
| **Retirement** | | | |
| Actuarial Accrued Liability | $ 1,206,062 | $ 1,067,447 | $ 954,604 |
| Actuarial Value of Assets | 559,973 | 559,973 | 559,973 |
| Unfunded Actuarial Accrued Liability | 646,089 | 507,474 | 394,631 |
| Funded Ratio | 46.4% | 52.5% | 58.7% |
| Actuarially Determined Contribution Rate | 108.94% | 85.39% | 65.24% |
| **Insurance** | | | |
| Actuarial Accrued Liability | $ 258,767 | $ 232,798 | $ 211,182 |
| Actuarial Value of Assets | 234,239 | 234,239 | 234,239 |
| Unfunded Actuarial Accrued Liability | 24,528 | (1,441) | (23,057) |
| Funded Ratio | 90.5% | 100.6% | 110.9% |
| Actuarially Determined Contribution Rate | 10.51% | 3.68% | 0.00% |
| **Combined** | | | |
| Actuarial Accrued Liability | $ 1,464,829 | $ 1,300,245 | $ 1,165,786 |
| Actuarial Value of Assets | 794,212 | 794,212 | 794,212 |
| Unfunded Actuarial Accrued Liability | 670,617 | 506,033 | 371,574 |
| Funded Ratio | 54.2% | 61.1% | 68.1% |
| Actuarially Determined Contribution Rate | 119.45% | 89.07% | 65.24% |

## Sensitivity Analysis - Inflation Rate

**(Dollar amounts expressed in thousands)**

| (1) | Decrease Inflation Rate (2) | Valuation Results (3) | Increase Inflation Rate (4) |
|---|---|---|---|
| Payroll Growth Rate | -0.25% | 0.00% | 0.25% |
| Inflation Rate | 2.05% | 2.30% | 2.55% |
| Discount Rate - Retirement | 5.00% | 5.25% | 5.50% |
| Discount Rate - Insurance | 6.00% | 6.25% | 6.50% |
| **Retirement** | | | |
| Actuarial Accrued Liability | $ 1,098,450 | $ 1,067,447 | $ 1,037,993 |
| Actuarial Value of Assets | 559,973 | 559,973 | 559,973 |
| Unfunded Actuarial Accrued Liability | 538,477 | 507,474 | 478,020 |
| Funded Ratio | 51.0% | 52.5% | 53.9% |
| Actuarially Determined Contribution Rate | 92.23% | 85.39% | 78.92% |
| **Insurance** | | | |
| Actuarial Accrued Liability | $ 234,228 | $ 232,798 | $ 231,453 |
| Actuarial Value of Assets | 234,239 | 234,239 | 234,239 |
| Unfunded Actuarial Accrued Liability | (11) | (1,441) | (2,786) |
| Funded Ratio | 100.0% | 100.6% | 101.2% |
| Actuarially Determined Contribution Rate | 4.22% | 3.68% | 3.19% |
| **Combined** | | | |
| Actuarial Accrued Liability | $ 1,332,678 | $ 1,300,245 | $ 1,269,446 |
| Actuarial Value of Assets | 794,212 | 794,212 | 794,212 |
| Unfunded Actuarial Accrued Liability | 538,466 | 506,033 | 475,234 |
| Funded Ratio | 59.6% | 61.1% | 62.6% |
| Actuarially Determined Contribution Rate | 96.45% | 89.07% | 82.11% |

## Sensitivity Analysis - Payroll Growth

**(Dollar amounts expressed in thousands)**

| (1) | Decrease Payroll Growth (2) | Valuation Results (3) | Increase Payroll Growth (4) |
|---|---|---|---|
| Payroll Growth Rate | -1.00% | 0.00% | 1.00% |
| Inflation Rate | 2.30% | 2.30% | 2.30% |
| Discount Rate - Retirement | 5.25% | 5.25% | 5.25% |
| Discount Rate - Insurance | 6.25% | 6.25% | 6.25% |
| **Retirement** | | | |
| Actuarial Accrued Liability | $ 1,067,447 | $ 1,067,447 | $ 1,067,447 |
| Actuarial Value of Assets | 559,973 | 559,973 | 559,973 |
| Unfunded Actuarial Accrued Liability | 507,474 | 507,474 | 507,474 |
| Funded Ratio | 52.5% | 52.5% | 52.5% |
| Actuarially Determined Contribution Rate | 93.72% | 85.39% | 77.64% |
| **Insurance** | | | |
| Actuarial Accrued Liability | $ 232,798 | $ 232,798 | $ 232,798 |
| Actuarial Value of Assets | 234,239 | 234,239 | 234,239 |
| Unfunded Actuarial Accrued Liability | (1,441) | (1,441) | (1,441) |
| Funded Ratio | 100.6% | 100.6% | 100.6% |
| Actuarially Determined Contribution Rate | 3.69% | 3.68% | 3.68% |
| **Combined** | | | |
| Actuarial Accrued Liability | $ 1,300,245 | $ 1,300,245 | $ 1,300,245 |
| Actuarial Value of Assets | 794,212 | 794,212 | 794,212 |
| Unfunded Actuarial Accrued Liability | 506,033 | 506,033 | 506,033 |
| Funded Ratio | 61.1% | 61.1% | 61.1% |
| Actuarially Determined Contribution Rate | 97.41% | 89.07% | 81.32% |

**Kentucky Public Pensions Authority**
**SPRS Retirement Fund**
**($ in Millions)**

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

Notes and assumptions:

The projection is based on the results of the June 30, 2022 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 5.25%.

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

The total active population is assumed to decrease 2% each year for each of the next 30 years.

Covered payroll is assumed to remain level throughout the entire projection.

The contribution rate established in the Commonwealth's biennium budget is assumed to be equal to the full actuarially determined contribution rate.

**Kentucky Public Pensions Authority**
**SPRS Insurance Fund**
**($ in Millions)**

| Fiscal Year Beginning July 1, | Actuarial Accrued Liability | Actuarial Value of Assets | Unfunded Actuarial Accrued Liability | Funded Ratio | Employer Contribution | Member Contribution | Covered Payroll | Employer Contribution as % of Covered Payroll | Employer Actuarially Determined Contribution |
|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 2022 | $ 233 | $ 234 | $ (1) | 100% | $ 7 | $ - | $ 48 | 14.11% | 14.11% |
| 2023 | 236 | 241 | (5) | 102% | 7 | - | 48 | 14.11% | 3.68% |
| 2024 | 238 | 247 | (9) | 104% | 1 | - | 48 | 2.12% | 2.12% |
| 2025 | 238 | 248 | (10) | 104% | 1 | - | 48 | 2.12% | 1.65% |
| 2026 | 238 | 241 | (3) | 101% | - | - | 48 | 0.75% | 0.75% |
| 2027 | 237 | 238 | (1) | 100% | - | - | 48 | 0.75% | 1.50% |
| 2028 | 235 | 235 | - | 100% | 1 | - | 48 | 1.31% | 1.31% |
| 2029 | 232 | 231 | 1 | 100% | 1 | - | 48 | 1.31% | 1.08% |
| 2030 | 229 | 226 | 3 | 99% | - | - | 48 | 0.86% | 0.86% |
| 2031 | 226 | 221 | 5 | 98% | - | - | 48 | 0.86% | 0.72% |
| 2032 | 222 | 215 | 7 | 97% | - | - | 48 | 0.60% | 0.60% |
| 2033 | 218 | 209 | 9 | 96% | - | - | 48 | 0.60% | 0.52% |
| 2034 | 213 | 202 | 11 | 95% | - | - | 48 | 0.47% | 0.47% |
| 2035 | 209 | 196 | 13 | 94% | - | - | 48 | 0.47% | 0.42% |
| 2036 | 205 | 189 | 16 | 92% | - | - | 48 | 0.38% | 0.38% |
| 2037 | 202 | 183 | 19 | 91% | - | - | 48 | 0.38% | 0.37% |
| 2038 | 199 | 178 | 21 | 89% | - | - | 48 | 0.35% | 0.35% |
| 2039 | 197 | 173 | 24 | 88% | - | - | 48 | 0.35% | 0.34% |
| 2040 | 195 | 168 | 27 | 86% | 1 | - | 48 | 1.54% | 1.54% |
| 2041 | 194 | 164 | 30 | 85% | 1 | - | 48 | 1.54% | 5.17% |
| 2042 | 194 | 160 | 34 | 83% | 7 | - | 48 | 15.13% | 15.13% |
| 2043 | 194 | 164 | 30 | 85% | 7 | - | 48 | 15.13% | 16.06% |
| 2044 | 195 | 168 | 27 | 86% | 8 | - | 48 | 16.16% | 16.16% |
| 2045 | 196 | 174 | 22 | 89% | 8 | - | 48 | 16.16% | 16.65% |
| 2046 | 197 | 180 | 17 | 91% | 7 | - | 48 | 15.61% | 15.61% |
| 2047 | 198 | 186 | 12 | 94% | 7 | - | 48 | 15.61% | 15.52% |
| 2048 | 200 | 193 | 7 | 97% | 7 | - | 48 | 15.47% | 15.47% |
| 2049 | 202 | 202 | - | 100% | 2 | - | 48 | 3.96% | 3.96% |
| 2050 | 203 | 203 | - | 100% | 2 | - | 48 | 3.91% | 3.91% |
| 2051 | 205 | 205 | - | 100% | 2 | - | 48 | 3.87% | 3.87% |

Notes and assumptions:

The projection is based on the results of the June 30, 2022 actuarial valuation and assumes that all actuarial assumptions are realized, including the assumed annual asset return of 6.25%.

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

The total active population is assumed to decrease 2% each year for each of the next 30 years.

Covered payroll is assumed to remain level throughout the entire projection.

The contribution rate established in the Commonwealth's biennium budget is assumed to be equal to the full actuarially determined contribution rate.