

**Teachers' Retirement System
State of Montana**

**ACTUARIAL VALUATION
(As of July 1, 1998)**

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September 29, 1998

Teachers' Retirement Board
State of Montana
1500 Sixth Avenue
Helena, Montana 59620-0139

Dear Members of the Board:

At your request, we have made an actuarial valuation of the Teachers' Retirement System of the State of Montana as of July 1, 1998. The results of the valuation are contained in the following report; they are summarized in section 1.

In brief, the current employer contribution rate, 7.47% of members' salaries, covers continuing actuarial costs of the System. A measure of the adequacy of the rate is the period required to amortize the unfunded actuarial liability. The following table compares this valuation's amortization period with that of the previous valuation:

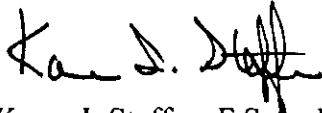
<u>Valuation Date</u>	<u>Amortization Period Years From Valuation Date</u>
July 1, 1996	27.2
July 1, 1998	9.2

Your particular attention is called to Section 2 of this report. There we refer to the guidelines employed in the preparation of this report. We also comment on the sources and reliability of both the data and the actuarial assumptions upon which our findings depend. Those comments are the basis for our certification that this report is complete and accurate to the best of our knowledge and belief.

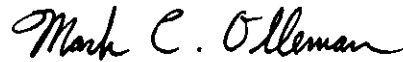
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September 29, 1998
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We would like to express our appreciation to Mr. David L. Senn, Executive Director of the System, and to members of his staff, who gave substantial assistance in supplying the data on which this report is based.

Respectfully submitted,



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KIS/MCO/eh

**Teachers' Retirement System
State of Montana**

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Section 1

Summary of the Findings

As a result of the actuarial valuation of the benefits in effect under the Montana Teachers' Retirement System as of July 1, 1998, we recommend that the current employer contribution rate, 7.47% of members' salaries, remain in effect.

This rate is sufficient to meet the actuarial cost of the System accruing at the valuation date and to amortize the unfunded actuarial liability over 9.2 years. The actuarial costs are calculated using the entry age actuarial cost method.

The 1998 actuarial valuation indicates that a substantial actuarial gain occurred during the preceding two fiscal years. The gain is primarily due to higher returns on the market value of assets than expected, and is reflected in the 19.4% and 16.6% net investment return on a market value basis and 14.9% and 16.0% on an actuarial basis for the past two years. These asset gains are much more pronounced than the asset gains reflected in the July 1, 1996 valuation. The following chart compares the annual returns for the past four years.

<u>Year</u>	<u>Market Return</u>	<u>Actuarial Return</u>	<u>Actuarial Return over 8.0% Assumption</u>
7/1/94 to 6/30/95	15.7%	8.9%	0.9%
7/1/95 to 6/30/96	12.4%	10.4%	2.4%
7/1/96 to 6/30/97	19.4%	14.9%	6.9%
7/1/97 to 6/30/98	16.6%	16.0%	8.0%

Asset gains result when the return on the actuarial value of assets exceeds the actuarial investment return assumption of 8.0%. The actuarial return on assets has exceeded the assumption by a total of approximately 15% (6.9% + 8.0%) 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, 1996 valuation exceeded the assumption by a total of a little over 3% (0.9% + 2.4%). The asset gains in the last two years reduced the unfunded actuarial liability (UAL) by about \$228 million. Without the asset gains the UAL would be closer to \$542 million instead of the \$314 million shown in this report.

The results include changes to the salary increase assumptions as detailed in our Investigation of Economic Experience, dated August 27, 1997. The July 1, 1996 Actuarial Valuation assumed general wage increases of 6.0% and individual increases due to merit and longevity of 0.5% for a total assumed individual increase of 6.5%. The July 1, 1998 Actuarial Valuation assumes general wage increases of 5.0% and individual increases due to merit and longevity of 1.0% for a total of 6.0%.

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

Amortization Period Remaining at July 1, 1998

July 1, 1996 Valuation Amortization Period		27.2 years
Passage of time		- 2.0
Effect of Changes in Benefits and Contribution Rates		none
Effect of Changes in Actuarial Assumptions		- 0.7
Effect of Increased ORP Contributions		<u>- 1.9</u>
Expected Amortization Period at July 1, 1998		22.6 years
Effect of Actuarial Experience Gains and Losses:		
Investments (Gain)	-13.7	
Loss from Other Causes	<u>+ 0.3</u>	<u>- 13.4</u>
Actual Amortization Period Remaining at July 1, 1998		+ 9.2 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, 1998.

A summary of the findings resulting from this valuation is presented in the previous section. Section 3 describes the assets of the System. A summary of the assets is set forth in Tables 1, 2 and 3. Sections 4 and 5 describe how the obligations of the System are to be met under the actuarial cost method in use. Section 6 discloses actuarial information based on the requirements of Statement No. 25 of the Governmental Accounting Standards Board.

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, 1998, 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.

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the System's staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. The participant data used for the valuation were submitted by the staff on computer disks. In our examination of these data, we found them to be reasonably consistent and comparable with data used in prior valuations.

We believe the actuarial assumptions used in the valuation, as summarized in Appendix A, are reasonably related to the experience of the System. The assumptions are the same as those used in our July 1, 1996 actuarial valuation, with the exception of the general wage and individual salary increase assumptions. That assumption was revised to be consistent with those recommended in our August 27, 1997 economic assumptions study report and was adopted by the Board for the July 1, 1998 actuarial valuation. The revised assumptions represent our best estimate of future conditions affecting the System.

In choosing the assumptions and preparing this report, we have conformed to generally recognized and accepted actuarial principles and practices that are consistent with the principles prescribed by the Actuarial Standards Board (ASB) and the Code of Professional Conduct and Qualification Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

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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, 1998. On that date the assets available for the payment of benefits are appraised. These assets are compared with the actuarial liabilities, which are generally well in excess of the assets. The actuarial process thus leads to a method of determining what contributions by members and their employers are needed to strike a balance.

For the July 1, 1989 valuation, the prior actuary adopted a new asset valuation method based on a three-year smoothing between the System's cost value and market value. The same method, except using a four-year smoothing period, is currently being used by the Montana Public Employee Retirement System. We recommend that the current smoothing method be retained for the July 1, 1998 valuation, but reviewed for reasonableness before the July 1, 2000 valuation.

The total assets of the System are reduced by a minor portion that is set aside for the payment of current liabilities. The resulting net assets equal the total fund balance available for the payment of benefits.

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 actuarial value of the net assets available for benefits on the valuation date. The actuarial value of net assets is 90.0% of the market value as of July 1, 1998.

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**Table 1
Statement of Plan Net Assets
June 30, 1998 and 1997**

ASSETS	<u>1998</u>	<u>1997</u>
Current Assets:		
Cash	\$ 4,437,694	\$ 1,323,491
Cash Equivalents-Short Term Investment Pool	30,606,718	50,337,040
Accounts Receivable	11,005,624	9,401,225
Interest Receivable	7,170,537	8,637,982
Total Current Assets	<u>\$ 53,220,573</u>	<u>\$ 69,699,738</u>
Investments, at fair value:		
Mortgages	\$ 99,857,435	\$ 78,854,719
Investment Pools	1,802,422,822	1,547,022,639
Other Investments	60,000,736	46,304,474
Total Investments	<u>\$ 1,962,280,993</u>	<u>\$ 1,672,181,832</u>
Securities Lending Collateral	\$ 131,322,491	\$ 193,935,870
Other Assets:		
Land and Buildings	\$ 193,844	\$ 193,844
Less: Accumulated Depreciation	(106,009)	(102,247)
Intangible Assets	159,819	79,580
Advances	0	186
Equipment	137,249	230,906
Less: Accumulated Depreciation	(60,720)	(139,466)
Total Other Assets	<u>\$ 324,183</u>	<u>\$ 262,803</u>
TOTAL ASSETS	<u>\$ 2,147,148,240</u>	<u>\$ 1,936,080,243</u>
Accounts Payable	\$ 6,620,273	\$ 6,719,486
Securities Lending Liability	131,322,491	193,935,870
Compensated Absences	46,028	34,869
Property Held In Trust	235	9,588
Installment Purchase Payable	0	10,426
TOTAL LIABILITIES	<u>\$ 137,989,027</u>	<u>\$ 207,710,239</u>
NET ASSETS HELD IN TRUST FOR PENSION BENEFITS	<u><u>\$ 2,009,159,213</u></u>	<u><u>\$ 1,735,370,004</u></u>

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**Table 2
Statement of Changes in Plan Net Assets
June 30, 1998 and 1997**

ADDITIONS	<u>1998</u>	<u>1997</u>
Contributions:		
Employer	\$ 44,476,127	\$ 41,639,722
Plan Member	41,937,700	40,348,306
Other	<u>200,083</u>	<u>101,267</u>
Total Contributions	\$ 86,613,910	\$ 82,089,295
 Rental Income	 \$ 17,625	 \$ 16,450
Investments Income:		
Net Appreciation/(Depreciation)		
In fair value of investments	\$ 195,343,125	\$ 191,159,724
Investment Earnings	<u>92,870,223</u>	<u>92,690,140</u>
Total Investment Income	\$ 288,213,348	\$ 283,849,864
 Less Investment Expense	 <u>\$ 1,408,732</u>	 <u>\$ 1,149,170</u>
Net Investment Income	\$ 286,804,616	\$ 282,700,694
 Security Lending Income	 \$ 9,304,669	 12,107,528
Less Security Lending Expense	<u>(8,972,791)</u>	<u>11,447,632</u>
Total Security Lending Income	\$ 331,878	\$ 659,896
 Total Net Investment Income	 \$ 287,136,494	 \$ 283,360,590
 DEDUCTIONS		
Benefit Payments	\$ 94,204,970	\$ 88,631,324
Withdrawals	4,826,198	3,839,562
Administrative Expense	<u>881,452</u>	<u>675,961</u>
Total Deductions	\$ 99,912,620	\$ 93,146,847
 NET INCREASE IN PLAN NET ASSETS	 \$ 273,855,409	 \$ 272,319,488
 NET ASSETS HELD IN TRUST FOR PENSION BENEFITS BEGINNING OF YEAR	 \$1,735,370,004	 \$1,463,050,516
 Prior Period Adj.	 (66,200)	 0
 END OF YEAR	 <u><u>\$2,009,159,213</u></u>	 <u><u>\$1,735,370,004</u></u>

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Table 3

Determination of Actuarial Value of Assets

Valuation Date	Total Fund Balances		Cumulative Unrealized Gain	Increase During Year	Smoothing Weights	Smoothed Portions of Gain
	Cost Value	Market Value				
July 1, 1996	\$1,143,883,484	\$1,463,050,516	\$ 319,167,032	\$ 319,167,032	100.00%	\$ 319,167,032
July 1, 1997	1,207,551,557	1,735,370,004	527,818,447	208,651,415	66.67	139,100,943
July 1, 1998	1,285,483,342	2,009,159,213	723,675,871	195,857,424	33.33	<u>65,285,808</u>
						\$ 523,553,783

Actuarial Assets

July 1, 1998 Cost Value	\$1,285,483,342
Smoothed Portion of Gain	<u>523,553,783</u>
July 1, 1998 Actuarial Value	\$1,809,037,125

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Section 4

Actuarial Liabilities

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, 1998. In this section, the discussion will focus on the commitments of the System, which will be referred to as its actuarial liabilities.

Table 4 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 and by sex.

The actuarial liabilities summarized in Table 4 include the actuarial present value of all future benefits expected to be paid with respect to each member. 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.

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Table 4

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

(All amounts are actuarial present values in millions)

	July 1, 1998			July 1, 1996
	Male	Female	Total	Total
A. Active members				
Service retirement	\$ 576.1	\$ 792.6	\$1,368.7	\$1,324.4
Disability retirement	11.2	18.8	30.0	29.3
Survivors' benefits	31.3	15.1	46.4	46.2
Vested Retirement	9.9	20.2	30.1	32.0
Refund of Member Contributions	12.5	22.4	34.9	37.5
Total	\$ 641.0	\$ 869.1	\$1,510.1	\$1,469.4
B. Inactive members and annuitants				
Service retirement	\$ 516.8	\$ 346.7	\$ 863.5	\$ 756.2
Disability retirement	5.8	8.2	14.0	113.7
Beneficiaries*	8.7	49.6	58.3	52.8
Vested terminated members	12.4	19.2	31.6	29.2
Nonvested terminated members	3.7	8.8	12.5	10.5
Total	\$ 547.4	\$ 432.5	\$ 979.9	\$ 862.4
C. Grand Total	\$1,188.4	\$1,301.6	\$2,490.0	\$2,331.8

**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 4 indicates that there is a shortfall in current actuarial assets to meet the total actuarial liabilities. 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 liability.

The two items described above, normal cost and unfunded actuarial 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 employee and by type of benefit under the System. These are summarized in Table 5. The normal costs as of July 1, 1996 and July 1, 1998 include .031% to fund the additional cost of the changes to the Vietnam service credit.

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. More often than not, 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 liability (UAL) exists.

Table 6 shows how the UAL 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 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. Finally, Line E shows the unfunded actuarial liability.

As can be seen from this discussion, a key consideration in the adequacy of the funding of the System is how the UAL is being amortized. Table 7 shows that the current employer and member contribution rates are adequate to pay the total normal cost rate (8.880% of pay), with enough left over to amortize the UAL in 9.2 years. Therefore, the current basis is sufficient to meet future requirements.

The amortization of the UAL assumes contributions made as a percent of pay for members of the Optional Retirement Plan (ORP) until June 30, 2033. The July 1, 1996 Teachers' Retirement System (TRS) valuation assumed continued contributions of 2.503% of pay through June 30, 2027 for ORP members. The July 1, 1996 Montana University System (MUS) Valuation found the 2.503% rate to be insufficient to pay off the MUS unfunded actuarial liability by June 30, 2033. The rates have been revised for the July 1, 1998 TRS valuation to be consistent with the results of the July 1, 1996 MUS actuarial valuation. The MUS valuation was required by MCA, Section 19-21-203. The July 1, 1996 MUS valuation projected \$98.0 million in additional UAL on July 1, 1997 due to present and former MUS members. This "additional" UAL is the amount that would not be paid for by the future contributions of MUS members. The level % of future ORP salaries from July 1, 1997 through June 30, 2033 necessary to pay for this UAL was 3.97%. Subsequent to the MUS valuation, 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 value of future ORP payments included in the July 1, 1998 TRS valuation is \$90.6 million. This value is less than previously expected due to the change in valuation assumptions. Future general wage increases are now assumed to be 5.0% per year instead of 6.0%. In addition to the 5.0% general wage increase assumption, individual salaries are assumed to increase by 1.0% due to merit and longevity.

The recent asset gains and assumption changes will both have an impact on the MUS as well as the TRS. We therefore recommend the ORP contribution rates be reviewed with the July 1, 2000 Actuarial Valuation. This is consistent with MCA, Section 19-20-621 which prescribes periodic valuations to determine appropriate ORP contribution rates.

The unfunded actuarial 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.

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Table 5

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

	July 1, 1998			July 1, 1996
	Male	Female	Total	Total
Service retirement	5.31%	6.62%	6.09%	6.46%
Disability retirement	0.17	0.24	0.21	0.22
Survivors' benefits	0.39	0.17	0.26	0.28
Vested retirement	0.52	0.55	0.54	0.55
Refund of member contributions	1.94	1.67	1.78	1.82
Total	8.33%	9.25%	8.88%	9.33%

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Table 6

**Unfunded Actuarial Liability
(All dollar amounts in millions)**

	July 1, 1998	July 1, 1996
A. Actuarial present value of all future benefits for present and former members and their survivors (Table 4)	\$ 2,490.0	\$ 2,331.8
B. Less actuarial present value of total future normal costs for present members	366.7	392.2
C. Actuarial liability	\$ 2,123.3	\$ 1,939.6
D. Less actuarial value of assets available for benefits (Table 3)	1,809.0	1,376.7
E. Unfunded actuarial liability	\$ 314.3*	\$ 562.9

**Of this amount, approximately \$90.6 million will be 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 3.12%, 3.42% and 3.73% for the Fiscal Years ending in 1999, 2000 and 2001 respectively. The percentage of salary will be a level 4.04% for the Fiscal Years ending in 2002 through 2033.*

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Table 7

**Recommended Contribution Rates
As Percentages of Salary**

	<u>July 1, 1998</u>	<u>July 1, 1996</u>
A. Employer contribution rate	7.470%	7.470%
B. Member contribution rate	<u>7.044</u>	<u>7.044</u>
C. Total contribution rate	14.514%	14.514%
D. Less total normal cost rate (Table 5)	<u>8.880</u>	<u>9.328</u>
E. Amount available to amortize unfunded actuarial liability*	5.634%	5.186%
F. Amortization period from Valuation Date	9.2 years	27.2 years**

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

** The amortization period as of July 1, 1996 was 27.2 years; thus, the expected period as of July 1, 1998 is 25.2 years.

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Section 6

Actuarial Information for Accounting Purposes

For fiscal years beginning after June 15, 1996, new GASB reporting standards are required for defined benefit pension plans reporting and disclosures (Statement No. 25). The System adopted the new standards in 1996.

The new reporting requirements for Statement No. 25 include certain supplementary information to the financial statements. These include:

- A schedule of funding progress, and
- A schedule of employer contributions.

The Schedule of Funding Progress compares actuarial assets and liabilities of the System, based on the actuarial funding method used. The required Schedule of Employer Contributions compares the employer contributions required based on the actuarial valuation (the actuarial required contribution, or ARC) with those employer contributions actually made. The ARC must be calculated based on certain parameters required for disclosure purposes. We believe the current actuarial methods and assumptions used in this valuation to determine the employer's contribution for funding purposes satisfy the new GASB reporting requirements.

GASB Statement No. 27 is effective for fiscal years beginning after June 15, 1997, for pension accounting by state and local governmental employers. The System is a cost sharing multiple employer defined benefit pension plan, so the only disclosures required by the new Statement No. 27 by employers is a description of the pension plan and the funding policy adopted to fund the plan benefits, including the required contribution rates.

The comparability of the data from year to year can be affected by changes in actuarial assumptions, benefit provisions, accounting policies, etc. The actuarial assumptions were revised in each of the last three actuarial valuations: July 1, 1994, 1996 and 1998.

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Table 8

**Schedule of Funding Progress
(All dollar amounts in thousands)**

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liabilities (AAL)(1)	Unfunded Actuarial Accrued Liabilities (UAAL)(2)	Funded Ratio	Covered Payroll(3)	UAAL as a Percentage of Covered Payroll
July 1, 1992	\$ 954,542	\$ 1,533,883	\$ 579,341	62.2%	\$ 465,063	124.6%
July 1, 1994	1,157,512	1,712,933	555,421	67.6	472,860	117.5
July 1, 1996	1,376,716	1,939,569	562,853(4)	71.0	501,516	112.2
July 1, 1998	1,809,037	2,123,290	314,253	85.2	529,795	59.3

(1) Actuarial present value of benefits less actuarial present value of future normal costs based on entry age actuarial cost method.

(2) Actuarial accrued liabilities less actuarial value of assets.

(3) Covered Payroll includes compensation paid to all active employees on which contributions are calculated. Covered Payroll differs from the Active Member Valuation Payroll shown in Table C-1, which is an annualized compensation of only those members who were active on the actuarial valuation date.

(4) Note that although the UAAL increased from 1994 to 1996, the Covered Payroll increased more. Therefore, both the UAAL as a Percentage of Covered Payroll and the amortization period for the UAAL decreased.

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Table 9

**Solvency Test
(All dollar amounts in thousands)**

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liabilities for			Portion of Actuarial Accrued Liabilities Covered by Assets		
		(A) Active Member Contributions	(B) Retirees and Beneficiaries	(C) Active Members (Employer Financed Portion)	(A)	(B)	(C)
July 1, 1992	\$ 954,542	\$ 407,441	\$ 622,016	\$ 504,426	100.0%	88.0%	0.0%
July 1, 1994	1,157,512	459,776	768,570	484,587	100.0	90.8	0.0
July 1, 1996	1,376,716	541,440	862,384	535,745	100.0	96.9	0.0
July 1, 1998	1,809,037	603,614	979,954	539,722	100.0	100.0	41.8%

**Teachers' Retirement System
State of Montana**

Table 10

**Schedule of Contributions from the Employer and Other Contributing Entities
(All dollar amounts in thousands)**

Fiscal Year Ending	Covered Employee Payroll ⁽¹⁾	Actual Employer Contributions ⁽²⁾	Actual Employer Contribution % ⁽²⁾	Annual Required Contribution (ARC) % ⁽³⁾	Percentage of ARC Contributed
6/30/93	\$493,614	\$38,088	7.459%	7.459%	100%
6/30/94	472,860	39,164	7.4645 ⁽⁴⁾	7.4645 ⁽⁴⁾	100
6/30/95	486,809	39,073	7.47	7.47	100
6/30/96	501,516	40,627	7.47	7.47	100
6/30/97	511,934	41,640	7.47	7.47	100
6/30/98	529,795	44,476	7.47	7.47	100

(1) Computed as the dollar amount of the actual employer contribution made as a percentage of payroll divided by the contribution rate expressed as a percentage of payroll. Amounts before 1994 use the entire actual employer contribution, including the ORP contributions.

(2) The actual and required employer contributions are expressed as a percentage of payroll. Contributions for termination pay are included in the actual employer contribution, but are not made as a set percentage of payroll. Contributions made as a percentage of the salaries of the members in the Optional Retirement Plan (ORP) are included. In the Fiscal Year ended June 30, 1998, \$1.8 million was contributed based on ORP member salaries. The ORP contribution rate varies from year to year.

(3) The State makes employer contributions as a percentage of actual payroll. Thus, as long as the percentage equals the percentage required by the most recent actuarial valuation, the dollar amount of the Annual Required Contributions (ARC) is equal to the actual dollar amount of the required employer contributions.

(4) The employer contribution rate changed from 7.459% to 7.470% of pay at January 1, 1994. 7.4645% is the average of those rates.

**Teachers' Retirement System
State of Montana**

Appendix A

Actuarial Procedures and Assumptions

The actuarial assumptions used in this valuation were adopted by the Board for the July 1, 1998 Actuarial Valuation. The salary increase assumptions were changed as a result of our Investigation of Economic Experience, dated August 27, 1997. These assumptions are summarized in Table A-1.

Tables A-2 through A-5 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-6 shows the assumed probability of immediate refund of contributions 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 was defined to equal the total of the individual normal costs, divided by the total pay rate as of July 1, 1998.

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 liability. The unfunded actuarial 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 7.470% of members' salaries.

Administrative Expense

The administrative expenses of the System are assumed to be funded by investment earnings in excess of 8% per year.

Valuation of Assets - Cost Basis

- Bonds:* Bonds are valued at amortized book value.
Mortgages: Mortgages are valued at par value.
Common Stocks: Each issue of common stock is valued at cost.
Other Assets: Other assets are carried on a book (cost) basis.

Premiums and discounts are amortized using the straight-life method over the life of the securities (8 years for mortgages).

Valuation of Assets - Actuarial Basis

The difference between the total market value of assets and the cost value of assets is added to the cost value on a 3-year smoothed basis.

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

No future postretirement benefit increases are assumed.

Future Salaries

The composite rate of future salary increases is assumed to be 6.0% per year, compounded annually. This is the sum of a 5.0% general wage increase assumption and an assumption of 1.0% individual salary increase due to promotion and longevity. This assumption was adopted July 1, 1998.

Service Retirement

Table A-2 shows the annual assumed rates of retirement among members eligible for service retirement. Separate rates are used when a member is eligible for reduced benefits, for the first year a member is eligible for full benefits, and for the years following the first year a member is eligible for full benefits. The rates for General Members were adopted July 1, 1994. The rates for University Members were adopted July 1, 1996.

Disablement

The rates of disablement used in this valuation are illustrated in Table A-3. These rates were adopted July 1, 1996.

Mortality

The mortality rates used in this valuation are illustrated in Table A-4. A written description of each table used is included in Table A-1.

Other Terminations of Employment

The rates of assumed future withdrawal from active service for reasons other than death, disability or retirement are shown for representative ages in Table A-5. These rates were adopted July 1, 1996.

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-6 shows the assumed probability of immediate refund of contributions among members terminating with five or more years of service. These rates were adopted July 1, 1996.

The data provided for some of the current terminated vested members included their accrued benefit. We calculated the present value of future benefits for these members and compared it with their available contribution account and took the larger value. We then estimated the present value of future benefits for all other 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 based on ORP payroll for the fiscal year ending June 30, 1998 was \$1,782,307. Based on a contribution rate of 2.81%, we assumed the total ORP payroll for the fiscal year to be \$63,427,295 (\$1,782,307 divided by 2.81%).

**Teachers' Retirement System
State of Montana**

Table A-1

**Summary of Valuation Assumptions
(July 1, 1998)**

I. Economic assumptions	
A. General wage increases*	5.00%
B. Individual salary increase due to promotion and longevity	1.00%
C. Investment return	8.00%
D. Growth in membership	0.00%
E. Postretirement benefit increases	0.00%
F. Interest on member accounts	6.00%
II. Demographic assumptions	
A. Retirement	Table A-2
(General Member assumptions adopted July 1, 1994)	
(University Member assumptions adopted July 1, 1996)	
B. Disablement (adopted July 1, 1996)	Table A-3
C. Mortality among contributing members	Table A-4
1983 Group Annuity Mortality (GAM) Table, with ages set back two years	
D. Mortality among service retired and disabled members and beneficiaries	Table A-4
1983 GAM Table, with ages set back one year.	
E. Other terminations of employment (adopted July 1, 1996)	Table A-5
F. Probability of retaining membership in the System upon vested termination (adopted July 1, 1996)	Table A-6

**Montana University System (MUS) members are assumed to have a 0.63% higher average final compensation due to extra service near retirement.*

**Teachers' Retirement System
State of Montana**

Table A-2

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
50	5.0%	15.4%	10.0%	2.5%	9.5%	4.9%
51	5.3	15.6	10.0	2.7	9.5	4.9
52	5.6	15.8	10.0	3.0	9.5	6.8
53	6.0	16.1	10.0	3.2	9.5	6.8
54	6.3	16.4	10.0	3.4	14.0	6.8
55	6.7	16.9	12.5	3.7	15.7	6.8
56	7.1	17.5	12.5	4.2	18.2	6.8
57	7.6	18.2	12.5	4.4	18.6	7.7
58	8.0	19.2	12.5	4.9	19.2	8.6
59	8.5	20.4	12.5	5.4	20.4	10.4
60	*	22.0	20.0	*	22.0	12.2
61		22.0	20.0		22.0	14.0
62		22.0	20.0		22.0	18.2
63		22.0	20.0		22.0	14.0
64		22.0	20.0		22.0	18.2
65		22.0	20.0		22.0	26.1
66		22.0	20.0		22.0	22.2
67		22.0	20.0		22.0	22.2
68		22.0	20.0		22.0	22.2
69		22.0	20.0		22.0	22.2
70		**	**		**	**

**All benefits are unreduced after attaining age 60.*

***Immediate retirement is assumed at age 70 or over.*

Teachers' Retirement System
State of Montana

Table A-3

Disablement

Annual Rates

<u>Age</u>	<u>General Members</u>	<u>University Members</u>
25	.009%	.003%
30	.018	.006
35	.036	.012
40	.063	.021
45	.108	.036
50	.164	.055
55	.248	.083
60	.377	.126

Teachers' Retirement System
State of Montana

Table A-4

Mortality

Annual Rates*

Age	Men	Women
25	.05%	.03%
30	.06	.03
35	.09	.05
40	.12	.07
45	.22	.10
50	.39	.16
55	.61	.25
60	.92	.42
65	1.56	.71
70	2.75	1.24
75	4.46	2.40
80	7.41	4.29
85	11.48	6.99

**Rates shown are set back one year for retirees and two years for active members.*

Teachers' Retirement System
State of Montana

Table A-5

Other Terminations of Employment
Among Members Not Eligible to Retire

Annual Rates

<u>Age</u>	<u>General and University Members</u>
25	22.22%
30	13.95
35	8.30
40	5.84
45	4.19
50	3.60
55	3.02
60	2.67

Teachers' Retirement System
State of Montana

Table A-6

Probability of Retaining Membership in the System
Upon Vested Termination

<u>Age</u>	<u>Probability of Retaining Membership</u>
25	60%
30	60
35	60
40	60
45	63
50	71
55	75

**Teachers' Retirement System
State of Montana**

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 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: 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: 7.044% of compensation.
Employer: 7.470% of compensation.

Interest on Member Contributions

Interest on member contributions is currently being credited at a rate of 5.5% per annum.

Cost-of-Living Adjustments

Each year the Board determines if the total investment income earned on the retirement fund for the fiscal year is sufficient to pay a permanent cost-of-living adjustment to certain retired members. If an adjustment is granted, it is considered actuarially funded by the system and is included in the next actuarial valuation in the determination of the actuarially required contribution rates.

**Teachers' Retirement System
State of Montana**

Appendix C

Valuation Data

This valuation is based upon the membership of the System as of July 1, 1998. 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. All information is shown separately for males and females.

Members	Full-Time Members	Part-Time Members*	Total Contributing Members*	Annual Full- Time Salaries in Thousands
Male	4,944	543	5,487	\$ 191,044
Female	<u>8,601</u>	<u>3,328</u>	<u>11,929</u>	<u>268,147</u>
Total	13,545	3,871	17,416	\$ 459,191

**Excludes 776 part-time members with salaries under \$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 valuation also includes liabilities attributable to members who have terminated employment but have not withdrawn their contributions. There are 8,158 such members who are not vested and 1,190 such members who are vested. These counts include 97 records provided in the active data with salary equal to zero.*

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			
Male	3,282	\$ 52,831	\$ 16,097
Female	3,907	37,929	9,708
Disability Retirement			
Male	69	583	8,446
Female	131	832	6,354
Survivors of Deceased Retired Members			
Male	90	497	5,520
Female	473	3,753	7,935
Survivors of Deceased Active Members			
Male	110	506	4,600
Female	261	2,015	7,718
Child Beneficiaries	<u>39</u>	<u>94</u>	2,400
Total Annuitants	8,362	\$ 99,040	11,844

Teachers Retirement System - State of Montana
Active Members - Full Time
Distribution Of Employees and Salaries as of July 1, 1998

Number of Employees - By Age Group - Males

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	4	11	2											17
25 to 29	20	105	82	95	33									335
30 to 34	6	42	38	94	244	28								452
35 to 39	7	22	27	60	175	158	54							503
40 to 44	5	15	14	44	145	166	229	76						694
45 to 49	3	25	20	32	120	138	187	369	122					1,016
50 to 54	5	14	15	23	83	86	118	195	450	96				1,085
55 to 59	4	9	9	6	29	39	45	59	150	212	32			594
60 to 64	2	4	1	7	20	22	20	15	31	56	34	1		213
65 to 69		3	2	1	1	4	5	2	1	4	3	3		29
70 and up						1		2	3					6
Totals	56	250	210	362	850	642	658	718	757	368	69	4		4,944

Annual Salaries in Thousands - By Age Group - Males

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	37	242	54											333
25 to 29	155	2,217	1,862	2,367	885									7,486
30 to 34	70	972	942	2,529	7,109	933								12,556
35 to 39	59	503	716	1,705	5,452	5,644	2,083							16,162
40 to 44	50	394	362	1,342	4,828	6,186	9,147	3,161						25,472
45 to 49	28	715	585	945	4,200	5,459	8,026	15,742	5,391					41,091
50 to 54	91	511	559	752	2,886	3,769	5,721	9,151	19,825	4,343				47,607
55 to 59	65	335	313	174	1,132	1,613	2,063	2,806	7,501	10,136	1,545			27,683
60 to 64	19	175	29	206	972	1,063	1,046	728	1,557	3,186	1,806	53		10,842
65 to 69		89	35	29	3	213	260	93	48	217	260	202		1,450
70 and up						53		158	150					361
Totals	575	6,154	5,458	10,049	27,467	24,934	28,345	31,840	34,471	17,883	3,612	255		191,044

**Teachers Retirement System - State of Montana
Active Members - Full Time
Distribution Of Employees and Salaries as of July 1, 1998**

Number of Employees - By Age Group - Males

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	4	11	2											17
25 to 29	20	105	82	95	33									335
30 to 34	6	42	38	94	244	28								452
35 to 39	7	22	27	60	175	158	54							503
40 to 44	5	15	14	44	145	166	229	76						694
45 to 49	3	25	20	32	120	138	187	369	122					1,016
50 to 54	5	14	15	23	83	86	118	195	450	96				1,085
55 to 59	4	9	9	6	29	39	45	59	150	212	32			594
60 to 64	2	4	1	7	20	22	20	15	31	56	34	1		213
65 to 69		3	2	1	1	4	5	2	1	4	3	3		29
70 and up						1		2	3					6
Totals	56	250	210	362	850	642	658	718	757	368	69	4		4,944

Annual Salaries in Thousands - By Age Group - Males

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	37	242	54											333
25 to 29	155	2,217	1,862	2,367	885									7,486
30 to 34	70	972	942	2,529	7,109	933								12,556
35 to 39	59	503	716	1,705	5,452	5,644	2,083							16,162
40 to 44	50	394	362	1,342	4,828	6,186	9,147	3,161						25,472
45 to 49	28	715	585	945	4,200	5,459	8,026	15,742	5,391					41,091
50 to 54	91	511	559	752	2,886	3,769	5,721	9,151	19,825	4,343				47,607
55 to 59	65	335	313	174	1,132	1,613	2,063	2,806	7,501	10,136	1,545			27,683
60 to 64	19	175	29	206	972	1,063	1,046	728	1,557	3,186	1,806	53		10,842
65 to 69		89	35	29	3	213	260	93	48	217	260	202		1,450
70 and up						53		158	150					361
Totals	575	6,154	5,458	10,049	27,467	24,934	28,345	31,840	34,471	17,883	3,612	255		191,044

Table C-1
(Continued)

Teachers Retirement System - State of Montana
Active Members - Full Time
Distribution Of Employees and Salaries as of July 1, 1998

Average Annual Salary - By Age Group - Males

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	9,336	21,993	27,020											19,606
25 to 29	7,744	21,119	22,711	24,913	26,815									22,347
30 to 34	11,739	23,138	24,786	26,906	29,135	33,337								27,778
35 to 39	8,435	22,861	26,537	28,411	31,154	35,723	38,572							32,132
40 to 44	10,059	26,284	25,853	30,510	33,297	37,266	39,943	41,598						36,703
45 to 49	9,386	28,596	29,261	29,535	35,000	39,555	42,922	42,662	44,187					40,444
50 to 54	18,118	36,487	37,297	32,703	34,771	43,824	48,482	46,927	44,056	45,236				43,878
55 to 59	16,326	37,258	34,733	29,014	39,020	41,357	45,834	47,565	50,004	47,813	48,293			46,605
60 to 64	9,652	43,756	29,184	29,485	48,615	48,331	52,286	48,503	50,229	56,899	53,126	53,111		50,900
65 to 69		29,727	17,654	28,600	3,260	53,334	51,935	46,744	47,519	54,329	86,652	67,423		49,997
70 and up						52,929		79,164	50,019					60,219
Totals	10,274	24,615	25,992	27,761	32,314	38,837	43,078	44,345	45,537	48,594	52,342	63,845		38,642

Table C-1
(Continued)

Teachers Retirement System - State of Montana
Active Members - Full Time
Distribution Of Employees and Salaries as of July 1, 1998

Number of Employees - By Age Group - Females

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	14	49	5	1									69
25 to 29	35	159	138	250	114								696
30 to 34	16	63	53	179	435	63							809
35 to 39	16	43	51	113	313	337	120						993
40 to 44	21	51	58	156	342	317	394	111					1,450
45 to 49	20	48	60	120	391	375	379	483	162	1			2,039
50 to 54	11	28	32	56	246	273	240	262	316	72			1,536
55 to 59	2	11	11	16	89	86	130	147	122	99	25		738
60 to 64	1		5	3	22	19	31	52	48	33	16	2	232
65 to 69			1		6	4	2	7	5	6	4	1	36
70 and up					1	1				1			3
Totals	136	452	414	894	1,959	1,475	1,296	1,062	653	212	45	3	8,601

Annual Salaries in Thousands - By Age Group - Females

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	130	915	87	20									1,152
25 to 29	348	3,074	2,797	5,490	2,674								14,383
30 to 34	151	1,271	1,137	4,129	11,155	1,892							19,734
35 to 39	129	857	1,085	2,658	8,534	10,656	4,258						28,177
40 to 44	136	993	1,322	3,723	9,489	10,166	14,184	4,178					44,192
45 to 49	183	1,089	1,275	2,933	11,168	12,731	13,824	18,790	6,460	36			68,489
50 to 54	116	630	849	1,454	7,422	9,145	9,293	10,283	12,774	2,936			54,902
55 to 59	26	257	223	369	2,642	2,999	4,971	5,807	4,956	4,103	962		27,316
60 to 64	15		98	80	539	710	1,132	1,999	1,889	1,367	652	86	8,567
65 to 69			5		184	110	60	206	184	224	131	37	1,141
70 and up					19	29				47			94
Totals	1,234	9,086	8,878	20,856	53,825	48,437	47,722	41,264	26,263	8,713	1,745	123	268,147

Table C-1
(Continued)

Teachers Retirement System - State of Montana
Active Members - Full Time
Distribution Of Employees and Salaries as of July 1, 1998

Average Annual Salary - By Age Group - Females

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	9,279	18,675	17,335	20,421									16,697
25 to 29	9,952	19,333	20,266	21,960	23,456								20,665
30 to 34	9,406	20,170	21,458	23,064	25,645	30,031							24,394
35 to 39	8,078	19,922	21,271	23,524	27,266	31,619	35,481						28,375
40 to 44	6,475	19,477	22,791	23,867	27,746	32,070	36,000	37,639					30,477
45 to 49	9,149	22,694	21,247	24,438	28,562	33,498	36,475	38,903	39,878	36,094			33,589
50 to 54	10,578	22,500	26,544	25,965	30,169	33,498	38,720	39,249	40,423	40,778			35,743
55 to 59	13,185	23,379	20,280	23,066	29,686	34,870	38,240	39,501	40,626	41,442	38,498		37,014
60 to 64	14,553		19,662	26,571	24,503	37,358	36,531	38,448	39,361	41,427	40,749	42,939	36,929
65 to 69			4,974		30,587	27,594	29,850	29,496	36,722	37,411	32,715	37,057	31,695
70 and up					18,525	28,709				46,705			31,313
Totals	9,075	20,102	21,444	23,329	27,476	32,839	36,822	38,855	40,219	41,100	38,785	40,978	31,176

Table C-1
(Continued)

Teachers Retirement System - State of Montana
Active Members - Part Time
Distribution Of Employees and Salaries as of July 1, 1998

Number of Employees - By Age Group - Males

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	14	8	2											24
25 to 29	53	26	10	5	1									95
30 to 34	10	15	9	6	9									49
35 to 39	12	11	6	5	6	6	1							47
40 to 44	11	12	8	5	14	8	1	2						61
45 to 49	12	9	10	10	14	10	10	4	1					80
50 to 54	4	12	5	9	11	11	10	9	9	5				85
55 to 59	6	3	3	5	6	3	4	4	20	7				61
60 to 64	3	3	1	1	2	1	2		1	8	1			23
65 to 69		4	4			1	2				1	1	1	14
70 and up				1		2				1				4
Totals	125	103	58	47	63	42	30	19	31	22	2	1		543

Number of Employees - By Age Group - Females

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	70	27	7											104
25 to 29	157	99	50	53	21									380
30 to 34	69	38	31	46	64	20								268
35 to 39	90	100	62	95	93	48	35							523
40 to 44	93	103	75	121	149	57	47	34						679
45 to 49	79	73	60	112	214	61	32	33	15					679
50 to 54	27	40	28	59	125	50	17	9	19	3				377
55 to 59	11	6	11	21	56	36	30	14	4	3				192
60 to 64	5	6	6	8	22	15	6	6	5	2	1	1		83
65 to 69	3	4	2	4	4	4	2	5	1					29
70 and up	3		1	2	3	2	2	1						14
Totals	607	496	333	521	751	293	171	102	44	8	1	1		3,328

Total of Above 3,871
Part Time Participants with Salary Less Than \$1,000 776
Total Part Time Participants 4,647

Table C-2

**Teachers Retirement System - State of Montana
Distribution of Inactive Lives**

Members Receiving Service Retirement Benefits as of July 1, 1998

Age	Number of Persons		Annual Benefits in Thousands		Average Annual Benefits	
	Males	Females	Males	Females	Males	Females
<50	23	25	401	434	17,436	17,343
50 to 54	262	182	4,783	2,748	18,255	15,099
55 to 59	513	367	9,393	5,173	18,310	14,096
60 to 64	657	526	12,004	6,963	18,272	13,238
65 to 69	674	588	11,929	6,919	17,698	11,768
70 to 74	499	484	7,172	4,670	14,372	9,648
75 to 79	333	489	4,382	3,887	13,158	7,950
80 to 84	184	497	1,822	3,366	9,902	6,772
85 to 89	84	423	619	2,174	7,370	5,139
90 and up	53	326	327	1,594	6,161	4,891
Total	3,282	3,907	52,831	37,929	16,097	9,708

Members Receiving Disability Retirement Benefits as of July 1, 1998

Age	Number of Persons		Annual Benefits in Thousands		Average Annual Benefits	
	Males	Females	Males	Females	Males	Females
<50	6	17	38	129	6,343	7,577
50 to 54	9	11	73	86	8,122	7,773
55 to 59	12	18	110	122	9,135	6,793
60 to 64	12	16	101	139	8,428	8,671
65 to 69	12	13	106	76	8,864	5,869
70 to 74	8	14	80	90	10,056	6,433
75 to 79	6	13	45	59	7,460	4,545
80 to 84	3	16	18	68	6,163	4,256
85 to 89	1	6	11	29	10,819	4,894
90 and up		7		34		4,875
Total	69	131	583	832	8,446	6,354

Table C-2
(continued)

**Teachers Retirement System - State of Montana
Distribution of Inactive Lives**

Survivors of Deceased Retired Members as of July 1, 1998

Age	Number of Persons		Annual Benefits in Thousands		Average Annual Benefits	
	Males	Females	Males	Females	Males	Females
<50	11	12	50	95	4,542	7,895
50 to 54	5	14	28	117	5,555	8,330
55 to 59	5	17	40	157	8,085	9,259
60 to 64	13	44	64	451	4,906	10,242
65 to 69	9	53	75	556	8,316	10,490
70 to 74	8	65	57	625	7,176	9,622
75 to 79	11	91	63	636	5,708	6,992
80 to 84	20	79	80	580	4,019	7,341
85 to 89	3	52	20	286	6,689	5,509
90 and up	5	46	19	250	3,872	5,429
Total	90	473	497	3,753	5,520	7,935

Survivors of Deceased Active Members as of July 1, 1998

Age	Number of Persons		Annual Benefits in Thousands		Average Annual Benefits	
	Males	Females	Males	Females	Males	Females
<50	32	51	116	241	3,619	4,723
50 to 54	12	32	41	276	3,438	8,618
55 to 59	12	27	49	252	4,121	9,317
60 to 64	12	26	76	211	6,310	8,129
65 to 69	7	32	49	319	7,033	9,960
70 to 74	17	33	94	339	5,539	10,267
75 to 79	6	32	32	229	5,259	7,171
80 to 84	7	10	33	45	4,693	4,478
85 to 89	2	13	6	76	3,191	5,871
90 and up	3	5	10	27	3,202	5,367
Total	110	261	506	2,015	4,600	7,718

Table C-2
(continued)

**Teachers Retirement System - State of Montana
Distribution of Inactive Lives**

Terminated Vested Members as of July 1, 1998
Number of Persons

<u>Age</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
<25	0	1	1
25 to 30	1	3	4
30 to 35	17	43	60
35 to 40	29	104	133
40 to 45	51	151	202
45 to 50	89	201	290
50 to 55	86	167	253
55 to 60	71	113	184
60 to 65	24	27	51
65 and up	4	8	12
Total	372	818	1,190

Child Beneficiaries as of July 1, 1998 *
Number of Persons

<u>Age</u>	<u>Number</u>
<5	0
5 to 6	3
7 to 8	2
9 to 10	3
11 to 12	2
13 to 14	12
15 to 16	6
17 and up	11
Total	39

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

**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 and the annuitants covered as of the various valuation dates.

Table D-2 summarizes the contribution rates determined by each annual actuarial valuation.

Teachers' Retirement System State of Montana

Table D-1

Membership Data

Active Members

Valuation Date (July 1)	Full-Time Members	Part-Time Members	Total Contributing Members	Annual Full- Time Salaries in Thousands	Average Full- Time Annual Salary	Average Age	Average Years of Service
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
1994	14,938	2,637	17,575	416,968	27,914	42.5	11.0
1996	13,251	5,444	18,695	424,085	32,004	43.3	11.6
1998	13,545	4,647	18,192	459,191	33,901	44.0	12.1

**Not available.*

Annuityants

Valuation Date (July 1)	Number	Annual Benefits in Thousands	Average Annual Benefit
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
1996	7,896	87,351	11,063
1998	8,362	99,040	11,844

Teachers' Retirement System State of Montana

Table D-2

Contribution Rates

Valuation Date (July 1)	Normal Cost Rate		UAL Rate	Total Employer Rate	Total Rate
	Employee	Employer			
1989*	7.044%	1.783%	5.676%	7.459%	14.503%
1992	7.044%	2.832%	4.627%	7.459%	14.503%
1994	7.044%	2.450%	5.020%	7.470%	14.514%
1996	7.044%	2.284%	5.186%	7.470%	14.514%
1998	7.044%	1.836%	5.634%	7.470%	14.514%

**Valuation performed by Hendrickson, Miller & Associates, Inc.*

**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 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 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 Liability

The excess of the Actuarial 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.