



**Cavanaugh Macdonald**  
CONSULTING, LLC

*The experience and dedication you deserve*

OKLAHOMA PUBLIC EMPLOYEES RETIREMENT SYSTEM

## **Oklahoma Public Employees Retirement System**

### **Actuarial Valuation Report as of July 1, 2020**





# Cavanaugh Macdonald

CONSULTING, LLC

*The experience and dedication you deserve*

October 7, 2020

Board of Trustees  
Oklahoma Public Employees Retirement System  
5400 N Grand Boulevard, Suite 400  
P.O. Box 53007  
Oklahoma City, OK 73112-5625

Members of the Board:

In this report are submitted the results of the annual valuation of the assets and liabilities of the Oklahoma Public Employees Retirement System (OPERS), prepared as of July 1, 2020.

The purpose of this report is to provide a summary of the funded status of the System as of July 1, 2020 and to provide the actuarially determined rate. While not verifying the data at the source, the actuary performed tests for consistency and reasonability.

The promised benefits of the System are included in the actuarially calculated contribution rates which are developed using the Entry Age Normal cost method. A five-year market-related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded actuarial accrued liability (UAAL) that is being amortized by regular annual contributions as a level percentage of payroll, on the assumption that payroll will increase by 3.25% annually.

An experience study was performed covering the period from July 1, 2016 through June 30, 2019, resulting in several recommendations that were ultimately adopted by the Board of Trustees. The changes to the actuarial assumptions and methods are discussed in detail in the Executive Summary section of this report.

As in recent valuations, liabilities have been calculated without considering future cost of living adjustments (COLAs) in keeping with House Bill 2132 (2011). We note that House Bill 3350 (2020) granted a one-time benefit increase to certain retirees funded by the System. Should funding of future COLAs and/or stipends be provided by the System, the COLAs and/or stipends should be included in the actuarial valuation. In addition, House Bill 2630 (2014) closed the plan to most new employees hired after November 1, 2015.

We note that as we prepare this report, the world is in the midst of a pandemic. We have considered available information, but do not believe that there is yet sufficient data to warrant the modification of any of our assumptions. We will continue to monitor the situation and advise the Board in the future of any adjustments that we believe would be appropriate.

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This is to certify that the independent consulting actuaries are members of the American Academy of Actuaries and have experience in performing valuations for public retirement systems, that the valuation was prepared for funding purposes with assumptions and methods that meet the parameters of the Actuarial Standards of Practice, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

Future actuarial results may differ significantly from the current results presented in this report due to factors such 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. Because the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

We have prepared the Schedule of Funding Progress and Trend Information shown in the financial section of the Comprehensive Annual Financial Report. We have also reviewed the supplemental medical benefits provided by the System under Section 401(h) of the Internal Revenue Code and have determined that these benefits are subordinate to the retirement benefits as required.

In our opinion, in order for the System to meet all the benefit obligations of the plan for current active and retired members, contributions equal to at least the actuarially determined rate are necessary for future fiscal years. Assuming these contributions are made to the System, from year to year in the future at the rates recommended on the basis of the successive actuarial valuations, the continued sufficiency of the retirement fund to provide the benefits called for under the System may be safely anticipated. Because the statutory contribution exceeds the actuarially determined rate in this valuation, we recommend the statutory contribution be used to pay the UAAL down faster than under the current schedule and to protect against potential future investment and experience losses.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Alisa Bennett'.

Alisa Bennett, FSA, EA, FCA, MAAA  
President

A handwritten signature in blue ink, appearing to read 'Brent A. Banister'.

Brent Banister, PhD, FSA, EA, FCA, MAAA  
Chief Actuary



## TABLE OF CONTENTS

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	<u>Page</u>
<b>Executive Summary .....</b>	<b>1</b>
<b>Section 1 Summary of Findings .....</b>	<b>10</b>
<b>Section 2 Assets .....</b>	<b>11</b>
<b>Section 3 System Liabilities .....</b>	<b>15</b>
<b>Section 4 Employer Contributions .....</b>	<b>18</b>
<b>Section 5 Risk Consideration .....</b>	<b>24</b>
<b>Section 6 Other Information .....</b>	<b>33</b>
<b>Appendix A Summary of System Provisions .....</b>	<b>36</b>
<b>Appendix B Actuarial Assumptions and Methods .....</b>	<b>50</b>
<b>Appendix C Data .....</b>	<b>60</b>
<b>Appendix D Glossary .....</b>	<b>69</b>



## EXECUTIVE SUMMARY

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### OVERVIEW

The Oklahoma Public Employees Retirement System (“OPERS” or “System”) provides retirement benefits for most employees of the State of Oklahoma, for most county employees, and for employees of local employers who have elected to participate in OPERS.

This report presents the results of the July 1, 2020 actuarial valuation for the System. The primary purposes of performing an actuarial valuation are to:

- Determine the employer contribution rate required to fund the System on an actuarial basis;
- Evaluate the sufficiency of the statutory contribution rate;
- Disclose asset and liability measures as of the valuation date;
- Determine the experience of the System since the last valuation date; and
- Analyze and report on trends in System contributions, assets, and liabilities.

We note that as we prepare this report, the world is in the midst of a pandemic. We have considered available information, but do not believe that there is yet sufficient data to warrant the modification of any of our assumptions. We will continue to monitor the situation and advise the Board in the future of any adjustments that we believe would be appropriate.

An experience study was performed that analyzed the experience during the period from July 1, 2016 through June 30, 2019. As a result of that study, several changes to the actuarial assumptions and methods were recommended to the Board of Trustees and adopted, effective with the July 1, 2020 actuarial valuation. Significant assumption changes included:

- 1) decreasing the price inflation from 2.75% to 2.50%,
- 2) decreasing the investment return from 7.00% to 6.50%,
- 3) decreasing the payroll growth from 3.50% to 3.25%,
- 4) changing the mortality assumption to reflect recent mortality experience, and
- 5) adjusting withdrawal, retirement, and disability rates to better fit observed experience.

The revised set of actuarial assumptions increased the actuarial liability at July 1, 2020 by \$553.5 million, or 5.1% of liability, and increased the actuarially determined contribution rate by 5.58% of payroll. Additional details are provided later in this section of the report. The experience study, available on the OPERS website, contains significant discussion on the rationale for the changes.

As in recent valuations, liabilities have been calculated without considering future cost of living adjustments (COLAs) and/or stipends in keeping with House Bill 2132 (2011). Should funding of future COLAs and/or stipends be provided by the System, the COLAs and/or stipends should be included in the actuarial valuation. We note that House Bill 3350 (2020) granted a one-time benefit increase effective July 1, 2020 to certain retirees funded by the System. This *ad hoc* cost-of-living adjustment (COLA) granted members who retired prior to or on July 1, 2015 a 4.0% increase to their benefit amounts, members who retired between July 1, 2015 and July 1, 2018 received a 2.0% increase to their benefit amounts, and members who retired after July 1, 2018 did not receive an increase to their benefit amounts. As a result, the actuarial accrued liability increased by \$183.0 million, and the actuarially determined contribution rate increased by 1.56% of payroll.



## EXECUTIVE SUMMARY

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As described in previous valuation reports, the Plan has been amended by House Bill 2630, enacted in 2014, which states that effective November 1, 2015, OPERS shall create a defined contribution plan for most people first employed by a participating employer. Exemptions from the new defined contribution plan include hazardous duty members and district attorneys, assistant district attorneys and employees of the district attorney's office. In order to reduce the liabilities of the defined benefit plan, each employer shall send to OPERS the difference between the required employer contribution to OPERS and the amount required to match the participating employee's contribution in the defined contribution plan, known as Pathfinder.

Senate Bill 2120, also enacted in 2014, amends House Bill 2630 to further exempt from the new defined contribution plan county elected officials and employees of a county, county hospital, city or town, conservation district, circuit engineering district, and any public or private trust in which a county, city or town participates. Senate Bill 2120 also states that employees who participate in the defined contribution system are excluded from the \$105 health care subsidy.

New employees specifically exempted from the defined contribution plan will participate in the existing defined benefit plan.

Senate Bill 2120 and House Bill 2630 will, in combination, significantly reduce the number of new members entering the plan after November 1, 2015. While this had a small impact initially on the valuation results, as time goes by, there are potential ramifications of this legislation that will affect on-going plan funding. In particular, the current amortization of the UAAL is based on the assumption of increasing payroll. The current provision of the new legislation should provide at least as much toward the UAAL as would have been expected otherwise, so we are comfortable with this methodology. We would encourage the Board to study the long-term impact of this legislation.

The valuation results provide a snapshot view of the System's financial condition on July 1, 2020. The unfunded actuarial accrued liability for the System increased by \$593.1 million due to various factors. A detailed analysis of the change in the unfunded actuarial accrued liability from July 1, 2019 to July 1, 2020 is shown on page 5.

The highlights of the valuation are shown below:

<b>Funded Status \$(millions)</b>	<b>Actuarial Valuation Date</b>	
	<b>July 1, 2020</b>	<b>July 1, 2019</b>
Actuarial Accrued Liability	\$10,943	\$10,047
Actuarial Value of Assets	\$10,212	\$ 9,910
Unfunded Actuarial Accrued Liability	\$ 731	\$ 138
Funded Ratio (Actuarial Value)	93.3%	98.6%
Market Value of Assets	\$10,098	\$ 9,958
Funded Ratio (Market Value)	92.3%	99.1%

There was a liability gain of \$26.3 million from demographic experience which resulted in an actuarial accrued liability that was lower than expected (0.24% of expected liability). The components of this net liability gain are identified on page 6.

The return on the market value of assets as reported by the System was 4.5% for the year ended June 30, 2020. The actuarial value of assets is determined using a method to smooth investment gains and losses in order to develop more stable contribution rates. The return on the actuarial value of assets was approximately 6.2% which resulted in an actuarial loss of \$75.5 million.



## EXECUTIVE SUMMARY

The actuarial contribution rate for the employers increased from 2019 to 2020:

Contribution Rate	Actuarial Valuation Date	
	July 1, 2020	July 1, 2019
Normal Cost	10.99%	10.15%
Amortization of UAAL*	6.19%	1.08%
Budgeted Expenses	<u>0.47%</u>	<u>0.47%</u>
Actuarially Determined Contribution Rate	17.65%	11.70%
<b>Less</b> Estimated Member Contribution Rate	<u>4.24%</u>	<u>4.19%</u>
Employer Actuarially Determined Contribution Rate	13.41%	7.51%
<b>Less</b> Employer Statutory Contribution Rate	16.50%	16.50%
Contribution Shortfall (Surplus)	(3.09%)	(8.99%)

\*The amortization of UAAL contribution rate recognizes the employer contributions made on behalf of the defined contribution plan participant payroll.

Primarily due to the removal of the COLA assumption and reserve starting with the June 30, 2011 valuation, the employer actuarial contribution rate is less than the employer statutory contribution rate. It is recommended that the employer statutory contribution rate continue unchanged as this will decrease the unfunded actuarial accrued liability, accelerate progress on reaching long-term funding goals, and protect against potential future investment and experience losses.

### EXPERIENCE: July 1, 2019 to July 1, 2020

In many respects, an actuarial valuation can be thought of as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is July 1, 2020. On that date, the assets available for the payment of benefits are appraised. The assets are compared with the liabilities of the System, which are generally in excess of assets. The actuarial process leads to a method of determining the contributions needed by members and employers in the future to balance the System assets and liabilities.

Changes in the System's assets and liabilities impacted the change in the actuarial contribution rates between July 1, 2019 and July 1, 2020. Each component is examined in the following discussion.

### ASSETS

As of July 1, 2020, the System had total funds of \$10.10 billion when measured on a market value basis. This was an increase of \$140 million from the July 1, 2019 figure of \$9.96 billion. The market value of assets is not used directly in the calculation of the actuarial contribution rate. An asset valuation method, which smooths the effect of market fluctuations, is used to determine the value of assets used in the valuation, called the "actuarial value of assets." Differences between the actual return on the market value of assets and the assumed return on the actuarial value of assets are phased in over a five-year period. The resulting value must be no less than 80% of the market value and no more than 120% of market value, referred to as "the corridor." See Table 3 for the detailed development of the actuarial value of assets as of July 1, 2020.

The actuarial value of assets as of July 1, 2020 was \$10.21 billion. The annualized dollar-weighted rate of return for fiscal year 2020, measured on the actuarial value of assets, was approximately 6.2%, which resulted in an actuarial loss of \$75.5 million. Measured on the market value of assets, the return on assets as reported by the System was 4.5%.





## EXECUTIVE SUMMARY

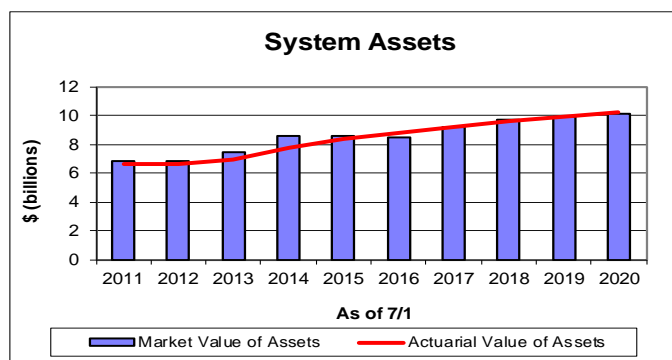
The components of the change in the market and actuarial value of assets for the System are set forth below:

	Market Value \$(millions)	Actuarial Value \$(millions)
Net Assets, July 1, 2019*	\$9,953.1	\$9,909.7
• Employer and Member Contributions	361.9	361.9
• Benefit Payments and Expenses	(667.0)	(667.0)
• Investment Income/(Loss)	449.8	607.6
Preliminary Value, July 1, 2020	10,097.8	10,212.2
Application of Corridor	N/A	N/A
Final Net Assets, July 1, 2020	\$10,097.8	\$10,212.2
Estimated Rate of Return**	4.5%	6.2%

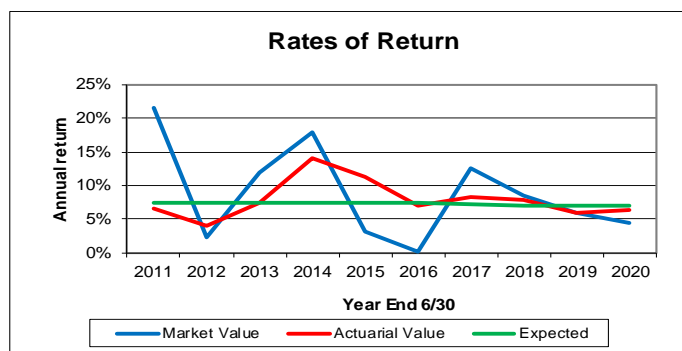
\*The June 30, 2019 market value of assets was revised after the 2019 valuation report was issued.

\*\*Rate of return on market value was reported by the System.

Due to the use of an asset smoothing method, there is approximately \$114 million of deferred investment loss that has not yet been recognized. This deferred investment experience will be reflected in the actuarial value of assets over the next few years.



*There have been years during the last decade in which the actuarial value of assets has been both higher and lower than the market value, which is what would be expected using an asset smoothing method.*



*Rates of return on the market value of assets are very volatile. The more stable return on the actuarial value of assets illustrates the advantage of using an asset smoothing method.*





## EXECUTIVE SUMMARY

### SYSTEM LIABILITIES

The actuarial accrued liability is that portion of the present value of future benefits that will not be paid by future normal costs. The difference between this liability and the asset value at the same date is referred to as the unfunded actuarial accrued liability (UAAL). The UAAL will be reduced if the employers' contributions exceed the employers' normal cost for the year, after allowing for interest earned on the previous years' balance of unfunded actuarial accrued liability. Benefit improvements, experience gains/losses, and changes in the actuarial assumptions and methods will also impact the total actuarial accrued liability and the unfunded portion thereof.

As discussed earlier, an experience study was performed in 2020 and, as a result, several changes were recommended to the actuarial assumptions and methods. These changes are first reflected in the July 1, 2020 actuarial valuation. The detailed financial impact of the changes was summarized earlier in this section of the report. Due to the experience study, the unfunded actuarial liability increased by \$553 million.

The unfunded actuarial accrued liability as of July 1, 2020 is:

Actuarial Accrued Liability	\$ 10,943,079,053
Actuarial Value of Assets	<u>10,212,241,395</u>
Unfunded Actuarial Accrued Liability	\$ 730,837,658

See Table 5 for the detailed development of the Actuarial Accrued Liability and Table 7 for the calculation of the Unfunded Actuarial Accrued Liability.

Other factors influencing the UAAL from year to year include actual experience versus that expected based on the actuarial assumptions (for assets and liabilities), changes in the actuarial assumptions, procedures or methods and changes in benefit provisions. The actual experience measured in this valuation is that which occurred during the plan year ended June 30, 2020. There was an experience loss on the actuarial value of assets due to the actual rate of return being less than expected and an experience gain on the liabilities due to demographic experience and data adjustments more favorable than expected and the effect of contributions more than the actuarial rate. However, there were also significant increases in liability due to the change in the actuarial assumptions and the *ad hoc* COLA effective July 1, 2020 that were partially offset by contributions above the actuarial target. The net result was an increase in the UAAL from \$138 million to \$731 million.

Between July 1, 2019 and July 1, 2020, the change in the unfunded actuarial accrued liability for the System was as follows (in millions):

	<u>\$(millions)</u>
Unfunded Actuarial Accrued Liability, July 1, 2019	\$138
• effect of contributions more than actuarial rate	(178)
• expected decrease due to amortization	(11)
• investment experience	76
• liability experience <sup>1</sup>	(26)
• other experience	(4)
• change in actuarial assumptions	553
• 2020 ad hoc COLA	<u>183</u>
Unfunded Actuarial Accrued Liability, July 1, 2020	\$ 731

<sup>1</sup> Liability gain is about 0.24% of total expected actuarial accrued liability



## EXECUTIVE SUMMARY

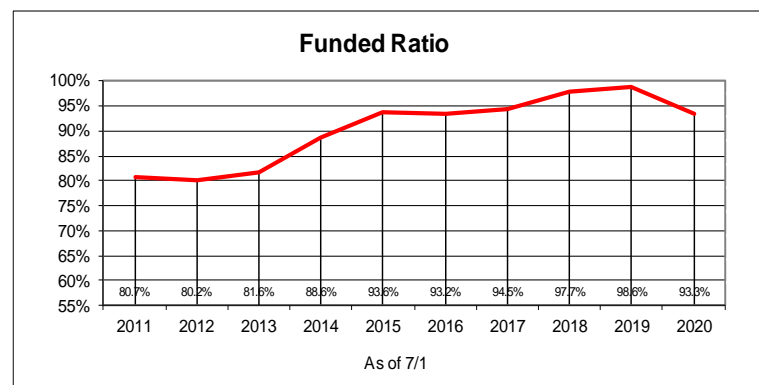
The liability gain for the System can be allocated to actual experience related to each actuarial assumption as follows:

Liability Source	Impact of AAL \$(millions)	% of Expected Liability
Salary Increases	\$6.4	0.06%
Mortality	(27.2)	(0.25)%
Termination of Employment	1.0	0.01%
Retirements	(15.2)	(0.14)%
Disability	1.0	0.01%
New Entrants and Rehires	23.1	0.21%
Miscellaneous/Data Changes	<u>(15.4)</u>	<u>(0.14)%</u>
Total (Gain)/Loss	(\$26.3)	(0.24)%

A detailed summary of the change in the UAAL is shown in Table 9.

An evaluation of the unfunded actuarial accrued liability on a pure dollar basis may not provide a complete analysis because only the difference between the assets and liabilities (which are both very large numbers) is reflected. Another way to evaluate the unfunded actuarial accrued liability and the progress made in its funding is to track the funded status, which is the ratio of the actuarial value of assets to the actuarial accrued liability. The funded status information, on both an actuarial and market value basis, is shown below in \$(millions). These ratios do not indicate whether or not the plan could settle its liabilities with available assets, nor are they sufficient, on their own, to indicate the future funding needs of the System.

	7/1/15	7/1/16	7/1/17	7/1/18	7/1/19	7/1/20
<b>Using Actuarial Value of Assets:</b>						
Funded Ratio	93.6%	93.2%	94.5%	97.7%	98.6%	93.3%
Unfunded Actuarial Accrued Liability (UAAL)	\$ 576	\$ 637	\$ 540	\$ 226	\$ 138	\$ 731
<b>Using Market Value of Assets:</b>						
Funded Ratio	96.0%	89.5%	94.4%	98.2%	99.1%	92.3%
Unfunded Actuarial Accrued Liability (UAAL)	\$ 360	\$ 992	\$ 552	\$ 182	\$ 89	\$ 845



*Through the first part of this period, the funded ratio was low and declining. Numerous factors contributed to the decline, including changes in the benefit provisions, contributions less than the actuarial rate, demographic experience and investment experience less favorable than expected based on the assumptions.*



## EXECUTIVE SUMMARY

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### CONTRIBUTION RATES

The funding objective of the System is to pay the normal cost rate plus an amount that will pay off the unfunded actuarial accrued liability over a closed 20-year period commencing July 1, 2007.

Under the Entry Age Normal cost method, the actuarial contribution rate consists of:

- A “normal cost” for the portion of projected liabilities allocated by the actuarial cost method to service of members during the year following the valuation date;
- An “unfunded actuarial accrued liability contribution” for the excess of the portion of projected liabilities allocated to service to date over the actuarial value of assets.

Contributions to the System are made by the members and their employers. Most State employees pay 3.5% of compensation. Local government employees contribute from 3.5% to 8.5% of compensation, depending on the rate chosen by their employer. Starting in 2004, most participants were eligible to make an election to contribute an additional 2.91% of pay and to increase their benefit accrual multiplier for future years of service to 2.5%. Hazardous Duty employees and most elected officials have a different required contribution rate (see Summary of Provisions section of this report).

Effective July 1, 1999, the State’s contribution rate was reduced from 12.5% to 10.0% of payroll and stayed at that level until 2005. For the same period, the combined employer and employee contribution rates for the county and local employees were 13.5% of payroll. As of July 1, 2005, the State’s contribution rate increased to 11.5% of payroll with additional increases of 1.0% each July until reaching 16.5%. The 1.0% increase that was supposed to be effective July 1, 2010 was delayed one year by the 2010 Legislature and was effective July 1, 2011. For county and local employees, the combined contribution rate increased to 15.0% on July 1, 2005 and increased an additional 1.0% of payroll each year beginning July 1, 2006 until it reached 20.0% on July 1, 2010.

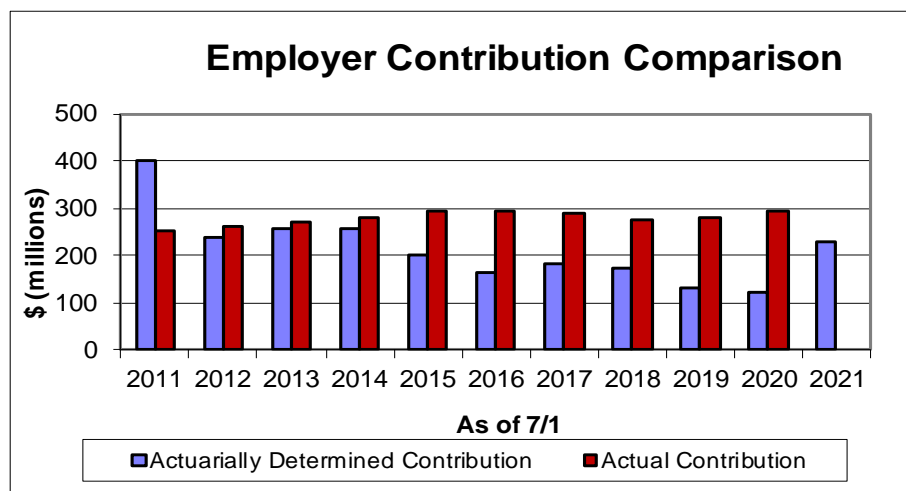
As described in previous valuation reports, the Plan has been amended by House Bill 2630, enacted in 2014, which states that effective November 1, 2015, OPERS shall create a defined contribution plan for most people first employed by a participating employer. In order to reduce the liabilities of the defined benefit plan, each employer shall send to OPERS the difference between the required employer contribution to OPERS and the amount required to match the participating employee’s contribution in the defined contribution plan. The amortization of UAAL contribution rate in this valuation recognizes the employer contributions made on behalf of the defined contribution plan participant payroll.

The ultimate contribution rate of 16.5% for the State is greater than the employer actuarial contribution rate for fiscal year 2020 developed in this valuation. When contributions to the System are greater than the actuarial rate, the UAAL is expected to decrease and be paid down faster. As of the July 1, 2020 valuation, if the System receives the statutory rate and the expected employer contributions on behalf of the defined contribution member payroll and all assumptions are met, it is projected the UAAL will be paid off within the next five years, even though seven years remain in the amortization period.

The following graph shows the total actuarially determined employer contribution compared to the amount actually received in each year. The funding policy contribution equals the System’s normal cost, budgeted expenses, and an amortization of the unfunded actuarial accrued liability. For July 1, 1998 and prior years, the unfunded actuarial accrued liability was amortized over 25 years from July 1, 1987. For the July 1, 1999 valuation, the amortization period was changed to 40 years from July 1, 1987. For the July 1, 2008 valuation, the amortization period was changed to 20 years from July 1, 2007 (no change in the number of years remaining). As of July 1, 2020, seven years remain in the amortization period.



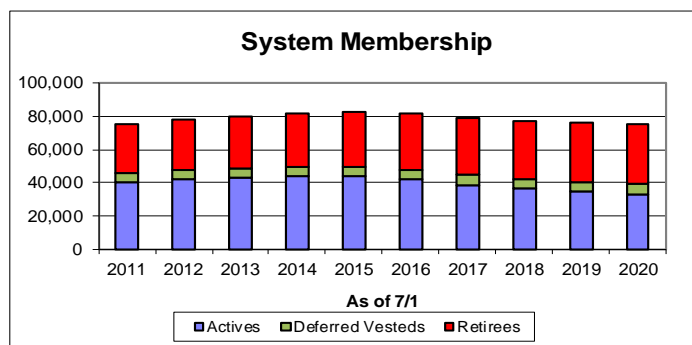
## EXECUTIVE SUMMARY



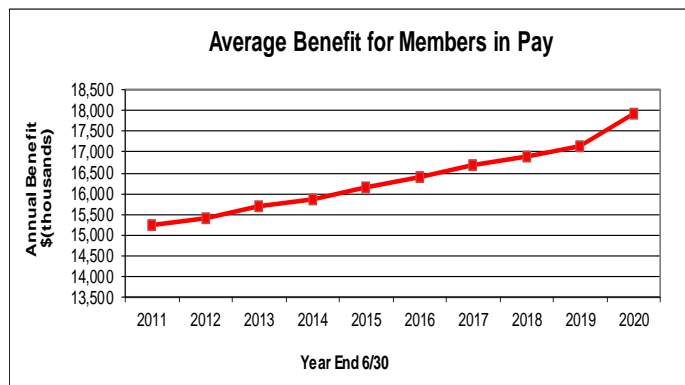
## MEMBER INFORMATION

The number of active members included in the valuation decreased from 34,536 to 33,115 in the 2020 valuation.

Retired member counts and average retirement benefit amounts continue to increase steadily. There were 36,179 retirees and beneficiaries in the 2020 valuation, with an average benefit of \$1,494 per month. This represents a 4.6% increase in the average monthly benefit from the previous year.



*The number of active members has been declining and will continue to decline in the future due to the defined benefit plan being closed to most new entrants. The number of terminated vested and retirees has increased which is to be expected in an ongoing retirement system.*



*The average benefit for retirees has climbed steadily over the past 10 years as new retirees leave with higher salaries and therefore, higher benefits than those already retired. In addition, most of the members who die are older with smaller benefits.*



## EXECUTIVE SUMMARY

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### COMMENTS

As the graph on page 4 shows, investment experience continues to be extremely volatile which creates significant challenges when funding retirement systems. The rate of return on the market value of assets for FY 2020 was reported by the System as 4.5%, resulting in a net deferred loss versus the rate assumed in the prior valuation for the 2020 fiscal year of 7.0%. The assumed rate of return in future years will be 6.5%. However, the asset smoothing mechanism will recognize the deferred \$114 million loss in future years. There was also an experience gain of \$26.3 million on liabilities, due to various factors shown on page 6.

The employer contribution rate increased according to a statutory schedule to an ultimate rate of 16.50% which was reached July 1, 2011. It must be noted that the portion of the actuarial contribution rate to be used to amortize the unfunded actuarial accrued liability was calculated as a level percentage of payroll assuming payroll grows by 3.25% per year, even though House Bill 2630 closes the plan effective November 1, 2015 to all but specifically exempted new employees. This is because House Bill 2630 requires each employer to send to OPERS the difference between the required employer contribution to OPERS and the amount required to match the participating employee's contribution in the defined contribution plan. It is important to note that this continued contribution stream payable on new employee payroll is incorporated into the actuarially determined rate calculated in this valuation, and any changes to reduce the funds received under this provision would negatively impact the actuarially determined rate either now or in the future.

As noted earlier in the report, due primarily to the removal of the COLA assumption and reserve starting in July 1, 2011, the actuarial contribution rate of 13.41% is less than what is currently being funded, even taking into account the assumption changes and the 2020 *ad hoc* COLA. The combined impact of the assumption changes and the *ad hoc* COLA was an increase of 7.14% in the actuarial contribution rate, resulting in a total actuarial contribution rate of 13.41%. The statutory contribution rate is 16.50%, so there is a contribution margin in this year's valuation of 3.09%. Absent any future investment or experience losses, this will serve to decrease the UAAL and cause it to be paid down faster. As of the July 1, 2020 valuation, if the System pays the statutory rate and the plan continues to receive employer contributions on behalf of the defined contribution member payroll, it is projected that the UAAL will be paid off within the next five years. Paying the statutory rate also helps to protect against potential future investment and experience losses that may be more frequent and/or severe in this time of economic uncertainty.

Also, as noted earlier in the report, should funding of future COLAs and/or stipends be provided by the System, the COLAs and/or stipends should be included in the actuarial valuation.

A typical retirement plan faces many different risks. The term "risk" is most commonly associated with an outcome with undesirable results. However, in the actuarial world risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. Actuarial Standard of Practice Number 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions. Risk evaluation is an important part of managing a defined benefit plan. Please see Section 5 of this report for an in-depth discussion of the specific risks facing the Oklahoma Public Employees Retirement System.



## SECTION 1- SUMMARY OF FINDINGS

For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below.

### COMPARISON OF PRINCIPAL VALUATION RESULTS

	7/1/2020 Valuation	7/1/2019 Valuation	% Change
<b>1. PARTICIPANT DATA</b>			
Number of:			
Active Members	33,115	34,536	(4.1)
Retired and Disabled Members and Beneficiaries	36,179	35,869	0.9
Inactive Members	<u>6,082</u>	<u>6,106</u>	(0.4)
Total Members	75,376	76,511	(1.5)
Projected Annual Salaries of Active Members	\$ 1,571,954,116	\$ 1,584,630,994	(0.8)
Annual Retirement Payments for Retired Members and Beneficiaries	\$ 648,673,669	\$ 614,578,512	5.5
<b>2. ASSETS AND LIABILITIES</b>			
Total Actuarial Accrued Liability	\$ 10,943,079,053	\$ 10,047,374,213	8.9
Market Value of Assets	\$ 10,097,798,827	\$ 9,958,113,213	1.4
Actuarial Value of Assets	\$ 10,212,241,395	\$ 9,909,683,940	3.1
Unfunded Actuarial Accrued Liability	\$ 730,837,658	\$ 137,690,273	430.8
Funded Ratio	93.3%	98.6%	(5.4)
<b>3. EMPLOYER CONTRIBUTION RATES AS A PERCENT OF PAYROLL</b>			
Normal Cost Rate	10.99%	10.15%	
Amortization of Unfunded Actuarial Accrued Liability	6.19%	1.08%	
Budgeted Expenses	<u>0.47%</u>	<u>0.47%</u>	
Total Actuarially Determined Contribution Rate	17.65%	11.70%	
Less Estimated Member Contribution Rate	<u>4.24%</u>	<u>4.19%</u>	
Employer Actuarially Determined Contribution Rate	13.41%	7.51%	
Less Statutory State Employer Contribution Rate	<u>16.50%</u>	<u>16.50%</u>	
Contribution Shortfall/(Surplus)	(3.09%)	(8.99%)	



## SECTION 2 - ASSETS

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### Oklahoma Public Employees Retirement System

#### Market Value of Assets

The current market value represents the "snapshot" or "cash-out" value of System assets as of the valuation date. In addition, market values of assets provide the basis for measuring investment performance. As of July 1, 2020, the market value of assets for the System was \$10.1 billion. Table 1 is a comparison, at market values, of System assets as of June 30, 2020, and June 30, 2019, in total and by investment category. Table 2 summarizes the change in the market value of assets from July 1, 2019 to June 30, 2020.

#### Actuarial Value of Assets

Neither the market value of assets, representing a "cash-out" value of System assets, nor the book value of assets, representing the cost of investments, may be the best measure of the System's ongoing ability to meet its obligations.

To arrive at a suitable value for the actuarial valuation, a technique for determining the actuarial value of assets is used, which dampens swings in the market value while still indirectly recognizing market values.

The actuarial value of assets is based on a five-year moving average of expected and actual market values determined as follows:

- at the beginning of each fiscal year, a preliminary expected actuarial asset value is calculated as the sum of the previous year's actuarial value increased with a year's interest at the System valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;
- the expected actuarial asset value is set equal to the preliminary expected actuarial value plus the unrecognized investment gains and losses as of the beginning of the previous fiscal year;
- the difference between the expected actuarial asset value and the market value is the investment gain or loss for the previous fiscal year;
- the (final) actuarial asset value is the preliminary value plus 20% of the investment gains and losses for each of the five previous fiscal years, but in no case more than 120% of the market value or less than 80% of the market value.

Table 3 shows the development of the actuarial value of assets (AVA) as of the valuation date.





## SECTION 2 - ASSETS

### Oklahoma Public Employees Retirement System

**Table 1**

#### Analysis of Net Assets at Market Value

	June 30, 2020		June 30, 2019	
	Amount \$(millions)	% of Total	Amount \$(millions)	% of Total
Cash & Equivalents	\$ 308.6	3.0%	\$ 134.3	1.3%
Short-term Investments	2.3	0.0%	18.3	0.2%
Government Obligations	2,179.7	21.2%	2,128.2	21.4%
Corporate Bonds	1,168.5	11.3%	962.5	9.6%
Domestic Equity	4,001.0	38.8%	3,982.6	39.9%
International Equity	2,645.0	25.6%	2,739.7	27.5%
Real Estate	10.2	0.1%	11.8	0.1%
Subtotal	\$ 10,315.3	100.0%	\$ 9,977.4	100.0%
Property (net)	0.0		0.0	
Other Assets	1.1		1.0	
Net Receivables/(Payables)	(218.6)		(20.3)	
Net Assets	\$ 10,097.8		\$ 9,958.1	



## SECTION 2 - ASSETS

### Oklahoma Public Employees Retirement System

**Table 2**

#### Statement of Changes in Net Assets

	Fiscal Year Ended June 30,	
	2020	2019
1. Market Value of Net Assets at Beginning of Year*	\$ 9,953,060,877	\$ 9,702,031,567
2. Contributions		
a. Members	\$ 67,808,024	\$ 66,566,433
b. State and local agencies	294,118,022	282,473,659
c. Total contributions (2a) + (2b)	\$ 361,926,046	\$ 349,040,092
3. Net Investment Income		
a. Net appreciation (depreciation) in fair value of investments	\$ 311,353,392	\$ 414,354,265
b. Interest	83,129,396	88,292,026
c. Dividends	67,125,912	71,479,955
d. Securities lending activities	1,970,322	2,204,586
e. Real estate	931,753	530,504
f. Total investment income/(loss)	\$ 464,510,775	\$ 576,861,336
(3a) + (3b) + (3c) + (3d) + (3e)		
g. Investment expenses	(14,681,062)	(8,730,849)
h. Net investment income/(loss) (3f) + (3g)	\$ 449,829,713	\$ 568,130,487
i. Total additions/(subtractions) (2c) + (3h)	\$ 811,755,759	\$ 917,170,579
4. Deductions		
a. Retirement, death, and survivor benefits	\$ 646,840,289	\$ 639,964,684
b. Refunds and withdrawals	14,451,508	15,369,288
c. Administrative expenses	5,726,012	5,754,961
d. Total deductions (4a) + (4b) + (4c)	\$ 667,017,809	\$ 661,088,933
5. Net Change in Assets (3i) - (4d)	\$ 144,737,950	\$ 256,081,646
6. Market Value of Net Assets at End of Year	\$ 10,097,798,827	\$ 9,958,113,213
(1) + (5)		

\*The June 30, 2019 market value of assets was revised after the 2019 valuation report was issued.



## SECTION 2 - ASSETS

### Oklahoma Public Employees Retirement System

**Table 3**

#### Determination of Actuarial Value of Assets

1. Market Value as of July 1, 2019*	\$	9,958,113,213
2. Contributions		
a. Member	\$	67,808,024
b. Employer		294,118,022
c. Total (a) + (b)	\$	361,926,046
3. Decreases During Year		
a. Benefit payments	\$	(646,840,289)
b. Refunds and withdrawals		(14,451,508)
c. Administrative expenses		(5,726,012)
d. Total (a) + (b) + (c)	\$	(667,017,809)
4. Expected Return on Assets at 7.00%	\$	686,570,314
5. Expected Market Value as of June 30, 2020 (1) + (2c) + (3d) + (4)	\$	10,339,591,764
6. Actual Market Value as of June 30, 2020	\$	10,097,798,827
7. Year End 2020 Asset Gain/(Loss) (6) - (5)	\$	(241,792,937)

#### Schedule of Asset Gains/(Losses)

Year End	Original Amount	Recognized in Prior Years	Recognized in This Year	Recognized in Future Years
2016	\$ (624,000,243)	\$ (499,200,194)	\$ (124,800,049)	\$ 0
2017	447,141,757	268,285,054	89,428,351	89,428,352
2018	124,320,672	49,728,269	24,864,134	49,728,269
2019	(100,274,733)	(20,054,947)	(20,054,947)	(60,164,839)
2020	(241,792,937)	0	(48,358,587)	(193,434,350)
Total	\$ (394,605,484)	\$ (201,241,818)	\$ (78,921,098)	\$ (114,442,568)
8. Asset Gain/(Loss) to be Recognized in the Future			\$	(114,442,568)
9. Initial Actuarial Value as of June 30, 2020 (6) - (8)			\$	10,212,241,395
10. Constraining Values:				
a. 80% of market value (6) x 0.8			\$	8,078,239,062
b. 120% of market value (6) x 1.2			\$	12,117,358,592
11. Actuarial Value as of June 30, 2020 (9), but not less than (10a), nor greater than (10b)			\$	10,212,241,395

\*The June 30, 2019 market value of assets was revised after the 2019 valuation report was issued.



## SECTION 3 - SYSTEM LIABILITIES

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### Oklahoma Public Employees Retirement System

In the previous section, an actuarial valuation was compared with an inventory process, and an analysis was given of the inventory of assets of the System as of the July 1, 2020 valuation date. In this section, the discussion will focus on the commitments of the System, which are referred to as its liabilities.

Table 4 contains an analysis of the actuarial present value of all future benefits (PVFB) for contributing members, inactive members, retirees and their beneficiaries. The analysis is provided for each group.

The liabilities summarized in Table 4 include the actuarial present value of all future benefits expected to be paid with respect to each member. For an active member, this value includes measures of both benefits already earned and future benefits expected to be earned. For all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of the surviving beneficiaries.

The actuarial assumptions used to determine liabilities are based on the results of an experience study covering the three-year period ended June 30, 2019. This set of assumptions is shown in Appendix B. The liabilities reflect the benefit structure in place as of July 1, 2020.

#### Actuarial Liabilities

A fundamental principle in financing the liabilities of a retirement program is that the cost of its benefits should be related to the period in which benefits are earned, rather than to the period of benefit distribution. An actuarial cost method is a mathematical technique that allocates the present value of future benefits into annual costs. In order to do this allocation, it is necessary for the funding method to “break down” the present value of future benefits into two components:

- (1) that which is attributable to the past; and
- (2) that which is attributable to the future.

Actuarial terminology calls the part attributable to the past the “past service liability” or the “actuarial accrued liability.” The portion allocated to the future is known as the “present value of future normal costs,” with the specific piece of it allocated to the current year being called the “normal cost.” Table 5 contains the calculation of actuarial liabilities for all groups.

In valuations prior to July 1, 2011, the System used an assumption of a 2% annual COLA each year in developing liabilities and contribution rates. The System did not have an automatic COLA provision, but ad hoc COLAs had historically been granted by the Legislature. The 2011 Oklahoma Legislature passed House Bill 2132 which removed COLAs from the definition of “non-fiscal retirement bills” in the Oklahoma Pension Legislation Actuarial Analysis Act (OPLAAA). The impact of this change was to make any COLA bill subject to all of the requirements of OPLAAA, including the requirement that such bills provide adequate funding to pay the cost. As a result, beginning with the July 1, 2011 actuarial valuation, the liabilities of the System have been calculated without a COLA assumption. Also, as noted earlier in the report, should funding of future COLAs and/or stipends be provided by the System, the COLAs and/or stipends should be included in the actuarial valuation.



## SECTION 3 – SYSTEM LIABILITIES

### Oklahoma Public Employees Retirement System

**Table 4**

**Present Value of Future Benefits  
As of July 1, 2020**

	Regular	Elected Officials	Hazardous Duty	Total
1. Active Employees				
a. Retirement Benefit	\$ 4,123,148,422	\$ 192,554,989	\$ 227,060,474	\$ 4,542,763,885
b. Withdrawal Benefit	264,309,814	7,942,714	15,152,903	287,405,431
c. Pre-Retirement Death Benefit	89,165,964	2,021,143	3,253,343	94,440,450
d. Disability Benefit	69,283,122	2,436,104	3,474,633	75,193,859
e. Return of Member Contributions	34,185,330	447,423	6,583,014	41,215,767
f. Supplemental Medical Benefit	<u>159,560,667</u>	<u>4,835,690</u>	<u>9,040,904</u>	<u>173,437,261</u>
g. Subtotal	\$ 4,739,653,319	\$ 210,238,063	\$ 264,565,271	\$ 5,214,456,653
2. Inactive Nonvested Members				\$ 57,571,307
3. Inactive Vested Members				424,093,975
4. Return of Excess Contributions				243,744
5. Disabled Members				117,270,447
6. Retirees				5,837,527,097
7. Beneficiaries				423,073,397
8. Supplemental Medical Benefit for Retirees				201,307,235
9. Total Inactive Liability				\$ <u>7,061,087,202</u>
Sum of (2) through (8)				
10. Total PVFB (1g) + (9)				\$ 12,275,543,855



## SECTION 3 – SYSTEM LIABILITIES

### Oklahoma Public Employees Retirement System

Table 5

#### Actuarial Accrued Liability As of July 1, 2020

	Regular	Elected Officials	Hazardous Duty	Total
1. Present Value of Future Benefits for Active Members				
a. Retirement Benefit	\$ 4,123,148,422	\$ 192,554,989	\$ 227,060,474	\$ 4,542,763,885
b. Withdrawal Benefit	264,309,814	7,942,714	15,152,903	287,405,431
c. Pre-Retirement Death Benefit	89,165,964	2,021,143	3,253,343	94,440,450
d. Disability Benefit	69,283,122	2,436,104	3,474,633	75,193,859
e. Return of Member Contributions	34,185,330	447,423	6,583,014	41,215,767
f. Supplemental Medical Benefit	159,560,667	4,835,690	9,040,904	173,437,261
g. Subtotal	\$ 4,739,653,319	\$ 210,238,063	\$ 264,565,271	\$ 5,214,456,653
2. Present Value of Future Normal Costs for Active Members				
a. Retirement Benefit	\$ 842,374,276	\$ 24,549,611	\$ 77,291,380	\$ 944,215,267
b. Withdrawal Benefit	153,994,511	5,760,674	8,564,486	168,319,671
c. Pre-Retirement Death Benefit	22,821,792	362,825	1,251,335	24,435,952
d. Disability Benefit	23,244,035	613,014	1,391,117	25,248,166
e. Return of Member Contributions	109,215,397	2,874,104	11,843,511	123,933,012
f. Supplemental Medical Benefit	42,116,662	1,115,722	3,080,350	46,312,734
g. Subtotal	\$ 1,193,766,673	\$ 35,275,950	\$ 103,422,179	\$ 1,332,464,802
3. Present Value of Future Benefits for Inactive Members (Table 4)				\$ 7,061,087,202
4. Total Actuarial Accrued Liability (1g) - (2g) + (3)				\$ 10,943,079,053



## SECTION 4 – EMPLOYER CONTRIBUTIONS

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### Oklahoma Public Employees Retirement System

In the previous two sections, attention has been focused on the assets and the liabilities (present value of future benefits) of the System. A comparison of Tables 3 and 4 indicates there is a shortfall in current actuarial assets needed to meet the present value of all future benefits for current members and beneficiaries.

In an active system, there will always be a difference between the assets and the present value of all future benefits. An actuarial valuation determines a schedule of future contributions that will provide for this funding in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. Under an actuarial cost method, the contributions required to meet the difference between current assets and current liabilities are allocated each year between two elements: (1) the normal cost; and (2) the payment on the unfunded actuarial accrued liability.

The term “fully funded” is often applied to a system in which contributions at the normal cost rate are sufficient to pay for the benefits of existing employees as well as for those of new employees. More often than not, systems are not fully funded, either because of past benefit improvements that have not been completely funded and/or because of actuarial deficiencies that have occurred because experience has not been as favorable as anticipated under the actuarial assumptions. Under these circumstances, an unfunded actuarial accrued liability (UAAL) exists.

#### Description of Rate Components

The actuarial cost method used by the System is the traditional Entry Age Normal (EAN) cost method as a level percent of pay. Under the EAN cost method, the actuarial present value of each member’s projected benefit is allocated on a level basis over the member’s compensation between the entry age of the member and the assumed exit age. The portion of the actuarial present value allocated to the valuation year is called the normal cost. The actuarial present value of benefits allocated to prior years of service is called the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains/losses.

Effective with the July 1, 2008 valuation, the UAAL is amortized as a level percent of payroll over a closed 20-year period commencing July 1, 2007, with 10 years remaining in the amortization period. For July 1, 1998 and prior years, the unfunded actuarial accrued liability was amortized over 25 years from July 1, 1987. For the July 1, 1999 valuation, the amortization period was changed to 40 years from July 1, 1987. For members participating in the Pathfinder defined contribution plan, the employer sends to OPERS the difference between the OPERS required rate (16.5% for state members) and the amount required for the Pathfinder employer match. These extra contributions to OPERS allow the use of the level percent of payroll amortization method since they are expected to produce a payment stream that is constant, if not increasing, as a percent of covered payroll.

#### Contribution Rate Summary

The normal cost rate is developed in Table 6. Table 7 illustrates the development of the contribution rate for amortization of the unfunded actuarial accrued liability. Table 8 explains the development of the total actuarial contribution rate.





## SECTION 4 – EMPLOYER CONTRIBUTIONS

### Oklahoma Public Employees Retirement System

Table 6

#### Normal Cost Contribution Rates As a Percentage of Salary

	Regular	Elected Officials	Hazardous Duty	Total	% of Pay
1. Normal Cost					
a. Retirement Benefit	\$ 108,486,950	\$ 4,522,682	\$ 10,231,515	\$ 123,241,147	7.84%
b. Withdrawal Benefit	17,555,088	972,037	1,171,239	19,698,364	1.25%
c. Pre-Retirement Death Benefit	2,763,670	63,255	174,174	3,001,099	0.19%
d. Disability Benefit	2,669,649	96,812	192,302	2,958,763	0.19%
e. Return of Member Contributions	13,986,654	525,823	1,612,304	16,124,781	1.03%
f. Supplemental Medical Benefit	7,055,096	234,324	450,886	7,740,306	0.49%
g. Total	\$ 152,517,107	\$ 6,414,933	\$ 13,832,420	\$ 172,764,460	10.99%
2. Estimated Payroll for the Year	\$ 1,446,041,667	\$ 36,124,151	\$ 89,788,298	\$ 1,571,954,116	
3. Normal Cost Rate (1g)/(2)	10.55%	17.76%	15.41%	10.99%	



## SECTION 4 – EMPLOYER CONTRIBUTIONS

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### Oklahoma Public Employees Retirement System

Table 7

#### Unfunded Actuarial Accrued Liability Contribution Rate

1. Actuarial Present Value of Future Benefits	\$	12,275,543,855
2. Actuarial Present Value of Future Normal Costs		<u>1,332,464,802</u>
3. Actuarial Accrued Liability (1) - (2)	\$	10,943,079,053
4. Actuarial Value of Assets		<u>10,212,241,395</u>
5. Unfunded Actuarial Accrued Liability (UAAL) (3) - (4)	\$	730,837,658
6. Amortization of UAAL over 20 years from July 1, 2007 (assumed mid-year) <sup>1</sup>	\$	118,016,407
7. Total Estimated Payroll for Year Ending June 30, 2021 <sup>2</sup>	\$	1,907,051,003
8. Amortization as a Percent of Payroll		6.19%

<sup>1</sup> The UAAL is amortized as a level percent of payroll, assuming payroll increases 3.25% per year.

<sup>2</sup> Includes \$335,096,887 in payroll on behalf of DC plan participants.



## SECTION 4 – EMPLOYER CONTRIBUTIONS

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### Oklahoma Public Employees Retirement System

Table 8

#### Actuarial Contribution Rate

	July 1,	
	2020	2019
1. Total Normal Cost Rate	10.99%	10.15%
2. Amortization of UAAL <sup>1</sup>	6.19%	1.08%
3. Budgeted Expenses <sup>2</sup>	<u>0.47%</u>	<u>0.47%</u>
4. Total Actuarial Contribution Rate (1) + (2) + (3)	17.65%	11.70%
5. Estimated Member Contribution Rate	<u>4.24%</u>	<u>4.19%</u>
6. Employer Actuarial Contribution Rate (4) - (5)	13.41%	7.51%

<sup>1</sup> Amortization of UAAL is a level percent of payroll. Recognizes contributions received on behalf of defined contribution plan members.

<sup>2</sup> Provided by the System.



## SECTION 4 – EMPLOYER CONTRIBUTIONS

### Oklahoma Public Employees Retirement System

**Table 9**

#### Calculation of Actuarial Gain/(Loss)

1. Expected Actuarial Accrued Liability		
a. Actuarial accrued liability at July 1, 2019	\$	10,047,374,213
b. Normal cost at mid-year		160,782,080
c. Benefit payments for fiscal year ending June 30, 2020		(661,291,797)
d. Interest on (a), (b), and (c)		686,094,635
e. Impact of assumption changes		553,467,830
f. Impact of benefit changes		182,976,638
g. Expected actuarial accrued liability as of July 1, 2020	\$	10,969,403,599
(a) + (b) + (c) + (d) + (e) + (f)		
2. Actuarial Accrued Liability at July 1, 2020	\$	10,943,079,053
3. Actuarial Accrued Liability Gain/(Loss) (1g) - (2)	\$	26,324,546
4. Expected Actuarial Value of Assets		
a. Actuarial value of assets at July 1, 2019	\$	9,909,683,940
b. Contributions for fiscal year ending June 30, 2020		361,926,046
c. Benefit payment and administrative expenses for fiscal year ending June 30, 2020		(667,017,809)
d. Interest on (a), (b), and (c)		683,180,265
e. Expected actuarial value of assets as of July 1, 2020	\$	10,287,772,442
(a) + (b) + (c) + (d)		
5. Actuarial Value of Assets at July 1, 2020	\$	10,212,241,395
6. Actuarial Value of Assets Gain/(Loss) (5) - (4e)	\$	(75,531,047)
7. Net Actuarial Gain/(Loss) (3) + (6)	\$	(49,206,501)



## SECTION 4 – EMPLOYER CONTRIBUTIONS

### Oklahoma Public Employees Retirement System

**Table 10**

#### Summary of Contribution Requirements

	Actuarial Valuation as of		Percent Change
	July 1, 2020	July 1, 2019	
1. Expected Annual Payroll	\$ 1,571,954,116	\$ 1,584,630,994	(0.8%)
2. Total Normal Cost	\$ 172,764,460	\$ 160,782,080	7.5%
3. Unfunded Actuarial Accrued Liability	\$ 730,837,658	\$ 137,690,273	430.8%
4. Amortization of Unfunded Actuarial Accrued Liability over 20 Years from July 1, 2007*	\$ 118,016,407	\$ 19,943,299	491.8%
5. Budgeted Expenses (Provided by the System)	\$ 7,425,538	\$ 7,392,383	0.4%
6. Total Required Contribution (2) + (4) + (5)	\$ 298,206,405	\$ 188,117,762	58.5%
7. Estimated Member Contributions	\$ 66,641,720	\$ 66,381,018	0.4%
8. Required Employer Contribution (6) - (7)	\$ 231,564,685	\$ 121,736,744	90.2%
9. Previous Year's Actual Contribution			
a. Member	\$ 67,808,024	\$ 66,566,433	1.9%
b. Employer	294,118,022	282,473,659	4.1%
c. Total	\$ 361,926,046	\$ 349,040,092	3.7%

\*Amortization of UAAL is a level percent of payroll.



## SECTION 5 – RISK CONSIDERATION

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### Oklahoma Public Employees Retirement System

Actuarial Standards of Practice are issued by the Actuarial Standards Board and are binding on credentialed actuaries practicing in the United States. These standards generally identify what the actuary should consider, document and disclose when performing an actuarial assignment. In September, 2017, Actuarial Standard of Practice Number 51, *Assessment and Disclosure of Risk in Measuring Pension Obligations*, (ASOP 51) was issued as final with application to measurement dates on or after November 1, 2018. This ASOP, which applies to funding valuations, actuarial projections, and actuarial cost studies of proposed plan changes, was first applicable for the July 1, 2019 actuarial valuation for the Oklahoma Public Employees Retirement System (System).

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal risk or the plan could become “pay as you go”. The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including the impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for contribution rates to be too high for the plan sponsor/employer to pay; and
- external risks such as the regulatory and political environment.

There is a direct correlation between healthy, well-funded retirement plans and consistent contributions equal to the full actuarial contribution rate each year. The sources of funding for OPERS do not guarantee that the full contributions will be made, but because the System is currently well-funded, the amounts are currently sufficient. There is a risk if the funded status declines significantly that the contribution structure would not be able to return the System to being well-funded.

Another significant risk factor for OPERS is investment return because of the volatility of returns and the size of plan assets compared to payroll (see Table 11). A perusal of historical returns over 10-20 years reveals that the actual return each year is rarely close to the average return for the same period. This is to be expected, given the underlying capital market assumptions and the System’s asset allocation.



## SECTION 5 – RISK CONSIDERATION

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Finally, because OPERS is a partially closed plan, there will be a decline in active membership for a number of years as current active employees leave, but are not replaced by an OPERS defined benefit plan member due to their participation in Pathfinder. Usually this would raise concerns because there would be a shrinking payroll over which to fund the amortization of the UAAL. Since OPERS currently collects contributions on the pay of the state employees not covered by OPERS and since OPERS is well funded, there is less concern with the partial closure. Should the funding approach change, however, there could be a significant increase in the risks faced by OPERS.

A key demographic risk for all retirement systems, including OPERS, is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions anticipate some improvements in mortality experience over time and these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, which would also be significant, although more easily absorbed. While either of these events could happen, they are not frequent events and are generally modest in their impact, and thus represent much less risk than the volatility associated with investment returns. We note that as we prepare this report, the world is in the midst of a pandemic. At this time, it is not clear what, if any, impact this will have on the OPERS plan. However, these events do point out the wisdom of considering what risks a plan may face.

The following exhibits summarize some historical information that helps indicate how certain key risk metrics have changed over time. Many are due to the maturing of the retirement system.





## SECTION 5 – RISK CONSIDERATION

### Oklahoma Public Employees Retirement System

Table 11

#### Historical Asset Volatility Ratios

As a retirement system matures, the size of the market value of assets increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

Actuarial Valuation Date	Market Value of Assets	Estimated Plan Year Payroll	Asset Volatility Ratio	Increase in ACR with a Return 10% Lower than Assumed*
7/1/2005	\$5,504,489,147	\$1,454,210,509	3.79	6.12%
7/1/2006	5,817,165,538	1,568,350,023	3.71	5.99%
7/1/2007	6,640,477,411	1,626,737,832	4.08	6.59%
7/1/2008	6,255,207,565	1,682,663,413	3.72	6.01%
7/1/2009	5,173,537,778	1,732,975,532	2.99	4.83%
7/1/2010	5,774,379,263	1,683,697,139	3.43	5.54%
7/1/2011	6,841,001,769	1,570,500,148	4.36	7.04%
7/1/2012	6,821,303,541	1,633,837,374	4.18	6.75%
7/1/2013	7,441,781,618	1,695,347,809	4.39	7.09%
7/1/2014	8,570,104,910	1,744,041,536	4.91	7.93%
7/1/2015	8,636,441,984	1,808,972,785	4.77	7.70%
7/1/2016	8,435,578,907	1,790,809,603	4.71	7.61%
7/1/2017	9,229,499,873	1,688,543,856	5.47	8.83%
7/1/2018	9,702,031,567	1,601,074,591	6.06	9.79%
7/1/2019	9,958,113,213	1,584,630,994	6.28	10.14%
7/1/2020	10,097,798,827	1,571,954,116	6.42	10.37%

*Note: Years prior to 7/1/2010 were provided by the prior actuary.*

\*The impact of asset smoothing is not reflected in the impact on the Actuarial Contribution Rate (ACR). Current year assumptions are used for all years shown.

The assets at June 30, 2020 are 642% of payroll, so underperforming the investment return assumption by 1.00% (i.e., earn 5.50% for one year) is equivalent to 6.42% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAAL, this illustrates the risk associated with volatile investment returns.



## SECTION 5 – RISK CONSIDERATION

### Oklahoma Public Employees Retirement System

**Table 12**

#### Historical Cash Flows

Plans with negative cash flows will experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments. Note that negative cash flows are expected in mature retirement systems. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of MVA that may cause significant concerns. OPERS has generally had negative cash flows of less than 3% in recent years, so there is no concern for the foreseeable future.

<b>Year End</b>	<b>Market Value of Assets (MVA)</b>	<b>Contributions</b>	<b>Benefit Payments and Expenses</b>	<b>Net Cash Flow</b>	<b>Net Cash Flow as a Percent of MVA</b>
6/30/2005	\$5,504,489,147	\$191,775,056	\$336,037,736	(\$144,262,680)	(2.62%)
6/30/2006	5,817,165,538	227,261,755	349,539,019	(122,277,264)	(2.10%)
6/30/2007	6,640,477,411	261,936,847	377,414,439	(115,477,592)	(1.74%)
6/30/2008	6,255,207,565	286,775,377	395,397,691	(108,622,314)	(1.74%)
6/30/2009	5,173,537,778	311,734,343	426,155,646	(114,421,303)	(2.21%)
6/30/2010	5,774,379,263	328,820,672	444,874,268	(116,053,596)	(2.01%)
6/30/2011	6,841,001,769	319,336,013	479,400,000	(160,063,987)	(2.34%)
6/30/2012	6,821,303,541	329,009,579	503,400,243	(174,390,664)	(2.56%)
6/30/2013	7,441,781,618	338,195,447	521,895,082	(183,699,635)	(2.47%)
6/30/2014	8,570,104,910	350,571,518	540,228,497	(189,656,979)	(2.21%)
6/30/2015	8,636,441,984	365,330,320	563,282,356	(197,952,036)	(2.29%)
6/30/2016	8,435,578,907	370,050,081	586,669,682	(216,619,601)	(2.57%)
6/30/2017	9,229,499,873	358,615,175	614,308,717	(255,693,542)	(2.77%)
6/30/2018	9,702,031,567	344,916,830	632,863,130	(287,946,300)	(2.97%)
6/30/2019	9,958,113,213	349,040,092	661,088,933	(312,048,841)	(3.13%)
6/30/2020	10,097,798,827	361,926,046	667,017,809	(305,091,763)	(3.02%)

*Note: Years prior to 6/30/2010 were provided by the prior actuary.*



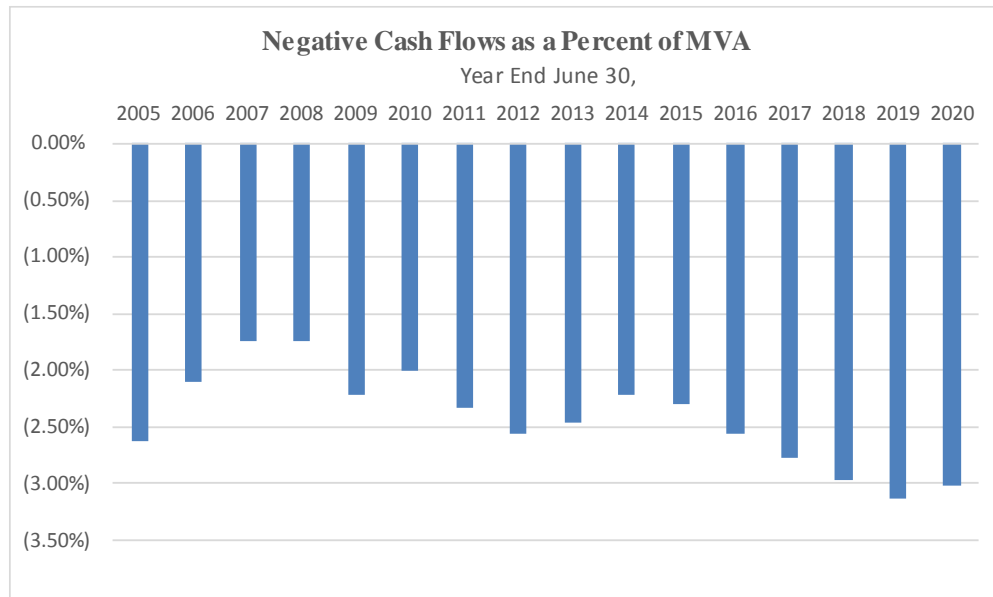
## SECTION 5 – RISK CONSIDERATION

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### Oklahoma Public Employees Retirement System

Table 12 (continued)

#### Historical Cash Flows





## SECTION 5 – RISK CONSIDERATION

### Oklahoma Public Employees Retirement System

Table 13

#### Liability Maturity Measurement

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. The retirement of the remaining baby boomers over the next decade is expected to further exacerbate the aging of the retirement system population. With more of the total liability residing with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs.

Projections provide the most effective way of analyzing the impact of these changes on future funding measures, but studying several key metrics from the valuation can also provide some valuable insight.

Year End	Retiree Liability (a)	Total Actuarial Accrued Liability (b)	Retiree Percentage (a / b)	Covered Payroll (c)	Ratio (b/c)
6/30/2005	\$3,310,805,089	\$7,575,419,808	43.7%	\$1,454,210,509	5.21
6/30/2006	3,533,634,732	7,914,657,886	44.6%	1,568,350,023	5.05
6/30/2007	3,742,715,550	8,413,248,130	44.5%	1,626,737,832	5.17
6/30/2008	4,050,368,848	8,894,287,254	45.5%	1,682,663,413	5.29
6/30/2009	4,241,876,602	9,291,457,837	45.7%	1,732,975,532	5.36
6/30/2010	4,484,099,170	9,622,627,833	46.6%	1,683,697,139	5.72
6/30/2011	4,153,994,755	8,179,767,661	50.8%	1,570,500,148	5.21
6/30/2012	4,321,790,926	8,334,637,900	51.9%	1,633,837,374	5.10
6/30/2013	4,512,915,419	8,556,121,906	52.7%	1,695,347,809	5.05
6/30/2014	4,652,763,014	8,753,669,153	53.2%	1,744,041,536	5.02
6/30/2015	4,864,693,645	8,996,125,901	54.1%	1,808,972,785	4.97
6/30/2016	5,173,659,555	9,427,809,623	54.9%	1,790,809,603	5.26
6/30/2017	5,526,693,946	9,781,617,070	56.5%	1,688,543,856	5.79
6/30/2018	5,677,148,092	9,884,133,615	57.4%	1,601,074,591	6.17
6/30/2019	5,828,546,805	10,047,374,213	58.0%	1,584,630,994	6.34
6/30/2020	6,377,870,941	10,943,079,053	58.3%	1,571,954,116	6.96

*Note: Years prior to 6/30/2010 were provided by the prior actuary.*



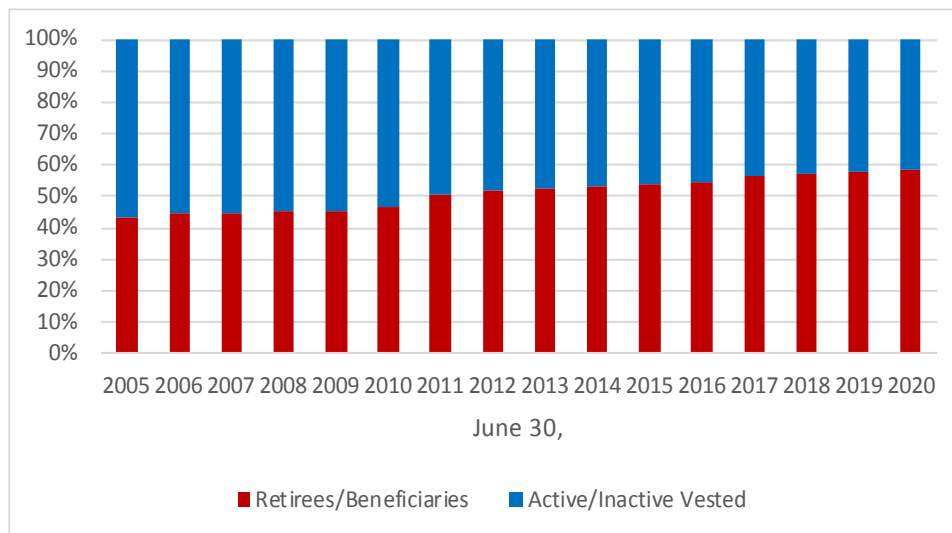
## SECTION 5 – RISK CONSIDERATION

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### Oklahoma Public Employees Retirement System

Table 13 (continued)

#### Liability Maturity Measurement





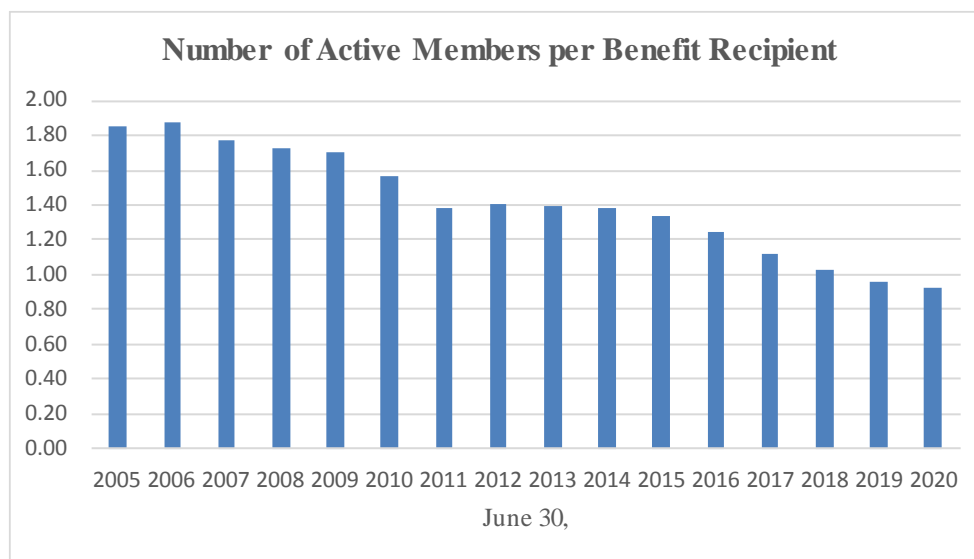
## SECTION 5 – RISK CONSIDERATION

### Oklahoma Public Employees Retirement System

Table 14

Valuation Date July 1	Historical Member Statistics							
	Active Members				Retired Members			
	Number	Payroll	Average Salary		Number	Active/ Retired	Average Benefits	
			\$	% Incr.			\$	% Incr.
2005	43,918	\$1,454,210,509	\$33,112		23,679	1.85	\$12,899	
2006	45,472	1,568,350,023	34,490	4.16%	24,372	1.87	13,529	4.88%
2007	44,712	1,626,737,832	36,383	5.49%	25,233	1.77	13,749	1.63%
2008	45,120	1,682,663,413	37,293	2.50%	26,033	1.73	14,449	5.09%
2009	45,683	1,732,975,532	37,935	1.72%	26,949	1.70	14,629	1.25%
2010	43,934	1,683,697,139	38,323	1.02%	28,009	1.57	14,877	1.70%
2011	40,551	1,570,500,148	38,729	1.06%	29,418	1.38	15,226	2.35%
2012	42,569	1,633,837,374	38,381	(0.90%)	30,263	1.41	15,422	1.29%
2013	43,273	1,695,347,809	39,178	2.08%	31,135	1.39	15,679	1.67%
2014	43,947	1,744,041,536	39,685	1.29%	31,833	1.38	15,862	1.17%
2015	43,843	1,808,972,785	41,260	3.97%	32,754	1.34	16,144	1.78%
2016	41,806	1,790,809,603	42,836	3.82%	33,749	1.24	16,404	1.61%
2017	38,873	1,688,543,856	43,437	1.40%	34,579	1.12	16,673	1.64%
2018	36,329	1,601,074,591	44,072	1.46%	35,260	1.03	16,884	1.27%
2019	34,536	1,584,630,994	45,883	4.11%	35,869	0.96	17,134	1.48%
2020	33,115	1,571,954,116	47,470	3.46%	36,179	0.92	17,930	4.65%

Note: Years prior to 7/1/2010 were provided by the prior actuary.





## SECTION 5 – RISK CONSIDERATION

### Oklahoma Public Employees Retirement System

Table 15

#### Comparison of Valuation Results under Alternate Investment Return Assumptions

Investment Return Assumption	5.50%	6.00%	6.50%	7.00%	7.50%
<b>Contributions</b>					
Normal Cost Rate	13.88%	12.33%	10.99%	9.82%	8.81%
Amortization of UAAL	16.19%	11.05%	6.19%	1.58%	(2.80%)
Budgeted Expenses	0.47%	0.47%	0.47%	0.47%	0.47%
Total Actuarial Determined Contribution	30.54%	23.85%	17.65%	11.87%	6.48%
Member Contribution Rate	(4.24%)	(4.24%)	(4.24%)	(4.24%)	(4.24%)
Statutory State Contribution Rate	(16.50%)	(16.50%)	(16.50%)	(16.50%)	(16.50%)
<b>Contribution Shortfall/(Surplus)</b>	9.80%	3.11%	(3.09%)	(8.87%)	(14.26%)
<b>Actuarial Value of Assets (\$ in thousands)</b>	\$10,212,241	\$10,212,241	\$10,212,241	\$10,212,241	\$10,212,241
<b>Actuarial Accrued Liability</b>	\$12,186,089	\$11,537,995	\$10,943,079	\$10,396,174	\$9,892,330
<b>Funded Ratio</b>	83.8%	88.5%	93.3%	98.2%	103.2%

Note: All other assumptions are unchanged for purposes of this sensitivity analysis.





## **SECTION 6 – OTHER INFORMATION**

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### **Oklahoma Public Employees Retirement System**

In this section we also provide exhibits showing the funding progress, present value of accumulated benefits, and an exhibit showing the expected benefit payments for the System.



## SECTION 6 – OTHER INFORMATION

### Oklahoma Public Employees Retirement System

**Table 16**

#### Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b)-(a)	Funded Ratio (a)/(b)	Covered Payroll (c)	UAAL as a Percent of Covered Payroll ((b) - (a))/(c)
7/1/2011	\$6,598,627,939	\$8,179,767,661	\$1,581,139,722	80.7%	\$1,570,500,148	100.7%
7/1/2012	6,682,200,296	8,334,637,900	1,652,437,604	80.2%	1,633,837,374	101.1%
7/1/2013	6,978,873,421	8,556,121,906	1,577,248,485	81.6%	1,695,347,809	93.0%
7/1/2014	7,759,257,716	8,753,669,153	994,411,437	88.6%	1,744,041,536	57.0%
7/1/2015	8,420,306,645	8,996,125,901	575,819,256	93.6%	1,808,972,785	31.8%
7/1/2016	8,790,886,036	9,427,809,623	636,923,587	93.2%	1,790,809,603	* 35.6%
7/1/2017	9,241,292,469	9,781,617,070	540,324,601	94.5%	1,688,543,856	* 32.0%
7/1/2018	9,658,125,021	9,884,133,515	226,007,594	97.7%	1,601,074,591	* 14.1%
7/1/2019	9,909,683,940	10,047,374,213	137,690,273	98.6%	1,584,630,994	* 8.7%
7/1/2020	10,212,241,395	10,943,079,053	730,837,658	93.3%	1,571,954,116	* 46.5%

\*Covered Payroll shown is for the defined benefit plan members only although employer contributions toward the UAAL are being received on behalf of defined contribution plan members.



## SECTION 6 – OTHER INFORMATION

### Oklahoma Public Employees Retirement System

Table 17

#### Projected Benefit Payments

The table below shows estimated benefits expected to be paid over the next ten years, based on the assumptions used in this valuation. The “Actives” column shows the benefits expected to be paid to members currently active on July 1, 2020. The “Retirees” column shows benefits expected to be paid to members receiving benefit payments as of July 1, 2020 or to members who have terminated employment and are entitled to a deferred vested benefit.

#### Retirement, Survivor and Withdrawal Benefits

Year Ending June 30	Actives	Retirees	Total
2021	\$ 31,594,000	\$ 653,252,000	\$ 684,846,000
2022	63,144,000	642,539,000	705,683,000
2023	92,509,000	631,286,000	723,795,000
2024	120,403,000	619,521,000	739,924,000
2025	148,454,000	606,885,000	755,339,000
2026	175,494,000	593,523,000	769,017,000
2027	201,839,000	579,181,000	781,020,000
2028	227,227,000	564,363,000	791,590,000
2029	252,837,000	548,244,000	801,081,000
2030	278,370,000	531,696,000	810,066,000

#### Supplemental Medical Premium Benefits

Year Ending June 30	Actives	Retirees	Total
2021	\$ 1,110,000	\$ 18,383,000	\$ 19,493,000
2022	2,789,000	18,111,000	20,900,000
2023	4,318,000	17,826,000	22,144,000
2024	5,722,000	17,529,000	23,251,000
2025	7,039,000	17,206,000	24,245,000
2026	8,273,000	16,881,000	25,154,000
2027	9,417,000	16,509,000	25,926,000
2028	10,454,000	16,127,000	26,581,000
2029	11,411,000	15,699,000	27,110,000
2030	12,304,000	15,274,000	27,578,000



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

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### Oklahoma Public Employees Retirement System

Following is a summary of the major System provisions used to determine the System's financial position as of July 1, 2020.

**Effective date and fiscal year**

The System became effective January 1, 1964. The fiscal year is July 1 to June 30.

**Administration**

The System is administered by the Oklahoma Public Employees Retirement System Board of Trustees. The Board acts as the fiduciary for the investment and administration of the System.

**Employees included**

All permanent employees of the State of Oklahoma, and any other employer such as a county, county hospital, city or town, conservation districts, circuit engineering districts, and any trust in which a county, city or town participates and is the primary beneficiary, are eligible to join if:

- a) the employee is not eligible for or participating in another retirement system authorized under Oklahoma law, is covered by Social Security and is not participating in the U.S. Civil Service Retirement System; and
- b) the employee is scheduled for at least 1,000 hours per year and salary is not less than the hourly rate of the monthly minimum wage for State employees (for employees of local government employers, not less than the hourly rate of the monthly minimum wage for such employees).

Membership is mandatory for new eligible employees on the first of the month following employment. Effective November 1, 2015, the Plan is closed to most new State employees. Any employee with service in the System prior to November 1, 2015 will continue to be a member or will join the System upon re-employment with a participating employer.

**Employer and employee contributions**

Most State employees except Hazardous Duty employees and most elected officials:

Employee:	3.5%
Employer:	16.5%
Total:	20.0%



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

### Oklahoma Public Employees Retirement System

#### Employer and employee contributions

(continued)

Prior to July 1, 2006 the employee contribution rate varied on pay above/below \$25,000 as shown in the chart at the end of this section. This plan provision was changed by the 2006 Legislature.

Before November 1, 2010, elected officials selected a contribution rate of 4.5%, 6%, 7.5%, 8.5%, 9% or 10% which determined the computation factor used in calculating their benefit. Elected officials elected or appointed on or after November 1, 2010 (but before November 1, 2011) were limited to selecting either the 4.5% contribution rate or the 10% contribution rate. Those elected after November 1, 2011 contribute at 3.5% like most non-elected members.

Contributions for Hazardous Duty employees are summarized at the end of this appendix.

Local government employees contribute from 3.5% to 8.5% of pay, depending on the rate chosen by their employers.

Starting in 2004, regular members may make an election to contribute an additional 2.91% of pay and increase their accrual rate for future years of service to 2.5% (referred to as Step-Up Option). Elected officials elected on or after November 1, 2011 may also elect Step-Up.

Contributions are based on compensation defined by the Board.

#### Contribution Summary: Regular State Contributions (By Statute) For Pay Under \$25,000

Fiscal Year	Employer Contribution	Employee Contribution	Total Contribution	Applicable Salary Cap
1994-1995	11.5%	2.0%	13.5%	\$50,000
1995-1996	11.5%	2.0%	13.5%	\$60,000
1996-1997	12.0%	2.5%	14.5%	\$70,000
1997-1998	12.5%	3.0%	15.5%	\$80,000
1998-1999	12.5%	3.0%	15.5%	No Cap
1999-2005	10.0%	3.0%	13.0%	No Cap
2005-2006	11.5%	3.0%	14.5%	No Cap



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

### Oklahoma Public Employees Retirement System

#### Employer and employee contributions

(continued)

For Pay Between \$25,000 and Cap				
Fiscal Year	Employer Contribution	Employee Contribution	Total Contribution	Applicable Salary Cap
1994-1995	11.5%	3.5%	15.0%	\$50,000
1995-1996	11.5%	3.5%	15.0%	\$60,000
1996-1997	12.0%	3.5%	15.5%	\$70,000
1997-1998	12.5%	3.5%	16.0%	\$80,000
1998-1999	12.5%	3.5%	16.0%	No Cap
1999-2005	10.0%	3.5%	13.5%	No Cap
2005-2006	11.5%	3.5%	15.0%	No Cap

For All Pay			
Fiscal Year	Employer Contribution	Employee Contribution	Total Contribution
2006-2007	12.5%	3.5%	16.0%
2007-2008	13.5%	3.5%	17.0%
2008-2009	14.5%	3.5%	18.0%
2009-2011	15.5%	3.5%	19.0%
2011-Present	16.5%	3.5%	20.0%

#### Years of Service

##### Prior Service

All service of the employee prior to the employer's entry date is credited prior service providing the participating employer joined on or before January 1, 1975. Prior service for employees of employers who join after January 1, 1975, may be purchased by the employee. Prior service is allowed for certain active wartime military service (maximum 5 years credit) for members employed prior to July 1, 2000 and for employment with public schools or Board of Regents for Higher Education prior to July 1943. Service need not be continuous employment to be credited.



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

---

### Oklahoma Public Employees Retirement System

#### Years of Service

##### Participating Service

After the employer's entry date, a member's participating service is credited for all periods of employment for which required contributions are made. Service is prorated according to hours worked per month on and after July 1, 1979. Certain active wartime military service is credited, provided the contribution accumulation is not withdrawn. Active and retired members are credited with additional participating service based on their accumulated contributions prior to June 30, 1977 (if not withdrawn prior to retirement), according to the following:

<u>Member Accumulation</u>				<u>Additional Years</u>
\$	1	to	\$ 500	1
	501	to	1,000	2
	1,001	to	1,500	3
	1,501	to	2,000	4
	2,001	to	More	5

A member who has withdrawn his or her contributions and later returns to membership may repay the amount withdrawn plus interest as determined by the Board to reinstate participating service which was canceled by his or her withdrawal.

A member may receive credit for those years of service as an elected official if the member is not receiving credit for that service in any other public retirement system. The member must pay an amount equal to the actuarial cost to fund the difference between the member's projected benefits with and without the additional service credit.

The total participating service of a member who retires or terminates employment and elects a vested benefit shall include up to one hundred thirty (130) days of unused sick leave accumulated subsequent to August 1, 1959, during the member's employment with any participating employer. Such credit shall be added in terms of whole months. If unused sick leave entitles the member to an additional year of service, the additional cost is borne by the employer. For members joining on or after November 1, 2012, any additional months of unused sick leave credit will be added to the service credit without rounding the total service up to the next higher year. Any cost to the employer will be based on the actual number of months of unused sick leave.



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

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### Oklahoma Public Employees Retirement System

#### Years of Service

##### **Participating Service** (continued)

A member may receive credit for those years of credited service accumulated while a member of the Oklahoma Firefighters Pension and Retirement System, the Oklahoma Police Pension and Retirement System, the Uniform Retirement System for Justices and Judges, the Oklahoma Law Enforcement Retirement System, or the Teachers' Retirement System of Oklahoma, if the member is not receiving or eligible to receive retirement credit or benefits from this service in any other public retirement system. The member may receive credit for this service by paying the amount actuarially determined to cover the cost of the previous service.

##### **Credited Service**

Credited service equals prior service plus participating service. The result is rounded up to the next year if the number of remaining months is equal to or greater than six. Credited service of members joining on or after November 1, 2012 will not be rounded up. Members will be credited with, and their benefit calculation will be computed on, the actual number of years and months of credited service.

#### Compensation

The member's basic salary and wages as defined by the Board of Trustees, including amounts contributed to deferred compensation plans. Overtime and moving expenses are excluded.

#### Final average compensation

The average of the thirty-six (36) highest months of compensation earned within the last ten (10) years of participating service. For members hired on or after July 1, 2013, final average compensation is the average of the sixty (60) highest months of compensation earned within the last ten (10) years of participating service. Final average compensation will be subject to any applicable salary caps and based on salary on which contributions have been made.

For all members hired prior to July 1, 1995, the minimum final average compensation is \$13,800. For members hired on or after July 1, 1995, no minimum is applied until the member has fifteen (15) years of service. For members with between fifteen (15) and twenty (20) years of service, the minimum final average compensation is \$6,900. For a member with more than twenty (20) years of service, the minimum is \$13,800.





## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

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### Oklahoma Public Employees Retirement System

#### Normal retirement date

Normal retirement is the earliest of: (1) first day of the month coinciding with or next following the 62<sup>nd</sup> birthday; or, (2) the first day of the month coinciding with or following the date at which the sum of a member's age and number of years of credited service total eighty (80) if the member was hired prior to July 1, 1992; or (3) following the date at which the sum of member's age and number of years of credited service total ninety (90) if the member was hired after July 1, 1992. Members employed after January 1, 1983 must complete at least six (6) years of full-time equivalent employment with a participating employer before receiving any retirement benefits.

For regular employees hired on or after November 1, 2011, the retirement age is 65. Alternatively, they may retire under the "Rule of 90" if they are at least age 60.

The normal retirement date for elected officials is the first of the month coinciding with or following the official's 60th birthday or the first day of the month coinciding with or following the date at which the sum of the member's age and years of credited service total eighty (80).

For elected officials appointed or elected on or after November 1, 2011, the retirement age is 65 with a minimum of eight (8) years of elected service, or age 62 if they have ten (10) years of elected service.

#### Normal retirement benefit

The benefit on or after normal retirement, payable monthly for life to non-elected members, is as follows:

2% of final average compensation multiplied by years of credited service.

For members who have elected the Step-Up Option, a 2.5% multiplier is applied to the "stepped-up" full years. Elected officials appointed or elected on or after November 1, 2011, are also eligible for the Step-Up Option.



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

---

### Oklahoma Public Employees Retirement System

#### Normal retirement benefit

(continued)

The benefit payable monthly for life to elected officials is the greater of 1) the preceding benefit, or 2) the benefit calculated using highest annual compensation as an elected official times credited service multiplied by the following applicable computation factor:

<u>% of Compensation Contributed</u>	<u>% of Highest Annual Compensation</u>
4.5%	1.9%
6.0%	2.5%
7.5%	3.0%
8.5%	3.4%
9.0%	3.6%
10.0%	4.0%

Elected officials who became members after July 1, 1990 must participate in the System as elected officials for at least six (6) years to qualify for the elected official benefit formula on all years of previous non-elected participating service. For elected officials elected or appointed on or after November 1, 2011, the vesting period is eight (8) years.

OPERS members who are elected after August 21, 2008 have a benefit cap of 100% of their highest annual salary. Elected officials who become members after August 21, 2008 (but before November 1, 2011) receive a benefit that consists of two separate calculations. Their non-elected years are multiplied by 2% and their elected years are multiplied by the applicable percentage selected and paid for by the members.

Elected officials who are appointed or elected on or after November 1, 2010 (but before November 1, 2011) have two benefit multiplier options: 1.9% and 4.0%. Those elected after November 1, 2011 contribute at 3.5%, like most non-elected members, and have a multiplier of 2%. In addition, they must be age 62 with at least ten (10) years as an elected official, or age 65 with at least eight (8) years as an elected official, to qualify for retirement.



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

---

### Oklahoma Public Employees Retirement System

#### Early retirement benefit

A member with at least ten (10) years of participating service may retire as early as age 55. The benefit is determined by the normal retirement formula based on years of credited service and Final Average Compensation (highest annual compensation for elected officials) at termination. The percentage payable at early retirement age is:

<u>Elected Officials</u>		<u>Other Members</u>	
Age	Percentage	Age	Percentage
60	100%	62	100.00%
59	94	61	93.33
58	88	60	86.67
57	82	59	80.00
56	76	58	73.33
55	70	57	66.67
		56	63.33
		55	60.00

The following tables apply to regular and hazardous duty employees employed, or elected officials appointed or elected, on or after November 1, 2011:

<u>Elected Officials</u>		<u>Other Members</u>	
Age	Percentage	Age	Percentage
62	100.00%	65	100.00%
61	93.33	64	93.33
60	86.67	63	86.67
		62	80.00
		61	73.33
		60	66.67



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

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### Oklahoma Public Employees Retirement System

#### **Disability benefit**

A member with at least eight (8) years of credited service is eligible for a disability benefit provided the member qualifies for disability benefits as certified by the Social Security Administration or the Railroad Retirement Board and having a date of disability within one year after the date last physically on the job. The benefit is determined by the normal retirement formula based on service and salary history at date of disability. The benefit is payable immediately without actuarial reduction. Option A is the only available form of survivor payment for non-elected members.

#### **Vested benefit**

A member who terminates after eight (8) years of credited service (six years for most elected officials) is eligible for a vested benefit determined by the normal retirement formula, based on service and compensation to date of termination.

The benefit is payable at age 62 (or age 60 for most elected officials), provided the member's contribution accumulation is not withdrawn and the member has at least six (6) years of full-time equivalent employment. A member with ten (10) or more years of service also has the option of reduced benefits at early retirement age.

Members terminating with less than eight (8) years (or six years for most elected officials) of credited service may elect to receive a refund of their member contribution accumulation.

A limited additional retirement service benefit of \$200 per month is payable up to the total of excess contributions paid by the member for those vested members as of July 1, 1998. This is not applicable for active members who received a transfer of excess contributions or retired members as of July 1, 1998.

For regular employees employed on or after November 1, 2011, a vested benefit is not payable for Normal Retirement until age 65. For elected officials appointed or elected on or after November 1, 2011, a vested benefit requires at least eight (8) years of elected service and is not payable for normal retirement until age 65.



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

---

### Oklahoma Public Employees Retirement System

#### **Pre-retirement death benefit**

For a deceased active member who had met normal, early or vested retirement provisions, the spouse may elect a spouse's benefit. This spouse's benefit is the amount that would have been paid if the member had instead retired and elected the joint and 100% survivor option (Option B). If named as the designated beneficiary, the spouse may elect a refund of the deceased member's contribution accumulation in lieu of the Option B monthly benefit.

In addition to the provision above, the eligible spouse of a deceased elected official with at least six (6) years of elected service or eight (8) years if elected on or after November 1, 2011, and married at least three (3) years immediately preceding death, may elect to receive 50% of the maximum benefit the member would have been eligible to receive. The starting date of benefits is the date the deceased member would have been eligible for early or normal retirement. Benefits cease upon death of the surviving spouse.

Any other designated beneficiary of a member other than an eligible spouse will receive a refund of the deceased member's contribution accumulation.

#### **Post-retirement death benefit**

Upon the death of a retired member, a \$5,000 lump-sum death benefit will be paid to the member's beneficiary, or estate if there is no beneficiary.



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

---

### Oklahoma Public Employees Retirement System

<b>Optional form of retirement benefits</b>	<p>The normal form of benefit for an unmarried member, other than an elected official, is a single life monthly annuity with a guaranteed refund of the unpaid employee contribution accumulation. The normal form for a married member is a 50% joint and survivor annuity benefit. Optional forms of payment with actuarial reduction are available to all members retiring under the normal retirement, early retirement or vested retirement provision. These options are:</p> <p>Option A – Joint and 50% Survivor Annuity with a return to the unreduced amount if the joint annuitant dies.</p> <p>Option B – Joint and 100% Survivor Annuity with a return to the unreduced amount if the joint annuitant dies.</p> <p>Option C – Life Annuity with a minimum of 120 monthly payments.</p> <p>For married members, spousal consent is required for any option other than Option A, or a joint annuitant other than the spouse.</p> <p>Medicare Gap Benefit Option allows members under age 65 to receive a higher benefit before age 65 (to help pay health insurance premiums) and a permanently lower benefit after age 65.</p>
<b>Post-retirement medical benefit</b>	<p>The System will contribute the lesser of \$105 per month or the Medicare Supplement Premium to the Office of Management and Enterprise Services, Employees Group Insurance Division (or other eligible employer health plans) for members receiving retirement benefits.</p>
<b>Expenses</b>	<p>The expenses of administering the System are paid from the retirement trust fund.</p>



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

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### Oklahoma Public Employees Retirement System

#### **Hazardous Duty Members (Department of Corrections, Officers, Grand River Dam Authority Public Safety Officers, Oklahoma Military Department Firefighters) Benefits**

Members covered by the Hazardous Duty Provisions have the retirement eligibility requirements, contribution rates and benefit formula described below.

#### **Department of Corrections:**

The normal retirement age is the earliest of: twenty (20) years of service as a member covered by the Department of Corrections Hazardous Duty Provisions; or, the first day of the month coinciding with or next following the 62<sup>nd</sup> birthday; or, the first day of the month coinciding with or following the date at which the sum of a member's age and number of years of credited service total eighty (80), if the member was hired prior to July 1, 1992, or following the date at which the sum of a member's age and number of years of credited service total ninety (90) if the member was hired after July 1, 1992. Members employed after January 1, 1983 must complete at least six (6) years of full-time equivalent employment with a participating employer before receiving any retirement benefits. The benefit formula is 2.5% of final average compensation, multiplied by the number of years of service as an eligible officer for service, not exceeding twenty (20) years. For service in excess of twenty (20) years, the benefit formula is 2% of final average compensation.

For hazardous duty employees hired on or after November 1, 2011, the normal retirement age is age 65. Alternatively, they may retire under the earliest of (i) the "Rule of 90" if they are at least age 60 or (ii) twenty (20) years of service as a member covered by hazardous duty provisions.

Members eligible for these benefits with at least five (5) years of experience in their positions on or after June 30, 2004 remain eligible to retire after twenty (20) years even if they transfer to positions within DOC that are not eligible to retire after twenty (20) years.

Special Surviving Spouse and Child benefits for any member employed by the Department of Corrections (DOC) killed or mortally wounded during the performance of duty are equal to 2.5% of final average monthly compensation multiplied by the greater of the member's actual service or twenty (20) years. In addition, an amount of \$400 per month will be paid as long as a child of the deceased member is under the age of 18 (or 22 if enrolled full time at an institution of higher education).



## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

### Oklahoma Public Employees Retirement System

**Hazardous Duty Members  
(Department of Corrections,  
Officers, Grand River Dam  
Authority Public Safety Officers,  
Oklahoma Military Department  
Firefighters) Benefits**  
(continued)

Contributions for members covered by the Department of Corrections Hazardous Duty Provisions are:

	<u>Year</u>	<u>Up to \$25,000</u>	<u>Above \$25,000</u>
	1994/1995	6.5%	8.0%
	1995/1996	6.5%	8.0%
	1996/1997	7.0%	8.0%
	1997/1998	7.5%	8.0%
	First 20 Years of Service	<u>Service Beyond 20 Years</u>	
		<u>Up to \$25,000</u>	<u>Above \$25,000</u>
July 1998 – June 1999	8.0%	N/A	N/A
July 1999 – June 2000	8.0%	N/A	N/A
July 2000 – June 2010	8.0%	N/A	N/A
July 2010 and after	8.0%	3.5%	3.5%

#### **Grand River Dam Authority Public Safety Officers Hired for the First Time in the Position on or after July 1, 2016:**

The normal retirement date is the first day of the month following the date the member accrues twenty (20) years of full-time equivalent service as a member covered by the Grand River Dam Authority Public Safety Officers Provisions.

Alternatively, for members who began participating in OPERS before November 1, 2011, the normal age of retirement is age 62 with at least 6 years of full-time equivalent employment; or the first day of the month following the date at which the sum of the member's age and number of years of credited service totals eighty (80), if the member was hired before July 1, 1992; or the first day of the month following the date at which the sum of the member's age and number of years of credited service totals ninety (90), if the member was hired on or after July 1, 1992. For members who began participating in OPERS on or after November 1, 2011, the normal age of retirement is age 65 with at least 6 years of full-time equivalent employment, or the first day of the month following the date at which the sum of the member's age and number of years of credited service totals





## APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

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### Oklahoma Public Employees Retirement System

**Hazardous Duty Members  
(Department of Corrections,  
Officers, Grand River Dam  
Authority Public Safety Officers,  
Oklahoma Military Department  
Firefighters) Benefits**  
(continued)

ninety (90) and the member is at least 60 years of age. Members must complete at least six (6) years of full-time equivalent employment with a participating employer before receiving any retirement benefits.

The benefit formula is 2.5% of final average compensation, multiplied by the number of years of service as an eligible officer for service, not exceeding twenty (20) years. For service in excess of twenty (20) years, the benefit formula is 2% of final average compensation.

#### **Oklahoma Military Department Firefighters:**

The benefit for Oklahoma Military Department firefighters who began employment July 1, 2002 and after is based on a 2.5% benefit multiplier. They are also eligible for full benefits after twenty (20) years as a firefighter and their employee contribution rate is 8%. Oklahoma Military Department firefighters employed prior to July 1, 2002 were given a one-time option to: (a) have their benefit formula, retirement eligibility, and employee contribution rate remain unchanged; (b) apply the new provisions (including the new contribution rate) to service after January 1, 2003; or (c) apply the new benefit formula and retirement eligibility to all of the member's service, apply the 8% contribution rate for service after July 1, 2002, and make a contribution equal to the increase in the actuarial value of the member's retirement benefit.

In contrast to DOC members, the 2.5% formula and 8% contribution rate applies to service after twenty (20) years.



## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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### Oklahoma Public Employees Retirement System

#### Entry Age Actuarial Cost Method

Liabilities and contributions shown in this report are computed using the Individual Entry Age method of funding. Sometimes called the “funding method,” this is a particular technique used by actuaries for establishing the amount of the annual actuarial cost of pension benefits, or normal cost, and the related unfunded actuarial accrued liability. Ordinarily the annual contribution to the System is comprised of (1) the normal cost; and (2) an amortization payment on the unfunded actuarial accrued liability.

Under the Entry Age Actuarial Cost Method, the **Normal Cost** is computed as the level percentage of pay which, if paid from the earliest time each member would have been eligible to join the System had it existed (thus entry age) until his retirement or termination, would accumulate with interest at the rate assumed in the valuation to a fund sufficient to pay all benefits under the System.

The **Actuarial Accrued Liability** under this method, at any point in time, is the theoretical amount of the fund that would have accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The **Unfunded Actuarial Accrued Liability** is the excess of the actuarial accrued liability over the actuarial value of System assets on the valuation date.

Under this method, experience gains or losses, i.e. decreases or increases in actuarial accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

#### Asset Valuation Method

The actuarial value of assets is based on a five-year moving average of expected and actual market values determined as follows:

- at the beginning of each fiscal year, a preliminary expected actuarial asset value is calculated as the sum of the previous year’s actuarial value increased with a year’s interest at the System valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;
- the expected actuarial asset value is set equal to the preliminary expected actuarial value plus the unrecognized investment gains and losses as of the beginning of the previous fiscal year;
- the difference between the expected actuarial asset value and the market value is the investment gain or loss for the previous year;
- the (final) actuarial asset value is the preliminary value plus 20% of the investment gains and losses for each of the five previous fiscal years, but in no case more than 120% of the market value or less than 80% of the market value.



## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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### Oklahoma Public Employees Retirement System

#### Amortization Method

Effective July 1, 2008, the unfunded actuarial accrued liability is amortized as a level percent of payroll over a 20-year closed period commencing July 1, 2007. For the defined contribution members, the employer sends to OPERS the difference between the OPERS required rate (16.5% for state members) and the amount required for the employer match in Pathfinder. These extra contributions to OPERS allow the use of the level percent of payroll amortization method since they are expected to produce a payment stream that is constant, if not increasing, as a percent of covered payroll.

#### Valuation Procedures

The actuarial accrued liability held for non-vested, inactive members who have a break in service, or for non-vested members who have quit or been terminated, even if a break in service has not occurred as of the valuation date, is equal to the amount of the individual's unclaimed contributions.

The wages used in the projection of benefits and liabilities are considered earnings for the year ending June 30, 2018, increased by the salary scale to develop expected earnings for the current valuation year. Earnings are annualized for new members assumed to have less than twelve months of reported earnings.

The calculations for the required employer contribution are determined as of mid-year. This is a reasonable estimate because contributions are made on a monthly basis throughout the year.

We did not value the 415 limit for active participants. The impact was assumed to be *de minimus*.

The compensation limitation under IRC Section 401(a)(17) is considered in this valuation.

Liability is included for members who appear to be deferred vested, but who have not yet submitted certain paperwork and therefore are not in the vested data provided. An estimated benefit was provided by the System. A corrected benefit and status will be provided by the System when the actual benefit and status have been finalized.

Members who are contributing to the System, but have not yet filled out an enrollment application, are included as active members. Where data elements are missing, reasonable estimates are used. Age is based on average entry age for other members. Gender is assigned in proportion to the overall group.

A liability is included for contribution amounts due to be refunded to terminated vested members who made voluntary contributions to increase the maximum compensation limit prior to July 1, 1998. The System supplied the included amounts.



## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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### Oklahoma Public Employees Retirement System

These assumptions were recommended in the 2016-2019 Experience Study to the Board, which then adopted them. That report, which is available on the OPERS website, provides the rationale for the recommendations.

#### Economic Assumptions

<b>Price Inflation:</b>	2.50% per annum, compounded annually
<b>Investment Return:</b>	6.50% net of investment expenses per annum, compounded annually
<b>Salary Increases:</b>	Sample rates below (midpoint of range shown):

<u>Nearest Age</u>	<u>% Increase</u>
20 - 24	9.25
25 - 29	7.55
30 - 34	6.05
35 - 39	5.25
40 - 44	4.95
45 - 49	4.55
50 - 54	4.25
55 - 59	4.05
60 - 64	3.55
65+	3.25

<b>Payroll Growth:</b>	3.25% per year
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#### Ad hoc benefit increase assumptions

Monthly benefits	No increases assumed
Medical Supplement	No increases assumed

<b>Projection of 401(a)(17) compensation limit:</b>	Projected with inflation at 2.50%
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## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

### Oklahoma Public Employees Retirement System

#### Demographic Assumptions

#### Annual Rates of Retirement Per 100 Eligible Regular Non-Elected Members

<u>Age</u>	<u>Hired Prior to 11/1/2011</u>		<u>Hired on or After 11/1/2011</u>	
	<u>Those Eligible For Unreduced Retirement</u>	<u>Those Eligible For Reduced Retirement</u>	<u>Those Eligible For Unreduced Retirement</u>	<u>Those Eligible For Reduced Retirement</u>
50	15	N/A	N/A	N/A
51	15	N/A	N/A	N/A
52	15	N/A	N/A	N/A
53	15	N/A	N/A	N/A
54	15	N/A	N/A	N/A
55	10	4	N/A	N/A
56	10	4	N/A	N/A
57	11	4	N/A	N/A
58	12	4	N/A	N/A
59	13	5	N/A	N/A
60	14	6	30/15*	5
61	20	13	30/15*	6
62	25	N/A	30/15*	6
63	15	N/A	30/15*	6
64	15	N/A	30/15*	13
65	30	N/A	30/15*	N/A
66	25	N/A	25	N/A
67	25	N/A	25	N/A
68	25	N/A	25	N/A
69	25	N/A	25	N/A
70	50	N/A	50	N/A
71	50	N/A	50	N/A
72	50	N/A	50	N/A
73	50	N/A	50	N/A
74	50	N/A	50	N/A
75	100	N/A	100	N/A

\*30 when first eligible to retire and 15 thereafter



## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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### Oklahoma Public Employees Retirement System

#### Demographic Assumptions (continued)

##### Annual Rates of Retirement Per 100 Eligible Elected Members

<u>Age</u>	<u>Elected Prior to 11/1/2011</u>		<u>Elected on or After 11/1/2011</u>	
	<u>Those Eligible For Unreduced Retirement</u>	<u>Those Eligible For Reduced Retirement</u>	<u>Those Eligible For Unreduced Retirement</u>	<u>Those Eligible For Reduced Retirement</u>
50	25	N/A	N/A	N/A
51	25	N/A	N/A	N/A
52	25	N/A	N/A	N/A
53	25	N/A	N/A	N/A
54	25	N/A	N/A	N/A
55	20	7.0	N/A	N/A
56	20	7.0	N/A	N/A
57	20	7.0	N/A	N/A
58	20	7.0	N/A	N/A
59	20	7.0	N/A	N/A
60	20	N/A	N/A	10
61	20	N/A	N/A	10
62	20	N/A	20	N/A
63	20	N/A	20	N/A
64	20	N/A	20	N/A
65	20	N/A	20	N/A
66	20	N/A	20	N/A
67	35	N/A	35	N/A
68	35	N/A	35	N/A
69-74	35	N/A	35	N/A
75	100	N/A	100	N/A



## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

### Oklahoma Public Employees Retirement System

#### Demographic Assumptions (continued)

##### Annual Rates of Retirement Per 100 Eligible Hazardous Duty Members

<u>Hired Prior to 11/1/2011</u>				<u>Hired on or After 11/1/2011</u>			
<u>Less Than 20</u>		<u>At Least 20</u>		<u>Less Than 20</u>		<u>At Least 20</u>	
<u>Years of Service</u>		<u>Years of Service</u>		<u>Years of Service</u>		<u>Years of Service</u>	
<u>Age</u>		<u>Service</u>		<u>Age</u>		<u>Service</u>	
50	N/A	20	25	50	N/A	20	25
51	N/A	21	25	51	N/A	21	25
52	N/A	22	20	52	N/A	22	20
53	N/A	23-24	15	53	N/A	23-34	15
54	N/A	25-29	23	54	N/A	25-29	23
55	4	30-34	25	55	N/A	30-34	25
56	5	35+	100	56	N/A	35+	100
57	5			57	N/A		
58	5			58	N/A		
59	5			59	N/A		
60	5			60	7		
61	20			61	20		
62	40			62	20		
63	22			63	20		
64	25			64	20		
65	40			65	40		
66	25			66	25		
67	25			67	23		
68	25			68	22		
69	25			69	21		
70	100			70	100		



## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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### Oklahoma Public Employees Retirement System

#### Demographic Assumptions (continued)

##### **Mortality Rates:**

Active participants and  
nondisabled pensioners

Pub-2010 Below Median, General Membership  
Active/Retiree Healthy Mortality Table with base rates  
projected to 2030 using Scale MP-2019. Male rates are  
unadjusted and female rates are set forward two years.

Disabled pensioners

Nondisabled retiree mortality set forward 12 years for  
disabled experience.

Hazardous Duty members

For Department of Corrections officers, we assumed the  
mortality rate is 10% higher than the above table while  
the participant is active. This 10% is assumed to be in-  
line-of-duty.

##### **Disability Rates:**

Graduated rates

Disabled rates per 100 members

Nearest

Hazardous

Age

Regular/Elected

Duty

20

0.009

0.009

30

0.009

0.022

40

0.022

0.058

50

0.139

0.180

60

0.200

0.400





## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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### Oklahoma Public Employees Retirement System

#### Demographic Assumptions (continued)

##### Withdrawal Rates:

<u>Service</u>	<u>Rate</u>
0	26.0%
1	22.0%
2	18.0%
3	14.0%
4	12.0%
5	10.5%
6	9.0%
7	8.0%
8	7.0%
9	6.5%
10	6.0%
11	5.5%
12	5.0%
13	4.8%
14	4.5%
15	4.3%
16	4.0%
17	3.8%
18	3.5%
19	3.3%
20	3.0%
21	2.8%
22	2.5%
23	2.3%
24	2.0%
25	1.8%
26	1.5%
27	1.3%
28+	1.0%



## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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### Oklahoma Public Employees Retirement System

#### Demographic Assumptions (continued)

##### Probability of Electing Vested Benefit:

Regular Members Only	
<u>Duration</u>	<u>Rate</u>
8	80%
13	85%
18	90%
23	95%
28	100%

##### Marital Status:

Percentage Married  
Age difference

85%  
Males assumed to be four years older than spouses.

##### Children:

Special death benefits are provided upon the in-line-of-duty death of Department of Corrections' employees who have young children. We have assumed the average age of the youngest child of such employees is nine and that 50% of such children will attend an institution of higher education to age 22.

##### Form of Payment:

Participants are assumed to elect a life-only form of payment.



## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

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### Oklahoma Public Employees Retirement System

#### Demographic Assumptions (continued)

**Assumed age for commencement  
of deferred benefits:**

Currently active members assumed to terminate in the future prior to retirement eligibility are assumed to commence benefits at age 62 (non-elected members) or age 60 (elected members).

Currently active members hired on or after 11/1/2011 assumed to terminate in the future prior to retirement eligibility are assumed to commence benefits at age 65.

Currently inactive members with deferred benefits are assumed to commence benefits on a date provided by OPERS.

**Provision for expenses:**

Administrative expenses, as budgeted by the Oklahoma Public Employees Retirement System.



## APPENDIX C – DATA

### Oklahoma Public Employees Retirement System Valuation Data Distribution – Actives – Regular Membership

Age	Years of Service									Total
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & Up	
<b>Under 25</b>	778	21								799
Avg. Pay	\$24,827	\$35,997								\$25,121
<b>25 to 29</b>	850	553	4							1,407
Avg. Pay	\$28,374	\$40,839	\$52,874							\$33,343
<b>30 to 34</b>	777	1,478	262	5						2,522
Avg. Pay	\$30,454	\$45,205	\$47,091	\$57,395						\$40,880
<b>35 to 39</b>	806	1,440	873	214	5					3,338
Avg. Pay	\$30,883	\$47,023	\$52,893	\$52,283	\$53,242					\$45,007
<b>40 to 44</b>	564	1,302	864	577	180					3,487
Avg. Pay	\$30,885	\$46,639	\$51,843	\$55,939	\$55,308					\$47,367
<b>45 to 49</b>	534	1,044	780	646	577	130	7			3,718
Avg. Pay	\$32,041	\$45,966	\$48,874	\$54,446	\$57,373	\$58,570	\$52,954			\$48,273
<b>50 to 54</b>	519	1,031	782	587	612	375	172	7		4,085
Avg. Pay	\$32,952	\$44,438	\$47,947	\$51,586	\$54,891	\$57,172	\$64,704	\$72,476		\$48,314
<b>55 to 59</b>	483	989	687	658	612	421	423	182	17	4,472
Avg. Pay	\$31,010	\$42,904	\$46,946	\$48,613	\$51,044	\$54,531	\$62,195	\$60,148	\$62,613	\$47,890
<b>60 to 64</b>	350	854	687	584	567	326	303	256	97	4,024
Avg. Pay	\$33,314	\$43,337	\$45,786	\$49,119	\$50,581	\$54,091	\$57,480	\$63,645	\$61,009	\$48,397
<b>65 to 69</b>	157	365	321	220	197	134	113	67	89	1,663
Avg. Pay	\$29,446	\$44,571	\$46,820	\$50,978	\$50,205	\$56,197	\$58,162	\$59,752	\$64,870	\$48,650
<b>70 &amp; up</b>	98	144	118	117	72	50	40	26	41	706
Avg. Pay	\$27,254	\$49,986	\$44,675	\$48,244	\$50,709	\$52,632	\$56,941	\$51,024	\$58,680	\$46,853
<b>Total</b>	5,916	9,221	5,378	3,608	2,822	1,436	1,058	538	244	30,221
Avg. Pay	\$30,012	\$45,039	\$48,929	\$51,757	\$53,288	\$55,576	\$60,562	\$61,482	\$62,138	\$45,837



## APPENDIX C – DATA

### Oklahoma Public Employees Retirement System Valuation Data Distribution – Actives – Elected Membership

Age	Years of Service									Total
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & Up	
<b>Under 25</b> Avg. Pay	1 \$21,199									1 \$21,199
<b>25 to 29</b> Avg. Pay	3 \$37,839	3 \$45,930								6 \$41,884
<b>30 to 34</b> Avg. Pay	4 \$38,055	4 \$43,704	2 \$49,289							10 \$42,562
<b>35 to 39</b> Avg. Pay	6 \$44,680	14 \$50,494	8 \$43,274	7 \$49,856						35 \$47,719
<b>40 to 44</b> Avg. Pay	5 \$42,744	22 \$58,147	11 \$45,587	12 \$50,708	5 \$51,641					55 \$52,020
<b>45 to 49</b> Avg. Pay	12 \$54,339	21 \$46,012	7 \$45,085	17 \$55,076	21 \$63,304	6 \$45,266	2 \$51,776			86 \$53,195
<b>50 to 54</b> Avg. Pay	9 \$43,366	22 \$51,876	18 \$66,385	18 \$52,928	25 \$51,792	15 \$53,514	9 \$52,522	1 \$52,163		117 \$53,860
<b>55 to 59</b> Avg. Pay	11 \$46,229	24 \$46,396	14 \$48,847	22 \$46,412	18 \$46,792	18 \$47,380	11 \$59,581	2 \$57,315		120 \$48,267
<b>60 to 64</b> Avg. Pay	9 \$49,512	25 \$49,230	28 \$52,445	19 \$59,363	21 \$61,505	13 \$48,528	12 \$60,565	7 \$65,164	2 \$42,172	136 \$54,871
<b>65 to 69</b> Avg. Pay	13 \$41,315	16 \$47,208	14 \$55,103	8 \$59,087	10 \$48,470	5 \$43,238	4 \$51,791	2 \$90,178	2 \$46,633	74 \$50,246
<b>70 &amp; up</b> Avg. Pay	1 \$60,511	8 \$49,829	7 \$45,921	2 \$91,986	5 \$43,379	1 \$67,392	3 \$102,811		1 \$50,279	28 \$57,413
<b>Total</b> Avg. Pay	74 \$45,444	159 \$49,714	109 \$52,312	105 \$53,830	105 \$54,456	58 \$48,993	41 \$60,342	12 \$66,942	5 \$45,578	668 \$51,925



## APPENDIX C – DATA

### Oklahoma Public Employees Retirement System Valuation Data Distribution – Actives – Hazardous Duty Membership

Age	Years of Service									Total
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & Up	
<b>Under 25</b> Avg. Pay	253 \$33,086									253 \$33,086
<b>25 to 29</b> Avg. Pay	338 \$34,610	86 \$38,590								424 \$35,417
<b>30 to 34</b> Avg. Pay	237 \$34,206	138 \$39,974	23 \$42,213							398 \$36,669
<b>35 to 39</b> Avg. Pay	106 \$35,368	98 \$40,720	79 \$43,234	22 \$47,439						305 \$39,996
<b>40 to 44</b> Avg. Pay	60 \$33,411	59 \$39,399	55 \$43,600	72 \$47,261	18 \$49,720					264 \$41,761
<b>45 to 49</b> Avg. Pay	56 \$36,644	43 \$37,910	45 \$43,269	61 \$46,923	16 \$47,948	3 \$46,683				224 \$41,959
<b>50 to 54</b> Avg. Pay	32 \$38,603	36 \$41,528	33 \$40,642	44 \$46,373	21 \$47,408	7 \$50,911	1 \$50,246			174 \$43,184
<b>55 to 59</b> Avg. Pay	36 \$35,310	20 \$37,867	21 \$39,325	30 \$45,233	7 \$44,099	5 \$48,866	2 \$62,383	2 \$51,741		123 \$40,590
<b>60 to 64</b> Avg. Pay	8 \$34,996	11 \$39,675	12 \$41,593	11 \$40,818	4 \$51,985	2 \$58,006				48 \$41,426
<b>65 to 69</b> Avg. Pay	2 \$36,889	2 \$39,265		4 \$42,461	2 \$45,920					10 \$41,399
<b>70 &amp; up</b> Avg. Pay	1 \$4,559	1 \$39,017		1 \$55,623						3 \$33,066
<b>Total</b> Avg. Pay	1,129 \$34,407	494 \$39,649	268 \$42,528	245 \$46,451	68 \$48,032	17 \$50,398	3 \$58,337	2 \$51,741		2,226 \$38,460



## APPENDIX C – DATA

### Oklahoma Public Employees Retirement System Valuation Data Distribution – Actives – All Membership Groups

Age	Years of Service									
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & Up	Total
<b>Under 25</b>	1,032	21								1,053
Avg. Pay	\$26,848	\$35,997								\$27,031
<b>25 to 29</b>	1,191	642	4							1,837
Avg. Pay	\$30,167	\$40,562	\$52,874							\$33,849
<b>30 to 34</b>	1,018	1,620	287	5						2,930
Avg. Pay	\$31,357	\$44,756	\$46,715	\$57,395						\$40,314
<b>35 to 39</b>	918	1,552	960	243	5					3,678
Avg. Pay	\$31,491	\$46,656	\$52,018	\$51,775	\$53,242					\$44,618
<b>40 to 44</b>	629	1,383	930	661	203					3,806
Avg. Pay	\$31,220	\$46,514	\$51,282	\$54,899	\$54,723					\$47,045
<b>45 to 49</b>	602	1,108	832	724	614	139	9			4,028
Avg. Pay	\$32,914	\$45,654	\$48,539	\$53,827	\$57,330	\$57,739	\$52,692			\$48,027
<b>50 to 54</b>	560	1,089	833	649	658	397	182	8		4,376
Avg. Pay	\$33,442	\$44,492	\$48,056	\$51,269	\$54,535	\$56,923	\$64,022	\$69,937		\$48,258
<b>55 to 59</b>	530	1,033	722	710	637	444	436	186	17	4,715
Avg. Pay	\$31,618	\$42,888	\$46,761	\$48,402	\$50,847	\$54,177	\$62,130	\$60,027	\$62,613	\$47,710
<b>60 to 64</b>	367	890	727	614	592	341	315	263	99	4,208
Avg. Pay	\$33,748	\$43,457	\$45,973	\$49,287	\$50,978	\$53,902	\$57,597	\$63,685	\$60,628	\$48,527
<b>65 to 69</b>	172	383	335	232	209	139	117	69	91	1,747
Avg. Pay	\$30,430	\$44,653	\$47,166	\$51,111	\$50,081	\$55,731	\$57,944	\$60,634	\$64,470	\$48,677
<b>70 &amp; up</b>	100	153	125	120	77	51	43	26	42	737
Avg. Pay	\$27,360	\$49,907	\$44,745	\$49,035	\$50,233	\$52,921	\$60,141	\$51,024	\$58,480	\$47,198
<b>Total</b>	7,119	9,874	5,755	3,958	2,995	1,511	1,102	552	249	33,115
Avg. Pay	\$30,869	\$44,844	\$48,695	\$51,483	\$53,210	\$55,265	\$60,548	\$61,565	\$61,805	\$45,464

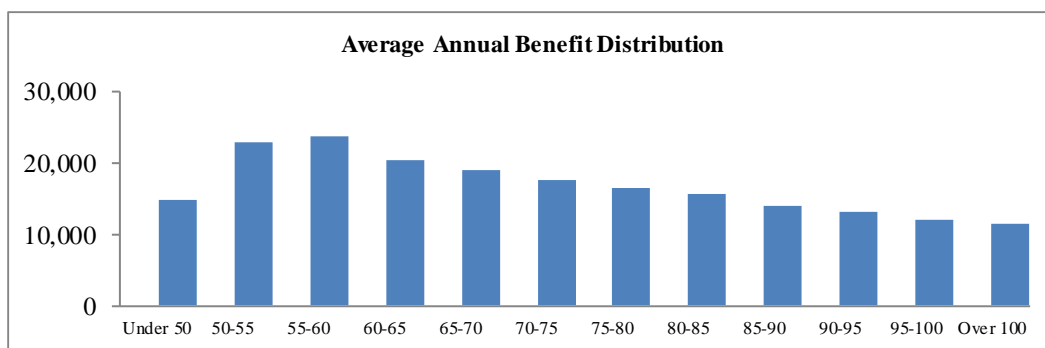
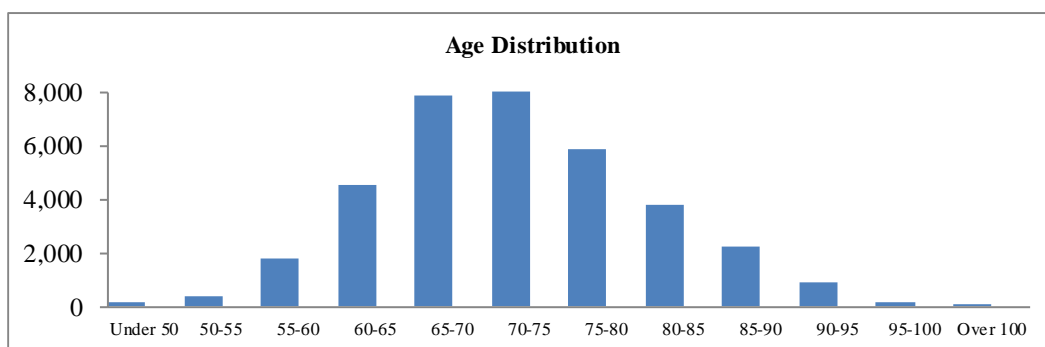


## APPENDIX C – DATA

### Oklahoma Public Employees Retirement System

#### Valuation Data Distribution – Retired Members

Age	Number			Annual Benefits		
	Male	Female	Total	Male	Female	Total
Under 50	114	102	216	\$ 2,049,203	\$ 1,138,698	\$ 3,187,901
50-55	213	173	386	5,164,598	3,687,690	8,852,288
55-60	867	969	1,836	21,845,231	21,902,432	43,747,663
60-65	1,736	2,807	4,543	38,654,501	54,646,848	93,301,349
65-70	3,196	4,708	7,904	63,971,677	86,251,109	150,222,786
70-75	3,439	4,705	8,144	65,869,989	78,710,458	144,580,447
75-80	2,485	3,429	5,914	45,098,310	52,673,805	97,772,115
80-85	1,535	2,313	3,848	27,706,023	32,806,766	60,512,789
85-90	787	1,463	2,250	12,740,745	18,947,828	31,688,573
90-95	280	616	896	4,209,376	7,690,365	11,899,741
95-100	50	159	209	900,143	1,628,707	2,528,850
Over 100	8	25	33	91,610	287,557	379,167
Total	14,710	21,469	36,179	\$288,301,406	\$360,372,263	\$648,673,669







## APPENDIX C – DATA

### Oklahoma Public Employees Retirement System

	Actuarial Valuation as of		% Change
	7/1/2020	7/1/2019	
1. Active members			
a. Number	33,115	34,536	(4.1%)
b. Annual compensation	\$ 1,571,954,116	\$ 1,584,630,994	(0.8%)
c. Average annual compensation	47,470	45,883	3.5%
d. Average age	47.7	47.3	0.8%
e. Average service	11.7	11.4	2.6%
2. Accumulated member contributions			
a. Active members	\$ 561,222,208	\$ 549,813,390	2.1%
b. Unclaimed contribution amounts	57,571,307	54,553,190	5.5%
c. Total	\$ 618,793,515	\$ 604,366,580	2.4%
3. Vested terminated members			
a. Number	2,808	2,930	(4.2%)
b. Annual deferred benefits	\$ 30,407,748	\$ 30,978,490	(1.8%)
c. Average annual deferred benefit	10,829	10,573	2.4%
d. Annual supplemental medical insurance premiums	\$ 3,538,080	\$ 3,691,800	(4.2%)
4. Assumed deferred vested - count	3,274	3,176	3.1%
5. Retired members			
a. Number	30,560	30,355	0.7%
b. Annual retirement benefits	\$ 582,847,985	\$ 553,540,461	5.3%
c. Average annual retirement benefit	19,072	18,236	4.6%
d. Annual supplemental medical insurance premiums	\$ 17,178,840	\$ 17,616,000	(2.5%)
6. Beneficiaries			
a. Number	4,262	4,117	3.5%
b. Annual retirement benefits	\$ 51,453,127	\$ 46,913,371	9.7%
c. Average annual retirement benefit	12,073	11,395	5.9%
7. Disabled members			
a. Number	1,357	1,397	(2.9%)
b. Annual retirement benefits	\$ 14,372,557	\$ 14,124,680	1.8%
c. Average annual retirement benefit	10,591	10,111	4.7%
d. Annual supplemental medical insurance premiums	\$ 677,880	\$ 733,320	(7.6%)
8. Total members included in valuation	75,376	76,511	(1.5%)



## APPENDIX C – DATA

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### Oklahoma Public Employees Retirement System

	Actuarial Valuation as of	
	7/1/2020	7/1/2019
<b>Regular Members</b>		
Number	30,221	31,658
Average annual compensation	\$ 45,837	\$ 44,328
Average age	48.3	47.9
Average service	12.0	11.6
<b>Elected officials</b>		
Number	668	675
Average annual compensation	\$ 51,925	\$ 53,255
Average age	54.7	53.9
Average service	15.4	14.5
<b>Hazardous Duty</b>		
Number	2,226	2,203
Average annual compensation	\$ 38,460	\$ 34,134
Average age	37.1	36.9
Average service	6.6	6.5
<b>Total</b>		
Number	33,115	34,536
Average annual compensation	\$ 45,464	\$ 43,852
Average age	47.7	47.3
Average service	11.7	11.4

**APPENDIX C – DATA**

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**Oklahoma Public Employees Retirement System**

	Actuarial Valuation as of	
	7/1/2020	7/1/2019
<b>Retirees</b>		
Number	30,560	30,355
Average annual benefit	\$ 19,072	\$ 18,236
Average age	71.9	71.6
<b>Disability Retirees</b>		
Number	1,357	1,397
Average annual benefit	\$ 10,591	\$ 10,111
Average age	66.4	66.0
<b>Beneficiaries</b>		
Number	4,262	4,117
Average annual benefit	\$ 12,073	\$ 11,395
Average age	74.8	74.4
<b>Total</b>		
Number	36,179	35,869
Average annual benefit	\$ 17,930	\$ 17,134
Average age	72.0	71.7
<b>Vested Members</b>		
Number	6,082	6,106
Average annual benefit	\$ 10,435	\$ 10,327
Average age	52.4	52.2



## APPENDIX C – DATA

### Oklahoma Public Employees Retirement System

	Active Members	Vested Terminated	Receiving Benefits			Total Members
			Retirees	Disability Retirees	Benefici- aries	
<b>As of July 1, 2019</b>	<b>34,536</b>	<b>6,106</b>	<b>30,355</b>	<b>1,397</b>	<b>4,117</b>	<b>76,511</b>
Age retirements	(1,065)	(319)	1,384	0	0	0
Disability retirements	(17)	(16)	0	33	0	0
Deaths without payments continuing	(37)	(24)	(891)	(65)	(201)	(1,218)
Deaths with payments continuing	(28)	(19)	(282)	(13)	342	0
Nonvested terminations/refund of contributions	(2,762)	(88)	0	0	0	(2,850)
Vested terminations	(615)	615	0	0	0	0
Transfers	0	(26)	0	0	0	(26)
Data adjustments	0	8	(1)	5	4	16
Rehires	843	(155)	(5)	0	0	683
New entrants during the year	2,260	0	0	0	0	2,260
Net change	(1,421)	(24)	205	(40)	145	(1,135)
<b>As of July 1, 2020</b>	<b>33,115</b>	<b>6,082</b>	<b>30,560</b>	<b>1,357</b>	<b>4,262</b>	<b>75,376</b>

	Active	Retired	Terminated	Total
			Vested	
Records submitted on data file	32,684	65,011	2,808	100,503
Remove deceased retirees	0	(28,824)	0	(28,824)
Remove unusable data	(15)	0	0	(15)
Remove those with another status	(3)	(8)	0	(11)
Add those with no application	449	0	0	449
Add assumed vesteds	0	0	3,274	3,274
<b>Total valued</b>	<b>33,115</b>	<b>36,179</b>	<b>6,082</b>	<b>75,376</b>



## APPENDIX D - GLOSSARY

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### Oklahoma Public Employees Retirement System

#### **Accrued Benefit**

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

#### **Actuarial Accrued Liability**

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

#### **Actuarial Assumptions**

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement, and retirement; changes in compensation, rates of investment earnings, and asset appreciation or depreciation; procedures used to determine the Actuarial Value of Assets; and other relevant items.

#### **Actuarial Cost Method**

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

#### **Actuarial Gain (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, as determined in accordance with a particular Actuarial Cost Method.

#### **Actuarial Present Value**

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.

#### **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 pension plan.

#### **Actuarial Value of Assets**

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

#### **Actuarially Equivalent**

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

#### **Amortization Payment**

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.



## APPENDIX D - GLOSSARY

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### Oklahoma Public Employees Retirement System

#### **Deferred Vested Participant**

A vested member who has terminated employment prior to early or normal retirement age who does not withdraw his or her contributions and is, therefore, due a retirement benefit at a later date.

#### **Entry Age Actuarial Cost Method**

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability.

#### **Market Value of Assets**

The fair value of cash, investments and other property belonging to a pension plan that could be acquired by exchanging them on the open market.

#### **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 Projected Benefits.

#### **Projected Benefits**

Those pension plan 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.

#### **Unaccrued Benefit**

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

#### **Unfunded Actuarial Accrued Liability**

The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.

#### **Withdrawal Liability**

The liability due to an active member terminating employment with a deferred vested benefit.