

REPORT ON
ACTUARIAL VALUATION
MINNESOTA STATE RETIREMENT SYSTEM
JUNE 30, 1972
3-1/2% INTEREST RATE ASSUMPTION

December 11, 1972

COATES AND CRAWFORD

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December 11, 1972

Board of Trustees
Minnesota State Retirement System
529 Jackson Street
St. Paul, Minnesota 55101

Gentlemen:

We are pleased to transmit herewith our report on the actuarial valuation of your Retirement System made as of June 30, 1972.

Pursuant to Contract No. E-0633, under which this valuation was authorized, the actuarial valuation was carried out on the basis of a 3-1/2% interest rate assumption and on the basis of the other actuarial assumptions set forth in our report submitted to the Board on February 4, 1972. Also, in accordance with the above noted contract, we utilized the entry age normal cost method of funding to determine the unfunded accrued liability of the System.

Contract No. E-0633 authorized a second valuation to be carried out on the basis of a 4% interest assumption. The results of the "4% valuation" will be submitted in a separate actuarial report.

We hereby certify that the actuarial valuation of the Minnesota State Retirement System made as of June 30, 1972 was carried out on the basis of accepted actuarial methods and procedures and in accordance with the provisions of Minnesota Statutes 1971, Chapter 356. The results of that valuation indicate that the contributions required from the employees and from the State under Minnesota Statutes 1971, Chapter 352, as presently constituted are adequate to provide the benefits that will be paid from the System.

We look forward to the opportunity of discussing this report with you at your convenience.

Very truly yours,

COATES AND CRAWFORD
Consulting Actuaries

By

Robert H. Little, F.S.A.

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REPORT ON
ACTUARIAL VALUATION
OF THE
MINNESOTA STATE RETIREMENT SYSTEM
AS OF
JUNE 30, 1972

SECTION I
INTRODUCTION

In accordance with Contract No. E-0633 between the State of Minnesota and this firm, we have completed the actuarial valuation of the Minnesota State Retirement System as of June 30, 1972.

The Executive Director of the System furnished us with detailed employee information on all active members, inactive members and retired members of the System as of June 30, 1972. The Executive Director and his staff are to be complimented on the accuracy and completeness of the aforementioned data.

The Executive Director also furnished us with a Financial Report setting forth the assets and liabilities of the Fund as of June 30, 1972. No

physical audit of these assets was made by us and our calculations are based upon the Financial Report as submitted.

This valuation is based on the System as it was constituted on June 30, 1972.

The following Section II sets forth the results of the actuarial valuation and Section III contains the exhibits required by Chapter 356 of the Statutes. The schedules attached at the end of the report show the actuarial assumptions used in the current valuation which were developed during the course of the actuarial investigation carried out as of June 30, 1971. These schedules were requested by the Interim Commission in their "GVS Minnesota Memo #18".

SECTION II

RESULTS OF ACTUARIAL VALUATION

The contract under which this valuation was authorized specifies that the actuarial valuation be carried out on the basis of a 3-1/2% interest rate assumption and upon the actuarial assumptions developed during the course of the actuarial investigation carried out as of June 30, 1971. We were also instructed to carry out the actuarial valuation on the basis of an entry age normal cost method of funding. The current valuation was carried out in accordance with the stipulations contained in the aforementioned contract.

The entry age normal cost method of funding requires the determination of the level contribution rate which, if contributed on behalf of all new employees from the dates of employment to the dates of separation from service, will be adequate to provide all of their benefits. Under this funding method, the unfunded accrued liability is taken as the total liability of the System for benefits earned in the past as well as those earnable in the future, less the assets on hand, less the present value of future employee contributions and less the present value of future State entry age normal cost contributions.

In order to develop the entry age normal cost contribution rate for new employees, we carried out a complete valuation of active members as of June 30, 1971 who were employed during the preceding four and one-half year period. The results of these calculations indicate that the total entry age normal cost rate under the present scale of benefits amounts to 5.77%

of salary. Employees are required by law to contribute 3% and, accordingly, the State's share of the entry age normal cost contribution rate amounts to 2.77%. We expect the entry age normal cost rate to remain fairly stable unless there is a change in employment practices or in the Retirement Law.

The law requires that the State make the following contributions to the Fund with respect to members contributing at a 3% rate:

- (1) A "matching" contribution equal to 3% of the members' salaries,
and
- (2) An "additional" contribution equal to one-third of members' contributions, or 1% of salary.

We have been advised that it is the intent of the Minnesota Legislature to pay the "additional" contributions referred to above for a limited time only.

The Accounting Balance Sheet shown on the following page was furnished by the Executive Director.

The Actuarial Balance sheet shown on the page following the Accounting Balance Sheet summarizes the results of the valuation. In the current valuation we have made provision for administrative expenses amounting to .19% of salaries.

MINNESOTA STATE RETIREMENT SYSTEM

ACCOUNTING BALANCE SHEET
AS OF
JUNE 30, 1972

ASSETS

Cash in office	\$ 25.00
Deposits in banks	264,526.92
Short term investments (at cost)	6,139,468.12
Accounts receivable:	
a) Accrued employee contributions	346,505.70
b) Accrued employer contributions	382,893.49
c) Employee back payments	32,668.72
d) Investment maturities and sales	316,297.25
e) Other	21,083.25
Accrued interest in investments	1,011,013.25
Dividends declared & payable, but not yet received	62,082.37
Investment in debt securities at amortized cost	67,013,548.92
Investment in equities at cost	49,956,219.44
Equipment at depreciated cost	9,082.46
Prepaid postage	2,000.00
Deferred yield adjustment account	394,395.17
Deferred charges to future participation in the MAFB Fund	.00
Annuity stabilization account	819,553.54
Participation in the MAFB Fund	52,732,562.67
 Total Assets	 <u>\$179,503,926.27</u>

LIABILITIES AND RESERVES

LIABILITIES

Accounts payable:	
a) Due to MAFB Fund	\$ 232,796.53
b) Security purchases	968,076.68
c) Annuities	1,556.10
d) Survivor benefits	2,543.97
e) Annuitant deposits	17,454.54
f) Accrued expenses	51,640.10
g) Overpaid dividends & prepaid postage	2,296.27
h) Transfer to unclassified employee retirement	11,883.72
Suspense item:	
a) Unredeemed 6-yr. warrants (cancelled by State Auditor)	3,781.05
 Total Liabilities	 <u>\$ 1,292,028.96</u>

RESERVES

Employee contribution reserve	\$ 47,240,336.36
Survivor benefit reserve	300,561.00
Reserve for participation in the MAFB Fund	52,732,562.67
Annuity stabilization reserve	819,553.54
State contribution reserve	77,118,883.74
 Total Reserves	 <u>\$178,211,897.31</u>
 Total Liabilities and Reserves	 <u>\$179,503,926.27</u>

MINNESOTA STATE RETIREMENT SYSTEM

ACTUARIAL BALANCE SHEET
AS OF
JUNE 30, 1972

ASSETS

1.	Assets on Hand from Accounting Balance Sheet:		
	a) Participation in MAFB Fund and Annuity Stabilization Reserve	\$ 53,552,116.21	
	b) All other Assets	<u>125,951,810.06</u>	\$179,503,926.27
2.	Present Value of Employees' Future Contributions (3% of Participating Salary)		68,243,574.00
3.	Present Value of State Future Contributions Applicable to:		
	a) Entry Age Normal Cost (2.77% of Participating Salary)	\$ 63,011,567.00	
	b) Unfunded Accrued Liability (Balance of 3% "Matching" Contribution less .19% for Operating Expenses or .04% of Participating Salary)	909,914.00	
	c) Unfunded Accrued Liability (Portion to be funded by "Additional" Contribution)	<u>18,041,328.90</u>	<u>81,962,809.90</u>
4.	TOTAL ASSETS		<u><u>\$329,710,310.17</u></u>

LIABILITIES

5.	Current Liabilities from Accounting Balance Sheet		\$ 1,292,028.96
6.	Present Value of Earned and Earnable Benefits Payable to Presently Active Members:		
	a) Retirement Benefits	\$212,004,036.00	
	b) Disability Benefits	18,411,450.00	
	c) Refundments due to death or withdrawal	35,290,230.00	
	d) Surviving Spouse Benefits	<u>5,878,667.00</u>	271,584,383.00
7.	Present Value of Benefits for Deferred Annuitants:		
	a) Retirement Benefits	\$ 2,562,813.00	
	b) Refundments due to death or withdrawal	124,583.00	
	c) Benefits already authorized	<u>5,946.00</u>	2,693,342.00
8.	Present Value of Refundments to former members without vested rights		287,879.00
9.	Benefits Payable from MAFB Fund:		
	a) Reserve for Participation	\$ 52,732,562.67	
	b) Annuity Stabilization Reserve	<u>819,553.54</u>	53,552,116.21
10.	Present Value of Survivor Benefits		<u>300,561.00</u>
11.	TOTAL LIABILITIES		<u><u>\$329,710,310.17</u></u>

The Actuarial Balance Sheet is a convenient device to present the results of an actuarial valuation. The following comments are intended to assist you in your understanding of the items contained in the Actuarial Balance Sheet.

Item 1 shows the assets on hand and was taken directly from the Accounting Balance Sheet.

Item 2 shows the present value of members' future contributions required by law equal to 3% of the members' salaries.

Item 3 shows the present value of State future contributions to the System. We have divided the present value applicable to the State's contributions as follows:

Item 3(a) The portion attributable to the State's share of the total entry age normal cost contribution of 5.77% of members' salaries. After deducting the members' share of 3%, the State's share of the entry age normal cost contribution amounts to 2.77% of members' salaries.

Item 3(b) The portion attributable to the balance of the State's "matching" 3% contribution (.23% of members' salaries less .19% which is allocated for operating expenses) which is being used to pay a portion of the State's share of the cost.

Item 3(c) The portion attributable to the State's "additional" contribution. On the basis of the annualized salaries payable as of June 30, 1972, the 1% "additional" contribution amounts

to approximately \$2,861,000.00 per year and the full amount of the contribution will amortize the \$18,041,328.90 shown in Item 3(c) in a little over seven years. The level annual contribution required to amortize \$18,041,328.90 over the 25-1/2 year period ending on December 31, 1997 is \$1,062,739.00.

Item 5 shows the current liabilities and was taken directly from the Accounting Balance Sheet.

Item 6 shows the actuarially computed present value of all benefits earned to June 30, 1972 and earnable after that date that will be paid from the System to presently active members.

Item 7 shows the actuarially computed present value of all benefits payable from the System to members who have terminated service with vested benefits.

Item 8 shows the actuarially computed present value of refundments that will be paid from the System to members who have terminated service without vested benefits.

The total of \$52,732,562.67 shown for Item 9(a) represents the value of benefits payable from the MAFB to MSRS retirees and may be related to a computed present value on the basis of a 3-1/2% interest assumption and the 1937 Standard Annuity Mortality Table of \$50,410,799.

CONCLUSIONS

In a Retirement System such as yours where both the benefits and contributions are specified in the Retirement Law, the major purpose of an actuarial valuation is to determine whether or not the prescribed contributions are adequate to provide the benefits that will ultimately be paid under the System. The results of the current valuation show that the benefits to be provided under the System can be financed by the 3% members' contributions and the State's "matching" 3% contributions plus the State's "additional" contribution for approximately seven years.

SECTION III

REQUIRED EXHIBITS

Minnesota Statutes 1971, Chapter 356, requires, in Section 356.20, Subdivision 4(1), that the actuary of the System prepare an exhibit setting forth certain specified information with regard to the System as of the valuation date, including "Reserves Required" under the System. In an earlier conference with representatives of the State's Employee Retirement System's Interim Commission, we were advised that "Reserve Required", as contemplated in the aforementioned statute, may be defined as the actuarially computed present value applicable to a specified benefit reduced by the actuarially computed present value of any portion of the total entry age normal cost contribution under the System which is applicable to the specified benefit.

The exhibit required by Section 356.20, Subdivision 4(1) of Minnesota Statutes 1971, Chapter 356, is presented on the following pages of this Section III and we hereby certify that the Reserves Required set forth therein have been computed in accordance with the Entry Age Normal Cost (level Normal Cost) basis in the manner outlined in the definition referred to above.

MINNESOTA STATE RETIREMENT SYSTEM

EXHIBIT REQUIRED BY MINNESOTA STATUTES 1971, CHAPTER 356,
SECTION 356.20, SUBDIVISION 4(1)
AS OF JUNE 30, 1972

ASSETS AND UNFUNDED ACCRUED LIABILITY

Assets

1. Cash in office	\$ 25.00
2. Deposits in banks	264,526.92
3. Short term investments (at cost)	6,139,468.12
4. Accounts receivable:	
a) Accrued employee contributions	346,505.70
b) Accrued employer contributions	382,893.49
c) Employee back payments	32,668.72
d) Investment maturities and sales	316,297.25
e) Other	21,083.25
5. Accrued interest in investments	1,011,013.25
6. Dividends declared & payable, but not yet received	62,082.37
7. Investment in debt securities at amortized cost	67,013,548.92
8. Investment in equities at cost (Market Value \$59,448,886)	49,956,219.44
9. Equipment at depreciated cost	9,082.46
10. Prepaid postage	2,000.00
11. Deferred yield adjustment account	394,395.17
12. Annuity stabilization account	819,553.54
13. Participation in the MAFB Fund	52,732,562.67
14. Total Assets	<u>\$179,503,926.27</u>

Unfunded Accrued Liability

15. Unfunded Accrued Liability to be funded by portion of State's 3% "Matching Contribution" in excess of State's share of entry age normal cost contribution and Operating Expenses	\$ '909,914.00
16. Unfunded Accrued Liability to be funded by State's "Additional" contribution	<u>18,041,328.90</u>
17. Total Unfunded Accrued Liability	\$ 18,951,242.90
18. TOTAL ASSETS AND UNFUNDED ACCRUED LIABILITY	<u>\$198,455,169.17</u>

CURRENT LIABILITIES AND RESERVES REQUIRED

Current Liabilities

19. Accounts payable:	
a) Due to MAFB Fund	\$ 232,796.53
b) Security purchases	968,076.68
c) Annuities	1,556.10
d) Survivor benefits	2,543.97
e) Annuitant deposits	17,454.54
f) Accrued expenses	51,640.10
g) Overpaid dividends & prepaid postage	2,296.27
h) Transfer to unclassified employee retirement	11,883.72
20. Suspense item	<u>3,781.05</u>
21. Total current liabilities	\$ 1,292,028.96

Reserves Required

22. Total Reserves Required per attached schedule	<u>\$197,163,140.21</u>
23. TOTAL CURRENT LIABILITIES AND RESERVES REQUIRED	<u>\$198,455,169.17</u>

Note: Accumulated contributions, without interest, of members not yet retired amounted to \$47,240,336.36 as of June 30, 1972.

MINNESOTA STATE RETIREMENT SYSTEM

DETERMINATION OF RESERVES REQUIRED
AS OF
JUNE 30, 1972

	(1)	(2)	(3)
<u>Benefits For:</u>	<u>Present Value of Benefits</u>	<u>Present Value of Applicable Portion of Normal Cost Contribution</u>	<u>Reserves Required (1) - (2)</u>
1. Active Members:			
a) Retirement Benefits	\$212,004,036.00	\$ 86,896,818.00	\$125,107,218.00
b) Disability Benefits	18,411,450.00	11,373,929.00	7,037,521.00
c) Refundments due to death or withdrawal	35,290,230.00	30,482,130.00	4,808,100.00
d) Surviving Spouse Benefits	5,878,667.00	2,502,264.00	3,376,403.00
2. Deferred Annuitants	2,693,342.00	-	2,693,342.00
3. Former Members Without Vested Rights	287,879.00	-	287,879.00
4. Survivors	300,561.00	-	300,561.00
5. Benefits Payable from MAFB Fund:			
a) Reserve for Par- ticipation	52,732,562.67	-	52,732,562.67
b) Annuity Stabilization Reserve	819,553.54	-	819,553.54
6. Total	\$328,418,281.21	\$131,255,141.00	\$197,163,140.21

Minnesota Statutes 1971, Chapter 356, requires, in Section 356.20, Subdivision 4(2) and (3), that there be submitted annually an analysis of the System's income and deductions from income with increases in total reserves required being specifically referred to as a deduction from income. The exhibit required by Section 356.20, Subdivision 4(2) and (3) is presented on the following page of this Section III. Items of income and deductions from income with the exception of increases in total reserves required were taken directly from statements prepared by the Executive Director.

Inasmuch as any excess of "income" over "deductions from income" must be equal to the reduction in the Unfunded Accrued Liability of the System over the period covered by the analysis, we have confirmed that fact in Item 14 of the exhibit.

MINNESOTA STATE RETIREMENT SYSTEM

EXHIBIT REQUIRED BY MINNESOTA STATUTES 1971, CHAPTER 356,
SECTION 356.20, SUBDIVISION 4(2) and (3)
FISCAL YEAR ENDING JUNE 30, 1972

ANALYSIS OF INCOME AND DEDUCTIONS FROM INCOME

INCOME

1.	<u>From Employees</u>	
	Employee contributions	\$ 7,512,599.06
	Employee accrued contributions receivable	346,505.70
	Employee contributions, accounts receivable	15,074.81
2.	<u>From Employers</u>	
	Employer contributions	7,524,902.81
	Employer additional contributions	2,503,021.48
	Employer accrued contributions receivable	382,893.49
3.	<u>From Investments</u>	
	Interest on debt securities	3,973,444.61
	Dividends on corporate stock	1,440,818.46
	Premium on bonds called	1,630.78
	MAFB Fund income	4,737,297.82
4.	<u>Other Revenues</u>	
	Interest on back payments by employees	15,937.58
	Employer payments in lieu of interest	151.45
	Adjustment in prior year benefit payments	94.37
	Unclaimed contributions & benefits cancelled into fund	73.53
	Employer contributions from unclassified employee retirement	2,701.19
	Increase in MAFB Fund a/c capitalization of bond losses	229,958.57
	Gain on sales of securities	21,307.03
5.	TOTAL INCOME	\$28,708,412.74

DEDUCTIONS FROM INCOME

6.	<u>Benefits</u>	
	Retirement benefits	\$ 5,463,690.25
	Survivor benefits (spouses)	29,162.64
	Interest paid - deceased employees	92,419.64
	Interest paid - compulsory retirees	3,084.32
7.	<u>Refundments</u>	
	Left service	1,779,514.47
	Coverage by other systems	61,375.34
	Employee deaths	271,416.50
	Annuitant deaths	87,325.97
	Erroneous deductions	9,956.17
8.	<u>Unclassified Employee Retirement Account</u>	
	Transfer of employee contributions	152,324.07
	Transfer of employer contributions	152,324.07
	Transfer of interest on initial assets	15,096.06
9.	Operating Expenses	446,124.26
10.	Reduction in Annuity Stabilization Reserve	502,390.15
11.	<u>Increase in Total Reserves Required</u>	
	Reserves Required 6-30-71	\$179,667,934.41
	Reserves Required 6-30-72	197,163,140.21
12.	TOTAL DEDUCTIONS FROM INCOME	\$26,561,409.71
13.	EXCESS OF INCOME OVER DEDUCTIONS FROM INCOME	\$ 2,147,003.03
14.	REDUCTION IN UNFUNDED ACCRUED LIABILITY:	
	Unfunded Accrued Liability 6-30-71	\$ 21,098,245.93
	Unfunded Accrued Liability 6-30-72	18,951,242.90

Minnesota Statutes 1971, Chapter 356, requires, in Section 356.20, Subdivision 4(4), that there be submitted annually an analysis of changes in the membership of the System. Section 356.21, Subdivisions 4 and 5, requires information with respect to the annual payroll and annual annuities of the members of the System as well as certain information with respect to average ages. The exhibit required by Section 356.20, Subdivision 4(4), Section 356.21, Subdivision 4(6), and Section 356.21, Subdivision 5(9) and (10) is presented on the following pages of this Section III. All of the information was taken directly from an exhibit prepared by the Executive Director.

MINNESOTA STATE RETIREMENT SYSTEM

EXHIBIT REQUIRED BY MINNESOTA STATUTES 1971, CHAPTER 356,
SECTION 356.20, SUBDIVISION 4(4), SECTION 356.21, SUBDIVISION 4(6) AND
SECTION 356.21, SUBDIVISION 5(9) AND (10)
FISCAL YEAR ENDING JUNE 30, 1972

COVERED EMPLOYEE STATEMENT

ACTIVE EMPLOYEES:

	<u>NUMBER</u>	<u>ANNUAL PAYROLL</u>
Active at July 1, 1971	37,129	\$258,358,553.00
New Entrants, 7/1/71 - 6/30/72	<u>7,172</u>	40,789,470.57
TOTAL	44,301	

Less Separations from Active Service:

Refundment	5,126	26,952,966.84
Separation with a Vested Right to a deferred annuity	70	456,767.85
Separation with neither refundment nor right to a deferred annuity	1,491	5,100,219.47
Disability	49	371,012.58
Death	138	1,005,711.51
Service Retirement	464	4,014,649.11
Death While Eligible Annuity	<u>1</u>	11,817.60
TOTAL SEPARATIONS	7,339	

Active at June 30, 1972	<u>36,962</u>	<u>\$286,119,677.92</u>
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Average Entry Age of New Employees

<u>For the Year</u>	<u>Male</u>	<u>Female</u>	<u>Average of Total</u>
1/1/67 - 12/31/67	32 yrs. 0 mos.	28 yrs. 1 mo.	29 yrs. 6 mos.
1/1/68 - 12/31/68	31 yrs. 6 mos.	27 yrs. 5 mos.	28 yrs. 11 mos.
1/1/69 - 12/31/69	31 yrs. 1 mo.	26 yrs. 10 mos.	28 yrs. 2 mos.
1/1/70 - 6/30/71	32 yrs. 8 mos.	28 yrs. 1 mo.	29 yrs. 8 mos.
7/1/71 - 6/30/72	30 yrs. 9 mos.	27 yrs. 9 mos.	28 yrs. 11 mos.

Average age at entry into State service for all active employees at June 30, 1972:

Average Male	31 yrs. 7 mos.
Average Female	29 yrs. 9 mos.
Total Average	30 yrs. 7 mos.

ANNUITANT STATEMENT

	<u>Number</u>	<u>Annual Annuity Benefit Payable</u>
(1) SERVICE RETIREMENT ANNUITANTS:		
Receiving at June 30, 1971	3,741	\$4,464,085.92
New	451	694,154.40
	<u>4,192</u>	<u>\$5,158,240.32</u>
Deaths	199	244,594.44
	<u>3,993</u>	<u>4,913,645.88</u>
2% benefit increase and other special adjustments	0	69,714.96
Receiving at June 30, 1972	<u>3,993</u>	<u>4,983,360.84</u>
(2) DISABLED EMPLOYEES:		
Receiving at June 30, 1971	198	177,249.12
New	49	51,808.68
	<u>247</u>	<u>229,057.80</u>
Deaths	25	28,750.56
	<u>222</u>	<u>200,307.24</u>
2% benefit increase	0	2,572.20
Receiving at June 30, 1972	<u>222</u>	<u>202,879.44</u>
(3) WIDOWS RECEIVING AN ANNUITY OR SURVIVOR BENEFIT:		
A. BENEFICIARIES RECEIVING AN OPTIONAL OR REVERSIONARY ANNUITY:		
Receiving at June 30, 1971	134	108,646.80
New	19	12,793.68
	<u>153</u>	<u>121,440.48</u>
Deaths	3	2,223.00
End of Period Certain	1	662.28
	<u>149</u>	<u>118,555.20</u>
2% Benefit Increase	0	2,096.64
Receiving at June 30, 1972	<u>149</u>	<u>120,651.84</u>
B. SPOUSES RECEIVING A SURVIVOR BENEFIT:		
Receiving at June 30, 1971	33	29,747.64
Deaths	1	780.00
Receiving at June 30, 1972	<u>32</u>	<u>28,967.64</u>
(4) CHILDREN RECEIVING A SURVIVOR BENEFIT:		
Receiving at June 30, 1971	0	.00
No New Additions		

ANNUITANT STATEMENT

(Continued)

	<u>Number</u>	<u>Annual Annuity Benefit Payable</u>
(5) DEFERRED ANNUITANTS:		
Receiving at June 30, 1971	565	\$ 358,694.52
New	52	30,976.44
	<u>617</u>	<u>389,670.96</u>
Deaths	27	17,860.92
	<u>590</u>	<u>371,810.04</u>
2% benefit increase	0	6,170.64
Receiving at June 30, 1972	<u>590</u>	<u>377,980.68</u>

Average Age at Retirement of New Service Annuitants

<u>YEAR</u>	<u>AVERAGE RETIREMENT AGE</u>
1/1/67 - 12/31/67	66 years, 0 months
1/1/68 - 12/31/68	67 years, 4 months
1/1/69 - 12/31/69	66 years, 2 months
1/1/70 - 6/30/70	66 years, 0 months
7/1/70 - 6/30/71	65 years, 11 months
7/1/71 - 6/30/72	66 years, 3 months

Average Age at Retirement of all Existing Service Annuitants

66 years, 2 months

Section 356.21, Subdivision 4 of the Minnesota Statutes 1971 requires an analysis of the increase or decrease in the unfunded liability that occurred since the last valuation. The exhibit shown on the following pages of this Section III contains the information required by Section 356.21, Subdivision 4(1), (2), (3), (4) and (5).

MINNESOTA STATE RETIREMENT SYSTEM

EXHIBIT REQUIRED BY MINNESOTA STATUTES 1971, CHAPTER 356
SECTION 356.21, SUBDIVISION 4(1), (2), (3), (4) and (5)
FISCAL YEAR ENDING JUNE 30, 1972

1.	Unfunded Accrued Liability June 30, 1971			\$21,098,246
2.	Change due to current rate of funding and interest requirement (Subdivision 4(4)):			
	(a) 1971-72 Past Service Contribution	-	\$2,603,353	
	(b) 3-1/2% interest requirement	+	<u>738,439</u>	- 1,864,914
3.	Change due to actuarial gains (-) or losses (+) because of 1971-72 experience deviations from expected (Subdivision 4(3)):			
	(a) Excess interest earnings	-	1,269,044	
	(b) Withdrawals	-	691,275	
	(c) Age and Service retirements	+	634,279	
	(d) Disability retirements	+	66,318	
	(e) Deaths in active service	-	154,252	
	(f) Salary increases	+	<u>2,714,790</u>	+ 1,300,816
4.	Change due to 1971-72 entrants (Subdivision 4(5))			- 1,582,905
5.	Unfunded Accrued Liability June 30, 1972			\$18,951,243

SCHEDULE 1

SALARY SCALES

<u>Age</u>	<u>Male</u>	<u>Female</u>
20	.580	.596
21	.597	.615
22	.614	.633
23	.634	.651
24	.654	.669
25	.674	.687
26	.694	.705
27	.714	.723
28	.734	.741
29	.754	.759
30	.774	.775
31	.793	.790
32	.810	.803
33	.826	.816
34	.840	.829
35	.851	.841
36	.863	.853
37	.874	.864
38	.883	.874
39	.892	.884
40	.901	.893
41	.909	.902
42	.917	.911
43	.924	.919
44	.931	.926
45	.938	.933
46	.942	.939
47	.948	.945
48	.956	.951
49	.960	.957
50	.965	.963
51	.970	.968
52	.974	.973
53	.978	.977
54	.981	.981

SCHEDULE 1

SALARY SCALES

(Continued)

<u>Age</u>	<u>Male</u>	<u>Female</u>
55	.984	.984
56	.987	.987
57	.989	.988
58	.991	.990
59	.993	.991
60	.994	.993
61	.995	.994
62	.997	.996
63	.998	.997
64	.999	.999
65	1.000	1.000
66	1.000	1.000
67	1.000	1.000
68	1.000	1.000
69	1.000	1.000
70	1.000	1.000

SCHEDULE 2

Male Members

Probabilities of Separation from Active Service

(Number Separating at Each Age Per 10,000 Working at That Age)

<u>Age</u>	<u>Withdrawal</u>	<u>Death</u>	<u>Disability</u>	<u>Age and Service Retirement</u>
20	2,400	6		
21	2,250	6		
22	2,080	7		
23	1,920	7		
24	1,760	7		
25	1,600	7		
26	1,470	7		
27	1,340	7		
28	1,230	8		
29	1,130	8		
30	1,040	8	2	
31	950	9	2	
32	890	10	2	
33	830	11	2	
34	770	12	2	
35	720	13	2	
36	680	15	2	
37	640	16	2	
38	600	18	2	
39	560	20	2	
40	530	22	2	
41	500	25	2	
42	480	27	2	
43	460	29	2	
44	430	32	2	
45	410	35	2	
46	390	38	3	
47	370	41	4	
48	350	44	5	
49	340	48	6	

SCHEDULE 2

Male Members
(Continued)

Probabilities of Separation from Active Service

(Number Separating at Each Age Per 10,000 Working at That Age)

<u>Age</u>	<u>Withdrawal</u>	<u>Death</u>	<u>Disability</u>	<u>Age and Service Retirement</u>
50	320	52	7	
51	300	57	8	
52	280	63	10	
53	260	70	12	
54	240	77	14	
55	210	85	17	
56	170	93	20	
57	140	102	23	
58	90	111	28	30
59	40	120	33	30
60		130	38	40
61		140	45	150
62		150	55	150
63		160	68	250
64		170	87	1,350
65		180		2,000
66		190		1,500
67		200		1,900
68		210		2,000
69		220		3,950
70				10,000

SCHEDULE 3

Female Members

Probabilities of Separation from Active Service

(Number Separating at Each Age Per 10,000 Working at That Age)

<u>Age</u>	<u>Withdrawal</u>	<u>Death</u>	<u>Disability</u>	<u>Age and Service Retirement</u>
20	3,700	1		
21	3,550	2		
22	3,390	2		
23	3,230	2		
24	3,070	3		
25	2,910	3		
26	2,750	4		
27	2,600	4		
28	2,430	4		
29	2,270	4		
30	2,120	4		
31	1,970	4		
32	1,820	4		
33	1,680	4		
34	1,540	4		
35	1,410	4	1	
36	1,300	5	1	
37	1,190	5	1	
38	1,090	6	1	
39	1,000	7	2	
40	920	8	2	
41	850	8	2	
42	780	9	3	
43	720	11	3	
44	680	13	3	
45	630	15	3	
46	590	17	4	
47	560	19	4	
48	530	21	4	
49	500	23	5	

SCHEDULE 3

Female Members
(Continued)

Probabilities of Separation from Active Service

(Number Separating at Each Age Per 10,000 Working at That Age)

<u>Age</u>	<u>Withdrawal</u>	<u>Death</u>	<u>Disability</u>	<u>Age and Service Retirement</u>
50	470	25	5	
51	440	27	6	
52	410	30	7	
53	390	33	8	
54	360	36	10	
55	330	39	12	
56	290	43	15	
57	230	47	18	
58	170	51	22	50
59	90	56	26	50
60		61	31	150
61		66	37	150
62		72	44	200
63		78	52	350
64		83	61	1,100
65		88		1,750
66		94		1,450
67		100		1,650
68		106		1,850
69		112		4,700
70				10,000

REPORT ON
ACTUARIAL VALUATION
MINNESOTA STATE RETIREMENT SYSTEM
JUNE 30, 1972
4% INTEREST RATE ASSUMPTION

December 11, 1972



FILE COPY

COATES AND CRAWFORD

CONSULTING ACTUARIES

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EDWARD L. CHAPIN
HARRY M. CHURCH
BARRETT N. COATES, JR.
ANGUS L. CRAWFORD
ROBERT H. LITTLE

December 11, 1972

Board of Trustees
Minnesota State Retirement System
529 Jackson Street
St. Paul, Minnesota 55101

Gentlemen:

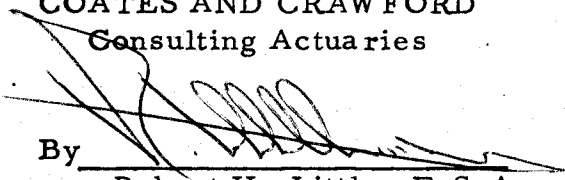
We are pleased to transmit herewith our report on the actuarial valuation of your Retirement System made as of June 30, 1972 on the basis of a 4% interest rate assumption. This valuation was authorized under Contract No. E-0633.

We look forward to the opportunity of discussing this report with you at your convenience.

Very truly yours,

COATES AND CRAWFORD
Consulting Actuaries

By


Robert H. Little, F.S.A.

RHL:th

REPORT ON
ACTUARIAL VALUATION
OF THE
MINNESOTA STATE RETIREMENT SYSTEM
AS OF
JUNE 30, 1972

ON THE BASIS OF 4% INTEREST RATE ASSUMPTION

The contract under which this valuation was authorized specified that the actuarial valuation be carried out on the basis of the System as it was constituted on June 30, 1972 using 3-1/2% and 4% interest rate assumptions and the other actuarial assumptions developed during the course of the June 30, 1971 actuarial investigation. This report sets forth the results of the 4% valuation. The results of the 3-1/2% valuation have been submitted in a separate report.

In order to develop the entry age normal cost contribution rate for new employees, we carried out a complete valuation as of June 30, 1971 of active members who were employed during the preceding four and one-half year period. The results of these calculations indicate that the total entry age normal cost rate amounts to 5.28% of salary. This rate compares with a 5.77% rate developed on the basis of a 3-1/2% interest assumption.

Employees are required by law to contribute 3% and, accordingly, the State's share of the entry age normal cost contribution rate amounts to 2.28%.

The law requires that the State make the following contributions to the Fund with respect to members contributing at a 3% rate:

- (1) A "matching" contribution equal to 3% of the members' participating salaries, and
- (2) An "additional" contribution equal to one-third of members' contributions, or 1% of participating salaries.

We have been advised that it is the intent of the Minnesota Legislature to pay the "additional" contributions referred to above for a limited time only.

The Actuarial Balance Sheet shown on the following page summarizes the results of the valuation. An Accounting Balance Sheet has not been included in this report because it would duplicate the Accounting Balance Sheet included in our report on the 3-1/2% valuation required by law.

MINNESOTA STATE RETIREMENT SYSTEM

ACTUARIAL BALANCE SHEET

AS OF

JUNE 30, 1972

4% INTEREST RATE ASSUMPTION

ASSETS

1. Assets on Hand from Accounting Balance Sheet:		
a) Participation in MAFB Fund and Annuity Stabilization Reserve	\$ 53,552,116.21	
b) All other Assets	<u>125,951,810.06</u>	\$179,503,926.27
2. Present Value of Employees' Future Contributions (3% of Participating Salary)		65,744,076.00
3. Present Value of State Future Contributions Applicable to:		
a) Entry Age Normal Cost (2.28% of Participating Salary)	\$ 49,965,498.00	
b) Unfunded Accrued Liability (Balance of 3% "Matching" Contribution less .19% for Operating Expenses or .53% of Participating Salary)	11,614,787.00	
c) Unfunded Accrued Liability (Portion to be funded by "Additional" Contribution)	<u>(4,244,704.10)</u>	<u>57,335,580.90</u>
4. TOTAL ASSETS		<u><u>\$302,583,583.17</u></u>

LIABILITIES

5. Current Liabilities from Accounting Balance Sheet		\$ 1,292,028.96
6. Present Value of Earned and Earnable Benefits Payable to Presently Active Members:		
a) Retirement Benefits	\$188,424,688.00	
b) Disability Benefits	16,852,500.00	
c) Refundments due to death or withdrawal	34,145,345.00	
d) Surviving Spouse Benefits	<u>5,221,539.00</u>	244,644,072.00
7. Present Value of Benefits for Deferred Annuitants:		
a) Retirement Benefits	\$ 2,389,131.00	
b) Refundments due to death or withdrawal	124,583.00	
c) Benefits already authorized	<u>5,655.00</u>	2,519,369.00
8. Present Value of Refundments to former members without vested rights		287,879.00
9. Benefits Payable from MAFB Fund:		
a) Reserve for Participation	\$ 52,732,562.67	
b) Stabilization Reserve	<u>819,553.54</u>	53,552,116.21
10. Present Value of Survivor Benefits		<u>288,118.00</u>
11. TOTAL LIABILITIES		<u><u>\$302,583,583.17</u></u>

The Actuarial Balance Sheet is a convenient device to present the results of an actuarial valuation. The following comments are intended to assist you in your understanding of the items contained in the Actuarial Balance Sheet.

Item 1 shows the assets on hand and was taken directly from the Accounting Balance Sheet.

Item 2 shows the present value of members' future contributions required by law equal to 3% of the members' participating salaries.

Item 3 shows the present value of State future contributions to the System. We have divided the present value applicable to the State's contributions as follows:

Item 3(a) The portion attributable to the State's share of the total entry age normal cost contribution of 5.28% of members' salaries. After deducting the members' share of 3%, the State's share of the entry age normal cost contribution amounts to 2.28% of members' salaries.

Item 3(b) The portion attributable to the balance of the State's "matching" contribution (.72% of members' salaries less .19% which is allocated for operating expense).

Item 3(c) The portion attributable to the State's "additional" contribution. The negative amount shows that the State's matching contribution is more than sufficient to fund all existing benefits for present members.

Item 5 shows the current liabilities and was taken directly from the Accounting Balance Sheet.

Item 6 shows the actuarially computed present value of all benefits earned to June 30, 1972 and earnable after that date that will be paid from the System to presently active members.

Item 7 shows the actuarially computed present value of all benefits payable from the System to members who have terminated service with vested benefits.

Item 8 shows the actuarially computed present value of refundments that will be paid from the System to members who have terminated service without vested benefits.

Item 9 shows the MSRS participation in the MAFB Fund and Item 10 shows the present value of survivor benefits.

The three exhibits presented on the following pages of this report are those which conform to the requirements of Minnesota Statutes 1971, Chapter 356, Section 356.20, Subdivisions 4(1), 4(2) and 4(3), except for the fact that they reflect a 4% interest assumption rather than the 3-1/2% assumption required by Chapter 356.

MINNESOTA STATE RETIREMENT SYSTEM

EXHIBIT REQUIRED BY MINNESOTA STATUTES 1971, CHAPTER 356,
SECTION 356.20, SUBDIVISION 4(1) AS OF JUNE 30, 1972

4% INTEREST RATE ASSUMPTION

ASSETS AND UNFUNDED ACCRUED LIABILITY

Assets

1. Cash in office	\$ 25.00
2. Deposits in banks	264,526.92
3. Short term investments (at cost)	6,139,468.12
4. Accounts receivable:	
a) Accrued employee contributions	346,505.70
b) Accrued employer contributions	382,893.49
c) Employee back payments	32,668.72
d) Investment maturities and sales	316,297.25
e) Other	21,083.25
5. Accrued interest in investments	1,011,013.25
6. Dividends declared & payable, but not yet received	62,082.37
7. Investment in debt securities at amortized cost	67,013,548.92
8. Investment in equities at cost (Market Value \$59,448,886)	49,956,219.44
9. Equipment at depreciated cost	9,082.46
10. Prepaid postage	2,000.00
11. Deferred yield adjustment account	394,395.17
12. Annuity stabilization account	819,553.54
13. Participation in the MAFB Fund	52,732,562.67
14. Total Assets	<u>\$179,503,926.27</u>

Unfunded Accrued Liability

15. Unfunded Accrued Liability to be funded by portion of State's 3% "Matching Contribution" in excess of State's share of entry age normal cost contribution and Operating Expenses	\$ 11,614,787.00
16. Unfunded Accrued Liability to be funded by State's "Additional" contribution	<u>(4,244,704.10)</u>
17. Total Unfunded Accrued Liability	\$ 7,370,082.90
18. TOTAL ASSETS AND UNFUNDED ACCRUED LIABILITY	<u>\$186,874,009.17</u>

CURRENT LIABILITIES AND RESERVES REQUIRED

Current Liabilities

19. Accounts Payable:	
a) Due to MAFB Fund	\$ 232,796.53
b) Security purchases	968,076.68
c) Annuities	1,556.10
d) Survivor benefits	2,543.97
e) Annuitant deposits	17,454.54
f) Accrued expenses	51,640.10
g) Overpaid dividends & prepaid postage	2,296.27
h) Transfer to unclassified employee retirement	11,883.72
20. Suspense item	<u>3,781.05</u>
21. Total current liabilities	\$ 1,292,028.96

Reserves Required

22. Total Reserves Required per attached schedule	<u>\$185,581,980.21</u>
23. TOTAL CURRENT LIABILITIES AND RESERVES REQUIRED	<u>\$186,874,009.17</u>

Note: Accumulated contributions, without interest, of members not yet retired amounted to \$47,240,336.36 as of June 30, 1972.

MINNESOTA STATE RETIREMENT SYSTEM

DETERMINATION OF RESERVES REQUIRED
AS OF
JUNE 30, 1972

4% INTEREST RATE ASSUMPTION

<u>Benefits For:</u>	(1)	(2)	<u>Reserves Required (1) - (2)</u>
	<u>Present Value of Benefits</u>	<u>Present Value of Applicable Portion of Normal Cost Contribution</u>	
1. Active Members:			
a) Retirement Benefits	\$188,424,688.00	\$ 74,071,659.00	\$114,353,029.00
b) Disability Benefits	16,852,500.00	10,299,906.00	6,552,594.00
c) Refundments due to death or withdrawal	34,145,345.00	29,146,540.00	4,998,805.00
d) Surviving Spouse Benefits	5,221,539.00	2,191,469.00	3,030,070.00
2. Deferred Annuitants	2,519,369.00	-	2,519,369.00
3. Former Members Without Vested Rights	287,879.00	-	287,879.00
4. Survivors	288,118.00	-	288,118.00
5. Benefits Payable from MAFB Fund:			
a) Reserve for Participation	52,732,562.67	-	52,732,562.67
b) Annuity Stabilization Reserve	819,553.54	-	819,553.54
6. Total	\$301,291,554.21	\$115,709,574.00	\$185,581,980.21

MINNESOTA STATE RETIREMENT SYSTEM

EXHIBIT REQUIRED BY MINNESOTA STATUTES 1971, CHAPTER 356,
SECTION 356.20, SUBDIVISION 4(2) and (3)
FISCAL YEAR ENDING JUNE 30, 1972

4% INTEREST RATE ASSUMPTION

ANALYSIS OF INCOME AND DEDUCTIONS FROM INCOME

INCOME

1.	<u>From Employees</u>	
	Employee contributions	\$ 7,512,599.06
	Employee accrued contributions receivable	346,505.70
	Employee contributions, accounts receivable	15,074.81
2.	<u>From Employers</u>	
	Employer contributions	7,524,902.81
	Employer additional contributions	2,503,021.48
	Employer accrued contributions receivable	382,893.49
3.	<u>From Investments</u>	
	Interest on debt securities	3,973,444.61
	Dividends on corporate stock	1,440,818.46
	Premium on bonds called	1,630.78
	MAFB Fund income	4,737,297.82
4.	<u>Other Revenues</u>	
	Interest on back payments by employees	15,937.58
	Employer payments in lieu of interest	151.45
	Adjustment in prior year benefit payments	94.37
	Unclaimed contributions & benefits cancelled into fund	73.53
	Employer contributions from unclassified employee retirement	2,701.19
	Increase in MAFB Fund a/c capitalization of bond losses	229,958.57
	Gain on sales of securities	21,307.03
5.	<u>TOTAL INCOME</u>	<u>\$28,708,412.74</u>

DEDUCTIONS FROM INCOME

6.	<u>Benefits</u>	
	Retirement benefits	\$ 5,463,690.25
	Survivor benefits (spouses)	29,162.64
	Interest paid - deceased employees	92,419.64
	Interest paid - compulsory retirees	3,084.32
7.	<u>Refundments</u>	
	Left service	1,779,514.47
	Coverage by other systems	61,375.34
	Employee deaths	271,416.50
	Annuitant deaths	87,325.97
	Erroneous deductions	9,956.17
8.	<u>Unclassified Employee Retirement Account</u>	
	Transfer of employee contributions	152,324.07
	Transfer of employer contributions	152,324.07
	Transfer of interest on initial assets	15,096.06
9.	<u>Operating Expenses</u>	446,124.26
10.	<u>Reduction in Annuity Stabilization Reserve</u>	502,390.15
11.	<u>Increase in Total Reserves Required</u>	
	Reserves Required 6-30-71	\$168,543,770.41
	Reserves Required 6-30-72	185,581,980.21
12.	<u>TOTAL DEDUCTIONS FROM INCOME</u>	<u>\$26,104,413.71</u>
13.	<u>EXCESS OF INCOME OVER DEDUCTIONS FROM INCOME</u>	<u>\$ 2,603,999.03</u>
14.	<u>REDUCTION IN UNFUNDED ACCRUED LIABILITY:</u>	
	Unfunded Accrued Liability 6-30-71	\$ 9,974,081.93
	Unfunded Accrued Liability 6-30-72	7,370,082.90

MSRS VALUATION AS OF JUNE 30, 1972

The purpose of this memorandum is to discuss the valuation report of the Minnesota State Retirement System dated December 11, 1972 which was submitted to the Commission in accordance with Chapter 249 of Minnesota Laws 1967. The valuation was made using the entry age normal cost method and assuming 3 1/2% interest. The report was prepared by Robert H. Little of Coates and Crawford, Consulting Actuaries.

This memo contains the following:

1. Statistical and Valuation Data
2. Discussion of Valuation Results
3. Conclusion

1. Statistical and Valuation Data

Results of the valuation reports as of June 30, 1971 and June 30, 1972 are shown for comparative purposes. Figures are rounded where necessary for simplicity of presentation.

	<u>As of</u> <u>June 30, 1971</u>	<u>As of</u> <u>June 30, 1972</u>
(1) <u>Membership</u>		
Active Members	37,129	36,962
Inactive Members	7,759	5,465
Retired Members	4,440	4,732
Disabled Members	198	222
Survivors of Deceased Members	33	32
(2) <u>Payroll and Annuities Payable</u>		
Total Annualized Payroll	\$ 258.4 Million	\$ 286.1 Million
Annuities (annual)	5.1 Million	5.7 Million
(3) <u>Valuation Balance Sheet</u>		
Accrued Liability	\$ 179.7 Million	\$ 197.1 Million
Assets	<u>158.6 Million</u>	<u>178.2 Million</u>
Unfunded Accrued Liability (Deficit)	\$ 21.1 Million	\$ 18.9 Million
Funding Ratio (Ratio of Assets to Accrued Liability)	88.3%	90.4%

(4) Normal Cost and Funding Costs

	<u>Percent of Covered Payroll</u>	<u>Percent of Covered Payroll</u>
Normal Cost	5.77%	5.77%
Normal Cost	5.77%	5.77%
Interest on Deficit	0.29	0.23
Expenses	<u>0.19</u>	<u>0.19</u>
Total ("Minimum Contribution")	6.25%	6.19%
Normal Cost	5.77%	5.77%
Amortization by 1997	0.47	0.39
Expenses	<u>0.19</u>	<u>0.19</u>
Total ("Required Contribution")	6.43%	6.35%

(5) Statutory Contributions

Employee	3.0%	3.0%
Employer Regular	3.0	3.0
Employer Additional	<u>1.0</u>	<u>1.0</u>
Total Contributions	7.0%	7.0%

(6) Investment Yield (A) 4.46% * 4.68% *

(A) Ratio of investment income (on an accrual basis) to mean assets.

* Excluding assets in Minnesota Adjustable Fixed Benefit Fund.

2. Discussion of Valuation Results

The MSRS Actuary uses a variation of the entry age normal cost method in which the normal cost is determined as a percentage of payroll only for new entrants of recent years. In the 1971 valuation, the normal cost was determined for new entrants during the period January 1, 1967 to June 30, 1971. The normal cost was not redetermined in the 1972 valuation apparently on the assumption that the age and salary distribution for new employees has not changed. We are not able to make a thorough check on this assumption. On the one hand, an examination of the average ages of new entrants in recent years indicates that it is reasonable. On the other hand, the analysis shown below of the decrease in the deficit contains a substantial decrease from new entrants which indicates that their normal cost was lower than the 5.77% applied to the entire membership.

During the 12-month period, the unfunded accrued liability decreased from \$21,098,246 to \$18,951,243, a decrease of \$2,147,003. The MSRS Actuary gives the following complete analysis of this decrease.

Decreases:

Amortization Contribution	\$ 1,864,914	
Excess Interest Earnings	1,269,044	
Excess Terminations	691,275	
Excess Deaths	154,252	
New Entrants	<u>1,582,905</u>	\$ 5,562,390

Increases:

Deviations in Salary Rates	\$ 2,714,790	
Deviations in Retirement Rates	634,279	
Deviations in Disability Rates	<u>66,318</u>	<u>3,415,387</u>

Net Decrease \$ 2,147,003

3. Conclusion

The 1972 Valuation Report filed by MSRS conforms with the requirements of Chapter 249. Furthermore, this is an excellent Report containing much useful information and much pertinent discussion.

On page 9 of the Report, the MSRS Actuary concludes: "The results of the current valuation show that the benefits to be provided under the System can be financed by the 3% members' contributions and the State's "matching" 3% contributions plus the State's "additional" contribution for approximately 7 years." Although we obtained a slightly longer period, the difference is not significant.

Franklin C. Smith
Associate, Society of Actuaries
GEORGE V. STENNES AND ASSOCIATES
Commission Actuaries