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Volunteer Firefighters' Compensation Act of the State of Montana

MPERA
MONTANA PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION

Actuarial Valuation
As of June 30, 2020

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CONSULTING, LLC
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September 30, 2020

Public Employees' Retirement Board
100 North Park, Suite 200
Helena, MT 59620-0139

Members of the Board:

In this report are submitted the results of the annual valuation of the assets and liabilities of the Volunteer Firefighters' Compensation Act of the State of Montana (VFCA), prepared as of June 30, 2020.

The purpose of this report is to provide a summary of the funded status of the System as of June 30, 2020. While not verifying the data at source, the actuary performed tests for consistency and reasonability. The valuation indicates that the State contribution amortizes of the unfunded accrued liability over a 4-year period. The asset values used to determine unfunded liabilities are not market values but less volatile market related values. A smoothing technique is applied to market values to determine the market related values. The unfunded liability amounts using the market value of assets would be different. The interest rate used for determining liabilities is based on the expected return on assets.

The promised benefits of the System are included in the actuarially calculated contribution rates, which are developed using the Entry Age Normal Cost Method. Four-year market related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded accrued liability that is being amortized by regular annual contributions as a level dollar amount over 4 years. The assumptions recommended by the actuary and adopted by the Board are, in the aggregate, reasonably related to the experience under the Fund and to reasonable expectations of anticipated experience under the Fund.

In order to prepare the results in this report we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

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

This is to certify that Todd Green, President and Beverly Bailey, Senior Actuary for Cavanaugh Macdonald Consulting, are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. This also certifies that the undersigned have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

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

Respectfully submitted,

Todd B. Green, ASA, FCA, MAAA
President

Beverly V. Bailey, ASA, EA, FCA, MAAA
Senior Actuary

Volunteer Firefighters' Compensation Act of the State of Montana

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Section I: Summary of Results

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

VALUATION DATE	**June 30, 2020**	**June 30, 2019**
Participant Counts		
Active Members	2,401	2,249
Retirees and Beneficiaries	1,523	1,487
Disabled Members	1	1
Terminated Vested Members	766	777
Terminated Non-Vested Members	-	-
Total*	4,691	4,514
Annual Retirement Allowances for Retired Members and Beneficiaries	$ 3,067,875	$ 2,985,225
Assets		
Actuarial value	$ 41,716,780	$ 40,008,887
Market value	39,908,236	39,866,038
Actuarial Accrued Liability (AAL)	$ 47,868,436	$ 47,200,070
Unfunded Actuarial Accrued Liability (UAAL)	$ 6,151,656	$ 7,191,183
Funded Ratio	87.15%	84.76%
Market Value Rate of Return	2.66%	5.41%
Annual Cost		
Employer Contribution Rate		
Normal Rate	$ 110,985	$ 102,140
Administrative Expense Load	293,470	201,971
UAAL Amortization (30 Years)	509,369	595,444
Total	$ 913,824	$ 899,555
Actual Contribution for Preceding Fiscal Year	$ 2,486,772	$ 2,370,454
Amortization Period Based on Actual Contributions	4 years	5 years

* A reconciliation between participant counts used for the annual report and counts for the valuation appears at the beginning of Appendix D.

As a result of this actuarial valuation of the benefits in effect under the Volunteer Firefighters' Compensation Act as of June 30, 2020, the state contribution amortizes the Unfunded Actuarial Accrued Liability (UAAL) of the Retirement System over 4 years. The Funded Ratio is 87.15%.

Calculations based on the Market Value of Assets

MCA 19-2-407 requires this report to show how market performance is affecting the actuarial funding of the Retirement System. The June 30, 2020, market value of assets is $1,808,544 less than the actuarial value of assets. This is due to the smoothing of investment gains and losses over a four-year period. If the market value of assets was used, the Funded Ratio would be 83.37%.

Additional Details

MCA 19-17-301 sets the State's contribution at an amount equal to 5.00% of the premium taxes collected from insurers.

The actuarial costs are calculated using the entry age actuarial cost method. This is the method used by most public plans. It is designed to provide a stable contribution rate as a percent of member pay. This actuarial valuation measures the adequacy of the contribution rates set in Montana State Law.

Investment Experience

The market assets earned 2.66% net of investment expenses. As a result of prior years' unrecognized losses, the actuarial assets earned 6.87%, which is 0.78% less than the actuarial assumption of 7.65%. The return on the actuarial assets differs from the return on market assets because the actuarial value of assets spreads gains and losses over four years. The chart below shows the annual returns for the past ten years.

Year	Market Return	Actuarial Return	Assumed Investment Return	Market Return over Assumption	Actuarial Return over Assumption
7/1/2009 to 6/30/2010	12.30	(1.30)	7.75	4.55	(9.05)
7/1/2010 to 6/30/2011	20.98	(0.14)	7.75	13.23	(7.89)
7/1/2011 to 6/30/2012	1.67	2.97	7.75	(6.08)	(4.78)
7/1/2012 to 6/30/2013	12.01	11.11	7.75	4.26	3.36
7/1/2013 to 6/30/2014	16.23	12.34	7.75	8.48	4.59
7/1/2014 to 6/30/2015	4.49	8.95	7.75	(3.26)	1.20
7/1/2015 to 6/30/2016	1.84	8.30	7.75	(5.91)	0.55
7/1/2016 to 6/30/2017	11.51	7.89	7.75	3.76	0.14
7/1/2017 to 6/30/2018	8.68	6.59	7.65	1.03	(1.06)
7/1/2018 to 6/30/2019	5.41	6.93	7.65	(2.24)	(0.72)
7/1/2019 to 6/30/2020	2.66	6.87	7.65	(4.99)	(0.78)

Asset gains or losses result when the return on the actuarial value of assets differs from the investment return assumption.

Amortization of the UAAL

The total contribution for the current fiscal year is estimated to be equal to the previous year's State contribution. The amount available to amortize the unfunded actuarial accrued liability of the System is equal to the total State contribution reduced by amounts for normal cost and anticipated administrative expenses. The total State contribution for the June 30, 2019, actuarial valuation was equal to $2,370,454. This contribution was sufficient to amortize the actuarial unfunded accrued liability over a 5-year period. The total State contribution for the June 30, 2020, valuation is equal to $2,486,772. This amount is sufficient to amortize the unfunded actuarial accrued liability over a 4-year period.

Funding and Benefits Policy

The Montana Public Employees' Retirement Board has adopted a Funding and Benefits Policy to provide general guidelines to help ensure decisions are made based on sound, consistent, and thoroughly examined criteria. The Funding and Benefits Policy includes guidance on the following topics:

1) Funding Requirement
   a) The Funding and Benefits Policy states:
      1. The Entry Age Normal Cost Method shall be applied to the projected benefits in determining the Normal Cost and Actuarial Accrued Liability.
      2. Asset smoothing can be used in the valuation process to spread the recognition of investment gains and losses over a four-year period.
      3. The unfunded actuarial accrued liability should be amortized over a reasonable period of time and should not exceed 30 years on a rolling basis. Generally, the funding period should be constant or decreasing.
   b) Analysis: The liabilities of the System are determined using the Entry Age Normal Cost Method and are compared to the actuarial value of assets, which are developed using asset smoothing that recognizes gains and losses over a four-year period. Finally, the amortization period as of June 30, 2020 is 4 years based on the actuarial value of assets. The current employer contributions fund the System within the Board's policy guidelines.
2) Funding Objectives
   a) The Funding and Benefits Policy states: "The primary objectives are to: 1) ensure that the systems are financially sound and pay all benefits promised using assets accumulated from required employer and member contributions and investment income; and 2) achieve a well-funded status with a range of safety to absorb market volatility without creating a UAL."
   b) Analysis: The State contributions provided for in statute are sufficient to amortize the unfunded actuarial accrued liability within a 4-year period. This ensures that the System is financially sound and will be able to pay all promised benefits and achieve a well-funded status with a range of safety to absorb market volatility without creating an additional UAAL.

3) Benefit Enhancements

   a) The Funding and Benefits Policy states: “Proposals must provide funding from sources sufficient to cover future costs. Unfunded liabilities created by the proposal must be amortized over a period of time appropriate to the retirement system, but not more than 30 years.”

   b) Analysis: Without supplemental funding, a benefit enhancement would increase the amortization period of the unfunded actuarial accrued liability and further delay the goal of achieving a well-funded status with a range of safety to absorb market volatility without extending the amortization period.

Sensitivity to Future Experience

The valuation results are projections based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing the ultimate cost. The following illustrations provide simple analyses on how the costs are sensitive to changes in the assumed rate of return.

Investment Return – The investment return generally has the largest impact on the funding of the System.

Impact of Assuming 1.0% Higher Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.65%	87.15%	4 Years	$2.5
Higher Assumption 8.65%	95.19	2 Years	1.1
Change - Increase / (Decrease)	8.04%	(2) Years	($1.4)

Impact of Assuming 0.5% Higher Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.65%	87.15%	4 Years	$2.5
Higher Assumption 8.15%	91.16	3 Years	1.6
Change - Increase / (Decrease)	4.01%	(1) Years	($0.9)

Impact of Assuming 0.5% Lower Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.65%	87.15%	4 Years	$2.5
Lower Assumption 7.15%	83.17	5 Years	2.8
Change - Increase / (Decrease)	(3.98%)	1 Years	$0.3

Impact of Assuming 1.0% Lower Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.65%	87.15%	4 Years	$2.5
Lower Assumption 6.65%	79.23	7 Years	3.5
Change - Increase / (Decrease)	(7.92%)	3 Years	$1.0

* Amounts reflect estimated increase/(decrease) in FY2021 employer contributions only, in order to maintain the 4 year amortization period.

The future funding status of the System will be determined by the System's experience. The System's actual asset returns and retirement rates, as well as member longevity, salary increases, withdrawal rates, disability rates and future legislation will all impact the funding status of the System. The entry age normal cost method and four year smoothing of asset gains and losses will help to provide a more orderly funding of the System's liabilities, but will not change the actual experience. The amortization of the UAAL is not likely to remain level with each passing actuarial valuation. Instead, the amortization amount is expected to decrease slightly on average, reflecting gains and losses due to experience different than the actuarial assumptions.

Assumption Changes

There have been no assumption changes since the previous valuation.

Benefit Changes

There have been no benefit changes since the previous valuation.

Contribution Changes

There have been no contribution changes since the previous valuation.

Method Changes

There have been no method changes since the previous valuation.

Impact of Changes

The following table summarizes how experience has changed the UAAL since the June 30, 2019 Actuarial Valuation. Further detail can be found in Table 10.

Changes in the Unfunded Actuarial Accrued Liability (UAAL)

June 30, 2019 Valuation UAAL	$7,191,183
Normal Cost (Including Expenses)	516,254
Contributions	(2,486,772)
Interest	494,500
Expected June 30, 2020 UAAL	$5,715,165
Experience (Gain)/Loss on Actuarial Liabilities	$126,635
Experience (Gain)/Loss on Actuarial Assets	309,856
Assumption & Method Changes	0
Plan Changes	0
Total (Gain)/Loss	$436,491
June 30, 2020 Valuation UAAL	$6,151,656

Summary

- The System's actuarial value investment return of 6.87% for the year ended June 30, 2020, is 0.78% less than the actuarial assumption of 7.65%. This represents an asset loss of $309,856 due to investment return less than anticipated. As of June 30, 2020, the market value of assets was $39,908,236. As of June 30, 2020, the actuarial value of assets was $41,716,780. The June 30, 2020 market value of assets will be recognized in future actuarial valuations unless it is offset by returns greater than the 7.65% assumption.

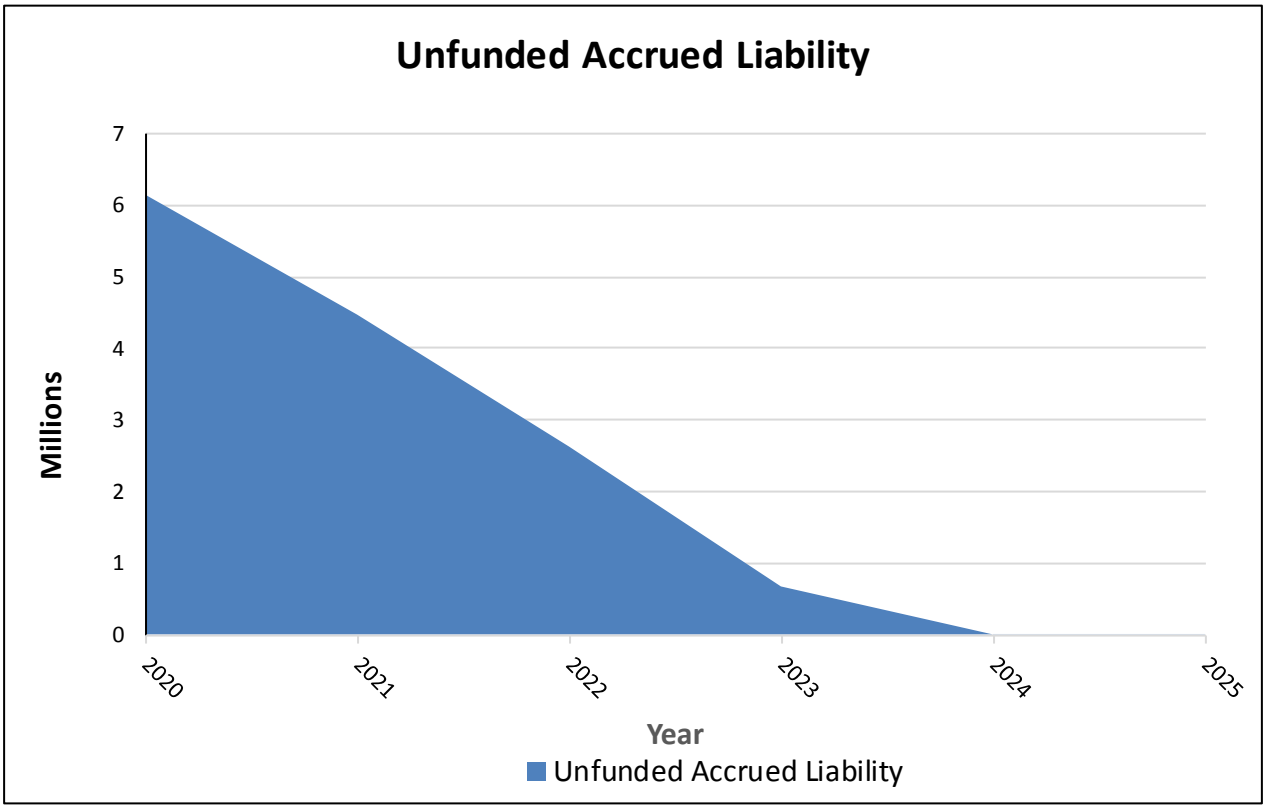
- As of June 30, 2020, the amortization period of the UAAL is 4 years. Prior to this valuation, the funding period was 5 years. The ultimate goal of the Board's Funding and Benefit Policy is to increase the funded status to a level such that the amortization period is below 30 years. The System is currently being funded in the parameters as defined by the Board.

- The funding of the retirement system will be impacted by future experience, which will sometimes be more favorable than the actuarial assumptions and sometimes less favorable. In particular, investment returns larger and smaller than the 7.65% assumption are expected to have significant impacts on the System's funding progress. In the long term, the favorable experience is needed to offset the less favorable experience. This is the reason for using an actuarial value of assets that allows gains and losses to be smoothed over four years.

- The Board-adopted rate of return assumption of 7.65% does not, in our professional judgment, conflict with what would constitute a reasonable assumption for the purpose of the measurement Actuarial Standard of Practice No. 27 (ASOP 27). The basis for this opinion is the average long-term capital market assumptions published in the Survey of Capital Market Assumptions 2020 Edition by Horizon Actuarial Service, LLC, which yield a median real return of 4.94% and assumed inflation based on the intermediate inflation assumption of 2.4% in the 2020 OASDI Trustees Report used by the Chief Actuary for Social Security to produce 75 year cost projections. Combining these two results yields a nominal return of 7.34%. The Board's adopted assumption of 7.65% is sufficiently close to our calculated reasonable assumption of 7.34%. Note our report discloses the Systems Funded Ratio and Amortization Period based on an assumed rate of return of 7.65%. In the *Sensitivity to Future Experience* section, results are also presented based on an assumed rate of return of 7.15%. The results of the valuation using an assumed rate of return of 7.34% would include a funded ratio and amortization period between the results shown at 7.65% and 7.15%.

Projected Progress toward 100% Funding

The table below shows the projected progress toward reaching 100%. When the System is 100% funded, the Unfunded Actuarial Accrued Liability will be fully amortized. This is scheduled to occur within 4 years. The ultimate goal of the VFCA System is to become at least 100% funded and to establish a reserve equal to 10% of the Systems Actuarial Accrued Liability.



Assets

In many respects, an actuarial valuation can be regarded as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is June 30, 2020. On that date, the assets available for the payment of benefits are appraised. These assets are compared with the actuarial liabilities. The actuarial process thus leads to a method of determining what contributions by members and their employers are needed to strike a balance.

The asset valuation method being used is a four-year smoothing method. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

Table 1 lists the assets held and their market value for the past two years. Table 2 summarizes the fund's activity during the past two years. Table 3 summarizes the determination of the actuarial value of assets. Table 4 summarizes historical asset returns for the last 10 years including the amount recognized by the actuarial asset valuation method which was greater or less than the actuarial investment return assumption. Table 5 summarizes the historical asset values on a market value and actuarial value basis, to the extent it was available. Additional data can be included in this table for future reports, if provided by the System.

Table 1:
Statement of Fiduciary Net Position
Fiscal Year Ended June 30,

	2020	2019
ASSETS		
Cash and Short Term Investments	$ 865,237	$ 1,429,197
Securities Lending Collateral	208,607	182,258
Receivables:		
Interest Receivable	231	2,463
Accounts Receivable	3,485	4,480
Due from Other Funds	-	-
Due from Primary Government	-	-
Notes Receivable	-	-
Total Receivables	$ 3,716	$ 6,943
Investments, at fair value:		
Investment Pools	39,098,340	38,342,398
Other Investments	-	-
Total Investments	$ 39,098,340	$ 38,342,398
Capital Assets		
Property and Equipment, at cost, net of Accumulated Depreciation	$ 298	$ 298
Intangible Assets, at cost, net of Amortization Expense	246,171	290,126
Total Capital Assets	$ 246,469	$ 290,424
TOTAL ASSETS	$ 40,422,369	$ 40,251,220
LIABILITIES		
Securities Lending Liability	$ 208,607	$ 182,258
Accounts Payable	11,742	-
Unearned Revenue	315	953
Due to Other Funds	293,469	201,971
Compensated Absences	-	-
OPEB Implicit Rate Subsidy LT	-	-
TOTAL LIABILITIES	$ 514,133	$ 385,182
NET POSITION - RESTRICTED FOR PENSION BENEFITS	$ 39,908,236	$ 39,866,038

Table 2:
Statement of Changes in Fiduciary Net Position
Fiscal Year Ended June 30,

	2020	2019
ADDITIONS		
Contributions:		
Employer	$ -	$ -
Plan Member	-	-
Other	2,486,772	2,370,454
Total Contributions	$ 2,486,772	$ 2,370,454
Misc Income	$ -	$ -
Investment Income:		
Net Appreciation/(Depreciation) in Fair Value of Investments	$ 1,237,999	$ 1,932,356
Investment Earnings	12,278	367,767
Security Lending Income	4,413	9,464
Investment Income/(Loss)	$ 1,254,690	$ 2,309,587
Investment Expense	(206,444)	(234,330)
Security Lending Expense	(2,352)	(4,749)
Net Investment Income/(Loss)	$ 1,045,894	$ 2,070,508
Total Additions	$ 3,532,666	$ 4,440,962
DEDUCTIONS		
Benefit Payments	$ 3,065,017	$ 2,996,808
Refunds/Distributions	-	-
Refunds to Other Plans	-	-
Transfers to DCRP	-	-
Transfers to MUS-RP	-	-
Supplemental Insurance Payments	12,150	10,875
OPEB Expense	-	-
Administrative Expense	414,114	296,866
Total Deductions	$ 3,491,281	$ 3,304,549
NET INCREASE (DECREASE) IN PLAN NET ASSETS	$ 41,385	$ 1,136,413
NET POSITION - RESTRICTED FOR PENSION BENEFITS BEGINNING OF YEAR	$ 39,866,038	$ 38,729,625
ADJUSTMENT	$ 813	$ -
END OF YEAR	$ 39,908,236	$ 39,866,038

Table 3:
Determination of Actuarial Value of Assets

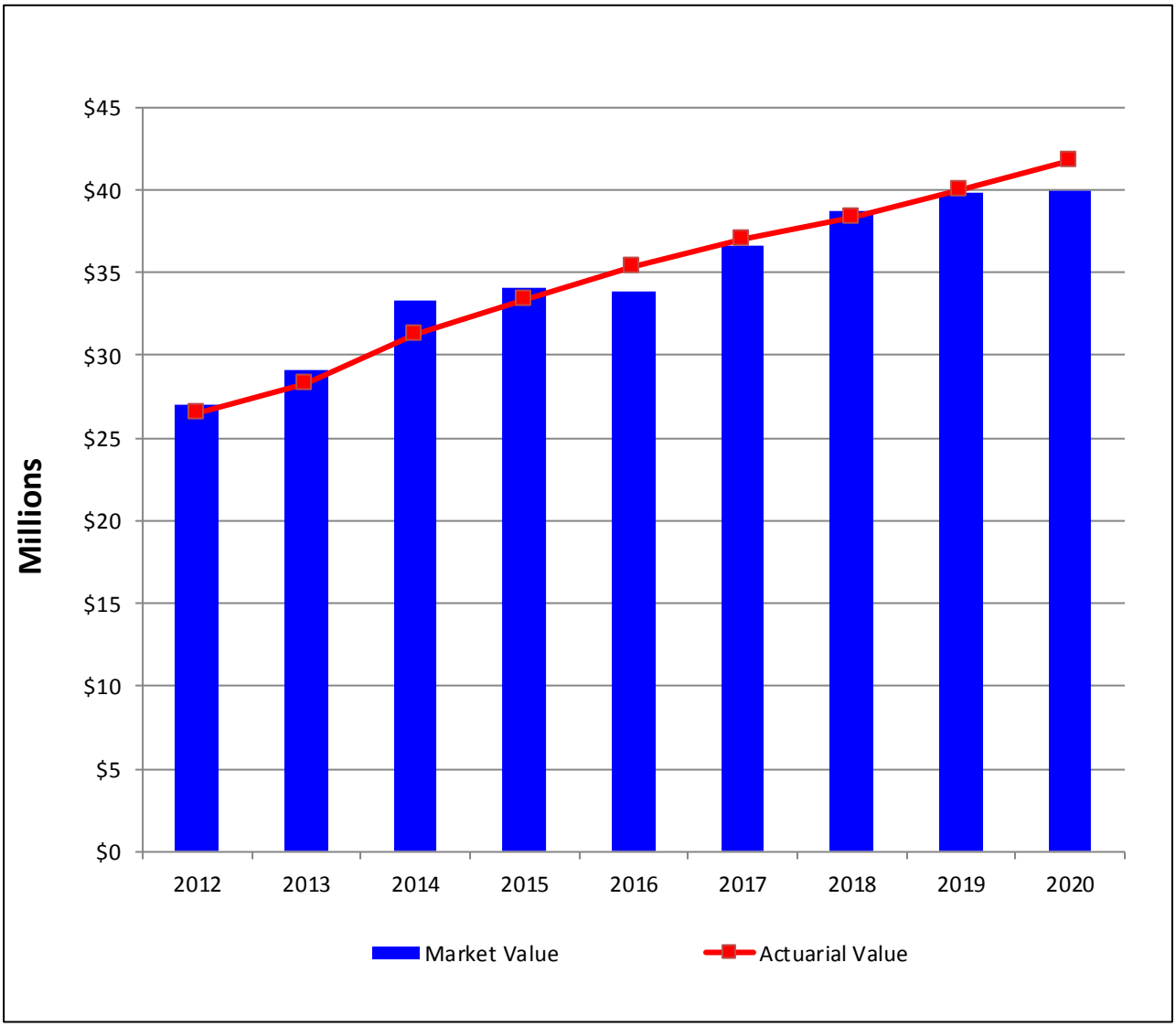
Valuation Date June 30:	2019	2020	2021	2022	2023
A. Actuarial Value Beginning of Year	$ 38,321,273	$ 40,008,887			
B. Market Value End of Year	39,866,038	39,908,236			
C. Market Value of Beginning of Year	38,729,625	39,866,038			
D. Cash Flow					
D1. Contributions	$ 2,370,454	$ 2,486,772			
D2. Benefit Payments	(3,007,683)	(3,077,167)			
D3. Administrative Expenses	(296,866)	(414,114)			
D4. Investment Expenses	(239,079)	(208,796)			
D5. Net	$ (1,173,174)	$ (1,213,305)			
E. Investment Income					
E1. Market Total: B. - C. - D5.	$ 2,309,587	$ 1,255,503			
E2. Assumed Rate	7.65%	7.65%			
E3. Amount for Immediate Recognition C.*E2. + ((D1.+D2.+D3.)*E2.*0.5) - D4.	3,166,166	3,220,125			
E4. Amount for Phased-in Recognition E1. - E3.	(856,579)	(1,964,622)			
F. Excluded Gain/(Loss)					
F1. Current Year: 0.25 * E4.	$ (214,145)	$ (491,156)	$ -	$ -	$ -
F2. First Prior Year	93,213	(214,145)	(491,156)	-	-
F3. Second Prior Year	313,161	93,213	(214,145)	(491,156)	-
F4. Third Prior Year	(497,607)	313,161	93,213	(214,145)	(491,154)
F5. Total Excluded Investment Gain/(Loss)	$ (305,378)	$ (298,927)	$ (612,088)	$ (705,301)	$ (491,154)
G. Actuarial Value End of Year A. + D5. + E3. + F5.	$ 40,008,887	$ 41,716,780			

Table 4:
Historical Investment Returns*

Fiscal Year Ending	Market Returns	Actuarial Returns	Assumed Rate of Return	Actuarial Return Over Assumption
June 30, 2011	20.98%	(0.14)%	7.75%	(7.89)%
June 30, 2012	1.67%	2.97%	7.75%	(4.78)%
June 30, 2013	12.01%	11.11%	7.75%	3.36%
June 30, 2014	16.23%	12.34%	7.75%	4.59%
June 30, 2015	4.49%	8.95%	7.75%	1.20%
June 30, 2016	1.84%	8.30%	7.75%	0.55%
June 30, 2017	11.51%	7.89%	7.75%	0.14%
June 30, 2018	8.68%	6.59%	7.65%	(1.06)%
June 30, 2019	5.41%	6.93%	7.65%	(0.72)%
June 30, 2020	2.66%	6.87%	7.65%	(0.78)%
10 Year Average	7.80%	6.41%		(0.53)%

* Returns reflect all investment returns, including investment income and realized and unrealized investment gains and losses, and are net of investment expenses and administrative expenses paid by the System.

Table 5:
Market Value of Assets vs. Actuarial Value of Assets



Actuarial Present Value of Future Benefits

In the previous section, an actuarial valuation was related to an inventory process, and an analysis was given of the inventory of assets of the System as of the valuation date. In this section, the discussion will focus on the commitments of the System, which will be referred to as its actuarial liabilities.

Table 6 contains an analysis of the actuarial present value of all future benefits for active members, for retirees, and for beneficiaries. The analysis is given by type of benefit.

The actuarial liabilities summarized in Table 6 include the actuarial present value of all future benefits expected to be paid with respect to each member covered as of the valuation date. For an active member, this value includes a measure of both benefits already earned and future benefits to be earned. Thus, for all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of their surviving beneficiaries.

The actuarial valuation does not recognize liabilities for employees who become members and participate in the System after the valuation date.

Table 6:
Actuarial Present Value of Future Benefits for Actives, Retirees, and Beneficiaries

	June 30, 2020 Total	June 30, 2019 Total
A. Active Members Liability Due to Probability of		
Retirements	$ 9,929,121	$ 9,668,096
Disabilities	-	-
In-Service Deaths	104,279	101,614
Terminations	3,924,057	3,807,400
Total	$ 13,957,457	$ 13,577,110
B. Inactive Members and Annuitants		
Service Retirement	$ 25,789,769	$ 25,268,948
Disability Retirement	8,680	8,927
Beneficiaries*	18,159	16,852
Vested Terminated Members	8,483,168	8,683,748
Total	$ 34,299,776	$ 33,978,475
C. Grand Total	$ 48,257,233	$ 47,555,585

*Includes survivors of retired and active members.

Employer Contributions

In the previous two sections, attention has been focused on the assets and the present value of all future benefits of the System. A comparison of Tables 3 and 6 indicates that there is a shortfall in current actuarial assets to meet the present value of all future benefits for current members and beneficiaries.

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

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. For this valuation, the entry age actuarial cost method has been used. A description of the entry age actuarial cost method is provided in Appendix A. Under this method, or essentially any actuarial cost method, the contributions required to meet the difference between current assets and the present value of all future benefits are allocated each year between three elements:

- A normal cost amount, which ideally is relatively stable as a percentage of salary over the years;
- A load for administrative expenses; and
- An amount which is used to amortize the UAAL.

The two items described above, normal cost and UAAL, are the keys to understanding the actuarial cost method. Let us first discuss the normal cost.

The normal cost is the theoretical contribution rate, which will meet the ongoing costs of a group of average new employees. Suppose that a group of new employees were covered under a separate fund from which all benefits and to which all contributions and associated investment return were to be paid. Under the entry age actuarial cost method, the normal cost contribution rate is that level percentage of pay which would be exactly right to maintain this fund on a stable basis. If experience were to follow the actuarial assumptions exactly, the fund would be completely liquidated with the last payment to the last survivor of the group.

The assumed investment rate of return is 7.65%, net of investment expenses only. As a result, the actuarially determined contribution must include an amount for administrative expenses expected to occur during the year.

We have determined the normal cost rates separately by type of benefit under the System. These are summarized in Table 7. In Table 7 we also provide a summary of the member and employer statutory contributions.

The term "fully funded" is often applied to a system where contributions for everyone at the normal cost rate will fully pay for the benefits of existing as well as new employees. Often, systems are not fully funded, either because of benefit improvements in the past that have not been completely paid for or actuarial deficiencies that have occurred because experience has not been as anticipated. Under these circumstances, a UAAL exists.

Table 8 shows how the UAAL was derived for the System. Lines A and B show, respectively, the total present value of future benefits and the portion of the future liability that is expected to be paid from future normal cost contributions, both employer and employee. The future normal cost contributions are the portion of the present value of future benefits that are attributed to future years of service that have not been earned yet by the active membership. Line C shows the actuarial accrued liability. Line D shows the amount of assets available for benefits. Line E shows the UAAL.

The UAAL at any date after establishment of a system is affected by any actuarial gains or losses arising when the actual experience of the system varies from the experience anticipated by the actuarial assumptions used in the valuations. To the extent actual experience as it develops differs from the assumptions used, so also will the actual emerging costs differ from the estimated costs. The impact of these differences in actual experience from the assumptions is included in Section 1, the Summary of Findings.

Table 7:
Normal Cost Contribution Amounts

	June 30, 2020 Total	June 30, 2019 Total
Service retirements	$ 51,043	$ 47,320
Disability retirements	-	-
In Service Death	6,380	5,895
Termination benefits	53,562	48,925
Total Normal Cost	$ 110,985	$ 102,140
Administrative Expense Load	$ 293,470	$ 201,971
Amount Available to Amortized the Unfunded Actuarial Accrued Liability	$ 2,082,317	$ 2,066,343
Statutory Funding Rate	$ 2,486,772	$ 2,370,454

Table 8:
Unfunded Actuarial Accrued Liability

	June 30, 2020	June 30, 2019
A. Actuarial present value of all future benefits for present members, retirees and their survivors (Table 6)	$ 48,257,233	$ 47,555,585
B. Less actuarial present value of total future normal costs for present members	388,797	355,515
C. Actuarial accrued liability	$ 47,868,436	$ 47,200,070
D. Less assets available for benefits	41,716,780	40,008,887
E. Unfunded actuarial accrued liability	$ 6,151,656	$ 7,191,183

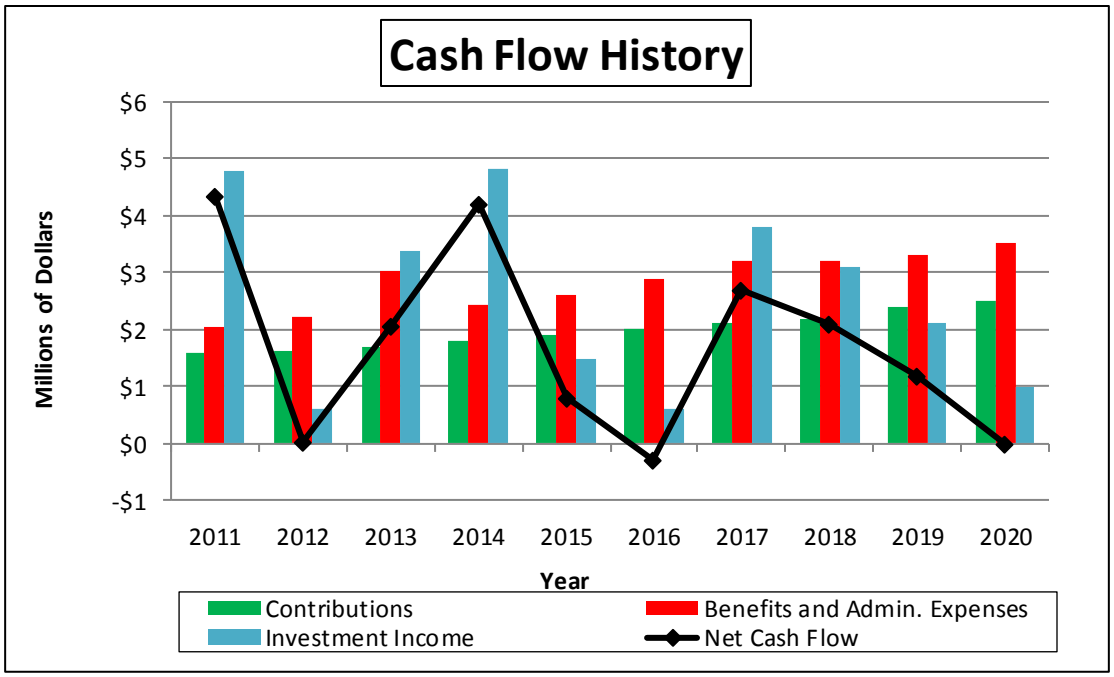
Cash Flows

The fundamental equation for funding a retirement system is that benefits and administrative expenses must be provided for by contributions (past and future) and investment income. When a retirement system matures, benefits and administrative expenses often exceed contributions. In this case we say the system has a "negative cash flow." Mature systems are characterized by negative cash flows and large pools of assets. This is natural. Actuarial funding is designed to accumulate large pools of assets which will in turn provide investment income and finance negative cash flows when systems mature. If the fund is looked at as a whole, investment income is usually larger than the difference between contributions and benefit payments. The retirement system's investment strategy should maximize potential returns at a prudent level of risk while providing for needed cash flows.

Table 9 shows the System had a positive cash flow for the year ended June 30, 2020. The System's total cash flow including benefit payments, administrative expenses and investment earnings was $0 million. Of the $0 million, $1.0 million was due to investment returns.

If the System had a positive cash flow, there would be no need to plan where the funds would come from to pay benefits since benefits could be paid by incoming contributions. A negative cash flow, as defined above, requires planning what funds will be used to pay the difference between benefits and contributions.

Table 9:
Cash Flow History
(Dollar amounts in millions)



	Historical Cash Flows			
Year Ended June 30	Contributions	Benefits & Administrative Expenses	Investment Income	Net Cash Flow
2011	$ 1.6	$ 2.0	$ 4.8	$ 4.4
2012	1.6	2.2	0.6	0.0
2013	1.7	3.0	3.4	2.1
2014	1.8	2.4	4.8	4.2
2015	1.9	2.6	1.5	0.8
2016	2.0	2.9	0.6	(0.3)
2017	2.1	3.2	3.8	2.7
2018	2.2	3.2	3.1	2.1
2019	2.4	3.3	2.1	1.2
2020	2.5	3.5	1.0	0.0

Actuarial Gains or Losses

An analysis of actuarial gains or losses is performed in conjunction with all regularly scheduled valuations.

The developments of the gains or losses related to the actuarial liability and the assets are shown in Table 10. The results of our analysis of the financial experience of the System in the three most recent regular actuarial valuations are presented in Table 11. Each gain or loss shown represents our estimate of how much the given type of experience caused the Unfunded Actuarial Accrued Liability or Funding Reserve to change in the period since the previous actuarial valuation.

Gains and losses shown due to demographic sources are approximate. Demographic experience is analyzed in greater detail in our periodic experience studies.

Non-recurring gains and losses result from changes in the actuarial assumptions and benefit improvements.

Table 10:
Analysis of Actuarial (Gains) or Losses*

A.	ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS	
1.	Actual Actuarial Accrued Liability as of June 30, 2019:	$ 47,200,070
2.	Normal Cost for this Plan Year (Including Expenses):	516,254
3.	Interest on items 1 and 2 [(1+2) x 7.65%]:	3,650,299
4.	Benefit Payments for this Plan Year (Including Expenses):	(3,491,281)
5.	Interest on item [4 x 7.65% x .5]:	(133,541)
6.	Expected Actuarial Accrued Liability as of June 30, 2020:	$ 47,741,801
7.	Changes due to:	
	a. Assumption Changes:	-
	b. Plan Amendments:	-
	c. Funding Method:	-
	d. Actuarial (Gain) / Loss:	$ 126,635
8.	Actual Actuarial Accrued Liability as of June 30, 2020:	$ 47,868,436
9.	Items Affecting Calculation of Unfunded Accrued Actuarial Liability:	
	a. Benefit provisions reflected in the unfunded accrued liability (see Appendix C)	
	b. Actuarial assumptions and methods used to determine actuarial accrued liability (see Appendix B)	
B.	ASSET (GAIN) / LOSS ANALYSIS	
1.	Actuarial Value of Assets as of June 30, 2019:	$ 40,008,887
2.	Interest on item [1 x 7.65%]:	3,060,680
3.	Contributions for this Plan Year:	2,486,772
4.	Interest on item [3. x 7.65% x .5]:	95,119
5.	Benefit Payments for this Plan Year (Including Expenses):	(3,491,281)
6.	Interest on item [5. x 7.65% x .5]:	(133,541)
7.	Expected Actuarial Value of Assets as of June 30, 2020:	$ 42,026,636
8.	Actuarial Value of Assets as of June 30, 2020:	$ 41,716,780
9.	(Gain) / Loss:	$ 309,856
C.	UNFUNDED ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS	
1.	Actual Unfunded Actuarial Accrued Liability as of June 30, 2019:	$ 7,191,183
2.	Normal Cost for this Plan Year (Including Expenses):	516,254
3.	Contributions for this Plan Year:	(2,486,772)
4.	Interest on items 1 - 3: [(1+2) x 7.65% + (3 x 7.65% x .5)]:	494,500
5.	Expected Unfunded Actuarial Accrued Liability as of June 30, 2020:	$ 5,715,165
6.	Changes due to:	
	a. Assumption Changes:	-
	b. Plan Amendments:	-
	c. Funding Method:	-
	d. Actuarial (Gain) / Loss:	$ 436,491
7.	Actual Unfunded Actuarial Accrued Liability as of June 30, 2020:	$ 6,151,656

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.

Table 11:
Historical Actuarial (Gains) or Losses*

	UAAL (Gain)/Loss		
	June 30, 2020	June 30, 2019	June 30, 2018
Investment Income Investment income was (greater) less than expected based on actuarial value of assets.	$ 309,856	$ 274,139	$ 384,512
Age & Service Retirements Members retired at (older) younger ages or with (less) greater final average pay than expected	(686,547)	(656,706)	(592,819)
Disability Retirements Disability claims were (less) greater than expected	-	-	-
Death-in-Service Benefits Survivor claims were (less) greater than expected	28,847	29,375	9,069
Withdrawal From Employment (More) less reserves were released by withdrawals than expected	419,212	564,890	324,527
Death After Retirement Retirees (died younger) lived longer than expected	(16,951)	(159,387)	(22,982)
Data Adjustments and Benefit Payment Timing Service purchases, data corrections, etc.	397,917	598,013	177,027
Other Miscellaneous (gains) and losses	(15,843)	(11,354)	(7,429)
Total (Gain) or Loss During Period From Financial Experience	$ 436,491	$ 638,970	$ 271,905
Non-Recurring Items.			
Changes in actuarial assumptions and methods	-	-	-
Changes in benefits caused a (gain) loss	-	-	-
Composite (Gain) Loss During Period	$ 436,491	$ 638,970	$ 271,905

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease)/increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.

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

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

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

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

There is a direct correlation between healthy, well-funded retirement plans and consistent contributions equal to the full actuarial contribution rate each year. The System is primarily funded by State contributions that are equal to 5% of certain fire insurance premium taxes collected and passed through the general fund. These contributions, together with the earnings on these accumulated contributions fund benefit accruals for current active members and administrative expenses. The remainder of the contributions amortizes the unfunded actuarial accrued liability. The contribution rates are set by state statute and intended to provide the needed amounts to fund the system over time. The purpose of the valuation is to determine if the fixed employer and member contributions remain sufficient to fund the Plan. Due to the fixed nature of the contributions actuarial gains and losses are reflected in the amortization period. Generally, the largest source of actuarial gains and losses are caused by investment volatility. A key risk factor to the System's funding is that over time, the Statutory Contribution Rates will be insufficient to accumulate enough funds, with investment income, to fund the promised benefits.

The other significant risk factor for the System is investment return because of the volatility of returns and the size of plan assets compared to payroll. This is to be expected, given the underlying capital market assumptions and the System's asset allocation. To the extent market rates of interest affect the expected return on assets, there is a risk of change to the discount rate which determines the present value of liabilities and actuarial valuation results. Please see the summary of results of this report which demonstrates the sensitivity of valuation results to differing discount rates.

A key demographic risk for the Retirement System is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect a margin for improvement in mortality experience these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, which would also be significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

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

Historical Asset Volatility Ratios
(in 1,000's)

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

Actuarial Valuation Date	Market Value of Assets	Estimated Plan Year Payroll	Asset Volatility Ratio
6/30/2015	34,104	0	N/A
6/30/2016	33,883	0	N/A
6/30/2017	36,630	0	N/A
6/30/2018	38,730	0	N/A
6/30/2019	39,866	0	N/A
6/30/2020	39,908	0	N/A

Since funding of the System is not based on payroll, the Assets Volatility Ratio is irrelevant in this case.

Historical Cash Flows
(in 1,000's)

Plans with negative cash flows will experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments and administrative expenses. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of MVA that may cause significant concerns. The System has negative cash flows which ranged from 2.35% to 2.97% for the prior six years.

Year End	Market Value of Assets (MVA)	Contributions	Benefit Payments	Net Cash Flow	Net Cash Flow as a Percent of MVA
6/30/2015	34,104	1,913	2,560	(647)	(1.90%)
6/30/2016	33,883	2,036	2,877	(841)	(2.48%)
6/30/2017	36,630	2,065	3,154	(1,089)	(2.97%)
6/30/2018	38,730	2,212	3,248	(1,036)	(2.67%)
6/30/2019	39,866	2,370	3,305	(935)	(2.35%)
6/30/2020	39,908	2,487	3,491	(1,004)	(2.52%)

Liability Maturity Measurement

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. The retirement of the remaining baby boomers over the next decade is expected to further exacerbate the aging of the retirement system population. Retiree liability as a percentage of the total actuarial accrued liability has been growing over the last five years. As more of the total liability begins to reside with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs. Below are two tables which demonstrate the ratio of the System's retiree liability compared to the total accrued liability and the ratio of the number of retirees and beneficiaries to the number of active members.

Year End	Retiree Liability (a)	Total Actuarial Accrued Liability (b)	Retiree Percentage (a) / (b)
6/30/2015	31,520,180	44,318,250	71.1%
6/30/2016	31,852,441	44,010,066	72.4%
6/30/2017	33,571,977	45,871,379	73.2%
6/30/2018	34,098,356	46,305,640	73.6%
6/30/2019	33,978,475	47,200,070	72.0%
6/30/2020	34,299,776	47,868,436	71.7%

Historical Member Statistics

Valuation Date June 30,	Number of Active	Number of Retired	Active/ Retired
2015	1,977	1,371	1.44
2016	1,895	1,425	1.33
2017	1,957	1,438	1.36
2018	2,026	1,474	1.37
2019	2,249	1,488	1.51
2020	2,401	1,524	1.58

The assumptions and methods utilized in the valuation were developed in the six-year experience study for the period ending June 30, 2016.

Tables B-2 through B-4 give rates of decrement for service retirement, disablement, mortality, and other terminations of employment.

Actuarial Cost Method

The actuarial valuation was prepared using the entry age actuarial cost method. Under this method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated as a level percentage of the individual's projected compensation between entry age and assumed exit. The portion of this actuarial present value allocated to a valuation year is called the normal cost. The normal cost was first calculated for each individual member. The normal cost rate is the total of the individual normal costs, divided by the total pay rate.

The portion of this actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets and (b) the actuarial present value of future normal costs is called the UAAL. The UAAL is amortized as a level percentage of the projected salaries of present and future members of the System.

Records and Data

The data used in the valuation consists of financial information, records of age, sex, service, salary, contribution rates, and account balances of contributing members and records of age, sex, and amount of benefit for retired members and beneficiaries. All of the data was supplied by the System and has been accepted for valuation purposes without audit.

Replacement of Terminated Members

The ages at entry and distribution by sex of future members are assumed to average the same as those of the present members they replace. If the number of active members should increase, it is further assumed that the average entry age of the larger group will be the same, from an actuarial standpoint, as that of the present group. Under these assumptions, the normal cost rates for active members will not vary with the termination of present members.

Administrative and Investment Expenses

The investment expenses of the System are assumed to be funded by investment earnings in excess of 7.65% per year.

Administrative expenses are assumed to equal $293,470 in fiscal year end 2020.

Valuation of Assets

The actuarial asset valuation method spreads asset gains and losses over four years. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

Investment Earnings

The annual rate of investment earnings of the assets of the System is assumed to be 7.65% per year net of investment expenses, compounded annually.

Service Retirement

Table B-2 shows the annual assumed rates of retirement among members eligible for service retirement. Separate rates are used when a member is eligible for reduced benefits, for the first year a member is eligible for full benefits, and for the years following the first year a member is eligible for full benefits.

Disablement

There are no rates of disablement used in this valuation.

Mortality

The mortality rates used in this valuation are illustrated in Table B-3. A written description of each table used is included in Table B-1.

Other Terminations of Employment

The rates of assumed future withdrawal from active service for reasons other than death, disability or retirement are shown for representative ages in Table B-4.

Probability of Marriage and Dependent Children

If death occurs in active status, all members are assumed to have an eligible spouse with no dependent children. Female spouses are assumed to be three years younger than males.

Table B-1

Summary of Valuation Assumptions

I.	Economic assumptions		
	A.	Investment return	7.65%
	B.	Price Inflation Assumption	2.75%
	C.	Growth in membership	0.00%
II.	Demographic assumptions		
	A.	Retirement	Table B-2
	D.	Mortality among contributing members, service retired members, and beneficiaries. The tables include margins for mortality improvement which is expected to occur in the future. For Males and Females: RP 2000 Combined Employee and Annuitant Mortality Table projected to 2020 using Scale BB, set back one year for males.	Table B-3
	E.	Mortality among disabled members For Males and Females: RP 2000 Combined Employee and Annuitant Mortality Table.	Table B-3
	F.	Other terminations of employment	Table B-4

Table B-2

Retirement
Annual Rates

Age	10 to 19 Years of Service	20 or More Years of Service
Less than 55	0.0%	0.0%
55	0.0	40.0
56	0.0	40.0
57	0.0	40.0
58	0.0	40.0
59	0.0	40.0
60	20.0	40.0
61	20.0	40.0
62	20.0	40.0
63	20.0	40.0
64	20.0	40.0
65	20.0	40.0
66	20.0	40.0
67	20.0	40.0
68	20.0	40.0
69	20.0	40.0
70 & Over	100.0	100.0

Vested terminations are assumed to retire at their earliest unreduced eligibility.

Table B-3

Mortality
Annual Rates

	Contributing Members, Service Retired Members and Beneficiaries		Disabled Members	
Age	Men	Women	Men	Women
25	0.0354%	0.0195%	0.0376%	0.0207%
30	0.0388	0.0249	0.0444	0.0264
35	0.0661	0.0447	0.0773	0.0475
40	0.0961	0.0665	0.1079	0.0706
45	0.1316	0.1058	0.1508	0.1124
50	0.1879	0.1578	0.2138	0.1676
55	0.3010	0.2458	0.3624	0.2717
60	0.5271	0.4135	0.6747	0.5055
65	0.9041	0.7624	1.2737	0.9706
70	1.4636	1.3151	2.2206	1.6742
75	2.5057	2.2077	3.7834	2.8106
80	4.2816	3.6037	6.4368	4.5879
85	7.3750	6.0833	11.0757	7.7446
90	13.0721	10.5549	18.3408	13.1682
95	21.7835	17.2452	26.7491	19.4509

Table B-4

Other Terminations of Employment
Among Members Not Eligible to Retire
Annual Rates

Years of Service	All Members
0	30.0%
1	30.0
2	30.0
3	30.0
4	30.0
5	30.0
6	25.0
7	25.0
8	21.0
9	17.0
10-26	13.0
26 & Over	10.0

Type of plan	• Multiple-employer cost-sharing
Membership eligibility	• Unpaid volunteer firefighters serving with qualified volunteer fire companies in unincorporated areas throughout the state.
Member contributions	• No member contributions
State contributions	• 5% of certain fire insurance premium taxes collected and passed through the general fund
Credit for service	To receive a year of credit for service, a volunteer firefighter must: • Serve with a single fire company for an entire fiscal year, **and** • Receive a minimum of 30 hours of training. • Fractional years **are not** credited.
Normal retirement eligibility and benefit formula	• Age 55 with 20 years of credit for service, **or** • Age 60 with 10 years of credit for service • $8.75 per month x year of credit for service up to 20 years • $7.50 per month x year of credit for service after 20 years • For VFCA members retiring **prior to** July 1, 2011, maximum credited service is 30 years • VFCA members retiring **on or after** July 1, 2011, will receive $7.50 per month for each additional year of credited service after 30 years in each year that the trust is actuarially sound and the amortization period is 20 years or less; otherwise benefits for the year will only be paid on credited service up to 30 years.
Duty-related disability retirement eligibility and benefit formula	• Any current member on a fire company's roster • **The greater of:** a. $87.50 per month, **or** b. ($8.75 per month x year of credit for service up to 20 years) + ($7.50 per month x year of credit for service after 20 years up to 30 years of credit for service)
Survivor's eligibility and benefit formula	• 10 years of credit for service or a retired member • A monthly survivor benefit to the surviving spouse (or equally to dependent children if there is no surviving spouse or after a surviving spouse dies, for as long as they remain dependent children) equal to the full benefit otherwise payable to the member. • Survivor benefits terminate when benefits have been paid for a total of 40 months, including any benefits paid to the retired member prior to death.
Changes since last valuation	• None

Valuation Data

This chart is presented for informational purposes only. The counts shown in the valuation line were used for preparation of the liabilities disclosed within this report. The counts disclosed for the Annual Financial Report and the Summary of Results (page 1) match the CAFR at the request of the Board. The differences between counts, if any, have no material effect upon the liability calculation.

	Active	Disabled	Retirees and Beneficiaries	Terminated Vested Members	Total
Participant Counts Used for Valuation	2,397	1	1,523	766	4,687
Disabled Members having attained normal retirement age					
Beneficiaries of Disabled Members					
Beneficiaries with less than one year of certain payments remaining					
Other Adjustments	4				4
Participant Counts shown in the Annual Financial Report	2,401	1	1,523	766	4,691

This valuation is based upon the membership of the System as of June 30, 2020. Membership data was supplied by the System and has been accepted for valuation purposes without audit. However, tests were performed to ensure that the data is sufficiently accurate for valuation purposes.

Active Members	Number
Full-Time Members	2,397

Table D-1 contains summaries of the data for active members. For full-time members, values shown in the tables are the numbers of members and their service.

Table D-2 presents distributions of the following:

- Members receiving service retirement benefits.
- Members receiving disability retirement benefits.
- Survivors of deceased retired members receiving benefits.
- Survivors of deceased active members.
- Terminated vested members.

Table D-3 is a reconciliation of membership data from June 30, 2019 to June 30, 2020.

The following is a summary of retired members and beneficiaries currently receiving benefits. The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 38 for an explanation of the number of annuitants used for valuation purposes.

Type of Annuitant	Number	Annual Benefits	Average Annual Benefits
Service Retirement	1,518	$ 3,057,210	$ 2,014
Survivors of Deceased Retired Members	1	2,190	2,190
Survivors of Deceased Active Members	4	7,425	1,856
Total Retirees and Beneficiaries	1,523	$ 3,066,825	$ 2,014
Disability Retirement	1	1,050	1,050
Total Annuitants	1,524	$ 3,067,875	$ 2,013

	Number
Vested Terminated Members	766

Table D-1:
Active Members Distribution of
Full-Time Employees
as of June 30, 2020

Number of Employees

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	8	35	42	84	19								188
25 to 29	3	18	32	78	102	10							243
30 to 34	6	19	33	76	82	34	2			1			253
35 to 39	3	11	28	72	88	53	18	3			1		277
40 to 44	7	11	19	49	76	50	38	12	2				264
45 to 49	2	5	23	47	66	49	35	25	7				259
50 to 54	1	2	9	29	62	48	49	32	20	10			262
55 to 59	1	5	7	41	50	36	46	27	17	7	4		241
60 to 64	1	6	10	19	45	37	32	16	13	4	1	3	187
65 to 69	1	2	12	11	24	24	17	10	2	6	1	2	112
70 and up	1	1	6	19	26	24	15	8	6	4	1		111
Totals	34	115	221	525	640	365	252	133	67	32	8	5	2,397

Table D-2:
Distribution of Inactive Lives

Members Receiving Service Retirement Benefits as of June 30, 2020

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	-	$ -	$ -
50 to 54	-	$ -	-
55 to 59	84	208,350	2,480
60 to 64	232	492,915	2,125
65 to 69	349	717,975	2,057
70 to 74	341	663,765	1,947
75 to 79	251	485,580	1,935
80 to 84	164	307,665	1,876
85 to 89	64	124,380	1,943
90 and up	33	56,580	1,715
Totals	1,518	$ 3,057,210	$ 2,014

Members Receiving Disability Retirement Benefits as of June 30, 2020

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	-	$ -	$ -
50 to 54	-	-	-
55 to 59	-	-	-
60 to 64	-	-	-
65 to 69	1	1,050	1,050
70 to 74	-	-	-
75 to 79	-	-	-
80 to 84	-	-	-
85 to 89	-	-	-
90 and up	-	-	-
Totals	1	$ 1,050	$ 1,050

Table D-2:
Distribution of Inactive Lives

Survivors of Deceased Retired Members as of June 30, 2020

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	-	$ -	$ -
50 to 54	-	-	-
55 to 59	-	-	-
60 to 64	-	-	-
65 to 69	-	-	-
70 to 74	-	-	-
75 to 79	-	-	-
80 to 84	1	2,190	2,190
85 to 89	-	-	-
90 and up	-	-	-
Totals	1	$ 2,190	$ 2,190

Survivors of Deceased Active Members as of June 30, 2020

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	1	$ 1,260	$ 1,260
50 to 54	1	2,190	2,190
55 to 59	-	-	-
60 to 64	1	1,785	1,785
65 to 69	-	-	-
70 to 74	1	2,190	2,190
75 to 79	-	-	-
80 to 84	-	-	-
85 to 89	-	-	-
90 and up	-	-	-
Totals	4	$ 7,425	$ 1,856

Table D-2:
Distribution of Inactive Lives

Terminated Vested Members as of June 30, 2020
Number of Persons

Age	Number
<25	
25 to 29	1
30 to 34	6
35 to 39	49
40 to 44	36
45 to 49	77
50 to 54	117
55 to 59	153
60 to 64	125
65 to 69	85
70 and above	117
Total	766

Table D-3:
Data Reconciliation

The following table shows a reconciliation of the participants used in the previous valuation to this valuation. This chart reflects the counts used for valuation purposes as a result of data processing.

	Active Contributing Members	Terminated Vested Members	Service Retired Members	Disabled Members	Survivors and Beneficiaries
June 30, 2019 Valuation	2,245	777	1,484	1	3
Non-Vested Terminations	(227)	(2)	-	-	-
Vested Terminations	(43)	45	-	-	-
Service Retirements	(40)	(36)	76	-	-
Disability Retirements	-	-	-	-	-
Deaths	(3)	(3)	(38)	-	-
New Entrants	346	-	-	-	2
Rehires	119	(15)	-	-	-
Other	-	-	(4)	-	-
June 30, 2020 Valuation	2,397	766	1,518	1	5

Comparative Schedules

This section contains tables that summarize the experience of the System shown in present and past valuation reports.

Table E-1 shows a summary of the active members covered as of the various valuation dates.

Table E-2 shows a summary of the retired and inactive members as of the various valuation dates.

Table E-3 summarizes the contribution amounts determined by each annual actuarial valuation.

Table E-1:
Active Membership Data

Valuation Date (June 30)	Actives	Average Age	Average Years of Service	Average Hire Age
2020	2,401	45.1	9.1	36.1
2019	2,249	45.3	9.2	36.1
2018	2,026	45.6	9.2	36.3
2017	1,957	45.5	9.5	36.0
2016	1,895	45.6	9.8	35.8
2015	1,977	46.0	9.8	36.2
2014	1,935			
2013	2,101			
2012	2,106			

Table E-2:
Members in Receipt of Annuities and Inactive Membership Data

		All Annuitants					Terminated Members	
Valuation Date (June 30)	Number	Annual Benefits in Thousands	Average Annual Benefit	Average Current Age	Average Age at Retirement	Average Service at Retirement	Number Vested Terminated	Number Non-Vested Terminated
2020	1,524	3,068	2,013	71.9	60.1	19.2	766	
2019	1,488	2,985	2,007	71.7	60.1	19.1	777	
2018	1,474	2,953	2,004	71.4	59.8	19.1	815	
2017	1,438	2,871	1,997	71.2	59.9	19.0	824	
2016	1,425	2,831	1,987	71.0	59.8	19.0	878	
2015	1,371	2,377	1,734	70.9	59.7	18.7	905	
2014	1,332	2,314	1,737				939	
2013	1,285	2,235	1,739				884	
2012	1,242	2,118	1,705				879	

Table E-3:
Contribution Amounts

Valuation Date (June 30)	Calculated Employer Contribution	Normal Cost Amount*	UAAL Amount**	Actual State Contribution***
2020	$ 913,824	$ 404,455	$ 509,369	
2019	899,555	304,111	595,444	2,486,772
2018	823,290	162,169	661,121	2,370,454
2017	915,642	177,318	738,824	2,212,113
2016	1,109,996	271,371	838,625	2,064,561
2015	1,331,372	280,441	1,050,931	2,036,297
2014	890,358	245,657	644,701	1,913,482
2013	1,116,227	197,941	843,867	1,818,237
2012	1,125,222	199,294	879,482	1,711,321

* Includes administrative expenses starting with the 2014 Valuation Date.
** The UAAL amount is the contribution available to amortize the UAAL. It is equal to the total contribution, minus the normal cost.
*** The actual contribution amount is for the FYE on the June 30 following the valuation date.

The information presented in the required supplementary schedules was determined as part of the actuarial valuation as of June 30, 2020. Additional information as of the latest actuarial valuation follows.

Valuation date	June 30, 2020
Actuarial cost method	Entry Age Normal
Amortization method	Open
Remaining amortization period	4 Years
Asset valuation method	Four-year smoothed market
Actuarial assumptions:	
Investment rate of return*	7.65%
General wage growth*	N/A
Merit salary increases	N/A
*Includes inflation	2.75%

Gain and Loss in Accrued Liability During Years Ended June 30 Resulting from Differences Between Assumed Experience and Actual Experience						
	Gain or (Loss) for Year Ending June 30, (expressed in thousands)					
Type of Activity	2015	2016	2017	2018	2019	2020
Investment Income on Actuarial Value of Assets	$ 371	$ 180	$ 48	$ (385)	$ (274)	$ (310)
Combined Liability Experience	128	989	619	113	(365)	(126)
(Loss)/Gain During Year from Financial Experience	$ 499	$ 1,169	$ 667	$ (272)	$ (639)	$ (436)
Non-Recurring Items	(5,799)	0	(2,124)	0	0	0
Composite Gain or (Loss) During Year	$ (5,300)	$ 1,169	$ (1,457)	$ (272)	$ (639)	$ (436)

Schedule of Funding Progress (expressed in thousands)						
Valuation Date June 30,	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Funded Ratio	Unfunded AAL (UAAL)	Covered Payroll	UAAL as a Percentage of Covered Payroll
2020	$ 41,717	$ 47,868	87%	$ 6,152	N/A	N/A
2019	40,009	47,200	85%	7,191	N/A	N/A
2018	38,321	46,306	83%	7,984	N/A	N/A
2017	36,955	45,871	81%	8,917	N/A	N/A
2016	35,302	44,010	80%	8,708	N/A	N/A
2015	33,405	44,318	75%	10,913	N/A	N/A

Solvency Test Aggregate Accrued Liabilities for (expressed in thousands)							
Valuation Date June 30,	Active Member Contributions (1)	Retirees & Beneficiaries (2)	Active Member Employer Financed Contributions (3)	Actuarial Value of Reported Assets	Portion of Accrued Liability Covered by Reported Assets (1)	(2)	(3)
2020	$ -	$ 25,817	$ 22,052	$ 41,717	N/A	100%	72%
2019	-	25,295	21,905	40,009	N/A	100%	67%
2018	-	25,061	21,245	38,321	N/A	100%	62%
2017	-	24,509	21,363	36,955	N/A	100%	58%
2016	-	22,884	21,126	35,302	N/A	100%	59%
2015	-	22,161	22,157	33,405	N/A	100%	51%

The following definitions are largely excerpts from a list adopted in 1981 by the major actuarial organizations in the United States. In some cases the definitions have been modified for specific applicability to the Volunteer Firefighters' Compensation Act of the State of Montana. Defined terms are capitalized throughout this Appendix.

Accrued Benefit

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

Actuarial Accrued Liability

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

Actuarial Assumptions

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

Actuarial Cost Method

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

Actuarial Gains and Losses

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

Actuarial Present Value

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Valuation

The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

Actuarial Value of Assets

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

Actuarially Equivalent

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

Amortization Payment

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

Entry Age Actuarial Cost Method

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

Market Value of Assets

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

Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

Projected Benefits

Those pension plan benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits.

Unaccrued Benefit

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

Unfunded Actuarial Accrued Liability

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