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TEACHERS RETIREMENT ASSOCIATION
STATE OF MINNESOTA

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REPORT OF ACTUARIAL VALUATION AND EXPERIENCE STUDY

JUNE 30, 1975

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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, 1975, in accordance with the provisions of Minnesota Statutes, Sections 356.20 to 356.23. The results of our analysis are presented in the following report.

Required Reserves 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 6 years with an interest assumption of 5%.

The required reserves for annuities shown in Table 1 are as follows:

Summary of Required Reserves for Annuities

Adjustable Fixed Benefit Fund	\$205,174,122.51
Variable Annuity Fund	20,218.67
Disability	3,916,705.74
1915 Law Annuities	177,176.53
Survivors Benefit	<u>1,729,063.17</u>
Total	\$211,017,286.62

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 Required Reserves For Prior Service

	<u>Basic</u>	<u>Coordinated</u>
<u>Active Members</u>		
Full Formula	\$243,610,255	\$418,006,761
Partial Formula	39,665,269	116,016,239
Full Variable	<u>-0-</u>	<u>16,577</u>
Total	\$283,275,524	\$534,039,577
<u>Inactive Members</u>		
Full Formula	\$ 36,282,048	\$ 44,199,441
Partial Formula	551,982	2,199,282
Full Variable	<u>-0-</u>	<u>246,219</u>
Total	\$ 36,834,030	\$ 46,644,942
Total Accrued prior service liability		\$900,794,073

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For members under a formula plan 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.

For members under the full variable money purchase plan the accrued prior service liability has been determined to be represented by 180% of the members accumulation at June 30, 1957 plus 220% of the members accumulated fixed deposits with interest to the valuation date plus 300% of any unpaid arrears.

Unfunded Liabilities. 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.

	6-30-74	6-30-75
Required Reserves For:		
Adjustable Fixed Benefit Annuities	\$ 170,377,947	\$ 205,174,123
Variable Annuity Fund	21,009,642	20,191,487
Other Annuities	4,556,913	5,787,017
Accrued Prior Service	882,575,198	900,794,073
Total Actuarial Liabilities	<u>\$1,078,519,700</u>	<u>\$1,131,946,700</u>
Assets in Excess of Current Liabilities	\$ 538,893,416	\$ 586,870,721
Unfunded Liability	\$ 539,626,284	\$ 545,075,979
Funding Ratio	50.0%	51.8%

During the year unfunded liabilities increased by \$5,449,695. An analysis of the causes of this increase are presented in the appendix to this report.

Normal Support Rate. Current statutes provide after July 1, 1975 for equal employer and employee contributions of 8% of salary for the Basic Group and 4% for the Coordinated Group. Prior to July 1, 1975 employer contributions were 7% and 3.5%. For members under a formula plan the aggregate entry age normal cost to provide retirement benefits was determined as follows:

	<u>Employer</u>	<u>Employee</u>	<u>Total</u>
Basis - Full Formula	7.55%	8.00%	15.55%
Partial Formula	6.99	8.00	14.99
Coordinated - Full Formula	4.13	4.00	8.13
Partial Formula	3.88	4.00	7.88

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

Additional Support Rate. An additional contribution of 2% of salary was provided by statute to amortize the actuarial deficit. After July 1, 1975 this additional contribution increases to 2.5% of salary. 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, 1997.

	<u>6-30-74</u>	<u>6-30-75</u>
(a) Unfunded Liability	\$539,626,284	\$545,075,979
(b) Annual Cost to Amortize by 1997	40,006,178	41,409,699
(c) Current Annual Payroll	598,421,409	663,335,223
(d) Additional Support Rate (b)/(c)	6.69%	6.24%

Interest at the rate of 5% on the current unfunded liability amounts to \$27,253,799 or 4.11% of the current annual payroll.

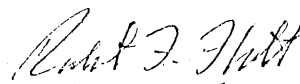
It is apparent that the additional support rate now provided by statute is inadequate. Legislative action should be sought to increase this rate to at least 5%.

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 \$17,858,291. This represents a return of 5.03% on the mean assets in excess of current liabilities excluding participation in the Variable Fund and the Adjustable Fixed Benefit Fund. This includes recognized unrealized depreciation on stocks in the amount of \$708,315 and realized gains of \$68,443 on sale of investments. Interest at the rate of 5.75% was credited to members accumulated deposits.

Administrative Expense. The cost of administration of the Fund during the year amounted to \$699,206. This represents 0.11% of the current annual payroll.

Respectfully submitted,

BROWN AND FLOTT


Robert F. Flott

November 21, 1975

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>			
<u>1. Service Retirement Annuitants</u>			
as of 6-30-74	5867	\$14,664,913.12	\$158,805,024.68
net adjustments made in 6-30-74 bal.	--	+ 1,179.72	
granted during year	712	3,309,784.64	
terminated by death	123	259,942.44	
expired	7	7,234.92	
cancelled	1	1,854.24	
as of 6-30-75	6448	\$17,706,845.88	\$193,416,406.64
<u>2. Beneficiaries of Deceased Members</u>			
as of 6-30-74	105	\$ 250,482.72	\$ 2,064,185.69
granted during year	8	40,854.96	
expired	6	14,106.12	
as of 6-30-75	107	\$ 277,231.56	\$ 2,494,398.10
<u>3. Beneficiaries of Deceased Annuitants</u>			
as of 6-30-74	264	\$ 472,474.56	\$ 2,305,071.15
transfer from type 1	41	81,581.04	
expired	37	69,760.56	
as of 6-30-75	268	\$ 484,295.04	\$ 2,578,533.04
<u>4. Section 136.82 Supplemental Annuities</u>			
as of 6-30-74	68	\$ 24,645.00	\$ 279,140.95
terminated by death	2	1,367.16	
granted during year	8	3,150.12	
as of 6-30-75	74	\$ 26,427.96	\$ 293,934.78
<u>5. Section 354.59 Allowances and 354.581 Increases</u>			
as of 6-30-74		\$ 872,391.48	\$ 6,924,524.71
expirations		41,158.68	
as of 6-30-75		\$ 831,232.80	\$ 6,390,849.95
Total 6-30-74 MAFBF	6304	\$16,284,906.88	\$170,377,947.18
Total 6-30-75 MAFBF	6897	\$19,326,033.24	\$205,174,122.51

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<u>Type of Annuity</u>	<u>Number</u>	<u>Annual Amount</u>	<u>Present Value</u>
<u>Annuities Payable from Variable Annuity Fund</u>			
<u>6. Service Retirement Annuitants</u>			
as of 6-30-74	4	\$ 510.72	6,943.51
granted during year	7	1,000.32	
as of 6-30-75	11	\$ 1,511.04	\$ 20,218.67
<u>Other Annuities and Benefits</u>			
<u>7. Disability Annuitants</u>			
as of 6-30-74	80	\$ 213,805.92	\$ 2,960,032.14
net adjustments made in 6-30-74 bal.		- 50.40	
granted during year	41	153,647.64	
terminated by death	11	54,277.92	
transfers to type 1	13	31,415.28	
as of 6-30-75	97	\$ 281,709.96	\$ 3,916,705.74
<u>8. Survivors Benefits</u>			
as of 6-30-74	167	\$ 162,075.00	\$ 1,398,661.40
granted during year	12	31,168.56	
terminated	16	13,275.00	
as of 6-30-75	163	\$ 179,968.56	\$ 1,729,063.17
<u>Other Annuities and Benefits (continued)</u>			
<u>9. 1915 Law Retirement Annuitants</u>			
as of 6-30-74	46	\$ 43,557.72	\$ 198,219.98
terminated by death	13	12,187.08	
as of 6-30-75	33	\$ 31,370.64	\$ 141,247.81
<u>10. Section 354.44, Subd. 5 Increases</u>			
as of 6-30-74	--	\$ 11,040.00	\$ 50,533.68
terminated by death	--	3,120.00	
as of 6-30-75	--	\$ 7,920.00	\$ 35,928.72

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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>Money Purchase - Full Variable</u>				
At 6-30-74			0	0
Less than 20 days of resumed service			35	
at 6-30-75			35	\$ 133,833
<u>Full Formula</u>				
At 6-30-74	3,594	\$48,676,883	41,469	\$372,691,047
New Entrants	9		7,414	
To Inactive	13		1,328	
Separation with Refund	5		3,842	
Deaths	8		60	
Disability Retirement	10		22	
Service Retirement	150		466	
At 6-30-75	3,399	\$50,871,846	43,165	\$423,471,848
<u>Partial Formula</u>				
At 6-30-74	731	\$11,543,287	13,734	\$165,510,192
New Entrants			108	
To Inactive	2		159	
Separation with Refund			509	
Deaths			22	
Disability Retirement			11	
Service Retirement	2		10	
At 6-30-75	727	\$12,464,512	13,131	\$176,393,184
<u>Total</u>				
Total at 6-30-74	4,325	\$60,220,170	55,203	\$538,201,239
Total at 6-30-75	4,126	\$63,336,358	56,331	\$599,998,865

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TABLE 3

SUMMARY OF CENSUS OF INACTIVE MEMBERS

	<u>Basic Group</u>	<u>Coordinated Group</u>
<u>Money Purchase - Full Variable</u>		
At 6-30-74		252
Separation with Refund		<u>63</u>
At 6-30-75		189
<u>Full Formula</u>		
At 6-30-74	1,261	16,228
From Active	13	1,328
Separation with Refund	49	340
Write-Offs	121	2,444
Deaths	3	18
Service Retirement	<u>60</u>	<u>22</u>
At 6-30-75	1,041	14,732
<u>Partial Formula</u>		
At 6-30-74	15	377
From Active	2	159
Deaths	0	2
Service Retirement	<u>4</u>	<u>0</u>
At 6-30-75	13	534
<u>Total</u>		
Total at 6-30-74	1,276	16,857
Total at 6-30-75	1,054	15,455

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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	.000530	.00076	.203
25	.000616	.00100	.168
30	.000758	.00112	.133
35	.000991	.00129	.098
40	.001374	.00164	.063
45	.002000	.00221	.028
50	.003580	.00347	.000
55	.006475	.00712	.000
60	.010436	.01264	.000

Assumed age at retirement - 62

Post Retirement Mortality - 1971 Group Annuity Mortality Table for
 males set back 6 years.

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APPENDIX TO VALUATION REPORT

1. ACTUARIAL ANALYSIS OF CHANGE IN UNFUNDED LIABILITIES

As indicated in the report of actuarial valuation, during the current year the unfunded liability or deficit increased by \$5,449,695. The cause of this increase may be summarized as follows:

Increases:

Deficiency in investment income	\$23,484,952	
Deficiency in contributions	16,613,579	
Cost of ancillary benefits	1,141,897	
Mortality loss (retired lives)	<u>46,065</u>	
Total increases		\$41,286,493

Decreases:

Actuarial gain from benefit projection	<u>\$35,836,798</u>
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Net Increase	\$ 5,449,695
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In computing required reserves it is assumed that investment income would be earned at the rate of 5% per annum. The income required to maintain reserves on this basis exceeded the actual income from investments by \$23,465,199 in the Adjustable Fixed Benefit Fund, and by \$19,753 in the basic fund.

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 \$16,613,579 less than this required amount.

Ancillary benefits include disability, surviving spouses, surviving children, and 1915 law annuities in force. The cost of these benefits in the current year amounted to \$1,486,806. This is in part offset by \$344,909 interest forfeited when members received a refund of their deposits.

The loss from mortality represents the difference between tabular and actual reserves released by death of annuitants in the AFBF.

In computing prior service liabilities, it is assumed that individual salaries will increase at the rate of 3.5% per annum. During the year the average salary actually increased by 9.8%, yet the computer projected benefits increased by 1.9% resulting in the actual gain shown above. In our opinion this gain is an aberration resulting from an error in the computer program used in projecting benefits last year. It should be noted that in 1974 the computer projected benefits increased by 12.1% resulting in a reported actuarial loss of \$81,287,228. The actual increase for each of the last two years should have been about 6.8% resulting in an actual loss each year of about \$22,725,000.

Teachers Retirement Association
State of Minnesota

APPENDIX TO VALUATION REPORT

2. SUPPLEMENTARY VALUATION OF PRIOR SERVICE LIABILITY

In accordance with Section 356.215 the required reserves for prior service were computed using the entry age normal cost method. This year at the request of the Legislative Committee on Pensions and Retirement, a supplementary valuation of the prior service liability was prepared to determine the present value of the deferred benefit to which each vested participant would be entitled upon reaching normal retirement age and also the amount of contributions which would be refunded to non-vested participants if the plan were terminated.

Using the same assumptions as in the regular valuation we have determined these liabilities as follows:

Present value of accrued benefits for vested participants	\$632,630,148
Refund for non-vested participants	<u>63,887,008</u>
Total	\$696,517,156

The prior service liability computed in this manner is \$204,276,917 less than the liability computed by the statutory method.

Teachers Retirement Association
State of Minnesota

REPORT OF EXPERIENCE STUDY 1971-1975

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

	<u>6-30-71</u>	<u>6-30-75</u>	<u>Increase</u>
Accrued Liability	\$443,057,442	\$1,131,946,700	\$688,889,258
Assets	<u>324,917,889</u>	<u>586,870,721</u>	<u>261,952,832</u>
Unfunded Liability	\$118,139,553	\$ 545,075,979	\$426,936,426
Funding Ratio	73.3%	51.8%	

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:

Benefit improvements	\$472,359,654
Salary scale losses	56,476,806
Deficiency in investment income	13,614,920
Deficiency in contributions	9,815,538
Cost of ancillary benefits	<u>2,532,212</u>

Total Increases \$554,799,130

Decreases:

Assumption changes	\$127,714,981
Mortality gain (retired lives)	<u>147,723</u>

Total Decreases \$127,862,704

Net Increase \$426,936,426

Post-Retirement Mortality. Effective June 30, 1973 the Fund adopted the 1971 Group Annuity Mortality Table for males set back six years as a mortality assumption for both males and females. Over the four years covered by this study there were 476 deaths of service retirement annuitants, whereas, 483 deaths were expected according to the assumed mortality basis. The ratio of actual to expected deaths was 98.5%.

Teachers Retirement Association
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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, 1975 the average salary was \$10,976 compared with \$8,376 four years earlier. This represents an average annual increase rate of 7%.

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>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>
4.61%	5.79%	5.77%	5.03%

In the Adjustable Fixed Benefit Fund the corresponding rates of return on the mean participation has been:

<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>
10.54%	13.53%	5.05%	-7.73%

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 27.4 years. The average in each of the last five years has been:

<u>1970-71</u>	<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>
27.2	27.7	28.4	28.0	27.9

Average Age at Retirement. The average age at which service retirements have taken place for all current annuitants is 64.5 years. The average in each of the last five years has been:

<u>1970-71</u>	<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>
65.3	65.1	65.0	64.0	63.4

Teachers under a formula plan retiring before age 62 receive an actuarially reduced benefit. Those retiring after 62 receive the same benefit as those retiring at 62. Retirement at age 62 is assumed in calculating prior service liabilities.

TEACHERS RETIREMENT ASSOCIATION

JUNE 30, 1975 FINANCIAL REPORT

A. <u>Assets</u>	
Deposits in banks	\$ 591,623.90
Accounts Receivable:	
Accrued members' contributions	3,529,406.47
Accrued employer's contributions	8,982,143.01
Employer's social security receivable	4,513,677.00
Minnesota Variable Annuity Fund	321,079.35
Proceeds from sale of investments	1,131,244.30
Social Security Retirement Division	827.85
Interest charges on late remittances	2,667.78
Other	3,066.52
Accrued interest on investments	3,100,597.59
Dividends on stock, declared but not yet received	69,660.24
Investment in bonds at amortized cost	162,276,152.37
Investment in common stocks at cost	171,967,700.67
Short term investments	17,478,578.16
Deferred Yield Adjustment Account	5,222,132.73
Recognized unrealized appreciation in stocks	5,468,536.09
Participation in Minnesota Adjustable Fixed Benefit Fd	185,549,420.49
Participation in Minnesota Variable Annuity Fund	20,191,487.18
Equipment at cost, less depreciation	33,997.46
Total Assets	<u>\$ 590,433,999.16</u>
B. <u>Unfunded Accrued Liability</u>	<u>\$ 545,075,978.17</u>
C. <u>Accumulated Members' Contributions Without Interest</u>	
Regular TRA	\$ 167,828,941.20
Variable Annuity Fund (includes Earnings)	11,416,818.41
Total	<u>\$ 179,245,759.61</u>
D. <u>Current Liabilities</u>	
Accounts Payable:	
Annuity payments	\$ 1,565,178.78
Accrued expenses	60,591.92
Purchase of investments in process	555,250.44
Minnesota Adjustable Fixed Benefit Fund	1,382,152.57
Other	104.21
Total Current Liabilities	<u>\$ 3,563,277.92</u>
E. <u>Total Reserves Required as Per Attached Schedule</u>	<u>\$1,131,946,699.41</u>

Teachers Retirement Association
State of Minnesota

SCHEDULE OF TOTAL RESERVES REQUIRED JUNE 30, 1975

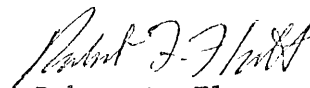
1. <u>For Adjustable Fixed Benefit Fund Participants</u>	\$ 205,174,122.51
2. <u>For Variable Annuity Fund Participants</u>	20,191,487.18
3. <u>For Active Members</u>	817,315,101.00
4. <u>For Inactive Members</u>	83,478,972.00
5. <u>For Other Annuitants</u>	
a. 1915 Law Retirement Annuities	141,247.81
b. Disability Annuities	3,916,705.74
c. Widow's Annuities	1,525,040.13
d. Surviving Children's Annuities	<u>204,023.04</u>
Total	<u>\$ 5,787,016.72</u>
Total Required Reserves	\$1,131,946,699.41

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 21, 1975

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