

Oklahoma City Employee Retirement System

Annual Actuarial Valuation

December 31, 2017



Table of Contents

Section	Page	Item
		Introduction
A		Valuation Results
	1	Funding Objective
	2	Computed Contributions
	3-4	Funding Progress Indicators
	5	Comments
	6	Unfunded Actuarial Accrued Liability
B		Summary of Benefit Provisions, Assets and Valuation Data
	1-2	Summary of Benefit Provisions
	3-4	Asset Information
	5-7	Retired Lives
	8-10	Active and Inactive Members
	11	Comparative Statement
C		Actuarial Methods, Actuarial Assumptions and Definition of Technical Terms
	1-2	Valuation Process
	3	Actuarial Methods
	4-7	Actuarial Assumptions
	8	Definitions of Technical Terms
	9	Miscellaneous and Technical Assumptions
D		Supplementary Information
	1-2	Supplementary Information
E		Retirement System Experience – Actual vs Expected
	1	Derivation of Experience Gain (Loss)
	2	Service Retirements During the Indicated Plan Years
	3	Non-Vested Withdrawals from Active Membership During the Indicated Plan Years
	4	Number Added to and Removed from Active Membership



July 23, 2018

The Board of Trustees
Oklahoma City Employee Retirement System
Oklahoma City, Oklahoma

Dear Board Members:

The results of the December 31, 2017 annual actuarial valuation of the Oklahoma City Employee Retirement System are presented in this report. The purpose of the valuation is to measure the System's funding progress and to determine the employer contribution for the fiscal year beginning July 1, 2019. This report should not be relied upon for any other purpose. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report. Future actuarial measurements may differ significantly from those presented in this report due to such factors as experience differing from that anticipated by actuarial assumptions, changes in plan provisions, actuarial assumptions/methods or applicable law. Due to the limited scope of this assignment, we did not perform an analysis of the potential range of future measurements.


The valuation was based upon the actuarial assumptions and methods adopted by the Board, information, furnished by the Retirement System, concerning Retirement System benefits, financial transactions, plan provisions, individual members, terminated members, retirees and beneficiaries. Data was checked for internal reasonability and year-to-year consistency, but was not audited by us. As a result, we are unable to assume responsibility for the accuracy or completeness of the information provided.

The fiscal year 2020 contribution rate shown in this report was based on the actuarial assumptions and methods shown in Section C of this report. This report includes risk metrics on pages A-4 and D-1 but does not include additional risk metrics such as those that assess the risk of future experience not meeting actuarial assumptions. These additional risk assessments were beyond the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material impact on the plan's financial condition.

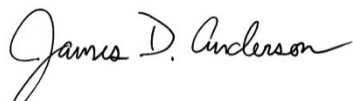
The Board of Trustees
Oklahoma City Employee Retirement System
July 23, 2018
Page 2

To the best of our knowledge, this report is complete and accurate and the valuation was conducted in accordance with standards of practice prescribed by the Actuarial Standards Board and in compliance with the applicable state statutes. Louise Gates and James D. Anderson are independent of the plan sponsor and are Members of the American Academy of Actuaries (MAAA) who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. It is our opinion that the actuarial assumptions used for the valuation are reasonable.

Respectfully submitted,



Louise Gates, ASA, FCA, MAAA



James D. Anderson, FSA, EA, FCA, MAAA



SECTION A

VALUATION RESULTS

Funding Objective

The funding objective of the Retirement System is to establish and receive contributions, expressed as percentages of active member payroll, which will remain approximately level from year-to-year and will not have to be increased for future generations of citizens.

Contribution Rates

The Retirement System is supported by member contributions, City contributions and investment income from Retirement System assets.

Contributions which satisfy the funding objective are determined by the annual actuarial valuation and are sufficient to:

- (1) Cover the actuarial present value of benefits allocated to the current year by the actuarial cost method described in Section C (the normal cost); and
- (2) Finance over a period of future years the actuarial present value of benefits not covered by valuation assets and anticipated future normal costs (unfunded actuarial accrued liability).

Computed contribution rates for the fiscal year beginning July 1, 2019 are shown on page A-2.

Computed Contributions Expressed as Percentages of Active Member Payroll

The December 31, 2017 valuation results (contribution rates) will be used by the City for the fiscal year beginning July 1, 2019. The total computed contribution rates determined in the current and prior year's valuation are also shown below.

Development of the Employer Contribution Rate

<u>Contributions for</u>	<u>Employer %</u>
Normal Cost	
Service pensions	10.44%
Disability pensions	0.55%
Survivor pensions	
- Death before retirement	0.41%
Termination benefits	
- Deferred service pensions	0.33%
- Refunds of current member contributions	0.99%
Total normal cost	12.72%
Unfunded Actuarial Accrued Liability (UAAL)	
UAAL credit ¹	(1.16%)
Total Computed Contribution Rate	11.56%
Member contribution rate	6.00%
City's computed rate	5.56%

Computed Contribution Rates as of December 31st of the Indicated Valuation Year

<u>Contributions for</u>	<u>Employer Contribution %</u>	
	<u>2017</u>	<u>2016</u>
Total Normal Cost	12.72%	12.62%
Member Portion	6.00%	6.00%
City Portion	6.72%	6.62%
UAAL Credit ¹	(1.16%)	(1.39%)
City Contribution	5.56%	5.23%

¹ The unfunded actuarial accrued liability (the UAAL) was amortized as a level percent of active member payroll over a period of 24 years in the 2017 valuation and 25 years in the 2016 valuation.

Funding Progress Indicators

There is no single all-encompassing indicator to measure a retirement system's funding progress. A traditional measure has been the relationship of valuation assets to actuarial accrued liability - a measure that is influenced by the choice of actuarial cost method. Numeric information using this traditional measure is shown on the following page.

Additional understanding of funding progress can be achieved using the following tests, which compare the System's assets with:

- (1) members' contributions on deposit in the System;
- (2) present value of future benefits to present retired lives; and
- (3) present value of benefits based on service already rendered by active and inactive members.

In a system that has been following the discipline of level percent-of-payroll financing, member contributions on deposit (item 1) and the present value of future benefits to present retired lives (item 2) will be fully covered by present assets (except in rare circumstances). In addition, the present value of benefits based on service already rendered by members (item 3) will be partially covered by the remainder of present assets. The larger the funded portion of item 3, the stronger the condition of the system. Generally, if the system has been using level-percent financing, the funded portion of item 3 will increase over time. A historical comparison of funding progress tests is shown on the following page.

Limitations of the Funding Progress (funded status) Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based on the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to the funded status measurements shown in this report we note the following:

The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

The measurement is inappropriate for assessing the need for or the amount of future employer contributions.

The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

Funding Progress Test (Dollar Amounts in Thousands)

Valuation Date	Accrued Liabilities (AL)					Portion of Liabilities Covered by Assets			
	(1) Member Contribs.	(2) Retirants and Beneficiaries	(3) Active & Inactive Members (Employer Financed Portion)		Funding Value of Assets	(1)	(2)	(3)	Overall
			Total AL	Total AL					
12/31/98	\$37,900	\$ 82,258	\$ 118,498	\$ 238,656	\$ 260,877	100 %	100 %	119 %	109 %
12/31/99	39,866	85,724	120,316	245,906	307,872	100	100	152	125
12/31/00	41,550	100,936	180,814	323,300	350,398	100	100	115	108
12/31/01	42,226	116,552	185,819	344,597	372,737	100	100	115	108
12/31/02	44,368	128,120	200,072	372,560	375,382	100	100	101	101
12/31/03	46,654	136,873	207,496	391,023	374,192	100	100	92	96
12/31/04	48,487	150,664	216,013	415,164	381,495	100	100	84	92
12/31/05	54,239	169,752	212,913	436,904	424,182	100	100	94	97
12/31/06	55,557	187,693	214,297	457,547	476,913	100	100	109	104
12/31/07	60,118	204,470	224,239	488,827	529,876	100	100	118	108
12/31/08	62,128	221,456	235,650	519,234	528,664	100	100	104	102
12/31/09	65,106	237,302	254,019	556,427	529,137	100	100	89	95
12/31/10	64,922	267,120	234,792	566,834	524,731	100	100	82	93
12/31/11	67,324	252,166	214,229	533,719	514,499	100	100	91	96
12/31/12	69,987	257,057	226,544	553,588	547,686	100	100	97	99
12/31/13	72,209	281,206	228,451	581,866	589,527	100	100	103	101
12/31/14	74,142	297,061	236,092	607,295	628,686	100	100	109	104
12/31/15	74,832	320,443	238,710	633,985	665,077	100	100	113	105
12/31/16	76,435	347,246	237,531	661,212	692,359	100	100	113	105
12/31/17	78,265	378,063	240,341	696,669	721,090	100	100	110	104

Comments

Comment A: As of the valuation date, the Retirement System has a funding surplus. Based on the current Retirement System funding policy, the surplus was amortized and used as a credit against City normal cost contributions, resulting in a City pension contribution rate of 5.56% of plan member payroll for the City's 2019-2020 fiscal year. The established maximum City contribution rate is 10% of payroll. It is important to note that once the funding surplus is depleted, City contributions will increase to the level of normal cost contributions plus any necessary UAAL payments.

Comment B: There were no benefit changes reported to the actuary in connection with this valuation of the System. However, this valuation of the System reflects a change to the investment return assumption and the wage inflation assumption. Specifically, the investment return assumption was reduced from 7.40% to 7.10% and the wage inflation assumption was reduced from 3.75% to 3.25%. These changes were made to better reflect anticipated future System experience. These changes increased the actuary's assessment of plan liabilities by \$15.9 million as of the valuation date.

Comment C: During the year ended December 31, 2017, the return on System assets was higher than long term expectations. However, the market value smoothing techniques used in this valuation of the System recognize both past and present investment experience. As a result, the rate of return on valuation assets was 7.07% during calendar year 2017. This unfavorable experience was offset by actuarial gains due to lower than projected pay increases during calendar year 2017. Additional information on the investment experience is provided on pages B-3 and B-4 of this report.

Comment D: The System's funding percent based on the actuarial value of assets was 104% as of December 31, 2017. Last year the funding percent measured on the same basis was 105%. If the market value of assets was used as the basis for the funded ratio the result would be 107% as of December 31, 2017. Unless otherwise indicated, a funding status measurement presented in this report is based upon the actuarial accrued liability and the funding value of assets. It is important to note that the funding status measurement in this report is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations and the need for or the amount of future employer contributions.

Comment E: Actuarial Standards of Practice No. 35 requires certain disclosures related to mortality assumptions used in pension valuations. Specifically, it indicates that there should be sufficient detail to permit another qualified actuary to understand the provision made for future mortality improvement. Based on the 2017 experience study for the Oklahoma Public Employees Retirement System, we recommend a review of the mortality assumption to determine the appropriate margin for future mortality improvement for use in the 2018 and future valuations of this Retirement System.

Unfunded Actuarial Accrued Liability (amounts in thousands of dollars)

	December 31	
	2017	2016
A. Actuarial present value of future benefits	\$833,037	\$803,023
B. Actuarial present value of future normal costs	136,368	141,811
C. Actuarial accrued liability	696,669	661,212
D. Assets allocated to funding	721,090	692,359
E. Unfunded actuarial accrued liability	(24,421)	(31,147)
F. Ratio of assets to actuarial accrued liability	104%	105%

Historical Schedule of City Contribution Rates and the Associated Amortization Periods

Valuation Date December 31	Established City Contribution Rate as a % of Active Member Payroll	Years to Amortize UAL
2003	7.00 %	40.0
2004 #	8.25	40.0
2005	7.94	30.0
2006	6.16	29.0
2007	5.04	28.0
2008	6.77	27.0
2009	8.56	26.0
2010	9.49	25.0
2011 *	7.15	30.0
2012	6.44	29.0
2013 ^	5.88	28.0
2014	5.33	27.0
2015 ^	5.28	26.0
2016	5.23	25.0
2017 ^	5.56	24.0

* Retirement System amended.

The average established City contribution for the indicated fiscal year.

^ Change in Actuarial Assumptions.

SECTION B

SUMMARY OF BENEFIT PROVISIONS, ASSETS AND VALUATION DATA

Summary of Benefit Provisions Evaluated or Considered (December 31, 2017)

Regular Retirement (no reduction factor for age)

Eligibility - Pre 3-1-67 hires: Age 60 with 20 years of service; or, any age with 30 years of service.

Post 3-1-67 hires: Age 65 with 5 years of service; or, any age with 25 years of service.

Annual Amount - Normal retirement benefit: 2% of average final compensation for all years and complete months of service, to a maximum of 100% of AFC.

Average Final Compensation (AFC) - Average earned compensation (excluding compensation for unused vacation and sick leave) during highest 36 months of service out of the last 60 consecutive months of service.

Early Retirement (reduction factor for age)

Eligibility - Age 55 with 5 years of service.

Annual Amount - Same as regular retirement amount but reduced 4% for each full year or portion of a year that payments commence prior to age 65 (age 60 if hired prior to 3-1-67).

Deferred Retirement (vested benefit)

Eligibility - 5 years of service. Benefit begins at age 65 (age 60 if hired prior to 3-1-67) or at age 55 on a reduced basis.

Annual Amount - Same as regular retirement based on service and average final compensation at time of termination.

Duty Disability Retirement

Eligibility - No age or service requirements.

Annual Amount - 40% of average final compensation, reduced if degree of disability is less than total disability.

Non-Duty Disability Retirement

Eligibility - Any age with 15 years of service.

Annual Amount - 2% of average final compensation for each full year of service, plus 1/12 of 2% for each full month of service due to a partial year of service to a maximum of 40% of AFC. Amount is reduced if degree of disability is less than total disability.

Summary of Benefit Provisions Evaluated or Considered (December 31, 2017)

Duty Death Before Retirement

Eligibility - No age or service requirements.

Annual Amount - 20% of average final compensation to an eligible spouse. Payments cease upon death. If there is no eligible spouse, accumulated employee contributions are paid to designated beneficiary. For members eligible under age and service conditions, the benefit is the amount the spouse would have received as a joint annuitant under normal or early retirement conditions.

Non-Duty Death Before Retirement

Eligibility - Any age with 15 years of service.

Annual Amount - Same as duty death.

Post-Retirement Adjustments

Pensions may be adjusted annually (in January) for changes in the Consumer Price Index. The maximum adjustment is 2% per year compounded. The first adjustment is made one year following retirement for those age 65 (60 for pre 3-1-67 hires) or those awarded disability allowances. For all others, the first adjustment is made no earlier than 4 years following retirement.

Post-Retirement Death Benefit

Eligibility – Retiree currently collecting pension benefits from the System.

Amount – A one-time payment of \$5,000 payable upon the death of the retiree. This benefit is payable only upon the death of the retiree, and is payable to the designated beneficiary.

Member Contributions

6% of annual pay.

Employer Contributions

7% of annual payroll effective March 2, 2001 – December 31, 2005.

The actuarially determined contribution rate (up to a maximum of 10% of pay) effective January 1, 2006.

Partial Lump Sum Payment Option

Members who are eligible for Regular Retirement may elect this optional form of payment, which allows for cash at retirement of up to \$30,000. Any remaining monthly retirement benefit is reduced actuarially to reflect the payment of cash at retirement.

Asset Information Submitted for Valuation

The net market value of Retirement System assets was reported to be \$742,843,872 as of December 31, 2017. The derivation of the funding value of assets used for the actuarial valuation is shown on the following page.

Revenues and Expenditures – Market Value Basis

	Year Ended December 31,	
	2017	2016
Revenues:		
a. Member contributions	\$ 7,987,430	\$ 7,498,942
b. City contributions	7,107,398	6,997,507
c. Investment income		
1. Interest and dividends	12,884,456	10,122,528
2. Realized & unrealized gain/(loss)	94,976,962	28,813,246
3. Securities lending income	0	0
d. Other	107,065	17,206
e. Total revenues	\$123,063,311	\$ 53,449,429
Expenditures:		
a. Refunds of member contributions	\$ 1,532,488	\$ 1,167,470
b. Benefits paid	33,176,030	30,925,582
c. Administrative expenses	489,096	418,485
d. Investment expenses	3,218,489	1,650,043
e. Other expenses	4,982	4,400
f. Total expenditures	\$ 38,421,085	\$ 34,165,980
Reserve Increase (Decrease):		
Total revenues minus total expenditures	\$ 84,642,226	\$ 19,283,449

Reported Market Value of Assets

	December 31, 2017
Cash & Other	\$ 48,178,509
Fixed Income	139,201,694
Equities	499,656,359
Real Estate	64,176,249
Total Assets	751,212,811
Less Accounts Payable/Other	8,368,939
Net Assets	\$742,843,872

Development of Valuation Assets

Year Ended December 31:	2016	2017
A. Funding Value Beginning of Year	\$665,076,625	\$692,359,151
B. Market Value End of Year	658,201,646	742,843,872
C. Market Value Beginning of Year	638,918,197	658,201,646
D. Non-Investment Net Cash Flow	(17,579,397)	(19,506,625)
E. Investment Income		
E1. Market Total: B - C - D	36,862,846	104,148,851
E2. Amount for Immediate Recognition (7.4%)	48,565,233	50,512,832
E3. Amount for Phased-In Recognition: E1-E2	(11,702,387)	53,636,019
F. Phased-In Recognition of Investment Income		
F1. Current Year: 0.25 x E3	\$ (2,925,597)	\$ 13,409,005
F2. First Prior Year	(12,621,973)	(2,925,597)
F3. Second Prior Year	(136,772)	(12,621,973)
F4. Third Prior Year	11,981,032	(136,772)
F5. Total	(3,703,310)	(2,275,337)
G. Funding Value End of Year: A + D + E2 + F5	692,359,151	721,090,021
H. Difference between Market & Funding Value	(34,157,505)	21,753,851
I. Net Recognized Rate of Return - Funding Value Basis	6.84%	7.07%
J. Net Recognized Rate of Return - Market Value Basis	5.85%	16.06%
K. Ratio of Funding Value to Market Value	1.052	0.971

Retirant and Beneficiary Data

Valuation Date Dec. 31	No. of Pension Recipients				Total Annual Pensions ⁽²⁾	% of Payroll	Average Annual Pension	% Incr. in Total Pensions
	Service	Disability	Survivor	Total				
1998	633	56	202	891	\$ 7,134,692	9.0 %	\$ 8,008	4.6 %
1999	643	56	202	901	7,470,215	9.2	8,291	4.7
2000 ⁽¹⁾	646	61	203	910	9,188,323	11.4	10,097	23.0
2001	694	63	205	962	10,386,513	12.4	10,797	13.0
2002	725	65	210	1,000	11,261,772	13.0	11,262	8.4
2003	731	68	207	1,006	11,972,938	14.0	11,902	6.3
2004	773	66	207	1,046	13,038,432	14.7	12,465	8.9
2005	796	67	213	1,076	14,355,655	15.7	13,342	10.1
2006	823	69	221	1,113	15,766,306	16.5	14,166	9.8
2007	854	66	233	1,153	17,117,037	17.2	14,846	8.6
2008	894	59	225	1,178	18,459,873	17.5	15,671	7.8
2009	936	56	226	1,218	19,673,159	17.8	16,152	6.6
2010	995	59	229	1,283	21,945,667	21.3	17,105	11.6
2011	1018	56	225	1,299	22,946,844	21.0	17,665	4.6
2012	1,030	55	239	1,324	23,757,916	20.7	17,944	3.5
2013	1,062	54	229	1,345	25,047,506	21.0	18,623	5.4
2014	1,101	55	224	1,380	26,599,897	21.4	19,275	6.2
2015	1,144	55	223	1,422	28,481,665	22.2	20,029	7.1
2016	1,211	57	223	1,491	30,700,847	24.2	20,591	7.8
2017	1,264	51	230	1,545	32,813,000	26.3	21,238	6.9

(1) Reflects a one-time increase resulting from purchasing power study.

(2) Annual pension amounts shown above are reported to the actuary by the City and reflect annualized pension payments as of the indicated valuation date.

Pensions Being Paid December 31, 2017 Tabulated by Age of Recipient

Age	Service Pensions		Disability Pensions		Survivor Pensions		Totals	
	No.	Annual Pensions	No.	Annual Pensions	No.	Annual Pensions	No.	Annual Pensions
45 - 49	6	\$ 173,928	1	\$ 17,532	6	\$ 96,960	13	\$ 288,420
50 - 54	35	1,049,052	1	19,992	6	108,324	42	1,177,368
55 - 59	142	3,790,932	9	113,652	12	174,852	163	4,079,436
60 - 64	248	6,290,784	16	221,928	24	444,924	288	6,957,636
65 - 69	289	6,984,919	13	131,376	29	428,196	331	7,544,491
70 - 74	218	4,696,752	3	35,052	28	354,744	249	5,086,548
75 - 79	152	3,043,596	5	57,168	44	689,401	201	3,790,165
80 - 84	99	1,812,024	1	10,812	37	432,252	137	2,255,088
85 - 89	50	855,216	1	14,112	21	218,868	72	1,088,196
90+	25	346,248	1	11,124	23	188,280	49	545,652
Totals	1,264	\$29,043,451	51	\$632,748	230	\$3,136,801	1,545	\$32,813,000

Pensions Being Paid December 31, 2017 Tabulated by Year of Retirement

Year of Retirement	No. #	Annual Pensions	
		Total	Average
1970 - 1974	1	\$ 11,122	\$ 11,122
1975 - 1979	5	56,720	11,344
1980 - 1984	13	145,869	11,221
1985	3	44,698	14,899
1986	7	102,394	14,628
1987*	30	536,052	17,868
1988	5	51,119	10,224
1989	6	122,283	20,381
1990	5	97,974	19,595
1991	13	198,653	15,281
1992	12	112,551	9,379
1993	10	80,548	8,055
1994	16	278,544	17,409
1995	21	310,671	14,794
1996	24	376,383	15,683
1997	24	338,670	14,111
1998	23	301,325	13,101
1999	27	382,669	14,173
2000	32	477,834	14,932
2001	57	1,263,257	22,162
2002	51	911,164	17,866
2003	45	958,525	21,301
2004	65	1,276,595	19,640
2005	57	1,247,417	21,885
2006	64	1,477,625	23,088
2007	72	1,499,847	20,831
2008	65	1,324,684	20,380
2009	75	1,788,323	23,844
2010	112	2,656,899	23,722
2011	62	1,410,375	22,748
2012	62	1,302,867	21,014
2013	83	1,907,660	22,984
2014	86	1,981,725	23,043
2015	98	2,631,804	26,855
2016	107	2,693,792	25,176
2017	107	2,454,362	22,938
Totals	1,545	\$32,813,000	\$21,238

* Reflects early retirement incentive program.

Includes surviving spouses of deceased retirees.

System Members Included in Valuation Comparative Schedule

Valuation Date Dec. 31	Number of		Annual Payroll ⁽¹⁾	Active Member Averages			Ratio of Active to Retired Members	% Increase/ (Decrease) in Avg Pay
	Active Members	Inactive Members		Age	Service	Pay		
1997	2,418	19	\$74,752	43.3 yrs.	11.1 yrs.	\$30,908	2.7	4.6 %
1998	2,404	25	79,195	43.7	11.6	32,929	2.7	6.5
1999	2,453	36	80,897	43.8	11.6	32,979	2.7	0.2
2000	2,454	41	80,503	44.0	11.6	32,805	2.7	(0.5)
2001	2,454	49	83,862	44.0	11.4	34,174	2.6	4.2
2002	2,374	55	86,428	44.5	11.7	36,406	2.4	6.5
2003	2,290	61	85,666	45.2	12.3	37,409	2.3	2.8
2004	2,302	54	88,866	45.2	12.3	38,604	2.2	3.2
2005	2,312	58	91,641	45.5	12.3	39,637	2.1	2.7
2006	2,353	62	95,504	45.5	12.1	40,588	2.1	2.4
2007	2,380	66	99,574	45.5	12.0	41,838	2.1	3.1
2008	2,422	71	105,566	45.8	11.9	43,586	2.1	4.2
2009	2,380	73	110,408	46.3	12.3	46,390	2.0	6.4
2010	2,304	81	102,915	46.4	12.3	44,668	1.8	(3.7)
2011	2,398	75	109,293	46.3	12.1	45,577	1.8	2.0
2012	2,459	83	114,933	46.4	12.0	46,740	1.9	2.6
2013	2,487	82	119,457	46.4	11.9	48,032	1.8	2.8
2014	2,500	82	124,142	46.5	11.9	49,657	1.8	3.4
2015	2,586	89	128,499	46.5	11.3	49,690	1.8	0.1
2016	2,506	108	127,017	46.6	11.6	50,685	1.7	2.0
2017	2,425	120	124,681	46.8	11.8	51,415	1.6	1.4

⁽¹⁾ In thousands of dollars.

Inactive Members - December 31, 2017
Eligible for Deferred Pensions
Tabulated by Age

<u>Age</u>	<u>No.</u>	<u>Estimated Annual Allowances</u>
Under 40	18	\$ 110,007
40	5	49,126
41	3	19,031
43	8	67,215
44	5	44,921
45	5	47,943
46	6	59,898
47	6	48,807
48	4	55,305
49	5	37,875
50	1	13,608
51	2	35,444
52	6	57,927
53	8	92,424
54	8	140,000
55	5	47,691
56	4	54,897
57	5	86,890
58	3	22,201
59	2	10,989
60 & Over	11	140,374
Totals	120	\$1,242,573

Active Members as of December 31, 2017 by Age and Years of Service

Age	Years of Service on Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
Under 20	2							2	\$ 60,497
20-24	39							39	1,219,928
25-29	147	23						170	6,028,833
30-34	128	63	28	1				220	8,989,573
35-39	116	107	48	23				294	13,362,796
40-44	104	74	57	38	10	1		284	14,469,304
45-49	76	66	53	65	38	19		317	17,240,501
50-54	50	55	63	62	52	48	20	350	19,726,471
55-59	69	59	39	55	44	56	61	383	21,418,847
60	8	14	15	7	4	11	10	69	4,029,888
61	10	6	8	10	6	6	11	57	3,603,125
62	6	5	13	5	6	4	14	53	3,200,799
63	5	5	8	4	1	8	11	42	2,483,486
64	4	6	4	8	6	10	5	43	2,717,948
65	5	2	4	6	7	6	4	34	1,979,527
66	1	2	2	3			4	12	697,448
67	3	2	4	2	1	2	1	15	949,322
68		5	1	2	3	1	5	17	1,001,353
69	1	1	1		1	2	1	7	509,539
70	1		2	1				4	255,160
71			1		1			2	114,613
72		1					1	2	142,984
73		1					1	2	127,586
74		1			1	1		3	183,739
78			1					1	49,925
79+	1		1			1		3	118,148
Totals	776	498	353	292	181	176	149	2,425	\$124,681,340

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Group Averages:

Age: 46.8 years
Service: 11.8 years
Annual Pay: \$51,415

Schedule of Retirees and Beneficiaries Added to and Removed From Rolls Comparative Statement

Year Ended Dec. 31	Added to Rolls ⁽²⁾		Removed from Rolls		Rolls End of Year			% Incr. in Benefits
	No.	Annual Benefits ⁽¹⁾	No.	Annual Benefits	No.	Annual Benefits	Avg. Annual Benefits	
2009	86	\$1,905,592	46	\$692,306	1,218	\$ 19,673,159	\$ 16,152	6.6 %
2010	120	3,059,254	55	786,746	1,283	21,945,667	17,105	11.6
2011	70	1,778,917	54	777,740	1,299	22,946,844	17,665	4.6
2012	74	1,467,021	49	655,949	1,324	23,757,916	17,944	3.5
2013	86	2,215,300	65	925,710	1,345	25,047,506	18,623	5.4
2014	95	2,483,415	60	931,024	1,380	26,599,897	19,275	6.2
2015	102	2,868,873	60	987,105	1,422	28,481,665	20,029	7.1
2016	108	2,856,572	39	637,390	1,491	30,700,847	20,591	7.8
2017	107	2,944,277	53	832,124	1,545	32,813,000	21,238	6.9

(1) Includes post retirement cost-of-living adjustments.

(2) Includes reported data corrections.

SECTION C

ACTUARIAL METHODS, ACTUARIAL ASSUMPTIONS AND DEFINITION OF TECHNICAL TERMS

The Actuarial Valuation Process

The **actuarial valuation** is the mathematical process by which actuarial present values and contribution rates are determined. The flow of activity constituting the valuation may be summarized as follows:

- A. **Census data**, furnished by plan administrator, including:
 - Retired lives now receiving benefits
 - Former employees with vested benefits not yet payable
 - Active employees

- B. + **Benefit provisions**, furnished by plan administrator

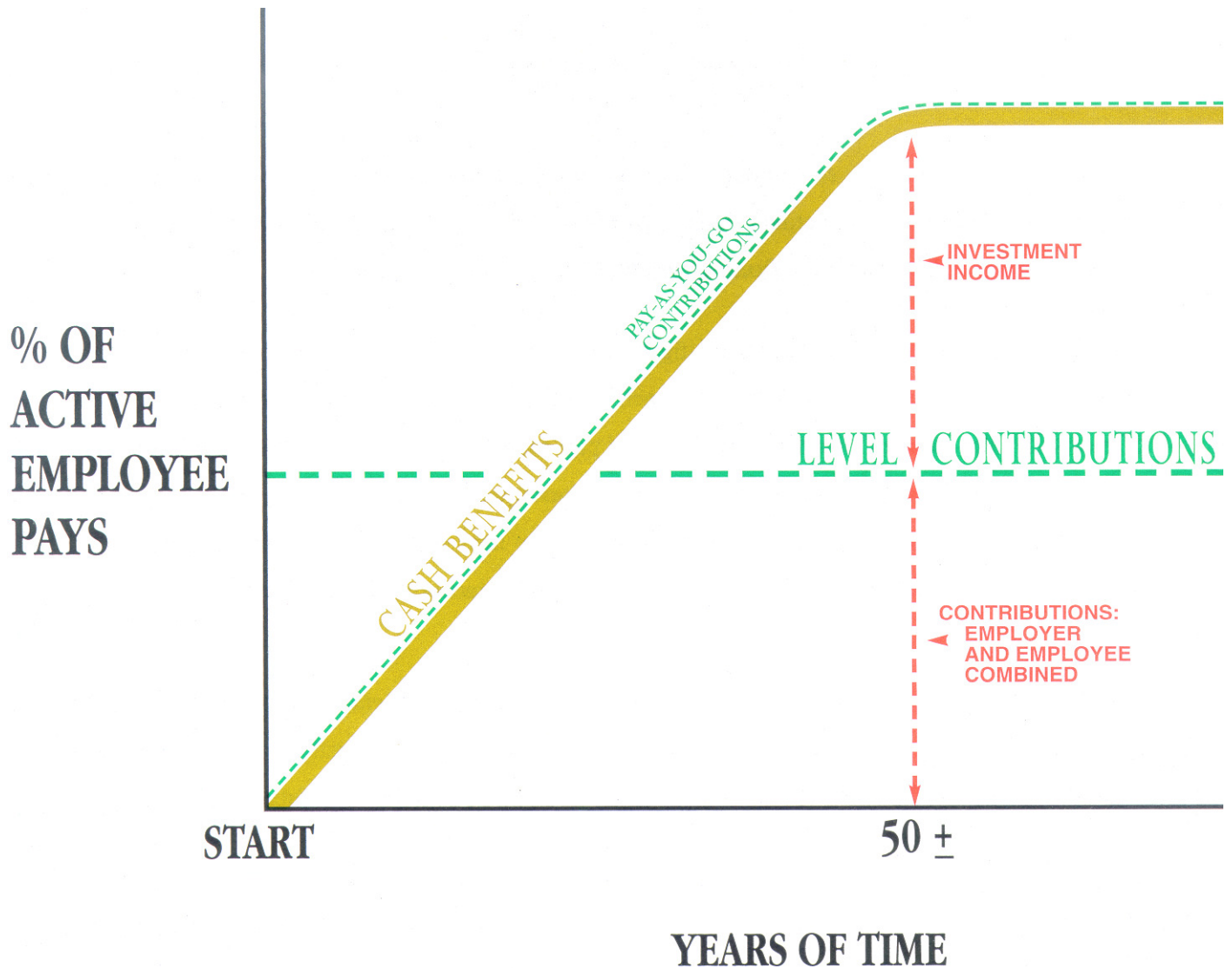
- C. + **Asset data** (cash & investments), furnished by plan administrator

- D. + **Assumptions concerning future experience** in various risk areas

- E. + The **funding method** for employer contributions (the long-term, planned pattern for employer contributions)

- F. + **Mathematically combining the assumptions, the funding method and the data**

- G. = Determination of:
 - Plan Financial Position and/or
 - New Employer Contribution Rate



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

Economic Risk Areas

- Rates of investment return
- Rates of pay increase
- Changes in active member group size

Non-Economic Risk Areas

- Ages at actual retirement
- Rates of mortality
- Rates of withdrawal of active members (turnover)
- Rates of disability

Actuarial Methods

Actuarial Cost Method

The actuarial cost method is a procedure for allocating the actuarial present value of pension plan benefits and expenses to time periods. The method used for the valuation is known as the individual entry-age actuarial cost method and has the following characteristics:

- (i) The annual normal costs for each individual active member, payable from the date of employment to the date of retirement, are sufficient to accumulate the value of the member's pension at time of retirement; and
- (ii) Each annual normal cost is a constant percentage of the member's year by year projected compensation.

The entry-age actuarial cost method allocates the actuarial present value of each member's projected benefits 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 portion of the actuarial present value not provided for by the actuarial present value of future normal costs is called the actuarial accrued liability. Deducting System assets from the actuarial accrued liability determines the unfunded actuarial accrued liability (UAAL).

Actuarial Value of Assets

The funding value of assets recognizes assumed investment income fully each year. Differences between actual and assumed investment income are phased-in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, funding value of assets will tend to be lower than market value. During periods when investment performance is less than the assumed rate, funding value of assets will tend to be greater than market value. The funding value of assets is unbiased with respect to market value. At any time it may be either greater or less than market value. If assumed rates are exactly realized for 4 consecutive years, it will become equal to market value.

Financing of the UAAL

The UAAL (or full funding surplus if assets exceed accrued liabilities) was amortized by level (principal and interest combined) percent of payroll contributions over a reasonable period of future years. For amortization purposes, it is assumed that the payroll upon which the UAAL contributions are collected will increase each year by 3.25%.

Actuarial Assumptions

Funding objective contribution requirements and actuarial present values are calculated by applying actuarial assumptions to the benefit provisions and people information of the System, using the actuarial cost method described on page C-3.

The principal areas of risk which require actuarial assumptions about future experiences are:

- (i) long-term rates of investment return to be generated by the assets of the System
- (ii) patterns of pay increases to members
- (iii) rates of mortality among members and retired lives
- (iv) rates of withdrawal of active members
- (v) rates of disability among active members
- (vi) the age patterns of actual retirements

In a valuation, the monetary effect of each assumption projected is for as long as a present covered person or potential beneficiary survives, a period of time which can be as long as a century. The actual experience of the System will not coincide exactly with assumed experience. From time-to-time one or more of the assumptions are modified to reflect experience trends (but not random or temporary year to year fluctuations).

The actuarial assumptions were based upon the results of an experience study for this Retirement System covering the period January 1, 2008 through December 31, 2012 and an assumption study dated May 31, 2018. A report dated December 4, 2013 presented the results of the experience study. The actuarial assumptions represent estimates of future experience. For the purpose of analyzing rates of post retirement mortality, we used the results of the 2011 actuarial experience study conducted for the Oklahoma Public Employees Retirement System (OPERS) which is the largest, comparable public employee retirement system in the state of Oklahoma.

Actuarial Assumptions

Investment Return (net of expenses)

The rate of investment return assumed in the valuation was 7.10% per year, compounded annually net of investment and administrative expenses. The assumed real rate of return over wage inflation is 3.85% per year.

Wage Inflation

The wage inflation rate assumed in this valuation was 3.25% per year. The wage inflation rate is defined to be the portion of total pay increases for an individual that are due to macroeconomic forces including productivity, price inflation, and labor market conditions. The wage inflation rate does not include pay changes rated to individual merit and seniority effects.

Salary Increase Rates

These assumptions are used to project current pays to those which will determine average final compensation.

Sample Years of Service	Annual Rate of Merit and Longevity
1	3.50 %
2	3.50
3	3.50
4	3.50
5	3.50
6	3.50
7	3.50
8	3.50
9	3.50
10	3.50
11	3.50
12	3.50
13	3.50
14	3.00
15+	0.00

The active member population is assumed to remain constant. For purposes of financing the unfunded liabilities, total payroll is assumed to grow at a rate of 3.25% per year.

Price Inflation

The assumed rate of price inflation used in this valuation was 2.25% per year.

Mortality rates are used to measure the probabilities of a member dying before retirement and the probability of each benefit payment being made. The RP 2000 mortality table projected to 2010 was used in this valuation of the System. This table was used by the Oklahoma Public Employees Retirement System (OPERS) at the time of the last System experience study. Sample statistics are shown below. This table was first used in the December, 31, 2013 valuation.

Sample Ages	Value at Retirement of		Future Life	
	\$1 Monthly for Life		Expectancy (Years)	
	Men	Women	Men	Women
50	\$149.34	\$152.27	31.81	34.12
55	140.72	144.52	27.13	29.40
60	129.86	134.77	22.62	24.85
65	116.94	123.16	18.40	20.57
70	102.32	109.95	14.56	16.65
75	85.86	95.27	11.08	13.11
80	68.61	79.30	8.09	9.96

Rates of retirement are used to measure the probabilities of an eligible member retiring during the next year, and are summarized below. These rates were first used for the December 31, 2013 valuation.

Age of Member	Percent of Eligible Members Retiring During Next Year	Years of Service	Percent Retiring
55	6%	25	15%
56	6	26	10
57	6	27	10
58	6	28	10
59	6	29	10
60	6	30	10
61	6	31	10
62	6	32	10
63	6	33	10
64	6	34	10
65	40	35	10
66	25	36	10
67	25	37	10
68	30	38	10
69	40	39	10
70	100	40	20
		41	10
		42	20
		43	10
		44	10
		45	100

The service based retirement rates were applied to those members first eligible to retire under "25 and out". The age based retirement rates were applied to members retiring under '65/5' or the Plan's early retirement condition. The probability of retiring at age 70 was assumed to be 100% regardless of service.

Rates of Separation from Active Membership

This assumption measures the probabilities of a member terminating employment. The rates do not apply to members who are eligible to retire.

Sample Ages	Years of Service	% of Active Members Separating within Next Year
ALL	0	25.00%
	1	17.00
	2	12.00
	3	8.00
	4	6.00
25	5 & Over	7.00
30		6.00
35		4.75
40		3.50
45		2.40
50		1.50
55		1.00
60		1.00

Rates of Disability

This assumption measures the probabilities of a member becoming disabled.

Age of Member	% of Active Members During Next Year	
	Males	Females
25	0.08%	0.06%
30	0.09	0.07
35	0.11	0.09
40	0.14	0.13
45	0.21	0.19
50	0.62	0.57
55	0.97	0.86
60	1.10	0.96

Disabled life mortality is measured by the RP 2000 mortality table projected to 2010 at time of disability.

Definitions of Technical Terms

Actuarial Accrued Liability. The difference between the actuarial present value of System benefits and the actuarial value of future normal costs. Also referred to as "accrued liability" or "actuarial liability."

Actuarial Assumptions. Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

Accrued Service. Service credited under the system which was rendered before the date of the actuarial valuation.

Actuarial Equivalent. A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate actuarial assumptions.

Actuarial Cost Method. A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of Retirement System benefits between future normal cost and actuarial accrued liability. Sometimes referred to as the "actuarial funding method."

Actuarial Gain (Loss). The difference between actual experience and actuarial assumption anticipated experience during the period between two actuarial valuation dates.

Actuarial Present Value. The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payment.

Amortization. Paying off an interest-discounted amount with periodic payments of interest and principal -- as opposed to paying off with lump sum payment.

Normal Cost. The actuarial present value of retirement system benefits allocated to the current year by the actuarial cost method.

Unfunded Actuarial Accrued Liability. The difference between actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded actuarial liability" or "unfunded accrued liability."

The existence of an unfunded actuarial accrued liability is not in itself bad, any more than a mortgage on a house is bad. The unfunded actuarial accrued liability does not represent a debt that is payable today. What is important is the ability to amortize the unfunded actuarial accrued liability and the trend in its amount (after due allowance for devaluation of the dollar).

Summary of Assumptions Used

December 31, 2017

Miscellaneous and Technical Assumptions

Marriage Assumption:	80% of the population is assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses for active member valuation purposes.
Pay Increase Timing:	Beginning of year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	All decrements were assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Normal Form of Benefit:	The assumed normal form of benefit is the straight life form.
Expenses:	Assumed investment return is net of administrative and investment expenses.
Non-forfeiture Assumption:	All vested terminated members who terminate close to retirement were assumed to elect a deferred retirement while those terminating with less service were assumed to elect a refund of their contributions in lieu of deferred retirement benefits.

SECTION D

SUPPLEMENTARY INFORMATION

Supplementary Information Schedule of Funding Progress

(DOLLAR AMOUNTS IN THOUSANDS)

Actuarial Valuation Date December 31,	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b)-(a)	Funded Ratio (a)/(b)	Active Member Covered Payroll (c)	UAAL as a Percentage of Active Member Covered Payroll ((b-a)/c)
2007	\$529,876	\$488,827	\$(41,049)	108.4 %	\$ 99,574	(41.2) %
2008	528,664	519,234	(9,430)	101.8	105,566	(8.9)
2009	529,137	556,427	27,290	95.1	110,408	24.7
2010	524,731	566,834	42,103	92.6	102,915	40.9
2011 ^{*#}	514,499	533,719	19,220	96.4	109,293	17.6
2012	547,686	553,588	5,902	98.9	114,933	5.1
2013 [#]	589,527	581,866	(7,661)	101.3	119,457	(6.4)
2014	628,686	607,295	(21,391)	103.5	124,142	(17.2)
2015 [#]	665,077	633,985	(31,092)	104.9	128,499	(24.2)
2016	692,359	661,212	(31,147)	104.7	127,017	(24.5)
2017 [#]	721,090	696,669	(24,421)	103.5	124,681	(19.6)

Changes in methods and assumptions.

** Plan provision changes.*

Analysis of the dollar amounts of the actuarial value of assets, actuarial accrued liability, or actuarial accrued liability in isolation can be misleading. Expressing the actuarial value of assets as a percentage of the actuarial accrued liability provides one indication of the System's funded status on a going-concern basis. Analysis of this percentage over time indicates whether the System is becoming financially stronger or weaker. Generally, the greater this percentage, the stronger the plan. The unfunded actuarial accrued liability and annual covered payroll are both affected by inflation. Expressing the unfunded actuarial accrued liability as a percentage of covered payroll approximately adjusts for the effects of inflation and aids analysis of the progress being made in accumulating sufficient assets to pay benefits when due. Generally, the smaller this percentage, the stronger the plan.

Supplementary Information

Summary of Actuarial Methods and Assumptions

Valuation Date	December 31, 2017
Actuarial Cost Method	Individual Entry Age
Amortization Method	Level Percent of payroll
Amortization Period	24 years closed
Asset Valuation Method	4-year smoothed market
Actuarial Assumptions:	
Investment Rate of Return*	7.10%
Projected Salary Increases*	3.25% - 6.75%
*Includes Wage Inflation	3.25%
Cost-of-Living Adjustments	Up to 2.0% per year

SECTION E

RETIREMENT SYSTEM EXPERIENCE ACTUAL VS EXPECTED

Derivation of Experience Gain (Loss) Calendar Years 2013 - 2017

Actual experience will never (except by coincidence) coincide exactly with assumed experience. It is hoped that gains and losses will cancel each other over a period of years, but sizable year-to-year fluctuations are common. Detail on the derivation of the experience gain (loss) is shown below, along with a year by year historic comparison.

	Amounts Shown are Expressed in Thousands of Dollars				
	2017	2016	2015	2014	2013
(1) UAAL* at start of year	\$ (31,147)	\$ (31,092)	\$ (21,391)	\$ (7,661)	\$ 5,902
(2) Normal cost	15,735	16,017	15,767	15,170	14,550
(3) Actual member and employer contributions	15,095	14,496	15,812	15,608	17,827
(4) Interest accrual on (1), (2) and (3)	(2,281)	(2,245)	(1,606)	(591)	320
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	(32,788)	(31,816)	(23,042)	(8,690)	2,945
(6) Increase due to benefit/assumption changes	15,886	0	7,149	0	3,568
(7) Increase due to revised actuarial methods	0	0	0	0	0
(8) Expected UAAL after changes: (5) + (6) + (7)	(16,902)	(31,816)	(15,893)	(8,690)	6,513
(9) Actual UAAL at end of year	(24,421)	(31,147)	(31,092)	(21,391)	(7,661)
(10) Gain (loss): (8) - (9)	7,519	(669)	15,199	12,701	14,174

* *Unfunded actuarial accrued liability (UAAL).*

Service Retirements During the Indicated Plan Years

Age Group	Number Retiring in the Indicated Year		
	2017	2016	2015*
40-44			1
45-49		5	1
50-54	4	5	11
55-59	22	20	17
60	10	4	1
61	4	5	3
62	6	7	9
63	4	12	9
64	4	2	10
65	9	6	5
66	2	4	6
67	5	3	3
68	3	4	
69	1	1	1
70 & Over	2	7	2
Total	76	85	79
Expected	101.3	97.6	99.6

* Excludes members who retired and became deceased in the same year.

The chart above shows actual versus expected retirements from City employment and does not include retirements from deferred status, death-in-service, or disability retirements.

Non-Vested Withdrawals from Active Membership During the Indicated Plan Years

Age Groups	Years of Service	Number Terminating During the Indicated Year		
		2017	2016	2015
	0	45	60	43
	1	42	19	23
	2	25	17	11
	3	19	12	17
	4	12	10	4
	Sub-Total	143	118	98
Under 30	5 & Over	1	0	2
30-34		5	7	4
35-39		5	2	4
40-44		4	3	8
45-49		7	3	6
50-54		3	4	3
55-59		2	2	2
60 & Over		3	3	3
Sub-Total		30	24	32
Total		173	142	130
Expected No.		137.1	146.1	128.2

Number Added to and Removed from Active Membership Actual & Expected

Valuation Date December 31	Number Added During Year		Terminations During Year								Active Members End of Year
			Retirement		Disabled		Died-In Service		Other Withdrawal		
	A	E	A	E	A	E	A	E	A	E	
2003	120	213	42	87.6	2	3.2	7	3.7	153	146.7	2,290
2004	207	201	62	98.7	1	3.0	3	3.9	129	119.9	2,302
2005	200	190	57	100.2	3	3.1	6	4.1	124	129.6	2,312
2006	238	197	63	88.8	3	3.1	2	3.8	129	131.4	2,353
2007	206	179	64	93.4	1	3.0	5	3.9	109	148.9	2,380
2008	220	178	68	94.7	0	2.8	0	4.0	110	149.5	2,422
2009	138	180	67	106.8	1	2.6	2	4.0	110	159.2	2,380
2010	137	213	91	106.7	4	2.5	4	4.1	114	132.6	2,304
2011	257	163	48	111.6	1	2.4	3	4.2	111	124.0	2,398
2012	242	181	45	116.1	1	2.5	3	4.4	132	146.0	2,459
2013	221	193	66	130.0	2	2.4	4	4.6	121	154.9	2,487
2014	223	210	74	97.9	3	2.4	2	3.2	131	136.0	2,500
2015	312	226	79	99.6	2	2.4	2	3.3	143	137.6	2,586
2016	172	252	85	97.6	1	2.5	1	3.3	165	155.2	2,506
2017	198	279	77	101.3	0	2.3	2	3.3	200	137.1	2,425
2013-2017	1,126	1,160	381	526.4	8	12.0	11	17.7	760	720.8	

A: Actual experience

E: Expected experience based on actuarial assumptions