



Actuarial Valuation Report

Educational Employees' Supplementary Retirement System of
Fairfax County

Annual Valuation as of December 31, 2018

Introduction

This report documents the results of the annual actuarial valuation as of December 31, 2018 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.

	Valuation Date December 31, 2017	Valuation Date December 31, 2018
Actuarial (Pension) Liability		
Retired Participants and Beneficiaries Receiving Payment	\$ 1,733,430,738	\$ 1,791,189,484
Terminated Vested Participants	120,519,393	132,479,724
Active Participants	<u>1,313,990,658</u>	<u>1,410,445,428</u>
Total	3,167,940,789	3,334,114,636
Actuarial Value of Assets	<u>(2,398,667,997)</u>	<u>(2,466,004,272)</u>
Unfunded Accrued Liability	\$ 769,272,792	\$ 868,110,364
Funded Ratio		
Actuarial Value of Asses	75.7%	74.0%
Market Value of Assets	77.2%	68.4%
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, 2018 valuation is 20 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 6.26% 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, 2018 valuation is 20 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 20 years, and to have a lower ongoing contribution requirement in subsequent years.

	Valuation Date December 31, 2018
1. Unfunded Accrued Liability (UAL)	\$ 868,110,364
2. Expected Contribution	
a. January 1 – June 30, 2019	24,499,938
b. July 1, 2019 – June 30, 2020	49,688,355
3. Interest	<u>92,088,232</u>
4. UAL at June 30, 2020 (1 – 2a – 2b + 3)	\$ 886,010,303
5. Projected Payroll for FY2021	1,702,376,657
6. Amortization Factor (20 years)	13.82765
7. Contribution rate for UAL (4 ÷ 5 ÷ 6)	3.76%

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 2019 was developed based on the results of the December 31, 2017 valuation.

Valuation Date	December 31, 2017	December 31, 2018
Contribution Rate as a Percent of Member Payroll for period ending June 30	2020 & 2021	N/A
Normal Cost (Current Cost) split by:		
Service Retirement	4.17%	4.05%
Reduced Service Retirement	0.29%	0.11%
Casualty Benefits	0.08%	0.10%
Separation Benefits	1.26%	1.36%
Administrative Expenses	<u>0.29%</u>	<u>0.26%</u>
Total	6.09%	5.88%
Less Member Contribution Rate	<u>(3.00)%</u>	<u>(3.00)%</u>
Employer Normal Cost	3.09%	2.88%
Add Contribution Rate for Unfunded Accrued Liability	<u>3.51%</u>	<u>3.76%</u>
Net Employer Contribution	6.60%	6.64%
Adjustment for ERFC 2001 Tier 2	<u>(0.16)%</u>	<u>(0.06)%</u>
Actuarially Determined Employer Contribution	<u><u>6.44%</u></u>	<u><u>6.58%</u></u>

Unfunded accrued liability was amortized as a level percent-of-payroll over 20 years in the December 31, 2018 valuation and 21 years in the December 31, 2017 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%	
			Combined July 1, 1999		
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	2017	3.00%	6.44%		6.58%

Market Value of Assets

Revenues and Expenditure	Plan Year Ending 12/31/2017	Plan Year Ending 12/31/2018
Fair Value of Assets at Beginning of Measurement Period	\$ 2,147,993,665	\$2,446,214,825
Revenue:		
Contributions—Employer	85,013,943	103,231,786
Contributions—Employee	43,540,017	49,657,299
Investment Return:		
Interest and Dividends	31,497,285	29,821,413
Net Appreciation	328,699,408	(150,658,734)
Investment Expense	(14,166,089)	(16,211,122)
Net Securities Lending	799,088	724,033
Real Estate	3,000,410	2,889,614
Miscellaneous	<u>3</u>	<u>0</u>
Total Investment Return	349,830,105	(133,434,796)
Total Revenue	478,384,065	19,454,289
Expenditures:		
Refunds of Member Contributions	(4,750,297)	(4,688,996)
Retirement Benefits Paid	(171,180,863)	(175,965,244)
Administrative Expenses	<u>(4,231,745)</u>	<u>(4,280,683)</u>
Total Expenditures	(180,162,905)	(184,934,923)
Net Change (Total Revenue less Total Expenditures)	<u>298,221,160</u>	<u>(165,480,634)</u>
Fair Value of Assets at End of Measurement Period	\$ 2,446,214,825	\$2,280,734,191
Receivable Contributions	<u>0</u>	<u>0</u>
Market Value of Assets at End of Measurement Period	<u>\$ 2,446,214,825</u>	<u>\$2,280,734,191</u>

Market Value of Assets

Asset Breakdown	Plan Year Ending 12/31/2017	Plan Year Ending 12/31/2018
Invested Assets		
Bonds	\$ 110,137,978	\$ 87,386,659
Stocks	748,720,362	598,625,671
Real Estate	194,495,958	202,394,151
Global Asset Allocation / Better Beta	367,823,949	339,813,564
Hedge Fund of Funds	114,878,083	113,428,273
Private Equity	76,729,584	96,530,580
Commingled Funds	<u>778,689,363</u>	<u>770,540,100</u>
Total Invested Assets	2,391,475,277	2,208,718,998
Short-term Investments and Cash	221,100,490	202,523,363
Receivables and Pre-Paid Expenses	5,869,288	4,171,165
Other Assets (furniture and equipment)	<u>43,555</u>	<u>47,511</u>
Total Assets	2,618,488,610	2,415,461,037
Liabilities	<u>(172,273,785)</u>	<u>(134,726,846)</u>
Net Assets	<u>2,446,214,825</u>	<u>2,280,734,191</u>

Portfolio Composition at Market Value	Year Ended December 31			
	2017		2018	
	Value	% of Total	Value	% of Total
Bonds	\$ 110,137,978	4.5 %	\$ 87,386,659	3.8 %
Stocks	748,720,362	30.7 %	598,625,671	26.2 %
Real Estate	194,495,958	8.0 %	202,394,151	8.9 %
Commingled Funds	778,689,363	31.8 %	770,540,100	33.8 %
Hedge Fund of Funds	114,878,083	4.7 %	113,428,273	5.0 %
Private Equity	76,729,584	3.1 %	96,530,580	4.2 %
Global Asset Allocation / Better Beta	367,823,949	15.0 %	339,813,564	14.9 %
Net Short-Term Investments and Cash	48,826,705	2.0 %	67,796,517	3.0 %
Receivables, Pre-Paid Expenses and Other	5,912,843	0.2 %	4,218,676	0.2 %
Total Assets	\$2,446,214,825	100.0 %	\$2,280,734,191	100.0 %

Actuarial Value of Assets

Year Ended December 31:	2018	2019	2020	2021	2022
A. Actuarial Value Beginning of Year	\$2,398,667,997	\$2,466,004,27			
B. Market Value End of Year	2,280,734,191				
C. Market Value Beginning of Year	2,446,214,825				
D. Non-Investment Net Cash Flow	(27,765,155)				
E. Investment Return Assumed Rate:	7.25%				
E1. Market Total: B-C-D	(137,715,479)				
E2. Amount for Immediate Recognition	172,896,943				
E3. Amount for Phased-in Recognition: E1-E2	(310,612,422)				
F. Phased-In Recognition of Investment Return:					
F1. Current year: 0.20 x E3	(62,122,484)				
F2. First Prior Year	36,406,910	(62,122,484)			
F3. Second Prior Year	(4,301,284)	36,406,910	(62,122,484)		
F4. Third Prior Year	(37,398,310)	(4,301,284)	36,406,910	(62,122,484)	
F5. Fourth Prior year	(10,380,345)	(37,398,308)	(4,301,284)	36,406,912	(62,122,486)
F6. Total Phased-In	(77,795,513)	(67,415,166)	(30,016,857)	(25,715,572)	(62,122,486)
G. Actuarial Value End of Year:					
G1. Preliminary Actuarial Value End of Year: A+D+E2+F6	2,466,004,272				
G2. Upper Corridor Limit: 125% x B	2,850,917,739				
G3. Lower Corridor Limit: 75% x B	1,710,550,643				
G4. Actuarial Value End of Year	2,466,004,272				
H. Actual/Projected Difference Between Market Value and Actuarial Value	(185,270,081)	(117,854,915)	(87,838,058)	(62,122,486)	
I. Market Rate of Return: E1 / (C + D/2)	(5.66%)				
J. Recognized Rate of Return: (E2 + F6) / (A + D/2)	3.99%				
K. Ratio of Actuarial Value to Market Value	108.12%				

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:	2014#	2015	2016	2017
A. Actuarial Value Beginning of Year	\$2,029,004,521	\$2,123,910,320	\$2,188,037,003	\$2,279,741,119
B. Market Value End of Year	2,146,541,289	2,063,873,705	2,147,993,665	2,446,214,825
C. Market Value Beginning of Year	2,100,721,679	2,146,541,289	2,063,873,705	2,147,993,665
D. Non-Investment Net Cash Flow	(52,485,779)	(52,982,467)	(51,152,042)	(47,377,200)
E. Investment Return Assumed Rate:	7.5%	7.5%	7.25%	7.25%
E1. Market Total: B-C-D	98,305,389	(29,685,117)	135,272,002	345,598,360
E2. Amount for Immediate Recognition	150,207,122	157,306,431	156,778,421	163,563,808
E3. Amount for Phased-in Recognition: E1-E2	(51,901,733)	(186,991,548)	(21,506,419)	182,034,552
F. Phased-in Recognition of Investment Return:				
F1. Current year: 0.20 x E3	(10,380,347)	(37,398,310)	(4,301,284)	36,406,910
F2. First Prior Year	18,413,301	(10,380,347)	(37,398,310)	(4,301,284)
F3. Second Prior Year	19,744,377	18,413,301	(10,380,347)	(37,398,310)
F4. Third Prior Year	(30,576,304)	19,744,377	18,413,301	(10,380,347)
F5. Fourth Prior year	(16,571)	(30,576,302)	19,744,377	18,413,301
F6. Total Recognized Investment Gain or Loss	(2,815,544)	(40,197,281)	(13,922,263)	2,740,270
G. Actuarial Value End of Year:				
G1. Preliminary Actuarial Value End of Year: A+D+E2+F6	2,123,910,320	2,188,037,003	2,279,741,119	2,398,667,997
G2. Upper Corridor Limit: 125% x B	2,683,176,611	2,579,842,131	2,684,992,081	3,057,768,531
G3. Lower Corridor Limit: 75% x B	1,609,905,967	1,547,905,279	1,610,995,249	1,834,661,119
G4. Actuarial Value End of Year	2,123,910,320	2,188,037,003	2,279,741,119	2,398,667,997
H. Actual/Projected Difference Between Market Value and Actuarial Value	22,630,969	(124,163,298)	(131,747,454)	47,546,828
I. Market Rate of Return: $E1 / (C + D/2)$	4.7%	(1.4)%	6.6%	16.3%
J. Recognized Rate of Return: $(E2 + F6) / (A + D/2)$	7.4%	5.6%	5.6%	7.4%
K. Ratio of Actuarial Value to Market Value	98.9%	106.0%	106.1%	98.1%

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)							
12/31/2009 ¹	1,208,093	1,314,885	1,024,984	2,339,869	1,769,540	570,329	75.6%
12/31/2010 ²	1,191,290	1,355,093	1,028,968	2,384,061	1,822,603	561,458	76.5%
12/31/2011 ³	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 ¹	1,373,096	1,590,489	1,290,214	2,880,703	2,188,037	692,666	76.0%
12/31/2016 ⁴	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%

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
12/31/2009	1,208,093	194%	146%	48%
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%

¹ After changes in actuarial assumptions or methods.

² After change in asset valuation method.

³ After change in benefits or contribution rates.

⁴ 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
12/31/14	78.52 %	0.55	2.04	0.44	1.60
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	0.68	1.47

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 12/31/2017 (\$ millions)	Year Ending 12/31/2018 (\$ millions)
1. Unfunded Accrued Liability (UAL) at Start of Year	\$ 752.8	\$ 769.3
2. Normal Cost	89.7	94.7
3. Member and Employer contributions	128.6	152.9
4. Interest Accrual	<u>53.2</u>	<u>53.7</u>
5. Expected UAL before changes: (1. + 2. - 3. + 4.)	767.1	764.8
6. Change from non-recurring activities, assumptions and/or benefit changes	<u>0.0</u>	<u>0.0</u>
7. Expected UAL after changes: (5. + 6.)	767.1	764.8
8. Actual UAL at end of year	<u>769.3</u>	<u>868.1</u>
9. Gain/(Loss) (7. - 8.)	\$ (2.2)	\$ (103.3)
 Gain (loss) as percent of actuarial accrued liabilities at start of year.	 (0.1)%	 (4.3)%

Breakdown of Unfunded Liability Gain/Loss

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

(\$ in Millions)	12/31/2017	12/31/2018
Economic Risks		
Pay Increases	\$ 8.8	\$ (16.1)
Investment Return	2.7	(77.7)
Demographic Risk		
Retirement	5.6	(6.0)
Mortality	1.7	(1.4)
Disability	(0.2)	(0.4)
Terminations	0.3	4.3
Data Adjustments and Miscellaneous	<u>(21.1)</u>	<u>(6.0)</u>
Unfunded Accrued Liability Gain/(Loss)	\$ (2.2)	\$ (103.3)

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)	(4.3)%

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, 2018. 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, 2017	December 31, 2018
Active Participants		
Number	21,841	22,048
Average Age	43.9	43.6
Average Service	9.4	9.4
Average Annual Pay	\$67,554	\$70,510
Inactives With Deferred Benefits		
Number	4,759	4,996
Average Current Age	45.0	44.2
Average Monthly Benefit ¹	\$3,420	\$3,522
Inactives Receiving Payment		
Number	11,729	12,101
Average Current Age	72.5	71.7
Average Monthly Benefit	\$14,308	\$14,201
Total Participants		
Number	38,329	39,145

¹ Before adjustment for assumed retirement age and payment form.

Population Statistics – Exhibit 1

ERFC Legacy Members
WOMEN Active Members in December 31, 2018 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				5				5	394,444	78,889
40-44	2	23	46	229	74			374	34,196,814	91,435
45-49	7	36	69	238	284	54		688	65,741,382	95,554
50-54	10	41	43	186	208	169	30	687	63,470,001	92,387
55-59	2	7	32	206	209	93	48	597	50,729,395	84,974
60		1	3	37	41	13	4	99	8,415,615	85,006
61		1	5	35	44	27	9	121	10,210,920	84,388
62			4	46	49	19	7	125	10,147,920	81,183
63			5	33	35	20	7	100	8,267,766	82,678
64		1	2	39	49	16	6	113	9,204,113	81,452
65				30	23	12	4	69	5,545,630	80,371
66			1	22	22	6	9	60	5,320,908	88,682
67			1	14	17	4	6	42	3,280,589	78,109
68			1	10	11	7	3	32	2,526,792	78,962
69				4	4	6	3	17	1,346,294	79,194
70			1	7	4	4	2	18	1,542,189	85,677
71				2	3	1	4	10	686,256	68,626
72				2	1	3		6	568,505	94,751
73					2	1	1	4	441,433	110,358
74				1	1			2	141,293	70,646
75 & Over				3	3	5	6	17	1,294,826	76,166
Totals	21	110	213	1,149	1,084	460	149	3,186	283,473,084	88,975

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

Age (Years) 53.4
Service (Years) 20.7
Annual Pay \$ 88,975

Population Statistics – Exhibit 3

ERFC 2001 Tier 1 Members
WOMEN Active Members in December 31, 2018 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	67	1						68	3,280,457	48,242
25-29	1112	421						1,533	88,541,732	57,757
30-34	566	1113	206	1				1,886	122,707,852	65,062
35-39	386	588	705	126				1,805	132,818,462	73,584
40-44	392	334	374	248				1,348	101,098,294	74,999
45-49	409	446	365	173				1,393	98,029,554	70,373
50-54	344	446	417	134				1,341	88,518,806	66,010
55-59	253	347	450	227				1,277	82,016,250	64,226
60	23	56	63	32				174	11,219,154	64,478
61	21	41	66	46				174	12,261,586	70,469
62	15	40	50	30				135	8,739,383	64,736
63	12	27	55	35				129	8,747,049	67,807
64	4	23	43	28				98	6,452,652	65,843
65	8	19	40	15				82	5,310,080	64,757
66	9	8	29	7				53	3,837,994	72,415
67	3	5	15	15				38	2,471,530	65,040
68	5	6	12	8				31	2,176,659	70,215
69	3	1	11	9				24	1,435,310	59,805
70	1	3	4	3				11	595,690	54,154
71	1	3	2	1				7	351,496	50,214
72	2	1	2	1				6	396,264	66,044
73			2					2	71,605	35,802
74			3	2				5	412,010	82,402
75 & Over	1			1				2	67,623	33,812
Totals	3,637	3,929	2,914	1,142	0	0	0	11,622	781,557,492	67,248

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

Age (Years) 42.7
Service (Years) 8.1
Annual Pay \$ 67,248

Population Statistics – Exhibit 5

ERFC 2001 Tier 2 Members WOMEN Active Members in December 31, 2018 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	42,499	21,250
20-24	500							500	24,112,129	48,224
25-29	694							694	35,958,295	51,813
30-34	357							357	19,833,276	55,555
35-39	302							302	17,035,524	56,409
40-44	309							309	17,253,116	55,835
45-49	315							315	16,598,091	52,692
50-54	205							205	10,809,608	52,730
55-59	125							125	6,257,241	50,058
60	15							15	813,670	54,245
61	13							13	688,646	52,973
62	10							10	496,493	49,649
63	6							6	352,019	58,670
64	4							4	194,402	48,601
65	4							4	244,703	61,176
66	5							5	171,773	34,355
67	2							2	136,905	68,453
68	1							1	23,273	23,273
69	1							1	28,051	28,051
70	1							1	28,051	28,051
71	1							1	28,051	28,051
72	1							1	22,380	22,380
73	1							1	86,290	86,290
74								0		
75 & Over								0		
Totals	2,874	0	0	0	0	0	0	2,874	151,214,486	52,615

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

Age (Years) 35.6
 Service (Years) 0.8
 Annual Pay \$ 52,615

Population Statistics – Exhibit 7

ALL Active Members in December 31, 2018 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	3							3	62,618	20,873
20-24	661	1						662	31,332,842	47,331
25-29	2166	471						2,637	146,125,986	55,414
30-34	1210	1358	245	1				2,814	177,686,284	63,144
35-39	865	760	934	173				2,732	196,222,074	71,824
40-44	848	447	576	666	92			2,629	202,381,877	76,981
45-49	853	566	545	589	426	83		3,062	240,619,459	78,582
50-54	655	546	552	445	316	239	39	2,792	213,258,622	76,382
55-59	467	414	573	519	274	130	62	2,439	176,703,550	72,449
60	51	63	83	80	52	18	5	352	25,804,357	73,308
61	44	51	86	97	49	31	13	371	28,644,262	77,208
62	32	49	63	86	51	21	9	311	22,661,385	72,866
63	29	34	64	81	42	24	9	283	21,409,501	75,652
64	14	28	54	73	56	17	8	250	18,862,600	75,450
65	20	24	52	52	25	15	4	192	14,190,588	73,909
66	20	12	40	33	25	8	11	149	11,737,607	78,776
67	8	8	19	32	18	5	6	96	6,917,763	72,060
68	8	9	20	20	12	7	5	81	5,941,021	73,346
69	5	4	15	16	5	6	4	55	3,828,500	69,609
70	2	7	6	13	6	5	3	42	3,034,450	72,249
71	5	4	2	4	4	1	4	24	1,502,226	62,593
72	4	1	4	5	2	3		19	1,545,053	81,319
73	3	1	2		3	3	1	13	1,058,352	81,412
74			3	3	1			7	553,303	79,043
75 & Over	2	1	3	7	6	6	8	33	2,530,183	76,672
Totals	7,975	4,859	3,941	2,995	1,465	622	191	22,048	1,554,614,462	70,510

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):	53.5	42.7	35.7	43.6
Service (Years)	21	8.2	0.8	9.4
Annual Pay	\$ 91,737	\$ 68,678	\$ 53,027	\$ 70,510

Population Statistics – Exhibit 8

Active Members by Years of Service
December 31, 2018

Service Years	Number of Members			Annual Pay (\$)	
	Males	Females	Total	Salary (\$)	Average (\$)
0	360	1638	1,998	103,918,506	52,011
1	286	1407	1,693	92,190,635	54,454
2	314	1364	1,678	95,198,103	56,733
3	278	1265	1,543	91,294,489	59,167
4	205	858	1,063	65,482,289	61,601
5	190	1047	1,237	78,123,886	63,156
6	193	920	1,113	73,561,003	66,093
7	195	878	1,073	72,795,095	67,843
8	149	672	821	57,035,723	69,471
9	93	522	615	43,009,237	69,934
10	142	605	747	55,607,780	74,441
11	145	653	798	58,078,595	72,780
12	162	627	789	59,948,409	75,980
13	183	649	832	64,905,385	78,011
14	182	593	775	63,273,585	81,643
15	146	488	634	54,499,487	85,961
16	136	415	551	46,589,623	84,555
17	138	528	666	58,799,860	88,288
18	145	452	597	52,272,180	87,558
19	139	408	547	49,187,410	89,922
20	102	322	424	38,858,431	91,647
21	79	235	314	28,968,206	92,255
22	69	201	270	25,980,141	96,223
23	61	137	198	19,813,239	100,067
24	70	189	259	25,312,325	97,731
25	66	151	217	21,641,876	99,732
26	26	80	106	10,538,988	99,424
27	19	79	98	9,645,036	98,419
28	31	90	121	11,965,193	98,886
29	20	60	80	7,900,571	98,757
30 & Over	42	149	191	18,219,179	95,388
Totals	4,366	17,682	22,048	1,554,614,462	70,510

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	ERFC 2001	ERFC 2001	Total		Last	Last	
	Legacy	Tier 1	Tier 2			Year	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%

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%

	Average					
	All Retirees			2018 Retirees		
	At Retirement		Current Monthly Benefit	At Retirement		Current Monthly Benefit
	Age	Service		Age	Service	
ERFC Legacy	58.7	22.9	\$1,278.05	61.4	24.0	\$1,539.08
ERFC 2001 Tier 1	63.4	9.9	450.07	63.6	11.9	525.27

Population Statistics – Exhibit 11

ERFC Legacy
Original Benefit Formulas (Before July 1, 1988)
Retirees and Beneficiaries December 31, 2018
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	274	5,723,179		5,723,179
Optional Form	14	308,948		308,948
Age and Service - Early:				
Straight Life	212	3,032,232		3,032,232
Optional Form	15	290,606		290,606
Age and Service Totals	515	9,354,965		9,354,965
Duty Disability				
Straight Life	3	111,118		111,118
Non-Duty Disability				
Straight Life	24	281,580		281,580
Age and Service Survivor				
Beneficiary, Duty Death and Non-Duty Death	34	370,373		370,373
Other Totals	61	763,072		763,072
Total Benefits	576	10,118,037		10,118,037

Population Statistics – Exhibit 12

ERFC Legacy
Benefit Formulas Effective July 1, 1988
Retirees and Beneficiaries December 31, 2018
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	5093	57,772,932	42,258,710	100,031,642
Optional Form	864	10,306,187	6,325,403	16,631,589
Age and Service - Early:				
Straight Life	3,612	18,891,056	13,795,896	32,686,953
Optional Form	357	2,066,546	1,375,958	3,442,504
Age and Service Totals	9,926	89,036,721	63,755,967	152,792,688
Duty Disability				
Straight Life	14	57,905	0	57,905
Optional Form	1	2,174	0	2,174
Non-Duty Disability				
Straight Life	117	560,217	5,060	565,276
Optional Form	12	53,559	0	53,559
Age and Service Survivor Beneficiary, Duty Death and Non-Duty Death	170	1,029,425	294,313	1,323,738
Other Totals	314	1,703,279	299,373	2,002,652
Total Benefits	10,240	90,740,000	64,055,340	154,795,340

Population Statistics – Exhibit 13

**ERFC 2001 Tier 1
Retirees and Beneficiaries December 31, 2018
by Type of Benefit Being Paid**

Type of Pension Being Paid	No.	Annual Current Benefits
Age and Service - Normal:		
Straight Life	1035	5,578,548
Optional Form	237	1,287,406
Age and Service - Early:		
Straight Life		0
Optional Form		0
Age and Service Totals	1,272	6,865,954
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	14	64,345
Other Totals	14	64,345
Total Benefits	1,286	6,930,299

Population Statistics – Exhibit 14

ERFC Legacy
Original Benefit Formulas (Before July 1, 1988)
Retirees and Beneficiaries December 31, 2018
Current Annual Benefits - Tabulated by Attained Ages

Attained Ages	No.	Annual Amount
63	1	\$2,234
65	2	17,863
67	2	12,444
68	1	18,482
70	2	24,642
72	1	35,696
73	3	55,262
74	2	24,234
75	2	18,212
76	2	24,021
77	5	67,057
78	3	42,277
79	12	166,995
80-84	182	3,976,239
85-89	169	3,475,519
90 & Up	187	2,156,860
Total	576	10,118,037

Population Statistics – Exhibit 15

ERFC Legacy
Benefit Formulas Effective July 1, 1988
Retirees and Beneficiaries December 31, 2018
Current Annual Benefits - Tabulated by Attained Ages

Attained Ages	No.	Annual Amount
Under 40	2	6,533
40-44	4	17,163
47	2	8,152
48	2	16,279
49	4	40,200
50	4	71,369
51	7	130,212
52	6	179,636
53	18	494,316
54	19	607,965
55	78	1,728,426
56	102	2,654,760
57	111	2,610,324
58	109	2,811,156
59	125	3,453,522
60	196	5,145,083
61	228	6,020,068
62	256	6,630,021
63	318	7,798,841
64	382	9,507,529
65	400	9,909,996
66	465	5,322,587
67	471	4,835,494
68	528	5,822,816
69	569	6,387,881
70-74	2,770	33,107,885
70-79	1,714	21,931,851
80 & Up	1,349	17,545,275
Total	10,239	154,795,340

Population Statistics – Exhibit 16

ERFC 2001 Tier 1
Retirees and Beneficiaries December 31, 2018
Current Annual Benefits - Tabulated by Attained Ages

Attained Ages	No.	Annual Amount
40-44	1	\$2,970
45	1	6,012
48	1	3,713
49	1	9,325
51	1	3,457
52	1	12,958
54	2	6,312
57	2	8,026
60	47	253,754
61	73	385,366
62	85	472,205
63	74	388,908
64	108	645,655
65	106	636,444
66	103	555,877
67	109	587,697
68	108	605,921
69	101	555,999
70-74	298	1,516,131
70-79	53	237,685
80 & Up	11	35,884
Total	1,286	6,930,299

Population Statistics – Exhibit 17

ERFC Legacy
Original Benefit Formulas (Before July 1, 1988)
Inactive Vested Members December 31, 20178
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 16 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, 20178
Annual Deferred Benefits – Tabulated by Attained Ages

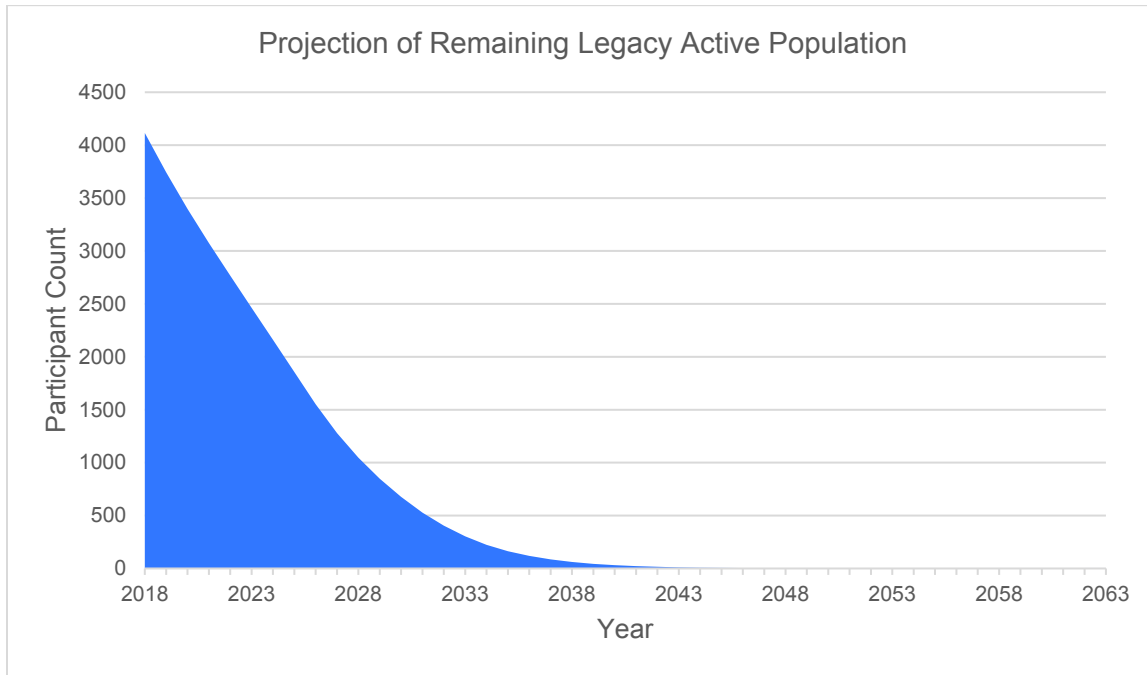
Attained Ages	No.	Annual Amount
38	1	\$4,016
39	1	1,567
40	34	86,413
41	53	136,400
42	69	179,984
43	72	200,226
44	97	233,169
45	92	248,602
46	100	263,193
47	116	382,754
48	119	355,062
49	104	307,354
50	95	324,415
51	93	285,034
52	83	282,568
53	77	223,687
54	76	246,811
55	53	215,859
56	36	139,197
57	33	166,894
58	33	131,755
59	30	115,354
60	25	128,228
61	30	132,005
62	19	92,798
63	16	62,537
64	17	97,637
65 & Up	46	143,377
Total	1,620	5,186,895

Population Statistics – Exhibit 19

ERFC 2001 Tier 1
Inactive Vested Members December 31, 20178
Annual Deferred Benefits – Tabulated by Attained Ages

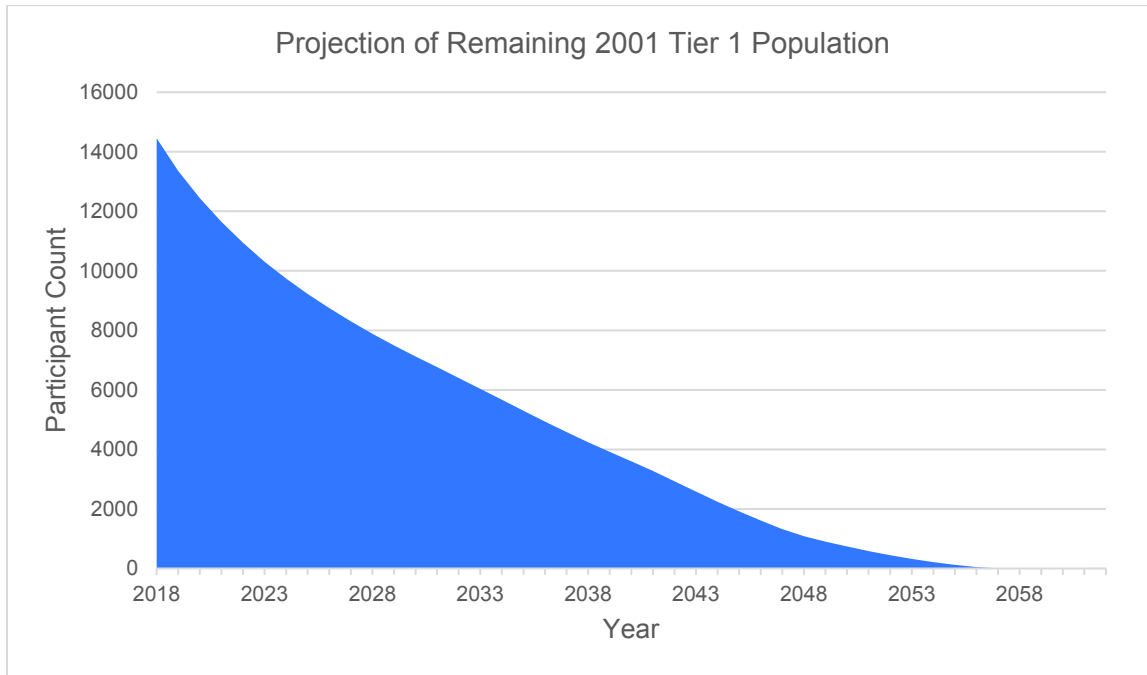
Attained Ages	No.	Annual Amount
27	5	\$11,444
28	32	66,114
29	64	152,401
30	86	212,492
31	111	298,261
32	137	385,339
33	138	421,923
34	158	508,723
35	192	648,854
36	202	718,941
37	230	837,369
38	221	867,931
39	227	913,737
40	186	728,566
41	133	515,116
42	112	454,140
43	100	428,872
44	74	281,871
45	75	322,854
46	56	244,380
47	74	295,440
48	48	196,301
49	50	200,359
50	40	169,253
51	48	238,992
52	46	212,558
53	50	234,128
54	50	187,975
55	49	200,582
56	63	263,839
57	75	307,785
58	79	308,961
59	66	270,592
60	22	69,212
61	16	66,409
62	13	53,603
63	6	14,342
64	7	26,764
65 & Up	19	74,821
Total	3,360	12,411,244

Expected Development of ERFC Legacy Present Population December 31, 2018



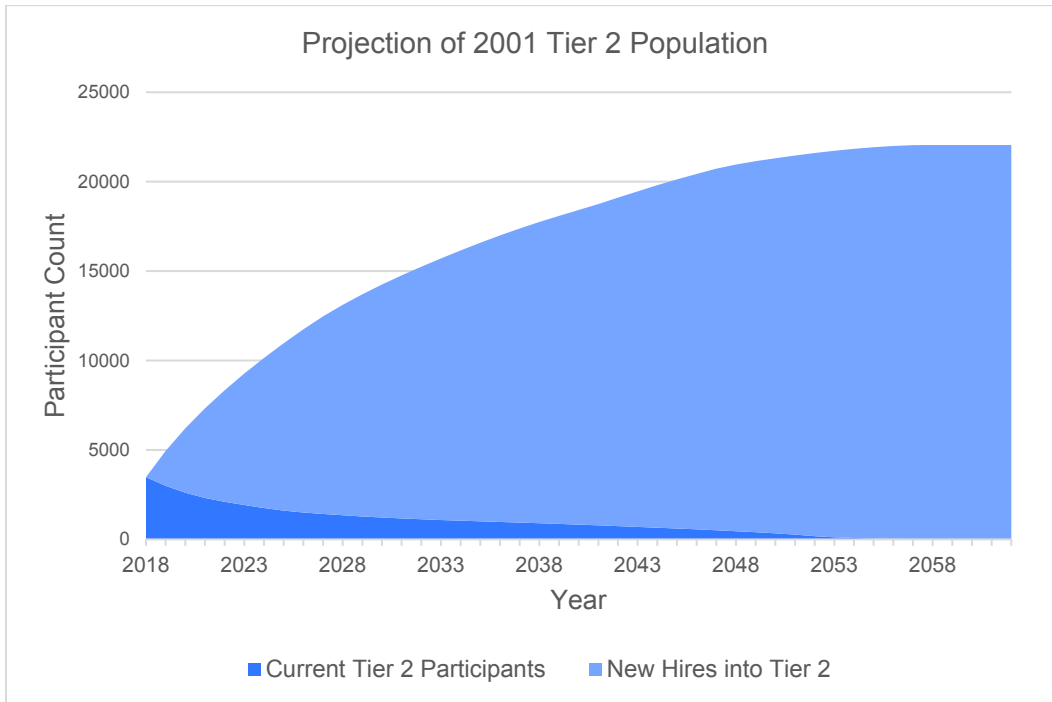
ERFC Legacy is a closed group that presently covers 4,115 active members. Approximately 99% of the present population is expected to receive monthly retirement benefits either by retiring directly from active service, or by separating from service without withdrawing contributions. Within 7 years, over half of the current membership will have left the group.

Expected Development of ERFC 2001 Tier 1 December 31, 2018



ERFC 2001 Tier 1 is a closed group that presently covers 14,451 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, 2018 level. The projection of the current ERFC Tier 2 population of 3,482 participants is shown separately from future new hires.

Actuarial Assumptions and Methods

Investment Return Rate	7.25%
Salary Increases	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, 2018 valuation is 20 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, 2018
Measurement Period	December 31, 2017 to December 31, 2018
Valuation Date	December 31, 2018
Census Data	As of December 31, 2017, and December 31, 2018.

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

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

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.

Reliance on Information from Prior Actuary

All information presented in this report as of December 31, 2017, and some explanation of terms, is from the Annual Actuarial Report prepared by GRS for ERFC as of December 31, 2017.

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	35.0%	6.0%	17.5%	30	17.5%			
53	35.0%	7.0%	17.5%	30	17.5%	35.0%		0.0%
54		8.0%				35.0%		0.0%
55		6.0%						
56	35.0%	4.0%	17.5%	31	17.5%			
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: (i) means 1.85 percent of the FAC multiplied by years of credited service, and (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: (1) attainment of age 65; and (2) the date when 30 years of service would have been completed.

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

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

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

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.