



# Actuarial Valuation Report

Educational Employees' Supplementary Retirement System of  
Fairfax County

Annual Valuation as of December 31, 2019

## Introduction

This report documents the results of the annual actuarial valuation as of December 31, 2019 for the Educational Employees' Supplementary Retirement System of Fairfax County ("ERFC"). The report was prepared at the request of the Executive Director and is intended for use by ERFC and those designated or approved by the Board.

This valuation has been conducted in accordance with generally accepted actuarial principles and practices, including the applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board.

The purpose of the valuation was to measure the funding progress of the ERFC plan. It should be noted that future actuarial measurements may differ significantly from the current measurements presented in this report due (but not limited to) to such factors as the following:

- Plan experience differing from that anticipated by the economic or demographic assumptions;
- Changes in actuarial methods or 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); 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 such future measurements.

In conducting the valuation, we have relied on personnel, plan design, and asset information supplied by the ERFC staff as of the valuation date. While we cannot verify the accuracy of all the information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy or completeness of the information and believe that it has produced appropriate results.

The actuarial assumptions and methods used in this valuation are described in the Actuarial Assumptions and Methods section of this report. The Board selected the economic and demographic assumptions and prescribed them for use for purposes of these calculations. Aon provided guidance with respect to these assumptions, and it is our belief that the assumptions represent reasonable expectations of anticipated plan experience. The undersigned are familiar with the near-term and long-term aspects of pension valuations and collectively meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein.

The information provided in this report is dependent upon various factors as documented throughout this report, which may be subject to change. Each section of this report is considered to be an integral part of the actuarial opinions.



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# Funding Requirements

## Summary

The following table illustrates the unfunded pension liability under the plan's current funding policy, which is restated below.

	<b>Valuation Date December 31, 2018</b>	<b>Valuation Date December 31, 2019</b>
<b>Actuarial (Pension) Liability</b>		
Retired Participants and Beneficiaries Receiving Payment	\$ 1,791,189,484	\$ 1,841,321,939
Terminated Vested Participants	132,479,724	145,542,445
Active Participants	<u>1,410,445,428</u>	<u>1,481,285,944</u>
Total	3,334,114,636	3,468,150,328
Actuarial Value of Assets	<u>(2,466,004,272)</u>	<u>(2,582,582,541)</u>
Unfunded Accrued Liability	\$ 868,110,364	\$ 885,567,787
<b>Funded Ratio</b>		
Actuarial Value of Assets	74.0%	74.5%
Market Value of Assets	68.4%	75.8%
Discount Rate	7.25%	7.25%

## Funding Policy

The ERFC Funding Policy, as stated in the ERFC Plan Document is “to establish and receive contributions which will remain approximately level from generation to generation of citizens and which, when combined with other assets and investment return thereon, will be sufficient to pay benefits when due, while providing a reasonable margin for adverse experience.”

For funding purposes, unfunded accrued liabilities are currently being amortized over a closed 30-year period ending on June 30, 2040. The remaining amortization period in the December 31, 2019 valuation is 19 years. Effective with valuations on/after December 31, 2019, unfunded accrued liabilities resulting from benefit and/or assumption changes will be amortized over 10 years (or less).

## Contribution Rate

Actuarial funding valuations as of even-numbered years (2016, 2018, 2020, etc.) are used to develop an interim employer contribution rate that is then compared with the employer contribution rate that will be effective in July of the year following the valuation (2017, 2019, 2021, etc.) to ensure that the rate previously determined and adopted by ERFC remains appropriate for the plan based on the most recent plan experience.

Actuarial funding valuations as of odd-numbered years (2017, 2019, 2021, etc.) are used to develop the appropriate employer contribution rate for the two-year period beginning 18 months after the valuation date. As such, the results from the December 31, 2017 valuation were used to set the employer contribution rate of 6.44% for the period July 1, 2019 to June 30, 2021.

The results from each annual actuarial valuation are also used to develop the financial reporting results required under the Governmental Accounting Standards Board (GASB) Statements, in accordance with parameters specified by the GASB for the fiscal year ending June 30 following the valuation date.

## Contribution Rate Percentage for Unfunded Accrued Liabilities

The employer contribution rate includes a charge intended to pay for the unfunded accrued liabilities. This charge is developed by projecting the unfunded liabilities from the valuation date to the beginning of the fiscal year in which the contributions will begin, and then amortizing this result over a set period as a level percent of the projected payroll.

For funding purposes, unfunded accrued liabilities are currently being amortized over a closed 30-year period ending on June 30, 2040. The remaining amortization period in the December 31, 2019 valuation is 19 years. Effective with valuations on/after December 31, 2019, unfunded accrued liabilities resulting from benefit and/or assumption changes will be amortized over 10 years (or less).

The following table illustrates the development of the charge for the current unfunded accrued actuarial liabilities. If ERFC contributes this amount and actual plan experience is equal to assumed, the plan would be expected to become fully funded on the funding basis within 19 years, and to have a lower ongoing contribution requirement in subsequent years.

	<b>Valuation Date December 31, 2019</b>
1. Unfunded Accrued Liability (UAL)	\$ 885,567,787
2. Expected Contribution	
a. January 1 – June 30, 2020	25,719,065
b. July 1, 2020 – June 30, 2021	50,880,932
3. Interest	<u>93,866,791</u>
4. UAL at June 30, 2021 (1 – 2a – 2b + 3)	\$ 902,834,580
5. Projected Payroll for FY2022	1,696,031,075
6. Amortization Factor (19 years)	13.35719
7. Contribution rate for UAL (4 ÷ 5 ÷ 6)	3.99%

## Computed Employer Contribution Rate

The following table illustrates the development of the employer contribution rate based on the current financial results of the plan and are shown for illustrative purposes. The actual employer contribution rate that will be effective in July 2020 was developed based on the results of the December 31, 2017 valuation.

Valuation Date	December 31, 2018	December 31, 2019
Contribution Rate as a Percent of Member Payroll for period ending June 30	N/A	2022 & 2023
Normal Cost (Current Cost) split by:		
Service Retirement	4.05%	3.96%
Reduced Service Retirement	0.11%	0.10%
Casualty Benefits	0.10%	0.10%
Separation Benefits	1.36%	1.33%
Administrative Expenses	0.26%	0.27%
Total	5.88%	5.76%
Less Member Contribution Rate	(3.00)%	(3.00)%
Employer Normal Cost	2.88%	2.76%
Add Contribution Rate for Unfunded Accrued Liability	3.76%	3.99%
Net Employer Contribution	6.64%	6.75%
Adjustment for ERFC 2001 Tier 2	(0.06)%	(0.05)%
Actuarially Determined Employer Contribution	6.58%	6.70%

Unfunded accrued liability was amortized as a level percent-of-payroll over 19 years in the December 31, 2019 valuation and 20 years in the December 31, 2018 valuation. If this schedule is continued, unfunded liabilities will be fully amortized on June 30, 2040. Effective with valuations on/after December 31, 2019, unfunded accrued liabilities resulting from benefit and/or assumption changes will be amortized over 10 years (or less).

The Funding Policy contribution for the two-year period beginning July 1, 2019 is determined by the December 31, 2017 valuation. The Board adopted a contribution rate of 6.44% of payroll.



## Employer Contribution Rate History

Fiscal Year	Valuation Date	Employee Rate	Adopted Employer Rate		ADEC
			Support	Educational	
1991	1989	2.00%	5.08%	5.53%	
1992	1990	2.00%	5.08%	5.53%	
1993	1991	2.00%	5.08%	5.53%	
1994	1992	2.00%	5.08%	5.53%	
1995	1993	2.00%	5.08%	5.53%	
1996	1994	2.00%	5.08%	5.53%	
1997	1995	2.00%	5.58%	6.03%	
1998	1996	2.00%	5.58%	6.03%	
1999	1997	2.00%	5.58%	6.03%	
			<b>Combined July 1, 1999</b>		
2000	1998	2.00%	4.99%		
2001	1999	2.00%	3.69%		
2002	2000	2.00%	3.69%		
2003	2001	2.00%	4.00%		
2004	2002	2.00% / 4.00%	4.29% / 2.53%		
2005	2003	4.00%	3.37%		
2006	2004	4.00%	3.37%		
2007	2004	4.00%	3.37%		
2008	2005	4.00%	3.37%		3.37%
2009	2005	4.00%	3.37%		3.14%
2010	2007	4.00%	3.20%		2.97%
2011	2007	4.00%	4.04%		4.04%
2012	2009	4.00%	4.34%		4.16%
2013	2009	3.00%	5.34%		5.38%
2014	2011	3.00%	5.60%		5.51%
2015	2011	3.00%	5.60%		5.58%
2016	2013	3.00%	5.60%		5.54%
2017	2013	3.00%	5.60%		5.59%
2018	2015	3.00%	6.24%		6.34%
2019	2016	3.00%	6.26%		6.26%
2020	2017	3.00%	6.44%		6.44%
2021	2018	3.00%	6.44%		6.58%
2022	2019	3.00%	TBD		6.70%

## Market Value of Assets

Revenues and Expenditure	Plan Year Ending 12/31/2018	Plan Year Ending 12/31/2019
Fair Value of Assets at Beginning of Measurement Period	\$ 2,446,214,825	\$2,280,734,191
Revenue:		
Contributions—Employer	103,231,786	101,004,729
Contributions—Employee	49,657,299	47,875,901
Investment Return:		
Interest and Dividends	29,821,413	27,104,534
Net Appreciation	(150,658,734)	315,167,718
Investment Expense	(16,211,122)	(15,105,059)
Net Securities Lending	724,033	490,851
Real Estate	2,889,614	58,625,219
Miscellaneous	<u>0</u>	<u>0</u>
Total Investment Return	(133,434,796)	386,283,263
Total Revenue	19,454,289	535,163,893
Expenditures:		
Refunds of Member Contributions	(4,688,996)	(4,293,441)
Retirement Benefits Paid	(175,965,244)	(178,969,223)
Administrative Expenses	<u>(4,280,683)</u>	<u>(4,561,761)</u>
Total Expenditures	(184,934,923)	(187,824,425)
Net Change (Total Revenue less Total Expenditures)	<u>(165,480,634)</u>	<u>347,339,468</u>
Fair Value of Assets at End of Measurement Period	\$ 2,280,734,191	\$2,628,073,659
Receivable Contributions	<u>0</u>	<u>0</u>
Market Value of Assets at End of Measurement Period	<u>\$ 2,280,734,191</u>	<u>\$2,628,073,659</u>

## Market Value of Assets

Asset Breakdown	Plan Year Ending 12/31/2018	Plan Year Ending 12/31/2019
Invested Assets		
Bonds	\$ 87,386,659	\$ 153,069,062
Stocks	598,625,671	502,005,363
Real Estate	202,394,151	180,870,517
Global Asset Allocation / Better Beta	339,813,564	390,282,081
Hedge Fund of Funds	113,428,273	168,376,982
Private Equity	96,530,580	121,065,696
Commingled Funds	<u>770,540,100</u>	<u>1,078,572,205</u>
Total Invested Assets	2,208,718,998	2,594,241,906
Short-term Investments and Cash	202,523,363	173,827,721
Receivables and Pre-Paid Expenses	4,171,165	4,792,130
Other Assets (furniture and equipment)	<u>47,511</u>	<u>26,816</u>
Total Assets	2,415,461,037	2,772,886,573
Liabilities	<u>(134,726,846)</u>	<u>(144,814,914)</u>
Net Assets	<u>2,280,734,191</u>	<u>2,628,073,659</u>

Portfolio Composition at Market Value	Year Ended December 31			
	2018		2019	
	Value	% of Total	Value	% of
Bonds	\$ 87,386,659	3.8 %	\$ 153,069,062	5.8 %
Stocks	598,625,671	26.2 %	502,005,363	19.1 %
Real Estate	202,394,151	8.9 %	180,870,517	6.9 %
Commingled Funds	770,540,100	33.8 %	1,078,572,205	41.0 %
Hedge Fund of Funds	113,428,273	5.0 %	168,376,982	6.4 %
Private Equity	96,530,580	4.2 %	121,065,696	4.6 %
Global Asset Allocation / Better Beta	339,813,564	14.9 %	390,282,081	14.9 %
Net Short-Term Investments and Cash	67,796,517	3.0 %	29,012,807	1.1 %
Receivables, Pre-Paid Expenses and Other	4,218,676	0.2 %	4,818,946	0.2 %
Total Assets	\$2,280,734,191	100.0 %	\$2,628,073,659	100.0 %

## Actuarial Value of Assets

Year Ended December 31:	2019	2020	2021	2022	2023
A. Actuarial Value Beginning of Year	\$2,466,004,272	\$2,582,582,541			
B. Market Value End of Year	2,628,073,659				
C. Market Value Beginning of Year	2,280,734,191				
D. Non-Investment Net Cash Flow	(34,382,034)				
E. Investment Return Assumed Rate:	7.25%				
E1. Market Total: B-C-D	(381,721,502)				
E2. Amount for Immediate Recognition	177,538,961				
E3. Amount for Phased-in Recognition: E1-E2	204,182,541				
F. Phased-In Recognition of Investment Return:					
F1. Current year: 0.20 x E3	40,836,508				
F2. First Prior Year	(62,122,484)	40,836,508			
F3. Second Prior Year	36,406,910	(62,122,484)	40,836,508		
F4. Third Prior Year	(4,301,284)	36,406,910	(62,122,484)	40,836,508	
F5. Fourth Prior year	(37,398,308)	(4,301,284)	36,406,912	(62,122,486)	40,836,509
F6. Total Phased-In	(26,578,658)	10,819,651	15,120,936	(21,285,978)	40,836,509
G. Actuarial Value End of Year:					
G1. Preliminary Actuarial Value End of Year: A+D+E2+F6	2,582,582,541				
G2. Upper Corridor Limit: 125% x B	3,285,092,074				
G3. Lower Corridor Limit: 75% x B	1,971,055,244				
<b>G4. Actuarial Value End of Year</b>	<b>2,582,582,541</b>				
H. Actual/Projected Difference Between Market Value and Actuarial Value	45,491,118	34,671,467	19,550,531	40,836,509	
I. Market Rate of Return: $E1 / (C + D/2)$	16.86%				
J. Recognized Rate of Return: $(E2 + F6) / (A + D/2)$	6.16%				
K. Ratio of Actuarial Value to Market Value	98.27%				

The Actuarial Value of Assets recognizes assumed investment return (line E2) fully each year. Differences between actual and assumed investment returns (line E3) are phased-in over a closed 5-year period.

## History of Actuarial Value of Assets

Year Ended December 31:	2015	2016	2017	2018
A. Actuarial Value Beginning of Year	\$2,123,910,320	\$2,188,037,003	\$2,279,741,119	\$2,398,667,997
B. Market Value End of Year	2,063,873,705	2,147,993,665	2,446,214,825	2,280,734,191
C. Market Value Beginning of Year	2,146,541,289	2,063,873,705	2,147,993,665	2,446,214,825
D. Non-Investment Net Cash Flow	(52,982,467)	(51,152,042)	(47,377,200)	(27,765,155)
E. Investment Return Assumed Rate:	7.5%	7.25%	7.25%	7.25%
E1. Market Total: B-C-D	(29,685,117)	135,272,002	345,598,360	(137,715,479)
E2. Amount for Immediate Recognition	157,306,431	156,778,421	163,563,808	172,896,943
E3. Amount for Phased-in Recognition: E1-E2	(186,991,548)	(21,506,419)	182,034,552	(310,612,422)
F. Phased-in Recognition of Investment Return:				
F1. Current year: 0.20 x E3	(37,398,310)	(4,301,284)	36,406,910	(62,122,484)
F2. First Prior Year	(10,380,347)	(37,398,310)	(4,301,284)	36,406,910
F3. Second Prior Year	18,413,301	(10,380,347)	(37,398,310)	(4,301,284)
F4. Third Prior Year	19,744,377	18,413,301	(10,380,347)	(37,398,310)
F5. Fourth Prior year	(30,576,30)	19,744,377	18,413,301	(10,380,345)
F6. Total Recognized Investment Gain or Loss	(40,197,281)	(13,922,263)	2,740,270	(77,795,513)
G. Actuarial Value End of Year:				
G1. Preliminary Actuarial Value End of Year: A+D+E2+F6	2,188,037,003	2,279,741,119	2,398,667,997	2,466,004,272
G2. Upper Corridor Limit: 125% x B	2,579,842,131	2,684,992,081	3,057,768,531	2,850,917,739
G3. Lower Corridor Limit: 75% x B	1,547,905,279	1,610,995,249	1,834,661,119	1,710,550,643
<b>G4. Actuarial Value End of Year</b>	<b>2,188,037,003</b>	<b>2,279,741,119</b>	<b>2,398,667,997</b>	<b>2,466,004,272</b>
H. Actual/Projected Difference Between Market Value and Actuarial Value	(124,163,298)	(131,747,454)	47,546,828	(185,270,081)
I. Market Rate of Return: $E1 / (C + D/2)$	(1.4)%	6.6%	16.3%	(5.66)%
J. Recognized Rate of Return: $(E2 + F6) / (A + D/2)$	5.6%	5.6%	7.4%	3.99%
K. Ratio of Actuarial Value to Market Value	106.0%	106.1%	98.1%	108.12%

# Reflects collapsing of bases for future gains and losses implemented in 2010 actuarial valuation.

## Asset and Liabilities

### Comparative Statement History

Valuation Date	Active Member Payroll	Computed Liabilities			Actuarial Value of Assets	Unfunded Accrued Liabilities	Funded %
		Retired	Other Members	Total			
(\$ in thousands)							
12/31/2010 <sup>1</sup>	1,191,290	1,355,093	1,028,968	2,384,061	1,822,603	561,458	76.5%
12/31/2011 <sup>2</sup>	1,246,973	1,401,877	1,069,087	2,470,964	1,866,952	604,012	75.6%
12/31/2012	1,297,537	1,448,291	1,117,837	2,566,128	1,935,292	630,836	75.4%
12/31/2013	1,320,309	1,482,770	1,162,730	2,645,500	2,029,005	616,495	76.7%
12/31/2014	1,340,344	1,510,717	1,223,128	2,733,845	2,123,910	609,935	77.7%
12/31/2015 <sup>1</sup>	1,373,096	1,590,489	1,290,214	2,880,703	2,188,037	692,666	76.0%
12/31/2016 <sup>3</sup>	1,436,588	1,668,485	1,364,018	3,032,503	2,279,741	752,762	75.2%
12/31/2017	1,475,449	1,733,431	1,434,510	3,167,941	2,398,668	769,273	75.7%
12/31/2018	1,554,614	1,791,189	1,542,925	3,334,114	2,466,004	868,110	74.0%
12/31/2019	1,632,427	1,841,322	1,626,828	3,468,150	2,582,582	885,568	74.5%

### Expressed as Percent of Active Member Payroll - Comparative Statement History

Valuation Date	Active Member Payroll (\$ thousands)	As Percent of Active Member Payroll		
		Computed Liabilities	Actuarial Value of Assets	Unfunded Liabilities
12/31/2010	1,191,290	200%	153%	47%
12/31/2011	1,246,973	198%	150%	48%
12/31/2012	1,297,537	198%	149%	49%
12/31/2013	1,320,309	200%	154%	46%
12/31/2014	1,340,344	204%	158%	46%
12/31/2015	1,373,096	210%	159%	51%
12/31/2016	1,436,588	211%	159%	52%
12/31/2017	1,475,449	215%	163%	52%
12/31/2018	1,554,614	214%	159%	56%
12/31/2019	1,632,427	212%	158%	54%

<sup>1</sup> After change in asset valuation method.

<sup>2</sup> After change in benefits or contribution rates.

<sup>3</sup> After change in benefits or contribution rates and actuarial assumptions or methods.

## Summary of Risk Measures Based on Market Value of Assets

Actuarial Valuation Date	Funded Ratio (MVA)	Annuitant Liabilities / AAL	AAL / Payroll	UAAL / Payroll	Market Value of Assets / Payroll
12/31/15	71.64 %	0.55	2.10	0.59	1.50
12/31/16	70.83 %	0.55	2.11	0.62	1.50
12/31/17	77.22 %	0.55	2.15	0.49	1.66
12/31/18	68.41%	0.54	2.14	0.56	1.47
12/31/19	75.78%	0.53	2.12	0.54	1.61

Short-term fluctuations in the various Risk Measures noted above will occur due to plan experience, plan changes, and assumption and method changes being different from expected. Long-term expectations are described below:

**MVA Funded Ratio:** The funded ratio is expected to trend toward 100% by June 30, 2040 under the current amortization basis, which assumes that any currently remaining unfunded amounts will be contributed by that date. Note that beginning with the 2019 valuation, unfunded liabilities arising will be amortized over a 10-year period, which may cause the long term funded status to be something other than 100%.

**Annuitant Liabilities / AAL:** The ratio of annuitant (retiree) liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and liquidity needs of the portfolio change.

**AAL / Payroll:** This ratio is expected to grow as the System matures.

**UAAL / Payroll:** The ratio of the unfunded actuarial accrued liability to payroll is expected to trend toward 0% by June 30, 2040 under the current amortization basis, which assumes that any currently remaining unfunded amounts will be contributed by that date. Note that beginning with the 2019 valuation, unfunded liabilities arising will be amortized over a 10-year period, which may cause the long term funded status to be something other than 100%.

**Market Value of Assets / Payroll:** As the funded ratio increases, this ratio is expected to converge to the ratio of AAL / Payroll.

## Change in Unfunded Accrued Liabilities During the Year

The following table illustrates the change in unfunded accrued liabilities during the year.

	Year Ending 12/31/2018 (\$ millions)	Year Ending 12/31/2019 (\$ millions)
1. Unfunded Accrued Liability (UAL) at Start of Year	\$ 769.3	\$ 868.1
2. Normal Cost	94.7	99.4
3. Member and Employer contributions	152.9	148.9
4. Interest Accrual	<u>53.7</u>	<u>61.1</u>
5. Expected UAL before changes: (1. + 2. - 3. + 4.)	764.8	879.7
6. Change from non-recurring activities, assumptions and/or benefit changes	<u>0.0</u>	<u>(34.8)</u>
7. Expected UAL after changes: (5. + 6.)	764.8	844.9
8. Actual UAL at end of year	<u>868.1</u>	<u>885.6</u>
9. Gain/(Loss) (7. - 8.)	\$ (103.3)	\$ (40.7)
 Gain (loss) as percent of actuarial accrued liabilities at start of year.	 (3.3)%	 (1.2)%

## Breakdown of Unfunded Liability Gain/Loss

The following table illustrates the breakdown of the unfunded gain/(loss) by source.

(\$ in Millions)	12/31/2018	12/31/2019
Economic Risks		
Pay Increases	\$ (16.1)	\$ (12.0)
Investment Return	(77.7)	(26.5)
Demographic Risk		
Retirement	(6.0)	(4.1)
Mortality	(1.4)	(2.4)
Disability	(0.4)	(0.3)
Terminations	4.3	6.3
Data Adjustments and Miscellaneous	<u>(6.0)</u>	<u>(1.7)</u>
Unfunded Accrued Liability Gain/(Loss)	\$ (103.3)	\$ (40.7)



## Experience Gains and Losses by Risk Area Comparative Statement (\$ in Millions)

Experience Period	Pay Increase	Investment Return	Retirement	Disability & Death-in-Service	Other Separations	Other &	Total Gain (Loss)	
							\$	Percent of Liabilities
1997-1998#	\$ (2.6)	\$ 81.1	\$ 5.9	\$ (0.5)	\$ 6.4	\$ (13.9)	\$ 76.4	6.3 %
1998-1999*	(8.4)	95.4	0.3	(1.0)	6.5	(3.8)	89.0	7.0 %
1999-2000	(17.6)	62.3	3.8	(1.2)	12.9	38.9	99.1	7.4 %
2000-2001	(9.1)	17.6	(0.3)	(1.0)	13.0	(19.5)	0.7	0.0 %
2001-2002	3.0	(50.4)	3.5	(1.1)	2.6	(29.9)	(72.3)	(4.7)%
2002-2003	18.5	(92.5)	11.0	(0.3)	4.0	(23.3)	(82.6)	(4.9)%
2003-2004#@								
2005	(7.1)	1.9	1.0	0.1	0.0	(3.2)	(7.3)	(0.4)%
2006	(4.7)	23.6	2.0	0.0	(0.8)	2.6	22.7	1.1 %
2007	10.0	25.1	1.9	(0.2)	(2.2)	(7.2)	27.4	1.4 %
2008	4.1	(277.5)	5.2	(0.4)	(4.0)	13.5	(259.1)	(11.8)%
2009	45.0	(34.6)	8.8	(0.8)	(10.0)	(11.6)	(3.2)	(0.1)%
2010#	53.1	(16.9)	5.2	0.2	(5.3)	(4.2)	32.1	1.4 %
2011	18.8	(30.6)	5.3	(0.2)	(4.2)	(4.8)	(15.7)	(0.7)%
2012	12.3	(10.8)	4.6	(0.3)	(3.4)	(10.2)	(7.8)	(0.3)%
2013	16.6	7.6	5.7	0.0	2.9	(5.1)	27.7	1.1 %
2014	8.5	(2.8)	5.8	(0.1)	0.6	2.8	14.8	0.6 %
2015#	17.7	(40.2)	5.9	(0.4)	1.0	(12.4)	(28.4)	(1.0)%
2016	(14.2)	(13.9)	5.1	0.2	6.6	(5.6)	(21.8)	(0.8)%
2017	8.8	2.7	3.3	(0.0)	2.6	(19.6)	(2.2)	(0.1)%
2018	(16.1)	(77.7)	(6.0)	(1.8)	4.3	(6.0)	(103.3)	(3.3)%
2019	(12.0)	(26.5)	(4.1)	(2.7)	6.3	(1.7)	(40.7)	(1.2)%

# Experience Study.  
\* Updated Gain Formulas.  
@ Gain (Loss) Analysis not performed.  
& Includes post-retirement mortality.

# Appendix

## Participant Data

The actuarial valuation was based on personnel information from Plan Sponsor records as of December 31, 2019. Following are some of the pertinent characteristics from the personnel data as of that date. Prior year characteristics are also provided for comparison purposes. Both age and service have been determined using years and months as of the valuation date.

	December 31, 2018	December 31, 2019
<b>Active Participants</b>		
Number	22,048	22,176
Average Age	43.6	44.3
Average Service	9.4	9.6
Average Annual Pay	\$70,510	\$73,612
<b>Inactives With Deferred Benefits</b>		
Number	4,996	5,240
Average Current Age	44.2	45.1
Average Monthly Benefit <sup>1</sup>	\$3,522	\$3,644
<b>Inactives Receiving Payment</b>		
Number	12,101	12,482
Average Current Age	71.7	72.1
Average Monthly Benefit	\$14,201	\$14,158
<b>Total Participants</b>		
Number	39,145	39,898

<sup>1</sup> Before adjustment for assumed retirement age and payment form.

## Population Statistics – Exhibit 1

**ERFC Legacy Members**  
**WOMEN Active Members in December 31, 2019 Valuation**  
**by Attained Age and Years of Service**

Age Group	Years of Completed Service at Valuation Date							Totals		Average (\$)
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	No.	Salary (\$)	
35-39			1	1				2	177,543	88,772
40-44	2	13	34	147	81			277	26,313,804	94,996
45-49	5	22	66	172	311	62	1	639	63,632,542	99,581
50-54	6	44	44	139	243	172	32	680	65,259,097	95,969
55-59	2	9	26	140	215	108	44	544	48,091,352	88,403
60	1	2	7	28	49	11	5	103	8,736,112	84,817
61		1	3	11	52	19	3	89	7,751,667	87,097
62		1	3	17	46	24	10	101	8,636,374	85,509
63			1	24	52	25	6	108	8,934,834	82,730
64			4	21	32	24	9	90	7,776,749	86,408
65		1	3	21	31	13	4	73	6,017,332	82,429
66				8	26	4	4	42	3,443,482	81,988
67			1	11	20	8	6	46	4,081,285	88,724
68	1		1	3	14	6	5	30	2,349,580	78,319
69				6	10	6	1	23	1,874,356	81,494
70				1	5	1	3	10	855,928	85,593
71			1	3	7	4	2	17	1,544,433	90,849
72				1	3	1	2	7	457,306	65,329
73				1		1	1	3	222,887	74,296
74					2	1	1	4	447,170	111,793
75 & Over				2	5	2	5	14	950,090	67,864
<b>Totals</b>	<b>17</b>	<b>93</b>	<b>195</b>	<b>757</b>	<b>1,204</b>	<b>492</b>	<b>144</b>	<b>2,902</b>	<b>267,553,923</b>	<b>92,196</b>

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

Age (Years)                      54.6  
Service (Years)                 21.3  
Annual Pay                        \$ 92,196





## Population Statistics – Exhibit 4

### **ERFC 2001 Tier 1 Members MEN Active Members in December 31, 2019 Valuation by Attained Age and Years of Service**

Age Group	Years of Completed Service at Valuation Date							Totals		Average (\$)
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	No.	Salary (\$)	
20-24	5							5	146,203	29,241
25-29	108	34						142	8,433,173	59,389
30-34	138	262	24					424	28,531,234	67,291
35-39	79	196	206	38				519	40,700,177	78,420
40-44	65	93	144	156				458	39,791,837	86,882
45-49	52	88	85	131				356	31,976,993	89,823
50-54	47	55	79	80				261	22,562,791	86,447
55-59	45	62	70	57				234	19,891,630	85,007
60	4	8	13	14				39	3,350,308	85,905
61	5	10	11	7				33	2,849,430	86,346
62	5	8	13	7				33	2,773,461	84,044
63	2	9	4	7				22	1,741,208	79,146
64	5	8	3	6				22	1,564,256	71,103
65	5	4	5	5				19	1,377,366	72,493
66	6	3	6	3				18	1,441,002	80,056
67	2	6	5	3				16	1,206,999	75,437
68	2	2	1	3				8	628,258	78,532
69		5	3	3				11	685,784	62,344
70		1	3	1				5	290,047	58,009
71		3		1				4	169,833	42,458
72	1	1						2	108,381	54,191
73		1	2					3	259,285	86,428
74	2	1						3	129,772	43,257
75 & Over		1	1	4				6	486,397	81,066
<b>Totals</b>	<b>578</b>	<b>861</b>	<b>678</b>	<b>526</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,643</b>	<b>211,095,826</b>	<b>79,870</b>

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

Age (Years)	44.1
Service (Years)	9.8
Annual Pay	\$ 79,870





## Population Statistics – Exhibit 6

### **ERFC 2001 Tier 2 Members MEN Active Members in December 31, 2019 Valuation by Attained Age and Years of Service**

Age Group	Years of Completed Service at Valuation Date							Totals		Average (\$)
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	No.	Salary (\$)	
15-19								0		
20-24	81							81	3,592,688	44,354
25-29	223							223	11,291,835	50,636
30-34	152							152	8,870,409	58,358
35-39	96							96	6,594,103	68,689
40-44	91							91	6,575,653	72,260
45-49	66							66	4,657,568	70,569
50-54	68							68	4,665,222	68,606
55-59	48							48	3,060,164	63,753
60	7							7	440,579	62,940
61	7							7	480,389	68,627
62	5							5	336,765	67,353
63	7							7	396,592	56,656
64	4							4	205,797	51,449
65	1							1	23,403	23,403
66								0		
67	3							3	113,191	37,730
68	1							1	103,070	103,070
69	2							2	160,061	80,030
70								0		
71								0		
72	1							1	41,818	41,818
73								0		
74								0		
75 & Over								0		
<b>Totals</b>	<b>863</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>863</b>	<b>51,609,305</b>	<b>59,802</b>

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

Age (Years)                      37.4  
 Service (Years)                1.3  
 Annual Pay                      \$ 59,802

## Population Statistics – Exhibit 7

### ALL Active Members in December 31, 2019 Valuation by Attained Age and Years of Service

Age Group	Years of Completed Service at Valuation Date							Totals		Average (\$)
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	No.	Salary (\$)	
15-19	2							2	45,843	22,921
20-24	630							630	31,154,297	49,451
25-29	2088	377	1					2,466	141,899,800	57,542
30-34	1229	1411	192	1				2,833	188,567,510	66,561
35-39	888	791	898	206				2,783	209,815,747	75,392
40-44	853	528	531	707	104			2,723	218,432,484	80,218
45-49	857	552	479	593	456	89	1	3,027	247,885,882	81,892
50-54	741	545	494	455	366	266	39	2,906	231,016,561	79,496
55-59	485	459	520	512	290	151	57	2,474	185,489,285	74,975
60	60	58	94	112	57	18	7	406	31,228,762	76,918
61	51	55	73	64	62	26	4	335	25,332,299	75,619
62	44	40	71	83	56	26	14	334	26,171,331	78,357
63	30	43	51	62	57	26	8	277	20,785,378	75,037
64	26	27	51	72	42	27	12	257	20,061,983	78,062
65	15	22	40	54	33	15	6	185	13,821,690	74,712
66	15	17	32	30	27	5	4	130	9,672,416	74,403
67	14	14	21	28	23	9	9	118	9,595,761	81,320
68	9	8	10	20	16	7	5	75	5,410,134	72,135
69	6	11	9	22	11	6	3	68	5,204,604	76,538
70	3	3	9	9	6	1	4	35	2,522,023	72,058
71		7	4	8	8	5	3	35	2,652,902	75,797
72	6	3	1	2	4	1	2	19	1,094,929	57,628
73	1	3	4	3	1	1	1	14	1,123,717	80,265
74	3	1	1	1	3	2	2	13	1,082,775	83,290
75 & Over	1	1	2	11	6	4	6	31	2,359,197	76,103
<b>Totals</b>	<b>8,057</b>	<b>4,976</b>	<b>3,588</b>	<b>3,055</b>	<b>1,628</b>	<b>685</b>	<b>187</b>	<b>22,176</b>	<b>1,632,427,309</b>	<b>73,612</b>

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

	ERFC Legacy	ERFC 2001 Tier 1	ERFC 2001 Tier 2	Total
Age (Years):	54.3	44.3	36.9	44.3
Service (Years)	21.6	9.2	1.3	9.6
Annual Pay	\$ 94,916	\$ 73,801	\$ 56,702	\$ 73,612

## Population Statistics – Exhibit 8

**Active Members by Years of Service  
December 31, 2019**

Service Years	Number of Members			Annual Pay (\$)	
	Males	Females	Total	Salary (\$)	Average (\$)
0	328	1550	1,878	101,922,746	54,272
1	318	1439	1,757	100,652,453	57,287
2	259	1249	1,508	89,476,167	59,334
3	291	1197	1,488	92,164,148	61,938
4	249	1177	1,426	91,233,850	63,979
5	182	807	989	65,902,961	66,636
6	177	977	1,154	79,004,720	68,462
7	185	872	1,057	76,013,639	71,915
8	181	825	1,006	73,686,428	73,247
9	140	630	770	57,631,545	74,846
10	88	496	584	44,181,761	75,654
11	134	578	712	56,541,549	79,412
12	138	611	749	58,617,132	78,261
13	152	609	761	61,387,566	80,667
14	174	608	782	64,877,666	82,964
15	172	559	731	63,087,545	86,303
16	136	468	604	54,813,891	90,751
17	129	392	521	46,244,557	88,761
18	132	497	629	58,093,177	92,358
19	140	430	570	52,164,596	91,517
20	132	368	500	46,692,362	93,385
21	98	296	394	37,779,831	95,888
22	77	222	299	28,687,112	95,944
23	60	189	249	24,642,194	98,965
24	57	129	186	19,290,141	103,710
25	63	145	208	20,911,770	100,537
26	64	133	197	20,297,204	103,031
27	22	69	91	9,346,564	102,709
28	18	70	88	8,849,238	100,560
29	26	75	101	10,199,763	100,988
30 & Over	43	144	187	18,033,034	96,433
<b>Totals</b>	<b>4,365</b>	<b>17,811</b>	<b>22,176</b>	<b>1,632,427,309</b>	<b>73,612</b>

## Population Statistics – Exhibit 9

### Persons in Valuation - Comparative Statement Active Members

Valuation Date	Number				Average Pay	Annual Increase In Average Pay		Price Inflation (CPI-U) Last Yr
	ERFC Legacy	ERFC 2001 Tier 1	ERFC 2001 Tier 2	Total		Last Year	Last 5 Years	
2/28/1974	7,429			7,429	\$13,087			
2/28/1975	8,075			8,075	13,693			
2/28/1976	8,609			8,609	15,929			
2/29/1980	8,990			8,990	18,901			
6/30/1983	9,359			9,359	24,104			
6/30/1985	9,596			9,596	26,229			
6/30/1986	10,084			10,084	27,523	4.90%		1.80%
6/30/1987	10,560			10,560	28,887	5.00%		3.70%
6/30/1988	10,727			10,727	31,784	10.00%		4.00%
6/30/1989	11,019			11,019	33,540	5.50%		5.20%
6/30/1990	11,539			11,539	35,702	6.40%	6.40%	4.70%
6/30/1991	12,313			12,313	36,699	2.80%	5.90%	4.70%
6/30/1992	12,308			12,308	36,356	(0.90)%	4.70%	3.10%
6/30/1993	12,330			12,330	36,539	0.50%	2.80%	3.00%
6/30/1994	12,873			12,873	37,365	2.30%	2.20%	2.50%
6/30/1995	13,287			13,287	39,215	5.00%	1.90%	3.00%
6/30/1996	13,110			13,110	40,508	3.30%	2.00%	2.80%
6/30/1997	13,473			13,473	41,098	1.50%	2.50%	2.30%
6/30/1998	13,806			13,806	42,210	2.70%	2.90%	1.70%
6/30/1999	14,449			14,449	43,326	2.60%	3.00%	2.00%
6/30/2000	15,050			15,050	45,112	4.10%	2.80%	3.70%
6/30/2001	15,955			15,955	47,628	5.60%	3.30%	3.20%
6/30/2002	15,363	711		16,074	48,635	2.10%	3.40%	1.10%
6/30/2003	13,934	3,804		17,738	48,850	0.40%	3.00%	2.10%
12/31/2004	11,856	6,864		18,720	52,234	6.90%	3.80%	3.30%
12/31/2005	10,895	8,186		19,081	55,040	5.40%	4.10%	3.40%
12/31/2006	10,065	9,306		19,371	57,396	4.30%	3.80%	2.50%
12/31/2007	9,350	10,249		19,599	59,260	3.20%	4.00%	4.10%
12/31/2008	8,791	10,940		19,731	61,383	3.60%	4.70%	0.10%
12/31/2009	8,417	11,474		19,891	60,736	(1.10)%	3.10%	2.70%
12/31/2010	7,900	12,241		20,141	59,148	(2.60)%	1.40%	1.50%
12/31/2011	7,353	13,623		20,976	59,448	0.50%	0.70%	3.00%
12/31/2012	6,801	14,718		21,519	60,297	1.40%	0.30%	1.70%
12/31/2013	6,221	15,422		21,643	61,004	1.20%	-0.10%	1.50%
12/31/2014	5,754	15,598		21,352	62,774	2.90%	0.70%	0.80%
12/31/2015	5,292	16,293		21,585	63,613	1.30%	1.50%	0.70%
12/31/2016	4,892	16,856		21,748	66,056	3.80%	2.10%	2.10%
12/31/2017	4,488	15,629	1,724	21,841	67,554	2.30%	2.30%	2.10%
12/31/2018	4,115	14,451	3,482	22,048	70,510	4.37%	2.93%	1.90%
12/31/2019	3,761	13,533	4,882	22,176	73,612	4.40%	3.23%	2.30%

## Population Statistics – Exhibit 10

### Persons in Valuations - Comparative Statement Retired Lives

Valuation Date	Number	Average Annual Benefit	Total Benefits	Active Member Payroll	Total Benefits as % of Payroll
2/28/1974	-	-	-	\$ 97,221,025	
2/28/1975	195	\$3,463	\$ 675,344	110,571,258	0.61%
2/28/1976	456	3,270	1,491,310	137,131,905	1.09%
2/29/1980	1,012	4,238	4,288,395	169,924,320	2.52%
6/30/1983	1,448	5,136	7,437,571	225,592,433	3.30%
6/30/1985	1,823	6,220	11,339,462	251,691,261	4.51%
6/30/1986	2,047	6,614	13,539,032	277,545,288	4.88%
6/30/1987	2,232	7,007	15,639,820	305,050,734	5.13%
6/30/1988	2,425	7,629	18,502,289	340,945,603	5.43%
6/30/1989	2,679	8,671	23,230,719	369,574,756	6.29%
6/30/1990	2,932	9,354	27,428,027	411,970,032	6.66%
6/30/1991	3,209	10,146	32,559,349	451,872,668	7.21%
6/30/1992	3,311	10,960	36,289,308	447,473,936	8.11%
6/30/1993	3,486	11,307	39,417,339	450,530,273	8.75%
6/30/1994	3,775	11,285	42,600,996	480,995,439	8.86%
6/30/1995	3,927	11,529	45,274,131	521,044,021	8.69%
6/30/1996	4,225	11,843	50,036,473	531,060,397	9.42%
6/30/1997	4,478	11,908	53,322,514	553,709,472	9.63%
6/30/1998	4,773	12,156	58,018,744	582,754,912	9.96%
6/30/1999	5,113	12,383	63,312,850	626,015,364	10.11%
6/30/2000	5,344	13,201	70,548,074	678,937,233	10.39%
6/30/2001	5,766	13,167	75,922,636	759,905,510	9.99%
6/30/2002	6,375	13,645	86,985,606	781,756,005	11.13%
6/30/2003	6,729	14,493	97,522,562	866,501,799	11.25%
12/31/2004	7,430	14,767	110,029,000	977,817,281	11.25%
12/31/2005	7,710	15,077	116,242,812	1,050,216,544	11.07%
12/31/2006	8,029	15,370	123,402,840	1,111,827,576	11.10%
12/31/2007	8,354	15,598	130,307,079	1,161,431,668	11.22%
12/31/2008	8,595	15,631	134,346,260	1,211,140,009	11.09%
12/31/2009	8,772	15,697	137,692,304	1,208,092,606	11.40%
12/31/2010	9,081	15,677	142,366,660	1,191,290,190	11.95%
12/31/2011	9,467	15,707	148,697,364	1,246,973,240	11.92%
12/31/2012	9,788	15,594	152,634,070	1,297,536,507	11.76%
12/31/2013	10,156	15,193	154,304,935	1,320,308,508	11.69%
12/31/2014	10,524	14,893	156,735,926	1,340,343,666	11.69%
12/31/2015	10,937	14,649	160,215,262	1,373,095,719	11.67%
12/31/2016	11,367	14,356	163,189,230	1,436,587,994	11.36%
12/31/2017	11,729	14,308	167,821,309	1,475,449,186	11.37%
12/31/2018	12,101	14,201	171,843,676	1,554,614,462	11.05%
12/31/2019	12,482	14,158	176,679,304	1,632,427,309	10.82%

	Average					
	All Retirees			2019 Retirees		
	At Retirement		Current Monthly Benefit	At Retirement		Current Monthly Benefit
	Age	Service		Age	Service	
ERFC Legacy	58.8	23.1	1,319.84	61.4	25.4	1,764.34
ERFC 2001 Tier 1	62.5	10.0	442.12	62.8	12.2	538.81

Population Statistics – Exhibit 11

**ERFC Legacy**  
**Original Benefit Formulas (Before July 1, 1988)**  
**Retirees and Beneficiaries December 31, 2019**  
**by Type of Benefit Being Paid**

Type of Pension Being Paid	No.	Annual Payable For Life	Annual Temporary Supplement	Annual Current Benefits
Age and Service - Normal:				
Straight Life	241	5,221,594		5,221,594
Optional Form	13	301,874		301,874
Age and Service - Early:				
Straight Life	200	3,007,616		3,007,616
Optional Form	14	293,017		293,017
Age and Service Totals	468	8,824,102		8,824,102
Duty Disability				
Straight Life	3	114,452		114,452
Non-Duty Disability				
Straight Life	22	269,791		269,791
Age and Service Survivor				
Beneficiary, Duty Death and Non-Duty Death	31	339,643		339,643
Other Totals	56	723,885		723,885
<b>Total Benefits</b>	<b>524</b>	<b>9,547,987</b>		<b>9,547,987</b>

Population Statistics – Exhibit 12

**ERFC Legacy**  
**Benefit Formulas Effective July 1, 1988**  
**Retirees and Beneficiaries December 31, 2019**  
**by Type of Benefit Being Paid**

Type of Pension Being Paid	No.	Annual Payable For Life	Annual Temporary Supplement	Annual Current Benefits
Age and Service - Normal:				
Straight Life	5214	81,745,027	20,961,537	102,706,564
Optional Form	910	13,469,329	3,931,083	17,400,413
Age and Service - Early:				
Straight Life	3,665	22,995,063	10,003,401	32,998,464
Optional Form	373	2,453,535	1,129,652	3,583,188
Age and Service Totals	10,162	120,662,954	36,025,674	156,688,627
Duty Disability				
Straight Life	14	59,601	0	59,601
Optional Form	1	2,239	0	2,239
Non-Duty Disability				
Straight Life	114	567,373	0	567,373
Optional Form	13	60,359	0	60,359
Age and Service Survivor				
Beneficiary, Duty Death and Non-Duty Death	170	1,202,597	166,614	1,369,211
Other Totals	312	1,892,169	166,614	2,058,783
<b>Total Benefits</b>	<b>10,474</b>	<b>122,555,123</b>	<b>36,192,288</b>	<b>158,747,411</b>

## Population Statistics – Exhibit 13

### ERFC 2001 Tier 1 Retirees and Beneficiaries December 31, 2019 by Type of Benefit Being Paid

Type of Pension Being Paid	No.	Annual Current Benefits
Age and Service - Normal:		
Straight Life	1199	6,849,646
Optional Form	291	1,691,156
Age and Service - Early:		
Straight Life		0
Optional Form		0
Age and Service Totals	1,490	8,540,802
Duty Disability		
Straight Life		0
Optional Form		0
Non-Duty Disability		
Straight Life		0
Optional Form		0
Age and Service Survivor Beneficiary, Duty Death and Non-Duty Death	26	118,111
Other Totals	26	118,111
<b>Total Benefits</b>	<b>1,516</b>	<b>8,658,913</b>



Population Statistics – Exhibit 14

**ERFC Legacy**  
**Original Benefit Formulas (Before July 1, 1988)**  
**Retirees and Beneficiaries December 31, 2019**  
**Current Annual Benefits - Tabulated by Attained Ages**

Attained Ages	No.	Annual Amount
64	1	\$2,301
66	2	18,377
67	1	1,316
68	2	12,795
69	1	19,036
71	2	25,381
73	1	36,767
74	3	56,920
75	2	24,961
76	2	18,759
77	2	24,742
78	4	51,723
79	3	43,545
80-84	141	2,955,957
85-89	169	3,796,660
90 & Up	183	2,408,255
Total	519	9,497,497

## Population Statistics – Exhibit 15

**ERFC Legacy**  
**Benefit Formulas Effective July 1, 1988**  
**Retirees and Beneficiaries December 31, 2019**  
**Current Annual Benefits - Tabulated by Attained Ages**

Attained Ages	No.	Annual Amount
Under 40	2	\$6,729
40-44	3	10,838
45	1	6,840
48	2	8,396
49	3	50,100
50	6	116,855
51	5	121,471
52	10	235,819
53	10	368,767
54	24	681,907
55	66	1,694,348
56	108	2,463,642
57	123	3,321,670
58	123	2,988,521
59	133	3,502,563
60	144	4,044,279
61	210	5,574,888
62	252	6,785,503
63	275	7,167,283
64	328	8,245,687
65	430	10,600,530
66	406	4,670,089
67	475	5,010,124
68	480	5,022,098
69	537	6,027,264
70-74	2,867	34,381,519
75-79	1,905	25,153,909
80 & Up	1,519	20,272,140
Total	10,447	158,533,778

Population Statistics – Exhibit 16

**ERFC 2001 Tier 1**  
**Retirees and Beneficiaries December 31, 2019**  
**Current Annual Benefits - Tabulated by Attained Ages**

<b>Attained Ages</b>	<b>No.</b>	<b>Annual Amount</b>
Under 40	1	\$1,135
40-44	1	3,059
46	1	6,102
49	1	3,824
50	1	9,605
52	1	3,561
53	1	13,347
55	3	11,308
57	1	3,626
58	2	8,146
60	57	302,372
61	60	322,162
62	91	533,702
63	106	633,858
64	92	542,982
65	131	852,800
66	132	827,303
67	121	688,433
68	118	684,892
69	113	663,419
70-74	391	2,135,742
70-79	79	363,875
80 & Up	12	43,660
<b>Total</b>	<b>1,516</b>	<b>8,658,913</b>

Population Statistics – Exhibit 17

**ERFC Legacy**  
**Original Benefit Formulas (Before July 1, 1988)**  
**Inactive Vested Members December 31, 2019**  
**Annual Deferred Benefits – Tabulated by Attained Ages**

Attained Ages	No.	Annual Amount
59	0	\$0
60	0	0
61	0	0
62	0	0
63	0	0
64	0	0
65 & Up	0	0
Total	0	0

\* In addition, there are 15 members whose accumulated contributions exceed the present value of their estimated future benefits. Liabilities for these members were set equal to their accumulated contributions.

## Population Statistics – Exhibit 18

**ERFC Legacy**  
**Benefit Formulas Effective July 1, 1988**  
**Inactive Vested Members December 31, 2019**  
**Annual Deferred Benefits – Tabulated by Attained Ages**

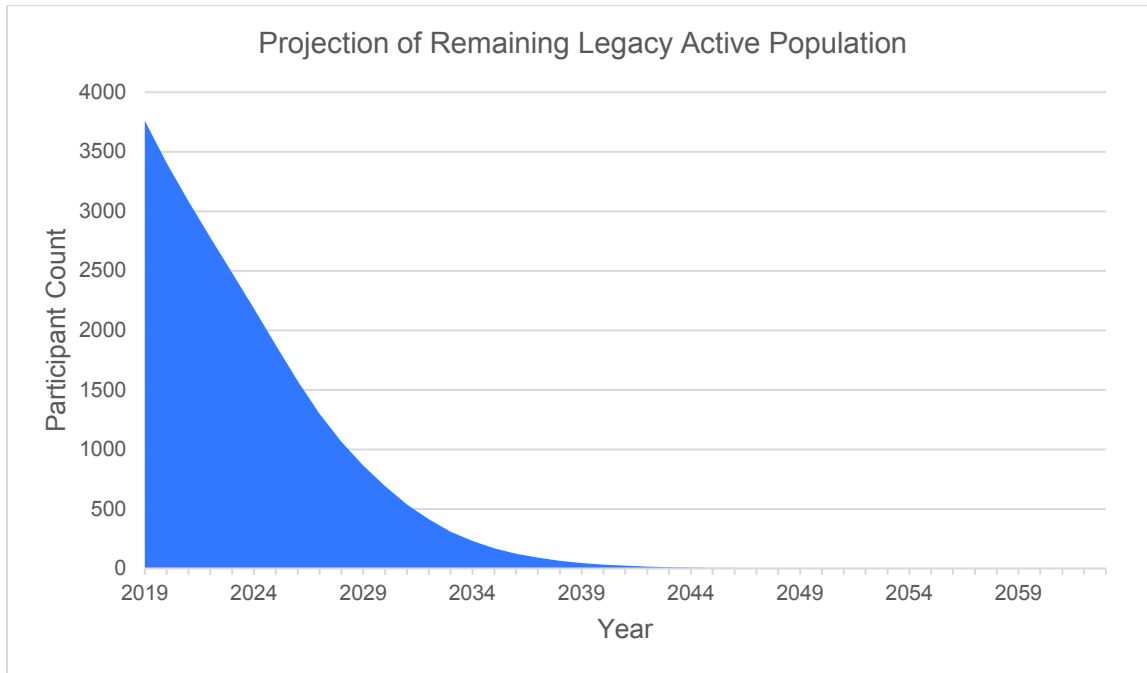
Attained Ages	No.	Annual Amount
40	1	\$1,567
41	34	103,521
42	55	152,077
43	69	181,340
44	68	182,472
45	97	239,234
46	94	264,727
47	98	267,347
48	114	374,229
49	117	346,502
50	104	312,567
51	97	351,852
52	93	280,119
53	83	332,372
54	72	190,908
55	51	173,283
56	42	175,081
57	34	146,729
58	32	146,826
59	31	133,597
60	32	156,230
61	20	92,332
62	27	108,282
63	19	99,272
64	16	68,382
65 & Up	55	225,733
Total	1,555	5,106,579

## Population Statistics – Exhibit 19

**ERFC 2001 Tier 1**  
**Inactive Vested Members December 31, 2019**  
**Annual Deferred Benefits – Tabulated by Attained Ages**

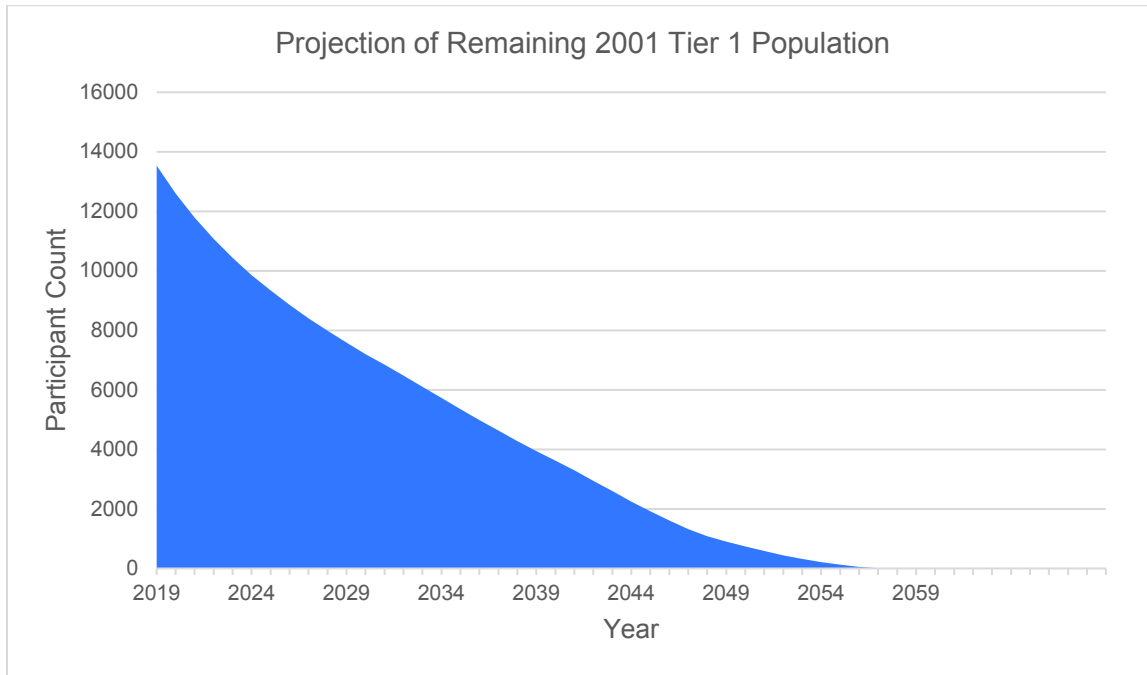
Attained Ages	No.	Annual Amount
27	6	\$12,066
28	18	41,775
29	54	126,766
30	84	215,034
31	105	281,007
32	136	384,411
33	164	490,502
34	162	519,555
35	178	612,958
36	207	735,256
37	210	772,449
38	238	886,209
39	238	971,620
40	235	969,088
41	187	744,651
42	128	506,981
43	111	461,689
44	100	419,412
45	80	330,272
46	83	377,132
47	58	258,911
48	83	348,768
49	59	252,393
50	55	247,158
51	52	227,569
52	59	310,377
53	55	244,703
54	53	260,347
55	61	243,213
56	64	300,787
57	74	315,358
58	90	399,013
59	87	360,956
60	25	99,529
61	21	86,569
62	12	52,266
63	12	39,820
64	4	9,666
65 & Up	22	69,578
<b>Total</b>	<b>3,670</b>	<b>13,985,813</b>

## Expected Development of ERFC Legacy Present Population December 31, 2019



ERFC Legacy is a closed group that presently covers 3,761 active members. Approximately 99% of the present population is expected to receive monthly retirement benefits either by retiring directly from active service, or by separating from service without withdrawing contributions. Within 7 years, over half of the current membership will have left the group.

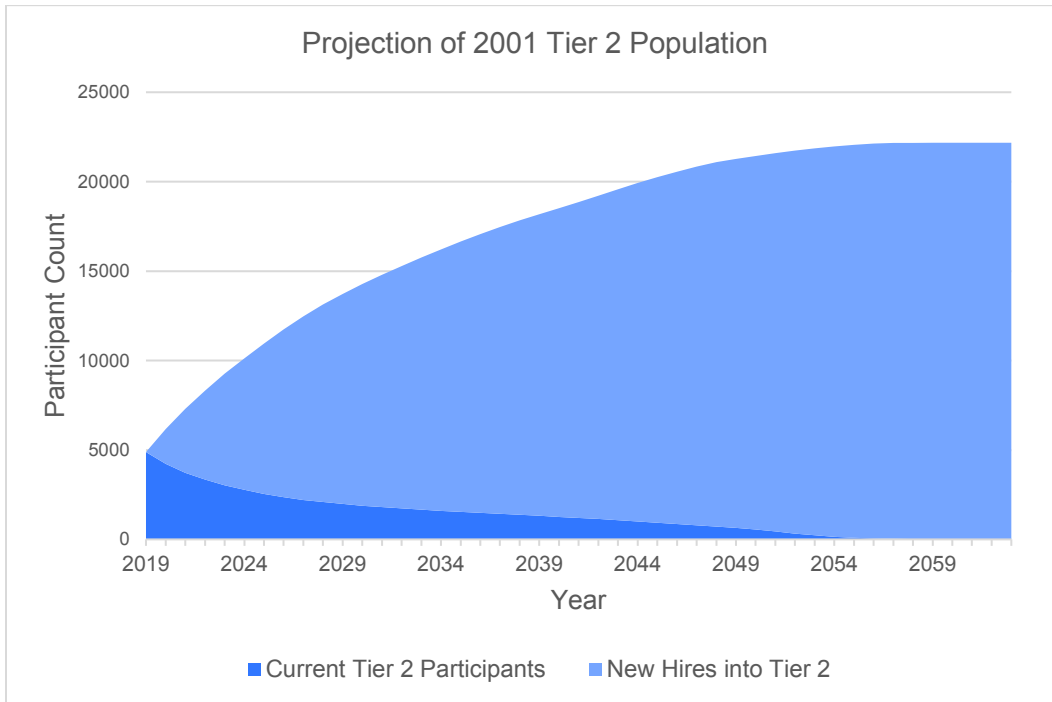
## Expected Development of ERFC 2001 Tier 1 December 31, 2019



ERFC 2001 Tier 1 is a closed group that presently covers 13,532 active members. Within 12 years, over half of the current membership will have left the group.



## Expected Development of ERFC 2001 Tier 2 December 31, 2018



The chart above shows the expected future development of the ERFC 2001 Tier 2 population assuming that new hires replace participants that exit the plan so as to maintain the total current active population at the December 31, 2019 level. The projection of the current ERFC Tier 2 population of 4,883 participants is shown separately from future new hires.

## Actuarial Assumptions and Methods

Investment Return Rate	7.25%
Salary Increases	For 2020: 0% After 2020: See Table 1
General Inflation	2.75%
Benefit and Compensation Limits	The IRC section 415 benefit limit, the IRC section 401(a)(17) compensation limit, and Social Security TWB have been projected at 2.50% per year.
Retirement Age	
Active Participants	See Table II
Terminated Vested Participants	At plan commencement age provided in terminated vested member data
Mortality Rates	
Healthy and Disabled	The mortality table used to measure retired life mortality was 90% of the male rates and 79% of the female rates of the RP-2014 mortality Total Data Set Healthy Annuitant Mortality tables, adjusted for mortality improvement back to the base year of 2006. Mortality rates for a particular calendar year are determined by applying the fully generational MP-2016 Mortality Improvement scale to the above-described tables. Tables were extended below age 50 with a cubic spline to the published Juvenile rates. The corresponding Disabled and Employee tables were used for disability and pre-retirement mortality, respectively.
Withdrawal Rates	See Table III
Disability Rates	See Table IV
Benefit Commencement for Terminated Vested Members:	At plan commencement age provided in terminated vested member data.
Pay Increase Timing:	Nine months after the valuation date (October 1st).
Decrement Timing	Middle of year decrements, with 100% retirement occurring at beginning of year.
Surviving Spouse Benefit/Marriage Assumption	It is assumed that 100% of males and 100% of females have an eligible spouse for purposes of death-in-service benefits, and that males are 3 years older than their spouse.

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.
Administrative Expenses	Actual administrative expenses during the measurement period are recognized in expense.
COLA Adjustment	Members hired prior to July 1, 2017: 3% (actual COLA).  Members hired on/after July 1, 2017: 2.59% (long-term estimate of provision of 100% of CPI-U capped at 4%; see GRS letter dated November 22, 2016).
Actuarial Value of Assets	The actuarial value of assets is determined by adjusting the fair value of plan assets as of December 31 each year to reflect investment gains and losses during each of the last 5 years at 20% per year. The resulting value is required to be within 75% and 125% of the market value of assets as of the same date.
Incidence of Contributions	Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
Amortization Basis for Funding	For funding purposes, unfunded accrued liabilities are currently being amortized over a closed 30-year period ending on June 30, 2040. The remaining amortization period in the December 31, 2019 valuation is 19 years. Effective with valuations on/after December 31, 2019, unfunded accrued liabilities resulting from benefit and/or assumption changes will be amortized over 10 years (or less).
Actuarial Equivalence Factors (as of the date of this report):	The interest rate is 7.25% for the Option D form of payment. For Small Pension payouts the interest rate is the lesser of 7.25% or the rate for 20-year Treasury Notes raised to the next highest integer, as of the December 1st preceding the Calendar year of retirement. Mortality is based upon a 20% unisex blend of the RP-2014 Total Data Set Healthy Annuitant Mortality Table.

Normal Form of Benefit	The assumed normal form of benefit is the straight life form.
Adjustments	<p>For members hired prior to July 1, 2001 computed liabilities and normal costs are increased by 3.25% to reflect service credit for unused sick leave that may be granted at retirement. Computed liabilities and normal costs for Normal and Early retirement are reduced by 0.5% to reflect a “negative subsidy” in the Plan Document option factors. Computed liabilities for retirees that elected optional forms of benefit (with beneficiaries) are increased by 1.81% to reflect the pop-up provision.</p> <p>To account for administrative expenses, 0.27% of pay was added to the otherwise computed normal cost. This amount will be adjusted each year based on actual administrative expenses during the year and pay as of the valuation date.</p> <p>For terminated vested records past social security age with no commencement age provided, immediate commencement is assumed. No other adjustments for missing or incomplete data are made; all data issues are fully resolved before commencing the valuation.</p>
Actuarial Cost Method	Entry Age Normal cost method
Discount Rate Method	Equal to the Expected Return on Assets
Measurement Date	December 31, 2019
Measurement Period	December 31, 2018 to December 31, 2019
Valuation Date	December 31, 2019
Census Data	As of December 31, 2018, and December 31, 2019.

## Changes in Funding Methods/Assumptions Since the Prior Year

### **Method Changes**

There have been no method changes in the funding valuation since the prior year.

### **Assumption Changes**

The assumptions used in the funding valuation were approved by the Board based on an actuarial experience study issued November 10, 2015 with further analysis done in July 2017.

The funding valuation reflects the one year pay (base, merit and seniority) freeze in 2020.

# Actuarial Assumptions and Methods

Table I

## Salary Increase Assumption

Pay Increase Assumption			
Service Index	Merit & Seniority	Base (Economy)	Increase Next Year
1	5.80%	3.25%	9.05%
2	4.00%	3.25%	7.25%
3	3.30%	3.25%	6.55%
4	3.10%	3.25%	6.35%
5	2.50%	3.25%	5.75%
6	2.40%	3.25%	5.65%
7	2.30%	3.25%	5.55%
8	1.70%	3.25%	4.95%
9	1.60%	3.25%	4.85%
10	1.40%	3.25%	4.65%
11	1.40%	3.25%	4.65%
12	1.40%	3.25%	4.65%
13	1.40%	3.25%	4.65%
14	1.40%	3.25%	4.65%
15	0.90%	3.25%	4.15%
16	0.80%	3.25%	4.05%
17	0.70%	3.25%	3.95%
18	0.50%	3.25%	3.75%
19	0.50%	3.25%	3.75%
20	0.40%	3.25%	3.65%
21	0.30%	3.25%	3.55%
22	0.20%	3.25%	3.45%
23	0.20%	3.25%	3.45%
24	0.20%	3.25%	3.45%
25	0.00%	3.25%	3.25%

**Table II**  
**Retirement Rates**

Ages	ERFC (Hired Before 7/1/2001)		ERFC 2001 Tier 1 (Hired 7/1/2001-6/30/2017)			ERFC 2001 Tier 2 (Hired On/After 7/1/2017)	
	Type of Retirement		Age Based	Service	Service Based	Age Based Rule of 90 Met?	
	Service	Reduced Service				Yes	No
45		2.0%					
46		2.0%					
47		2.0%					
48		2.0%					
49		2.0%					
50		2.0%					
51		3.0%					
52		6.0%					
53		7.0%					
54		8.0%					
55	35.0%	6.0%	17.5%	30	17.5%		
56	35.0%	4.0%	17.5%	31	17.5%	35.0%	0.0%
57	25.0%	4.0%	12.5%	32	12.5%	35.0%	0.0%
58	25.0%	4.0%	12.5%	33	12.5%	35.0%	0.0%
59	25.0%	4.0%	12.5%	34	12.5%	35.0%	0.0%
60	25.0%	7.0%	10.0%	35	10.0%	35.0% *	0.0%
61	30.0%	8.0%	10.0%	36	10.0%	35.0%	0.0%
62	30.0%	13.0%	10.0%	37	10.0%	35.0%	0.0%
63	30.0%	13.0%	10.0%	38	25.0%	35.0%	0.0%
64	30.0%	13.0%	20.0%	39	40.0%	35.0%	0.0%
65	30.0%		25.0%	40 & Up	100.0%	35.0%	0.0%
66	30.0%		30.0%			35.0%	0.0%
67	25.0%		25.0%			35.0%	30.0%
68	25.0%		15.0%			35.0%	15.0%
69	20.0%		15.0%			35.0%	15.0%
70	20.0%		15.0%			35.0%	15.0%
71	20.0%		15.0%			35.0%	15.0%
72	20.0%		15.0%			35.0%	15.0%
73	30.0%		15.0%			35.0%	15.0%
74	30.0%		15.0%			35.0%	15.0%
75 & Over	100.0%		100.0%			100.0%	100.0%

\* The probability is 60% at age 60 for people who first meet the Rule of 90 at age 60.

The age column index does not apply to the service based retirements. In ERFC 2001 Tier 1, an individual can retire at 30 years of service regardless of age. In ERFC 2001 Tier 2, an individual would be able to retire at FSSA with 5 years of service or when the sum of age and service is greater than or equal to 90. FSSA is assumed to be age 67 for members hired on/after July 1, 2017

**Table III**  
**Withdrawal Rates**

Service	% of Active Participants Withdrawing	
	Males	Females
0 - 1	13%	15%
1 - 2	12%	14%
2 - 3	11%	13%
3 - 4	9%	11%
4 - 5	7%	9%
5 - 6	6%	9%
6 - 7	5%	9%
7 - 8	4%	9%
8 - 9	4%	6%
9 - 10	4%	5%
10 - 11	4%	5%
11 - 12	3%	4%
12 - 13	3%	4%
13 - 14	3%	3%
14 - 15	2%	3%
15 - 16	2%	3%
16 - 17	1%	3%
17 - 18	1%	2%
18 - 19	1%	2%
19 - 20	1%	2%
20 - 21	1%	2%
21 - 22	1%	2%
22 - 23	1%	2%
23 - 24	1%	2%
24 - 25	1%	2%

*In addition, forfeiture occurs when a vested person separates from service and withdraws contributions thereby forfeiting future rights to an employer financed benefit. The total probability of forfeiture is obtained by multiplying the probability of withdrawal above by 10%. Forfeiture rates do not apply to individuals who are eligible for retirement at time of termination.*



**Table IV**  
**Sample Rates of Separation From Active Employment**

Ages in	% of Active Members Dying or Becoming Disabled within Next Year							
	Death*				Disability			
	Ordinary		Duty		Ordinary		Duty	
2017	Men	Women	Men	Women	Men	Women	Men	Women
20	0.0188%	0.0064%	0.0019%	0.0006%	0.0117%	0.0048%	0.0029%	0.0012%
21	0.0208%	0.0065%	0.0021%	0.0006%	0.0117%	0.0048%	0.0029%	0.0012%
22	0.0227%	0.0065%	0.0023%	0.0006%	0.0117%	0.0048%	0.0029%	0.0012%
23	0.0238%	0.0067%	0.0024%	0.0006%	0.0142%	0.0074%	0.0036%	0.0018%
24	0.0242%	0.0069%	0.0024%	0.0006%	0.0149%	0.0081%	0.0037%	0.0020%
25	0.0228%	0.0071%	0.0023%	0.0007%	0.0146%	0.0082%	0.0036%	0.0020%
26	0.0218%	0.0074%	0.0022%	0.0007%	0.0142%	0.0082%	0.0035%	0.0021%
27	0.0212%	0.0077%	0.0021%	0.0007%	0.0140%	0.0086%	0.0035%	0.0022%
28	0.0210%	0.0081%	0.0021%	0.0008%	0.0142%	0.0094%	0.0036%	0.0024%
29	0.0212%	0.0086%	0.0021%	0.0008%	0.0149%	0.0106%	0.0037%	0.0027%
30	0.0215%	0.0091%	0.0022%	0.0009%	0.0158%	0.0122%	0.0040%	0.0031%
31	0.0221%	0.0098%	0.0022%	0.0009%	0.0171%	0.0140%	0.0043%	0.0035%
32	0.0228%	0.0104%	0.0023%	0.0010%	0.0186%	0.0158%	0.0046%	0.0040%
33	0.0236%	0.0110%	0.0024%	0.0010%	0.0202%	0.0178%	0.0050%	0.0044%
34	0.0244%	0.0116%	0.0024%	0.0011%	0.0218%	0.0196%	0.0054%	0.0049%
35	0.0252%	0.0121%	0.0025%	0.0011%	0.0234%	0.0214%	0.0059%	0.0054%
36	0.0258%	0.0127%	0.0026%	0.0012%	0.0252%	0.0232%	0.0063%	0.0058%
37	0.0265%	0.0133%	0.0026%	0.0012%	0.0271%	0.0250%	0.0068%	0.0062%
38	0.0273%	0.0141%	0.0027%	0.0013%	0.0291%	0.0268%	0.0073%	0.0067%
39	0.0284%	0.0151%	0.0028%	0.0014%	0.0314%	0.0287%	0.0078%	0.0072%
40	0.0298%	0.0163%	0.0030%	0.0015%	0.0339%	0.0308%	0.0085%	0.0077%
41	0.0317%	0.0177%	0.0032%	0.0016%	0.0367%	0.0331%	0.0092%	0.0083%
42	0.0342%	0.0195%	0.0034%	0.0018%	0.0399%	0.0357%	0.0100%	0.0089%
43	0.0373%	0.0215%	0.0037%	0.0020%	0.0435%	0.0386%	0.0109%	0.0097%
44	0.0411%	0.0239%	0.0041%	0.0022%	0.0475%	0.0419%	0.0119%	0.0105%
45	0.0456%	0.0267%	0.0046%	0.0025%	0.0520%	0.0456%	0.0130%	0.0114%
46	0.0508%	0.0298%	0.0051%	0.0028%	0.0570%	0.0498%	0.0143%	0.0124%
47	0.0568%	0.0332%	0.0057%	0.0031%	0.0626%	0.0545%	0.0157%	0.0136%
48	0.0634%	0.0370%	0.0063%	0.0034%	0.0689%	0.0598%	0.0172%	0.0149%
49	0.0708%	0.0411%	0.0071%	0.0038%	0.0760%	0.0658%	0.0190%	0.0164%
50	0.0789%	0.0454%	0.0079%	0.0042%	0.0842%	0.0726%	0.0210%	0.0181%
55	0.1333%	0.0704%	0.0133%	0.0065%	0.1469%	0.1228%	0.0367%	0.0307%
60	0.2279%	0.1016%	0.0228%	0.0095%	0.2447%	0.1770%	0.0612%	0.0443%

\* Applicable to calendar year 2017. Rates in future years are determined by the MP-2016 projection scale

## Actuarial Assumptions and Methods

### Discussion of Actuarial Assumptions and Methods

For the funding valuation, ERFC selected the economic and demographic assumptions and prescribed them for use for purposes of compliance with the state's funding regulations. Aon provided guidance with respect to these assumptions, and it is our belief that the assumptions represent reasonable expectations of anticipated plan experience. The actuarial cost and amortization methods are not prescribed by state or local statute.

While the method used to value assets is prescribed by ERFC, Aon provided guidance with respect to the use of this method, and it is our belief that the method is appropriate for funding purposes.

### Calculation of Normal Costs and Liabilities

The method used to calculate the normal cost and projected benefit obligation for determining the employer contribution rate is the entry age normal cost method. Under this cost method, the actuarial accrued liability is based on a prorated portion of the present value of all benefits earned to date over the expected future working life time of plan participants. The proration is determined so that the cost with respect to service accrued from date of hire is recognized as a level percentage of pay each year. The Normal Cost is equal to the prorated cost for the year of the valuation.

Normal Costs and projected benefit obligations are determined separately for ERFC Legacy, ERFC Tier 1 and ERFC Tier 2 participants and blended together to produce the results shown in this report. It is expected that over time, the plans Normal Cost will become the Normal Cost for the Tier 2 participants. Unfunded actuarial accrued liabilities are amortized to produce contribution amounts (principal and interest) which are level percent-of-payroll contributions, assuming payroll grows at the rate indicated elsewhere in this report.

## Plan Provisions – ERFC Legacy

Eligibility to Participate	ERFC Members Hired After July 1, 1988 but Before July 1, 2001
Contributions	Effective July 1, 2012, members contribute 3% of their salaries. Interest credits are 5% annually through June 30, 2017, and 4% annually thereafter. If a member leaves covered employment before becoming eligible to retire, accumulated contributions are returned upon request. Members who receive a refund of contributions and are later rehired become members of ERFC 2001 Tier 2.
Eligibility for Retirement	
Normal Retirement	A member may retire any time after reaching the service retirement date, which is either (i) age 65 with 5 years of service or (ii) age 55 with 25 years of service
Early Retirement	A member with 25 years of service but younger than age 55 may retire after age 45. A member with less than 25 years of service and younger than age 65 may retire after age 55.
Disability Retirement	An active member with 5 or more years of service who becomes totally and permanently disabled may be retired and receive a disability pension. The 5-year service requirement is waived if the disability is service-connected.
Normal Retirement Benefit	For payment periods during the retired member's lifetime 103% times (i) minus (ii) where: <ul style="list-style-type: none"><li>(i) means 1.85 percent of the FAC multiplied by years of credited service, and</li><li>(ii) means 1.65 percent of the portion of VRS FAC in excess of \$1,200, multiplied by applicable years of creditable Virginia service; provided if the member is younger than age 65 and if creditable Virginia service is less than 30 years, the result of such multiplication shall be reduced for each month before the earlier of:<ul style="list-style-type: none"><li>(1) attainment of age 65; and</li><li>(2) the date when 30 years of service would have been completed.</li></ul></li></ul>

The reduction shall be one-half of 1% for each of the first 60 months and four-tenths of one percent for each month beyond 60 months, if any.

For payment periods, if any, before the age the member becomes eligible for full Social Security benefits, an additional temporary benefit equals to 103% times 1.00 percent of the FAC multiplied by years of credited service.

Early Retirement Benefit

Accrued benefit to early retirement date payable at normal retirement date reduced according to the following schedule:

After 25 years of service: Service Retirement amount reduced to reflect retirement age younger than age 55.

After 5 years of service, but before 25 years of service: For payment periods during the retired member's lifetime, the Service Retirement amount payable at age 65 reduced to reflect retirement age younger than age 65. For payment periods before the age the member becomes eligible for full Social Security benefits, an additional temporary benefit equal to the Service Retirement temporary benefit reduced to reflect retirement age younger than age 65.

Disability Benefit

The amount is 103% times a lifetime pension equal to 0.25 percent of the FAC multiplied by years of credited service. Credited service shall be increased by the time period from disability retirement to the date when the member would have reached the service retirement date. The minimum pension payable is 2.5 percent of FAC.

Vested Deferred Benefit  
Eligibility

An inactive member with 5 or more years of service will be entitled to a pension with payments beginning at age 55, provided she/he does not withdraw accumulated member contributions.

Amount

Calculated in the same manner as early retirement benefits.

Final Average Compensation (FAC)

A member's final average compensation is the average of the 3 highest consecutive years of salary during eligible employment.

Forms of Payment

Normal Form

The assumed normal form of benefit is the straight life form.

Optional Forms

Option A: 100% Joint and Survivor benefit. Benefit is 85% of the straight life amount adjusted for the difference in age between the retiree and beneficiary. The maximum benefit is 94% of the straight life amount.

Option B: 50% Joint and Survivor benefit. Benefit is 91% of the straight life amount adjusted for the difference in age between the retiree and beneficiary. The maximum benefit is 97% of the straight life amount.

Option C: 10 years Certain and Life. Benefit is 96% of the straight life amount.

Option D: Single sum payment not exceeding member's accumulated contribution balance, plus a single life annuity actuarially reduced from the pension amount otherwise payable.

Post-Retirement Increases

The amount of the monthly benefit is adjusted each March 31st, by 3% compounded annually, beginning with the March 31st which is more than three full months after the member's effective retirement date. Pensions of members that retire in the immediately preceding calendar year are increased by 1.489% (one-half a year's increase).

Spouse's Preretirement Death Benefit

Statutory Death Benefits

Eligibility

An active member with 5 or more years of service who dies will have benefits payable to the surviving spouse or other eligible beneficiary. The 5-year service requirement is waived if the death is service-connected.

Amount

If the member is eligible for a service or reduced service retirement then an eligible named beneficiary will receive such benefits reduced based upon an Option A (in the case of a spouse or an ex-spouse subject to a DRO) or Option B (in case of another eligible beneficiary) election. If not, the eligible named beneficiary will receive an amount equal to 103% times a lifetime pension equal of 0.25% of the FAC multiplied by years of credited service, and also reduced in connection with an Option A or Option B election. Credited service shall be increased by the time period from the date of death to the date when the member would have reached service retirement with a minimum of 10 years of service used, provided the death was service-connected. If a named beneficiary is not eligible for either of these types of benefits, the named beneficiary will receive a refund of the member's accumulated contributions.

## Alternative Benefits Available to Members with Some Service Before July 1, 1988

Service Retirement: Alternate Amount  
After Full Social Security Age

A member with service before 7/1/1988 may elect, at time of retirement, to receive an alternate benefit amount for payment periods after full Social Security age. The Alternative Guarantee amount is the amount that would have been received after the individual reached eligibility for full Social Security benefits under the Old Plan (pre – July 1, 1988) formulas. The amount is 103% of the total of:

- (i) the amount payable under June 30, 1987 benefit provisions,
- (ii) plus, if the retiring member is younger than full Social Security age and if creditable Virginia service is less than 30 years, 1.65 percent of VRS average final compensation in excess of \$1,200, multiplied by years of creditable Virginia service, and further multiplied by a certain percent based upon the number of months that retirement occurs before reaching the earlier of the above two conditions; such percent is one half of one percent for each of the first 60 such months and four-tenths of one percent for each of the next 60 such months, if any.

Reduced Service Retirement: Alternate  
Amount with 25 Years or more Years of  
Service

By election at time of retirement, such a member may elect to receive 103% of the following combination of benefits:

- (i) To age 55, 2.85 percent of the 3-year average annual salary multiplied by years of credited service, then actuarially reduced to reflect retirement age younger than age 55;
- (ii) From age 55 to 65, the amount to age 55 reduced by: 1.65 percent of the portion of VRS average final compensation in excess of \$1,200, multiplied by applicable years of creditable Virginia service; provided if creditable Virginia service is less than 30 years, the result of such multiplication shall be actuarially reduced for each month before the earlier of (1) attainment of age 65; and (2) the date when 30 years' service would have been completed; and
- (iii) From age 65 for life, the amount payable at age 65 according to June 30, 1987 provisions or the amount payable at age 65 according to July 1, 1988 provisions.

## Plan Changes Since the Prior Year

The financial accounting valuation does not reflect any plan changes.

## Plan Provisions – ERFC 2001 Tier 1

Eligibility to Participate	Members Hired On/After July 1, 2001 but Before July 1, 2017 (ERFC 2001 Tier 1)
Contributions	Effective July 1, 2012, members contribute 3% of their salaries. Interest credits are 5% annually through June 30, 2017, and 4% annually thereafter. If a member leaves covered employment before becoming eligible to retire, accumulated contributions are returned upon request. Members who receive a refund of contributions and are later rehired become members of ERFC 2001 Tier 2.
Eligibility for Retirement Normal Retirement	A member may retire at age 60 with 5 or more years of credited service, or after 30 years of credited service regardless of age.
Normal Retirement Benefit	The amount is a lifetime pension equal to 0.8% (eight-tenths of one percent) of FAC at retirement multiplied by years of credited service. If necessary, the pension will be increased to make the reserve value of the pension equal to the member's accumulated contributions as of the retirement effective date.
Vested Deferred Benefit Eligibility	Any member with 5 or more years of credited service who terminates employment prior to the service retirement date, will be eligible to receive a deferred vested pension commencing at age 60, provided accumulated contributions are left on deposit with the Plan.
Amount	The amount is a lifetime pension equal to 0.8% (eight-tenths of one percent) of FAC at termination multiplied by years of credited service. If necessary, the pension will be increased to make the reserve value of the pension equal to the member's accumulated contributions as of the effective retirement date
Final Average Compensation (FAC)	A member's Final Average Compensation is the average of the 3 highest years of salary during eligible employment.
Forms of Payment Normal Form	The assumed normal form of benefit is the straight life form.
Optional Forms	Option A: 100% Joint and Survivor benefit. Benefit is 85% of the straight life amount adjusted for the difference in age between the retiree and beneficiary. The maximum benefit is 94% of the straight life amount.

Option B: 50% Joint and Survivor benefit. Benefit is 91% of the straight life amount adjusted for the difference in age between the retiree and beneficiary. The maximum benefit is 97% of the straight life amount.

Option C: 10 years Certain and Life. Benefit is 96% of the straight life amount.

Post-Retirement Increases

The amount of the monthly benefit is adjusted each March 31st, by 3% compounded annually, beginning with the March 31st which is more than three full months after the member's effective retirement date. Pensions of members that retire in the immediately preceding calendar year are increased by 1.489% (one-half a year's increase).

Spouse's Preretirement Death Benefit

Statutory Death Benefits

Eligibility

Any member with 5 or more years of credited service who dies before beginning to receive a pension will have benefits payable to the named beneficiary.

Amount

The amount is a lifetime pension equal to 0.8% (eight-tenths of one percent) of FAC multiplied by years of credited service at the date of death. If necessary, the pension will be increased to make the reserve value of the pension equal to the member's accumulated contributions as of the date of death. The pension will be adjusted in accordance with an Option A (in the case of a spouse or an ex-spouse subject to a DRO) or Option B (in case of another eligible beneficiary) election payable immediately unless the member did not reach the service retirement eligibility prior to death, in which case the pension is reduced for each month that the member was younger than age 60 on the date of death in the following manner:

- a. One-half of 1% for each of the first 60 months and four-tenths of one percent for each month beyond 60 months (the number of months used for reduction is not to exceed the difference between the member's credited service at death and 30 years).

Plan Changes Since the Prior Year

The financial accounting valuation does not reflect any plan changes.



## Plan Provisions – ERFC 2001 Tier 2

Eligibility to Participate	Members Hired On/After July 1, 2017 (ERFC 2001 Tier 2)
Contributions	Members contribute 3% of their salaries. Interest credits are 4% annually. If a member leaves covered employment before becoming eligible to retire, accumulated contributions are returned upon request.
Eligibility for Retirement Normal Retirement	A member may retire at Full Social Security Age (FSSA) with 5 or more years of credited service, or when the sum of age plus service is greater than or equal to 90 (i.e., “Rule of 90”).
Normal Retirement Benefit	The amount is a lifetime pension equal to 0.8% (eight-tenths of one percent) of FAC at retirement multiplied by years of credited service. If necessary, the pension will be increased to make the reserve value of the pension equal to the member’s accumulated contributions as of the retirement effective date.
Vested Deferred Benefit Eligibility	Any member with 5 or more years of credited service who terminates employment prior to the service retirement date, will be eligible to receive a deferred vested pension commencing at FSSA, provided accumulated contributions are left on deposit with the Plan.
Amount	The amount is a lifetime pension equal to 0.8% (eight-tenths of one percent) of FAC at termination multiplied by years of credited service. If necessary, the pension will be increased to make the reserve value of the pension equal to the member’s accumulated contributions as of the effective retirement date.
Final Average Compensation (FAC)	A member’s Final Average Compensation is the average of the 5 highest years of salary during eligible employment.
Forms of Payment Normal Form	The assumed normal form of benefit is the straight life form.
Optional Forms	Before the effective retirement date, a retiring member may elect one of the following options:  Option A: 100% Joint and Survivor benefit. Benefit is 85% of the straight life amount adjusted for the

difference in age between the retiree and beneficiary. The maximum benefit is 94% of the straight life amount.

Option B: 50% Joint and Survivor benefit. Benefit is 91% of the straight life amount adjusted for the difference in age between the retiree and beneficiary. The maximum benefit is 97% of the straight life amount.

Option C: 10 years Certain and Life. Benefit is 96% of the straight life amount

#### Post-Retirement Increases

The amount of the monthly benefit is adjusted each March 31st, by 100% of the Consumer Price Index (CPI-U) (with a cap of 4%) compounded annually, beginning with the March 31st which is more than three full months after the member's effective retirement date. Pensions of members that retire in the immediately preceding calendar year are increased by one-half a year's increase.

#### Spouse's Preretirement Death Benefit Statutory Death Benefits Eligibility

Any member with 5 or more years of credited service who dies before beginning to receive a pension will have benefits payable to the named beneficiary.

#### Amount

The amount is a lifetime pension equal to 0.8% (eight-tenths of one percent) of FAC multiplied by years of credited service at the date of death. If necessary, the pension will be increased to make the reserve value of the pension equal to the member's accumulated contributions as of the date of death. The pension will be adjusted in accordance with Option A (in the case of a spouse or an ex-spouse subject to a DRO) or Option B (in case of another eligible beneficiary) election payable immediately unless the member did not reach the service retirement eligibility prior to death, in which case the pension is reduced for each month that the member was younger than service retirement eligibility on the date of death in the following manner:

One-half of 1% for each of the first 60 months and four-tenths of one percent for each month beyond 60 months (the number of months used for reduction is based on the lesser of FSSA or the age the member would have attained "Rule of 90").

#### Plan Changes Since the Prior Year

There were no plan changes during the year.

# **Sample Benefit Calculations**

## Sample Benefit Computation for ERFC Legacy Member Retiring After 30 Years of Service

Data:

A.	7/1/1963	Date of Birth
B.	7/1/2018	Effective Date
C.	7/1/1988	Membership Date
D.	30.00	ERFC Credited Service
E.	30.00	VRS Creditable Service
F.	55.00	Age
G.	Service	Retirement Type
H.	\$60,000.00	3-Year Average Salary
I.	\$60,000.00	5-Year Average Salary

The following table illustrates the calculation of the ERFC Monthly benefit

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### Lifetime Portion of Full Service Benefit

J.	ERFC Legacy Formula Benefit: $1.85\% \times 30 \text{ yrs.} \times \$60,000 =$	\$33,300.00
K.	minus VRS Adjustment of: $1.65\% \times 30 \text{ yrs.} \times (\$60,000 - \$1,200) \times 100\% =$ (100% is the VRS Early Service Retirement Reduction Factor for no years prior to the earlier of age 65 or 30 years of service)	<u>29,106.00</u>
L.	Sub Total	4,194.00
M.	plus additional 3% benefit adjustment	<u>125.82</u>
N.	Total of Lifetime Portion	4,319.82

### Additional Temporary Benefit until age FSSA (Full Social Security Age)

O.	Temporary Benefit Formula: $1\% \times 30 \text{ yrs.} \times \$60,000 =$	18,000.00
P.	plus additional 3% benefit adjustment	<u>540.00</u>
Q.	Total of Additional Temporary Benefit	18,540.00
R.	Monthly benefit effective 07/01/2017 at age 55 payable until FSSA, $(N + Q)/12 =$	1,904.99
S.	Monthly benefit effective 07/01/2030 at FSSA payable for life, $N/12 =$	359.99

The above computation does not reflect the alternative "guarantee" benefit which this member might elect. Members are eligible for a Lifetime Level Benefit (LLB) that is calculated by determining the annuitized value of the greater of their accumulated contribution balance or the present value of the currently provided benefit.

## Sample Benefit Computation for ERFC 2001 Tier 1 Member Retiring After 28 Years of Service

Data:

A.	7/1/1969	Date of Birth
B.	7/1/2029	Effective Date
C.	7/1/2001	Membership Date
D.	28.00	ERFC Credited Service
E.	N/A	VRS Creditable Service
F.	60.00	Age
G.	Service	Retirement Type
H.	\$60,000.00	3-Year Average Salary

The following table illustrates the calculation of the ERFC Monthly benefit

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**Lifetime Portion of Full Service Benefit**

ERFC 2001 Tier 1 Formula Benefit: $0.80\% \times 28 \text{ yrs.} \times \$60,000/12 =$	\$1,120.00
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## Sample Benefit Computation for ERFC 2001 Tier 2 Member Retiring After 30 Years of Service

Data:

A.	7/1/1985	Date of Birth
B.	7/1/2047	Effective Date
C.	7/1/2017	Membership Date
D.	30.00	ERFC Credited Service
E.	N/A	VRS Creditable Service
F.	62.00	Age
G.	Service	Retirement Type
H.	\$65,000.00	5-Year Average Salary

The following table illustrates the calculation of the ERFC Monthly benefit

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### Lifetime Portion of Full Service Benefit

ERFC 2001 Tier 2 Formula Benefit: $0.80\% \times 30 \text{ yrs.} \times \$65,000/12 =$	\$1,300.00
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# **ERFC Regulations – Funding Policy and Employer Contribution Rate**

Adopted: March 21, 2006  
Amended: May 28, 2009  
Amended: May 17, 2012  
Amended: June 27, 2013  
Amended: May 29, 2014

## ERFC Regulations – Funding Policy and Employer Contribution Rate

(Applicable to ERFC and ERFC 2001)

Pursuant to their authority under §15.03 of the ERFC Plan Document and §10.03 of the ERFC 2001 Plan Document, the Trustees have adopted the following regulations governing determination of the Employer contribution rate and implementation of the funding policy pursuant to §§3.05 and 16.03 of the ERFC Plan Document and §§3.05 and 11.03 of the ERFC 2001 Plan Document.

**16.3** A Purpose of Regulations. The funding policy of the Plan is stated in §16.03 of the ERFC Plan Document and §11.03 of the ERFC 2001 Plan Document. That policy is “to establish and receive contributions which will remain approximately level from generation to generation of citizens and which, when combined with other assets and investment return thereon, will be sufficient to pay benefits when due, while providing a reasonable margin for adverse experience.” Section 3.05 in each Plan Document provides that the employer “shall contribute a percentage of each Member’s Salary, at a rate to be determined by the actuary in accordance with the funding policy set forth in [this Plan Document].” Within the broader context of the stated funding policy, the objectives of the Trustees are:

- (1) To make consistent progress toward 100% funding of the Plan and to maintain 100% funding once it has been attained;
- (2) To stabilize the Employer contribution rate and avoid sharp increases or decreases due to specific events or short-term conditions; and
- (3) To maintain the Plan’s funding in accordance with actuarial standards of practice that apply to public sector plans and with applicable federal, state, and local laws and regulations.

**16.03B** Frequency of Actuarial Valuations. The actuary shall prepare annual actuarial valuations based upon calendar-year data. Whenever possible, the valuation for a particular year should be presented to the Trustees within the first 120 days of the following calendar year.

**16.03C** Schedule for Setting the Employer Contribution Rate. The Trustees will determine the Employer contribution rate biennially, in consultation with the actuary, based upon the actuarial valuation for the most recently completed calendar year. The rate shall be set and communicated to the Employer at least 9 months in advance of the effective date so that it will be available for use in the Employer’s budgetary process. Each rate shall remain in effect for two consecutive fiscal years. For example, a rate will be set in accordance with this schedule based on the actuarial valuation as of December 31, 2013. It will become effective July 1, 2015, and will remain in effect through June 30, 2017.

**16.3D** The Employer Contribution Rate. The Employer contribution rate will be set at a level that is expected to:



- (1) pay all normal costs accruing under the Plan during the Fiscal Years for which the rate is effective; and
- (2) amortize any unfunded liabilities over a reasonable period.

**16.03E** The Amortization Period for Unfunded Liabilities. In the biennial determination of the Employer contribution rate, the amortization period for unfunded liabilities will be set within the parameters permitted by actuarial standards of practice that apply to public sector plans and by applicable federal, state, or local laws and regulations, and shall, if permitted, be based upon level percent of pay. If those standards, laws, and regulations and the other principles stated in Paragraphs 16.03A and 16.03D permit, the amortization period for unfunded liabilities shall be set with the objective that the Plan will be 100% funded by June 30, 2040. In conjunction with actuarial valuations dated December 31, 2019 and later, the Trustees may elect to create a new 20-year amortization schedule for unfunded liabilities arising during that valuation and subsequent valuations, and to continue the amortization of preexisting unfunded liabilities to their scheduled end date. In order to stabilize contributions, the Trustees may from time to time elect to combine separate amortization schedules into a single schedule over the average remaining amortization period being used. Unfunded liabilities associated with benefit changes or assumption changes shall be funded over a period not exceeding 10 years. However, unfunded liabilities arising in conjunction with early retirement incentive programs offered by the Employer after 2013 shall be separately funded over a period not exceeding five future years and shall not be subject to the combining of amortization schedules mentioned elsewhere in this Paragraph 16.03E.

**16.03F** The Valuation of Plan Assets. The actuarial value of Plan assets shall be determined as a 5-year smoothed market value of assets. The smoothing technique shall fully recognize the assumed return each year. It shall further spread the difference between the actual return and the assumed return in equal installments over the current year and four future years. In the event that the method would result in an actuarial value of assets that is less than 75% of market value or more than 125% of market value, the actuarial value of assets shall be reset to 75% of market value or 125% of market value, as the case may be, and the total difference between market and actuarial value shall be spread over four future years. Based upon consultation with the actuary, the Trustees may combine bases in order to reset the actuarial value to be equal to the market value when the difference between market value and actuarial value is 5% or less of market value.

**16.03G** The Valuation of Plan Liabilities. The actuarial liabilities of the Plan shall be determined using the entry age actuarial cost method, and an investment return assumption chosen by the Trustees in conjunction with the Plan actuary and investment consultant. The investment return assumptions shall be based upon the long term expected return on assets, although the Trustees may take other factors into account when determining this assumption. The Trustees shall also adopt other assumptions necessary for the valuation based upon the advice of the actuary and the judgment of the Trustees. The Trustees shall cause a study of actuarial experience under the Plan to be performed at least once in each five-year period and shall adjust all assumptions accordingly as deemed necessary for prudent operation of the Plan.

**16.03H** Overfunding. In the event that the Plan's assets exceed the Plan's liabilities, all amortization schedules other than those related to any post-2013 early retirement incentive programs offered by the Employer shall be considered completed, and the Employer contribution rate will be set based upon the

normal cost and the completion of any remaining amortizations due to post-2013 early retirement incentive programs offered by the Employer, without regard to such overfunding. In such event, the Trustees shall review the Plan's asset allocation with a view toward de-risking the portfolio and potentially lowering the investment return assumption. Should such de-risking of the portfolio or future unfavorable experiences cause the unfunded liabilities to arise again, such liabilities shall be funded over a closed period of 20 future years and shall otherwise be subject to the regulations set forth in Paragraph 16.03E.

# Glossary

## Glossary

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

**Actuarial Accrued Liability.** The difference between the actuarial present value of system benefits and the actuarial present value of future normal costs. Also referred to as “past service liability.”

**Actuarial Assumptions.** Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment return and pay 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 (pay increases and investment return) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

**Actuarial Cost Method.** A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future benefits” between future normal costs and actuarial accrued liability. Sometimes referred to as the “actuarial funding method.”

**Actuarial Equivalent.** One series of payments is said to be actuarially equivalent to another series of payments if the two series have the same actuarial present value.

**Actuarial Gain (Loss).** The difference between actual unfunded actuarial accrued liabilities and anticipated unfunded actuarial accrued liabilities -- during the period between two valuation dates. It is a measurement of the difference between actual and expected experience.

**Actuarial Present Value.** The single sum now which is equal to 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.

**Actuary.** A person who is trained in the application of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries. The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation ASA, and ultimately to Fellowship with the designation FSA.

**Amortization.** Paying off an interest-bearing liability with periodic payments as opposed to paying it off with a single sum payment.

**Normal Cost.** The portion of the actuarial present value of future benefits that is assigned to the current year by the actuarial cost method. Sometimes referred to as “current cost.”

**Unfunded Actuarial Accrued Liabilities.** The difference between actuarial accrued liabilities and valuation assets (actuarial value of assets). Sometimes referred to as “unfunded past service liability” or simply as “unfunded liability.”

**Valuation Assets (Actuarial Value of Assets).** The value of plan assets recognized for valuation purposes. This may not be the same value that is used by the plan for financial reporting.