

19847

TRA

10
88-0296

RECEIVED

NOV 26 1979

MINNESOTA STATE
TEACHERS RETIREMENT ASSOC.

TEACHERS RETIREMENT ASSOCIATION
STATE OF MINNESOTA

REPORT OF ACTUARIAL VALUATION AND EXPERIENCE STUDY

JUNE 30, 1979

LEGISLATIVE REFERENCE LIBRARY
STATE OF MINNESOTA

Teachers Retirement Association
State of Minnesota

As requested by the Board of Trustees of the Fund, we have made an actuarial valuation of the Fund as of June 30, 1979, in accordance with the provisions of Minnesota Statutes, Section 356.20 to 356.23. The results of our analysis are presented in the following report.

Liability for Annuities. Table 1 summarizes the census of annuities in force showing for each type of annuitant the number, annual amount and the present value of annuities. The present value was calculated using the 1971 Group Annuity Mortality Table for males set back 8 years with an interest assumption of 5%.

The liability for annuities shown in Table 1 are as follows:

Summary of Liability for Annuities

Adjustable Fixed Benefit Fund	\$ 375,820,651.39
Variable Annuity Fund	215,552.28
Disability Benefits	11,322,083.33
1915 Law Annuities	97,720.57
Survivor Benefits	2,267,875.42
Total	\$ 389,723,882.99

Liability for Prior Service. Table 2 summarizes the census of active members and Table 3 the census of inactive members. These are shown separately for the Basic and Coordinated Group with each of these groups separated according to the benefit plan election in effect as of the date of this valuation. The accrued liability for prior service for each of these groups, exclusive of any participation in the Variable Annuity Fund, has been determined as follows:

Summary of Liability for Prior Service

	<u>Basic</u>	<u>Coordinated</u>
<u>Active Members</u>		
Full Formula	\$363,173,211	\$ 834,642,364
Former Partial Formula	82,085,326	293,461,195
Partial Formula	444,744	2,627,933
Total	\$445,703,281	\$1,130,731,492
<u>Inactive Members</u>		
Full Formula	\$ 17,152,429	\$ 30,961,063
Partial Formula	1,021,947	5,324,107
Total	\$ 18,174,376	\$ 36,285,170
Total accrued prior service liability		\$1,630,894,319

Teachers Retirement Association
State of Minnesota

The accrued prior service liability has been determined using the entry age normal cost method. The assumed rates of death disability and withdrawal are shown in Table 4. It was assumed that individual salaries would increase at the rate of 3.5% each year. An interest assumption of 5% was used.

Assets of the Fund. Table 5 summarizes the assets and current liabilities of the Fund. As required by Section 356.20 Subd. 5, the deferred yield adjustment account, amounting to \$6,483,780 is shown as an asset. This account represents realized losses incurred in the disposition of debt securities. Bonds are shown at amortized cost. Common stocks are shown at cost. The cost of common stocks is reduced by \$2,438,454 as recognized unrealized depreciation. The market value of these stocks was \$11,877,748 more than cost.

Unfunded Liability. The difference between the actuarial liabilities and the assets available for funding these liabilities is the actuarial deficit or unfunded liability. The following table compares these amounts as of June 30, last year and this year. The liability for benefits payable from the Variable Annuity Fund is assumed to be equal to the participation in such fund included with the assets.

Required Reserves For:	6-30-78	6-30-79
Adjustable Fixed Benefit Fund	\$ 327,181,507	\$ 375,820,651
Variable Annuity Fund	59,191,856	59,771,327
Other Annuities	10,865,846	13,687,679
Accrued Prior Service	1,335,537,476	1,630,394,319
Total Actuarial Liabilities	\$1,732,776,686	\$2,080,173,976
Assets in Excess of Current Liabilities	\$ 922,662,462	\$1,048,516,231
Unfunded Liability	\$ 810,114,224	\$1,031,657,745
Funding Ratio	53.2%	50.4%

During the year unfunded liabilities increased by \$221,543,521. An analysis of the causes of this increase is presented in the appendix to the report.

Annuity Stabilization Account. In determination of the unfunded liability and funding ratio shown above, the Annuity Stabilization Account of the MAFBF Fund in the amount of \$15,721,610 was not included as part of the assets of the fund. Presented below is information showing the effects of including the Annuity Stabilization Account as part of the assets of the fund:

	6-30-78	6-30-79
Assets in Excess of Current Liabilities	\$940,345,339	\$1,064,237,842
Unfunded Liability	792,431,347	1,015,936,134
Funding Ratio	54.3%	51.2%

Teachers Retirement Association
State of Minnesota

Normal Support Rate. Current statutes provided for equal employer and employee contributions of 8% of salary for the Basic Group and 4% for the Coordinated Group. Effective July 1, 1979 employee and employer contributions were increased to 8.5% for basic and 4.5% for coordinated members. The entry age normal cost was determined as follows:

<u>Basic</u>	
Full Formula	16.01%
Former Partial Formula	16.59
Partial Formula	14.93
Aggregate	16.14
 <u>Coordinated</u>	
Full Formula	8.92%
Former Partial Formula	9.40
Partial Formula	8.09
Aggregate	9.04

These entry age normal cost rates were used in the determination of the accrued liability for members under a formula plan.

Administrative Expense. The cost of administration of the Fund during the year amounted to \$1,020,617. This represents 0.11% of the current annual payroll.

Additional Support Rate. An additional employer contribution of 3% of salary is provided by statute to amortize the actuarial deficit. Effective July 1, 1979 this additional contribution rate will increase to 3.05%. The following table shows for this year and last year the computations of the additional support rate required to amortize the actuarial deficit by June 30, 2009:

	<u>6-30-78</u>	<u>6-30-79</u>
(a) Unfunded Liability	\$810,114,224	\$1,031,657,745
(b) Annual Cost to Amortize by 2009	51,954,343	67,110,817
(c) Current Annual Payroll	845,898,496	899,989,326
(d) Additional Support Rate (b) / (c)	6.14%	7.46%

Interest at the rate of 5% on the current unfunded liability amounts to \$51,582,887 or 5.73% of the current annual payroll.

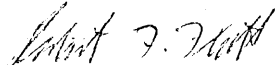
It is apparent that the additional support rate provided by statute is inadequate.

Teachers Retirement Association
State of Minnesota

Income From Investments. Income from investments earned during the year, and not allocated to the Adjustable Fixed Benefit Fund or Variable Annuity Fund, amounted to \$39,888,248. This represents a return of 6.98% on the mean assets in excess of current liabilities excluding participation in the Variable Fund and the Adjustable Fixed Benefit Fund. This includes a decrease in the recognized unrealized appreciation on stocks in the amount of \$1,976,748 and realized gains of \$1,332,695 on sale of stocks. Interest at the rate of 7.50% was credited to members accumulated deposits.

Respectfully submitted,

BROWN AND FLOTT


Robert F. Flott

Teachers Retirement Association
State of Minnesota

TABLE 1

SUMMARY OF CENSUS OF ANNUITANTS

<u>Type of Annuity</u>	<u>Number</u>	<u>Annual Amount</u>	<u>Present Value</u>
<u>Annuities Payable from Adjustable Fixed Benefit Fund</u>			
1. <u>Service Retirement Annuitants</u>			
as of 6-30-78	8247	\$28,582,373.48	\$312,237,316.92
net adjustments made in 6-30-78 bal.	----	318.36	
granted during year	610	3,390,092.55	
terminated by death	-183	- 567,031.92	
expired	-2	-3,689.76	
cancelled	-1	-1,789.44	
as of 6-30-79	8671	\$31,400,273.27	\$359,518,557.28
2. <u>Beneficiaries of Deceased Members</u>			
as of 6-30-78	115	\$ 386,193.60	\$ 3,703,783.50
granted during year	5	26,258.88	
expired	-8	-19,755.84	
as of 6-30-79	112	\$ 392,696.64	\$ 3,916,333.02
3. <u>Beneficiaries of Deceased Annuitants</u>			
as of 6-30-78	317	\$ 819,134.76	\$ 5,331,496.25
transfer from type 1	52	215,009.40	
expired	-20	-28,602.48	
as of 6-30-79	349	\$ 1,005,541.68	\$ 6,462,126.74
4. <u>Section 136.82 Supplemental Annuities</u>			
as of 6-30-78	115	\$ 58,086.48	\$ 645,534.50
net adjustments made in 6-30-78 bal.		11.64	
granted during year	12	8,562.36	
terminated by death	-1	-433.20	
as of 6-30-79	126	\$ 66,227.28	\$ 763,775.08
5. <u>Section 354.59 Allowances and 354.581 Increases</u>			
as of 6-30-78		\$ 747,075.72	\$ 5,263,376.27
expirations		-48,909.96	
as of 6-30-79		\$ 698,165.76	\$ 5,159,859.29
Total 6-30-78 MAFBF	8794	\$30,592,864.04	\$327,181,507.46
Total 6-30-79 NAFBF	9258	\$33,562,904.63	\$375,820,651.39

Teachers Retirement Association
State of Minnesota

TABLE 1 (Cont'd)

SUMMARY OF CENSUS OF ANNUITANTS

<u>Type of Annuity</u>	<u>Number</u>	<u>Annual Amount</u>	<u>Present Value</u>
<u>Annuities Payable from Variable Annuity Fund</u>			
6. <u>Service Retirement Annuitants</u>			
as of 6-30-78	51	\$ 10,989.48	\$ 146,211.42
net adjustment in 6-30-78 balance		+28.92	
granted during year	17	5,099.31	
terminated for reemployment	-1	-117.00	
as of 6-30-79	67	\$ 16,000.71	\$ 215,552.28
<u>Other Annuities and Benefits</u>			
7. <u>Disability Annuitants</u>			
as of 6-30-78	155	\$ 622,591.92	\$ 8,632,861.10
net adjustments made in 6-30-78 bal.		206.52	
granted during year	49	254,731.08	
returned to teaching	-8	-27,375.00	
terminated by death	-13	-39,303.60	
transfers to type 1	-9	-11,827.68	
as of 6-30-79	174	\$ 799,023.24	\$11,322,083.33
8. <u>Survivors Benefits</u>			
as of 6-30-78	124	\$ 193,311.60	\$ 2,119,650.27
granted during year	8	33,491.60	
terminated	-15	-18,257.76	
as of 6-30-79	117	\$ 208,545.00	\$ 2,267,875.42
9. <u>1915 Law Retirement Annuitants</u>			
as of 6-30-78	19	\$ 28,219.20	\$ 113,335.05
terminated by death	-4	-6,078.96	
as of 6-30-79	15	\$ 22,140.24	\$ 97,720.57
10. <u>Section 354.44, Subd. 5 Increases</u>			
as of 6-30-78	---	\$ 4,560.00	\$ 21,060.72
terminated by death	---	-960.00	
as of 6-30-79	---	\$ 3,600.00	\$ 16,053.12

Teachers Retirement Association
State of Minnesota

TABLE 2

SUMMARY OF CENSUS OF ACTIVE MEMBERS

	<u>BASIC GROUP</u>		<u>COORDINATED GROUP</u>	
	<u>Number</u>	<u>Annual Payroll</u>	<u>Number</u>	<u>Annual Payroll</u>
<u>Full Formula</u>				
At 6-30-78	2,921	\$54,021,014	47,430	\$,570,927,883
New Entrants	28		6,435	
To Inactive	4		749	
Separation with Refund	7		3,236	
Deaths	12		45	
Disability Retirement	16		27	
Service Retirement	<u>191</u>		<u>314</u>	
At 6-30-79	2,719	\$52,848,254	49,494	\$615,765,120
<u>Former Partial Formula</u>				
At 6-30-78	699	\$14,541,264	11,497	\$204,140,886
To Inactive	1		9	
Separation with Refund			124	
Deaths			17	
Disability Retirement			6	
Service Retirement	<u>9</u>		<u>19</u>	
At 6-30-79	689	\$15,054,532	11,322	\$213,948,880
<u>Partial Formula</u>				
At 6-30-78	<u>4</u>	<u>\$ 83,965</u>	<u>132</u>	<u>\$ 2,183,484</u>
At 6-30-79	4	\$ 91,372	132	\$ 2,281,168
<hr/>				
Total at 6-30-78	3,624	\$68,646,243	59,059	\$777,252,253
Total at 6-30-79	3,412	\$67,994,158	60,948	\$831,995,168

Teachers Retirement Association
State of Minnesota

TABLE 3

SUMMARY OF CENSUS OF INACTIVE MEMBERS

	<u>Basic Group</u>		<u>Coordinated Group</u>	
	<u>Number</u>	<u>Projected Annuity</u>	<u>Number</u>	<u>Projected Annuity</u>
<u>Full Formula</u>				
At 6-30-78	702	\$1,934,424	12,717	\$5,497,231
From Active	4		749	
Separation with Refund	40		329	
Deaths	0		18	
Service Retirement	<u>32</u>		<u>35</u>	
At 6-30-79	634	\$1,875,568	13,084	\$5,724,914
<u>Partial Formula</u>				
At 6-30-78	16	\$ 132,553	879	\$1,108,681
From Active	1		9	
Separation with Refund	0		80	
Deaths	0		3	
Service Retirement	<u>0</u>		<u>10</u>	
At 6-30-79	17	\$ 136,339	795	\$1,089,199
Total at 6-30-78	718	\$2,066,977	13,596	\$6,605,912
Total at 6-30-79	651	\$2,011,907	13,879	\$6,814,113

Teachers Retirement Association
State of Minnesota

TABLE 4

ASSUMED RATES OF DECREMENT USED IN
 VALUATION OF FORMULA PLAN BENEFITS

<u>Age</u>	<u>Death</u>	<u>Disability</u>	<u>Withdrawal</u>
20	.000405	.000380	.177
25	.000457	.000500	.146
30	.000544	.000560	.116
35	.000684	.000645	.085
40	.000916	.000820	.055
45	.001295	.001105	.024
50	.002000	.001735	.001
55	.003754	.003560	.001
60	.006480	.006320	.001

Assumed age at retirement - 62

Post Retirement Mortality - 1971 Group Annuity Mortality Table for males
 set back 8 years.

Teachers Retirement Association
State of Minnesota

TABLE 5

ASSETS AND CURRENT LIABILITIES

A. <u>Assets</u>	
Deposits in banks	\$ 288,640.37
Accounts Receivable:	
Accrued members' contributions	5,060,880.65
Accrued employers' contributions	16,289,538.87
Minnesota Variable Annuity Fund	244,263.15
Department of Education	154,572.85
Other	8,532.25
Accrued interest on investments	5,705,944.61
Dividends on stock, declared but not yet received	1,280,779.61
Investment in bonds at amortized cost	277,663,324.74
Investment in common stocks at cost	264,385,847.47
Short term investments	55,456,453.62
Deferred Yield Adjustment Account	6,483,780.32
Recognized unrealized appreciation in stocks	(2,438,454.21)
Participation in MAFBF Fund-Admitted Value	360,099,040.76
Participation in Minnesota Variable Annuity Fund	59,771,326.55
Equipment at cost, less depreciation	20,947.04
Total Assets	<u>\$1,050,475,418.65</u>
 B. <u>Current Liabilities</u>	
Accounts Payable:	
Annuity payments	\$ 5,451.75
Accrued expenses	49,896.15
Minnesota Adjustable Fixed Benefit Fund	1,903,839.28
Total Current Liabilities	<u>\$ 1,959,187.18</u>
 C. <u>Assets in Excess of Current Liabilities</u>	
	\$1,048,516,231.47

Teachers Retirement Association
State of Minnesota

APPENDIX TO VALUATION REPORT

ACTUARIAL ANALYSIS OF CHANGE IN UNFUNDED LIABILITIES

As indicated in the report of actuarial valuation, during the current year the unfunded liability increased by \$221,543,521. The causes of this increase may be summarized as follows:

Increases:

Changes in actuarial assumption	\$ 92,316,095
Actuarial loss - salary increases	81,829,301
Prior year adjustment	43,209,211
Contribution deficiency	16,952,373
Actuarial loss - ancillary benefits	580,791
AFBF mortality loss	117,050

Decreases:

Decrease in annuity stabilization reserve	1,961,266
Actuarial gain - investment income	<u>11,500,034</u>

Net Increase	\$221,543,521
--------------	---------------

As of June 30, 1979 the assumed rates of post-retirement mortality used in determining actuarial liabilities were changed. This change was necessary to reflect recent improvement in mortality. These revisions increased the actuarial liabilities by \$92,316,095.

As required by Section 356.215 Subd. 4, in calculating the accrued prior service liability it is assumed that salaries increase each year at a rate of 3.5%. In the past year salaries actually increased at a rate of 9.3%. This departure from the assumed rate increased the deficit by \$81,829,301.

Subsequent to the preparation of the 1978 valuation report a computer programing error was noted. This resulted in the exclusion of several years from the total years of service of active employees. This in turn understated the accrued liability for such employees by \$43,207,380. The effect of the change in assumptions reported last year should be increased by this amount.

For purposes of this report it is assumed that minimum contributions are the sum of the entry age normal cost, 5% interest on the unfunded liability at the beginning of the year, and administrative expenses. Actual employee and employer contributions were \$16,952,373 less than this required amount.

Teachers Retirement Association
State of Minnesota

APPENDIX TO VALUATION REPORT

Annuityants receiving benefits from the Adjustable Fixed Benefit Fund experienced mortality more favorable than expected resulting in an actuarial loss of \$117,050. This amount is transferred from the basic fund to the Adjustable Fixed Benefit Fund.

Ancillary benefits include disability, surviving spouse, surviving children and 1915 law annuities in force. The cost of these benefits in the current year was \$580,791 more than expected.

During the current year the AFBF annuity stabilization reserve decreased by \$1,961,266. This reflects an excess of admitted value distribution over required interest amounting to \$1,971,266. This was partially offset by a \$10,000 allocation of administrative expenses.

In computing required reserves it is assumed that investment income would be earned at the rate of 5% per annum. The actual income from investments exceeded the income required to maintain reserves on this basis by \$11,500,034.

Teachers Retirement Association
State of Minnesota

REPORT OF EXPERIENCE STUDY 1975-1979

The following table compares the actuarial balance sheet at the beginning and end of the period covered by this experience study report:

	<u>6-30-75</u>	<u>6-30-79</u>	<u>Increases</u>
Accrued Liability	\$1,131,946,700	\$2,080,173,976	\$948,227,276
Assets	<u>586,870,721</u>	<u>1,048,516,231</u>	<u>461,645,510</u>
Unfunded Liability	\$ 545,075,979	\$1,031,657,745	\$486,581,766
Funding Ratio	51.8%	50.4%	

In the valuation report for each of the past four years the causes of the increase in unfunded liabilities, or the deficit, are discussed. These may be summarized as follows:

Increases:

Actuarial assumption changes	\$245,268,569	
Actuarial loss - salaries	241,489,360	
Deficiency in employer contributions	38,847,849	
Actuarial loss - AFBF mortality	2,553,149	
Actuarial loss - ancillary benefits	1,778,893	
Benefit improvements	<u>310,453</u>	
Total Increases		\$530,248,273

Decreases:

Actuarial gain - investment income	\$ 19,891,118	
Actuarial gain - terminations	7,025,402	
Decrease in augmentation rate	6,815,806	
Prior years adjustment - AFBF	5,561,187	
Annuity stabilization reserve - decrease	3,903,092	
Transfer gain (Sec. 356.36)	<u>469,902</u>	
Total Decreases		<u>\$ 43,666,507</u>

Net Increase \$486,581,766

Post-Retirement Mortality. Effective June 30, 1979 the Fund adopted the 1971 Group Annuity Mortality Table for males set back eight years as a mortality assumption for both males and females. Over the four years covered by this study there were 610 deaths of service retirement annuitants, whereas, 618 deaths were expected according to the assumed mortality basis. The ratio of actual to expected deaths was 98.7%.

Teachers Retirement Association
State of Minnesota

Rate of Salary Increase. In calculating prior service liabilities it is assumed that salaries increase at the rate of 3.5% a year. At June 30, 1979 the average salary was \$13,984 compared with \$10,976 four years earlier. This represents an average annual increase rate of 6.25%.

Rate of Return on Investments. The rate of investment earnings on the mean assets of the Fund, excluding participation in the Adjustable Fixed Benefit Fund and the Variable Annuity Fund in each of the last four years has been:

<u>1975-76</u>	<u>1976-77</u>	<u>1977-78</u>	<u>1978-79</u>
5.02%	5.36%	5.96%	6.98%

A rate of 5% is assumed in calculating liabilities.

Average Age at Entry. The average age at entry for all members currently active under a formula plan is 27.2 years. The average in each of the last four years has been:

<u>1975-76</u>	<u>1976-77</u>	<u>1977-78</u>	<u>1978-79</u>
27.4	27.4	27.0	27.3

No average age at entry is assumed in calculating liabilities.

Average Age at Retirement. The average age at which service retirements have taken place for all current annuitants is 63.6 years. The average in each of the last four years has been:

<u>1975-76</u>	<u>1976-77</u>	<u>1977-78</u>	<u>1978-79</u>
63.3	63.1	62.7	62.2

Retirement at age 62 is assumed in calculating prior service liabilities.

Pre-Retirement Separations. Effective June 30, 1978 the Fund adopted the assumed rates of pre-retirement termination of active participants as shown in Table 4 of the valuation report. The following table shows a comparison of the actual separations during the four year period with the expected separations according to the assumed rates:

<u>Cause of Separation</u>	<u>Number of Separations</u>		<u>Ratio Actual To Expected</u>
	<u>Actual</u>	<u>Expected</u>	
Death in service	301	292	103%
Disability retirement	194	276	70
Other withdrawals	<u>19,614</u>	<u>19,355</u>	<u>101</u>
Total	20,109	19,923	101%

Teachers Retirement Association
State of Minnesota

SUMMARY OF BENEFIT PROVISIONS

1. Normal Retirement Benefit

- a. After attainment of age 65, or attainment of age 62 with 30 years service.
- b. Benefit based on average of highest consecutive 5 years earnings and years of service.
- c. Benefit percentages of average salary per year of service.

Basic : 2.0% for first 10 years, 2.5% thereafter
Coordinated: 1.0% for first 10 years, 1.5% thereafter

(These percentages are reduced by one-half for each year of participation in the partial formula groups)

2. Late Retirement Benefit

- a. Annuity determined as for normal retirement considering service and earnings to actual retirement.

3. Early Retirement Benefit

- a. After attainment of age 55 and completion of 10 years of service or after completion of 30 years of service.
- b. Annuity determined as for normal retirement considering service and earnings to actual retirement and reduced by $\frac{1}{2}$ of 1% for each month between actual retirement date and normal retirement date less $\frac{1}{4}$ of 1% for each month after actual retirement and attainment of age 60.
- c. After completion of 10 years service member may elect a deferred annuity to commence any time after attainment of age 55. The annuity is determined as for early retirement and increased by compound interest from the date service terminated to the date annuity payments begin. Interest will be at rate of 3% after 1979.

4. Disability Benefit

- a. After attainment of age 50 and completion of 5 years of service or after completion of 10 years of service.
- b. Annuity determined as for normal retirement considering service and earnings to actual retirement with no reduction because of age.
- c. Basic group members receive additional benefit based on their age at the time of retirement. This benefit is graded from \$5 monthly for age 64 to \$50 monthly for ages 55 and under.

Teachers Retirement Association
State of Minnesota

5. Pre-Retirement Death Benefit

- a. A refund of member's contributions with interest; or
- b. After attainment of age 55 and completion of 20 years of service or after completion of 30 years service - an annuity payable to a surviving spouse for life: or
- c. For basic group members after completion of 18 months of service an annuity payable to a surviving dependent spouse equal to 30% of the members salary in the last year plus 10% for each dependent child.

6. Other Separation Benefits

- a. A refund of member's contributions without interest

Teachers Retirement Association
State of Minnesota

SCHEDULE OF TOTAL RESERVES REQUIRED JUNE 30, 1979

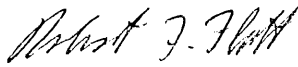
1. <u>For Adjustable Fixed Benefit Fund Participation</u>	\$ 375,820,651.39
2. <u>For Variable Annuity Fund Participants</u>	59,771,326.55
3. <u>For Active Members</u>	1,576,434,773.00
4. <u>For Inactive Members</u>	54,459,546.00
5. <u>For Other Annuitants</u>	
a. 1915 Law Retirement Annuities	97,720.57
b. Disability Annuities	11,322,083.33
c. Widow's Annuities	2,157,083.20
d. Surviving Children's Annuities	<u>110,072.22</u>
Total	\$ 13,687,679.32
Total Required Reserves	<u><u>\$ 2,080,173,976.26</u></u>

Certification

The above exhibit has been prepared in accordance with the provisions of Section 356.20. The required reserves for formula benefits have been computed in accordance with the entry age normal cost method.

Respectfully submitted,

BROWN AND FLOTT


Robert F. Flott

November 7, 1979