



TO:	Members of the Legislative Commission on Pensions and Retirement
FROM:	Ed Burek, Deputy Director
RE:	Proposal to Revise State Patrol Retirement Plan Actuarial Assumptions (Withdrawal Rates, Retirement Age Pattern, Mortality)

DATE: December 2, 2005

Introduction

During the 2005 Legislative Session, companion bills were introduced (S.F. 998 (Betzold-by request); H.F. 1754 (Smith)) which would increase the employee and employer contribution rates for the Minnesota State Retirement System (MSRS) State Patrol Retirement Plan. The increases would occur in two steps, with full phase-in occurring on July 1, 2006. The bills were heard by the Legislative Commission on Pensions and Retirement on May 12, 2005, but no final action was taken. The bills presumably stem from a State Patrol Retirement Plan experience study by the MSRS actuary. Based on that study, the MSRS actuary is recommending changes in a few demographic actuarial assumptions (termination or withdrawal rates, the retirement age pattern, and pre-retirement and post-retirement mortality). If given Commission approval, these changes will increase computed plan liabilities and normal cost.

The issue currently before the Commission is whether to approve these demographic actuarial assumption changes. Changing demographic assumptions does not require amending law. Only economic assumptions, such as those for pension fund rate of return and membership salary increase assumptions are specified in law, found in Minnesota Statutes, Section 356.215, with some additional provisions in Section 356.216 for local police and paid fire plans. However, revised demographic assumptions can not be used in an official plan actuarial valuation unless the changes are approved by the Commission (Section 356.215, Subdivision 18).

The actuarial valuation process is intended to provide policymakers and others with an accurate picture of the funded condition and financial requirements of a public pension plan, which is not possible if the actuarial valuation relies on obsolete or otherwise inadequate assumptions. Erroneous assumptions could serve only to mislead policy makers about the true financial status of a plan. If actuarial assumptions lead to an understatement of true plan costs, future problems are created because the Legislature will not be aware, in a timely manner, of a need to increase contributions to properly fund the plan. The longer the problem goes unrecognized, the more expensive it will be to address. On the other hand, if actuarial assumptions lead to overstatement of plan costs, more funding may flow to a plan than is needed, creating an unnecessary burden on taxpayers and leading to over funding and eventual pressure to provide a benefit improvement. Therefore, it is important that the Commission takes some care in reviewing experience studies to ensure that current assumptions are reasonable. If changes are recommended, the Commission needs to consider whether a change is sufficiently justified and whether the specific proposal is the best alternative, given the implications of the experience study results coupled with sound professional opinion.

The State Patrol Retirement Plan is a public safety plan with 834 active members and approximately 800 benefit recipients (service retirees and survivors, and disabilitants). Additional background on the plan is provided in Appendix A. A recent history of plan funding levels, contribution sufficiencies, plan benefit changes, and actuarial assumption changes since 1991 which impacted plan costs, is found in Appendix B.

The Commission no longer retains its own actuary due to a 2004 law change motivated in part by an appropriations reduction to the Commission. To provide the official valuations and other services, the seven largest retirement system administrators must jointly retain an actuary, with ratification of the choice by the Commission. The actuarial firm the directors selected as the joint actuary was the Segal Company.

A consequence of this 2004 law change is that the Commission is in a weakened position when it must consider actuarial matters. Thomas K. Custis of Milliman USA, the actuarial firm that the Commission had retained, was able to provide some review of the current assumption change proposal shortly before termination of the Commission's contract with that firm. In future reviews, the Commission will not have that guidance.

Overview Comments on the State Patrol Retirement Plan Experience Study: Problem of Sample Size

The 2004 State Patrol Retirement Plan experience study was provided by the MSRS actuary Mercer Human Resources Consulting (Mercer), rather than by the Segal Company, the jointly-retained actuary, or Milliman USA, the Commission's actuary at that time. The 2004 State Patrol Retirement Plan experience study covers the five-year period from 1998 to 2003. Unfortunately, because of the small size of this plan, at times it is difficult to draw conclusions with confidence. The data may be sufficient to suggest a general direction for change, to either strength or weaken an assumption, but the extent of the change needed seems based more on the actuary's professional judgment than upon the specific results from the plan's data. With only approximately 800 active members and a comparable number of retirees, there often are so few occurrences of the event under study that it is impossible to determine whether the results for given age cohorts are meaningful.

Recent Experience Study Results, Review by Actuaries

- a. <u>Summary</u>. Mercer commented on three problem areas, as follows:
 - 1. <u>Withdrawal</u>. Although the current assumptions already assume very low turnover compared to a general employee plan, actual turnover for members who had three or more years of service was less than half the predicted numbers. In contrast, those with less than three years of service had twice as many terminations as expected.
 - 2. <u>Retirement</u>. The assumed retirements at age 55, the normal retirement age for this fund, fit reasonably well, but early retirements are more than predicted for ages 50 to 53, and more retirements are occurring at age 56 than predicted.
 - 3. <u>Mortality</u>. Retired males and females are living longer than expected. The sample for active member mortality was too small to draw meaningful conclusions.

Based on those observations, Mercer developed specific recommendations to revise withdrawal assumptions by introducing use of select-and-ultimate rates, with different rates to apply during the first three years of service; to revise retirement age assumptions; and to strengthen the pre- and post-retirement mortality assumptions, including building in a slight cushion for future improvements in lifespan.

The proposed changes were reviewed in June 2004 by Thomas K. Custis, the consulting actuary for Milliman USA, which at that time was retained by the Commission. He supported the suggested changes in the withdrawal assumption and did not object to the revised retirement age assumptions, but he disagreed with the specific proposed retiree mortality assumptions. Although he agreed there was a need to revise mortality, he was concerned about the extent of the proposed change. Under the Mercer mortality proposal, State Patrol Retirement Plan retirees were assumed to live longer than retirees from the General State Employees Retirement Plan of the Minnesota State Retirement System (MSRS-General). The MSRS-General assumption was revised not long ago and should be a reasonable reflection of actual mortality for general employees. Mr. Custis suggested that the proposed Mercer mortality recommendations for the State Patrol Retirement Plan should be scaled back somewhat, to match the MSRS-General assumptions, and the MSRS actuary accepted that advice. The experience study results for withdrawal, retirement ages, and mortality, and the Mercer recommended assumptions are discussed in more detail below.

b. <u>Withdrawal</u>. In most Minnesota defined benefit plans, at least those covering general employees, individuals leaving covered employment well before retirement (referred to as termination, turnover, or withdrawal), plays a significant role in funding the plan. For those who leave with little covered service, their best option and perhaps their only option, is to take a refund. The refund consists of the employee contributions plus six percent interest. The remaining amount (all investment return on the employee contributions above six percent, the entire employer contribution amount, and all investment earnings on it) remain in the fund and is used to help finance benefits for those who remain. This turnover helps provide funding for the members of the plan who remain. Low turnover creates a need for higher contributions.

Before reviewing the State Patrol Retirement Plan withdrawal results from the experience study, it is useful to first quickly view results for a larger plan, to serve as a comparison for the State Patrol Retirement Plan results presented later. Below is information from the last MSRS-General experience study, covering 1996 through 2000 terminations.

Table 1 1996-2000 Terminations MSRS-General

	Males			Females			Total		
			Actual/			Actual/			Actual/
Age	Actual	Expected	Expected	Actual	Expected	Expected	Actual	Expected	Expected
<25	805	396.7	203%	1,371	719.9	190%	2,176	1,116.6	195%
25-29	1,432	621.7	230%	2,355	1,050.0	224%	3,787	1,671.7	227%
30-34	1,245	585.5	213%	2,132	968.0	220%	3,377	1,553.5	217%
35-39	1,096	620.6	177%	2,223	1,132.9	196%	3,319	1,753.4	189%
40-44	1,071	587.8	182%	2,071	1,047.4	198%	3,142	1,635.2	192%
45-49	900	542.2	166%	1,571	896.5	175%	2,471	1,438.7	172%
50-54	566	359.7	157%	883	590.8	149%	1,449	950.5	152%
55-59	119	94.8	126%	169	122.8	138%	228	217.6	132%
60-64	58	39.6	146%	91	60.2	151%	149	99.7	149%
65+	53	21.9	243%	45	24.5	183%	98	46.4	211%
ALL	7,345	3870.5	190%	12,911	6,612.9	195%	20,256	10,483.3	193%

Source: Table 5, "State Employees Retirement Fund Experience Study: 1996-2000", Milliman USA

MSRS-General had 48,000 active members in 2000. In a plan this large, a considerable number of individuals will be leaving plan-covered employment in any given time period, creating a considerable amount of data observations. For males and females combined, in each age group (except the oldest ages, at which individuals are more likely to be moving into retirement rather than terminating and moving into other employment) considerably more than a thousand terminations were expected given the actuarial assumptions that were in place, and often a few thousand individuals in each age group actually terminated. For any given age group, if the current assumption had predicted the actual turnover exactly, then the ratio of actual to expected terminations for that age group will be equal to one. The table shows that for each age group the ratio of actual to expected is consistently greater than one. There were considerable data on which to base results, and the results suggested a need to revise the termination assumptions. The large covered group made it possible to review male and female termination patterns separately, allowing consideration of whether termination rates differ by sex. The plan membership was also sufficiently large to allow study of individual years, rather than grouping the entire period (1996-2000) together, although that information is not presented here. When there are sufficient data, reviewing individual years allows one to study whether patterns are consistent throughout the period, or whether behavior is changing during the period.

Rather than having 48,000 active members, the State Patrol Retirement Plan has only 800, leading to considerably less stable and less meaningful actual/expected ratios. The termination data from the State Patrol Retirement Plan are shown in Table 2. Notice that the expected terminations by age in Table 1 generally were in the hundreds, and never less than a few dozen. In contrast, in Table 2, sometimes only a fraction of one termination is expected. The actuary chose to break the data in Table 2 into those with less than three years of service upon termination, and those with three or more years. While the MSRS-General study included four years of data, this one includes five, in an effort, generally not successful, to increase the number of observable events. Despite the additional year, rather than thousands of expected or actual terminations, in some age groups there were no terminations during the five year period, in other cases as few as one termination over that same period, and never more than seven. With samples this small, a single additional termination, due more to chance than to any predictable pattern, can considerably impact the ratio of actual to expected terminations.

The actuary concluded that terminations by those with less than three years service was considerably more than expected, while terminations by those with more than three years of service was considerable less than expected. Focusing on the last line of the table, for the "less than three year" group 8.02 terminations were expected given the current assumptions, but 17 terminations occurred, creating a ratio of actual to expected of 212 percent. Ratios of actual to expected for any given age group within this "less than three year" group, however, are not particularly meaningful due to the small size of the group. Only a fraction of the 800 member active group has less than three years of service, and a very small fraction of that "less than three years service" group terminated. When there are very few terminations, it can be impossible to obtain an actual/expected ratio of 100 percent, which normally would signify an excellent match between the assumed amount and the actual amount. For the 35 to 39 age group, a fraction of one termination (0.71 terminations) is expected, which is not possible in practice. If no one had terminated the ratio for that age group would have been zero. In actual experience, one individual terminated, creating a ratio of 140 percent. For the 45

to 49 age group, only 0.15 terminations are predicted. In actual experience, one individual terminated, resulting in an actual/expected ratio of 667 percent.

Although the ratio of actual to expected occurrences for the various age groups doe not provide much guidance for specifying a new trend line, the result for the "less than three year" group as a whole, specifically the 212 percent actual/expected ratio, does lend credence for some upward adjustment. The "three years and over" group displays more stability, although it remains the case that a single termination can have considerable sway in the results. For that group as a whole, the ratio of actual to expected is 42 percent, suggesting a need to decrease the termination assumptions for that group.

Table 2
1998-2003 Terminations
State Patrol Retirement Plan

	Less than 3 Years		3+ Years			Total			
			_						Actual/
	Actua	Expecte	Actual/	Actua		Actual/		Expecte	Expecte
Age	1	d	Expected	1	Expected	Expected	Actual	d	d
20-24	5	1.09	459%	0	1.07	0%	5	2.16	232%
25-29	5	3.70	135%	1	7.18	14%	6	10.88	55%
30-34	3	2.04	147%	4	9.76	41%	7	11.80	59%
35-39	1	0.71	140%	3	8.26	36%	4	8.98	45%
40-44	2	0.33	603%	5	9.30	54%	7	9.63	73%
45-49	1	0.15	667%	4	7.78	51%	5	7.93	63%
50+	0	0.00	N/A	1	0.00	N/A	1	0.00	N/A
ALL	17	8.02	212%	18	43.35	42%	35	51.38	68%

Source: "Experience Study, 1998-2003, Minnesota State Retirement System, State Patrol Retirement Plan", Mercer Human Resources Consulting, June 2004

The proposed turnover assumptions, shown in Table 3, would reduce assumed turnover for those with three or more years of service. Fewer turnovers will increase plan contribution rate requirements, although the impact from this change will not be significant in this plan because turnover is minimal, even under the existing assumptions. Retention definitely is not a problem in this plan.

The turnover assumption in the table for each age is expressed as the number of terminations in an assumed population of 10,000. Alternatively, these could be expressed as percentages. For example, at age 20 under the proposed assumptions it is expected that there will be 147 terminations during the year per 10,000 assumed employees or, alternatively, the assumed probability that a worker who is age 20 will terminate during the year is 1.47 percent. At age 25, there are expected to be 113 terminations per 10,000 assumed employees, or a 1.13 percent probability of terminating. At age 35, the probability of terminating is 0.47 percent. These probabilities decrease with age.

During the first three years of employment for any given employee, the probabilities reflected in the table will not be used. Instead, the assumed probability of terminating will be 2.5 percent in each of those first three years, or 250 terminations per 10,000 individuals.

Table 3 Turnover (Separation) Assumptions – Current and Proposed Rates State Patrol Retirement Plan

Δσ	Current Assumption Per 10,000 Occurrences		Current Assumptio n	Proposed As Per 10 Occurr	Proposed Assumption *	
e e	Male	Female	Percentages	Male	Female	Percentages
20	220	220	2.2%	147	147	1.47%
21	210	210	2.1%	140	140	1.40%
22	200	200	2.0%	133	133	1.33%
23	190	190	1.9%	127	127	1.27%
24	180	180	1.8%	120	120	1.20%
25	170	170	1.7%	113	113	1.13%
26	160	160	1.6%	107	107	1.07%
27	150	150	1.5%	100	100	1.00%
28	140	140	1.4%	93	93	.93%
29	130	130	1.3%	87	87	.87%
30	120	120	1.2%	80	80	.80%

	Current Assumption Per 10,000		Current Assumptio	Proposed Assumption* Per 10,000		Proposed Assumption
Ag	Occum	Tences	n	Occurr	ences	
e	Male	Female	Percentages	Male	Female	Percentages
31	110	110	1.1%	73	73	.73%
32	100	100	1.0%	67	67	.67%
33	90	90	.9%	60	60	.60%
34	80	80	.8%	53	53	.53%
35	70	70	.7%	47	47	.47%
36	60	60	.6%	40	40	.4%
37	60	60	.6%	40	40	.4%
38	60	60	.6%	40	40	.4%
39	60	60	.6%	40	40	.4%
40	60	60	.6%	40	40	.4%
41	60	60	.6%	40	40	.4%
42	60	60	.6%	40	40	.4%
43	60	60	.6%	40	40	.4%
44	60	60	.6%	40	40	.4%
45	60	60	.6%	40	40	.4%
46	60	60	.6%	40	40	.4%
47	60	60	.6%	40	40	.4%
48	60	60	.6%	40	40	.4%
49	30	30	.3%	20	20	.2%
50+	0	0	0	0	0	0

* Age-related rates apply after the three-year select period. During the first three years of employment, the rate is 250 per 10,000 occurrences or 2.5 percent.

c. <u>Retirement Age Assumptions</u>. The Mercer review of age at retirement is shown in Table 4. The study indicated that early retirements occurred with more frequency than predicted, although the actual number of early retirements is not great due to the small group size. More individuals retired at ages 50 through 53 than expected, and also at age 56.

Table 41998-2003 RetirementsState Patrol Retirement Plan

			1/	T . 1	Actual
			Actual/	Expected	Percentag
Age	Actual	Expected	Expected	Percentage	e
50	4	2.71	148%	2%	3%
51	12	2.68	448%	2%	9%
52	11	2.54	433%	2%	9%
53	9	2.53	356%	2%	7%
54	15	26.47	57%	20%	11%
55	85	84.09	101%	60%	61%
56	21	7.33	287%	20%	57%
57	1	3.36	30%	20%	6%
58	1	3.7	27%	20%	5%
59	3	3.07	98%	20%	20%
60	10	3.35	299%	20%	60%
61	4	1.3	308%	20%	62%
62	1	1.35	74%	50%	37%
63	1	0.79	127%	50%	64%
64	0	0.00	N/A	50%	N/A
65	0	0.00	N/A	100%	N/A
66	0	0.27	0%	100%	0%
67	0	1.00	0%	100%	0%
68	1	1.23	81%	100%	81%
69	0	0.00	N/A	100%	N/A
70+	0	0.00	N/A	100%	N/A
Total	179	147.77	121%		

Source: "Experience Study, 1998-2003, Minnesota State Retirement System, State Patrol Retirement Plan", Mercer Human Resources Consulting, June 2004

Table 5 displays the retirement assumption changes recommended by Mercer and MSRS, again in the form of occurrences per 10,000. Under the proposed assumptions, seven percent of employees age 50 will retire in that year, 60 percent of employees age 55 will retire in that year, and all employees who remain to age 60 are assumed to retire at age 60. The proposed changes will increase computed cost.

Early retirement in this plan is subsidized, and more individuals are expected to retire in the earliest eligible ages (age 50 through 53) than in the existing table. Also, it will be assumed that no employees remain after age 60. Minnesota Statutes, Section 43A.34, Subdivision 4, sets age 60 as the mandatory retirement age for members of the State Patrol Retirement Plan for individuals hired after July 1, 1973. Presumably, individuals shown in the prior table, Table 4, as retiring after age 60 reflect individuals hired before than date.

Table 5
Retirement Age Assumptions – Current and Proposed Rates
State Patrol Retirement Plan

	Current Assumption		Current	Proposed Assumption		Proposed
	Per 10,000	Occurrences	Assumption	Per 10,000	Occurrences	Assumption
Age	Male	Female	Percentages	Male	Female	Percentages
50	200	200	2.0%	700	700	7.0%
51	200	200	2.0%	700	700	7.0%
52	200	200	2.0%	700	700	7.0%
53	200	200	2.0%	700	700	7.0%
54	2,000	2,000	20.0%	700	700	7.0%
55	6,000	6,000	60.0%	6,000	6,000	60.0%
56	2,000	2,000	20.0%	4,000	4,000	40.0%
57	2,000	2,000	20.0%	2,000	2,000	20.0%
58	2,000	2,000	20.0%	2,000	2,000	20.0%
59	2,000	2,000	20.0%	2,000	2,000	20.0%
60	2,000	2,000	20.0%	10,000	10,000	100.0%
61	2,000	2,000	20.0%	0	0	0
62	5,000	5,000	50.0%	0	0	0
63	5,000	5,000	50.0%	0	0	0
64	5,000	5,000	50.0%	0	0	0
65	10,000	10,000	100.0%	0	0	0
66	0	0	0	0	0	0
67	0	0	0	0	0	0
68	0	0	0	0	0	0
69	0	0	0	0	0	0
70	0	0	0	0	0	0

d. <u>Mortality Assumptions</u>. Table 6 presents the results of Mercer's review of plan active member mortality. No active member females died during the 1998-2003 period. A few male active members died, but there were so few events that Mercer and Mr. Custis agreed that meaning conclusions can not be determined from the information.

Table 61998-2003 Active MortalityState Patrol Retirement Plan

		Male			Female	
			Actual/			Actual/
	Actua	Expecte	Expecte	Actua	Expecte	Expecte
Age	1	d	d	1	d	d
20-24	0	.02	0%	0	.00	N/A
25-29	0	.17	0%	0	.01	0%
30-34	1	.33	300%	0	.03	0%
35-39	1	.58	172%	0	.05	0%
40-44	1	1.01	99%	0	.06	0%
45-49	0	1.69	0%	0	.05	0%
50-54	1	2.60	38%	0	.04	0%
55-59	1	.90	112%	0	.02	0%
60-64	0	.13	0%	0	.00	N/A
65+	1	.04	2348%	0	.00	N/A
Total	6	7.47	80%	0	.26	0%

Source: "Experience Study, 1998-2003, Minnesota State Retirement System, State Patrol Retirement Plan", Mercer Human Resources Consulting, June 2004

Table 7 displays the retiree and survivor mortality for the 1998-2003 period. Again, due to the small size of this plan, there are few occurrences, creating some distorted actual/expected ratios. For females age 55-59, given the number of individuals in that age group and the assumed probability of death under the current assumptions, 0.21 deaths were expected. One death occurred, creating a 473 percent actual/expected ratio for that age group. In general, though, the overall actual/expected ratios for males, 66 percent, and females, 76 percent, suggest fewer deaths are occurring than

expected or, alternatively, that current assumptions understate the life expectancy of the covered groups. However, given the very small population involved, one must question whether the information is sufficient to conclude that mortality assumptions should be revised to assume longer life expectancies. And if longer life expectancies should be assumed, how much should the increase be?

		Male			Female	
Age	Actua	Expecte	Actual/ Expecte	Actua	Expecte	Actual/ Expecte
1150	<u> </u>	u	u			
20-24	2	0.00	N/A	0	0.00	N/A
25-29	0	0.00	N/A	1	0.00	N/A
30-34	0	0.00	N/A	1	0.00	N/A
35-39	0	0.00	N/A	1	0.00	N/A
40-44	0	0.00	N/A	0	0.01	0%
45-49	0	0.00	N/A	0	0.02	0%
50-54	0	0.63	0%	0	0.06	0%
55-59	2	5.08	39%	1	0.21	473%
60-64	3	6.96	43%	0	0.24	0%
65-69	6	9.89	61%	1	0.94	106%
70-74	14	19.33	72%	1	2.79	36%
75-79	18	24.29	74%	1	4.27	23%
80-84	14	22.36	63%	3	8.06	37%
85-89	7	10.85	65%	7	9.43	74%
90-94	3	5.01	60%	11	7.52	146%
95-99	0	0.32	0%	3	4.57	66%
100 +	0	0.00	N/A	1	1.19	0.40/
						84%
Total	69	104.72	66%	30	39.31	76%

Table 71998-2003 Retiree and Beneficiary MortalityState Patrol Retirement Plan

Source: "Experience Study, 1998-2003, Minnesota State Retirement System, State Patrol Retirement Plan", Mercer Human Resources Consulting, June 2004

Table 8 displays the information provided by MSRS for the current and proposed mortality changes. The mortality tables indicated below are named and are meaningful for actuaries but, for Commission purposes, displaying an actual set of probabilities of death or probabilities of survival might be more useful. The table refers to the 1983 Group Annuity Mortality Tables, which could be displayed as a table of probability of death at each given age. Males tend to have higher mortality than females, so male and female specific tables are used. Table 8 refers to mortality tables "set back," or "moved forward." This is best described by example. The current assumed mortality for pre-retirement males is the male 1983 Group Annuity Mortality Table set back one year, meaning that the mortality for males assumed at any given age is the mortality rate stated in the male 1983 Group Annuity Mortality Table for an individual one year younger (a pre-retirement male in the State Patrol Retirement Plan age 50 is assumed to have the mortality risk or rate stated for a male age 48, etc.).

The proposed assumptions would assume a considerably increased life-expectancy (or alternatively, a decreased risk of death at any given age). For instance, pre-retirement males would move from a one-year setback to a five-year setback. A male age 50 would no longer be assumed to have the mortality rate of a 49-year-old, instead, he would be assumed to have the same risk as a 45-year-old.

The proposed mortality changes, particularly the change in retiree mortality, are important cost drivers. Mercer indicates that the change in mortality assumptions will be the largest contributing factor in increasing plan liabilities. A change is proposed in the pre-retirement mortality table although Mr. Custis and the Mercer actuary both indicated that the sample size in the experience study was too small to be useful. The Commission may wish to ask David Bergstrom, the MSRS Executive Director, or a representative from Mercer, why and how this proposed pre-retirement mortality table was chosen.

Reviewing the Summary of Actuarial Assumptions and Methods found in the last MSRS-General actuarial report, it appears that the proposed State Patrol Retirement Plan pre-retirement and post-retirement mortality assumptions, for males and females, are identical to those currently in use for MSRS-General. Therefore, the proposed State Patrol Retirement Plan pre-retirement and post-retirement mortality assumptions reflect a conclusion by the actuaries that there is no basis for

assuming active or retired mortality differs between MSRS-General, and the State Patrol Retirement Plan public safety plan.

Table 8Mortality Assumptions - Current and Proposed TablesState Patrol Retirement Plan

	Current Assumption	Proposed Assumption
Pre- Retiremen t	Male: 1983 Group Annuity Mortality set back 1 year Female: 1983 Group Annuity Mortality	Male:1983 Group Annuity Mortality set back 5 yearsFemale:1983 Group Annuity Mortality set back 2years.
Post- Retiremen t	Male: 1983 Group Annuity Mortality set forward 2 years Female: 1983 Group Annuity Mortality set forward 2 years.	Male: 1983 Group Annuity Mortality set back 2 years Female: 1983 Group Annuity Mortality set back 1 years

e. <u>Combined Impact on Plan</u>. Table 9 presents information provided by Mercer and MSRS demonstrating the impact of each of the proposed changes on July 1, 2002, actuarial results. The mortality change has by far the largest impact, adding 5.5 percent of pay to the contribution requirements. The total impact from all of the assumption changes combined is 6.5 percent of pay, which would have increased the total required contributions in 2002 from 14.3 percent of pay to 20.8 percent of pay. The impact of these changes on the 2002 valuation is shown in Table 10.

Table 9Impact of Recommended Assumption Changes as of July 1, 2002State Patrol Retirement Plan

	Before Assumption	Impact of Assumption Changes				After Assumption
	Changes	Mortality	Withdrawal	Retirement	Total	Changes
Normal Cost	22.6%	1.1%	0.1%	0.5%	1.7%	24.3%
Supplemental Contribution	-8.5%	4.4%	0.0%	0.4%	4.8%	-3.7%
Expense Allowance	0.2%	0.0%	0.0%	0.0%	0.0%	0.2%
Total Required Contribution	14.3%	5.5%	0.1%	0.9%	6.5%	20.8%
Statutory Contributions	21.0%					21.0%
Sufficiency/(Deficiency)	6.7%					0.2%

Table 10Impact of Actuarial Changes on 2002 State Patrol Valuation

			Difference Between		Impact of Changes on	
		2002	2002 and Impact of Changes		2002 Valuation	
<u>Membership</u>						
Active Members		810				810
Service Retirees		577				577
Disabilitants		29				29
Survivors		156				156
Deferred Retirees		27				27
Nonvested Former						
Members		<u>11</u>				<u>11</u>
Total Membership		1,610				1,610
*						
Funded Status						
Accrued Liability		\$510,344,000		\$45,554,000		\$555,898,000
Current Assets		\$591,383,000				\$591,383,000
Unfunded Accrued Liability		(\$81,039,000)		\$45,554,000		(\$35,485,000)
Funding Ratio	115.88%		(9.50%)		106.38%	
Financing Requirements						
Covered Payroll		\$51,473,000				\$51,473,000
Benefits Payable		\$33,031,000				\$33,031,000
Normal Cost	22 62%	\$11.640.000	1 68%	\$858.030	24 30%	\$12 507 030
Administrative Expenses	0.20%	\$103,000	1.0070	<i>Φ</i> 050,757	0.20%	\$103,000
Normal Cost & Expense	$\frac{0.20\%}{22.82\%}$	\$11,752,000	1 68%	\$858.030	<u>0.20%</u> 24.50%	\$12,610,030
Normai Cost & Expense	22.0270	φ11,752,000	1.0070	<i>Ф</i> 050,757	24.3070	\$12,010,757
Normal Cost & Expense	22.82%	\$11,752,000	1.68%	\$858,939	24.50%	\$12,610,939
Amortization	<u>(8.48%)</u>	(\$4,365,000)	4.78%		<u>(3.70%)</u>	<u>(\$4,365,000)</u>
Total Requirements	14.34%	\$7,387,000	6.46%	\$858,939	20.80%	\$8,245,939
Employee Contributions	8.40%	\$4,324,000			8.40%	\$4,324,000
Employer Contributions	12.60%	\$6,486,000			12.60%	\$6,486,000
Employer Add'l Cont.	0.00%	\$0			0.00%	\$0
Direct State Funding	0.00%	\$0			0.00%	\$0
Other Govt. Funding	0.00%	\$0			0.00%	\$0

Administrative Assessment	0.00%	<u>\$0</u>			0.00%	<u>\$0</u>
Total Contributions	21.00%	\$10,810,000			21.00%	\$10,810,000
Total Requirements	14.34%	\$7,387,000	6.46%	\$858,939	20.80%	\$8,245,939
Total Contributions	21.00%	\$10,810,000			21.00%	\$10,810,000
Deficiency (Surplus)	(6.66%)	(\$3,423,000)	6.46%	\$858,939	(0.20%)	(\$2,564,061)

A problem for the Commission is that the actuary demonstrated the impact on the 2002 rather than 2003 actuarial valuation results, which seems odd given that the experience study included experience through 2003. The results will not hold exactly if applied against the 2003 or 2004 valuation.

Analysis and Discussion

Draft Resolution 05-1 implements the actuarial assumption changes for the State Patrol Retirement Plan as recommended by Mercer Human Resource Consulting, the MSRS actuarial consultant, after accepting changes suggested by Mr. Custis, who was the chief actuary for Milliman USA, the Commission's actuarial consultant prior to elimination of the Commission actuary role. The actuarial assumption change recommendations raise several pension and related public policy issues that the Commission may wish to consider, after taking testimony from interested parties, as follows:

- 1. <u>Conformity with Minnesota Statutes, Section 356.215, and the Commission's Standards for Actuarial Work</u>. The study does appear to be consistent with requirements in statutes and the Commission standards, assuming that the actuary who signed the experience study is regularly engaged in providing experience studies and actuarial reports. One of the signers is Stephen T. McElhaney, a Fellow in the Society of Actuaries (FSA). Minnesota Statutes, Section 356.215, Subdivision 1, defines an "approved actuary" for our purposes as a preparer regularly engaged in the provision of actuarial reports, experience studies, and related actuarial services *and* either having at least 15 years of service to major public employee retirement plans or having the credential "Fellow of the Society of Actuaries."
- 2. Choice of Actuaries to Provide Experience Study. The issue is choice of actuaries who performed the study, and whether to seek additional review of the study by another actuary. In 2003, the Commission gave MSRS permission to have a State Patrol Retirement Plan experience study performed. Milliman USA was the Commission actuary at that time, and under law that firm performed all official actuarial valuations and also provided periodic experience studies for MSRS-General, PERA-General, and TRA. Milliman USA had all the data needed for a State Patrol Retirement Plan experience study, since it gathered the information during the course of preparing the official annual actuarial valuations. The Commission may wish to inquire why MSRS did not use Milliman USA to provide the experience study. Although Mr. Custis of Milliman USA was able to provide a review of the Mercer study, at least of the recommendations that Mercer was proposing, having Milliman USA actually do the study might have further enhanced Commission member confidence in the study's recommendations.

A related question is whether the Commission should request that MSRS have the Segal Company review the Mercer study. The Segal Company is jointly retained by the larger pension fund administrations and provides actuarial valuation/experience study services previously provided by a Commission-retained actuary.

3. <u>Issue of Lack of Statistically Reliable Results</u>. An issue with the study is whether data are insufficient to reject current assumptions. Often there are not enough observations to provide meaningful results for the given age cohorts. The computed actual/expected ratios for given age groups can be changed drastically be a single random additional event. Recommendations to change assumptions seem based to an unusual degree upon professional judgment rather than the specific actual/expected ratios that were computed. The Commission may wish to have the plan actuary explain how decisions were made regarding whether a current assumption was sufficiently reliable, and how an alternative was chosen which hopefully is more accurate for the plan.

The most obvious specific example of an assumption change based on marginal amounts of data, but not the only example, is the data results and subsequent recommendations for active member mortality. Although Mr. Custis and the Mercer actuaries state that there are not enough occurrences to draw meaningful results, Mercer is recommending a change in mortality assumptions. For active member females, Table 6 indicated that under current assumptions a fraction of one death (0.26 deaths) was expected for the entire female active membership over the five-year period. In reality, partial deaths do not occur. In actual experience, no deaths occurred over the period, which is the most probable outcome under current assumption. If the observed experience is fully consistent with

the *current* assumption, why is the actuary recommending a change in the assumption? One death would also have seemed quite consistent with the current assumption (although that would have created an actual/expected ratio of 1 / 0.26 = 384 percent). There are a few more observations for males, but only six deaths in total over the five years covered by the study (or an average of 1.2 deaths per year), and never more than one in any age group.

Given the minimal number of observations, the recommendation requires an explanation. The Commission may wish to have Mercer or MSRS justify the proposed active and retired member mortality changes, as well the termination and retirement age assumptions, given the general lack of sufficient data.

- 4. <u>Match Between the Recent State Patrol Retirement Plan Experience and the Proposed Actuarial</u> <u>Assumption Changes</u>. The additional policy issue, related to the previous one, is whether the proposed assumptions will provide a better fit than the current ones. The instability in actual/expected assumption ratios, caused by the large impact that a single random event could have on any computed actual/expected ratio by age, makes it difficult to reject current assumptions with confidence. Similarly, it makes it difficult to have faith that the proposed assumptions are an improvement.
- 5. <u>Consideration of Experience of Similar Groups; Potential Need to Refine Actuarial Assumptions in</u> <u>Other Plans.</u> The issue is whether, in revising any mortality actuarial assumptions, a common set of assumptions should be used unless there is conclusive evidence that a given plan differs from that norm.

The discussions between Mr. Custis and Mercer involving this experience study led to a recommendation to use the same active and retired mortality assumptions in the State Patrol Retirement Plan as is currently in use for MSRS-General. Although not the subject of the current memo, a recent experience study on MSRS-Correctional also has led the actuaries to recommend use of the MSRS-General mortality assumptions in MSRS-Correctional. These recommended assumptions are consistent with the concept of using a common set of assumptions unless there is conclusive evidence to the contrary. While this concept makes considerable sense, this notion is generally not reflected across Minnesota public plans at the current time.

Table 11, below, displays the current pre-retirement and post-retirement mortality assumptions for several MSRS, PERA, and TRA plans. All of these plans use the 1983 Group Annuity Mortality Table, but with different amounts of "set back" or "set forward," as explained under Table 8. Table 11 includes the current and proposed assumptions for the State Patrol Retirement Plan and the Correctional State Employees Retirement Plan of the Minnesota State Retirement System (MSRS-Correctional). Though generally there is little basis for believing that mortality should differ across plans, particularly similar plans, the mortality assumptions used are rarely comparable. Only two comparable plan groups, the employees Retirement Plan of the Public Employees Retirement Association (PERA-Correctional), have the same mortality assumptions. Regarding the State Patrol Retirement Plan and PERA-P&F, the occupations of the covered membership are comparable, presumably the active duty risks are comparable, yet we currently assume the two plans have different mortality experience. Why?

The proposed State Patrol Retirement Plan mortality assumptions are identical to the current MSRS-General rates. If that is a justifiable assumption, then an implication is that active duty officers face no greater danger of death (including line-of-duty deaths) than general state employees, and that the stresses of the employment do not shorten life-expectancy during retirement. Commission staff also observes that, at the current time, active PERA-P&F members are assumed to have *lower* mortality than active MSRS-General members. A primary justification for having separate public safety plans is that the public safety plans cover the high-risk occupations. Do active duty police officers and firefighters really have less mortality risk than general state employees? Also, active PERA-General members are assumed to have noticeably lower mortality than active MSRS-General members? Is this justifiable? Finally, teachers are assumed to have much lower mortality while active members and during retirement than other employee groups. Is this truly the case? If a differential is justified, should the differential be as large as currently assumed?

Table 11 Mortality Assumptions Relative to 1983 Group Annuity Mortality Table, for Males and Females Various Public Pension Plans

		Pre-	Post-		
Pension Plan	Gender	Retirement	Retirement	Current Assumption	Proposed Assumption
MSRS-General	Males	\checkmark		-5	
	Females	\checkmark		-2	
	Males		\checkmark	-2	
	Females		\checkmark	-1	
MSRS-Correctional	Males	\checkmark		-1	-5
	Females	\checkmark		0	-2
	Males		\checkmark	+2	-2
	Females		\checkmark	+2	-1
State Patrol Plan	Males	\checkmark		-1	-5
	Females	\checkmark		0	-2
	Males		\checkmark	+2	-2
	Females		\checkmark	+2	-1
PERA-General	Males	\checkmark		-8	
	Females	\checkmark		-7	
	Males		\checkmark	-1	
	Females		\checkmark	-1	
PERA-Correctional	Males	\checkmark		-1	
	Females	\checkmark		0	
	Males		\checkmark	+2	
	Females		\checkmark	+2	
PERA-P&F	Males	\checkmark		-6	
	Females	\checkmark		-6	
	Males		\checkmark	-1	
	Females		\checkmark	-1	
TRA	Males	\checkmark		-12	
	Females	\checkmark		-10	
	Males		\checkmark	-6	
	Females		\checkmark	-3	

6. Cost Implications; Likely Actuarial Valuation Impact of the Proposed State Patrol Retirement Plan Actuarial Assumption Changes. The policy issue is the impact that the proposed State Patrol Retirement Plan assumption changes are likely to have on the funded condition and financing requirements of the retirement plan. The implications for required contributions were shown above in Table 9. Mortality changes, particularly those dealing with retired lives, had the largest impact of any change. The impact on the actuarial valuation was shown in Table 10. For some unknown reason, when this information was provided by MSRS during the 2005 Session, the impact was demonstrated using the 2002 actuarial valuation results. Given that the study included 2003 data and was completed in June 2004, it is odd that the impact was not demonstrated on a more recent actuarial valuation. Rather than try to update this information, which could introduce some error, the 2002 results are presented in this memo. Perhaps MSRS will have updated results provided by the actuary of your review.

Appendix A

Background Information on the State Patrol Retirement Plan

The State Patrol Retirement Plan was established in 1943, (Laws 1943, Chapter 637) and initially provided retirement coverage solely for state highway patrol troopers. Currently, the State Patrol Retirement Plan provides retirement coverage for four distinct groups of law enforcement officers, the State Patrol Division of the Department of Public Safety, the Bureau of Criminal Apprehension of the Department of Public Safety, the Enforcement (Game Wardens) Division of the Department of Natural Resources, and the Gambling Enforcement Division of the Department of Public Safety.

A separate retirement plan had been established for game wardens (the Game Wardens Retirement Plan) in 1955. In 1961, the State Police Retirement Plan was established for Bureau of Criminal Apprehension agents and officers and, when it was created, it absorbed the Game Wardens Retirement Plan. In 1969, the State Police Retirement Plan was in turn merged into the State Patrol Retirement Plan. In 1990, law enforcement officers in the Gambling Enforcement Division of the Department of Public Safety were added to the State Patrol Retirement Plan. With the exception of a small number of data processing personnel in the Bureau of Criminal Apprehension who were grandparented into the plan in 1987-1988, all members of the State Patrol Retirement Plan are peace officers licensed by the Peace Officers Standards and Training Board.

As a public safety pension plan, the State Patrol Retirement Plan pays larger retirement annuities, disability benefits, and survivor benefits than a general employee retirement plan and has an earlier normal retirement age for the retirement annuity. Because of these benefit plan differences, the plan has a greater actuarial cost and greater member and employer contributions than a general employee retirement plan. As law enforcement officers, members of the State Patrol Retirement Plan are not covered by Social Security under both state and federal law for their state law enforcement employment.

The retirement benefit provided for a member retiring at the plan's normal retirement age, age 55, is three percent of the high-five average salary for each year of service. A member who is age 55 or older with 30 years of service and has a high-five average salary of \$75,000 will receive an annuity of \$67,500. Members can retire as early as age 50 with only a slight reduction due to early retirement. The reduction is 1/10 of a percent for each month (1.2 percent per year) that the individual is under age 55. These early retirement annuities are subsidized. For disability determinations, the plan uses an occupational definition of disability, an inability to perform the specific job, rather than the more stringent definition used by general employee plans, which require an inability to perform any gainful employment. The disability benefit is generous. If the disability is duty-related, the benefit is computed just like a service pension except there is no reduction due to early receipt. The minimum service-related disability benefit is equivalent to a 20-year service pension. Non-duty-related disability benefits are computed the same way, except that the minimum benefit is equivalent to a 15-year pension, and the individual must have at least one year of service credit to be eligible.

The policy reason for having a more lucrative benefit program for public safety employee retirement plans is that public safety employment (police officer or firefighter service) is particularly hazardous, that it requires the maintenance of a particularly vigorous and robust workforce to meet the strenuous requirements of the employment position, and that the normally expected working career of a public safety employee will be significantly curtailed as a consequence of the hazards and strenuous requirements of that type of employment when compared to a general public employee.

Public employee pension plans are intended to assist the governmental personnel system by encouraging the recruitment of qualified and motivated new employees, the retention of able and valued existing employees, and the orderly and predictable out-transitioning of employees at the expected end or normal conclusion of their working career. For public safety employees, public safety employee retirement plans provide more lucrative benefits to assist in the recruitment and retention of new and existing personnel, but most clearly emphasize the out-transitioning function.

Appendix B

Background Information on the State Patrol Retirement Plan Funding Condition

Information on funding since 1991 is attached. The State Patrol Retirement Plan has been well funded, and the plan has had a contribution sufficiency in every year during this period. In 1991 the funding ratio was 89.3 percent. The plan's fund reached full funding in 1995, and has been more than fully funded ever since. The highest funding ratio occurred in 1999, when the funding ratio was 116 percent. The 2004 funding ratio is 109 percent, despite the impact of the same bad investment markets during the early 2000s as other pension funds. The plan has had a contribution sufficiency in every year. The highest sufficiency was 7.79 percent of pay in 1999. The most recent sufficiency was 2.85 percent of payroll.

The normal cost for this plan is high, since this is a public safety plan. The normal cost has displayed a fairly steady upward trend since 1991, with a normal cost of 19.02 percent in that year, increasing to 23.0 percent by 2004. Improved retirement benefits and accompanying changes in disability benefits, which are computed the same as the retirement benefits but with a minimum floor, contributed to that increase in normal cost, along with some impact due to actuarial assumption changes. The following notes some of the years where significant changes in plan benefits or assumptions occurred.

- In 1993, a cap which prohibited any service credit accrual after age 60 was removed from law, in an effort to avoid age discrimination concerns. The change had almost no discernable impact on normal cost.
- In 1995, a noticeable increase in normal cost occurred, increasing from 20.08 percent a year earlier to 21.21 percent. A cause of this change was an increase in the accrual rate used to compute the retirement benefits, from 2.5 percent of the high-five per year of service, to 2.65 percent. Corresponding increases were made in the disability benefit provisions. The employee contribution rate was increased to help cover the added cost.
- In 1997, several changes occurred in the plan. The accrual rate was increased again, from 2.65 percent to 3.0 percent. This noticeably increased benefits at the time of retirement, but a corresponding change in the operations of the State Board of Investment (SBI) Post Fund reduced expected post-retirement adjustments by one percent per year. Disability benefits were revised to correspond to the changes in the retirement annuity accrual rate. Subsidized early retirement benefits were created. Previously, individuals retiring early had to take an actuarial reduction. An actuarial reduction requires that benefits must be reduced so that they have the same lifetime value as if the individual had delayed receipt until normal retirement age. This was revised to require a reduction of only 0.2 percent per month for each month prior to normal retirement age, which is considerably less than an actuarial reduction. Given these changes, the normal cost increased from 21.33 in 1996 to 21.91 percent in 1997. Another change occurring in 1997 is that negative amortization was authorized for this plan, creating a negative 6.39 percent amortization factor, considerably reducing the total contribution requirements. The employee and employer contribution rates were reduced considerably. The contribution sufficiency was 5.33 percent of payroll, but this was the first year in which the total contributions, 21 percent of pay, were less than the normal cost plus expenses, which were 22.06 percent of pay.
- In 1999, the early retirement benefit was further subsidized, requiring only a 0.1 percent per month reduction, rather than 0.2 percent, for each month younger than age 55 at the time of retirement. The impact in normal cost seems negligible, from 22.5 percent in 1998 to 22.62 percent in 1998.
- In 2000 numerous changes occurred, although they seem to have had little impact on normal cost. Revisions were adopted in the male and female pre-retirement and post-retirement mortality tables, the male and female post-disability mortality table, retirement age, and separation (termination) assumptions. Statutory revisions included a revision in select-and-ultimate salary increase assumptions. The Legislature also revised the way the actuarial value of assets is computed, moving to a system based on market value and weighted past deviations between the expected value of assets assuming 8.5 percent investment returns, and the actual value of assets given the investment return that actually occurred. Another newly enacted provision extended the amortization date from 2020 to 2030.

Appendix C

Information on the Provision of Actuarial Services to the Legislature and the Various Retirement Plans

Beginning in 1955 (when the Commission was created as an interim commission) and ending in 2004, the Commission retained a consulting actuary to provide necessary actuarial consulting services. For the period 1955-1984, the consulting actuary retained by the Commission functioned chiefly as the actuarial advisor to the Commission, helping the Commission to review work products provided by the pension-plan-retained actuaries. The Commission-retained actuary assisted the Commission in reviewing actuarial valuations, experience studies, and benefit cost estimates provided by pension fund actuaries, and by recommending improvements in regulation and actuarial procedures.

This changed in 1984, when the Commission-retained actuary became the primary actuary. This change was an apparent reaction to various irreconcilable actuarial cost estimates for the "Rule of 85" temporary normal retirement provision proposal supplied by the various actuaries of the various pension plans. Under Minnesota Statutes 1984, Section 3.85, Subdivision 11, the Commission was required to retain a consulting actuarial firm to provide annual actuarial valuations, periodic experience study and periodic benefit increase costing services related to the various statewide and major Minnesota public pension plans. The Commission was also required to establish standards for the preparation of any required actuarial work. The various public pension plans were permitted, but not required, to retain a consulting actuary to review the work of the Commission-retained actuary and to provide the pension plan with any other actuarial services the plan administration desired.

Following the 1984 enactment of the 1984 law, the Commission held a competitive bidding process to select its consulting actuarial firm. A five-member (three House members, two Senate members) Commission subcommittee, chaired by Representative John Sarna, undertook the process. Four finalists were selected to make in-person presentations to the Commission subcommittee, which occurred on November 8, 9 and 13, 1984. The four finalists were Milliman & Robertson, Inc.; Peat, Marwick, Mitchell & Co.; Towers, Perrin, Forster & Crosby; and The Wyatt Company. The Commission subcommittee recommended The Wyatt Company, a recommendation which the Commission accepted on a unanimous vote. Through contract rebidding and contract extensions, the Wyatt Company remained the Commission actuary until 1990. In that year, Jim Hacking, the Executive Director of the Public Employees Retirement Association (PERA), raised questions about the level of the fees the Wyatt Company charged for its services, and Representative Wayne Simoneau requested that the Legislative Audit Commission audit the Wyatt Company's contract with the Commission. In 1990 the Commission, chosen from four finalists, one of which was the Wyatt Company. The contract was rebid a few times during the late 1990s, with Milliman & Robertson, Inc. continuing to be retained as the Commission actuary.

In 2002, an issue arose between Milliman USA (the renamed Milliman & Robertson, Inc.) and the Commission over liability limitations, third-party reliance on actuarial work, and mandatory dispute arbitration. The issue limited the 2002 contract with Milliman USA to the two years that Milliman USA was willing to commit to without a positive resolution of the liability limitation and related issues. In 2004, due to the issues that arose in 2002 and due to an appropriation reduction to the Commission, Laws 2004, Chapter 223, was enacted. Under that 2004 change, the Commission no longer retains an actuary. To provide the official valuations and other services, the seven largest retirement system administrators must jointly retain an actuary, with ratification of the choice by the Commission. The actuarial firm the directors selected as the joint actuary was the Segal Company.

A consequence of this change is that the Commission is in a weakened position when it must consider actuarial matters. Thomas K. Custis, Milliman USA, was able to provide some review of the current assumption change proposal shortly before termination of the Commission's contract with that firm. In the future, the Commission will no longer have its own actuary to provide any guidance.