

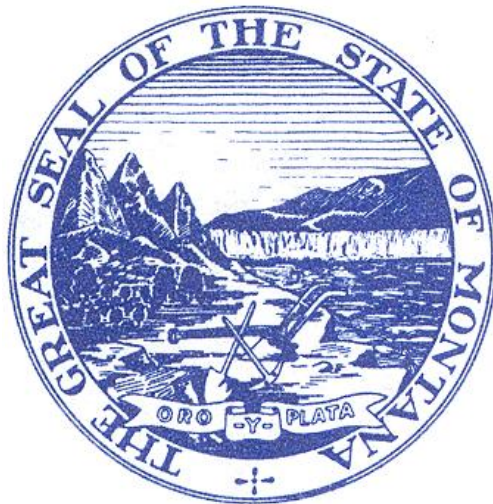


Cavanaugh Macdonald
CONSULTING, LLC

The experience and dedication you deserve

**Teachers' Retirement System
State of Montana**

**Actuarial Valuation
As of July 1, 2012**





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

September 25, 2012

Teachers' Retirement Board
State of Montana
1500 Sixth Avenue
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 Teachers' Retirement System of Montana (TRS), prepared as of July 1, 2012.

The purpose of this report is to provide a summary of the funded status of the System as of July 1, 2012 and to identify the annual employer contribution rate necessary to fund TRS on an actuarially sound basis in conformity with the Funding Policy adopted by the Board. While not verifying the data at source, the actuary performed tests for consistency and reasonability. On the basis of this valuation, it is recommended that employers make contributions to the Retirement System at the rate of 14.85% of payroll effective July 1, 2013. This is an increase of 4.89% over the current statutory rate.

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 percentage of payroll, on the assumption that payroll will increase by 4.50% annually. 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.

As a result of the actuarial valuation of the benefits in effect under the Montana Teachers' Retirement System as of July 1, 2012, we find the current statutory contribution is not sufficient to fund the Retirement System on an actuarially sound basis as set forth in the Board's adopted Funding and Benefits Policy. The stated objective of the policy is to amortize the unfunded liability over a closed 30 year period. The amortization period based on the current actuarial value of assets and statutory contribution rates is infinite. Measured by this standard, the System is not actuarially sound.

3550 Busbee Pkwy, Suite 250, Kennesaw, GA 30144

Phone (678) 388-1700 • Fax (678) 388-1730

www.CavMacConsulting.com

Offices in Englewood, CO • Kennesaw, GA • Bellevue, NE • Hilton Head Island, SC



September 25, 2012
Teachers' Retirement Board
Page 2

This is to certify that the independent consulting actuary is a member of the American Academy of Actuaries and has 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.

In our opinion, in order for the System to operate in an actuarially sound manner, contribution rates sufficient to fund TRS within the parameters defined by the Board's Funding and Benefits Policy and set forth herein are necessary for future fiscal years. Assuming that these contributions are made to the System, from year to year in the future at the rates recommended on the basis of the successive actuarial valuations, the continued sufficiency of the retirement fund to provide the benefits called for under the System may be safely anticipated.

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

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Edward Macdonald'.

Edward A. Macdonald, ASA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Todd B. Green'.

Todd B. Green, ASA, FCA, MAAA
Principal and Consulting Actuary

EAM:TBG/kc



**Teachers' Retirement System
State of Montana**

Table of Contents

| | Page |
|--|-------------|
| Section 1 Summary of Findings | 1 |
| Section 2 Assets | 9 |
| Table 1 Statement of Fiduciary Net Assets..... | 10 |
| Table 2 Statement of Changes in Fiduciary Net Assets..... | 11 |
| Table 3 Determination of Actuarial Value of Assets..... | 12 |
| Table 4 Historical Investment Returns..... | 13 |
| Table 5 Market Value of Assets vs. Actuarial Value of Assets..... | 14 |
| Section 3 Actuarial Present Value of Future Benefits | 15 |
| Table 6 Actuarial Present Value of Future Benefits for Contributing Members, Former Contributing Members, and Beneficiaries | 16 |
| Section 4 Employer Contributions | 17 |
| Table 7 Normal Cost Contribution Rates As Percentages of Salary | 19 |
| Table 8 Unfunded Actuarial Accrued Liability | 20 |
| Section 5 Cash Flows | 21 |
| Table 9 Cash Flow History | 22 |
| Table 10 Cash Flow Projection Statutory Basis..... | 23 |
| Table 11 Cash Flow Projection Annual Required Contribution Basis..... | 24 |
| Section 6 Actuarial Gains or Losses | 25 |
| Table 12 Analysis of Actuarial Gains or Losses..... | 26 |
| Appendix A Actuarial Procedures and Assumptions | 27 |
| Appendix B Summary of Benefit Provisions | 38 |
| Appendix C Valuation Data | 40 |
| Appendix D Comparative Schedules | 50 |
| Appendix E Glossary | 54 |



**Teachers' Retirement System
State of Montana**

Section I

Summary of Findings

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

(Dollar amounts in thousands)

| VALUATION DATE | July 1, 2012 | July 1, 2011 |
|--|---------------------|---------------------|
| Active members | | |
| Number | | |
| Full-Time Members | 12,202 | 12,506 |
| Part-Time Members | 6,170 | 5,978 |
| Annual valuation compensation | \$ 735,587 | \$ 746,694 |
| Retired members and beneficiaries | | |
| Number | 13,363 | 12,899 |
| Annual allowances | \$ 267,851 | \$ 250,500 |
| Inactive Members | | |
| Vested Terminated Members | 1,566 | 1,580 |
| Non-Vested Terminated Members | 11,172 | 10,727 |
| Assets | | |
| Actuarial value | \$ 2,852,007 | \$ 2,866,483 |
| Market value | 2,932,202 | 2,972,419 |
| Actuarial Accrued Liability (AAL) | \$ 4,814,726 | \$ 4,658,594 |
| Unfunded Actuarial Accrued Liability (UAAL) | \$ 1,962,719 | \$ 1,792,110 |
| Funded Ratio | 59.24% | 61.53% |
| Market Value Rate of Return | 2.21% | 21.67% |
| STATUTORY AND ANNUAL REQUIRED CONTRIBUTION EFFECTIVE 7/1/2013 | | |
| Total Normal Rate | | 9.65% |
| Employee Contribution Rate | | <u>7.15%</u> |
| Employer Normal Rate | | 2.50% |
| Employer Statutory Contribution Rate | | |
| Normal Rate | | 2.50% |
| UAAL Rate | | <u>7.46%</u> |
| Total Rate | | 9.96% |
| Amortization Period (Years) | | Infinite |
| Employer Contribution Necessary to Amortize Unfunded Liability Over 30 Years | | |
| Normal Rate | | 2.50% |
| UAAL Rate | | <u>12.35%</u> |
| Total Rate | | 14.85% |
| Required Increase in Statutory Contribution Rate | | 4.89% |



As a result of this actuarial valuation of the benefits in effect under the Montana Teachers' Retirement System as of July 1, 2012, we find the current schedule of contributions (shown in the "History of Legislated Contributions" below) is not sufficient to amortize the Unfunded Actuarial Accrued Liability (UAAL) of the Retirement System over 30 years. The Funded Ratio is 59.24%. A 30-year amortization period is the maximum acceptable amortization period specified in Statements No. 25 and 27 of the Governmental Accounting Standards Board (GASB). Therefore, when measured by that standard, the System is not actuarially sound. In addition, the current statutory contribution rates do not meet other parameters stated in the Board's Funding and Benefits Policy.

History of Legislated Contributions
(as a Percent of Pay)

School District and Other Employers

| | <u>Members</u> | <u>Employers</u> | <u>General fund</u> | <u>Total employee & employer</u> |
|-------------------------------|----------------|------------------|---------------------|--------------------------------------|
| Prior to July 1, 2007 | 7.15% | 7.47% | 0.11% | 14.73% |
| July 1, 2007 to June 30, 2009 | 7.15% | 7.47% | 2.39% | 16.73% |
| July 1, 2009 and after | 7.15% | 7.47% | 2.49% | 17.11% |

State and University Employers

| | <u>Members</u> | <u>Employers</u> | <u>General fund</u> | <u>Total employee & employer</u> |
|-------------------------------|----------------|------------------|---------------------|--------------------------------------|
| Prior to July 1, 2007 | 7.15% | 7.47% | 0.11% | 14.73% |
| July 1, 2007 to June 30, 2009 | 7.15% | 9.47% | 0.11% | 16.73% |
| July 1, 2009 and after | 7.15% | 9.85% | 0.11% | 17.11% |

Contribution Increases to Amortize UAAL Over 30 Years

Based on the results of the July 1, 2012 valuation, the current statutory contribution rate of 17.11% is not sufficient to amortize the UAAL over 30 years due primarily to recognition of prior years investment losses and contribution deficits. As a result, the required contribution rate determined as of July 1, 2012 indicates that the contributions to the System must be increased 4.89% of pay (17.11% to 22.00%) in order for the System to be funded in an actuarially sound manner and within the parameters defined by the TRS Board's Funding and Benefits Policy.

The required increases will meet the funding policy adopted by the Board and will amortize the UAAL over a 30 year period beginning July 1, 2013.

Calculations based on the Market Value of Assets

MCA 19-20-201 requires this report to show how market performance is affecting the actuarial funding of the Retirement System. The July 1, 2012 market value of assets is \$80.2 million more 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 amortization period would be 99 years, and the Funded Ratio would be 60.90%.

Based on market assets, a contribution increase of 4.34% of pay (17.11% to 21.45%) is projected to amortize the UAAL over a 30 year period beginning July 1, 2013.



Additional Details

MCA 19-20-604 states that the contribution from the State General Fund will be reduced by 0.11% when the amortization period of the System's UAAL is 10 years or less according to the System's latest actuarial valuation.

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 2.21% net of investment and operating expenses. As a result of prior years unrecognized losses, the actuarial assets earned 3.21% which is 4.54% less than the actuarial assumption of 7.75%. 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 following chart compares the annual returns for the past ten years.

| Year | Market Return | Actuarial Return | Market Return over Assumption* | Actuarial Return over Assumption* |
|-----------------------|---------------|------------------|--------------------------------|-----------------------------------|
| 7/1/2002 to 6/30/2003 | 6.16% | 1.60% | (1.84)% | (6.40)% |
| 7/1/2003 to 6/30/2004 | 13.31% | 2.12% | 5.31% | (5.88)% |
| 7/1/2004 to 6/30/2005 | 8.04% | 2.71% | 0.29% | (5.04)% |
| 7/1/2005 to 6/30/2006 | 8.91% | 8.46% | 1.16% | 0.71% |
| 7/1/2006 to 6/30/2007 | 17.64% | 10.22% | 9.89% | 2.47% |
| 7/1/2007 to 6/30/2008 | (4.88)% | 7.18% | (12.63)% | (0.57)% |
| 7/1/2008 to 6/30/2009 | (20.80)% | (10.26)% | (28.55)% | (18.01)% |
| 7/1/2009 to 6/30/2010 | 12.87% | 9.78% | 5.12% | 2.03% |
| 7/1/2010 to 6/30/2011 | 21.67% | (0.13)% | 13.92% | (7.88)% |
| 7/1/2011 to 6/30/2012 | 2.21% | 3.21% | (5.54)% | (4.54)% |

* The actuarial assumption was 8.0% through 6/30/2004 and 7.75% thereafter.

Asset gains or losses result when the return on the actuarial value of assets differs from the actuarial investment return assumption of 7.75% (8.0% before July 1, 2004).

On a market value basis the System earned \$345.0 million more than anticipated by the 7.75% assumption in the year ended June 30, 2011 and \$161.8 million less than anticipated by the 7.75% assumption in the year ended June 30, 2012. The net result as of July 1, 2012 is that the market value of assets is \$80.2 million more than the actuarial value of assets. This \$80.2 million in unrecognized asset gains will cause the contributions needed to amortize the UAAL in future valuations to decrease. However, to stay financially sound in the future, the System will need either (1) additional future gains such as asset returns over the 7.75% assumption, or (2) an increase in contribution rates or some of both.



Recent Contribution Increases

As shown in the “History of Legislated Contributions” at the beginning of this section, the employer contributions from the General Fund have increased to 2.49% of pay as of July 1, 2009. The supplemental contribution to ensure university member benefits are funded by university employers supplemental contribution rate was increased from 4.04% to 4.72% of Optional Retirement Plan (ORP) member pay at July 1, 2007. These additional contributions helped bring the amortization period of the System’s UAAL under 30 years at July 1, 2007. The valuation that determined the 4.72% contribution rate of ORP member pay was based on the valuation completed as of July 1, 2006. Based on the recent ORP valuation completed as of July 1, 2010, the supplemental contribution needs to be increased to 8.54% to maintain actuarial soundness and an amortization period within 30 years. Unfortunately, cumulative poor asset performance for the three years ended June 30, 2010 resulted in the increase in contributions.

Amortization Period Changes

The July 1, 2011 actuarial valuation calculated an amortization period of 71 years for the UAAL. The experience loss (primarily asset losses) increased the amortization period. The resulting amortization period at July 1, 2012 is infinite.

Funding and Benefits Policy

The Teachers’ Retirement System 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) Additional Funding

- a) The Funding and Benefits Policy states: “The Board will recommend to the Governor and the Legislature that funding of the Retirement System be increased and/or liabilities of the Retirement System be reduced, whenever the most recent actuarial valuation shows the amortization period or the unfunded liabilities 1) exceeds 30 years, and the Board cannot reasonably anticipate that the amortization period will decline or the funded ratio will improve without an increase in funding sources and/or a reduction in liabilities, or 2) is less than 30 years, but has increased over prior valuations and is projected to continue to grow.”

The Funding and Benefits Policy also states: “The Board may determine that surplus funds are available and recommend contribution reductions and/or benefit modifications only when the retirement system has no unfunded actuarial accrued liability, a stabilization reserve fund equal to at least 10% of the actuarial accrued liability is established, and the Board determines that sufficient additional reserves are retained to reasonably allow for adverse experience. The Board will not make a recommendation to reduce contribution rates or increase benefits which would result in contribution rates being less than the rate required to meet the normal cost plus 1.0%”

- b) Analysis: The amortization period at July 1, 2012 is infinite based on actuarial assets and 99 years based on market assets. Assuming experience follows the actuarial assumptions, the amortization period is projected to remain above 30 years based on both measures for some time to come. Therefore, the guidance in the Board’s Funding and Benefits Policy indicates the Board should “recommend to the legislature that funding be increased and/or liabilities be reduced.”



2) Ultimate Goal

- a) It is the desire of the Board to fully fund TRS. However, until the System becomes fully funded, any unfunded liability will be amortized over a closed period of no more than 30 years and funded as a level percent of pay. At such time as the System becomes fully funded and has a stabilization reserve of at least 10% of the actuarial accrued liability, the allowed amortization period for any subsequent unfunded liability will be reduced to a closed period of not greater than 20 years.
- b) Analysis: This goal is currently a long way off. This is represented by a 99 year and infinite amortization periods on a market value of assets and an actuarial value of assets basis respectively. Discipline will be required by all parties concerned to reach this goal and will have to include contribution increases to achieve and maintain the amortization period within 30 years.

3) Benefit Enhancements

- a) The Funding and Benefits Policy states: "Pursuant to 19-20-102, MCA, benefit enhancements should provide equitable retirement benefits to members of the Teachers' Retirement System based on each member's normal service and salary, limit the effect on the Retirement System of isolated salary increases received by a member, including, but not limited to end-of-career promotions or one-time salary enhancements during the member's last years of employment, and be equitably allocated among active members and retirees with consideration for intergenerational equity. Any recommendation for a benefit enhancement must include recommendations for necessary additional funding or other benefit reductions to cover any increase in normal cost arising from the recommended enhancements and to amortize any increase in the unfunded actuarial accrued liabilities arising from the recommended enhancements over a period not to exceed 25 years.

The Board will determine its position with respect to supporting or opposing legislation, on a case-by-case basis, and will apply this policy, actuarial standards, actuarial funding standards, and other industry-standard information and resources it finds persuasive, as decision guides. The Board may not support legislation to enhance benefits if the funded ratio is less than 85%, and the amortization period is greater than 20 years."

- b) Analysis: Since the funded ratio at July 1, 2012 of 59.24% is below 85% the Board's Funding and Benefits policy does not currently support enhanced benefits, even if funding of increased UAAL over 25 years is included.

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. We have amortized changes in the UAAL over 30 years for the purpose of these illustrations.



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

| <u>Impact of Assuming 0.5% Lower Investment Return</u> | |
|--|---|
| | <u>Funded Ratio</u> |
| Current Assumption 7.75% | 59.24% |
| Lower Assumption 7.25% | <u>56.13%</u> |
| Change | (3.11)% |
| | <u>Implied Contribution Increase / (Decrease)</u> |
| Normal Cost Rate | 1.15% |
| 30 year amortization of UAAL | <u>1.72%</u> |
| Increase | 2.87% |
| <u>Impact of Assuming 1.0% Lower Investment Return</u> | |
| | <u>Funded Ratio</u> |
| Current Assumption 7.75% | 59.24% |
| Lower Assumption 6.75% | <u>53.09%</u> |
| Change | (6.15)% |
| | <u>Implied Contribution Increase / (Decrease)</u> |
| Normal Cost Rate | 2.48% |
| 30 year amortization of UAAL | <u>3.38%</u> |
| Increase | 5.86% |



| Impact of Assuming 1.5% Lower Investment Return | |
|---|---|
| | <u>Funded Ratio</u> |
| Current Assumption 7.75% | 59.24% |
| Lower Assumption 6.25% | <u>50.13%</u> |
| Change | (9.11)% |
| | <u>Implied Contribution Increase / (Decrease)</u> |
| Normal Cost Rate | 4.02% |
| 30 year amortization of UAAL | <u>4.99%</u> |
| Increase | 9.01% |

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 period of the UAAL is not likely to decrease by the expected 1.0 year with each passing actuarial valuation. Instead, the amortization period is expected to decrease more or less than 1.0 years each year, 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 rate changes since the ones documented at the beginning of this summary.

Method Changes

Since the previous valuation, there have been no methodology changes.



Impact of Changes

The following table summarizes how experience has changed the UAAL since the July 1, 2011 Actuarial Valuation. Further detail can be found in Table 12.

Changes in the Unfunded Actuarial Accrued Liability (UAAL)

(In millions)

| | |
|--|-----------------|
| July 1, 2011 Valuation UAAL | \$ 1,792.1 |
| Expected Increase | <u>58.7</u> |
| Expected July 1, 2012 UAAL | \$ 1,850.8 |
| Experience Gain on Actuarial Liabilities | \$ (16.0) |
| Experience Loss on Actuarial Assets | \$128.0 |
| Assumption and Method Changes | <u>0.0</u> |
| Total Loss | <u>\$ 112.0</u> |
| July 1, 2012 Valuation UAAL | \$ 1,962.7 |



Teachers' Retirement System State of Montana

Summary

- * The System's actuarial value investment return of 3.21% for the year ended June 30, 2012 is 4.54% less than the actuarial assumption of 7.75%. This represents an asset loss of \$128.0 million due to investment return less than anticipated. The actuarial value of assets is not allowed to be greater than 120% or less than 80% of the market value of assets. As of July 1, 2012, the market value of assets was \$2,932.2 million. As of July 1, 2012 the preliminary actuarial value of assets was \$2,852.0 million. Since the preliminary actuarial value is within the corridor no adjustment is required to the preliminary actuarial value of assets. The July 1, 2012 market value of assets is \$80.2 million more than the actuarial value of assets. This \$80.2 million gain will be recognized in future actuarial valuations unless it is offset by returns less than the 7.75% assumption.
- * The amortization period of the UAAL is infinite. The guidance in the Board's Funding and Benefits Policy indicates the Board should "recommend to the legislature that funding be increased and/or liabilities be reduced." The Policy's ultimate goal is to increase the current net funded ratio of 59.24% above 110% to encourage stable contribution rates.
- * 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 7.75% 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 smoothes gains and losses over four years.



Teachers' Retirement System State of Montana

Section 2

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 July 1, 2012. 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. The actuarial value of assets is not allowed to be greater than 120% or less than 80% of the market value of assets.

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 15 years including the amount recognized by the actuarial asset valuation method which was greater or lesser than the actuarial investment return assumption.



**Teachers' Retirement System
State of Montana**

Table 1

Statement of Fiduciary Net Assets

| | <u>TOTAL TRS 2012</u> | <u>TOTAL TRS 2011</u> |
|--|---------------------------|---------------------------|
| ASSETS | | |
| Cash/Cash Equivalents-Short Term | | |
| Investment Pool | \$ 34,990,630 | \$ 49,573,673 |
| Receivables: | | |
| Accounts Receivable | 18,239,103 | 18,726,665 |
| Interest Receivable | 3,943,728 | 4,462,165 |
| Total Receivables | <u>\$ 22,182,831</u> | <u>\$ 23,188,830</u> |
| Investments, at fair value: | | |
| Investment Pools | 2,875,013,588 | 2,899,968,475 |
| Other Investments | 452,251 | - |
| Securities Lending Collateral | 130,643,155 | 146,389,177 |
| Total Investments | <u>\$ 3,006,108,994</u> | <u>\$ 3,046,357,652</u> |
| Assets Used in Plan Operations: | | |
| Land and Buildings | \$ 193,844 | \$ 193,844 |
| Less: Accumulated Depreciation | (150,545) | (150,545) |
| Equipment | 142,697 | 142,697 |
| Less: Accumulated Depreciation | (91,521) | (70,489) |
| Prepaid Expenses | - | 6,401 |
| Intangible Assets, net of amortization | 13,603 | 28,443 |
| Total Other Assets | <u>\$ 108,078</u> | <u>\$ 150,351</u> |
| TOTAL ASSETS | <u>\$ 3,063,390,533</u> | <u>\$ 3,119,270,506</u> |
| LIABILITIES | | |
| Accounts Payable | \$ 126,636 | \$ 86,396 |
| Securities Lending Liability | 130,643,155 | 146,389,177 |
| Compensated Absences | 178,869 | 180,541 |
| OPEB Implicit Rate Subsidy | 239,397 | 195,172 |
| TOTAL LIABILITIES | <u>\$ 131,188,057</u> | <u>\$ 146,851,286</u> |
| NET ASSETS HELD IN TRUST FOR PENSION BENEFITS | <u>\$ 2,932,202,476</u> | <u>\$ 2,972,419,220</u> |



**Teachers' Retirement System
State of Montana**

Table 2

Statement of Changes in Fiduciary Net Assets

| | TOTAL TRS 2012 | TOTAL TRS 2011 |
|--|--------------------------------|--------------------------------|
| ADDITIONS | | |
| Contributions: | | |
| Employer | \$ 72,422,404 | \$ 72,879,950 |
| Plan Member | 62,745,441 | 62,993,192 |
| Other | 16,843,766 | 17,437,366 |
| Total Contributions | <u>\$ 152,011,611</u> | <u>\$ 153,310,508</u> |
| Misc Income | \$ 9,689 | \$ 16,539 |
| Investment Income: | | |
| Net Appreciation/(Depreciation) in Fair Value of Investments | \$ (8,013,031) | \$ 455,020,967 |
| Investment Earnings | 89,331,577 | 99,119,730 |
| Security Lending Income | 1,177,164 | 1,200,925 |
| Investment Income/(Loss) | <u>\$ 82,495,710</u> | <u>\$ 555,341,622</u> |
| Less: Investment Expense | 15,891,193 | 15,978,901 |
| Less: Security Lending Expense | 263,225 | 334,365 |
| Net Investment Income/(Loss) | <u>\$ 66,341,292</u> | <u>\$ 539,028,356</u> |
| Total Additions | <u>\$ 218,362,592</u> | <u>\$ 692,355,403</u> |
| DEDUCTIONS | | |
| Benefit Payments | \$ 251,410,455 | \$ 235,122,805 |
| Withdrawals | 5,294,856 | 4,364,713 |
| Administrative Expense | 1,829,800 | 1,843,368 |
| OPEB Expenses | 46,055 | 51,017 |
| Total Deductions | <u>\$ 258,581,166</u> | <u>\$ 241,381,903</u> |
| NET INCREASE (DECREASE) IN PLAN NET ASSETS | \$ (40,218,574) | \$ 450,973,500 |
| NET ASSETS HELD IN TRUST FOR PENSION BENEFITS BEGINNING OF YEAR | \$ 2,972,419,220 | \$ 2,521,445,720 |
| ADJUSTMENT | \$ 1,830 | \$ - |
| END OF YEAR | <u><u>\$ 2,932,202,476</u></u> | <u><u>\$ 2,972,419,220</u></u> |

**Teachers' Retirement System
State of Montana
Table 3**



Determination of Actuarial Value of Assets

| Valuation Date July 1: | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|----------------------|----------------------|-------------------|-------------------|---------------------|
| A. Actuarial Value Beginning of Year | \$ 2,956,583,029 | \$ 2,866,483,194 | | | |
| B. Market Value End of Year | 2,972,419,220 | 2,932,202,476 | | | |
| C. Market Value of Beginning of Year | 2,521,445,720 | 2,972,419,220 | | | |
| D. Cash Flow | | | | | |
| D1. Contributions | 153,310,508 | 152,011,611 | | | |
| D2. Benefit Payments | <u>(239,487,518)</u> | <u>(256,705,311)</u> | | | |
| D3. Net | \$ (86,177,010) | \$ (104,693,700) | | | |
| E. Investment Income | | | | | |
| E1. Market Total: B. - C. - D3. | \$ 537,150,510 | \$ 64,476,956 | | | |
| E2. Assumed Rate | 7.75% | 7.75% | | | |
| E3. Amount for Immediate Recognition | 192,072,684 | 226,305,609 | | | |
| E4. Amount for Phased-in Recognition | 345,077,826 | (161,828,653) | | | |
| F. Phased-In Recognition of Investment Income | | | | | |
| F1. Current Year: 0.25 * E4. | \$ 86,269,457 | \$ (40,457,163) | \$ - | \$ - | \$ - |
| F2. First Prior Year | 29,028,252 | 86,269,457 | (40,457,163) | - | - |
| F3. Second Prior Year | (210,928,844) | 29,028,252 | 86,269,457 | (40,457,163) | - |
| F4. Third Prior Year | <u>(100,364,374)</u> | <u>(210,928,844)</u> | <u>29,028,252</u> | <u>86,269,457</u> | <u>(40,457,163)</u> |
| F5. Total Recognized Investment Gain | \$ (195,995,509) | \$ (136,088,298) | \$ 74,840,546 | \$ 45,812,294 | \$ (40,457,163) |
| G. Preliminary Actuarial Value End of Year A. + D3. + E3. + F5. | \$ 2,866,483,194 | \$ 2,852,006,805 | | | |
| H. Corridor | | | | | |
| H1. 80% of Market Value | \$ 2,377,935,376 | \$ 2,345,761,981 | | | |
| H2. 120% of Market Value | 3,566,903,064 | 3,518,642,971 | | | |
| I. Actuarial Value End of Year G. Not Less than H1. or Not Greater than H2 | \$ 2,866,483,194 | \$ 2,852,006,805 | | | |
| J. Difference Between Market & Actuarial Values | \$ 105,936,026 | \$ 80,195,671 | | | |



**Teachers' Retirement System
State of Montana**

Table 4

Historical Investment Returns*

| Fiscal Year Ending | Market Returns | Actuarial Returns | Actuarial Return Over 8.00% Assumption |
|-------------------------------|-----------------------|--------------------------|---|
| June 30, 1998 | 16.6% | 16.0% | 8.0% |
| June 30, 1999 | 11.9% | 12.3% | 4.3% |
| June 30, 2000 | 7.8% | 12.8% | 4.8% |
| June 30, 2001 | (5.1)% | 9.2% | 1.2% |
| June 30, 2002 | (7.3)% | 3.8% | (4.2)% |
| June 30, 2003 | 6.2% | 1.6% | (6.4)% |
| June 30, 2004 | 13.3% | 2.1% | (5.9)% |
| Fiscal Year Ending | Market Returns | Actuarial Returns | Actuarial Return Over 7.75% Assumption |
| June 30, 2005 | 8.0% | 2.7% | (5.0)% |
| June 30, 2006 | 8.9% | 8.5% | 0.7% |
| June 30, 2007 | 17.6% | 10.2% | 2.5% |
| June 30, 2008 | (4.9)% | 7.2% | (0.6)% |
| June 30, 2009 | (20.8)% | (10.3)% | (18.0)% |
| June 30, 2010 | 12.9% | 9.8% | 2.0% |
| June 30, 2011 | 21.7% | (0.1)% | (7.9)% |
| June 30, 2012 | 2.2% | 3.2% | (4.6)% |
| 15 Year Average | 5.3% | 5.7% | (2.1)% |

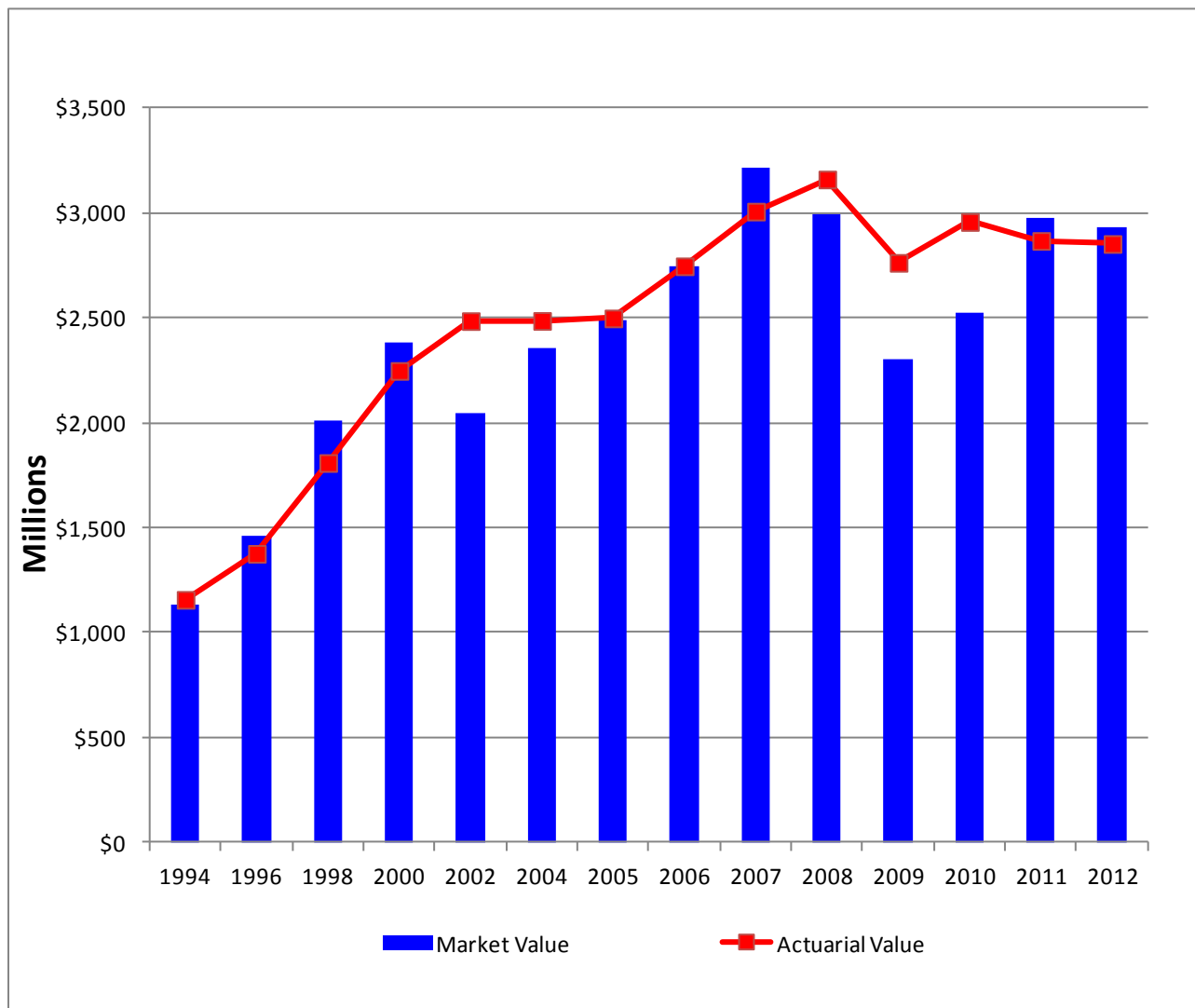
* Returns reflect all investment returns, including investment income and realized and unrealized investment gains and losses, and are net of investment expenses and administrative expenses paid by the System.



Teachers' Retirement System State of Montana

Table 5

Market Value of Assets vs. Actuarial Value of Assets





Teachers' Retirement System State of Montana

Section 3

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 contributing members, for former contributing members, 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.



**Teachers' Retirement System
State of Montana**

Table 6

**Actuarial Present Value of Future Benefits
for Contributing Members, Former Contributing
Members, and Beneficiaries**

(All amounts are actuarial present values in millions)

| | <u>July 1, 2012</u> <u>Total</u> | <u>July 1, 2011</u> <u>Total</u> |
|---|-------------------------------------|-------------------------------------|
| A. Active Members | | |
| Service Retirement | \$ 2,303.9 | \$ 2,332.0 |
| Disability Retirement | 13.7 | 13.8 |
| Survivors' Benefits | 52.9 | 53.5 |
| Vested Retirement | 30.6 | 30.1 |
| Refund of Member Contributions | 29.5 | 29.8 |
| Total | \$ 2,430.6 | \$ 2,459.2 |
| B. Inactive Members and Annuitants | | |
| Service Retirement | \$ 2,710.8 | \$ 2,545.2 |
| Disability Retirement | 21.7 | 20.8 |
| Beneficiaries* | 166.5 | 155.4 |
| Vested Terminated Members | 54.5 | 55.0 |
| Refund of Member Contributions | 18.2 | 16.5 |
| Total | \$ 2,971.7 | \$ 2,792.9 |
| C. Grand Total | \$ 5,402.3 | \$ 5,252.1 |

* Includes survivors of active and retired members and children's benefits



Teachers' Retirement System State of Montana

Section 4

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 two elements:

A normal cost amount, which ideally is relatively stable as a percentage of salary over the years;

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.

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 based upon the Board's adopted funding policy.

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. Line C shows the actuarial accrued liability. Line E shows the amount of assets available for benefits. Line F shows the UAAL.

The amortization of the UAAL assumes university supplemental contributions are made as a percent of pay for members of the Optional Retirement Plan (ORP) until June 30, 2033. Under Section 19-20-621, periodic separate valuations are to be performed to measure the liabilities of benefits to be paid under the Teachers' Retirement System (TRS) for Montana University System (MUS) members. The MUS valuations calculate contribution rates that finance the university member benefits with university contributions and reflect actual experience including investment returns. Therefore the university supplemental contribution rate has varied from time to time. Recently it has varied as follows:

| Supplemental University Contribution Rate | Fiscal Years Ending |
|--|--------------------------------|
| 2.81% | June 30, 1998 |
| 3.12% | June 30, 1999 |
| 3.42% | June 30, 2000 |
| 3.73% | June 30, 2001 |
| 4.04% | June 30, 2002 to June 30, 2007 |
| 4.72% | June 30, 2008 to June 30, 2033 |

The supplemental contribution to ensure university member benefits are funded by university employers was increased from 4.04% to 4.72% of ORP member pay effective July 1, 2007. The valuation that determined the 4.72% contribution rate of ORP member pay was based on the valuation completed as of July 1, 2006. Based on the recent ORP valuation completed as of July 1, 2010, the supplemental contribution needs to be increased to 8.54% of member pay to maintain actuarial soundness and an amortization period within 30 years. Loss of asset value based on poor market performance for the three years ended June 30, 2010 resulted in the recommended increase in contributions.

The value of future supplemental university contributions included in the July 1, 2012 TRS valuation is \$152.4 million based on a 4.72% contribution rate until July 1, 2033.

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.



**Teachers' Retirement System
State of Montana**

Table 7

**Normal Cost Contribution Rates
As Percentages of Salary**

| | <u>July 1, 2012 Total</u> | <u>July 1, 2011 Total</u> |
|--------------------------------|-------------------------------|-------------------------------|
| Service retirement | 7.73% | 7.72% |
| Disability retirement | 0.08% | 0.08% |
| Survivors' benefits | 0.26% | 0.26% |
| Vested retirement | 0.43% | 0.42% |
| Refund of member contributions | <u>1.15%</u> | <u>1.16%</u> |
| Total Normal Rate | <u>9.65%</u> | <u>9.64%</u> |
| Employee Normal Rate | 7.15% | 7.15% |
| Employer Normal Rate | 2.50% | 2.49% |



**Teachers' Retirement System
State of Montana**

Table 8

**Unfunded Actuarial Accrued Liability
(Dollar amounts in millions)**

| | July 1, 2012 | July 1, 2011 |
|--|---------------------|---------------------|
| A. Actuarial present value of all future benefits for present and former members and their survivors (Table 6) | \$ 5,402.3 | \$ 5,252.1 |
| B. Less actuarial present value of total future normal costs for present members | <u>587.6</u> | <u>593.5</u> |
| C. Actuarial accrued liability | \$ 4,814.7 | \$ 4,658.6 |
| D. Less assets available for benefits | <u>2,852.0</u> | <u>2,866.5</u> |
| E. Unfunded actuarial accrued liability | \$ 1,962.7 | \$ 1,792.1 |



Teachers' Retirement System State of Montana

Section 5

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 negative cash flow for the year ended June 30, 2012. The System’s total cash flow including benefits payments, administrative expenses and investment earnings was (\$40.2) million. Of the (\$40.2) million, \$66.3 million was due to investment returns.

Table 10 shows that at the current statutory contribution rate and if the System’s assets earn the assumed investment rate of return of 7.75%, the System has a positive cash flow that is trending to become negative after reflecting benefit payments, contributions and investment earnings. This is due to the fact that the current statutory contribution is no longer adequate to fund the System in an actuarial sound manner.

Table 11 shows that if the contributions are contributed to the System as recommended by the Actuary and the System’s assets earn the assumed rate of 7.75%, the System is projected to have a positive cash flow in all future years.

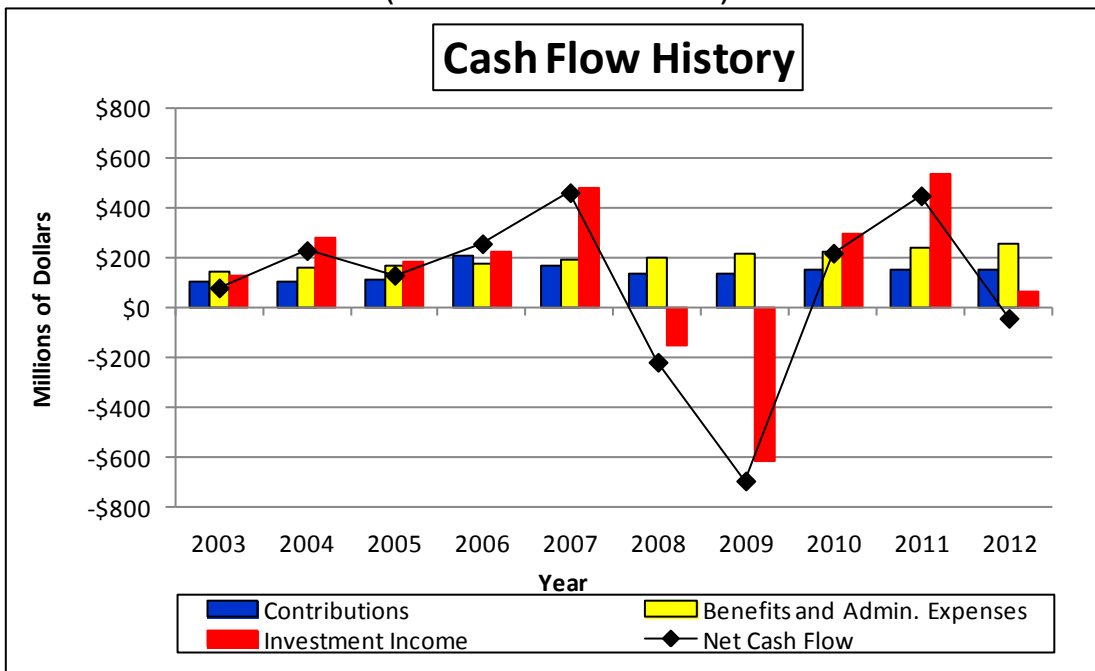
As long as the System had a positive cash flow, there was no need to plan where the funds would come from to pay benefits since benefits could be paid by incoming contributions. A negative cash flow, as defined above, requires planning what funds will be used to pay the difference between benefits and contributions. We are providing these projections to aid in developing the investment strategy for the System’s assets.



**Teachers' Retirement System
State of Montana**

Table 9

**Cash Flow History
(Dollar amounts in millions)**



| Historical Cash Flows | | | | |
|------------------------------|---------------|------------------------------------|-------------------|---------------|
| Year Ended | Contributions | Benefits & Administrative Expenses | Investment Income | Net Cash Flow |
| June 30 | | | | |
| 2003 | \$ 104.3 | \$ 148.6 | \$ 126.2 | \$ 81.9 |
| 2004 | 107.9 | 158.5 | 281.8 | 231.2 |
| 2005 | 110.7 | 167.1 | 188.7 | 132.3 |
| 2006 | 212.3 * | 178.4 | 224.8 | 258.7 |
| 2007 | 169.2 ** | 190.4 | 484.5 | 463.3 |
| 2008 | 141.0 | 203.6 | (153.3) | (215.9) |
| 2009 | 138.3 | 217.0 | (612.8) | (691.5) |
| 2010 | 152.3 | 226.3 | 295.0 | 221.0 |
| 2011 | 153.3 | 241.4 | 539.0 | 450.9 |
| 2012 | 152.0 | 258.6 | 66.3 | (40.2) |

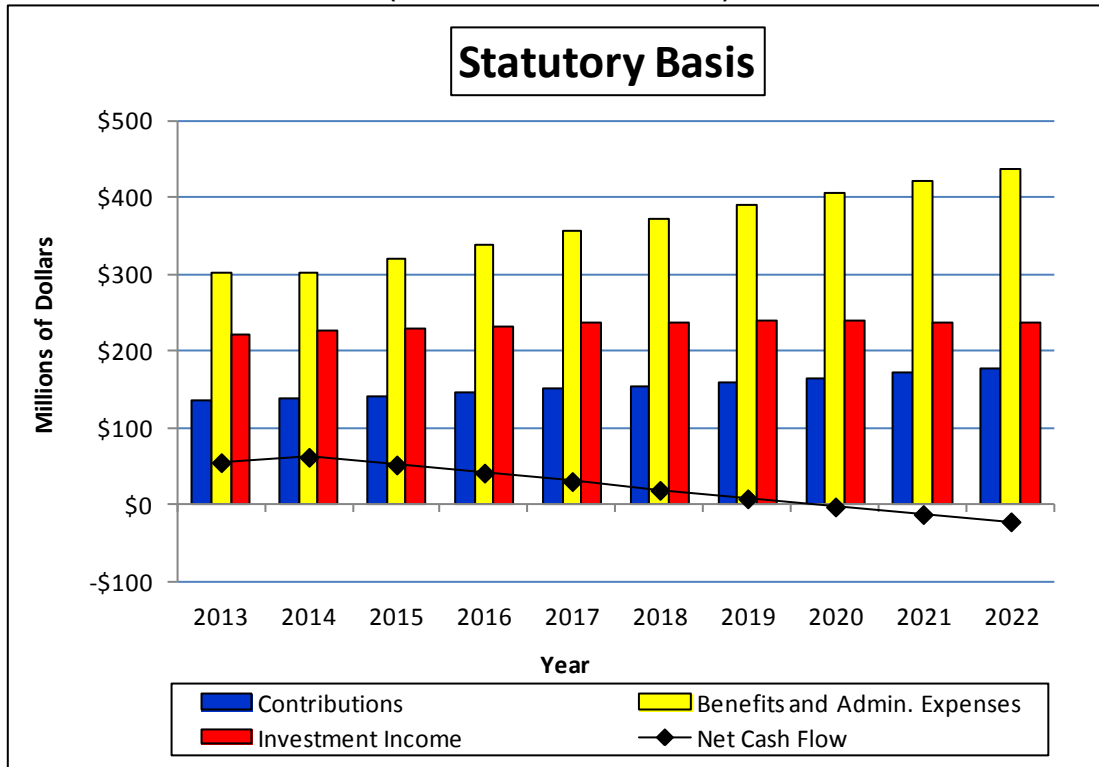
* Reflects \$100 million transfer to TRS
 ** Reflects \$50 million transfer to TRS



Teachers' Retirement System State of Montana

Table 10

Cash Flow Projections (Dollar amounts in millions)



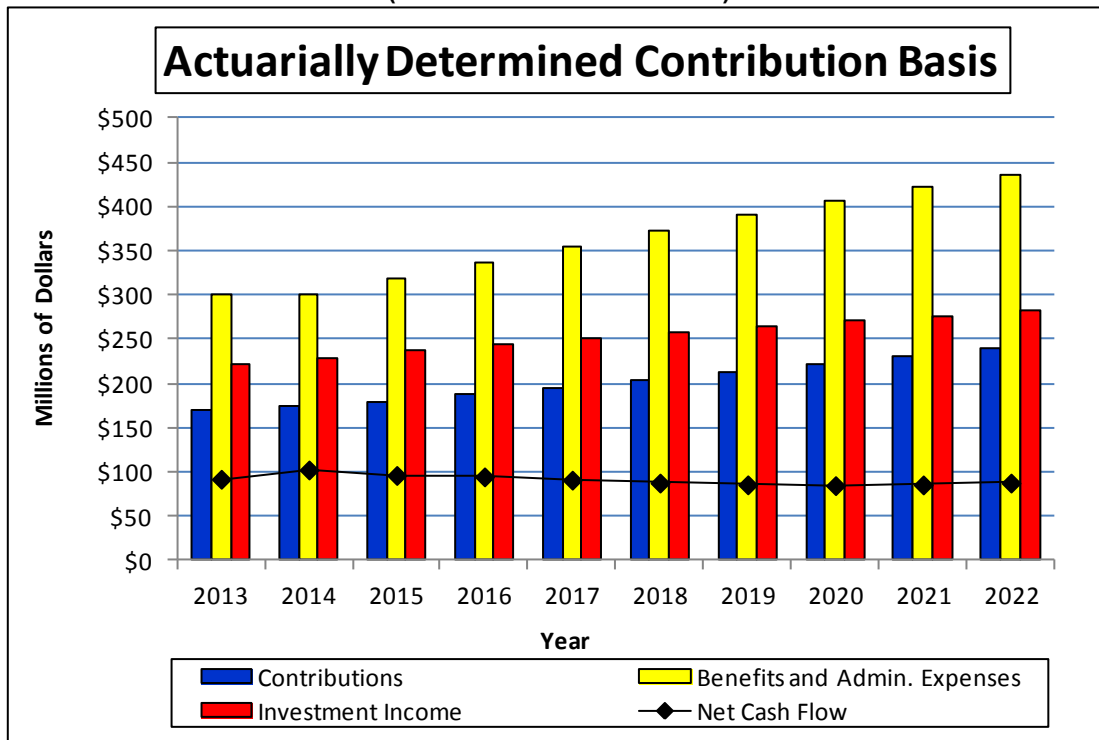
| Year Ended June 30 | Projected Cash Flows | | | |
|--------------------------|-----------------------------|--|---------------------------------|------------------|
| | Statutory Contributions | Benefits & Administrative Expenses | Assumed Investment Income | Net Cash Flow |
| 2013 | \$ 134.8 | \$ 300.7 | \$ 220.8 | \$ 54.9 |
| 2014 | 137.9 | 301.2 | 225.2 | 61.9 |
| 2015 | 141.6 | 319.1 | 229.4 | 51.9 |
| 2016 | 145.5 | 337.1 | 232.9 | 41.3 |
| 2017 | 149.8 | 355.1 | 235.6 | 30.3 |
| 2018 | 154.4 | 373.0 | 237.4 | 18.8 |
| 2019 | 159.4 | 390.0 | 238.4 | 7.8 |
| 2020 | 164.8 | 406.2 | 238.6 | (2.8) |
| 2021 | 170.7 | 421.4 | 238.0 | (12.7) |
| 2022 | 177.0 | 435.9 | 236.7 | (22.2) |



**Teachers' Retirement System
State of Montana**

Table 11

**Cash Flow Projections
(Dollar amounts in millions)**



| Year Ended June 30 | Projected Cash Flows | | | |
|--------------------|-------------------------------|------------------------------------|---------------------------|---------------|
| | Annual Required Contributions | Benefits & Administrative Expenses | Assumed Investment Income | Net Cash Flow |
| 2013 | \$ 170.5 | \$ 300.7 | \$ 222.2 | \$ 92.0 |
| 2014 | 174.2 | 301.2 | 229.5 | 102.5 |
| 2015 | 178.5 | 319.1 | 236.9 | 96.3 |
| 2016 | 187.8 | 337.1 | 244.0 | 94.7 |
| 2017 | 195.2 | 355.1 | 250.9 | 91.0 |
| 2018 | 203.1 | 373.0 | 257.6 | 87.7 |
| 2019 | 211.6 | 390.0 | 264.1 | 85.7 |
| 2020 | 220.6 | 406.2 | 270.4 | 84.8 |
| 2021 | 230.2 | 421.4 | 276.8 | 85.6 |
| 2022 | 240.4 | 435.9 | 283.2 | 87.7 |



**Teachers' Retirement System
State of Montana**

Section 6

Actuarial Gains or Losses

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

The results of our analysis of the financial experience of the System in the three most recent regular actuarial valuations are presented in Table 12. 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 assumption studies.

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



**Teachers' Retirement System
State of Montana**

Table 12

Analysis of Actuarial Gains or Losses*
(Dollar amounts in millions)

| | UAAL (Gain)/Loss | | |
|--|-------------------------|----------------------|----------------------|
| | June 30, 2012 | June 30, 2011 | June 30, 2010 |
| Investment Income | | | |
| Investment income was (greater) less than expected based on actuarial value of assets. | \$ 128.0 | \$ 229.8 | \$ (55.2) |
| Pay Increases | | | |
| Pay increases were (less) greater than expected. | (58.2) | (36.7) | (22.0) |
| Age & Service Retirements | | | |
| Members retired at (older) younger ages or with (less) greater final average pay than expected | 19.8 | 19.0 | 13.0 |
| Disability Retirements | | | |
| Disability claims were (less) greater than expected | 0.4 | 0.2 | 0.5 |
| Death-in-Service Benefits | | | |
| Survivor claims were (less) greater than expected | (0.1) | (0.5) | (0.4) |
| Withdrawal From Employment | | | |
| (More) less reserves were released by withdrawals than expected | 6.7 | 5.4 | 6.6 |
| Death After Retirement | | | |
| Retirees (died younger) lived longer than expected | 4.6 | 2.6 | (3.5) |
| Data Adjustments and Benefit Payment Timing | | | |
| Service purchases, data corrections, etc. | 10.2 | (10.9) | - |
| Other | | | |
| Miscellaneous (gains) and losses | <u>0.5</u> | <u>5.8</u> | <u>24.4</u> |
| Total (Gain) or Loss During Period From Financial Experience | \$ 111.9 | \$ 214.7 | \$ (36.6) |
| Non-Recurring Items. | | | |
| Changes in actuarial assumptions and methods | - | - | 156.6 |
| Changes in benefits caused a (gain) loss | <u>-</u> | <u>(6.7)</u> | <u>-</u> |
| Composite (Gain) Loss During Period | \$ 111.9 | \$ 208.0 | \$ 120.0 |

* 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.



Teachers' Retirement System State of Montana

Appendix A

Actuarial Procedures and Assumptions

Retirement, disablement and termination of employment assumptions reflect the five-year experience study for the period ending 2009 adopted by the Board on May 13, 2010.

The current asset valuation method was adopted for the July 1, 2007 valuation.

Tables A-3 through A-6 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 defined to equal 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 consist 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 were supplied by the System and are 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.

Employer Contributions

At the time of this valuation, the total employer contribution rate for normal costs and amortization of the UAAL was 9.96% of members' salaries. In accordance with MCA 19-20-604, the employer contribution rate will be reduced by 0.11% when the amortization period of the System's UAAL is 10 years or less according to the System's latest actuarial valuation.

Administrative and Investment Expenses

The administrative and investment expenses of the System are assumed to be funded by investment earnings in excess of 7.75% per year.

Valuation of Assets - Actuarial Basis

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. The gains and losses are measured starting with the year ended June 30, 2007. The actuarial value of assets is not allowed to be greater than 120% or less than 80% of the market assets. (Adopted effective July 1, 2007.)

Investment Earnings

The annual rate of investment earnings of the assets of the System is assumed to be 7.75% per year, compounded annually. (Adopted effective July 1, 2004)

Interest on Member Contributions

Interest on member contributions is assumed to accrue at a rate of 5% per annum, compounded annually. This assumption was set as of July 1, 2004.

Postretirement Benefit Increases

On January 1 of each year, the retirement allowance payable must be increased by 1.5% if the retiree has received benefits for at least 36 months prior to January 1 of the year in which the adjustment is to be made.



Future Salaries

The rates of annual salary increase assumed for the purpose of the valuation are illustrated in Table A-2. In addition to increases in salary due to merit and longevity, this scale includes an assumed 4.5% annual rate of increase in the general wage level of the membership. The merit and longevity increases for the MUS members did not show a pattern of increasing or decreasing with service at the time of our most recent study. Therefore, the MUS members have a flat 1% merit and longevity assumption. The general wage increase assumption was adopted July 1, 2004 and the merit and longevity scales were adopted July 1, 2002.

Montana University System (MUS) members are assumed to have a 0.63% higher average final compensation to account for the larger than average annual compensation increases observed in the years immediately preceding retirement.

Service Retirement

Table A-3 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. The rates for General Members were adopted May 13, 2010. The rates for University Members were adopted May 13, 2010.

Disablement

The rates of disablement used in this valuation are illustrated in Table A-4. These rates were adopted May 13, 2010.

Mortality

The mortality rates used in this valuation are illustrated in Table A-5. A written description of each table used is included in Table A-1. These rates were adopted July 1, 2006.

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 A-6. These rates were adopted May 13, 2010.

Benefits for Terminating Members

Members terminating with less than five years of service are assumed to request an immediate withdrawal of their contributions with interest. Table A-7 shows the assumed probability of retaining membership in the System among members terminating with five or more years of service. These rates were adopted July 1, 2002.

We estimated the present value of future benefits for terminated vested members based on the greater of the present value of their deferred benefit at age 60 or their available contribution account.



Part-Time Employees

The valuation data for active members identify part-time members. Part-time members earning less than \$1,000 during the last year were valued at their current member contribution balance.

Optional Retirement Program

ORP payroll as of June 30, 2012 was \$188,904,351.

Effective for fiscal years after June 30, 2007 until June 30, 2033, the Optional Retirement Program contribution rate is 4.72%, pursuant to MCA 19-20-621.

Buybacks, Purchase of Service, and Military Service

The active liabilities and normal cost (excluding liabilities and normal cost in respect of Return of Employee Contributions) were increased to 100.5% of their original value to fund this additional service based on a study of the System's experience for the five calendar years 1995 through 1999. Effective July 1, 2008.

Probability of Marriage

If death occurs in active status, all members are assumed to have an eligible surviving spouse and two children. The spouse is assumed to be the same age as the member.

Records with no Birth Date

New records with no birth date are assumed to be 25 years old. Records that are not new and have no birth date used the same birth date as the prior year's valuation.



Teachers' Retirement System State of Montana

Table A-1

Summary of Valuation Assumptions

| | |
|--|-----------|
| I. Economic assumptions | |
| A. General wage increases* (Adopted July 1, 2004) | 4.50% |
| B. Investment return (Adopted July 1, 2004) | 7.75% |
| C. Price Inflation Assumption (Adopted July 1, 2004) | 3.50% |
| D. Growth in membership | 0.00% |
| E. Postretirement benefit increases (Starting three years after retirement) | 1.50% |
| F. Interest on member accounts (Adopted July 1, 2004) | 5.00% |
| II. Demographic assumptions | |
| A. Individual salary increase due to promotion and longevity (General Member assumptions adopted July 1, 2002) (University Member assumptions adopted July 1, 2000) | Table A-2 |
| B. Retirement (adopted May 13, 2010) | Table A-3 |
| C. Disablement (adopted May 13, 2010) | Table A-4 |
| D. Mortality among contributing members, service retired members, and beneficiaries For Males: RP 2000 Combined Mortality Table for Males, set back three years, with mortality improvements projected by Scale AA to 2008 (adopted July 1, 2006). For Females: RP 2000 Combined Mortality Table for Females, set back two years, with mortality improvements projected by Scale AA to 2008 (adopted July 1, 2006). | Table A-5 |
| E. Mortality among disabled members For Males: RP 2000 Disabled Mortality Table for Males, set back three years, with mortality improvements projected by Scale AA to 2008 (adopted July 1, 2006). For Females: RP 2000 Disabled Mortality Table for Females, set forward three years, with mortality improvements projected by Scale AA to 2008 (adopted July 1, 2006). | Table A-5 |
| F. Other terminations of employment (adopted May 13, 2010) | Table A-6 |
| G. Probability of retaining membership in the System upon vested termination (adopted July 1, 2002) | Table A-7 |

* Montana University System (MUS) members are assumed to have a 0.63% higher average final compensation to account for the larger than average annual compensation increases observed in the years immediately preceding retirement.



**Teachers' Retirement System
State of Montana**

Table A-2

Future Salaries

| Years of Service | General Members | | | University Members | | |
|------------------|------------------------------|-----------------------|-----------------------|------------------------------|-----------------------|-----------------------|
| | Individual Merit & Longevity | General Wage Increase | Total Salary Increase | Individual Merit & Longevity | General Wage Increase | Total Salary Increase |
| 1 | 4.51% | 4.50% | 9.01% | 1.00% | 4.50% | 5.50% |
| 2 | 4.09 | 4.50 | 8.59 | 1.00 | 4.50 | 5.50 |
| 3 | 3.46 | 4.50 | 7.96 | 1.00 | 4.50 | 5.50 |
| 4 | 2.94 | 4.50 | 7.44 | 1.00 | 4.50 | 5.50 |
| 5 | 2.52 | 4.50 | 7.02 | 1.00 | 4.50 | 5.50 |
| 6 | 2.21 | 4.50 | 6.71 | 1.00 | 4.50 | 5.50 |
| 7 | 1.89 | 4.50 | 6.39 | 1.00 | 4.50 | 5.50 |
| 8 | 1.68 | 4.50 | 6.18 | 1.00 | 4.50 | 5.50 |
| 9 | 1.47 | 4.50 | 5.97 | 1.00 | 4.50 | 5.50 |
| 10 | 1.31 | 4.50 | 5.81 | 1.00 | 4.50 | 5.50 |
| 11 | 1.16 | 4.50 | 5.66 | 1.00 | 4.50 | 5.50 |
| 12 | 1.00 | 4.50 | 5.50 | 1.00 | 4.50 | 5.50 |
| 13 | 0.84 | 4.50 | 5.34 | 1.00 | 4.50 | 5.50 |
| 14 | 0.68 | 4.50 | 5.18 | 1.00 | 4.50 | 5.50 |
| 15 | 0.58 | 4.50 | 5.08 | 1.00 | 4.50 | 5.50 |
| 16 | 0.47 | 4.50 | 4.97 | 1.00 | 4.50 | 5.50 |
| 17 | 0.37 | 4.50 | 4.87 | 1.00 | 4.50 | 5.50 |
| 18 | 0.26 | 4.50 | 4.76 | 1.00 | 4.50 | 5.50 |
| 19 | 0.21 | 4.50 | 4.71 | 1.00 | 4.50 | 5.50 |
| 20 | 0.16 | 4.50 | 4.66 | 1.00 | 4.50 | 5.50 |
| 21 | 0.11 | 4.50 | 4.61 | 1.00 | 4.50 | 5.50 |
| 22 & Up | 0.00 | 4.50 | 4.50 | 1.00 | 4.50 | 5.50 |



**Teachers' Retirement System
State of Montana**

Table A-3

**Retirement
Annual Rates**

| Age | General Members | | | University Members | | |
|-----|-------------------------------|---------------------------------------|------------|-------------------------------|---------------------------------------|------------|
| | Eligible for Reduced Benefits | First Year Eligible for Full Benefits | Thereafter | Eligible for Reduced Benefits | First Year Eligible for Full Benefits | Thereafter |
| 45 | | 8.0% | 5.5% | | 17.0% | 8.0% |
| 46 | | 8.0 | 5.5 | | 17.0 | 8.0 |
| 47 | | 8.0 | 5.5 | | 17.0 | 8.0 |
| 48 | | 8.0 | 5.5 | | 17.0 | 8.0 |
| 49 | * | 8.0 | 5.5 | * | 17.0 | 8.0 |
| 50 | 5.0% | 8.0 | 5.5 | 7.0% | 17.0 | 8.0 |
| 51 | 5.0 | 8.0 | 6.3 | 7.0 | 17.0 | 8.0 |
| 52 | 5.0 | 8.0 | 8.0 | 7.0 | 17.0 | 8.0 |
| 53 | 5.0 | 9.0 | 7.3 | 7.0 | 17.0 | 8.0 |
| 54 | 5.0 | 9.0 | 8.2 | 7.0 | 17.0 | 8.0 |
| 55 | 7.0 | 9.0 | 9.8 | 7.0 | 15.0 | 8.0 |
| 56 | 7.0 | 12.0 | 11.3 | 7.0 | 15.0 | 8.0 |
| 57 | 7.0 | 11.8 | 12.5 | 7.0 | 15.0 | 8.0 |
| 58 | 7.0 | 14.8 | 13.1 | 7.0 | 15.0 | 8.0 |
| 59 | 7.0 | 17.4 | 14.8 | 7.0 | 15.0 | 8.0 |
| 60 | * | 14.6 | 17.0 | * | 15.0 | 8.5 |
| 61 | | 21.3 | 25.0 | | 14.0 | 14.5 |
| 62 | | 23.8 | 25.0 | | 20.0 | 19.0 |
| 63 | | 11.4 | 25.0 | | 14.0 | 14.5 |
| 64 | | 19.0 | 25.0 | | 20.0 | 18.0 |
| 65 | | 40.0 | 35.0 | | 28.0 | 26.0 |
| 66 | | 8.0 | 20.0 | | 21.0 | 21.0 |
| 67 | | 30.0 | 20.0 | | 21.0 | 24.5 |
| 68 | | 6.0 | 20.0 | | 21.0 | 19.5 |
| 69 | | 6.0 | 20.0 | | 21.0 | 30.0 |
| 70 | | ** | ** | | ** | ** |

* All benefits are unreduced after attaining age 60. Reduced benefits are not available before age 50.
 ** Immediate retirement is assumed at age 70 or over.



**Teachers' Retirement System
State of Montana**

Table A-4

**Disablement
Annual Rates**

| <u>Age</u> | <u>All Members</u> |
|------------|--------------------|
| 25 | .005% |
| 30 | .005 |
| 35 | .008 |
| 40 | .028 |
| 45 | .044 |
| 50 | .063 |
| 55 | .084 |
| 60 | .100 |



**Teachers' Retirement System
State of Montana**

Table A-5

**Mortality
Annual Rates**

| Age | Contributing Members, Service Retired Members and Beneficiaries | | Disabled Members | |
|-----|--|-------|------------------|-------|
| | Men | Women | Men | Women |
| 25 | .03% | .02% | 1.97% | .68% |
| 30 | .04 | .02 | 2.17 | .69 |
| 35 | .05 | .04 | 2.17 | .67 |
| 40 | .09 | .05 | 2.17 | .66 |
| 45 | .11 | .08 | 2.08 | .85 |
| 50 | .15 | .12 | 2.23 | 1.31 |
| 55 | .23 | .20 | 2.69 | 1.89 |
| 60 | .41 | .38 | 3.32 | 2.43 |
| 65 | .78 | .73 | 3.99 | 3.19 |
| 70 | 1.45 | 1.29 | 4.90 | 4.33 |
| 75 | 2.42 | 2.17 | 6.15 | 6.01 |
| 80 | 4.22 | 3.55 | 8.30 | 8.30 |
| 85 | 7.55 | 5.91 | 11.43 | 11.86 |



**Teachers' Retirement System
State of Montana**

Table A-6

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

| <u>Years of Service</u> | <u>All Members</u> |
|-----------------------------|--------------------|
| 1 | 36.5% |
| 2 | 20.5 |
| 3 | 14.6 |
| 4 | 10.5 |
| 5 | 8.5 |
| 6 | 7.0 |
| 7 | 6.4 |
| 8 | 5.8 |
| 9 | 5.4 |
| 10 | 5.0 |
| 11 | 4.3 |
| 12 | 3.9 |
| 13 | 3.5 |
| 14 | 3.2 |
| 15 | 2.9 |
| 16 | 2.6 |
| 17 | 2.3 |
| 18 | 2.0 |
| 19 | 1.9 |
| 20 | 1.8 |
| 21 | 1.7 |
| 22 | 1.6 |
| 23 | 1.5 |
| 24 | 1.5 |



**Teachers' Retirement System
State of Montana**

Table A-7

**Probability of Retaining Membership in the System
Upon Vested Termination**

| <u>Age</u> | <u>Probability of Retaining Membership</u> |
|------------|--|
| 25 | 54% |
| 30 | 54 |
| 35 | 58 |
| 40 | 58 |
| 45 | 60 |
| 50 | 70 |
| 55 | 75 |



**Teachers' Retirement System
State of Montana**

Appendix B

Summary of Benefit Provisions

| | |
|----------------------------|---|
| Effective Date | September 1, 1937. |
| Vesting Period | Five years. No benefits are payable unless the member has a vested right, except the return of employee contributions with interest. |
| Final Compensation | Average of highest three consecutive years of earned compensation. |
| Normal Form of Benefits | Life only annuity. All benefits cease upon death; however, in no event will the member receive less than the amount of employee contributions with interest. |
| Normal Retirement Benefits | |
| Eligibility: | 25 years of service or age 60 and five years of service. |
| Benefit: | The retirement benefit is equal to 1/60 of final compensation for each year of service. |
| Early Retirement Benefits | |
| Eligibility: | Five years of service and age 50. |
| Benefit: | The retirement benefit is calculated in the same manner as described for normal retirement, but the benefit is actuarially reduced by the lesser of the number of years equal to the age of the participant at the early retirement subtracted from age 60 or the number of years of service at early retirement subtracted from 25 years of service. |



Death Benefit

Eligibility: Five years of service.

Benefit: The death benefit is equal to 1/60 of final compensation for each year of service accrued at date of death, with an actuarial adjustment based on the relation of the member's age at death to the beneficiary's age. A monthly benefit of \$200 is paid to each child until age 18. In addition, a lump-sum benefit of \$500 is paid upon the death of an active or retired member.

Disability Benefit

Eligibility: Five years of service.

Benefit: The disability benefit is equal to 1/60 of final compensation for each year of service accrued at date of disability. The minimum benefit is 1/4 of the final compensation.

Withdrawal Benefits

With less than five years of service, the accumulated employee contributions with interest are returned. With more than five years, the member may elect a refund of contributions with interest or leave the contributions and interest in the System and retain a vested right to retirement benefits.

Contributions

Member: 7.15% of compensation.
Employer: 9.96% of compensation.

MCA 19-20-604 specifies that the employer contribution rate will be reduced by 0.11% when the amortization period of the System's UAAL is 10 years or less according to the System's latest actuarial valuation.

Interest on Member contributions

Effective July 1, 2010, the interest credited on member contributions is reduce from 1.0% to 0.25% per annum.

Cost-of-Living Adjustments

On January 1 of each year, the retirement allowance payable must be increased by 1.5% if the retiree has received benefits for at least 36 months prior to January 1 of the year in which the adjustment is to be made.



**Teachers' Retirement System
State of Montana**

Appendix C

Valuation Data

This valuation is based upon the membership of the System as of July 1, 2012. Membership data were supplied by the System and accepted for valuation purposes without audit. However, tests were performed to ensure that the data are sufficiently accurate for valuation purposes.

| <u>Active Members</u> | <u>Number</u> | <u>Annual Salaries in Millions</u> |
|--|---------------|--|
| Full-Time Members | 12,202 | \$ 622.1 |
| Part-Time Members* | <u>5,534</u> | <u>73.8</u> |
| Total Contributing Members* | 17,736 | \$ 695.9 |
| Active Members with Annual Compensation less than \$1,000 | 636 | |
| Total Active Members | 18,372 | |

* Excludes part-time members with annual compensation less than \$1,000.

Table C-1 contains summaries of the data for contributing members. For full-time members, values shown in the tables are the numbers of members and their total and average annual salaries. For part-time members, only the numbers of members are shown.

Table C-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.
- Child beneficiaries.
- Terminated vested members.

Table C-3 is a reconciliation of membership data from July 1, 2011 to July 1, 2012.



The following is a summary of retired members and beneficiaries currently receiving benefits:

| <u>Type of Annuitant</u> | <u>Number</u> | <u>Annual Benefits in Thousands</u> | <u>Average Annual Benefits</u> |
|---|---------------|---|--|
| Service Retirement | 11,675 | \$ 247,480 | \$ 21,197 |
| Survivors of Deceased Retired Members | <u>1,028</u> | <u>13,955</u> | <u>13,575</u> |
| Total Service Retirement (including survivors) | 12,703 | \$ 261,435 | \$ 20,581 |
| Disability Retirement | 203 | 2,160 | 10,642 |
| Survivors of Deceased Active Members | 423 | 4,174 | 9,869 |
| Child Beneficiaries | <u>34</u> | <u>82</u> | <u>2,400</u> |
| Total Annuitants | 13,363 | \$ 267,851 | \$ 20,044 |

| <u>Terminated Members with Contributions Not Withdrawn</u> | <u>Number</u> |
|--|---------------|
| Vested Terminated Members | 1,566 |
| Non-Vested Terminated Members | <u>11,172</u> |
| Total Terminated Members | 12,738 |



**Teachers' Retirement System
State of Montana**

Table C-1

**Active Members Distribution of
Full-Time Employees and Salaries
as of July 1, 2012**

Number of Employees

| Age | <u>Completed Years of Service</u> | | | | | | | | | | | | Totals | |
|-----------|-----------------------------------|-----|-----|--------|--------|----------|----------|----------|----------|----------|----------|-----|--------|--------|
| | 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+ | | |
| <25 | 17 | 107 | 38 | 2 | - | - | - | - | - | - | - | - | - | 164 |
| 25 to 29 | 35 | 194 | 251 | 339 | 234 | 1 | - | - | - | - | - | - | - | 1,054 |
| 30 to 34 | 9 | 84 | 112 | 239 | 767 | 164 | - | - | - | - | - | - | - | 1,375 |
| 35 to 39 | 7 | 57 | 75 | 169 | 459 | 565 | 111 | - | - | - | - | - | - | 1,443 |
| 40 to 44 | 5 | 39 | 38 | 119 | 318 | 393 | 539 | 126 | - | - | - | - | - | 1,577 |
| 45 to 49 | 9 | 28 | 31 | 88 | 216 | 263 | 339 | 461 | 114 | 1 | - | - | - | 1,550 |
| 50 to 54 | 4 | 23 | 15 | 78 | 212 | 252 | 281 | 335 | 440 | 139 | - | - | - | 1,779 |
| 55 to 59 | 4 | 25 | 26 | 40 | 142 | 206 | 265 | 311 | 324 | 376 | 112 | - | - | 1,831 |
| 60 to 64 | 2 | 11 | 12 | 14 | 74 | 105 | 121 | 196 | 193 | 197 | 196 | 41 | - | 1,162 |
| 65 to 69 | - | 2 | 1 | 8 | 15 | 22 | 26 | 32 | 31 | 24 | 23 | 30 | - | 214 |
| 70 and up | 1 | - | - | 4 | 7 | 3 | 4 | 5 | 7 | - | 5 | 17 | - | 53 |
| Totals | 93 | 570 | 599 | 1,100 | 2,444 | 1,974 | 1,686 | 1,466 | 1,109 | 737 | 336 | 88 | - | 12,202 |



**Teachers' Retirement System
State of Montana**

Table C-1

**Active Members Distribution of
Full-Time Employees and Salaries
as of July 1, 2012**

Annual Salaries in Thousands

| Age | <u>Completed Years of Service</u> | | | | | | | | | | | | Totals |
|-----------|-----------------------------------|--------|--------|--------|---------|----------|----------|----------|----------|----------|----------|-------|---------|
| | 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+ | |
| <25 | 435 | 3,249 | 1,223 | 70 | - | - | - | - | - | - | - | - | 4,978 |
| 25 to 29 | 899 | 6,319 | 8,413 | 11,939 | 9,008 | 41 | - | - | - | - | - | - | 36,619 |
| 30 to 34 | 203 | 2,988 | 4,097 | 8,994 | 32,453 | 7,719 | - | - | - | - | - | - | 56,454 |
| 35 to 39 | 280 | 2,197 | 2,854 | 6,866 | 20,654 | 28,816 | 6,123 | - | - | - | - | - | 67,790 |
| 40 to 44 | 143 | 1,506 | 1,454 | 4,968 | 14,416 | 20,090 | 30,741 | 7,579 | - | - | - | - | 80,896 |
| 45 to 49 | 270 | 1,138 | 1,343 | 3,597 | 9,513 | 13,572 | 19,362 | 27,934 | 6,919 | 67 | - | - | 83,715 |
| 50 to 54 | 114 | 968 | 825 | 3,402 | 9,552 | 12,581 | 15,708 | 20,034 | 26,846 | 8,650 | - | - | 98,681 |
| 55 to 59 | 126 | 1,058 | 1,218 | 1,802 | 6,709 | 10,435 | 14,908 | 18,514 | 19,966 | 23,938 | 7,223 | - | 105,896 |
| 60 to 64 | 86 | 485 | 571 | 845 | 3,368 | 5,454 | 6,570 | 11,360 | 12,044 | 12,692 | 12,780 | 2,797 | 69,052 |
| 65 to 69 | - | 121 | 37 | 623 | 782 | 1,257 | 1,395 | 2,066 | 2,365 | 1,766 | 2,097 | 2,272 | 14,781 |
| 70 and up | 12 | - | - | 159 | 307 | 158 | 248 | 227 | 489 | - | 405 | 1,274 | 3,278 |
| Totals | 2,568 | 20,030 | 22,035 | 43,264 | 106,762 | 100,122 | 95,054 | 87,714 | 68,630 | 47,113 | 22,505 | 6,342 | 622,140 |



**Teachers' Retirement System
State of Montana**

Table C-1

**Active Members Distribution of
Full-Time Employees and Salaries
as of July 1, 2012**

Average Annual Salary

| Age | Completed Years of Service | | | | | | | | | | | | Totals | |
|-----------|----------------------------|--------|--------|--------|--------|----------|----------|----------|----------|----------|----------|--------|--------|--------|
| | 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+ | | |
| <25 | 25,608 | 30,368 | 32,194 | 35,029 | - | - | - | - | - | - | - | - | - | 30,354 |
| 25 to 29 | 25,688 | 32,573 | 33,516 | 35,219 | 38,495 | 40,758 | - | - | - | - | - | - | - | 34,743 |
| 30 to 34 | 22,580 | 35,574 | 36,582 | 37,632 | 42,311 | 47,064 | - | - | - | - | - | - | - | 41,058 |
| 35 to 39 | 40,008 | 38,548 | 38,054 | 40,625 | 44,999 | 51,001 | 55,159 | - | - | - | - | - | - | 46,978 |
| 40 to 44 | 28,567 | 38,628 | 38,256 | 41,744 | 45,334 | 51,119 | 57,033 | 60,153 | - | - | - | - | - | 51,298 |
| 45 to 49 | 29,989 | 40,637 | 43,324 | 40,876 | 44,042 | 51,606 | 57,116 | 60,594 | 60,696 | 66,600 | - | - | - | 54,010 |
| 50 to 54 | 28,561 | 42,074 | 55,016 | 43,615 | 45,056 | 49,925 | 55,900 | 59,804 | 61,014 | 62,229 | - | - | - | 55,470 |
| 55 to 59 | 31,527 | 42,319 | 46,849 | 45,040 | 47,245 | 50,654 | 56,258 | 59,529 | 61,624 | 63,665 | 64,490 | - | - | 57,835 |
| 60 to 64 | 42,868 | 44,053 | 47,561 | 60,352 | 45,520 | 51,947 | 54,296 | 57,960 | 62,405 | 64,425 | 65,206 | 68,216 | - | 59,425 |
| 65 to 69 | - | 60,686 | 36,950 | 77,862 | 52,126 | 57,138 | 53,655 | 64,558 | 76,294 | 73,599 | 91,156 | 75,730 | - | 69,070 |
| 70 and up | 11,885 | - | - | 39,655 | 43,834 | 52,607 | 61,914 | 45,360 | 69,890 | - | 81,028 | 74,923 | - | 61,843 |
| Totals | 27,618 | 35,140 | 36,786 | 39,330 | 43,683 | 11,401 | 56,379 | 59,832 | 61,885 | 63,925 | 66,979 | 72,073 | - | 50,987 |



**Teachers' Retirement System
State of Montana**

Table C-1

**Active Members Distribution of
Part-Time Employees
as of July 1, 2012**

Number of Employees

| Age | Completed Years of Service | | | | | | | | | | | | Totals |
|-----------|----------------------------|-----|-----|--------|--------|----------|----------|----------|----------|----------|----------|-----|--------|
| | 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+ | |
| <25 | 150 | 72 | 15 | 11 | 1 | 1 | - | - | - | - | - | - | 250 |
| 25 to 29 | 253 | 132 | 73 | 90 | 42 | 7 | - | - | 1 | - | - | - | 598 |
| 30 to 34 | 113 | 102 | 50 | 74 | 80 | 33 | 8 | 2 | 1 | 1 | - | - | 464 |
| 35 to 39 | 87 | 92 | 62 | 90 | 94 | 48 | 25 | 9 | 3 | - | 2 | 1 | 513 |
| 40 to 44 | 98 | 101 | 68 | 114 | 138 | 49 | 24 | 11 | 8 | 2 | 3 | 1 | 617 |
| 45 to 49 | 55 | 66 | 58 | 106 | 199 | 105 | 45 | 15 | 8 | 9 | 3 | 9 | 678 |
| 50 to 54 | 52 | 74 | 52 | 91 | 199 | 181 | 91 | 50 | 16 | 7 | 6 | 7 | 826 |
| 55 to 59 | 52 | 52 | 33 | 89 | 188 | 141 | 104 | 42 | 22 | 10 | 7 | 16 | 756 |
| 60 to 64 | 43 | 28 | 32 | 48 | 111 | 93 | 73 | 54 | 22 | 20 | 1 | 10 | 535 |
| 65 to 69 | 13 | 15 | 17 | 26 | 55 | 30 | 24 | 19 | 6 | 2 | 1 | 1 | 209 |
| 70 and up | 7 | 7 | 3 | 16 | 20 | 14 | 10 | 5 | 2 | 2 | - | 2 | 88 |
| Totals | 923 | 741 | 463 | 755 | 1,127 | 702 | 404 | 207 | 89 | 53 | 23 | 47 | 5,534 |



**Teachers' Retirement System
State of Montana**

Table C-2

Distribution of Inactive Lives

Members Receiving Service Retirement Benefits as of July 1, 2012

| <u>Age</u> | <u>Number of Persons</u> | <u>Annual Benefits in Thousands</u> | <u>Average Annual Benefits</u> |
|------------|------------------------------|---|------------------------------------|
| <50 | 14 | \$ 366 | \$ 26,171 |
| 50 to 54 | 217 | 4,898 | 22,571 |
| 55 to 59 | 858 | 20,089 | 23,414 |
| 60 to 64 | 2,566 | 59,480 | 23,180 |
| 65 to 69 | 2,857 | 64,984 | 22,745 |
| 70 to 74 | 2,014 | 44,289 | 21,990 |
| 75 to 79 | 1,360 | 27,210 | 20,007 |
| 80 to 84 | 896 | 15,069 | 16,818 |
| 85 to 89 | 508 | 7,163 | 14,100 |
| 90 and up | 385 | 3,932 | 10,213 |
| Totals | 11,675 | \$ 247,480 | \$ 21,197 |

Members Receiving Disability Retirement Benefits as of July 1, 2012

| <u>Age</u> | <u>Number of Persons</u> | <u>Annual Benefits in Thousands</u> | <u>Average Annual Benefits</u> |
|------------|------------------------------|---|------------------------------------|
| <50 | 14 | \$ 177 | \$ 12,612 |
| 50 to 54 | 13 | 145 | 11,178 |
| 55 to 59 | 29 | 348 | 11,985 |
| 60 to 64 | 50 | 514 | 10,272 |
| 65 to 69 | 40 | 453 | 11,325 |
| 70 to 74 | 21 | 204 | 9,707 |
| 75 to 79 | 16 | 144 | 9,025 |
| 80 to 84 | 12 | 119 | 9,932 |
| 85 to 89 | 3 | 16 | 5,349 |
| 90 and up | 5 | 41 | 8,169 |
| Totals | 203 | \$ 2,160 | \$ 10,642 |



**Teachers' Retirement System
State of Montana**

Table C-2

Distribution of Inactive Lives

Survivors of Deceased Retired Members as of July 1, 2012

| <u>Age</u> | <u>Number of Persons</u> | <u>Annual Benefits in Thousands</u> | <u>Average Annual Benefits</u> |
|------------|------------------------------|---|------------------------------------|
| <50 | 50 | \$ 403 | \$ 8,056 |
| 50 to 54 | 19 | 206 | 10,854 |
| 55 to 59 | 42 | 503 | 11,981 |
| 60 to 64 | 77 | 1,064 | 13,822 |
| 65 to 69 | 142 | 2,179 | 15,346 |
| 70 to 74 | 147 | 2,381 | 16,199 |
| 75 to 79 | 162 | 2,507 | 15,477 |
| 80 to 84 | 146 | 2,112 | 14,468 |
| 85 to 89 | 143 | 1,643 | 11,491 |
| 90 and up | 100 | 955 | 9,550 |
| Totals | 1,028 | \$ 13,955 | \$ 13,575 |

Survivors of Deceased Active Members as of July 1, 2012

| <u>Age</u> | <u>Number of Persons</u> | <u>Annual Benefits in Thousands</u> | <u>Average Annual Benefits</u> |
|------------|------------------------------|---|------------------------------------|
| <50 | 74 | \$ 522 | \$ 7,058 |
| 50 to 54 | 39 | 244 | 6,259 |
| 55 to 59 | 48 | 488 | 10,158 |
| 60 to 64 | 58 | 705 | 12,150 |
| 65 to 69 | 66 | 720 | 10,910 |
| 70 to 74 | 41 | 552 | 13,457 |
| 75 to 79 | 32 | 282 | 8,813 |
| 80 to 84 | 37 | 424 | 11,450 |
| 85 to 89 | 16 | 189 | 11,787 |
| 90 and up | 12 | 50 | 4,143 |
| Totals | 423 | \$ 4,174 | \$ 9,869 |



**Teachers' Retirement System
State of Montana**

Table C-2

Distribution of Inactive Lives

**Terminated Vested Members as of July 1, 2012
Number of Persons**

| <u>Age</u> | <u>Number</u> |
|--------------|---------------|
| <25 | - |
| 25 to 29 | 4 |
| 30 to 34 | 89 |
| 35 to 39 | 150 |
| 40 to 44 | 189 |
| 45 to 49 | 245 |
| 50 to 54 | 316 |
| 55 to 59 | 394 |
| 60 to 64 | 146 |
| 65 to 69 | 27 |
| 70 and above | <u>6</u> |
| Total | 1,566 |

**Child Beneficiaries as of July 1, 2012
Number of Persons**

| <u>Age</u> | <u>Number</u> |
|------------|---------------|
| <5 | 1 |
| 5 to 6 | - |
| 7 to 8 | 1 |
| 9 to 10 | 2 |
| 11 to 12 | 6 |
| 13 to 14 | 7 |
| 15 to 16 | 14 |
| 17 to 18 | <u>3</u> |
| Total | 34 |



**Teachers' Retirement System
State of Montana**

Table C-3

Data Reconciliation

| | <u>Active Contributing Members*</u> | <u>Terminated Vested Members</u> | <u>Service Retired Members</u> | <u>Disabled Members</u> | <u>Survivors and Beneficiaries</u> |
|-------------------------------------|---|--|--|-----------------------------|--|
| July 1, 2011 Valuation | 17,906 | 1,580 | 11,250 | 207 | 1,442 |
| Refunds and Non-Vested Terminations | (1,085) | (66) | | | |
| Change to Annual Pay Under \$1,000 | 4 | 7 | | | |
| Vested Terminations | (208) | 208 | 72 | | |
| Service Retirements | (595) | (72) | 595 | | |
| Disability Retirements | (11) | (1) | | 12 | |
| Deaths with Beneficiary | (14) | (1) | (67) | (7) | 89 |
| Deaths without Beneficiary | | | (172) | (9) | (51) |
| New Entrants | 1,312 | | | | |
| Rehires | 418 | (85) | (7) | | |
| Other | 9 | (4) | 4 | | 5 |
| July 1, 2012 Valuation | 17,736 | 1,566 | 11,675 | 203 | 1,485 |

* Excludes active members with annual compensation less than \$1,000



**Teachers' Retirement System
State of Montana**

Appendix D

Comparative Schedules

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

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

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

Table D-3 summarizes the contribution rates determined by each annual actuarial valuation.



**Teachers' Retirement System
State of Montana**

Table D-1

Active Membership Data

| Active Members | | | | | | | | | |
|----------------------------|----------------------|------------------------|------------------------------------|---|--|---------------------------------------|------------------|-------------------------------|-----------------------|
| Valuation Date (July 1) | Full-Time Members | Part-Time Members** | Total Contributing Members** | Part-Time Members Annual Compensation less than \$1,000 | Annual Full-Time Salaries in Thousands | Average Full-Time Annual Salary | Average Age** | Average Years of Service** | Average Hire Age** |
| 1987 | 13,105 | 1,955 | 15,060 | * | \$340,481 | \$25,981 | * | * | * |
| 1989 | 12,546 | 2,541 | 15,087 | * | 339,866 | 27,090 | * | * | * |
| 1992 | 13,502 | 3,141 | 16,643 | * | 401,092 | 29,706 | 42.4 | 11.6 | 30.8 |
| 1994 | 14,938 | 2,637 | 17,575 | 377 | 416,968 | 27,914 | 42.5 | 11.0 | 31.5 |
| 1996 | 13,251 | 5,444 | 18,695 | 1,295 | 424,085 | 32,004 | 43.3 | 11.6 | 31.7 |
| 1998 | 13,545 | 4,647 | 18,192 | 776 | 459,191 | 33,901 | 44.0 | 12.1 | 31.9 |
| 2000 | 13,289 | 4,245 | 17,534 | 886 | 477,160 | 35,906 | 44.5 | 12.2 | 32.3 |
| 2002 | 12,796 | 4,650 | 17,446 | 723 | 486,204 | 37,997 | 45.0 | 12.2 | 32.8 |
| 2004 | 12,601 | 5,013 | 17,614 | 637 | 510,808 | 40,537 | 45.6 | 12.2 | 33.4 |
| 2005 | 12,523 | 5,019 | 17,542 | 697 | 523,909 | 41,836 | 45.8 | 12.4 | 33.4 |
| 2006 | 12,715 | 4,840 | 17,555 | 544 | 549,268 | 43,198 | 46.0 | 12.5 | 33.5 |
| 2007 | 12,634 | 4,994 | 17,628 | 548 | 568,351 | 44,986 | 46.2 | 12.5 | 33.7 |
| 2008 | 12,694 | 5,077 | 17,771 | 521 | 592,514 | 46,677 | 46.1 | 12.3 | 33.8 |
| 2009 | 12,673 | 5,270 | 17,943 | 513 | 613,077 | 48,377 | 46.2 | 12.4 | 33.8 |
| 2010 | 12,711 | 5,642 | 18,353 | 600 | 630,444 | 49,598 | 45.9 | 12.2 | 33.8 |
| 2011 | 12,506 | 5,400 | 17,906 | 578 | 633,005 | 50,616 | 46.2 | 12.4 | 33.8 |
| 2012 | 12,202 | 5,534 | 17,736 | 636 | 622,140 | 50,987 | 46.0 | 12.4 | 33.6 |

* Not available.

** Excludes part-time active members with annual compensation less than \$1,000.



**Teachers' Retirement System
State of Montana**

Table D-2

Retired and Inactive Membership Data

| Valuation Date (July 1) | All Annuitants | | | | | | Terminated Members | |
|----------------------------|----------------|------------------------------------|------------------------------|------------------------|------------------------------|-------------------------------------|--------------------------------|------------------------------------|
| | 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 |
| 1987 | 6,036 | \$ 43,236 | \$ 7,163 | * | * | * | * | * |
| 1989 | 6,330 | 49,546 | 7,827 | * | * | * | * | * |
| 1992 | 6,927 | 63,483 | 9,165 | * | * | * | * | * |
| 1994 | 7,530 | 78,183 | 10,383 | * | * | * | 1,105 | 5,722 |
| 1996 | 7,896 | 87,351 | 11,063 | * | * | * | 1,152 | 6,479 |
| 1998 | 8,362 | 99,040 | 11,844 | 69.6 | 57.3 | * | 1,190 | 8,158 |
| 2000 | 9,021 | 117,227 | 12,995 | 69.3 | 57.0 | * | 1,256 | 9,308 |
| 2002 | 9,768 | 139,131 | 14,244 | 69.1 | 56.8 | * | 1,485 | 8,231 |
| 2004 | 10,375 | 159,776 | 15,400 | 69.1 | 56.7 | * | 1,620 | 7,861 |
| 2005 | 10,664 | 170,129 | 15,954 | 69.3 | 56.7 | * | 1,649 | 8,569 |
| 2006 | 11,019 | 181,114 | 16,436 | 69.3 | 56.5 | * | 1,684 | 8,542 |
| 2007 | 11,356 | 195,237 | 17,192 | 69.3 | 56.6 | * | 1,671 | 8,963 |
| 2008 | 11,788 | 208,985 | 17,729 | 69.4 | 56.7 | * | 1,649 | 9,574 |
| 2009 | 12,036 | 219,267 | 18,218 | 69.7 | 57.5 | 25.5 | 1,640 | 9,868 |
| 2010 | 12,440 | 234,048 | 18,814 | 69.9 | 57.6 | 25.5 | 1,553 | 10,304 |
| 2011 | 12,899 | 250,500 | 19,420 | 70.0 | 57.8 | 25.5 | 1,580 | 10,727 |
| 2012 | 13,363 | 267,851 | 20,044 | 70.2 | 57.9 | 25.5 | 1,566 | 11,172 |

* Not available.



**Teachers' Retirement System
State of Montana**

Table D-3

Contribution Rates

| Valuation Date (July 1) | Contribution Rates | | | Normal Cost Rate | UAAL Rate* |
|----------------------------|--------------------|----------|---------|---------------------|---------------|
| | Employee | Employer | Total | | |
| 1992 | 7.044% | 7.459% | 14.503% | 9.876% | 4.627% |
| 1994 | 7.044 | 7.470 | 14.514 | 9.494 | 5.020 |
| 1996 | 7.044 | 7.470 | 14.514 | 9.328 | 5.186 |
| 1998 | 7.044 | 7.470 | 14.514 | 8.880 | 5.634 |
| 2000 | 7.15 | 7.58** | 14.73 | 9.71 | 5.02 |
| 2002 | 7.15 | 7.58 | 14.73 | 10.33 | 4.40 |
| 2004 | 7.15 | 7.58 | 14.73 | 10.34 | 4.39 |
| 2005 | 7.15 | 7.58 | 14.73 | 10.35 | 4.38 |
| 2006 | 7.15 | 7.58 | 14.73 | 10.37 | 4.36 |
| 2007 | 7.15 | 9.58 | 16.73 | 10.40 | 6.33 |
| 2008 | 7.15 | 9.58 | 16.73 | 10.87 | 5.86 |
| 2009 | 7.15 | 9.96 | 17.11 | 10.69 | 6.42 |
| 2010 | 7.15 | 9.96 | 17.11 | 9.74 | 7.37 |
| 2011 | 7.15 | 9.96 | 17.11 | 9.64 | 7.47 |
| 2012 | 7.15 | 9.96 | 17.11 | 9.64 | 7.47 |

* The UAAL rate is the amount available to amortize the UAAL. It is equal to the total contribution rate, minus the normal cost rate.

** The 1999 Legislation which passed the 1.5% GABA, also added a 0.11% state general fund contribution.



Teachers' Retirement System State of Montana

Appendix E

Glossary

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 Montana Teachers' Retirement System. 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 Gain (Loss)

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



Appendix E (continued)

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.



Appendix E (continued)

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.