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Oklahoma Police Pension and Retirement System

Actuarial Valuation Report as of July 1, 2019

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September 12, 2019

Board of Trustees
Oklahoma Police Pension and Retirement System
1001 N.W. 63rd Street, Suite 305
Oklahoma City, OK 73116-7335

Members of the Board:

At your request, we performed an actuarial valuation of the Oklahoma Police Pension and Retirement System (OPPRS) as of June 30, 2019 for the purpose of determining the required State contribution for the fiscal year ending June 30, 2020. The major findings of the valuation are contained in this report, which reflects the benefit provisions in place on June 30, 2019. There have been no changes to the plan provisions, actuarial methods, or assumptions since the prior valuation. Note that the special retiree stipend paid in October 2018 was reflected in the 2018 valuation.

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 smoothed 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 dollar amount over an open five year period.

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the System's staff. This information includes, but is not limited to, statutory provisions, member data and financial information. We found this information to be reasonably consistent and comparable with the information received in the prior year. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

We further certify that all costs, liabilities, rates of interest and other factors for OPPRS have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the System and reasonable expectations); and which, in combination, offer the best estimate of anticipated experience affecting OPPRS. Nevertheless, the emerging costs will vary from those presented in this report to the extent actual experience differs from that projected by the actuarial assumptions. The OPPRS Board has the final decision regarding the appropriateness of the assumptions and adopted them as indicated in Appendix B.

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Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.

The actuarial computations presented in this report are for purposes of determining the funding amounts for OPPRS as set out in the Oklahoma State Statutes. The calculations in the enclosed report have been made on a basis consistent with our understanding of OPPRS' funding policy. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes. For example, actuarial computations for purposes of fulfilling financial accounting requirements for the System under Governmental Accounting Standard No. 67 will be presented in a separate report.

The consultants who worked on this assignment are pension actuaries with substantive experience valuing public retirement systems. Cavanaugh Macdonald's advice is not intended to be a substitute for qualified legal or accounting counsel.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with assumptions and methods that meet the guidance of the Actuarial Standards of Practice. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in the report or to provide explanations or further details as may be appropriate.

We respectfully submit the following report and look forward to discussing it with you.

Sincerely,

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

Aaron Chochon, ASA, EA, FCA, MAAA
Actuary

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OVERVIEW

The Oklahoma Police Pension and Retirement System (OPPRS) provides retirement benefits for police officers employed by any of the approximately 135 contributing entities. OPPRS is administered by its own Board of Trustees.

This report presents the results of the July 1, 2019, 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;
- Assess and disclose the key risks associated with funding the System;
- Determine the experience of the System since the last valuation date; and
- Analyze and report on trends in System contributions, assets, and liabilities.

The valuation results provide a snapshot view of the System's financial condition on July 1, 2019. The amount of valuation assets in excess of System liabilities decreased by nearly $5.5 million due to various factors. A detailed analysis of the change in the unfunded actuarial accrued liability from July 1, 2018 to July 1, 2019 is shown on page 4.

The highlights of the valuation are shown below:

	Actuarial Valuation Date	
$(millions)	**July 1, 2019**	**July 1, 2018**
Actuarial Accrued Liability	$ 2,612.5	$ 2,515.8
Actuarial Value of Assets	$ 2,677.3	$ 2,586.1
Unfunded Actuarial Accrued Liability	($64.8)	($70.3)
Funded Ratio (Actuarial Value)	102.5%	102.8%
Market Value of Assets	$ 2,618.9	$ 2,563.4
Funded Ratio (Market Value)	100.2%	101.9%

There was a liability loss of about $4.4 million, less than 0.2% of liability, due to unfavorable demographic experience. The estimated rate of return on the market value of assets, net of investment expenses, was 4.1% for the year ended June 30, 2019. 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 estimated rate of return on the actuarial value of assets was about 5.5%, which resulted in an actuarial loss of about $51.5 million.

EXPERIENCE: July 1, 2018 to July 1, 2019

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, 2019. 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 the 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, 2018, and July 1, 2019. Each component is examined in the following discussion.

ASSETS

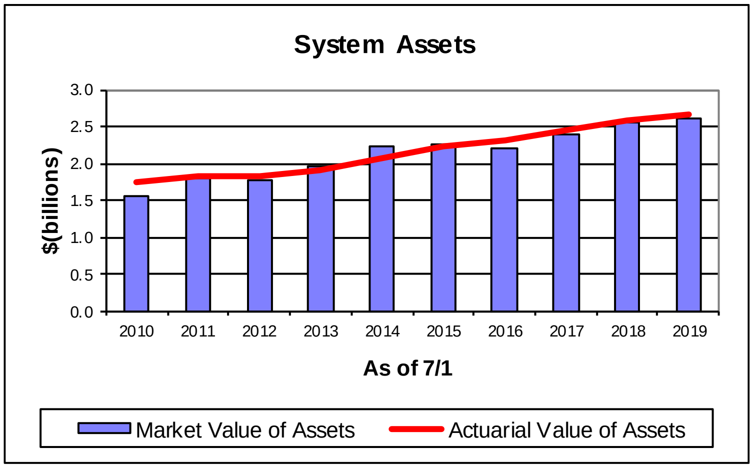
As of July 1, 2019, the System had total funds, when measured on a market value basis, of $2.62 billion. This was an increase of $0.06 billion from the balance of $2.56 billion as of July 1, 2018. The market value of assets is not used directly in the calculation of the actuarial contribution rate. An 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, 2019.

The actuarial value of assets as of July 1, 2019, was $2.68 billion. The annualized dollar-weighted rate of return for FY 2019, measured on the actuarial value of assets, was approximately 5.5%, which resulted in an actuarial loss. Measured on the market value of assets, the estimated rate of return, net of investment expenses, was about 4.1%.

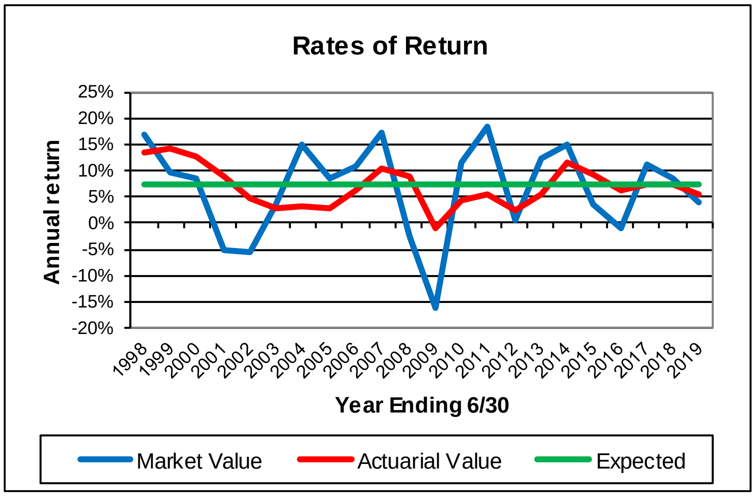
The components of the change in the market and actuarial value of assets for the System are set forth below:

	Market Value $(millions)	Actuarial Value $(millions)
Net Assets, July 1, 2018	$2,563	$2,586
• Employer and Member Contributions	108	108
• Benefit Payments and Expenses	(157)	(157)
• Investment Income/(Loss)	105	140
Preliminary Value July 1, 2019	$2,619	$2,677
Application of Corridor	N/A	N/A
Final Net Assets, July 1, 2019	$2,619	$2,677
Estimated Rate of Return	4.1%	5.5%

Due to the use of an asset smoothing method, there is about $58 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 four years.



While the market value of assets was notably lower than the actuarial value in 2010, a combination of strong returns and systematic recognition of the loss has now resulted in the two numbers being close to each other the last several years.



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.

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 actuarial accrued 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 employer's contributions exceed the employer's normal cost for the year, after allowing for interest on the previous years' 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.

The unfunded actuarial accrued liability as of July 1, 2019 is:

Actuarial Accrued Liability	$2,612,473,000
Actuarial Value of Assets	2,677,255,000
Unfunded Actuarial Accrued Liability	$ (64,782,000)

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 expected based on the actuarial assumptions (both asset and liability), 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 ending June 30, 2019. There was an experience loss on liabilities of approximately $4.4 million, and an experience loss on assets of approximately $51.5 million. Including the state contributions in excess of the actuarial required contribution, the amount of valuation assets in excess of System liabilities decreased by $5.5 million from July 1, 2018.

Between July 1, 2018 and July 1, 2019 the change in the unfunded actuarial accrued liability for the System was as follows:

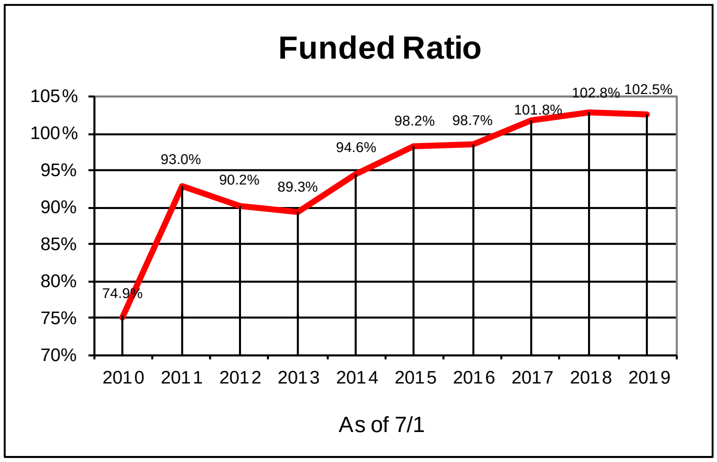
	$(millions)
Unfunded Actuarial Accrued Liability, July 1, 2018	($70.3)
· expected decrease due to amortization method	0.7
· contributions above required	(47.0)
· investment experience	51.5
· liability experience[1]	4.4
· other experience	(4.1)
Unfunded Actuarial Accrued Liability, July 1, 2019	($64.8)

[1] Liability loss is about 0.2% of total expected actuarial accrued liability

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 ratio does not indicate whether or the fund could settle all of its liabilities, nor is it sufficient by itself to indicate the future funding requirements of the plan. The funded ratio does, however, provide one indication of the funding progress made to this point in time.

The funded status information, on both an actuarial and market value basis, is shown in the following table in $(millions).

	7/1/14	7/1/15	7/1/16	7/1/17	7/1/18	7/1/19
Using Actuarial Value of Assets:						
Funded Ratio	94.6%	98.2%	98.7%	101.8%	102.8%	102.5%
Unfunded Actuarial Accrued Liability (UAAL)	$119	$40	$31	($44)	($70)	($65)
Using Market Value of Assets:						
Funded Ratio	101.5%	99.8%	93.6%	99.7%	101.9%	100.2%
Unfunded Actuarial Accrued Liability (UAAL)	($34)	$4	$150	$8	($48)	($6)



Since 2011, the funded ratio has gradually improved. (The increase from 2010 to 2011 was a result of removing the COLA assumption.)

CONTRIBUTION RATES

The funding objective of the System is for contributions to be at least sufficient to pay the normal cost rate plus an amount that will pay off the unfunded actuarial accrued liability over a rolling five-year period.

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. Members not in Deferred Option Plan (DOP) pay 8.00% of compensation. The employer rate is currently 13.00% of pay for actives members and 6.50% of pay for members participating in the DOP. The remainder of the Total Contribution rate is the required State contribution rate, which are 14% of the total state insurance premium tax revenue. Currently, the total contributions are sufficient to meet the System's funding needs.

COMMENTS

As the graph on page 3 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, net of investment expenses, for FY 2019 was about 4.1%. The market value of assets lags the actuarial value of assets (calculated using the asset smoothing method). This deferred loss will be recognized over the next five years, creating losses even if the assumed 7.5% return on the market value of assets is earned.

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

	7/1/2019 Valuation	7/1/2018 Valuation	% Change
1. PARTICIPANT DATA			
Number of:			
Active Members - Not vested	2,392	2,286	4.6
Active Members - Vested	2,510	2,505	0.2
Active Members Total	4,902	4,791	2.3
Retired and Disabled Members and Beneficiaries	3,815	3,720	2.6
Deferred Option Plan (DOP) Members	4	11	(63.6)
Inactive Members	983	926	6.2
Total members	9,704	9,448	2.7
Projected Annual Salaries of Active Members	$ 339,195,248	$ 323,111,811	5.0
Annual Retirement Payments for Retired Members, Disabled Members, and Beneficiaries	$ 120,238,651	$ 115,653,858	4.0
2. ASSETS AND LIABILITIES			
Total Actuarial Accrued Liability	$ 2,612,473,000	$ 2,515,811,000	3.8
Market Value of Assets	$ 2,618,857,000	$ 2,563,446,000	2.2
Actuarial Value of Assets	$ 2,677,255,000	$ 2,586,061,000	3.5
Unfunded Actuarial Accrued Liability	$ (64,782,000)	$ (70,250,000)	(7.8)
Funded Ratio (Actuarial Assets)	102.5%	102.8%	(0.3)
3. EMPLOYER CONTRIBUTION RATES AS A PERCENT OF PAYROLL			
Normal Cost Rate	20.5%	20.4%	0.5
Amortization of Unfunded Actuarial Accrued Liability	(1.6%)	(1.8%)	(11.1)
Budgeted Expenses	0.7%	0.7%	0.0
Total Actuarial Required Contribution Rate	19.6%	19.3%	1.6
Less Member Contribution Rate	(8.0%)	(8.0%)	0.0
Less Estimated Employer Contribution Rate	(13.0%)	(13.0%)	0.0
Required State Contribution Rate	0.0%	0.0%	0.0
Required State Contribution Amount	$ 0	$ 0	0.0

Oklahoma Police Pension and 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 a basis for measuring investment performance from time to time. As of July 1, 2019, the market value of assets for the System was $2.619 billion. Table 1 is a comparison, at market values, of System assets as of June 30, 2019 and June 30, 2018 in total and by investment category. Table 2 summarizes the change in the market value of assets from July 1, 2018 to June 30, 2019.

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:

- the expected market asset value is calculated as the sum of the previous year's market value increased with a year's interest at the System's valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;
- the difference between the expected market value and the actual market value is the investment gain or loss for the previous fiscal year;
- each year, 20% the initial gain or loss for the past five fiscal years is recognized;
- the actuarial asset value is the market value less the unrecognized investment gains and losses for each of the five previous fiscal years, but neither more than 120% of the market value nor less than 80% of the market value.

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

Oklahoma Police Pension and Retirement System

Table 1

Analysis of Net Assets at Market Value

	June 30, 2019			June 30, 2018		
		Amount $(millions)	% of Total		Amount $(millions)	% of Total
Cash & Short-term Investments	$	18.0	0.7%	$	38.4	1.5%
Receivables		13.8	0.5%		14.7	0.6%
U.S. Government Bonds		41.4	1.6%		20.7	0.8%
Corporate Bonds		387.6	14.8%		365.7	14.2%
Domestic Stock		644.1	24.5%		649.0	25.4%
International Stock		378.1	14.4%		378.1	14.7%
Private Equity		279.1	10.6%		237.3	9.2%
Hedge Funds		555.4	21.2%		557.4	21.7%
Real Estate		230.9	8.8%		221.8	8.6%
Commodities		75.4	2.9%		84.9	3.3%
Subtotal	$	2,623.8	100.0%	$	2,568.0	100.0%
Net Receivables/(Payables)		(4.9)			(4.6)	
Net Assets	$	2,618.9		$	2,563.4	

Oklahoma Police Pension and Retirement System

Table 2

Statement of Changes in Net Assets

	Fiscal Year Ended June 30			
		2019		2018
1. Market Value of Net Assets at Beginning of Year	$	2,563,446,000	$	2,395,381,000
2. Contributions				
a. Members	$	26,173,000	$	24,747,000
b. Participating employers		42,154,000		40,135,000
c. Insurance premium tax		39,559,000		39,028,000
d. Total contributions	$	107,886,000	$	103,910,000
3. Net Investment Income				
a. Interest and dividends	$	16,241,000	$	14,751,000
b. Realized gain and unrealized appreciation		104,266,000		205,758,000
c. Other		248,000		566,000
d. Total		120,755,000		221,075,000
e. Investment expenses		(15,873,000)		(15,636,000)
f. Net investment income	$	104,882,000	$	205,439,000
4. Total additions/(subtractions) (2d) + (3f)	$	212,768,000	$	309,349,000
5. Deductions				
a. Retirement benefits	$	153,609,000	$	137,914,000
b. Refunds of contributions		1,877,000		1,649,000
c. Administrative expenses		1,871,000		1,721,000
d. Total deductions	$	157,357,000	$	141,284,000
6. Net Change in Assets (4) - (5d)		55,411,000		168,065,000
7. Market Value of Net Assets at End of Year (1) + (6)	$	2,618,857,000	$	2,563,446,000

Oklahoma Police Pension and Retirement System

Table 3

Determination of Actuarial Value of Assets

1. Market Value as of July 1, 2018	$	2,563,446,000
2. Contributions	$	107,886,000
3. Decreases during year		
a. Retirement benefits	$	(153,609,000)
b. Refunds of contributions		(1,877,000)
c. Administrative expenses		(1,871,000)
d. Total deductions	$	(157,357,000)
4. Expected return on assets at 7.5%	$	190,437,000
5. Expected Market Value as of June 30, 2019 (1) + (2) + (3d) + (4)	$	2,704,412,000
6. Actual Market Value as of June 30, 2019	$	2,618,857,000
7. Year end 2019 asset gain/(loss) (6) - (5)	$	(85,555,000)

Schedule of Asset Gains/(Losses)

Year End		Original Amount		Recognized in Prior Years		Recognized in This Year		Recognized in Future Years
2015	$	(80,117,000)	$	(64,092,000)	$	(16,025,000)	$	0
2016		(189,424,000)		(113,655,000)		(37,885,000)		(37,884,000)
2017		79,083,000		31,634,000		15,817,000		31,632,000
2018		27,162,000		5,432,000		5,432,000		16,298,000
2019		(85,555,000)		0		(17,111,000)		(68,444,000)
Total					$	(49,772,000)	$	(58,398,000)

8. Asset gain/(loss) to be recognized in the future	$	(58,398,000)
9. Initial Actuarial Value as of June 30, 2019 (6) - (8)	$	2,677,255,000
10. Constraining values:		
a. 80% of market value (6) x 0.8	$	2,095,086,000
b. 120% of market value (6) x 1.2	$	3,142,628,000
11. Actuarial Value as of June 30, 2019 (9), but not less than (10a), nor greater than (10b), rounded	$	2,677,255,000

Oklahoma Police Pension and 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 valuation date, July 1, 2019. In this section, the discussion will focus on the commitments of the System, which are referred to as its liabilities.

Table 4 contains the actuarial present value of all future benefits (PVFB) for contributing members, inactive members, retirees and their beneficiaries.

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 includes 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 shown in Appendix B. The liabilities reflect the benefit structure in place as of July 1, 2019.

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.

Oklahoma Police Pension and Retirement System

Table 4

Present Value of Future Benefits
As of July 1, 2019

		Total
1. Active Employees		
a. Retirement Benefit	$	1,855,616,000
b. Withdrawal Benefit		50,982,000
c. Pre-Retirement Death Benefit		23,760,000
d. Disability Benefit		6,137,000
e. Subtotal	$	1,936,495,000
2. Inactive Nonvested Members	$	3,354,000
3. Inactive Vested Members	$	24,169,000
4. Disabled Members	$	24,685,000
5. Retirees	$	1,065,987,000
6. Beneficiaries	$	166,824,000
7. DOP Members, Including DOP Balances	$	8,791,000
8. Total PVFB	$	3,230,305,000

Inactive Members Eligible for Automatic COLA	$	95,602,000
Inactive Members Not Eligible for Automatic COLA		1,198,208,000
Total Inactive Liability	$	1,293,810,000

Oklahoma Police Pension and Retirement System

Table 5

Actuarial Accrued Liability
As of July 1, 2019

		Total
1. Present Value of Future Benefits for Active Members		
a. Retirement Benefit	$	1,855,616,000
b. Withdrawal Benefit		50,982,000
c. Pre-Retirement Death Benefit		23,760,000
d. Disability Benefit		6,137,000
e. Subtotal	$	1,936,495,000
2. Present Value of Future Normal Costs for Active Members		
a. Retirement Benefit	$	536,174,000
b. Withdrawal Benefit		59,907,000
c. Pre-Retirement Death Benefit		14,920,000
d. Disability Benefit		6,831,000
e. Subtotal	$	617,832,000
3. Present Value of Future Benefits for Inactive Members		1,293,810,000
4. Total Actuarial Accrued Liability (1e) - (2e) + (3)	$	2,612,473,000

Oklahoma Police Pension and 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 that 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. However, as of the July 1, 2019 valuation, the Oklahoma Police Pension and Retirement System has a negative UAAL. This is an indication that the funding of benefits is proceeding slightly ahead of schedule.

Description of Rate Components

The actuarial cost method used by the System is the traditional Entry Age Normal (EAN) – level-percent of pay cost method. 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 ages. 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. The UAAL is amortized as a level-dollar amount over an open 5-year period, while a surplus is amortized over 30 years.

Contribution Rate Summary

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

Oklahoma Police Pension and Retirement System

Table 6

Normal Cost Contribution Rates
As Percentages of Salary

		Total	% of Pay
1. Normal Cost			
a. Retirement Benefit	$	55,143,000	17.80%
b. Withdrawal Benefit		6,112,000	1.97%
c. Pre-Retirement Death Benefit		1,538,000	0.50%
d. Disability Benefit		685,000	0.22%
e. Total	$	63,478,000	20.49%
2. Estimated Payroll for Current Actives	$	309,731,000	
3. Normal Cost Rate (1e)/(2)		20.49%	

Oklahoma Police Pension and Retirement System

Table 7

Unfunded Actuarial Accrued Liability Contribution Rate

1. Actuarial Present Value of Future Benefits	$	3,230,305,000
2. Actuarial Present Value of Future Normal Costs		617,832,000
3. Actuarial Accrued Liability (1) - (2)	$	2,612,473,000
4. Actuarial Value of Assets		2,677,255,000
5. Unfunded Actuarial Accrued Liability (UAAL) (3) - (4)	$	(64,782,000)
6. Amortization of UAAL over 30 years (mid-year)*	$	(5,290,000)
7. Total Estimated Payroll for Year Ending June 30, 2020	$	339,854,000
8. Amortization as a Percent of Payroll		(1.6%)

*The UAAL is amortized as a level-dollar amount.

Oklahoma Police Pension Retirement System

Table 8

Actuarial Contribution Rate

	Valuation as of July 1, 2019 Amount	2019 Rate of Pay	2018 Amount	2018 Rate of Pay
1. Total Normal Cost*	$69,651,000	20.5%	$66,180,000	20.4%
2. Amortization of UAAL	(5,290,000)	(1.6%)	(5,737,000)	(1.8%)
3. Budgeted Expenses	2,250,000	0.7%	2,126,000	0.7%
4. Total Required Contribution	$66,611,000	19.6%	$62,569,000	19.3%
5. Member Contributions	27,136,000	8.0%	25,849,000	8.0%
6. Estimated Employer Contributions**	44,138,000	13.0%	42,075,000	13.0%
7. Required State Contribution (4) - (5) - (6) (not less than $0)	$0	0.0%	$0	0.0%
8. Prior year actual state contributions Rate is percentage of prior year compensation	$39,559,000	12.2%	$39,028,000	12.4%

* Normal cost is typically determined as a rate of pay. Dollar amount shown is an estimate only.

**Determination of Employer Rate	2019	2018
Active member projected payroll	339,195,248	323,111,811
Employer contribution rate	13.0%	13.0%
Estimated employer contributions	44,095,382	42,004,535
DOP member payroll	658,619	1,078,331
Employer contribution rate	6.5%	6.5%
Estimated employer contributions	42,810	70,092
Total contributions	44,138,192	42,074,627
As a percentage of total pay	13.0%	13.0%

Note: Due to rounding, there may be differences in addition or multiplication.

Oklahoma Police Pension and Retirement System

Table 9

Calculation of Actuarial Gain/(Loss)

1. Expected actuarial accrued liability		
a. Actuarial accrued liability at July 1, 2018	$	2,515,811,000
b. Normal cost for FY 2019		60,258,000
c. Benefit payments for fiscal year ending June 30, 2019		(155,486,000)
d. Interest on (a), (b), and (c)		187,480,000
e. Expected actuarial accrued liability as of July 1, 2019	$	2,608,063,000
2. Actuarial accrued liability at July 1, 2019	$	2,612,473,000
3. Actuarial accrued liability gain/(loss) (1e) - (2)	$	(4,410,000)
4. Expected actuarial value of assets		
a. Actuarial value of assets at July 1, 2018	$	2,586,061,000
b. Contributions for fiscal year ending June 30, 2019		107,886,000
c. Benefit payments and expenses for fiscal year ending June 30, 2019		(157,357,000)
d. Interest on (a), (b), and (c)		192,133,000
e. Expected actuarial value of assets as of July 1, 2019	$	2,728,723,000
5. Actuarial value of assets at July 1, 2019	$	2,677,255,000
6. Actuarial value of assets gain/(loss) (5) - (4e)	$	(51,468,000)
7. Net actuarial gain/(loss) (3) + (6)	$	(55,878,000)

Oklahoma Police Pension and 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, is first applicable for the July 1, 2019 actuarial valuation for the Oklahoma Police Pension and 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 and litigation 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 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 OPPRS 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.

The other significant risk factor for OPPRS is investment return because of the volatility of returns and the size of plan assets compared to payroll (see Table 10). 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.

A key demographic risk for all retirement systems, including OPPRS, is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect small, continuous 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, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

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.

Oklahoma Police Pension and Retirement System

Table 10

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*
6/30/2000	$1,319,263,000	$167,501,286	7.88	18.78%
6/30/2001	1,238,761,000	172,535,010	7.18	17.12%
6/30/2002	1,156,636,000	179,742,853	6.43	15.33%
6/30/2003	1,182,326,000	190,707,025	6.20	14.78%
6/30/2004	1,319,329,000	194,528,516	6.78	16.16%
6/30/2005	1,414,945,000	206,525,374	6.85	16.33%
6/30/2006	1,549,723,000	217,558,055	7.12	16.97%
6/30/2007	1,797,555,000	231,257,280	7.77	18.52%
6/30/2008	1,734,149,000	246,191,165	7.04	16.78%
6/30/2009	1,431,305,000	258,477,576	5.54	13.21%
6/30/2010	1,558,741,000	253,259,725	6.15	14.66%
6/30/2011	1,811,460,000	257,504,567	7.03	16.76%
6/30/2012	1,784,760,000	266,038,359	6.71	16.00%
6/30/2013	1,976,839,000	279,013,522	7.09	16.90%
6/30/2014	2,238,466,000	289,502,327	7.73	18.43%
6/30/2015	2,264,996,000	295,307,065	7.67	18.28%
6/30/2016	2,201,671,000	314,557,000	7.00	16.69%
6/30/2017	2,395,381,000	314,374,000	7.62	18.17%
6/30/2018	2,563,446,000	324,190,000	7.91	18.86%
6/30/2019	2,618,857,000	339,854,000	7.71	18.38%

Note: Years prior to the 6/30/2016 were provided by the prior actuary.

*The impact of asset smoothing is not reflected in the impact on the Actuarial Contribution Rate (ACR). The increase in the ACR is based on the 5-year amortization that would apply if the System funded ratio was below 100%. Current year assumptions are used for all years shown.

The assets at June 30, 2019 are 771% of payroll, so underperforming the investment return assumption by 1.00% (i.e., earn 6.50% for one year) is equivalent to 7.71% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAL, this illustrates the risk associated with volatile investment returns.

Oklahoma Police Pension and Retirement System

Table 11

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. 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. OPPRS has had negative cash flows of around 2% for many years, so there is no concern for the foreseeable future.

Year End	Market Value of Assets (MVA)	Contributions	Benefit Payments	Net Cash Flow	Net Cash Flow as a Percent of MVA
6/30/2000	$1,319,263,000	$48,941,000	$60,353,000	($11,412,000)	(0.87%)
6/30/2001	1,238,761,000	51,840,000	62,241,000	(10,401,000)	(0.84%)
6/30/2002	1,156,636,000	54,589,000	67,857,000	(13,268,000)	(1.15%)
6/30/2003	1,182,326,000	57,017,000	71,325,000	(14,308,000)	(1.21%)
6/30/2004	1,319,329,000	37,327,000	75,286,000	(37,959,000)	(2.88%)
6/30/2005	1,414,945,000	62,965,000	81,313,000	(18,348,000)	(1.30%)
6/30/2006	1,549,723,000	65,400,000	85,213,000	(19,813,000)	(1.28%)
6/30/2007	1,797,555,000	73,098,000	92,426,000	(19,328,000)	(1.08%)
6/30/2008	1,734,149,000	74,078,000	94,097,000	(20,019,000)	(1.15%)
6/30/2009	1,431,305,000	77,727,000	97,052,000	(19,325,000)	(1.35%)
6/30/2010	1,558,741,000	74,158,000	111,440,000	(37,282,000)	(2.39%)
6/30/2011	1,811,460,000	75,980,000	105,566,000	(29,586,000)	(1.63%)
6/30/2012	1,784,760,000	81,101,000	116,175,000	(35,074,000)	(1.97%)
6/30/2013	1,976,839,000	87,575,000	116,670,000	(29,095,000)	(1.47%)
6/30/2014	2,238,466,000	89,007,000	121,103,000	(32,096,000)	(1.43%)
6/30/2015	2,264,996,000	95,618,000	143,642,000	(48,024,000)	(2.12%)
6/30/2016	2,201,671,000	98,235,000	140,456,000	(42,221,000)	(1.92%)
6/30/2017	2,395,381,000	97,086,000	145,791,000	(48,705,000)	(2.03%)
6/30/2018	2,563,446,000	103,910,000	141,284,000	(37,374,000)	(1.46%)
6/30/2019	2,618,857,000	107,886,000	157,357,000	(49,471,000)	(1.89%)

Note: Years prior to the 6/30/2016 were provided by the prior actuary.

Oklahoma Police Pension and Retirement System

Table 12

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. The removal of the COLA assumption in 2011 significantly affects the comparison of the results before and after that date.

Year End	Retiree Liability (a)	Total Actuarial Accrued Liability (b)	Retiree Percentage (a) / (b)
6/30/2000	816,828,831	1,354,500,875	60.3%
6/20/2001	873,049,575	1,443,404,052	60.5%
6/30/2002	930,334,502	1,554,288,324	59.9%
6/30/2003	959,714,377	1,646,979,675	58.3%
6/30/2004	991,049,695	1,727,162,602	57.4%
6/30/2005	1,012,642,020	1,811,572,114	55.9%
6/30/2006	1,032,047,616	1,910,059,072	54.0%
6/30/2007	1,059,888,219	2,035,653,471	52.1%
6/30/2008	1,066,491,872	2,132,175,698	50.0%
6/30/2009	1,091,714,246	2,253,133,775	48.5%
6/30/2010	1,151,235,873	2,341,619,152	49.2%
6/30/2011	979,617,905	1,959,976,006	50.0%
6/30/2012	1,006,325,630	2,034,485,171	49.5%
6/30/2013	1,058,739,933	2,131,172,172	49.7%
6/30/2014	1,081,453,586	2,204,797,154	49.1%
6/30/2015	1,132,081,248	2,269,073,426	49.9%
6/30/2016	1,155,632,000	2,354,815,000	49.1%
6/30/2017	1,193,676,000	2,403,073,000	49.7%
6/30/2018	1,225,406,000	2,515,811,000	48.7%
6/30/2019	1,266,287,000	2,612,473,000	48.5%

Note: Years prior to the 6/30/2016 were provided by the prior actuary.

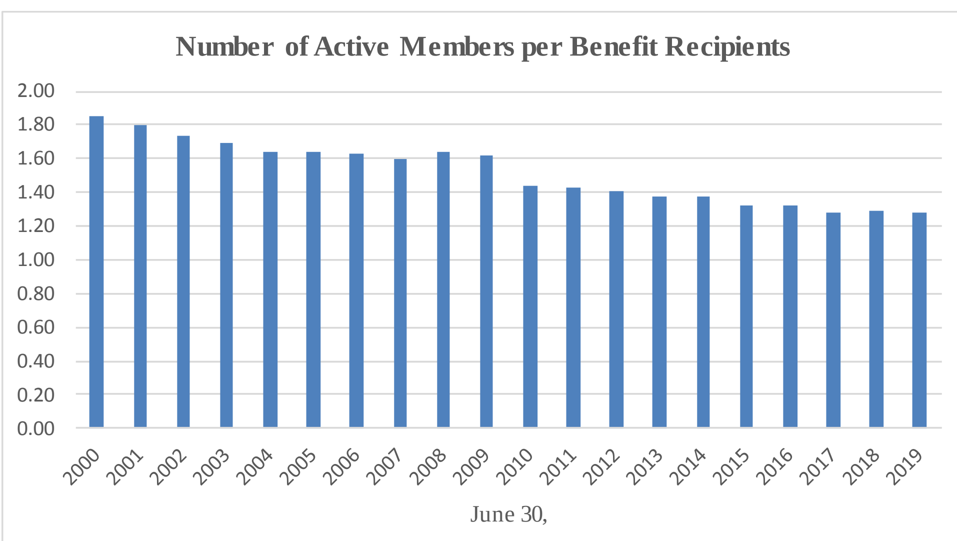
Oklahoma Police Pension and Retirement System

Table 13

Historical Member Statistics

Valuation Date June 30,	Number of Active	Number of Retired*	Active/ Retired
2000	3,778	2,042	1.85
2001	3,816	2,119	1.80
2002	3,836	2,205	1.74
2003	3,880	2,290	1.69
2004	3,895	2,373	1.64
2005	4,016	2,447	1.64
2006	4,141	2,548	1.63
2007	4,247	2,650	1.60
2008	4,453	2,719	1.64
2009	4,497	2,785	1.61
2010	4,305	2,993	1.44
2011	4,368	3,060	1.43
2012	4,441	3,148	1.41
2013	4,467	3,239	1.38
2014	4,557	3,320	1.37
2015	4,570	3,448	1.33
2016	4,679	3,550	1.32
2017	4,695	3,658	1.28
2018	4,791	3,720	1.29
2019	4,902	3,815	1.28

**DOP members are not included for this analysis.*
Note: Years prior to 6/30/2016 were provided by prior actuary.



Oklahoma Police Pension and Retirement System

Table 14

Comparison of Valuation Results under Alternate Investment Return Assumptions

This exhibit compares the key July 1, 2019 valuation results under five (5) different investment return assumptions to illustrate the impact of different assumptions on the funding of the System. Note that only the investment return assumption is changed, as identified in the heading below. All other assumptions are unchanged for purposes of this analysis.

Investment Return Assumption	**7.00%**	**7.25%**	**7.50%**	**7.75%**	**8.00%**
Contributions					
Normal Cost Rate	22.7%	21.6%	20.5%	19.5%	18.5%
Amortization of Unfunded Actuarial Accrued Liability	4.7%	0.0%	(1.6%)	(3.1%)	(4.7%)
Budgeted Expenses	0.7%	0.7%	0.7%	0.7%	0.7%
Total Actuarial Required Contribution Rate	28.1%	22.3%	19.6%	17.1%	14.5%
Less Member Contribution Rate	(8.0%)	(8.0%)	(8.0%)	(8.0%)	(8.0%)
Less Estimated Employer Contribution Rate	(13.0%)	(13.0%)	(13.0%)	(13.0%)	(13.0%)
Required State Contribution Rate	7.1%	1.3%	0.0%	0.0%	0.0%
Required State Contribution Amount ($ in Thousands)	$24,225	$4,513	$0	$0	$0
Actuarial Value of Assets	$2,677,255	$2,677,255	$2,677,255	$2,677,255	$2,677,255
Actuarial Accrued Liabilities	$2,745,648	$2,677,646	$2,612,473	$2,549,975	$2,490,007
Unfunded Actuarial Accrued Liabilities	$68,393	$391	($64,782)	($127,280)	($187,248)
Funded Ratio	97.5%	100.0%	102.5%	105.0%	107.5%

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

Oklahoma Police Pension and Retirement System

In this section we have an exhibit showing the expected benefit payments for the System, an exhibit showing the Present Value of Accrued Benefits, and some historical information.

Oklahoma Police Pension and Retirement System

Table 15

Projected Benefit Payments

The table below shows estimated benefits expected to be paid over the next twenty years, based on the assumptions used in this valuation. The “Actives” column shows benefits expected to be paid to members currently active on July 1, 2019. The “Inactives” column shows benefits as of July 1, 2019 expected to be paid to all members receiving benefit payments 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	Inactives	Total
2020	$ 77,702,000	$ 120,393,000	$ 198,095,000
2021	64,906,000	119,365,000	184,271,000
2022	70,296,000	118,250,000	188,546,000
2023	77,851,000	117,006,000	194,857,000
2024	83,835,000	115,569,000	199,404,000
2025	89,823,000	114,079,000	203,902,000
2026	94,331,000	112,448,000	206,779,000
2027	102,086,000	110,797,000	212,883,000
2028	110,553,000	109,004,000	219,557,000
2029	117,726,000	107,016,000	224,742,000
2030	129,540,000	104,920,000	234,460,000
2031	139,481,000	102,606,000	242,087,000
2032	147,758,000	100,145,000	247,903,000
2033	156,656,000	97,556,000	254,212,000
2034	165,888,000	94,791,000	260,679,000
2035	174,086,000	91,920,000	266,006,000
2036	182,530,000	88,963,000	271,493,000
2037	198,261,000	85,880,000	284,141,000
2038	209,574,000	82,693,000	292,267,000
2039	223,747,000	79,426,000	303,173,000

Oklahoma Police Pension and Retirement System

Table 16

Present Value of Accumulated System Benefits

The actuarial present value of accumulated vested and non-vested system benefits was computed on an ongoing System basis to provide information that generally complies with FASB Accounting Standards Codification (ASC 960). While ASC 960 is not directly applicable to public retirement systems, the information is included to allow for historical comparisons.

In this calculation, the benefits valued are based on the present salary and service information for each member. Eligibility for retirement and other future benefits takes into consideration future service as assumed by the System's demographic assumptions. The liabilities presented here may not be appropriate to reflect the settlement obligations of the System, nor are they necessarily appropriate for information regarding the funding of the System.

	July 1, 2019	July 1, 2018
Accumulated System Benefits		
Vested Benefits		
a. Active Members	$866,448,000	$835,642,000
b. Deferred Option Plan Members	8,791,000	10,417,000
c. Vested Terminated Members	24,169,000	19,391,000
d. Members Receiving Benefits	1,257,496,000	1,212,828,000
e. October 2018 Stipend	0	2,161,000
f. Total Vested Benefits	$2,156,904,000	$2,080,439,000
Non-vested Benefits	267,622,000	255,962,000
Total Accumulated System Benefits (PVAB)	$2,424,526,000	$2,336,401,000
Market Value of Assets Available for Benefits (MVA)	$2,618,857,000	$2,563,446,000
Funded Ratio (MVA / PVAB)	108.0%	109.7%
Assumed Rate of Interest	7.50%	7.50%

Oklahoma Police Pension and Retirement System

Table 17

Historical Investment Returns

Historical asset return information may be useful in explaining the current funded status of the System.

FYE	Actuarial Value			Market Value		
June 30	Annual	Cumulative	10 Years	Annual	Cumulative	10 Years
1990	8.6%	8.6%		9.2%	9.2%	
1991	7.9%	8.2%		8.1%	8.6%	
1992	8.7%	8.4%		13.8%	10.3%	
1993	10.3%	8.9%		15.1%	11.5%	
1994	9.3%	9.0%		0.0%	9.1%	
1995	11.0%	9.3%		17.7%	10.5%	
1996	11.9%	9.7%		13.5%	10.9%	
1997	12.8%	10.1%		17.3%	11.7%	
1998	13.5%	10.4%		16.9%	12.3%	
1999	14.3%	10.8%	10.8%	9.7%	12.0%	12.0%
2000	12.8%	11.0%	11.2%	8.7%	11.7%	12.0%
2001	8.8%	10.8%	11.3%	(5.3%)	10.2%	10.5%
2002	4.9%	10.3%	10.9%	(5.6%)	8.9%	8.4%
2003	2.7%	9.8%	10.1%	3.5%	8.5%	7.3%
2004	3.3%	9.3%	9.5%	15.0%	8.9%	8.8%
2005	3.0%	8.9%	8.7%	8.7%	8.9%	7.9%
2006	6.1%	8.8%	8.1%	11.0%	9.0%	7.7%
2007	10.6%	8.9%	7.9%	17.3%	9.5%	7.7%
2008	8.9%	8.9%	7.5%	(2.4%)	8.8%	5.8%
2009	(0.9%)	8.3%	5.9%	(16.4%)	7.4%	2.9%
2010	4.4%	8.2%	5.1%	11.7%	7.6%	3.2%
2011	5.6%	8.0%	4.8%	18.3%	8.0%	5.5%
2012	2.6%	7.8%	4.6%	0.5%	7.7%	6.2%
2013	5.4%	7.7%	4.9%	12.5%	7.9%	7.1%
2014	11.4%	7.8%	5.6%	15.0%	8.2%	7.1%
2015	9.3%	7.9%	6.3%	3.4%	8.0%	6.6%
2016	6.2%	7.8%	6.3%	(0.9%)	7.6%	5.4%
2017	7.5%	7.8%	6.0%	11.1%	7.8%	4.8%
2018	7.3%	7.8%	5.8%	8.6%	7.8%	5.9%
2019	5.5%	7.7%	6.5%	4.1%	7.7%	8.3%

Note: Returns prior to 2016 were prepared by the prior actuary.

Oklahoma Police Pension and Retirement System

Table 18

Solvency Test

Valuation Year	Aggregate Accrued Liabilities For (1) Active Member Contributions	(2) Retirees and Beneficiaries	(3) Active and Terminated Vested Members (Employer Financed Portion)	Valuation Assets	Portion of Accrued Liabilities Covered by Assets (1)	(2)	(3)
2010	$174,025,925	$1,111,074,787	$1,056,518,440	$1,754,372,000	100%	100%	44.4%
2011	184,781,373	944,081,922	831,112,711	1,822,702,000	100	100	83.5
2012	189,459,953	983,507,261	861,517,957	1,834,170,000	100	100	76.7
2013	199,233,453	1,037,456,527	894,482,192	1,902,581,000	100	100	74.4
2014	209,576,572	1,057,853,545	937,367,037	2,086,297,000	100	100	87.4
2015	214,685,883	1,112,855,884	941,531,659	2,229,272,000	100	100	95.8
2016	223,255,000	1,176,401,000	955,159,000	2,323,407,000	100	100	96.7
2017	238,151,000	1,193,676,000	971,246,000	2,447,351,000	100	100	104.6
2018	245,909,000	1,225,406,000	1,044,496,000	2,586,061,000	100	100	106.7
2019	251,559,000	1,266,287,000	1,094,627,000	2,677,255,000	100	100	105.9

Effective Date and Plan Year:	The System became effective July 1, 1981 and has been amended periodically since then. The plan year is July 1 to June 30.
Administration:	The System is administered by the Oklahoma Police Pension Retirement Board consisting of thirteen members. The Board shall be responsible for the policies and rules for the general administration of the System.
Plan Type:	Defined benefit plan.
Employers Included:	An eligible employer may join the System on the first day of any month. An application of affiliation must be filed in the form of a resolution before the eligible municipality can become a participating municipality.
Eligibility:	All persons employed full-time as officers working more than 25 hours per week or any person undergoing police training to become a permanent police officer with a police department of a participating municipality, with ages not less than twenty-one (21) nor more than forty-five (45) when accepting membership.
Salary Considered:	Base salary used in the determination of benefits does not include payment for accumulated sick and annual leave upon termination of employment or any uniform allowances.
Final Average Salary:	Final average salary means the average paid base salary for normally scheduled hours of an officer over the highest 30 consecutive months of the last 60 months of credited service.
Service Considered:	Credited service consists of the period during which the member participated in the System or predecessor municipal pay as an active employee, plus any service prior to the establishment of the municipal plan which was credited under the predecessor municipal systems of credited service granted by the State Board, plus any applicable military service.
State Contributions:	Insurance premium tax allocation. Historically, the System has received 14% of these collected taxes. For the fiscal years beginning July 1, 2004 and ending June 30, 2009, the System received 17% of these collected taxes. For the fiscal year thereafter, the System received 14% of these collected taxes. Beginning in fiscal year July 1, 2006, the System began receiving 26% of a special allocation established to refund the System for reduced allocations of insurance premium taxes resulting from increases in insurance premium tax credits. Beginning in fiscal year July, 1 2010, the amount of insurance premium tax apportioned to the System will be applied prior to the calculation of the Home Office Credit.

Member Contributions:	8% of paid salary. These contributions shall "be picked up" after December 31, 1988 pursuant to Section 414(h)(2) of the Internal Revenue Code.
Municipality Contributions:	Contribution is 13% of paid salary as of July 1, 1996.
Normal Retirement Benefit:	
Normal Retirement Eligibility:	20 years of credited service.
Benefit Amount:	2 1/2% of the final average salary multiplied by the years of credited service, with a maximum of 30 years of credited service considered.
Normal Form of Benefit:	The benefit is paid as a Joint and 100% Survivor Annuity if the member was married 30 months prior to death.
Termination Benefit:	
Less than 10 Years of Service:	Refund of member contributions without interest.
More than 10 Years of Service:	If greater than 10 years of service, but not eligible for the normal retirement benefit, the benefit is payable at the later of the date the member would have had 20 years of service and the date the member reaches age 50. The benefit amount is equal to 2 ½% of the greater of (i) final average salary or (ii) the salary paid to active employees as described under "salary considered" multiplied by the number of years and completed months of credited service.
Disability Benefit (Duty):	<u>Total Disability</u> Upon determination of disability incurred as a result of the performance of duty, the normal disability benefit is 50% of final average salary. <u>Partial Disability</u> Upon determination of partial disability incurred as a result of the performance of duty, the normal disability is reduced according to the percentage of impairment, as outlined in the "American Medical Association's Guide to the Evaluation of Permanent Impairment." The following shows the percent of normal disability benefit payable as related to the percent of impairment.

% Impairment	% of Benefit
1% to 49%	50%
50% to 74%	75%
75% to 100%	100%

Disability Benefit (Non-Duty):

Upon determination of disability after 10 years of service due to causes other than duty, the benefit equals the accrued benefit of 2 ½% of final average salary times years of credited service (maximum of 30 years) times:

- 100%, if permanent and total, or
- The following percentages, if partial disability:

% Impairment	% of Benefit
1% to 24%	25%
25% to 49%	50%
50% to 74%	75%
75% to 99%	90%

Upon determination of disability with less than 10 years of service due to causes other than duty, a refund of member contributions without interest will be paid.

Death Benefits Payable to Beneficiaries:

Prior to Retirement (Duty):

The greater of:

1) 2 ½% of final average salary times years of credited service (maximum of 30 years), or

2) 50% of final average salary.

Prior to Retirement (Non-Duty):

After 10 years of service, a benefit equal to 2 ½% of final average salary times years of credited service (maximum if 30 years).

Prior to 10 years of service, a refund of the accumulated contributions made by the member will be paid to the estate.

After Retirement or Vested Termination:

100% of the member's retirement or deferred vested benefit, payable when the member would have been eligible to receive it, payable to the beneficiary.

Lump Sum:	The beneficiary shall receive a lump-sum amount of $5,000.
Beneficiary Eligibility:	Surviving spouses must be married to the member 30 months prior to the date of death (waived in the case of duty related death). If the beneficiary is a child, the benefits are payable to age 18, or to age 22 if a full-time student. If the beneficiary is a spouse to whom the member was married for at least 30 months prior to death, if the death was not duty related, the benefits are payable for life.
Postretirement Adjustments:	Police officers eligible to receive increased benefits according to repealed Section 50-120 of Title 11 of the Oklahoma Statutes pursuant to a court order receive an adjustment of ⅓ to ½ of the increase or decrease of any adjustment to the base salary of a regular police officer.
Deferred Option Plan:	A member with 20 or more years of service may elect to participate in the Deferred Option Plan (DOP). Participation in the DOP shall not exceed five years. The member's contributions cease upon entering the DOP, but the agency contributions are divided equally between the Retirement System and Deferred Option Plan. The monthly retirement benefits that the member is eligible to receive are paid into the Deferred Option Plan account. Members can elect to retroactively join the DOP as of a back-dop-date which is no earlier than the member's normal retirement date or five years before his termination date. The monthly retirement benefits and employee contributions that would have been payable had the member elected to join the DOP are credited to the member's DOP account with interest. The retirement benefits are not recalculated for service and salary past the election date to join the Deferred Option Plan. However, the benefits are increased by cost-of-living increases applicable to retired members during the DOP period. When the member actually terminates employment, the Deferred Option Plan account balance may be paid in a lump sum or to an annuity provider. Monthly retirement benefits are then paid directly to the retired member. This Plan became effective during the July 1, 1991 to June 30, 1992 Plan Year. The Deferred Option Plan account is guaranteed a minimum of the valuation interest rate for investment return, or 2% less than the fund rate of return, if greater.

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.

Amortization Method

The unfunded actuarial accrued liability is amortized as a level dollar amount over a 5-year open period. Surplus, if any, is amortized as a level dollar amount over a 30-year open period.

Valuation Procedures

The wages used in the projection of benefits and liabilities are pay for the year ending June 30, 2019 (including longevity bonuses). These amounts were projected into the valuation year using the valuation salary scale.

In computing accrued benefits, average earnings were determined using the valuation salary scale. Historical earnings for the past five years have been retained.

Retired members were assumed to be married according to the probability of marriage assumption. For those in the Baker group, the assumption is 100% married.

The impact from compensation limit under IRC Section 401(a)(17) and from the dollar limitation required by the Internal Revenue Code Section 415 for governmental plans were considered in this valuation and was determined to be *de minimis*.

The calculations for the required state contribution are determined as of mid-year. Since the agency contributions, member contributions and State insurance premium tax allocations are made on a monthly basis throughout the year, a mid-year determination date represents an average weighting of the contributions.

Economic Assumptions

1. Inflation — 2.75%, per annum, compound annually.

2. Investment Return — 7.50%, net of investment expenses, per annum, compounded annually.

3. Salary Scale

Attained Service	Inflation %	Merit %	Increase %
0	3.50	8.50	12.00
1	3.50	6.50	10.00
2	3.50	5.50	9.00
3	3.50	4.50	8.00
4-6	3.50	4.00	7.50
7	3.50	3.75	7.25
8	3.50	3.50	7.00
9	3.50	3.25	6.75
10-12	3.50	3.00	6.50
13	3.50	2.00	5.50
14	3.50	1.25	4.75
15	3.50	0.75	4.25
16-25	3.50	0.25	3.75
26+	3.50	0.00	3.50

Demographic Assumptions

1. Retirement Rates — Sample rates are shown below:

Attained Service	Annual Rates of Retirement
20	15%
21	8
22	8
23	8
24	8
25	20
26	10
27	10
28	10
29	15
30	20
31	30
32	40
33	50
34	75
35	100

2. Mortality Rates

(a) Active participants — RP-2000 Combined Blue Collar Healthy Employees (generational using Scale AA) with age set back four years

(b) Active participants (post-retirement) and nondisabled pensioners — RP-2000 Combined Blue Collar Healthy Employees (generational using Scale AA)

(c) Disabled pensioners — RP-2000 Combined Blue Collar Healthy Employees with age set forward four years (no generational improvement)

3. Disability Rates — Sample rates are shown below:

Age	Rate
20-24	0.02%
25-29	0.02
30-34	0.04
35-39	0.06
40-44	0.08
45-49	0.10
50-54	0.12
Over 55	0.14

4. Withdrawal Rates — Sample rates are shown below:

Service Range	Rate
0	15.0%
1	12.0
2	10.0
3	8.0
4	7.0
5	6.0
6	5.0
7	4.5
8	4.0
9	3.5
10	3.0
11	2.5
12	2.0
13	1.5
14-20	1.0
Over 20	0.0

5. Marital Status

(a) Percentage married:	Males: 85%; Females: 85%
(b) Age difference:	Males are assumed to be three (3) years older than females.

Other Assumptions:

1. Deferred Benefits Begin at:	Age 50, or the date at which the participant would have achieved 20 years of service, if later.
2. Provision for Expenses:	Administrative Expenses, as budgeted by the Oklahoma Police Pension and Retirement System.
3. Percentage of Disability:	Members becoming disabled have a 50%-74% impairment.
4. Duty-Related Death:	All pre-retirement deaths are duty-related.
5. Cost-of-Living Allowance:	Police officers eligible to receive increased benefits according to repealed Section 50-120 of Title 11 of the Oklahoma Statutes pursuant to a court order receive an adjustment of 1/3 to 1/2 of the increase or decrease of any adjustment to the base salary of a regular police officer, based on an increase in base salary of 3.5% (wage inflation).
6. Deferred Option Plan:	Members currently participating in the Deferred Option Plan (DOP) are assumed to remain in the DOP for the maximum of five years. Active members leaving active service are assumed to retroactively elect to join the DOP for the maximum allowable period. DOP account balances are assumed to accumulate at 11% (to reflect the interest rate guarantee prior to retirement) for future BackDOP elections and members are assumed to elect a lump sum at retirement. All balances held in Deferred Option payout accounts are assumed to be paid immediately upon the end of employment.

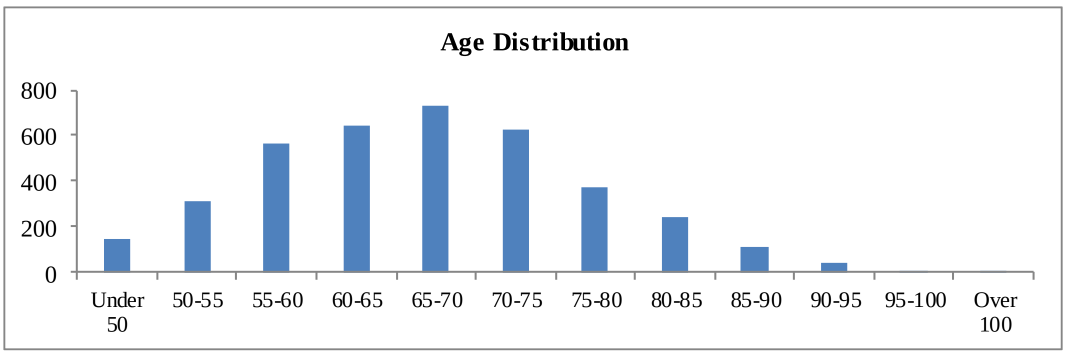
Oklahoma Police Pension and Retirement System
Valuation Data Distribution - Actives

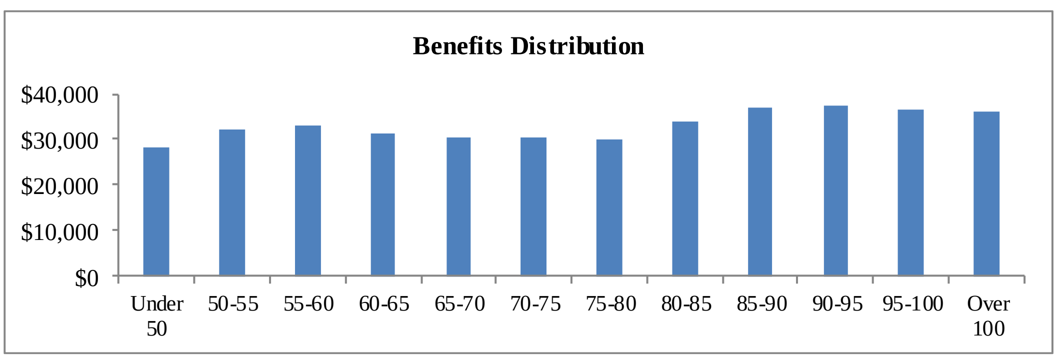
	Years of Service									
Age	**0 to 4**	**5 to 9**	**10 to 14**	**15 to 19**	**20 to 24**	**25 to 29**	**30 to 34**	**35 to 39**	**40 & Up**	**Total**
Under 25	198									198
Avg. Pay	$40,526									$40,526
25 to 29	585	77								662
Avg. Pay	$45,412	$57,130								$46,775
30 to 34	406	353	71							830
Avg. Pay	$46,151	$60,580	$69,322							$54,270
35 to 39	215	219	330	45						809
Avg. Pay	$45,103	$60,461	$73,984	$78,762						$62,914
40 to 44	84	103	205	255	62					709
Avg. Pay	$43,436	$55,606	$71,229	$83,055	$89,248					$71,496
45 to 49	53	60	129	224	275	38				779
Avg. Pay	$45,261	$52,312	$65,282	$77,998	$85,401	$91,913				$74,979
50 to 54	9	27	55	66	147	182	34			520
Avg. Pay	$37,877	$53,492	$60,858	$75,459	$81,463	$93,687	$92,068			$81,287
55 to 59	1	1	25	31	48	92	91	15		304
Avg. Pay	$35,112	$51,764	$65,391	$77,910	$76,465	$87,481	$94,923	$90,941		$85,058
60 & up	1		2	6	21	16	20	19	6	91
Avg. Pay	$35,360		$52,656	$66,451	$75,525	$80,712	$86,577	$97,332	$104,417	$83,782
Total	1,552	840	817	627	553	328	145	34	6	4,902
Avg. Pay	$44,770	$58,794	$70,315	$79,728	$83,635	$91,108	$93,102	$94,512	$104,417	$65,235

Oklahoma Police Pension and Retirement System

Retirees, Beneficiaries, & Disableds

Age	Number			Annual Benefits		
	Male	Female	Total	Male	Female	Total
Under 50	130	17	147	$ 3,831,501	$ 345,629	$ 4,177,130
50-55	251	58	309	8,372,678	1,605,619	9,978,297
55-60	472	96	568	16,286,432	2,405,347	18,691,779
60-65	540	106	646	17,718,586	2,531,024	20,249,610
65-70	640	89	729	20,324,820	1,836,822	22,161,642
70-75	556	67	623	17,329,389	1,693,160	19,022,549
75-80	315	59	374	9,280,939	1,932,723	11,213,662
80-85	168	77	245	5,295,801	3,008,312	8,304,113
85-90	58	57	115	2,175,316	2,064,462	4,239,778
90-95	18	27	45	631,524	1,058,991	1,690,515
95-100	3	9	12	101,515	335,859	437,374
Over 100	0	2	2	0	72,202	72,202
Total	3,151	664	3,815	$ 101,348,501	$ 18,890,150	$ 120,238,651





Oklahoma Police Pension and Retirement System

Deferred Vesteds

	Number			Annual Benefits		
Age	Male	Female	Total	Male	Female	Total
Under 35	1	1	2	$ 9,470	$ 13,491	$ 22,961
35-40	12	4	16	182,605	65,260	247,865
40-45	48	10	58	853,317	191,947	1,045,264
45-50	49	5	54	857,606	89,940	947,546
50-55	13	3	16	273,541	68,442	341,983
Over 55	11	1	12	214,649	14,538	229,187
Total	134	24	158	$ 2,391,188	$ 443,618	$ 2,834,806

DOP Participants

	Number			Annual Benefits		
Age	Male	Female	Total	Male	Female	Total
Under 50	1	0	1	$ 50,355	$ 0	$ 50,355
50-55	0	0	0	0	0	0
55-60	2	0	2	127,685	0	127,685
Over 60	1	0	1	30,037	0	30,037
Total	4	0	4	$ 208,077	$ 0	$ 208,077

Oklahoma Police Pension and Retirement System

	Actuarial Valuation as of		
	7/1/2019	7/1/2018	% Change
1. Active members			
a. Number	4,902	4,791	2.3%
b. Annual compensation	$ 319,780,158	$ 304,819,587	4.9%
c. Average annual compensation	$ 65,235	$ 63,623	2.5%
d. Average age	39.9	40.0	(0.3%)
e. Average service	11.9	12.0	(0.8%)
2. Non-vested terminated members			
a. Number	825	779	5.9%
b. Total contribution balances	$ 3,354,336	$ 2,926,134	14.6%
c. Average balance	$ 4,066	$ 3,756	8.3%
3. Vested terminated members			
a. Number	158	147	7.5%
b. Annual deferred benefits	$ 2,834,806	$ 2,317,749	22.3%
c. Average annual deferred benefit	$ 17,942	$ 15,767	13.8%
4. Retired members			
a. Number	2,887	2,802	3.0%
b. Annual retirement benefits	$ 96,422,803	$ 92,086,797	4.7%
c. Average annual retirement benefit	$ 33,399	$ 32,865	1.6%
5. Beneficiaries			
a. Number	790	778	1.5%
b. Annual retirement benefits	$ 21,475,904	$ 21,149,784	1.5%
c. Average annual retirement benefit	$ 27,185	$ 27,185	0.0%
6. Disabled members			
a. Number	138	140	(1.4%)
b. Annual retirement benefits	$ 2,339,944	$ 2,417,279	(3.2%)
c. Average annual retirement benefit	$ 16,956	$ 17,266	(1.8%)
7. DOP Participants			
a. Number	4	11	(63.6%)
b. Annual retirement benefits	$ 208,077	$ 451,779	(53.9%)
c. Average annual retirement benefit	$ 52,019	$ 41,071	26.7%
8. Total members included in valuation	9,704	9,448	2.7%

Oklahoma Police Pension and Retirement System

	Added to Rolls		Removed from Rolls		Rolls end of Year			
Year Ended	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	% Increase	Average Annual Benefits
2010	259*	8,245,373	51	1,619,770	2,993	87,074,817	8.2%	29,093
2011	127	2,261,138	60	1,652,074	3,060	87,683,881	0.7%	28,655
2012	139	4,587,513	51	1,073,612	3,148	91,197,782	4.0%	28,970
2013	151	4,773,719	60	694,596	3,239	95,276,905	4.5%	29,416
2014	123	3,873,758	42	1,303,391	3,320	97,847,272	2.7%	29,472
2015	175	6,613,773	47	947,483	3,448	103,513,562	5.8%	30,021
2016	175	6,489,659	73	2,024,379	3,550	107,978,842	4.3%	30,417
2017	181	6,601,023	73	2,234,813	3,658	112,345,052	4.0%	30,712
2018	177	6,561,513	115	3,252,707	3,720	115,653,858	2.9%	31,090
2019	184	7,351,430	89	2,766,637	3,815	120,238,651	4.0%	31,517

* Total headcount increased by 97 as a result of QDROs being reported as a separate record

Oklahoma Police Pension and Retirement System

Retirement Effective Dates July 1, 2009 to June 30, 2019	Years of Credited Service 10 - 15	15 - 20	20 - 25	25 - 30	30+
- Period 7/1/09 to 6/30/10					
Average Monthly Benefit	1,627.72	2,169.65	2,498.58	3,512.78	4,261.49
Average Final Average Salary	4,448.65	5,083.47	4,735.54	5,062.36	5,681.98
Number of Retired Members	1	2	83	24	11
- Period 7/1/10 to 6/30/11					
Average Monthly Benefit	0.00	1,661.80	2,760.39	3,833.83	4,340.60
Average Final Average Salary	0.00	4,022.97	5,223.88	5,558.07	5,787.46
Number of Retired Members	0	2	65	13	8
- Period 7/1/11 to 6/30/12					
Average Monthly Benefit	0.00	1,613.72	2,726.34	3,586.85	4,090.27
Average Final Average Salary	0.00	3,649.75	5,163.89	5,133.84	5,453.69
Number of Retired Members	0	2	72	23	6
- Period 7/1/12 to 6/30/13					
Average Monthly Benefit	0.00	0.00	2,721.31	3,891.38	4,880.42
Average Final Average Salary	0.00	0.00	5,186.65	5,673.97	6,507.22
Number of Retired Members	0	0	79	16	11
- Period 7/1/13 to 6/30/14					
Average Monthly Benefit	0.00	0.00	2,898.74	3,616.85	4,483.39
Average Final Average Salary	0.00	0.00	5,410.25	5,413.12	5,977.86
Number of Retired Members	0	0	70	15	4
- Period 7/1/14 to 6/30/15					
Average Monthly Benefit	0.00	0.00	3,017.32	4,431.50	4,847.67
Average Final Average Salary	0.00	0.00	5,652.31	6,556.21	6,463.57
Number of Retired Members	0	0	86	34	11
- Period 7/1/15 to 6/30/16					
Average Monthly Benefit	1,033.68	2,187.06	2,972.89	4,080.60	4,992.02
Average Final Average Salary	3,255.17	5,046.69	5,598.28	6,112.61	6,656.02
Number of Retired Members	5	4	72	21	20
- Period 7/1/16 to 6/30/17					
Average Monthly Benefit	855.06	2,135.63	3,087.72	3,808.06	4,696.16
Average Final Average Salary	3,323.17	4,970.40	5,783.97	5,527.60	6,261.54
Number of Retired Members	2	8	78	21	14
- Period 7/1/17 to 6/30/18					
Average Monthly Benefit	1,996.65	2,064.26	3,274.33	4,572.86	4,872.73
Average Final Average Salary	6,033.83	4,706.42	6,061.61	6,519.39	6,614.57
Number of Retired Members	5	3	73	10	16
- Period 7/1/18 to 6/30/19					
Average Monthly Benefit	1,005.54	2,299.46	3,227.48	4,474.98	5,095.19
Average Final Average Salary	3,281.42	5,068.54	6,043.30	6,391.58	6,793.58
Number of Retired Members	1	6	75	21	24
Five Year Average - Period 7/1/14 to 6/30/19					
Average Monthly Benefit	1,374.41	2,182.04	3,113.19	4,262.02	4,931.29
Average Final Average Salary	4,336.37	4,975.26	5,823.10	6,231.52	6,597.18
Total Number of Retired Members	13	21	384	107	85
Ten Year Average - Period 7/1/09 to 6/30/19					
Average Monthly Benefit	1,392.50	2,100.49	2,916.95	3,985.83	4,775.36
Average Final Average Salary	4,344.39	4,814.55	5,483.31	5,811.02	6,382.20
Total Number of Retired Members	14	27	753	198	125

Note: This schedule includes service retirements as of July 1, 2019 and does not include disability retirements. For participants in the Deferred Option Plan, the Retirement Effective Date is the date the member left active service and the final average salary is determined as of the date the member effectively entered the Deferred Option Plan.

Oklahoma Police Pension and 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 (2) 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.

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.