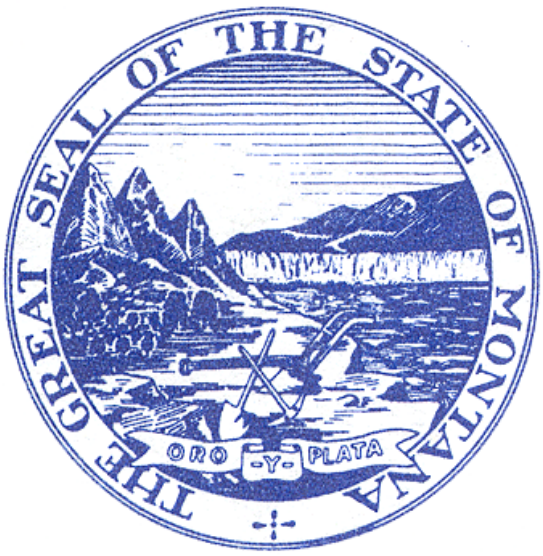
Teachers' Retirement System
State of Montana

ACTUARIAL VALUATION
(As of July 1, 2002)



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Section 1

Summary of Findings

As a result of the actuarial valuation of the benefits in effect under the Montana Teachers' Retirement System as of July 1, 2002, we recommend that the current employer contribution rate, 7.58% of members' salaries, remain in effect.

The 7.58% rate is sufficient to meet the actuarial cost of the System accruing at the valuation date and to amortize the unfunded actuarial accrued liability over 23.4 years. The actuarial costs are calculated using the entry age actuarial cost method. This actuarial valuation measures the adequacy of the contribution rates set in Montana State Law. MCA 19-20-604 states that the employer contribution rate will return to 7.47% when the amortization period of the Systemís unfunded actuarial accrued liability is 10 years or less according to the Systemís latest actuarial valuation.

Experience

The 2002 actuarial valuation indicates that an actuarial loss occurred during the preceding two fiscal years. The loss is primarily due to lower returns on the assets than expected by the actuarial assumptions, and is reflected in the 9.2% and 3.8% net investment return on an actuarial basis for the past two years. The following chart compares the annual returns for the past four years.

Year	Market Return	Actuarial Return	Actuarial Return over 8.0% Assumption
7/1/1998 to 6/30/1999	11.9%	12.3%	4.3%
7/1/1999 to 6/30/2000	7.8%	12.8%	4.8%
7/1/2000 to 6/30/2001	(5.1)%	9.2%	1.2%
7/1/2001 to 6/30/2002	(7.3)%	3.8%	(4.2)%

Asset gains or losses result when the return on the actuarial value of assets differs from the actuarial investment return assumption of 8.0%. The actuarial return on assets has under performed the assumption by about 3% (1.2% - 4.2%) in the last two years as shown in the last column of the chart. In contrast, the actuarial return on assets in the two years preceding the July 1, 2000 valuation exceeded the assumption by approximately 9% (4.3% + 4.8%). The asset loss in the last two years increased the unfunded actuarial accrued liability (UAAL) by about $72 million. Without the asset losses, the UAAL would be closer to $423 million instead of the $495 million shown in Table 8.

The asset losses of the last two years are projected to have a much larger impact on the funding of the System in the next four years. The actuarial asset method recognizes asset gains and losses over five years. At July 1, 2000 the System had $137 million in unrecognized asset gains. These gains partially offset the recognition of losses in the last two years. At July 1, 2002 the System has $443 million in unrecognized asset losses. This $443 million in unrecognized asset losses, if not offset by future gains, will cause the amortization period of the UAAL in future valuations to fall outside the measures accepted as financially sound. Therefore, to stay financially sound in the future, the System will need either (1) future gains such as asset returns well over 8.0%, or (2) an increase in contribution rates.

Assumption Changes

The valuation results include all changes made to the assumptions as detailed in our Investigation of Active Member Demographic Experience, dated August 29, 2002. See Table A-1 for a summary of assumptions including those changed for this 2002 valuation.

Benefit Changes

The following benefit improvement was passed in the 2001 legislative session:

- a $600 minimum benefit for members and beneficiaries retired at July 1, 2000 where the member at time of retirement had 25 years of service.

Contribution Changes

There have been no contribution changes since the July 1, 2000 actuarial valuation.

Impact of Changes

The effect of the asset losses and other experience on the amortization period can be distributed approximately as follows:

Amortization Period Remaining at July 1, 2002

July 1, 2000 Valuation Amortization Period		15.1 years
Passage of time		– 2.0
Effect of Changes in Benefits and Contribution Rates		+ 0.2
Effect of Changes in Actuarial Assumptions		+ 4.1
Expected Amortization Period at July 1, 2002		17.4 years
Effect of Experience Gains and Losses on Actuarial Accrued Liability:		
Salary Increases (Gain)	– 1.1	
Retired Mortality (Loss)	+ 0.3	
Loss from Other Causes	+ 0.9	+ 0.1
Effect of Experience Loss on Actuarial Assets		+ 5.9
July 1, 2002 Valuation Amortization Period		+ 23.4 years

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Section 2

Scope of the Report

This report presents the actuarial valuation of the Montana Teachers' Retirement System as of July 1, 2002.

A summary of the findings resulting from this valuation is presented in the previous section. Section 3 describes the assets of the System. Sections 4 and 5 describe how the obligations of the System are to be met under the actuarial cost method in use.

The actuarial procedures and assumptions used in this valuation are described in Appendix A. The current benefit structure, as determined by the provisions of the governing law on July 1, 2002, is summarized in Appendix B. Schedules of valuation data classifying the data used in the valuation by various categories of contributing members, former contributing members, and beneficiaries make up Appendix C. Appendix D provides a brief summary of the System's recent experience. Comparative statistics are presented on the System's membership and contribution rates. Appendix E is a glossary of actuarial terms used in this report.

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Section 3

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, 2002. 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 five 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 five years.

Table 1 lists the assets held and their market value for the past two years. Table 2 summarizes the fundís activity during the past two years. Table 3 summarizes the determination of the actuarial value of assets. Table 4 shows when asset gains or losses will be recognized in the actuarial value of assets. Table 5 summarizes historical asset returns since July 1, 1994 including the amount recognized by the actuarial asset valuation method which was greater or lesser than the actuarial investment return assumption.

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Table 1

Statement of Plan Net Assets
June 30, 2002 and 2001

ASSETS	**2002**	**2001**
Current Assets:		
Cash	$ 2,491,146	$ 5,711,360
Cash Equivalents-Short Term Investment Pool	39,431,230	58,221,816
Accounts Receivable	19,099,402	15,250,909
Interest Receivable	9,740,964	6,956,040
Total Current Assets	$ 70,762,742	$ 86,140,125
Investments, at fair value:		
Mortgages	$ 145,439,305	$ 122,669,330
Investment Pools	1,674,389,978	1,836,565,552
Other Investments	159,030,945	190,752,951
Total Investments	$1,978,860,228	$ 2,149,987,833
Securities Lending Collateral	$ 99,887,388	$ 91,502,255
Other Assets:		
Land and Buildings	$ 193,844	$ 193,844
Less: Accumulated Depreciation	(121,064)	(117,300)
Intangible Assets, net of amortization	3,836,503	4,249,099
Equipment	137,249	137,249
Less: Accumulated Depreciation	(112,035)	(102,265)
Total Other Assets	$ 3,934,497	$ 4,360,627
TOTAL ASSETS	$2,153,444,855	$ 2,331,990,840
LIABILITIES		
Accounts Payable	$ 11,791,136	$ 620,969
Securities Lending Liability	99,887,388	91,502,255
Compensated Absences	83,811	89,085
Installment Purchase Payable	0	570,417
TOTAL LIABILITIES	$ 111,762,335	$ 92,782,726
NET ASSETS HELD IN TRUST FOR PENSION BENEFITS	$2,041,682,520	$ 2,239,208,114

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Table 2

Statement of Changes in Plan Net Assets
June 30, 2002 and 2001

ADDITIONS	**2002**	**2001**
Contributions:		
Employer	$ 51,518,712*	$ 50,989,948*
Plan Member	47,872,258	48,277,894
Other	762,422	611,148
Total Contributions	$ 100,153,392	$ 99,878,990
Rental Income	$ 0	$ 5,581
Workers Comp. Dividend	$ 255	$ 445
Taxes	$ 0	$ 84
Investments Income:		
Net Appreciation/(Depreciation)		
In fair value of investments	$ (253,162,567)	$ (271,519,227)
Investment Earnings	96,262,329	154,496,707
Total Investment Income	$ (156,900,238)	$ (117,022,520)
Less Investment Expense	$ 3,074,434	$ 2,355,589
Net Investment Income	$ (159,974,672)	$ (119,378,109)
Security Lending Income	$ 2,796,477	8,215,605
Less Security Lending Expense	2,407,203	7,887,445
Total Security Lending Income	$ 389,274	$ 328,160
Total Net Investment Income	$ (159,585,398)	$ (119,049,949)
Total Additions	$ (59,431,751)	$ (19,164,849)
DEDUCTIONS		
Benefit Payments	$ 130,014,779	$ 118,841,895
Withdrawals	6,472,327	5,370,493
Administrative Expense	1,606,737	1,715,782
Total Deductions	$ 138,093,843	$ 125,928,170
NET INCREASE IN PLAN NET ASSETS	$ (197,525,594)	$ (145,093,019)
NET ASSETS HELD IN TRUST FOR PENSION BENEFITS BEGINNING OF YEAR	$ 2,239,208,114	$ 2,384,301,133
END OF YEAR	$ 2,041,682,520	$ 2,239,208,114

** Includes ORP amount of $3.96 mil FY2002 and $3.54 mil in FY2001.*

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Table 3

Determination of Actuarial Value of Assets
July 1, 2002

Determination of Recognized Investment Gains and Losses - Five-Year Smoothing

A. Expected investment return ñ Year Ended 6/30/2002		$ 177,683,301
B. Actual investment return ñ Year Ended 6/30/2002		$ (161,191,880)
C. Gains/(losses) ñ 2002 [B ñ A]		$ (338,875,181)
D. Gains/(losses) ñ 2001		$ (310,524,198)
E. Gains/(losses) ñ 2000		$ (3,684,142)
F. Gains/(losses) ñ 1999		$ 78,945,961
G. Gains/(losses) ñ 1998		$ 147,873,557
H. Gains/(losses) recognized at July 1, 2002* [1/5 C + 1/5 D + 1/5 E + 1/5 F + 1/5 G]		$ (85,252,802)

Determination of Actuarial Assets

Actuarial value of assets July 1, 2001		$ 2,428,684,863
Contributions less benefits	$ (36,333,714)	
Expected investment return	177,683,301	
Recognized investment gains/(losses)	(85,252,802)	56,096,785
Actuarial value of assets July 1, 2002		**2,484,781,648**
Unrecognized Loss		(443,099,128)
Market Value of Assets July 1, 2002 (Actuarial Value + Unrecognized Gain)		$ 2,041,682,520

Note: The actuarial value of assets is equal to the expected value plus a five-year smoothing of market value gains and losses. The actuarial asset method was adopted for the July 1, 2000 actuarial valuation with actuarial value of assets set equal to market value of assets at July 1, 1996. Deferred asset gains and losses prior to July 1, 1996 are ignored.

** Includes $1 rounding adjustment.*

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Table 4

Schedule of Investment Gain/(Loss) Recognition
(in millions)
July 1, 2002

Fiscal Year Ending 06/30	Market Value Investment Gain/(Loss) Over the Expected 8%	Investment Gain/(Loss) Recognized in Past Years					Investment Gain/(Loss) to be Recognized in Future Years			
		1998	1999	2000	2001	2002	2003	2004	2005	2006
1997	$ 166.1	$ 33.2	$ 33.2	$ 33.2	$ 33.2					
1998	147.9	29.5	29.5	29.5	29.5	$ 29.5				
1999	78.9		15.8	15.8	15.8	15.8	$ 15.8			
2000	(3.7)			(0.7)	(0.7)	(0.7)	(0.7)	$ (0.7)		
2001	(310.5)				(62.1)	(62.1)	(62.1)	(62.1)	$ (62.1)	
2002	(338.9)					(67.8)	(67.8)	(67.8)	(67.8)	$ (67.8)
2003	0.0						0.0	0.0	0.0	0.0
2004	0.0							0.0	0.0	0.0
2005	0.0								0.0	0.0
2006	0.0									0.0

Total Gain/(Loss) Recognized at Each Valuation Date								
Recognized					Scheduled to be Recognized**			
$62.7	$78.5	$77.8	$15.7	$(85.3)	$(114.8)	$(130.6)	$(129.9)	$(67.8)

Unrecognized Gain/(Loss) Remaining				
$(443.1)	$(328.3)	$(197.7)	$(67.8)	$0.0

* *The first gain/(loss) was measured in the fiscal year ending June 30, 1997.*
** *The total gain/(loss) actually recognized in each future year will include additional amortizations of future gains and/or losses.*

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Table 5

Historical Investment Returns*

Fiscal Year Ending	Market Returns	Actuarial Return	Actuarial Return Over 8.0% Assumption
June 30, 1995	15.7%	8.9%	0.9%
June 30, 1996	12.4	10.4	2.4
June 30, 1997	19.4	14.9	6.9
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)

* *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.*

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Section 4

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, July 1, 2002. 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.

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Table 6

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

(All amounts are actuarial present values in millions)

	July 1, 2002 Total	July 1, 2000 Total
A. Active members		
Service retirement	$ 1,699.6	$ 1,559.9
Disability retirement	20.4	27.2
Survivors' benefits	40.8	44.1
Vested Retirement	29.2	35.0
Refund of Member Contributions	32.1	35.9
Total	$ 1,822.1	$ 1,702.1
B. Inactive members and annuitants		
Service retirement	$ 1,430.9	$ 1,201.7
Disability retirement	16.1	15.3
Beneficiaries*	90.8	76.0
Vested terminated members	47.0	40.0
Nonvested terminated members	13.6	13.7
Total	$ 1,598.4	$ 1,346.7
C. Grand Total	$ 3,420.5	$ 3,048.8

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

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Section 5

Employer Contributions

In the previous two sections, attention has been focused on the assets and actuarial liabilities 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. This is the universal experience in all but a fully closed-down fund where no further contributions of any sort are anticipated.

In an active system, there will always be a difference between the actuarial liabilities and the assets. This difference has to be funded with future contributions and investment returns. 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. Under this method, or essentially any actuarial cost method, the contributions required to meet the difference between current assets and current actuarial liabilities 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

- Whatever amount is left over, which is used to amortize what is called the unfunded actuarial accrued liability.

The two items described above, normal cost and unfunded actuarial accrued liability, 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.

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 favorable as anticipated. Under these circumstances, an unfunded actuarial accrued liability (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: the portion of the present value of future benefits not provided by future normal cost contributions. Line D shows the actuarial value of assets available for benefits. Line E shows the unfunded actuarial accrued liability. Lines F and G show the impact of the present value of future scheduled ORP contributions (described below) on the unfunded actuarial accrued liability.

As can be seen from this discussion, a key consideration in the adequacy of the funding of the System is how the UAAL is being amortized. Table 9 shows that the current employer and member contribution rates are adequate to pay the total normal cost rate (10.33% of pay), with enough left over to amortize the UAAL in 23.4 years. Therefore, the current basis is sufficient to meet future requirements.

The amortization of the UAAL assumes contributions 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 Teachersí Retirement System (TRS) for Montana University System (MUS) members. As of the 1996 valuation, there was a $98.0 million difference, or shortfall, which is to be funded as a level percentage of future ORP salaries from July 1, 1997 to June 30, 2033. The single contribution rate determined as of July 1, 1997 was 3.97%. However, the following graded schedule for increasing the ORP contributions was adopted:

ORP 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, 2033

The July 1, 2000 actuarial valuation of the MUS calculated a $132.7 million difference or shortfall. The contribution schedule has not been changed. The value of future ORP payments included in the July 1, 2002 TRS valuation is $111.8 million.

The unfunded actuarial accrued liability 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.

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Table 7

Normal Cost Contribution Rates
As Percentages of Salary

	July 1, 2002 Total	July 1, 2000 Total
Service retirement	7.86%	6.90%
Disability retirement	0.15	0.19
Survivors' benefits	0.26	0.25
Vested retirement	0.60	0.64
Refund of member contributions	1.46	1.73
Total	10.33%	9.71%

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Table 8

Unfunded Actuarial Accrued Liability
(All dollar amounts in millions)

	July 1, 2002	July 1, 2000
A. Actuarial present value of all future benefits for present and former members and their survivors (Table 4)	$ 3,420.5	$ 3,048.8
B. Less actuarial present value of total future normal costs for present members	440.4	400.5
C. Actuarial accrued liability	$ 2,980.1	$ 2,648.3
D. Less actuarial value of assets available for benefits (Table 3)	2,484.8	2,247.5
E. Unfunded actuarial accrued liability	$ 495.3	$ 400.8
F. Less present value of future ORP contributions*	111.8	96.4
G. Unfunded actuarial accrued liability funded by TRS contributions	$ 383.5	$ 304.4

* *Paid by contributions to TRS made as a percentage of the salaries of the participants in the Optional Retirement Plan (ORP). The percentage of salary will be a level 4.04% for the Fiscal Years ending in 2002 through 2033.*

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Table 9

Recommended Contribution Rates
As Percentages of Salary

	July 1, 2002	July 1, 2000
A. Employer contribution rate*	7.58%	7.58%
B. Member contribution rate	7.15	7.15
C. Total contribution rate	14.73%	14.73%
D. Less total normal cost rate (Table 5)	10.33	9.71
E. Amount available to amortize unfunded actuarial accrued liability**	4.40%	5.02%
F. Amortization period from Valuation Date	23.4 years	15.1 years***

* *In accordance with MCA 19-20-604, the employer contribution rate will return to 7.47% when the amortization period of the Systemís unfunded actuarial accrued liability is 10 years or less according to the Systemís latest actuarial valuation.*

** *In addition, a percentage of the salaries of the participants in the Optional Retirement Plan (ORP) is available to help amortize the unfunded actuarial accrued liability.*

*** *The amortization period as of July 1, 2000 was 15.1 years; thus, the expected period as of July 1, 2002 is 13.1 years assuming no changes in benefits or assumptions. A summary of the impact of changes since the prior valuation is in Section 1.*

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Section 6

Cash Flows

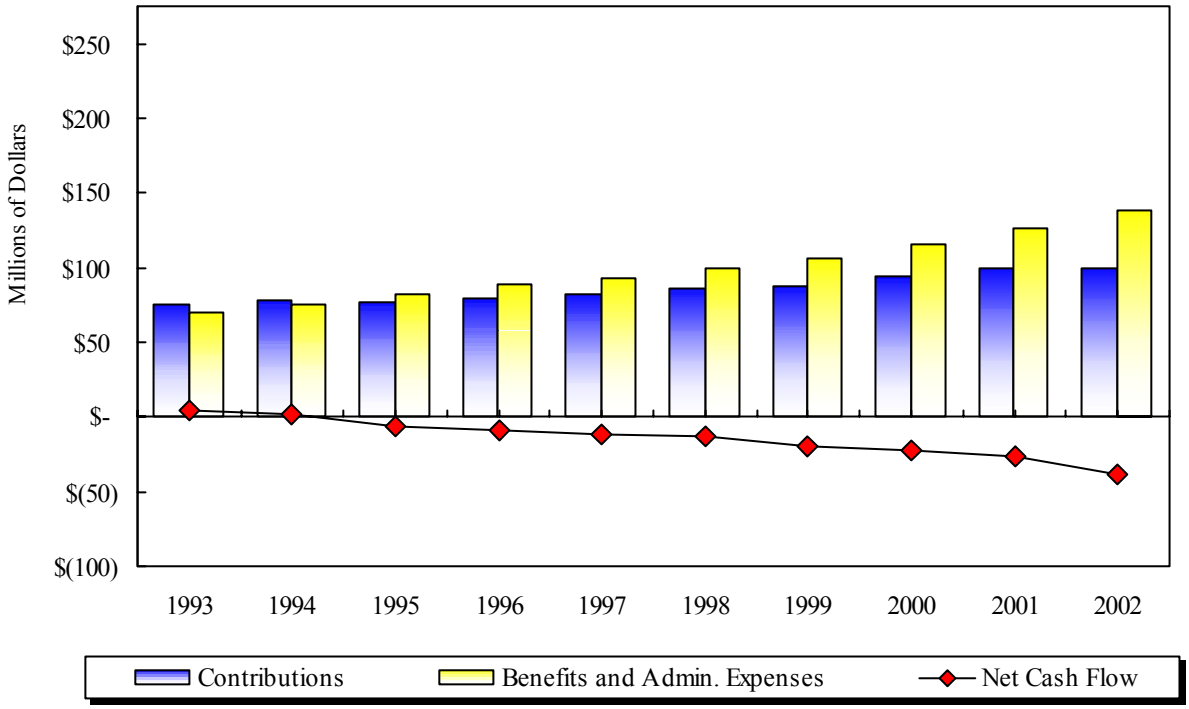
The fundamental equation for funding a retirement system is that benefits and administrative expenses must be provided for by contributions (past and future) and investment income. When a retirement system matures, benefits and administrative expenses often exceed contributions. In this case we say the system has a ìnegative cash flow.î 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 systemís investment strategy should recognize the need for actual cash funds when benefit payments exceed the cash income from contributions.

The Table 10 shows that until 1995 the System had a positive cash flow. In the year ended June 30, 2002 the Systemís benefits and administrative expenses exceeded contributions by $38 million. At the current contribution rates this is projected to increase to $114 million for the year ending June 30, 2012.

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 Systemís assets.

The projected contributions and administrative expenses are based on the actual amounts for the year ended June 30, 2002. Contributions are assumed to increase at the general wage increase assumption of 5%. Expenses are assumed to increase at the underlying inflation assumption of 4%.

Cash Flow History



Cash Flow Projections

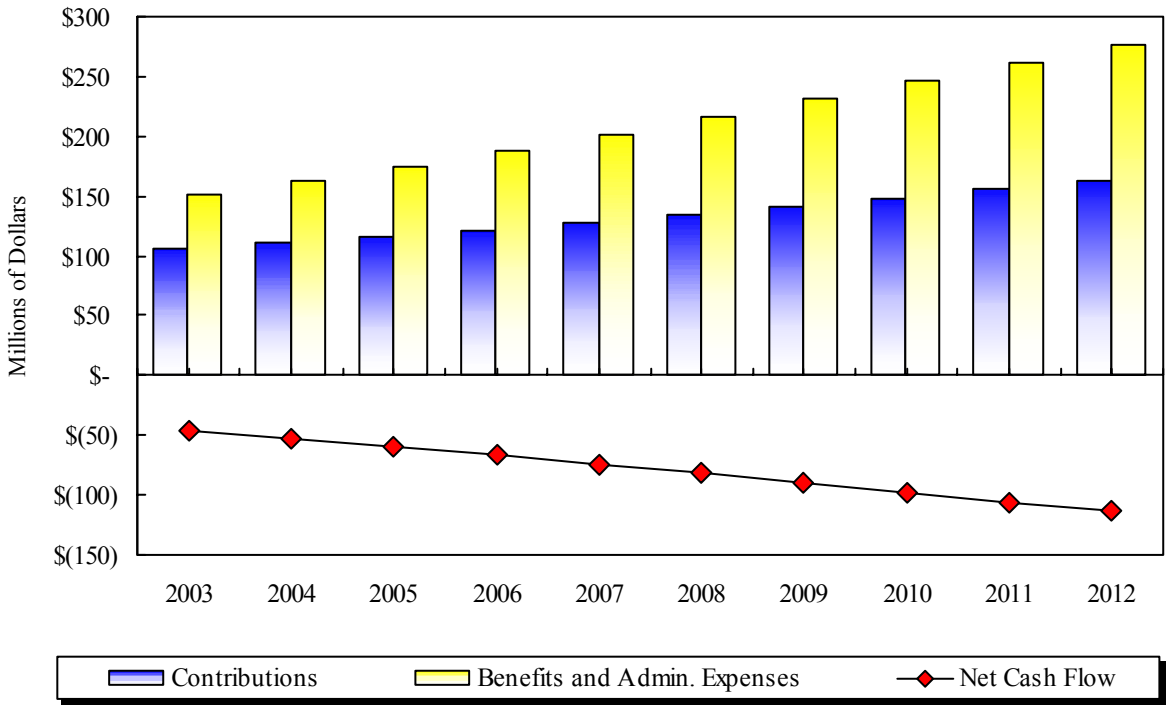


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Table 10

Cash Flow History and Projections

Historical Cash Flows*

Year Ended June 30,	Contributions	Benefits & Administrative Expenses	Net Cash Flow
1993	$ 75	$ 71	$ 4
1994	78	76	2
1995	77	83	(6)
1996	80	89	(9)
1997	82	93	(11)
1998	87	100	(13)
1999	88	107	(19)
2000	94	116	(22)
2001	100	126	(26)
2002	100	138	(38)

Projected Cash Flows*

Year Ending June 30,	Contributions	Benefits & Administrative Expenses	Net Cash Flow
2003	$ 105	$ 152	$ (47)
2004	110	163	(53)
2005	116	175	(59)
2006	122	188	(66)
2007	128	202	(74)
2008	134	216	(82)
2009	141	231	(90)
2010	148	246	(98)
2011	155	262	(107)
2012	163	277	(114)

** Millions of Dollars*

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Appendix A

Actuarial Procedures and Assumptions

The actuarial assumptions used in this valuation were adopted by the Board for the July 1, 2002 Actuarial Valuation. Several assumptions were changed as a result of our study, Investigation Of Active Member Demographic Experience, dated August 29, 2002.

Tables A-3 through A-6 give rates of decrement for service retirement, disablement, mortality, and other terminations of employment. These rates of decrement are referred to in actuarial literature as the absolute rate of decrement, or q'_x. Table A-7 shows the assumed probability of retaining membership in the System among members terminating with five or more years of service.

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 unfunded actuarial accrued liability. The unfunded actuarial accrued liability 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 unfunded actuarial liability was 7.58% of members' salaries. In accordance with MCA 19-20-604, the employer contribution rate will return to 7.47% when the amortization period of the Systemís unfunded actuarial liability is 10 years or less according to the Systemís 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 8% per year.

Valuation of Assets - Actuarial Basis

The actuarial asset valuation method spreads asset gains and losses over five 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 five years. The gains and losses are measured starting with the year ended June 30, 1997. Adopted in the July 1, 2000 actuarial valuation.

Investment Earnings

The annual rate of investment earnings of the assets of the System is assumed to be 8% per year, compounded annually.

Interest on Member Contributions

Interest on member contributions is assumed to accrue at a rate of 6% per annum, compounded annually. This assumption was set as of July 1, 1998.

Postretirement Benefit Increases

On January 1 of each year, the retirement allowance payable must be increased by 1.5% if the retireeís most recent retirement effective date is 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 5.0% 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, 1998 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 July 1, 2002. The rates for University Members were adopted July 1, 2002.

Disablement

The rates of disablement used in this valuation are illustrated in Table A-4. The rates for General Members were adopted July 1, 2002. The rates for University Members were adopted July 1, 1996.

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, 2000.

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 July 1, 2002.

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 their available contribution account.

Part-Time Employees

The valuation data for active members identify part-time members, but give no indication as to the number of hours worked. As done in the past, we imputed a "part-time percentage" by comparing the pay received with their annual equivalent full-time salary. Part-time members earning less than $1,000 during the last year were valued at their current member contribution balance.

Optional Retirement Program

The total contribution received for the fiscal year ending June 30, 2002 was $3,960,000. Based on a contribution rate of 4.04%, we assumed the total ORP payroll for the fiscal year to be $98,019,802 ($3,960,000 divided by 4.04%).

Buybacks, Purchase of Service, and Military Service

The active liabilities and normal cost were increased to 100.5% of their original value to fund this additional service based on a study of the Systemís experience for the five calendar years 1995 through 1999. Effective July 1, 2000.

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.

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Table A-1

Summary of Valuation Assumptions
(July 1, 2002)

I.	Economic assumptions		
	A.	General wage increases*	5.00%
	B.	Investment return	8.00%
	C.	Growth in membership	0.00%
	D.	Postretirement benefit increases (Starting three years after retirement)	1.50%
	E.	Interest on member accounts	6.00%
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 July 1, 2002)	Table A-3
	C.	Disablement (adopted July 1, 2002) (General Member assumptions adopted July 1, 2002) (University Member assumptions adopted July 1, 1996)	Table A-4
	D.	Mortality among contributing members, service retired members, and beneficiaries 1994 Group Annuity Mortality Table, with ages set back 3 years for males and ages set back 1 year for females. (adopted July 1, 2000)	Table A-5
	E.	Mortality among disabled members Based on the IRS Social Security Disabled Mortality Tables published in Revenue Ruling 96-7. Males are 70% of the Male IRS table to age 80, grading into the 1983 Group Annuity Mortality Table for Males between ages 80 and 85. Females are 85% of the IRS table at all ages. (adopted July 1, 2000)	Table A-5
	F.	Other terminations of employment (adopted July 1, 2002)	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.*

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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%	5.00%	9.51%	1.00%	5.00%	6.00%
2	4.09	5.00	9.09	1.00	5.00	6.00
3	3.46	5.00	8.46	1.00	5.00	6.00
4	2.94	5.00	7.94	1.00	5.00	6.00
5	2.52	5.00	7.52	1.00	5.00	6.00
6	2.21	5.00	7.21	1.00	5.00	6.00
7	1.89	5.00	6.89	1.00	5.00	6.00
8	1.68	5.00	6.68	1.00	5.00	6.00
9	1.47	5.00	6.47	1.00	5.00	6.00
10	1.31	5.00	6.31	1.00	5.00	6.00
11	1.16	5.00	6.16	1.00	5.00	6.00
12	1.00	5.00	6.00	1.00	5.00	6.00
13	0.84	5.00	5.84	1.00	5.00	6.00
14	0.68	5.00	5.68	1.00	5.00	6.00
15	0.58	5.00	5.58	1.00	5.00	6.00
16	0.47	5.00	5.47	1.00	5.00	6.00
17	0.37	5.00	5.37	1.00	5.00	6.00
18	0.26	5.00	5.26	1.00	5.00	6.00
19	0.21	5.00	5.21	1.00	5.00	6.00
20	0.16	5.00	5.16	1.00	5.00	6.00
21	0.11	5.00	5.11	1.00	5.00	6.00
22 & Up	0.00	5.00	5.00	1.00	5.00	6.00

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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		18.0%	9.5%		5.0%	4.9%
46		18.0	9.5		5.0	4.9
47		12.5	9.5		5.0	4.9
48		12.5	9.5		5.0	4.9
49	*	12.5	9.5	*	5.0	4.9
50	4.0%	12.5	9.5	1.9%	8.0	4.9
51	4.0	16.0	9.5	2.2	8.0	4.9
52	4.5	16.0	9.5	2.5	8.0	6.0
53	4.5	16.0	9.5	2.8	8.0	6.0
54	5.0	16.0	9.5	3.1	12.0	6.0
55	5.5	22.0	14.0	3.4	15.0	6.0
56	6.0	22.0	14.0	3.7	15.0	6.0
57	6.5	22.0	14.0	4.0	15.0	7.0
58	6.5	22.0	15.0	4.3	15.0	7.0
59	7.0	22.0	18.0	4.7	15.0	9.0
60	*	22.0	22.0	*	19.0	10.0
61		22.0	22.0		19.0	14.0
62		27.0	27.0		24.0	24.0
63		22.0	22.0		14.0	14.0
64		25.0	25.0		20.0	20.0
65		35.0	35.0		33.0	33.0
66		30.0	30.0		23.0	23.0
67		24.0	24.0		23.0	23.0
68		22.0	22.0		23.0	23.0
69		22.0	22.0		23.0	23.0
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
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Table A-4

Disablement
Annual Rates

Age	General Members	University Members
25	.010%	.003%
30	.010	.006
35	.020	.012
40	.040	.021
45	.080	.036
50	.130	.055
55	.180	.083
60	.260	.126

Teachers' Retirement System
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Table A-5

Mortality
Annual Rates

Age	Contributing Members, Service Retired Members and Beneficiaries		Disabled Members	
	Men	Women	Men	Women
25	.06%	.03%	1.92%	1.02%
30	.07	.03	2.15	1.26
35	.08	.04	2.39	1.50
40	.09	.07	2.69	1.75
45	.13	.09	3.01	2.04
50	.19	.13	3.36	2.38
55	.32	.21	3.72	2.77
60	.56	.39	4.07	3.23
65	1.01	.76	4.46	3.76
70	1.80	1.27	5.13	4.36
75	2.85	2.04	6.22	5.32
80	4.52	3.54	7.50	6.84
85	7.55	6.10	11.48	9.30

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Table A-6

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

Years of Service	General Members	University Members
1	30.0%	33.0%
2	16.0	17.0
3	11.0	13.0
4	9.0	11.0
5	8.0	9.0
6	7.7	8.3
7	7.3	7.7
8	7.0	7.0
9	6.6	6.6
10	6.2	6.2
11	5.8	5.8
12	5.4	5.4
13	5.0	5.0
14	4.6	4.6
15	4.2	4.2
16	3.8	3.8
17	3.4	3.4
18 and up	3.0	3.0

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Table A-7

Probability of Retaining Membership in the System Upon Vested Termination

Age	Probability of Retaining Membership
25	54%
30	54
35	58
40	58
45	60
50	70
55	75

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Appendix B

Summary of Benefit Provisions

Effective Date	September 1, 1937.
Vesting Period	5 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 3 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 5 years of service.
Benefit:	The retirement benefit is equal to 1/60 of final compensation for each year of service.
Early Retirement Benefits	
Eligibility:	5 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 reduced 1/2 of 1% for each of the first 60 months early and 3/10 of 1% for each of the next 60 months early.

Death Benefit

Eligibility:	5 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 memberís age at death to the beneficiaryís 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:	5 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 5 years of service, the accumulated employee contributions with interest are returned. With more than 5 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: 7.150% of compensation. Employer: 7.580% of compensation. MCA 19-20-604 specifies that the employer contribution rate will return to 7.47% when the amortization period of the Systemís unfunded actuarial liability is 10 years or less according to the Systemís latest actuarial valuation.
Interest on Member Contributions	Interest on member contributions is currently being credited at a rate of 4.5% per annum.
Cost-of-Living Adjustments	On January 1 of each year, the retirement allowance payable must be increased by 1.5% if the retireeís most recent retirement effective date is at least 36 months prior to January 1 of the year in which the adjustment is to be made.

Teachers' Retirement System
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Appendix C

Valuation Data

This valuation is based upon the membership of the System as of July 1, 2002. 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.

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.

Active Members	Number	Annual Salaries in Millions
Full-Time Members	12,796	$ 486.2
Part-Time Members*	4,650	52.7
Total Contributing Members*	17,446	$ 538.9
Active Members with Annual Compensation less than $1,000	723	
Total Active Members	18,169	

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

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.

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

Type of Annuitant	Number	Annual Benefits in Thousands	Average Annual Benefits
Service Retirement	8,438	$ 127,870	$ 15,154
Survivors of Deceased Retired Members	689	6,471	9,392
Total Service Retirement (including survivors)	9,127	134,341	14,719
Disability Retirement	200	1,614	8,072
Survivors of Deceased Active Members	402	3,082	7,666
Child Beneficiaries	39	94	2,400
Total Annuitants	9,768	$ 139,131	$ 14,244

Terminated Members with Contributions Not Withdrawn*	Number
Vested Terminated Members	1,485
Non-Vested Terminated Members	8,231
Total Terminated Members	9,716

* *Includes 209 records provided in the active data with salary equal to zero and contributions greater than zero.*

Teachers' Retirement System
State of Montana

Table C-1

Active Members Distribution of Full-Time Employees and Salaries
as of July 1, 2002

Number of Employees - By Age Group - All Members

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	17	66	15	-	-	-	-	-	-	-	-	-	98
25 to 29	41	278	225	321	111	-	-	-	-	-	-	-	976
30 to 34	9	101	128	231	604	103	-	-	-	-	-	-	1,176
35 to 39	16	79	71	127	412	497	91	-	-	-	-	-	1,293
40 to 44	21	70	49	150	320	388	507	146	-	-	-	-	1,651
45 to 49	14	68	83	128	371	417	475	639	186	-	-	-	2,381
50 to 54	12	35	53	92	259	450	465	544	707	181	1	-	2,799
55 to 59	8	38	23	47	118	209	243	259	339	383	66	-	1,733
60 to 64	-	8	9	13	31	57	75	83	92	113	78	10	569
65 to 69	-	2	3	1	11	14	14	11	13	10	19	4	102
70 and up	-	2	1	2	1	1	1	4	2	3	-	1	18
Totals	138	747	660	1,112	2,238	2,136	1,871	1,686	1,339	690	164	15	12,796

Teachers' Retirement System
State of Montana

Table C-1

Active Members Distribution of Full-Time Employees and Salaries
as of July 1, 2002

Annual Salaries in Thousands - By Age Group - All Members

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	137	1,511	332	-	-	-	-	-	-	-	-	-	1,980
25 to 29	470	6,418	5,480	8,250	3,050	-	-	-	-	-	-	-	23,667
30 to 34	101	2,431	3,280	6,193	18,388	3,442	-	-	-	-	-	-	33,836
35 to 39	218	2,043	1,876	3,470	13,213	18,452	3,604	-	-	-	-	-	42,877
40 to 44	189	1,727	1,348	4,162	10,576	14,638	20,994	6,362	-	-	-	-	59,996
45 to 49	154	1,871	2,320	3,697	12,407	16,110	20,107	28,840	8,524	-	-	-	94,029
50 to 54	145	1,050	1,589	2,861	8,658	17,288	20,110	25,282	32,861	8,516	46	-	118,408
55 to 59	94	1,165	666	1,581	4,125	8,416	10,696	12,699	17,060	18,842	3,213	-	78,559
60 to 64	-	235	309	475	1,148	2,185	3,192	3,988	4,621	6,223	4,009	614	27,000
65 to 69	-	47	120	25	375	697	724	607	649	583	1,191	188	5,206
70 and up	-	35	24	35	10	25	26	209	89	152	-	41	647
Totals	1,508	18,533	17,344	30,751	71,950	81,253	79,455	77,987	63,805	34,316	8,460	843	486,204

Teachers' Retirement System
State of Montana

Table C-1

Active Members Distribution of Full-Time Employees and Salaries
as of July 1, 2002

Average Annual Salary - By Age Group - All Members

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Average
<25	8,038	22,897	22,142	-	-	-	-	-	-	-	-	-	20,204
25 to 29	11,467	23,086	24,354	25,701	27,474	-	-	-	-	-	-	-	24,249
30 to 34	11,232	24,072	25,629	26,810	30,443	33,416	-	-	-	-	-	-	28,772
35 to 39	13,606	25,856	26,425	27,325	32,071	37,127	39,606	-	-	-	-	-	33,161
40 to 44	8,995	24,670	27,506	27,750	33,051	37,727	41,408	43,573	-	-	-	-	36,339
45 to 49	10,991	27,508	27,948	28,883	33,442	38,632	42,331	45,133	45,827	-	-	-	39,491
50 to 54	12,103	30,005	29,981	31,101	33,429	38,418	43,248	46,475	46,480	47,048	46,390	-	42,304
55 to 59	11,769	30,662	28,972	33,630	34,959	40,267	44,017	49,032	50,324	49,197	48,686	-	45,331
60 to 64	-	29,412	34,328	36,563	37,047	38,338	42,561	48,048	50,233	55,067	51,397	61,366	47,452
65 to 69	-	23,534	40,094	25,036	34,051	49,760	51,747	55,162	49,919	58,286	62,678	47,114	51,039
70 and up	-	17,449	23,936	17,609	9,988	25,206	26,474	52,137	44,717	50,752	-	40,778	35,930
Totals	10,926	24,810	26,279	27,653	32,149	38,040	42,466	46,256	47,651	49,733	51,582	56,193	37,997

Teachers' Retirement System
State of Montana

Table C-1

Active Members Distribution of Part-Time Employees and Salaries
as of July 1, 2002

Number of Employees - By Age Group - All Members

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	97	73	12	5	-	-	-	-	-	-	-	-	187
25 to 29	167	146	68	54	24	-	-	-	-	-	-	-	459
30 to 34	58	95	54	53	85	42	-	-	-	-	-	-	387
35 to 39	89	104	80	64	84	64	28	-	-	-	-	-	513
40 to 44	119	162	99	145	152	65	48	34	-	-	-	-	824
45 to 49	89	140	99	127	212	83	36	32	21	-	-	-	839
50 to 54	70	83	69	110	178	113	54	24	30	11	-	-	742
55 to 59	37	43	30	46	89	89	30	23	9	15	4	-	415
60 to 64	21	22	13	20	38	18	17	10	9	9	5	1	183
65 to 69	10	7	8	11	12	5	6	4	4	1	2	-	70
70 and up	5	4	2	7	5	4	2	1	-	-	-	1	31
Totals	762	879	534	642	879	483	221	128	73	36	11	2	4,650

Teachers' Retirement System
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Table C-2

Distribution of Inactive Lives

Members Receiving Service Retirement Benefits as of July 1, 2002

Age	Number of Persons	Annual Benefits in Thousands	Average Annual Benefits
<50	43	$ 789	$ 18,355
50 to 54	461	8,334	18,079
55 to 59	1,180	22,403	18,986
60 to 64	1,596	29,504	18,486
65 to 69	1,493	25,479	17,066
70 to 74	1,193	17,850	14,963
75 to 79	859	10,382	12,086
80 to 84	688	6,841	9,944
85 to 89	507	3,849	7,592
90 and up	418	2,438	5,833
Total	8,438	127,870	15,154

Members Receiving Disability Retirement Benefits as of July 1, 2002

Age	Number of Persons	Annual Benefits in Thousands	Average Annual Benefits
<50	14	$ 105	$ 7,519
50 to 54	38	315	8,291
55 to 59	30	291	9,713
60 to 64	28	243	8,681
65 to 69	22	190	8,644
70 to 74	24	199	8,287
75 to 79	15	99	6,596
80 to 84	17	103	6,045
85 to 89	9	45	5,038
90 and up	3	24	7,835
Total	200	1,614	8,072

Teachers' Retirement System
State of Montana

Table C-2

Distribution of Inactive Lives

Survivors of Deceased Retired Members as of July 1, 2002

Age	Number of Persons	Annual Benefits in Thousands	Average Annual Benefits
<50	28	$ 178	$ 6,342
50 to 54	25	210	8,399
55 to 59	35	342	9,763
60 to 64	52	610	11,735
65 to 69	91	996	10,942
70 to 74	77	863	11,208
75 to 79	117	1,191	10,184
80 to 84	120	1,004	8,363
85 to 89	85	669	7,876
90 and up	59	408	6,917
Total	689	6,471	9,392

Survivors of Deceased Active Members as of July 1, 2002

Age	Number of Persons	Annual Benefits in Thousands	Average Annual Benefits
<50	79	$ 384	$ 4,858
50 to 54	43	295	6,870
55 to 59	58	479	8,257
60 to 64	37	458	12,373
65 to 69	35	262	7,489
70 to 74	43	461	10,730
75 to 79	41	401	9,778
80 to 84	32	177	5,546
85 to 89	15	80	5,351
90 and up	19	84	4,399
Total	402	3,082	7,666

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Table C-2

Distribution of Inactive Lives

Terminated Vested Members as of July 1, 2002
Number of Persons

Age	Number
<25	-
25 to 29	4
30 to 34	90
35 to 39	143
40 to 44	211
45 to 49	283
50 to 54	391
55 to 69	237
60 to 64	112
65 to 69	11
70 & above	3
Total	1,485

Child Beneficiaries as of July 1, 2002
Number of Persons

Age	Number
<5	2
5 to 6	2
7 to 8	2
9 to 10	7
11 to 12	3
13 to 14	6
15 to 16	5
17 to 18	12
Total	39

Child Beneficiaries all receive $200 per month, for a total of $93,600 per year.

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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.

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Table D-1

Active Membership Data

Valuation Date (July 1)	Active Members: 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

* *Not available.*
** *Excludes part-time active members with annual compensation less than $1,000.*

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Table D-2

Retired and Inactive Membership Data

	All Annuitants					Terminated Members	
Valuation Date (July 1)	Number	Annual Benefits in Thousands	Average Annual Benefit	Average Current Age	Average Age 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

* *Not available.*

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Table D-3

Contribution Rates

Valuation Date (July 1)	Contribution Rates			Normal Cost Rate	UAAL Rate**
	Employee	Employer	Total		
1989*	7.044%	7.459%	14.503%	8.827	5.676%
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%

* *Valuation performed by Hendrickson, Miller & Associates, Inc.*
** *The unfunded actuarial accrued liability rate is the amount available to amortize the unfunded actuarial accrued liability. It is equal to the total contribution rate, minus the normal cost rate.*

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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 Teachers' Retirement System Retirement System. Defined terms are capitalized throughout this Appendix.

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 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.

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 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 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 Liability.

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.

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.

Unfunded Actuarial Accrued Liability

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

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.

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.