MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

ACTUARIAL VALUATION AS OF
JUNE 30, 1980

January 16, 1981

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January 16, 1981

Board of Directors
Minnesota State Retirement System
529 Jackson at 10th Street
St. Paul, Minnesota 55101

Gentlemen:

We have performed an actuarial valuation of the Minnesota State Retirement System Highway Patrolmen's Fund as of June 30, 1980.

The valuation was performed on the basis of accepted actuarial methods and procedures, in accordance with the applicable provisions set forth in Minnesota Statutes (Chapter 356) and stipulated in the Contract between the State of Minnesota and The Wyatt Company.

We hereby certify that on the basis of our valuation, contributions required from employees and the State under Minnesota Statutes (Chapter 352B) represent 96.7% of the requirements set forth in Chapter 356. Furthermore, the entry age normal cost method was utilized in determining the accrued liability for all benefits payable under the Fund.

Respectfully submitted,

THE WYATT COMPANY

Allan J. Grosh
Fellow, Society of Actuaries

Alan J. Schutz
Associate, Society of Actuaries

TABLE OF CONTENTS

TABLES

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Actuarial Valuation as of June 30, 1980

PURPOSE AND SUMMARY

The purpose of this report is to set forth the financial status of the Minnesota State Retirement System (MSRS), Highway Patrolmen's Fund in accordance with the applicable provisions set forth in Chapter 356 of the Minnesota Statutes and Chapter 607 of the Minnesota Laws of 1980.

Chapter 356 of the Minnesota Statutes sets forth the annual reporting requirements which govern the public employee retirement systems in Minnesota. The principal requirement (in addition to the experience study required every fourth year) is that an actuarial valuation be performed each year and that the valuation specifically set forth the following items based on an assumed 5% interest rate and a 3½% salary scale assumption:

1. The assets of the plan and the present value of all benefits which will be payable from the plan.
2. The normal cost of the plan (as a level percentage of payroll) based on the entry age normal cost method.
3. The accrued liability of the plan, defined as the present value of all benefits less the present value of future entry age normal costs.
4. An actuarial balance sheet showing accrued assets, accrued liabilities, and the deficit from full funding of the accrued liability (unfunded accrued liability).
5. The annual contribution required to pay normal cost and amortize the June 30, 1980 unfunded accrued liability by June 30, 2009.
6. An analysis explaining the increase or decrease in the unfunded accrued liability since the last valuation.

Chapter 607, Article 14, Section 16 of the Minnesota Laws of 1980 (which eventually will be entered as Chapter 11A of the Minnesota Statutes) pertains to the operation of the Minnesota Post Retirement Investment Fund (MPRI Fund). It includes requirements regarding the determination of the present value of benefits payable from the MPRI Fund (as of June 30, 1980 and as of January 1, 1981) and the corresponding mortality gain or loss each year, the latter to facilitate an appropriate transfer between the Highway Patrolmen's Fund and the MPRI Fund.

This reporting on the status of the Highway Patrolmen's Fund as of June 30, 1980, is intended to comply with all of the requirements regarding actuarial reporting that are set forth in Chapter 356 of the Statutes and Chapter 607 of the 1980 Laws. The Appendix at the end of the report cross-references the information of the Minnesota Statutes set forth herein with that specifically called for under Chapters 356 and 607 respectively.

Last year we performed an experience study as prescribed by Chapter 356. As a result of the findings in that study the Board adopted revised actuarial assumptions pertaining to mortality which are reflected in this valuation. The revision has resulted in increases in all actuarial requirements which have been communicated to the Board during the past year.

In summary, our valuation reveals the following:

1. The Chapter 356 contribution requirement has increased from 25.16% of pay as of June 30, 1979 to 28.96% as of June 30, 1980. Absent the mortality revision, these requirements would have actually decreased to 23.67%.

2. As reported during the year, an increase in prescribed contributions under Chapter 352B is indicated (these are presently 28% of payroll) to cover Chapter 356 requirements.

3. The depth of funding ratio, defined as the assets divided by the present value of accrued benefits on an ongoing basis, decreased from 66.34% as of June 30, 1979 to 63.05% as of June 30, 1980, again primarily as a result of the mortality revision.

The results of our valuation underlying the above are set forth in greater detail in the following sections of this report.

CHANGES FROM THE PRIOR YEAR'S REPORTING

In addition to the revision in the mortality basis discussed previously, Chapter 607 of the Minnesota Laws of 1980 revised the Statutes governing the Minnesota Adjustable Fixed Benefit (MAFB Fund) - first by changing the name of the Fund to the Minnesota Post-Retirement Investment Fund (MPRI Fund), and second by revising the manner in which the post-retirement benefit increases are determined.

The manner in which the deficit in the MPRI Fund (i.e., the counterpart to the prior MAFB Annuity Stabilization Account) is reported has been revised in accordance with our discussions with the Executive Director of MSRS and with the recommendation of the Legislative Auditor. This changes slightly the manner in which accrued liability and asset items are determined. This change revises certain values reported last year which are used this year for comparative purposes, and is described in detail later in the report.

PRINCIPAL VALUATION RESULTS

The principal results of our valuation are summarized and compared with those of June 30, 1979 in the table on the following page. Two sets of values are set forth for 1980 in order to facilitate a determination of the impact of the mortality revision.

As seen in the table, the normal cost has increased from 14.60% to 15.50% of covered payroll. Chapter 352B requires that Highway Patrol Officers pay 7% of pay towards normal cost and the State contribute 12% of covered payroll towards normal cost as well as a 9% legislated "additional contribution" for amortizing the unfunded accrued liability. Consequently, after adjusting by .18% of covered payroll for operating expenses, 3.32% (19.00% - 15.50% - 0.18%) in addition to the legislated 9% "additional contribution" is available for amortizing the unfunded accrued liability.

SUMMARY OF PRINCIPAL VALUATION RESULTS

		Prior Assumptions 1979	Prior Assumptions 1980	Revised Assumptions 1980
1.	Normal Cost*	2,398,654 (14.60)	2,601,518 (14.45)	2,790,556 (15.50)
2.	Accrued Liability	68,679,194	74,753,013	85,830,394
3.	Valuation Assets	42,593,851	49,620,012	49,620,012
4.	Accrued Liability Funding Ratio	62.02%	66.38%	57.81%
5.	Unfunded Accrued Liability	26,085,343	25,133,001	36,210,382
6.	Chapter 356 Requirement	4,132,865	4,261,440	5,214,379
7.	Prescribed Chapter 352B Requirement	4,600,158	5,041,004	5,041,004
8.	Plan Continuation Liability	64,207,643	70,056,433	78,698,547
9.	Plan Continuation Liability Funding Ratio	66.34%	70.83%	63.05%

* Parentheses indicate item as a percentage of covered payroll.

While the accrued liability of the plan has increased from $68,679,194 to $85,830,394 during the year, the valuation assets of the plan have increased from $42,593,851 to $49,620,012 during the same period. Consequently, the unfunded accrued liability has increased from $26,085,343 on June 30, 1979 to $36,210,382 on June 30, 1980 while the portion of accrued liability funded has decreased from 62.02% to 57.81% during the same period. The Chapter 356 contribution requirements have increased from $4,132,865 to $5,214,379.

The present value of accrued benefits, determined on a plan continuation basis (applying all ongoing actuarial assumptions including assumed salary increases and turnover) has increased from $64,207,643 to $78,698,547. As a result, the depth of funding ratio, defined as the valuation assets divided by the present value of accrued benefits, has decreased from 66.34% to 63.05%.

Table 1(a) summarizes the results of the valuation in detail, while Table 1(b) sets forth a comparison between the June 30, 1979 and June 30, 1980 principal actuarial valuation results.

VALUATION ASSETS

The Executive Director furnished us with a Financial Report setting forth the assets and liabilities of the Fund as of June 30, 1980. The accounting balance sheet furnished by the Executive Director is set forth in Table 2(a), as adjusted by us to reflect a $2,021,873.98 transfer of assets from the Highway Patrolmen's Fund to the MPRI Fund to reflect (i) the increase in reserve requirements due to the revision in actuarial assumptions, (ii) a decrease for the mortality gain during the year and (iii) a small accrual item for payments due the MPRI Fund.

ACTUARIAL BALANCE SHEETS

Table 2(b) sets forth an actuarial balance sheet summarizing the actuarial valuation. Whereas the previously mentioned accounting balance sheet (Table 2(a)) balances the current assets to date with current accumulated reserves for benefits payable, the actuarial balance sheet compares total assets, including the present value of all future contributions payable to the plan, with the present value of all benefits payable from the plan.

Table 3(a) sets forth a balance sheet comparing the assets and unfunded accrued liability (the total of the two equaling the accrued liability) to the current liabilities and reserves required under the plan. This table is in the format specifically required by Chapter 356 and is supported by attachments in the form of Tables 3(b), 3(c) and 3(d) which set forth the determination of the unfunded accrued liability and the status of the MPRI Fund as of June 30, 1980.

MINNESOTA POST RETIREMENT INVESTMENT FUND

Background

The Minnesota Post Retirement Investment Fund (MPRI Fund), previously termed the Minnesota Adjustable Fixed Benefit Fund (MAFB), is basically a vehicle for providing variable annuity payments to pensioners. When an active participant retires, assets equal to the present value of future benefits payable to that participant (and beneficiary, if applicable) are transferred from the State and Employee Contribution Reserves, to the MPRI Fund. Thereafter, benefits are paid from the MPRI Fund. Future benefit increases are determined on the basis of the investment performance of MPRI Fund assets.

Article 14, Section 16 of Chapter 607 of the 1980 Minnesota Laws provides a new method for determining benefit increases. A benefit increase is granted in any year in which the earnings of MPRI Fund assets exceed 5%. In a year in which there is an MPRI Fund deficit (i.e., required reserves exceed MPRI Fund assets) 25% of any income in excess of the 5% requirement is credited towards amortizing the deficit, with the remaining 75% being used to provide benefit increases. If there is no MPRI Fund deficit, all income in excess of the required 5% is used to provide benefit increases.

MPRI Fund Status as of June 30, 1980

Table 3(c) sets forth the determination of MPRI Fund net assets and reserve requirements as of June 30, 1980. The State Board of Investment reported MPRI Fund net assets of $13,577,910, including a credit of $188,727, representing 25% of MPRI Fund income earned in excess of the required 5% during fiscal 1980. Two additional credits totaling $53,765 resulted in a $242,492 decrease in the MPRI Fund deficit during the year. The Table sets forth net assets of $15,599,784 as of June 30, 1980 which reflect the following adjustments:

1. A decrease of $80,950 representing a transfer to the Highway Patrolmen's Fund for the mortality gain experienced during the year.

2. An increase of $2,102,824 for reserve strengthening ($2,102,649) and an accrual adjustment ($175).

The required reserves for MPRI Fund benefits were determined to be $16,238,628 and $16,036,555 as of June 30, 1980 and January 1, 1981 respectively. The latter represents the base for benefit increases that will go into effect on January 1, 1981.

As required by Chapter 607 of the 1980 Laws, Table 3(d) allocates the mortality gain and reserve determinations for January 1, 1981 benefit increase purposes to the eligible and non-eligible groups.

Accounting Treatment of MPRI Fund Deficit

The Legislative Auditor, in his February 4, 1980 memorandum suggested several revisions to the manner in which assets and liabilities pertaining to the MPRI Fund are to be disclosed. These suggestions have been incorporated in this report.

Generally, participation in the MPRI Fund is now defined as the greater of net assets, or required reserves. This suggests that a "surplus" (or assets exceeding required reserves) in addition to being treated as an asset is also treated as "a liability" even though increases have not or possibly will not be granted based on this surplus. Conversely, a deficit (or the amount by which required reserves exceed actual assets) in addition to being treated as a liability, is now being treated as an asset. The latter represents the status as of June 30, 1980, which can be depicted as follows:

ACCOUNTING TREATMENT OF MPRI FUND

ASSETS	
. Net Assets	15,599,784
. MPRI Fund Deficit	638,844
. Total	16,238,628
LIABILITIES	
. Required Reserves	16,238,628
. MPRI Fund Surplus	0
. Total	16,238,628

These revisions produce the following changes in disclosure this year:

1. The plan continuation liability funding ratio is slightly higher on this basis since an identical amount (equal to the MPRI Fund deficit) has been included in both the numerator and denominator of the fraction.

2. Table 4 must include a balancing item representing the change in the MPRI Fund deficit during the year.

While we feel that the accounting method introduced in our prior year's report represented a more complete disclosure of actual assets and reserve requirements of the Highway Patrolmen's Fund, we have adopted the Legislative Auditor's recommendation to be consistent with the reporting approach of the other major public retirement plans in Minnesota.

RECONCILIATION OF THE UNFUNDED ACCRUED LIABILITY

Tables 4 and 5 reconcile the change in the unfunded accrued liability during the year. Table 4 sets forth an accounting balance sheet illustrating that the increase in the unfunded accrued liability is equal to the excess of deductions over income during the year, where any increase in required actuarial reserves is indicated as a deduction item.

Table 5 sets forth our analysis of the change in the unfunded accrued liability. As is shown in detail in the table, the unfunded accrued liability increased from $26,085,343 on June 30, 1979 to $36,210,382 as of June 30, 1980. This increase has resulted primarily on account of:

1. A reduction due to contributions (employee plus employer) in excess of normal cost, operating expenses and interest on the unfunded accrued liability, in the amount of $1,075,516.

2. An increase of $11,077,381 due to the change in the actuarial mortality basis, including an increase of $2,102,649 in MPRI Fund reserve requirements.

3. An increase due to a net actuarial loss of $123,174. The net actuarial loss reflects the extent to which investment, turnover and mortality gains have been exceeded by the loss attributable to pay increases.

EMPLOYEE DATA

The Executive Director furnished us with employee information pertaining to all active members, inactive members and retired members of the Fund. Tables 6(a) and 6(b) summarize the changes in active, inactive and retired membership during the year in accordance with the requirements set forth in Section 356.215 of the Minnesota Statutes, Subdivisions 4 and 5.

The data, reported as of June 30, 1980, reflect a covered payroll of $16,848,411 which represents total member earnings during the year ended June 30, 1980. Chapter 356, Section 356.215, Subdivision 4 of the Statutes requires that the actuarial valuation reflect salaries that will be in force during the ensuing fiscal year for which the valuation is being performed. Based on salary information submitted by the Executive Director, it was determined that the average July 1980 increase was approximately 6.00%. Accordingly, we increased the reported salaries by 6.00%. This has resulted in a covered payroll of $18,003,587 after annualizing the salaries of those members who worked for less than a year during the reporting period.

PLAN VALUED

The provisions of the Minnesota State Retirement System, Highway Patrolmen's Fund are governed principally by Chapter 352B of the Minnesota Statutes and by Article 14, Section 16 of Chapter 607 of the Minnesota Laws of 1980 pertaining to MPRI Fund benefits. Table 7 sets forth a summary of the principal provisions as of June 30, 1980. No changes to Chapter 352B were reported since the last actuarial valuation as of June 30, 1979. The revisions set forth in Chapter 607 of the 1980 Laws, concerning MPRI Fund benefits have been discussed previously.

ACTUARIAL METHODS AND ASSUMPTIONS

Actuarial Methods

Chapter 356 of the Minnesota Statutes calls for the determination of normal cost and accrued liability in accordance with the entry age normal cost method, one of several available projected cost methods. Several versions of this method are being used today which represent modifications of the "textbook" approach. We have continued to use the version employed in prior years. Use of this specific version results in a lower normal cost and a higher resulting unfunded accrued liability than would result by applying the more "standard" entry age cost method.

Under the method used, the normal cost is first determined (based on the age at hire of each member) as the level annual dollar deposit required to pay for the cost of each member's projected benefits over a period from his date of hire to his date of retirement. The accrued liability is, by definition, equal to the present value of all projected benefits under the plan less the present value of all future normal costs (the level dollar normal costs are used for this purpose). The unfunded accrued liability is the net of the accrued liability and current valuation assets on hand.

To comply with the requirements of Chapter 356 which calls for normal cost to be determined as a level percentage of salary, the level dollar normal cost is then converted to a level percentage of payroll basis, by applying an approximation which produces a mathematical equivalency.

Actuarial Assumptions

This report reflects the revision in the mortality basis adopted by the Board effective for the June 30, 1980 actuarial valuations. The revision, which replaces the 1959-61 United States Life Tables with the more conservative 1971 Group Annuity Mortality Table has increased all actuarial requirements, including the MPRI Fund reserve requirements.

All actuarial assumptions other than the mortality assumption are identical to those used in the prior year. Tables 8(a) and 8(b) summarize the actuarial assumptions used.

* * * * * * * * * *

If, in connection with this valuation of the Fund, additional investigations are indicated, we will be happy to undertake any further computations that may be desired.

Respectfully submitted,

THE WYATT COMPANY

Allan J. Grosh
Fellow, Society of Actuaries

Alan J. Schutz
Associate, Society of Actuaries

Table 1(a)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Summary of Actuarial Valuation as of June 30, 1980

A.	BASIC DATA			
	1.	Active Members		
		a.	Number	782
		b.	Covered payroll	18,003,587
	2.	Retired Members/Beneficiaries		
		a.	Number	302
		b.	Average annual benefit payable	5,030
	3.	Deferred Annuitants		
		a.	Number	23
		b.	Average annual vested benefit	7,303
	4.	Former Members Without Vested Rights		
		a.	Number	13
		b.	Average employee contributions	184
B.	BASIC FINANCIAL RESULTS			
	1.	Normal Cost		2,790,556
	2.	Accrued Liability		85,830,394
	3.	Valuation Assets		49,620,012
	4.	Portion of Accrued Liability Funded		57.81%
	5.	Unfunded Accrued Liability [2 - 3]		36,210,382
C.	DETERMINATION OF ANNUAL REQUIREMENT IN ACCORDANCE WITH CHAPTER 356 1/			
	1.	Normal Cost		2,790,556 (15.50)
	2.	Assumed Operating Expenses		32,290 (0.18)
	3.	Amortization of the Unfunded Accrued Liability by June 30, 2009		2,391,533 (13.28)
	4.	Total Chapter 356 Requirement [1 + 2 + 3]		5,214,379 (28.96)
D.	DETERMINATION OF CONTRIBUTION SUFFICIENCY 2/			
	1.	Actual Prescribed Contributions (Chapter 352B)		
		a.	Employee contributions	1,260,251 (7.00)
		b.	Employer "matching" contribution	2,160,430 (12.00)
		c.	Employer "additional" contribution	1,620,323 (9.00)
		d.	Total of (a) through (c)	5,041,004 (28.00)
	2.	Chapter 356 Requirements [Per Item C.4.]		5,214,379
	3.	Sufficiency [1.(d) ÷ 2]		96.7%
E.	DEPTH OF FUNDING - PLAN CONTINUATION BASIS			
	1.	Present Value of Accrued Benefits		
		a.	Active members	59,852,776
		b.	Deferred annuitants	1,573,116
		c.	Former members without vested rights	2,386
		d.	Survivors - Children	151,831
		e.	Disabled members	819,360
		f.	Participation in MPRI Fund	16,238,628
		g.	Balance of 1979 two year increase	60,450
		h.	Total present value of accrued benefits	78,698,547
	2.	Valuation Assets		49,620,012
	3.	Portion of Accrued Benefits Funded [2 ÷ 1(h)]		63.05%

1/ Parentheses indicate Chapter 356 contribution levels as a percentage of salary.

2/ Estimated July 1, 1980 - June 30, 1981 contributions on an accrual basis. Parentheses indicate statutory annual contribution levels as a percentage of salary, as set forth in Chapter 352B of the Minnesota Statutes.

Table 1(b)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Comparison of 1979 and 1980 Actuarial Valuation Results

	Prior Assumptions 1979		Prior Assumptions 1980	Revised Assumptions 1980
1. Active Members				
a. Number	770		782	782
b. Covered payroll	16,429,135		18,003,587	18,003,587
2. Retired Members/Beneficiaries				
a. Number	304		302	302
b. Average annual benefit payable	4,786		5,030	5,030
3. Deferred Annuitants				
a. Number	17		23	23
b. Average annual vested benefit	6,076		7,303	7,303
4. Former Members Without Vested Rights				
a. Number	12		13	13
b. Average employee contributions	142		184	184
5. Normal Cost 1/	2,398,654 (14.60)		2,601,518 (14.45)	2,790,556 (15.50)
6. Accrued Liability	68,679,194	2/	74,753,013	85,830,394
7. Valuation Assets	42,593,851	2/	49,620,012	49,620,012
8. Unfunded Accrued Liability	26,085,343		25,133,001	36,210,382
9. Accrued Liability Funding Ratio	62.02%		66.38%	57.81%
10. Chapter 356 Requirement (Normal Cost Plus Amortization by 2009). 3/	4,132,865 (25.16)		4,261,440 (23.67)	5,214,379 (28.96)

	Prior Assumptions 1979	Prior Assumptions 1980	Revised Assumptions 1980
11. Present Value of Accrued Benefits Plan Continuation Basis 2/	64,207,643	70,056,433	78,698,547
12. Depth of Funding [7 ÷ 11]	66.34%	70.83%	63.05%

1/ Parentheses indicate contribution levels as a percentage of salary.
2/ 1979 report disclosure adjusted to reflect revised accounting treatment of MPRI Fund participation.
3/ Including assumed operating expenses. Parentheses indicate contribution levels as a percentage of salary.

Table 2(a)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Accounting Balance Sheet as of June 30, 1980

A.	ASSETS		
1.	Cash		3,264.90
2.	Short Term Investments (at Cost)		5,812,667.23
3.	Accounts Receivable:		
	a. Accrued employee contributions	39,624.44	
	b. Accrued employer contributions	118,873.35	158,497.79
4.	Accrued Interest on Investments		456,801.65
5.	Dividends Declared and Payable, but Not Yet Received		49,832.94
6.	Investment in Debt Securities at Amortized Cost		14,868,890.11
7.	Investment in G.N.M.A.'s at Amortized Cost		1,146,562.15
8.	Investment in Equities at Cost 1/		13,156,990.31
9.	Deferred Yield Adjustment Account		128,909.40
10.	Participation in MPRI Fund 2/		16,238,628.00
11.	TOTAL ASSETS		52,021,044.48
B.	LIABILITIES AND RESERVES		
	Liabilities		
1.	Accounts Payable		
	a. Security purchases	345,986.02	
	b. Due MPRI Fund	2,021,873.98	
	c. State Employees Retirement Fund	32,290.01	2,400,150.01
2.	Suspense Item: Unredeemed 6 Year Old Warrants		882.60
3.	Total Liabilities		2,401,032.61
	Reserves		
1.	Participation in MPRI Fund 2/		16,238,628.00
2.	Balance of 1979 Two Year Increase		60,450.00
3.	Disability Benefit Reserve		819,360.00
4.	Survivor Benefit Reserve - Children		151,831.00
5.	Employee Contribution Reserve		9,432,723.59
6.	State Contribution Reserve		22,917,019.28
7.	Total Reserves (Valuation Assets) 3/		49,620,011.87
8.	TOTAL LIABILITIES AND RESERVES		52,021,044.48

1/ Market value as of June 30, 1980 is $14,231,542.

2/ Equal to greater of Net Assets ($15,599,784) of Required Reserves ($16,238,628) as of June 30, 1980, excluding January 1, 1981 benefit increases.

3/ Portion of assets to be applied as valuation assets towards providing benefits.

Table 2(b)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Actuarial Balance Sheet as of June 30, 1980

A. ASSETS			
1. Assets on Hand from Accounting Balance Sheet:			
	a. Reserves for MPRI Fund Benefits	16,238,628	
	b. All other assets	35,782,417	52,021,045
2. Present Value of Employees' Future Contributions			16,053,016
3. Present Value of State Future Contributions Applicable to:			
	a. Entry age normal cost	19,492,941	
	b. Unfunded accrued liability (Balance of "matching" contribution less .18% for operating expense)	7,613,731	
	c. Unfunded accrued liability (Portion to be funded by "additional" contribution)	28,596,651	55,703,323
4. TOTAL ASSETS			123,777,384
B. LIABILITIES			
1. Current Liabilities from Accounting Balance Sheet			2,401,033
2. Present Value of Earned and Earnable Benefits Payable to Presently Active Members:			
	a. Retirement benefits	89,883,828	
	b. Disability benefits	6,607,733	
	c. Refundments due to death or withdrawal	560,352	
	d. Surviving spouse benefits	2,863,862	
	e. Vested termination benefits	2,614,805	102,530,580
3. Present Value of Benefits for Deferred Annuitants:			
	a. Retirement benefits	1,565,661	
	b. Refundments due to death	7,455	1,573,116
4. Present Value of Refundments to Former Members Without Vested Rights			2,386
5. Present Value of Survivor Benefits - Children			151,831
6. Present Value of Disability Benefits			819,360
7. Participation in MPRI Fund			16,238,628
8. Balance of 1979 Two Year Increase			60,450
9. TOTAL LIABILITIES			123,777,384

Table 3(a)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Chapter 356 Balance Sheet as of June 30, 1980

ASSETS AND UNFUNDED ACCRUED LIABILITY

A. ASSETS 1/		
1. Cash		3,264.90
2. Short Term Investments (at Cost)		5,812,667.23
3. Accounts Receivable:		
a. Accrued employee contributions	39,624.44	
b. Accrued employer contributions	118,873.35	158,497.79
4. Accrued Interest on Investments		456,801.65
5. Dividends Declared and Payable, but Not Yet Received		49,832.94
6. Investment in Debt Securities at Amortized Cost		14,868,890.11
7. Investment in G.N.M.A.'s at Amortized Cost		1,146,562.15
8. Investment in Equities at Cost		13,156,990.31
9. Deferred Yield Adjustment Account		128,909.40
10. Participation in MPRI Fund 2/		16,238,628.00
11. Total Assets		52,021,044.48
B. UNFUNDED ACCRUED LIABILITY		
1. Unfunded Accrued Liability to be Funded by Portion of Employee Contributions and State "Matching" Contribution in Excess of Entry Age Normal Cost Contribution and Operating Expenses		7,613,731.00
2. Unfunded Accrued Liability to be Funded by States "Additional" Contribution		28,596,651.13
3. Total Unfunded Accrued Liability		36,210,382.13
4. TOTAL ASSETS AND UNFUNDED ACCRUED LIABILITY		88,231,426.61

CURRENT LIABILITIES AND RESERVES REQUIRED

C. LIABILITIES		
1. Accounts Payable:		
a. Security purchases	345,986.02	
b. Due MPRI Fund	2,021,873.98	
c. Due State Employees Retirement Fund	32,290.01	2,400,150.01
2. Suspense Item: Unredeemed 6 Year Old Warrants		882.60
3. Total Liabilities		2,401,032.61
D. RESERVES REQUIRED		
1. Total Reserves Required per Attached Table 3(b)		85,830,394.00
2. TOTAL CURRENT LIABILITIES AND RESERVES REQUIRED		88,231,426.61

1/ Accumulated contributions, without interest, of members not yet retired amounted to $9,432,723.59 as of June 30, 1980 (includes accrued but unpaid contributions).

2/ Equal to greater of Net Assets ($15,599,784) or Required Reserves ($16,238,628) as of June 30, 1980, excluding the January 1, 1981 benefit increases.

Table 3(b)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Determination of Accrued Liability and
Unfunded Accrued Liability as of June 30, 1980

	Present Value of Benefits	Present Value of Applicable Portion of Normal Cost Contribution	Accrued Liability Equals Reserves Required (1)-(2)
A. DETERMINATION OF ACCRUED LIABILITY			
1. Active Members			
a. Retirement benefits	89,883,828	27,259,912	62,623,916
b. Disability benefits	6,607,733	3,845,575	2,762,158
c. Refundments due to death or withdrawal	560,352	573,649	(13,297)
d. Survivor and childrens' benefits	2,863,862	1,912,164	951,698
e. Vested termination benefits	2,614,805	1,954,657	660,148
2. Deferred Annuitants	1,573,116	---	1,573,116
3. Former Members Without Vested Rights	2,386	---	2,386
4. Survivors - Children	151,831	---	151,831
5. Disabled Members	819,360	---	819,360
6. Participation in MPRI Fund	16,238,628	---	16,238,628
7. Balance of 1979 Two Year Increase	60,450	---	60,450
8. Total	121,376,351	35,545,957	85,830,394
B. DETERMINATION OF UNFUNDED ACCRUED LIABILITY			
1. Accrued Liability	---	---	85,830,394
2. Valuation Assets	---	---	49,620,012
3. Unfunded Accrued Liability [1 - 2]	---	---	36,210,382

Table 3(c)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Determination of MPRI Fund Participation and Reserves as of June 30, 1980 1/

1.	Unadjusted MPRI Fund Net Assets as of June 30, 1980	13,577,910
2.	Transfer to Highway Patrolmen's Fund from MPRI Fund for 1980 Mortality Gain	80,950
3.	Amount Transferable to MPRI Fund for Reserve Strengthening (Actuarial Assumption Revision) and Accrual Adjustment	2,102,824 2/
4.	Net Amount Transferable [3 - 2]	2,021,874
5.	Net Assets as of June 30, 1980 [1 + 4]	15,599,784
6.	Required Reserves as of June 30, 1980	16,238,628
7.	Required Reserves as of January 1, 1981	16,036,555

1/ Does not reflect impact of benefit increases to be effective January 1, 1981.

2/ $1,987,056 as of June 30, 1979; $2,102,824 as of June 30, 1980 (including adjustment for those retiring in year ending on June 30, 1980 and accrual adjustment of $175).

Table 3(d)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Allocation of MPRI Fund Reserves According to
Eligibility for January 1, 1981 Increase 1/

			Total Allocated to	
		Total	Members Eligible for Increase	Members Not Eligible for Increase
1.	Reserves as of June 30, 1980	16,238,628	14,755,613	1,483,015
2.	Reserves as of January 1, 1981	16,036,555	14,565,721	1,470,834
3.	Mortality Gain (Loss) During the Year Ended June 30, 1980	80,950	87,767	(6,817)

1/ Does not reflect impact of benefit increases to be effective on January 1, 1981.

Table 4

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Analysis of Income and Deductions From Income and Effect on the Unfunded Accrued Liability

A. INCOME		
1. From Employees		
a. Employee contributions	1,163,502.20	
b. Employee accrued contributions receivable	39,624.44	1,203,126.64
2. From Employers		
a. Employer contributions	1,994,322.42	
b. Employer additional contributions	1,494,863.91	
c. Employer accrued contributions receivable	118,873.35	3,608,059.68
3. From Investments		
a. Interest on securities	1,747,823.76	
b. Dividends on corporate stock	748,597.29	
c. Gain on sale of securities	592,634.29	3,089,055.34
4. From MPRI Fund Participation		
a. Participation in MPRI Fund Income		905,686.17
5. Other Revenues		
a. General Fund appropriation	117,690.00	
b. Miscellaneous	532.94	118,222.94
6. TOTAL INCOME		8,924,150.77
B. DEDUCTIONS FROM INCOME		
1. Benefits		
a. Service retirement annuities	1,397,074.19	
b. Disability retirement benefits	62,152.98	
c. Survivor benefits (children)	32,138.29	
d. Lump sum annuity payments	61,410.00	1,552,775.46
2. Refundments (Employee Contributions)		
a. Left service	54,020.17	
b. Erroneous deductions	222.44	54,242.61
3. Operating Expenses		
a. Administrative expenses 1/	32,290.01	
b. Interest expense on mortality adjustment	16,189.63	48,479.64
4. Increase in Total Reserves Required		
a. Reserves required 6/30/79	68,679,194.00 2/	
b. Reserves required 6/30/80	85,830,394.00	17,151,200.00
5. Decrease in MPRI Fund Deficit		242,492.00
6. TOTAL DEDUCTIONS FROM INCOME		19,049,189.71
7. EXCESS OF DEDUCTIONS FROM INCOME OVER INCOME		10,125,038.94
C. INCREASE IN UNFUNDED ACCRUED LIABILITY		
1. Unfunded Accrued Liability 6/30/79		26,085,342.59
2. Unfunded Accrued Liability 6/30/80		36,210,382.13
3. INCREASE IN UNFUNDED ACCRUED LIABILITY		10,125,039.54

1/ Represents .18% of covered payroll.
2/ Adjusted from prior year's report to include the deficit in the MAFB Fund.

Table 5

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Analysis of Change in the Unfunded Accrued Liability
During the Fiscal Year Ending June 30, 1980

1.	Unfunded Accrued Liability as of June 30, 1979			26,085,343
2.	Change Due to Current Rate of Funding and Interest Requirements			
	a.	1979 - 80 past service contribution	(2,379,783)	
	b.	5% Interest requirement	1,304,267	(1,075,516)
3.	Increase Due to Change in Actuarial Assumptions			
	a.	Increase in MPRI Fund requirements	2,102,649	
	b.	Other increases	8,974,732	11,077,381
4.	Change Due to Actuarial Gains (indicated by parentheses) or Losses (no parentheses) Because of Experience Deviations from Expected			
	a.	Salary increases	2,482,547	
	b.	Investment income	(1,029,179)	
	c.	MPRI Fund mortality gain	(80,950)	
	d.	Withdrawals, death, disability of active members (balancing item)	(1,249,244)	123,174
5.	Unfunded Accrued Liability as of June 30, 1980			36,210,382

Table 6(a)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Covered Highway Patrolmen Census Data as of June 30, 1980

	Number	Annual Payroll
Active at June 30, 1979	770	15,034,183
New Entrants 1/	43	
Total	813	
Less Separations from Active Service:		
Refund of Contributions 1/	9	113,119
Separation with a Vested Right to a Deferred Annuity	5	88,103
Separation with Neither Refund or Right to a Deferred Annuity	4	34,088
Disability	1	21,069
Service Retirement	11	256,581
Death, Spouse's Benefit Payable	1	23,805
Total Separations	31	
Active June 30, 1980	782	16,848,411

AVERAGE ENTRY AGE OF NEW EMPLOYEES

For the Fiscal Year Ending	Male	Female	Average of Total
6/30/77	28.1	27.4	28.0
6/30/78	26.1	26.3	26.1
6/30/79	28.2	26.5	28.1
6/30/80	25.7	22.5	25.5

Average age at entry in State service for all active employees at 6/30/80

Male	26.5
Female	24.1
Total	26.4

1/ Includes those who entered the plan and terminated during the period from July 1, 1979 to June 30, 1980.

Table 6(b)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Highway Patrolmen's Plan Annuitant Census Data as of June 30, 1980

		Number	Annual Annuity Benefit Payable
A.	SERVICE RETIREMENT ANNUITANTS		
	Receiving at June 30, 1979	178	1,129,256.76
	New	11	107,064.48
	Deaths	15	82,055.52
	Adjustments-Net Result	5	28,889.64
	Receiving at June 30, 1980	179	1,183,155.36
B.	DISABLED EMPLOYEES		
	Receiving at June 30, 1979	9	62,702.04
	New	1	8,549.52
	Deaths	0	0.00
	Disability Rescinded	1	8,505.96
	Adjustments-Net Result	(2)	(3,828.36)
	Receiving at June 30, 1980	9	58,917.24
C.	WIDOWS RECEIVING AN ANNUITY OR SURVIVOR BENEFIT		
	Beneficiaries Receiving an Optional or Reversionary Annuity		
	Receiving at June 30, 1979	85	226,310.88
	New	7	24,162.72
	Deaths	8	18,062.52
	Adjustments-Net Result	3	14,077.32
	Receiving at June 30, 1980	87	246,488.40

		Number	Annual Annuity Benefit Payable
D.	CHILDREN RECEIVING A SURVIVOR BENEFIT		
	Receiving at June 30, 1979	32	36,615.72
	New	0	0.00
	Reinstated	0	0.00
	No longer eligible	5	4,657.92
	Adjustments-Net Result	0	(1,319.52)
	Receiving at June 30, 1980	27	30,638.28
E.	DEFERRED ANNUITANTS		
	Deferred as of June 30, 1979	17	103,293.84
	New	6	64,677.84
	Began Receiving	0	0.00
	Deferred as of June 30, 1980	23	167,971.68

AVERAGE AGE AT RETIREMENT OF NEW SERVICE ANNUITANTS

Fiscal Year Ending	Average Retirement Age
6/30/77	58.2
6/30/78	57.8
6/30/79	59.0
6/30/80	57.6
All Existing Service Annuitants	58.7

Table 7

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Summary of Principal Plan Provisions as of June 30, 1980

1.	Coverage:	From first date of employment.
2.	Service Credit:	Service is credited from date of coverage. For State Police Officers hired after July 1, 1961 no service is credited after age 60.
3.	Contributions:	
	a. Employee:	7% of salary
	b. State of Minnesota:	21% of salary.
4.	Final Average Salary:	Monthly average for the highest 5 successive years of salary.
5.	Normal Retirement:	
	a. Eligibility:	Attainment of age 55 and completion of 10 years of service.
	b. Benefit Amount:	2-1/2% of Final Average Salary for each of the first 20 years of service plus 2% of Final Average Salary for each year of service thereafter.
6.	Form of Payment:	Life annuity with actuarially equivalent options also available.
7.	Disability Retirement:	
	a. Eligibility:	
	. In line of duty:	None.
	. Not in line of duty:	Five years of service and less than age 55.
	b. Benefit Amount:	
	. In line of duty:	50% of average monthly salary plus 2% for each year of service in excess of 20, offset by Workers' Compensation.
	. Not in line of duty:	2-1/2% of average monthly salary for each year up to and including 20 years plus 2% for each year in excess of 20; subject to a minimum of 25%.

Page 1 of 3

c. Death benefits: If a member dies while receiving a work related disability benefit, or a non-work related disability benefit after having completed 20 years of service, 20% of his Final Average Salary is payable to the surviving spouse.

8. Deferred Service Retirement:

a. Eligibility: Completion of 10 years of service.

b. Benefit Amount: Retirement benefits payable at normal retirement date are determined according to the normal retirement benefit formula based on the member's Final Average Salary and service at termination, such amount being subject to an increase for each year between termination and retirement of 5% for years prior to January 1, 1981 and 3% compounded annually thereafter.

9. Return of Contributions: If a member terminates before becoming eligible for any other benefits under the plan, his employee contributions are returned.

10. Surviving Spouse Death Benefit:

a. Eligibility: Death of member in service.

b. Benefit Amount: 20% of Final Average Salary.

11. Children's Death Benefits:

a. Eligibility: Death benefits are payable to children (below age 18, or 22 if a student) of members who die in active service.

b. Amount: 10% of Final Average Salary, plus $20 per month prorated equally to such children.

c. Maximum: Total benefit to all children may not exceed 40% of Final Average Salary.

12. Repayment of Contributions:

a. Eligible Members: Rehired members.

b. Repayment Provision: Such rehired member may repay all refundments made to him, including interest at 5% compounded annually. In such case, service previously credited during the prior period of membership is restored.

13. Combined Service Provisions:

a. Eligible Members: Members who have had coverage under two or more Minnesota Public Retirement Systems, with a total of at least 10 years of credited service.

b. Benefit Provisions: Benefits under both plans are based on the highest Final Average Salary including all years from both plans, and on the plans in effect on the member's last day in covered public employment.

14. Proportionate Annuity: Any member who terminates after attaining age 65 and completing at least one year of service is entitled to a proportionate retirement annuity based on his allowable service credit.

Table 8(a)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S PLAN

Summary of Actuarial Assumptions and Methods

1.	Mortality:	1971 Group Annuity Mortality Table with ages set back 8 years for females.
2.	Withdrawal:	Graded rates starting at .03 at age 20 and and decreasing uniformly to zero at age 50, as set forth in the Separation From Active Service Table.
3.	Disability:	The rates of disability were adapted from experience of the New York State Employees' Retirement System, as set forth in the Separation From Active Service Table.
4.	Expenses:	Prior year expenses are assumed to be applicable in the coming year.
5.	Interest Rate:	5% per annum.
6.	Salary Scale:	3-1/2% per annum.
7.	Assumed Retirement Age:	Age 57 for Highway Patrolmen and for State Police Officers hired after June 30, 1961. Age 62.5 for State Police Officers hired before July 1, 1961.
8.	Actuarial Cost Method:	Individual level dollar entry age cost method, modified to approximate a level percentage of future payroll normal cost.

Table 8(b)

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S PLAN

Probabilities of Separation From Active Service
(Number Separating at Each Age Per 10,000 Working at That Age)

Age	Death 1/ Males	Death 1/ Females	Withdrawal 2/	Disability 2/
20	5	4	300	4
21	5	4	290	4
22	5	4	280	5
23	6	4	270	5
24	6	4	260	6
25	6	5	250	6
26	7	5	240	6
27	7	5	230	7
28	7	5	220	7
29	8	5	210	8
30	8	5	200	8
31	9	6	190	9
32	9	6	180	9
33	10	6	170	10
34	10	7	160	10
35	11	7	150	11
36	12	7	140	12
37	13	8	130	13
38	14	8	120	15
39	15	9	110	16
40	16	9	100	18
41	18	10	90	20
42	20	10	80	22
43	23	11	70	24
44	26	12	60	26

Age	Death 1/ Males	Death 1/ Females	Withdrawal 2/	Disability 2/
45	29	13	50	29
46	33	14	40	32
47	38	15	30	36
48	42	16	20	41
49	47	18	10	46
50	53	20		50
51	59	23		57
52	65	26		64
53	71	29		72
54	78	33		80
55	85	38		88
56	93	42		98
57	100	47		108
58	109	53		118
59	119	59		129
60	131	65		141
61	144	71		154
62	159	78		167

1/ 1971 Group Annuity Mortality Table, with ages set back 8 years for females.

2/ Same withdrawal and disability rates pertain to males and females.

APPENDIX

MINNESOTA STATE RETIREMENT SYSTEM
HIGHWAY PATROLMEN'S FUND

Table References to Chapter 356 and Chapter 607 1/

Table Number	Description 2/	References
1(a)	Summary of Actuarial Valuation, Contribution Sufficiency, and Depth of Funding	356.215 Subd. 4(1) 356.215 Subd. 4(7)
1(b)	Comparison of 1979 and 1980 Actuarial Valuation Results	
2(a)	Accounting Balance Sheet	
2(b)	Actuarial Balance Sheet	
3(a)	Chapter 356 Balance Sheet	356.20 Subd. 4(1) 356.215 Subd. 4(2) 356.215 Subd. 4(6) 356.215 Subd. 4(8) 607 Article 14
3(b)	Determination of Accrued Liability and Unfunded Accrued Liability	
3(c) and 3(d)	Determination of MPRI Fund Participation and Reserves	
4	Analysis of Income and Deductions From Income and Effect on the Unfunded Accrued Liability	356.20 Subd. 4(2) 356.20 Subd. 4(3) 356.215 Subd. 4(11)

Table Number	Description 2/	References
5	Analysis of Change in the Unfunded Accrued Liability During the Fiscal Year Ending June 30, 1980	356.215 Subd. 4(9)
6(a)	Covered Employee Census Data	356.20 Subd. 4(4) 356.215 Subd. 4(10)
6(b)	General Annuitant Census Data	
7	Summary of Principal Plan Provisions	356.215 Subd. 4(12)
8(a)	Summary of Actuarial Assumptions and Methods	356.215 Subd. 4(4) 356.215 Subd. 4(5)
8(b)	Probabilities of Separation from Active Service	

1/ Chapter 356 of the Minnesota Statutes;
Chapter 607 of the 1980 Minnesota Laws.

2/ All as of June 30, 1980.

HIGHWAY PATROLMEN VALUATION AS OF JUNE 30, 1980

The purpose of this memorandum is to discuss valuation reports of the Minnesota Highway Patrol Officers Retirement Association which were submitted to the Commission in accordance with Minnesota Statutes, Chapter 356. The valuations were made using the entry age normal cost method and assuming 5% interest. Although a separate memorandum was prepared on the 1979 valuation, the Commission's schedule did not permit a review of it, and the results are incorporated into this memorandum. The 1978 report was prepared by John Teisberg and Thomas Kuhlman of Towers, Perrin, Forster and Crosby, and the later reports were prepared by Allan J. Grosh and Alan J. Schutz of the Wyatt Company.

This memorandum contains the following:

1. Statistical Valuation Data
2. Discussion of Valuation Results
3. Experience Study
4. Conclusion

1. Statistical and Valuation Data

Results of the valuation reports as of June 30, 1978, June 30, 1979 and June 30, 1980 are shown for comparative purposes. Figures are rounded where necessary for simplicity of presentation.

	1978	1979	1980
(1) Membership			
Active members	751	770	782
Deferred Annuitants	19	17	23
Retired Members	165	178	179
Disabled Members	8	9	9
Widows of Deceased Members	83	85	87
Children of Deceased Members	35	32	27
(2) Payroll and Annuities Payable (Thousands of Dollars)			
Total Payroll	$13,772	$16,429*	$18,004*
Annuities (annual)	1,298	1,455	1,519
(3) Valuation Balance Sheet (Thousands of Dollars)			
Accrued Liability	$59,643	$68,679	$85,830
Assets	37,265	42,594	49,620
Unfunded Accrued Liability (Deficit)	$22,378	$26,085	$36,210
Funding Ratio	62.5%	62.0%	57.8%

*The 1979 and 1980 payroll figures include July increases; the 1978 figures does not. Furthermore, only base salary was used in 1978 compared with total compensation in 1979 and 1980.

		1978	1979	1980
(4)	Normal Cost and Funding Costs			
		% of Payroll		
	Normal Cost	14.19%	14.60%	15.50%
	Administrative Expense	0.25	0.23	0.18
	Normal Cost plus Expense	14.44%	14.83%	15.68%
	Normal Cost plus Expense	14.44%	14.83%	15.68%
	Interest on Deficit	8.12	7.94	10.06
	Total (Minimum Contribution)	22.56%	22.77%	25.74%
	Normal Cost Plus Expense	14.44%	14.83%	15.68%
	Amortization by 2009	10.57	10.33	13.28
	Total (Required Contribution)	25.01%	25.16%	28.96%
(5)	Statutory Contributions			
	Employee	7.0%	7.0%	7.0%
	Employer Regular	12.0	12.0	12.0
	Employer Additional	9.0	9.0	9.0
	Total Contributions	28.0%	28.0%	28.0%
(6)	Investment Yield *	6.54%	6.91%	8.30%

* Rate of return on mean assets excluding Minnesota Adjustable Fixed Benefit Fund

2. Discussion of Valuation Results

The increases in the normal cost and deficit which occurred from 1978 to 1979 can be attributed to the use of total compensation in 1979 versus base salary in prior years. As a result of the 1975-1979 experience study, which will be reviewed in Section 3, a much more conservative mortality assumption was adopted for the 1980 valuation, and this accounts for the substantial increase in the normal cost and other funding figures.

One change in the amortization requirement does not show in the above display. Between 1978 and 1979, the target date for full funding was changed from 1997 to 2009. The 1978 amortization percentage based on the previous 1997 target date was 12.80% compared with 10.57% shown above.

The unfunded accrued liability increased from $22,377,838 to $26,085,343 from 1978 to 1979, an increase of $3,707,505; and then to $36,210,382 during the past year, an increase of $10,125,039. An approximate analysis of these changes follows:

	1978-79	1979-80
Increases:		
Change in Method	$ 5,469,555	$ 0
Change in Assumptions	0	11,077,381
Salary Scale Loss	1,028,889	2,482,547
Mortality Loss - Retireds	339,702	0
Total Increases	$6,838,146	$13,559,928
Decreases:		
Amortization Contribution	$1,136,469	$1,075,516
Excess Interest	647,812	436,545
Capital Gain (Net)	45,326	592,634
Mortality Gain - Retireds	0	80,950
Deviations in Mortality, Withdrawal & Disablement	1,301,034	1,249,244
Total Decreases	$3,130,641	$3,434,889
Net Increase	$3,707,505	$10,125,039

Although it is not an important item, we think that the 1979-80 Excess Interest figure should be in the $950,000 to $1,000,000 range which would mean either the reduction of another Decrease item or the increase of one of the Increase entries.

3. Experience Study

As required by statute, the 1979 report included a study of actual experience compared with that predicted by the previous actuarial assumptions.

The following chart compares the number of actual events during the 1975-79 period with the number expected according to the actuarial assumptions:

	Actual	Expected	Ratio
Withdrawals	34	29	117.2%
Disablements	9	11	81.8%
Mortality - Actives	7	18	38.9%
Mortality - Retireds	23	37	62.2%
Age Retirements	55	98	56.1%

The following shows the average age at retirement during each of the years in the study:

Year	1976	1977	1978	1979
Avg. Age	60.4	58.6	57.8	59.0

The greatest deviation has been in the number of deaths which shows that the mortality table employed previously did not fit the experience. The 1975 study indicated the same trend, but the deviations were not as large. Since the trend observed in 1975 has not only continued but also has deteriorated, the MSRS Actuary recommended a prompt change to a more realistic mortality assumption.

Although the results on withdrawals and disablements are favorable, the margins do not suggest a change. Furthermore, a continuation of the same experience leaves some conservativeness in the picture.

The ratio in the age retirements indicates that retirements are occurring later than assumed. For almost all of the active participants, the assumed average retirement age is 57.0, but for a dwindling number of State Police Officers, it is 62.5. The chart of the actual average ages at retirement confirms the conclusion that the assumptions are conservative. The Actuary recommends future monitoring of this item before any change is considered.

Since the assumed interest rate and the assumed salary increase rate are set by statute, the Actuary did not report on these items. The following chart shows figures which we found readily available:

Year	Interest Rate	Salary Increase
1976	5.19%	NA
1977	5.98	NA
1978	6.54	6.8%
1979	6.91	6.5% (16.4% when July 1979 increases included)

4. Conclusion

The valuation reports and experience study filed by the Highway Patrol comply with the various statutes.

The new assumptions produce required support which exceeds the actual (28.96% versus 28.0%). A continuation of this deficiency would extend the date of full funding by 5 to 6 years. Since this is the first report under the new assumptions, it is recommended that no action be considered until the effect of the change has been observed for another 2 or 3 years.