REPORT ON THE RESULTS OF THE
EXPERIENCE STUDY OF THE
STATE TEACHERS' RETIREMENT
SYSTEM OF VERMONT

COVERING THE PERIOD JULY 1, 2005 THROUGH JUNE 30, 2010

March 23, 2011

Board of Trustees
State Teachers' Retirement System of Vermont
Montpelier, Vermont 05602

Dear Board Members:

Section 1942, subsection (m), of Title 16, Chapter 55, Vermont Statutes Annotated, provides in part that at least once in each five-year period, the actuary is to make a study of the System's recent experience to assist in setting assumptions. In accordance with this provision, the results of our experience study covering the five-year period from July 1,2005, through June 30, 2010, are described in this report, along with our recommendations for certain modifications in the present assumptions. We have also included a brief section discussing the financial impact of the recommended changes.

The Table of Contents, which immediately follows, outlines the information contained in this report.

This study was prepared under the supervision of David L. Driscoll, with analysis of the rate-of-return and inflation assumptions performed under the supervision of Kai Petersen. We are Fellows of the Society of Actuaries and Members of the American Academy of Actuaries. We meet the Qualification Standards of the Academy to render the actuarial opinions contained herein, and we are available to answer questions concerning them. Additionally, Mr. Petersen is a Chartered Financial Analyst (CFA) Charter holder and has performed the analyses in accordance with the professional standards of the CFA Institute.

Respectfully submitted,

David L. Driscoll, F.S.A., E.A.   Kai Petersen, F.S.A., C.F.A.
Principal and Consulting Actuary   Principal, National Asset Liability Management Group Leader

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THE STATE TEACHERS' RETIREMENT SYSTEM OF VERMONT

REPORT ON THE RESULTS OF AN INVESTIGATION
OF THE ACTUARIAL EXPERIENCE OF THE SYSTEM, 2005 - 2010.

I.   <u>INTRODUCTION</u>

In order to accumulate funds to pay retirement benefits on a reasonable and relatively stable basis, the actuary prepares annual valuations of the System's assets and liabilities to measure the funded status and to ensure that funding is progressing at a rate that is adequate to meet the System's obligations.

The primary purposes of funding are to equitably allocate costs between generations of taxpayers and to provide security to members, who view the funds set aside as assurance that their benefits will be paid.

While the ultimate cost of the System is not determinable until all benefits are paid and expenses provided for, each actuarial valuation attempts to estimate costs based on assumptions selected to predict, as accurately as possible, future experience in order to produce stable contribution rates.

Overly conservative or aggressive assumptions will result in actuarial gains or losses each year. When translated into contributions, this will result in decreasing or increasing contribution rates and an inequitable allocation of costs.

The major actuarial assumptions are:

      (a)   Active service demographic assumptions,

      (b)   Compensation increase assumptions,

      (c)   Post-retirement mortality rates,

      (d)   Interest rate, and

      (e)   Cost-of-living adjustment rates.

Before presenting our analysis of the System's experience and discussion of the proposed assumptions, it is important to outline considerations that should govern the selection of actuarial assumptions. The recommendations of the American Academy of Actuaries are as follows:

(i)   The actuarial assumptions selected should reflect the actuary's best judgement of future events. They should take into account actual experience to the extent possible, but they should also reflect long-term future trends rather than give undue weight to recent past experience.

(ii)   The actuary should consider the impact of inflation in selecting the actuarial assumptions to be used.

(iii)   The actuary should give consideration to the reasonableness of each actuarial assumption independently as well as the combined impact of all the assumptions.

(iv)   The actuary should give careful attention to changes in plan design that may significantly alter expected future experience. For example, a liberalization of early retirement benefits may make advisable a revision in the retirement assumption.

(v)   The actuary, in choosing assumptions, should take into account general or specific information available from other sources, including the plan sponsor, plan administrator, investment managers, accountants, economists, etc.

The purpose of this Report is to provide the information necessary to decide on the appropriate assumptions to be used in future valuations. It should be noted that these decisions cannot be made "in a vacuum" but must reflect the present and expected situation within the State and the System.

The balance of this Report deals in detail with the various assumptions. In each area we have made recommendations as to what we believe are appropriate assumptions. These recommendations reflect our "best estimate" of the likely future experience based on:

(a)   the recent past experience,

(b)   the general economic views prevailing at this time, and

(c)   anticipated trends.

II.   ACTIVE SERVICE DEMOGRAPHIC ASSUMPTIONS

The active service demographic assumptions include rates of:

(a)   Termination,

(b)   Disability,

(c)   Death before retirement, and

(d)   Retirement.

Our review of active service demographic assumptions is based on the actuarial valuation data for Group C members of the System, since Group A is closed to new members and relatively few active Group A members remain. The basis for analysis of the System's experience is a comparison of the actual number of separations from service under each category with those expected based on the assumptions currently in use.

The "expected" values are calculated by applying the various rates or probabilities to the individuals exposed to each respective event. For example, active members not yet eligible for early retirement would be exposed to the probabilities of withdrawal, death and disability. A member eligible for early retirement would be exposed to disability, death and early retirement. A member who is who is eligible for normal retirement would be exposed to disability, death and normal retirement.

Numerical summaries of the System's experience from July 1, 2005, through June 30, 2010, are presented in Appendix I. The tables show the ratios of the actual experience of the System as compared to that anticipated by the present actuarial assumptions. The results are shown separately by assumption and, where appropriate, by gender.

The ratios of actual to expected experience indicate the extent of deviation from the assumptions. A ratio of 1.0 would mean the experience has been exactly as anticipated.

As an aid to the Trustees in analyzing these results, we have also prepared a series of graphs, which present the statistical data summarized in Appendix I in visual form. Our comments will refer to these graphs, which immediately follow each of the following subsections.

Termination

The graphs that follow present the withdrawal and vesting experience separately for male and female teachers.

The overall experience of the last five years among Group C indicates that actual members leave before service retirement were close to the expected members who leave before service retirement The gaps between are not substantially different. We therefore recommend no change to the current rates.

Active Service Experience - Terminations
July 1, 2005 through June 30, 2010

Men Teachers

Women Teachers
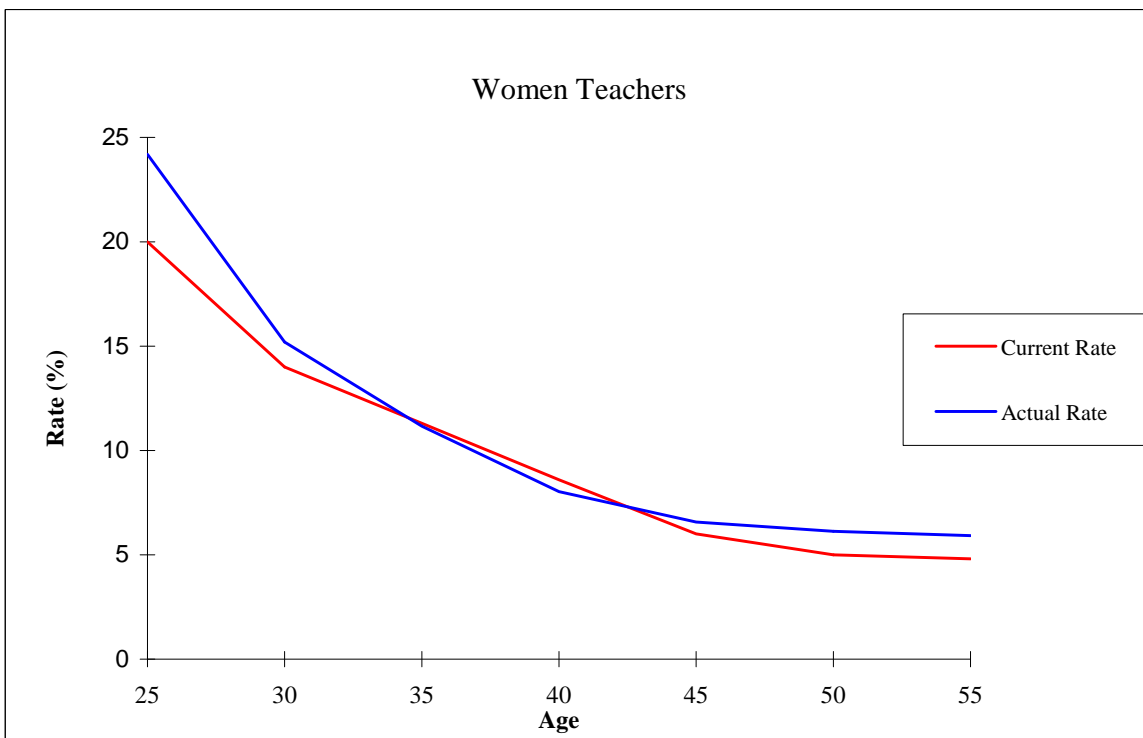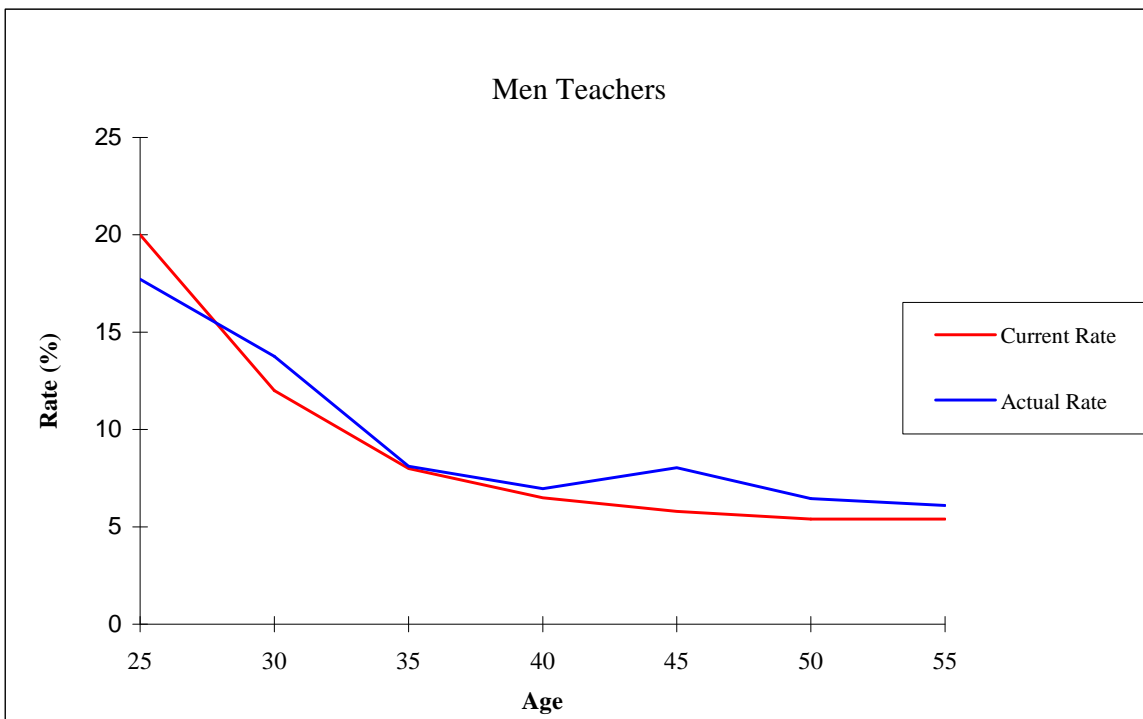
Disability

The graphs that follow show the incidence of disability among employee. The financial impact on the funding of the System of this experience is relatively minor. Upon examination, the current assumed rates of disability produced expected disabilities that exceeded significantly the actual number for participants over age 45. Therefore we recommend reducing the assumed disability rates for at those ages. The statistics are summarized in Table 2 of Appendix I. The proposed rates are set forth in detail in Appendix II.

Death

Like disabilities, deaths among active members are a relatively small proportion of the overall incidence of departure from the active population. The financial impact on the funding of the System of this experience is relatively minor. Upon examination, the overall active service mortality experience indicates that the current assumption is forecasting slightly larger numbers of deaths among male active participants than are actually observed; and forecasting slightly lower numbers of deaths among female active participants than are actually observed. The present assumed rates of mortality produce expected numbers of in-service deaths that do not differ substantially from the actual numbers. We therefore recommend no changes be made to the current rates.

Active Service Experience - Disability Retirements
July 1, 2005 through June 30, 2010

Men Teachers

Women Teachers

Active Service Experience - Deaths
July 1, 2005 through June 30, 2010

Men Teachers

Women Teachers
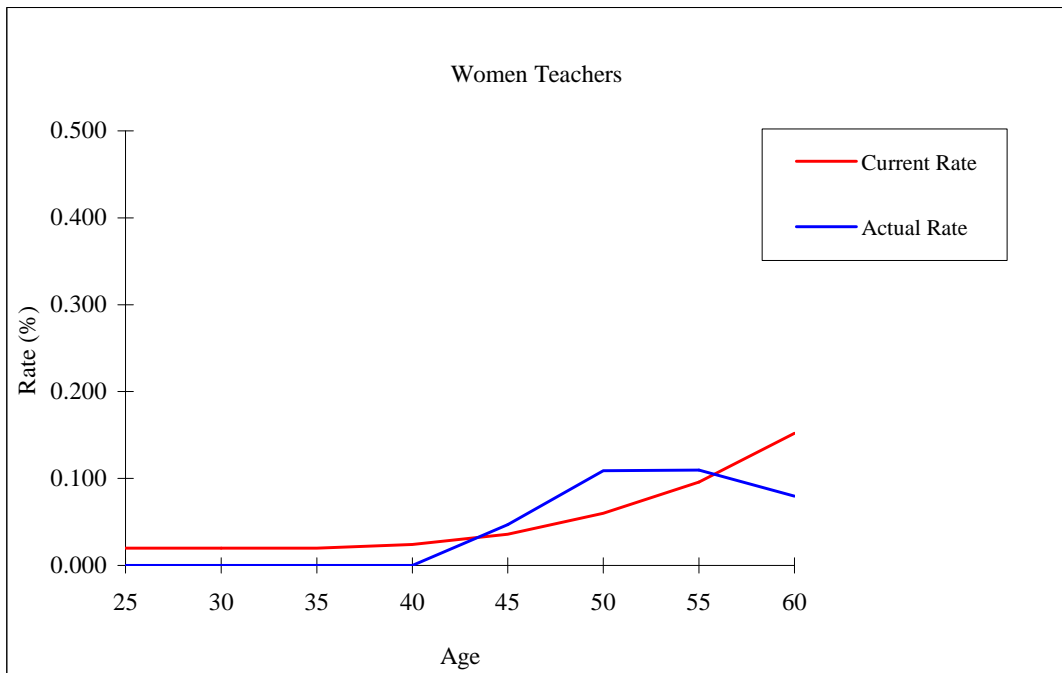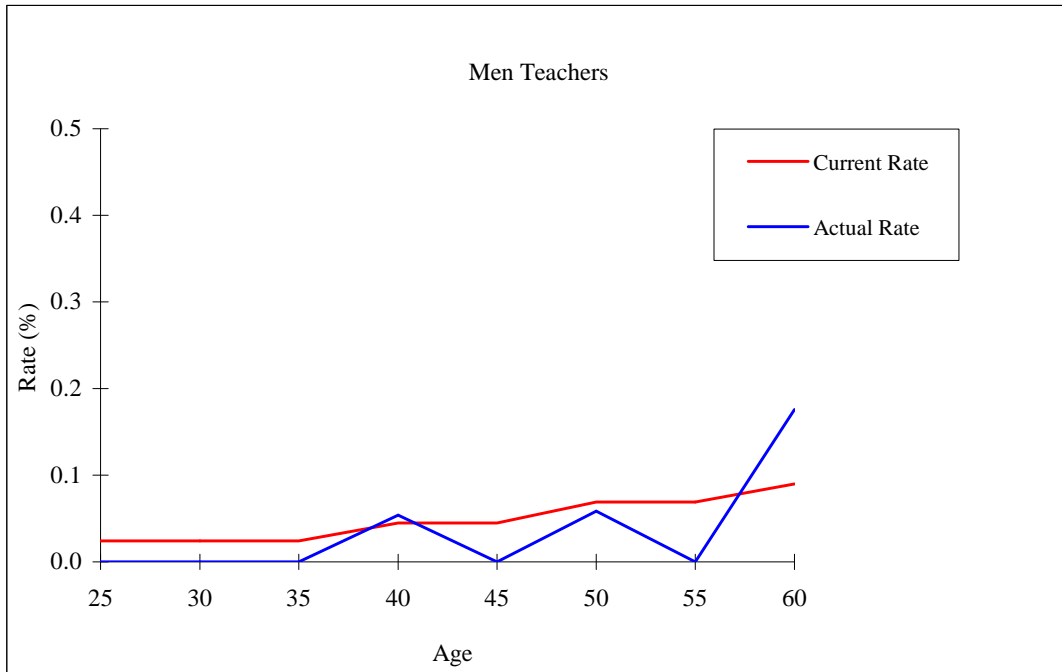
Reduced Early Retirement

The experience with regard to reduced early retirement is shown on the following graphs. The overall actual number of early retirements among both males and females are slightly greater than the expected number of early retirements. As the gap between the expected and actual numbers of such retirements is relatively small, we do not recommend any change in the assumed rates at this time.

Service Retirement

The service retirement experience graphs on page 12 are based on the current assumption for "grandfathered" Group C members, as statistics on retirement experience among non-grandfathered members have not yet been compiled. Overall, the observed active service retirement experience among "grandfathered" members was not substantially different from that expected. The present assumed rates of service retirement produce expected retirements that are close to the actual numbers. Hence, we do not recommend any change in the assumed rates of service retirements at this time.

Active Service Experience - Reduced Early
July 1, 2005 through June 30, 2010

Men Teachers

Women Teachers
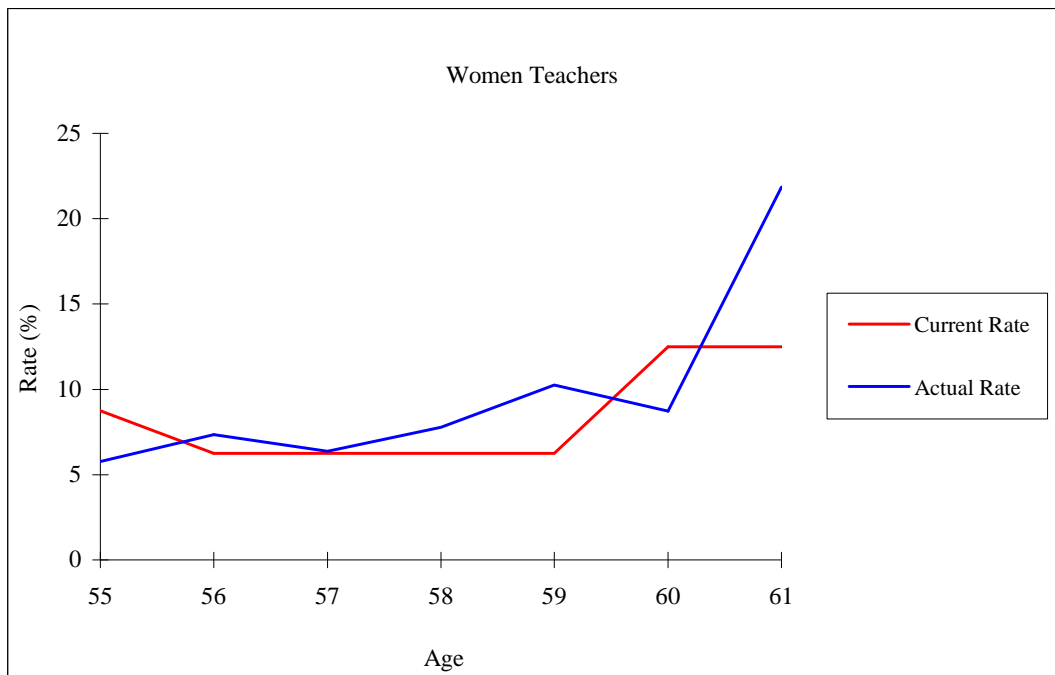
Active Service Experience - Service Retirements
July 1, 2005 through June 30, 2010
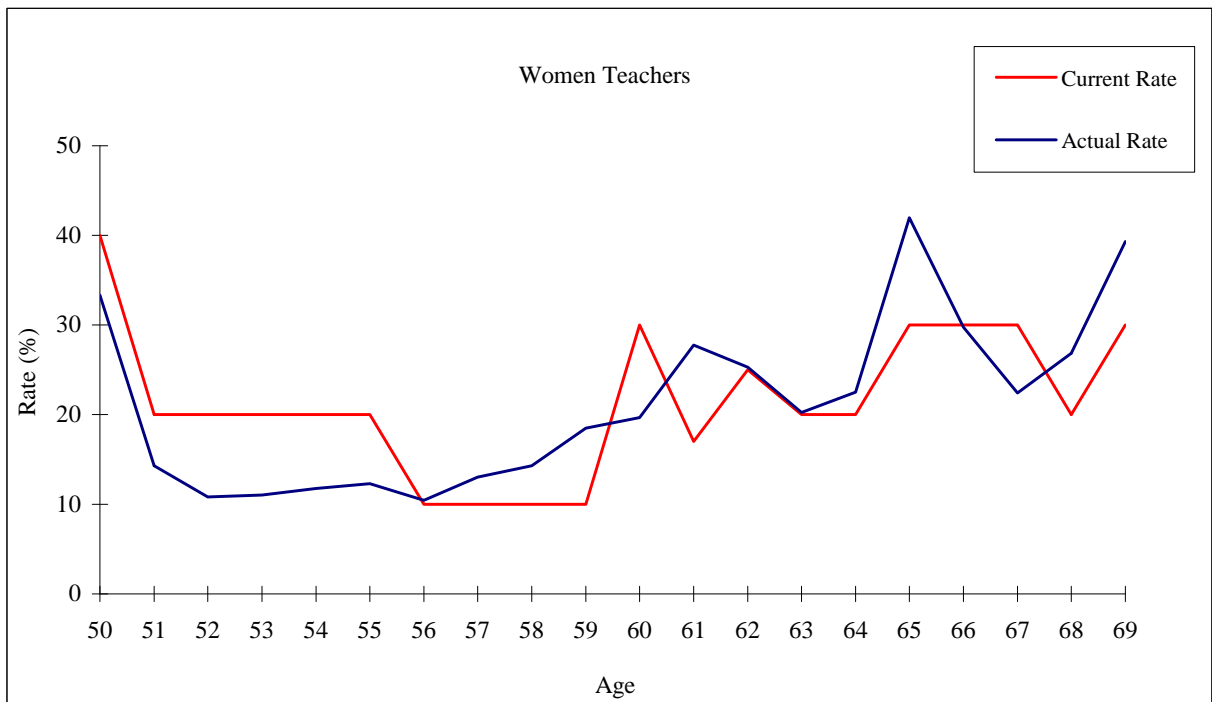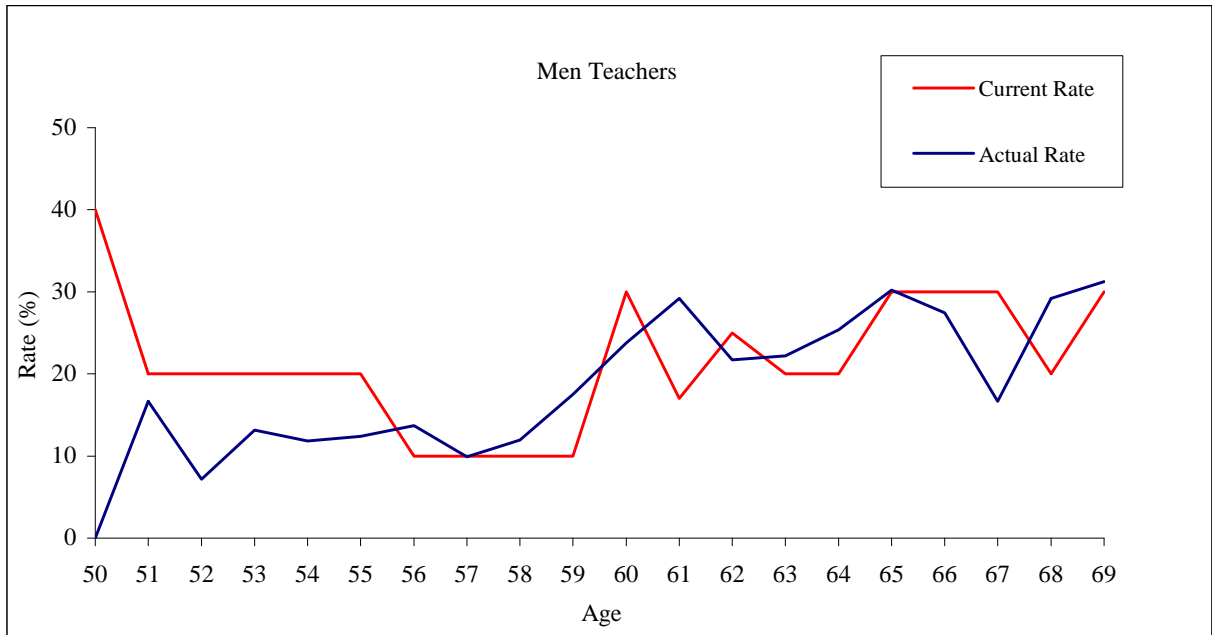
III.   POST-RETIREMENT MORTALITY RATES

A review of the statistics with regard to post-retirement mortality for both Group A and C retired members, which are summarized in Table 7 of Appendix I, reveals that observed mortality among retired female teachers were higher than expected while that for male retired teachers were lower than expected.   Based upon a closer examination of this experience, and in consideration of expected mortality among future retirees, we recommend the following changes to the post-retirement mortality tables:

For service retirees, terminated vested members and beneficiaries: Change from the 1995 Buck Mortality Tables with a one-year setback for both males and females to the 1995 Buck Mortality Tables with a three-year setback for males and a one-year setback for females.

For disabled members: Change from the unprojected RP-2000 Disabled Life Table to the RP-2000 Disabled Life Table with projection to 2016 using Scale AA.

IV.   MEMBERS IN INACTIVE STATUS

Since 2008, liabilities for members in inactive status have been maintained at 300% of their accumulated contributions with interest.   An examination of the liability ultimately created by participants who moved from inactive status to some other status leads us to recommend that the percentage of contributions with interest used to estimate the liability for these participants be raised from 300% to 350%.

V.   ECONOMIC ASSUMPTIONS

Economic assumptions include rates of compensation increase, investment income and post-retirement adjustment in benefits on account of inflation. These assumptions have been analyzed by their components; i.e., the inflation level reflected in each assumption and the merit-promotion component of the compensation increase rates or the real rate of return component of the total return rate.

Inflation / Cost-of-Living

The System provides annual cost-of-living adjustments (COLAs). For Group A, the annual adjustment is equal to the increase in the CPI-U, but not more than 5%. For Group C, the adjustment equals one-half the increase in the CPI-U, again limited to 5%.

With regard to the inflation assumption, the U.S. Consumer Price Index indicates that annual rates of inflation have been as follows since 2006:

Fiscal Year End	Increase*
2006	4.3%
2007	2.7%
2008	5.0%
2009	-1.4%
2010	1.1%

*Based on CPI-U unadjusted 12 month ended June 30 for All items

With regard to the inflation assumption for COLAs, the U.S. Consumer Price Index (CPI-U) indicates that the inflation rate has averaged slightly above 2.3% annually since July 1, 2006.

Other economic data presently available (e.g., yields on inflation-indexed bonds, surveys of forecasts) suggest that the financial markets presently anticipate a long-term average rate of inflation of 2.5% to 3.0%. The Survey of Professional Forecasters published by the Philadelphia Federal Reserve showed an uptick in inflation forecasts of about 0.1% in the survey data released in March 2011. Current economic assumptions used in the valuation of the System are based on an inflation rate of approximately 3.0% per year.

Currently, we assume a 3% annual adjustment in pensions for Group A members and a 1.5% annual adjustment in pensions for Group C members. We recommend that these assumptions be retained.

Merit-Promotion Salary Increases

The graph on next page indicates that the overall active service salary increases over the five-year period covered by the study have been lower than those expected. Based on the actual experience and anticipated future salary increases, we recommend lowering of the assumed rates of salary increase. The statistics are summarized in Table 6 of Appendix I. The proposed new rates are set forth in detail in Appendix II.

Active Service Experience - Salary Experience
July 1, 2005 through June 30, 2010

Men and Women Teachers
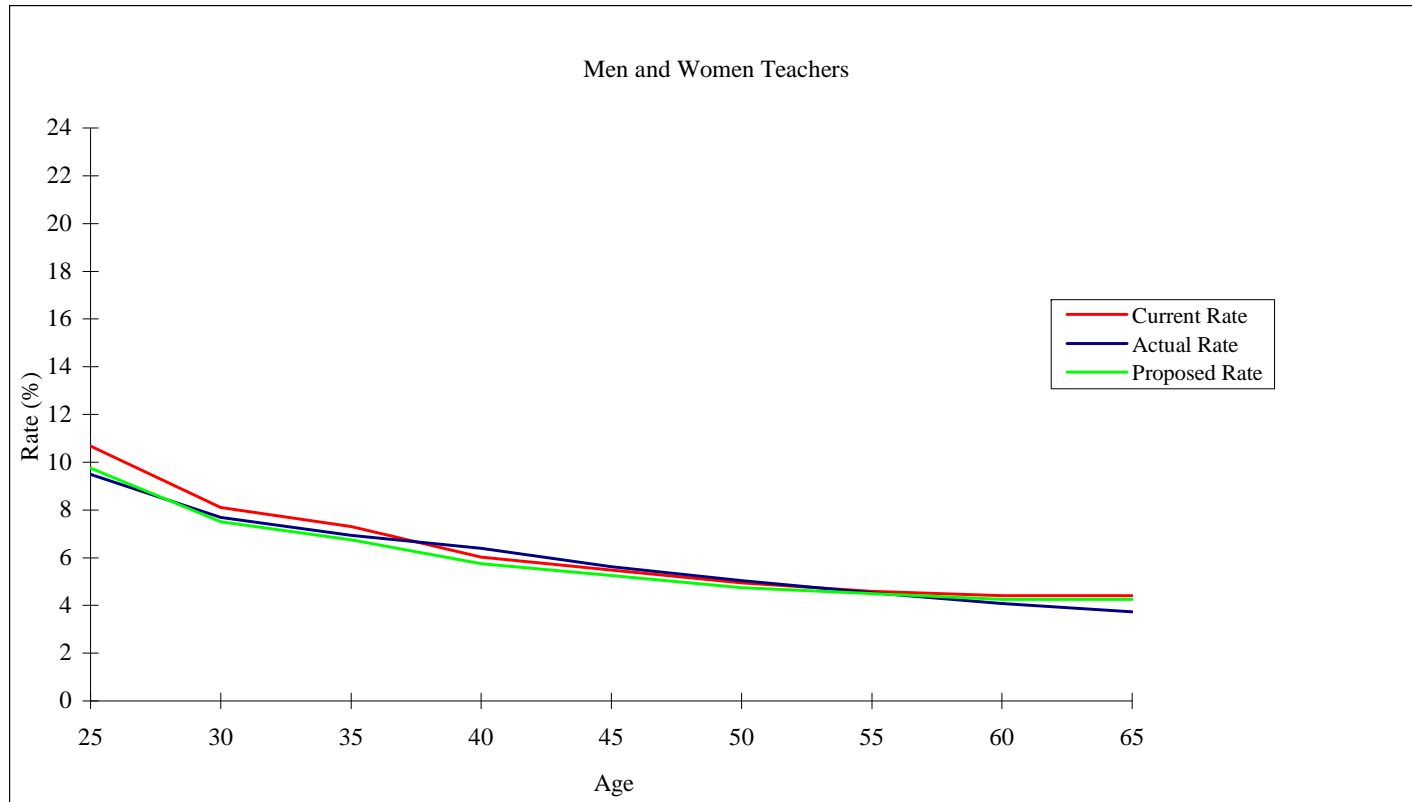
Interest Rate

The estimated total rates of return earned by the System's assets are shown below.

Year Ending June 30	Rate of Return Based on Actuarial Asset Value	Rate of Return Based on Market Asset Value
2006	8.44%	10.35%
2007	10.53%	17.74%
2008	6.94%	-6.38%
2009	-11.23%	-20.49%
2010	6.75%	19.22%
2006-2010	3.97%	2.89%

The rate of return on the market value of assets has averaged approximately 2.89% annually during the past five years.

In an effort to forecast the expected long-term rate of return on System assets, we use a capital market model (described in more detail in Appendix IV) in which individual asset class returns are estimated under a wide variety of simulated economic environments based on their underlying relationships to key economic variables, and then rolled up into a forecast of the performance of a portfolio invested in accordance with the target allocation established by the Vermont Pension Investment Committee (VPIC) at its August 24, 2010, meeting. The model is calibrated to current economic and market conditions, and trends to a state of equilibrium. Over a 20-year period, the 50th percentile rate of return forecast for such a portfolio is approximately 7.9%.

Differences between near-term and long-term expectations of rates of return on assets may be incorporated in the assumed rate of return by setting it on a select-and-ultimate basis. A select-and-ultimate return assumption posits different rates for an initial number of years (called a select

period) before stabilizing at an ultimate rate. A select-and-ultimate rate structure can be used to reflect expectations of unusually strong or weak returns in near-term years followed by a trending to a long-term equilibrium. In this sense, it is a more elaborate and complete specification of future return assumptions than is a single rate used in all future years.

We have developed a select-and-ultimate interest rate assumption on the basis of the current VPIC target asset allocation. Using the 50th percentile forecast results for each year over a 20-year horizon and applying an adjustment to reflect the five-year smoothing of asset returns generates the following select-and-ultimate interest rate set:

Year 1: 6.25%	Year 9: 8.50%
Year 2: 6.75%	Year 10: 8.50%
Year 3: 7.00%	Year 11: 8.50%
Year 4: 7.50%	Year 12: 8.50%
Year 5: 7.75%	Year 13: 8.50%
Year 6: 8.25%	Year 14: 8.50%
Year 7: 8.25%	Year 15: 8.50%
Year 8: 8.25%	Year 16: 8.75%
Year 17 and later: 9.00%	

Use of a select-and-ultimate interest rate assumptions as the investment return assumption is justifiable on the basis of the manner in which these assumptions have been established and on the basis of relevant Actuarial Standards of Practice promulgated by the Actuarial Standards Board,

which specifically label the select-and-ultimate approach to setting assumed rates of return on pension plan assets as acceptable. Conformity to Actuarial Standards of Practice makes this approach suitable for use in preparing calculations under current pension accounting standards of the Governmental Accounting Standards Board (GASB). However, for computational or administrative ease, it may be preferable to set the assumed interest rate equal to the single rate (perhaps constrained to be a multiple of 0.10% or 0.25%) that produces the same result as the select-and-ultimate rate set.

VI.   COST ANALYSIS AND CONCLUSION

To assist the Board in selecting and approving the final package of valuation assumptions to be used prospectively from June 30, 2011, we have prepared a valuation of the System as of June 30, 2010, to reflect the potential impact of the revised assumptions.

Based on the demographic assumptions recommended in this report and various investment return assumptions, the total contribution calculated as of June 30, 2010, for the fiscal year ending June 30, 2012, are shown below. Additional details on these results are summarized in Appendix V.

	FYE 2012
Current Assumptions - 8.25%	$51,241,932
Recommended Assumptions:	
8.25% Return	$51,318,640
Select and Ultimate Returns	$56,889,913

This report discusses actuarial assumptions only. Methods such as the five-year average asset valuation procedure and the amortization period used for the unfunded accrued liability also affect the costs of System. These methods are not reviewed because they are not amenable to five-year experience analysis. We should note, however, that this experience study has not revealed any reasons to change any of the methods currently employed.

APPENDIX I

ACTUAL AND EXPECTED EXPERIENCE

TABLE 1

**COMPARISON OF ACTUAL AND EXPECTED SEPARATIONS
FROM ACTIVE SERVICE**

TERMINATIONS

Central Age of Group	Men Teachers			Women Teachers		
	Actual	**Expected**	**Ratio of Actual To Expected**	**Actual**	**Expected**	**Ratio of Actual To Expected**
Under 25	14	15.80	0.886	90	74.40	1.210
25-29	98	112.52	0.871	406	454.49	0.893
30-34	114	142.11	0.802	423	486.90	0.869
35-39	129	136.85	0.943	324	409.49	0.791
40-44	132	102.16	1.292	279	316.44	0.882
45-49	110	95.91	1.147	338	306.92	1.101
50-54	136	120.37	1.130	406	337.09	1.204
55 and over	37	13.34	2.774	95	29.67	3.202
Total	770	739	1.042	2,361	2,415	0.977

TABLE 2

**COMPARISON OF ACTUAL AND EXPECTED SEPARATIONS
FROM ACTIVE SERVICE**

DISABILITY RETIREMENTS

Central Age of Group	Men Teachers			Women Teachers		
	Actual	**Expected**	**Ratio of Actual To Expected**	**Actual**	**Expected**	**Ratio of Actual To Expected**
Under 25	0	0.01	0.000	0	0.06	0.000
25-29	0	0.10	0.000	0	0.40	0.000
30-34	1	0.23	4.348	0	0.57	0.000
35-39	0	0.50	0.000	1	0.65	1.538
40-44	1	0.62	1.613	2	1.17	1.709
45-49	0	1.13	0.000	1	3.23	0.310
50-54	2	7.31	0.274	8	18.92	0.423
55 and over	4	50.73	0.079	9	83.42	0.108
Total	8	60.63	0.132	21	108.42	0.194

TABLE 3

**COMPARISON OF ACTUAL AND EXPECTED SEPARATIONS
FROM ACTIVE SERVICE**

DEATHS

Central Age of Group	Men Teachers			Women Teachers		
	Actual	**Expected**	**Ratio of Actual To Expected**	**Actual**	**Expected**	**Ratio of Actual To Expected**
Under 25	0	0.02	0.000	0	0.07	0.000
25-29	0	0.17	0.000	0	0.53	0.000
30-34	0	0.34	0.000	0	0.76	0.000
35-39	1	0.60	1.667	0	0.81	0.000
40-44	0	0.74	0.000	2	1.30	1.538
45-49	1	0.94	1.064	6	2.44	2.459
50-54	0	1.69	0.000	8	5.38	1.487
55-59	5	2.18	2.294	6	8.66	0.693
60-64	1	5.39	0.186	12	5.65	2.124
65 and over	1	1.68	0.595	2	1.07	1.869
Total	9	13.75	0.655	36	26.67	1.350

TABLE 4

COMPARISON OF ACTUAL AND EXPECTED SEPARATIONS
FROM ACTIVE SERVICE

REDUCED EARLY RETIREMENTS

Central Age of Group	Men Teachers			Women Teachers		
	Actual	Expected	Ratio of Actual To Expected	Actual	Expected	Ratio of Actual To Expected
55	25	36.56	0.684	79	119.77	0.660
56	23	24.88	0.924	95	80.94	1.174
57	24	24.33	0.986	75	73.64	1.018
58	32	22.14	1.445	85	68.39	1.243
59	33	19.24	1.715	97	59.20	1.639
60	19	31.02	0.613	67	96.14	0.697
61	37	25.39	1.457	144	82.39	1.748
Total	193	183.56	1.051	642	580.47	1.106

TABLE 5

**COMPARISON OF ACTUAL AND EXPECTED SEPARATIONS
FROM ACTIVE SERVICE**

SERVICE RETIREMENTS

Central Age of Group	Men Teachers			Women Teachers		
	Actual	Expected	Ratio of Actual To Expected	Actual	Expected	Ratio of Actual To Expected
50	2	0.00	0.000	1	0.40	2.500
51	1	0.20	5.000	2	0.60	3.333
52	2	2.00	1.000	8	6.40	1.250
53	10	9.80	1.020	16	19.80	0.808
54	13	17.20	0.756	24	35.60	0.674
55	14	22.60	0.619	25	40.60	0.616
56	20	14.60	1.370	24	23.00	1.043
57	16	16.20	0.988	31	23.80	1.303
58	21	17.60	1.193	35	24.50	1.429
59	31	17.70	1.751	42	22.70	1.850
60	39	49.20	0.793	35	53.40	0.655
61	40	23.29	1.717	38	23.29	1.632
62	58	66.75	0.869	154	152.25	1.011
63	42	37.80	1.111	79	78.00	1.013
64	34	26.80	1.269	63	56.00	1.125
65	26	25.80	1.008	73	52.20	1.398
66	17	18.60	0.914	25	25.20	0.992
67	6	10.80	0.556	13	17.40	0.747
68	7	4.80	1.458	11	8.20	1.341
69	5	4.80	1.042	11	8.40	1.310
70 and over	12	48.00	0.250	14	43.00	0.326
Total	416	434.54	0.957	724	714.74	1.013

TABLE 6

COMPARISON OF ACTUAL AND EXPECTED
ANNUAL SALARIES OF MEMBERS

Central Age of Group	Men Teachers			Women Teachers		
	Annual Salaries (Salaries shown in 1,000s)			Annual Salaries (Salaries shown in 1,000s)		
	Actual	Expected	Ratio of Actual To Expected	Actual	Expected	Ratio of Actual To Expected
Under 25	2,116	2,325	0.910	9,100	9,955	0.914
25-29	22,795	24,607	0.926	81,960	88,202	0.929
30-34	53,932	57,708	0.935	137,320	146,801	0.935
35-39	82,790	88,220	0.938	167,873	178,461	0.941
40-44	79,310	83,749	0.947	191,838	202,643	0.947
45-49	87,242	91,433	0.954	261,201	274,550	0.951
50-54	131,426	137,177	0.958	363,475	380,104	0.956
55-59	154,892	161,122	0.961	381,081	396,711	0.961
60-64	68,326	70,909	0.964	144,378	149,710	0.964
65 and over	12,267	12,747	0.962	15,944	16,491	0.967
Total	695,096	729,997	0.952	1,754,170	1,843,628	0.951

TABLE 7

SUMMARY OF MORTALITY EXPERIENCE
OF PENSIONERS

Group	Men Teachers			Women Teachers			Total		
	Actual	Expected	Ratio of Actual To Expected	Actual	Expected	Ratio of Actual To Expected	Actual	Expected	Ratio of Actual To Expected
Service Retirees	205	236.18	0.868	411	360.18	1.141	616	596.36	1.033
Disability Retirees	9	15.20	0.592	10	14.84	0.674	19	30.04	0.632
Beneficiaries of Deceased Members	34	14.23	2.389	72	20.89	3.447	106	35.12	3.018
Total	248	265.61	0.934	493	395.91	1.245	741	661.52	1.120

APPENDIX II

RECOMMENDED ACTIVE SERVICE TABLES

TABLE 1

**COMPARISON OF CURRENT AND RECOMMENDED SEPARATIONS
FROM ACTIVE SERVICE**

DISABILITY

Age	Men Teachers		Women Teachers	
	Current	Recommended	Current	Recommended
25	0.01%	0.01%	0.02%	0.02%
26	0.02%	0.02%	0.02%	0.02%
27	0.02%	0.02%	0.02%	0.02%
28	0.02%	0.02%	0.02%	0.02%
29	0.02%	0.02%	0.02%	0.02%
30	0.02%	0.02%	0.02%	0.02%
31	0.02%	0.02%	0.02%	0.02%
32	0.02%	0.02%	0.02%	0.02%
33	0.02%	0.02%	0.02%	0.02%
34	0.02%	0.02%	0.02%	0.02%
35	0.02%	0.02%	0.02%	0.02%
36	0.03%	0.03%	0.02%	0.02%
37	0.03%	0.03%	0.02%	0.02%
38	0.03%	0.03%	0.02%	0.02%
39	0.04%	0.04%	0.02%	0.02%
40	0.03%	0.03%	0.02%	0.02%
41	0.03%	0.03%	0.02%	0.02%
42	0.04%	0.04%	0.03%	0.03%
43	0.04%	0.04%	0.03%	0.03%
44	0.05%	0.05%	0.04%	0.04%
45	0.05%	0.05%	0.05%	0.05%
46	0.06%	0.06%	0.05%	0.05%
47	0.06%	0.06%	0.06%	0.06%
48	0.07%	0.06%	0.07%	0.06%
49	0.08%	0.06%	0.08%	0.07%
50	0.18%	0.07%	0.18%	0.07%
51	0.27%	0.07%	0.21%	0.08%
52	0.30%	0.07%	0.25%	0.08%
53	0.33%	0.08%	0.29%	0.09%
54	0.38%	0.08%	0.34%	0.09%
55	0.44%	0.09%	0.39%	0.10%
56	0.53%	0.11%	0.45%	0.10%
57	0.71%	0.14%	0.52%	0.11%
58	0.94%	0.19%	0.61%	0.12%
59	1.17%	0.23%	0.71%	0.14%
60	1.47%	0.29%	0.84%	0.17%
61	1.83%	0.37%	1.01%	0.20%
62	2.30%	0.46%	1.21%	0.24%
63	2.88%	0.58%	1.44%	0.29%
64	3.60%	0.72%	1.70%	0.34%
65	0.00%	0.00%	1.99%	0.40%
66	0.00%	0.00%	2.31%	0.46%
67	0.00%	0.00%	2.66%	0.53%
68	0.00%	0.00%	3.04%	0.61%
69	0.00%	0.00%	3.45%	0.69%

TABLE 2

**COMPARISON OF CURRENT AND RECOMMENDED
FUTURE SALARY INCREASE**

Age	Current	Recommended
25	10.68%	8.40%
26	10.14%	7.95%
27	9.61%	7.50%
28	9.09%	7.35%
29	8.59%	7.20%
30	8.10%	7.05%
31	7.94%	6.90%
32	7.78%	6.75%
33	7.62%	6.55%
34	7.46%	6.35%
35	7.30%	6.15%
36	7.18%	5.95%
37	7.06%	5.75%
38	6.94%	5.65%
39	6.82%	5.55%
40	6.03%	5.45%
41	5.92%	5.35%
42	5.81%	5.25%
43	5.71%	5.15%
44	5.60%	5.05%
45	5.49%	4.95%
46	5.38%	4.85%
47	5.27%	4.75%
48	5.17%	4.70%
49	5.06%	4.65%
50	4.95%	4.60%
51	4.88%	4.55%
52	4.81%	4.50%
53	4.73%	4.45%
54	4.66%	4.40%
55	4.59%	4.35%
56	4.55%	4.30%
57	4.52%	4.25%
58	4.48%	4.25%
59	4.45%	4.25%
60	4.41%	4.25%

<u>APPENDIX III</u>

RECOMMENDED POST-RETIREMENT MORTALITY TABLES

APPENDIX III

RECOMMENDED POST RETIREMENT MORTALITY TABLES
PENSIONERS AND BENEFICIARIES

AGE	MALES	FEMALES	AGE	MALES	FEMALES
50	0.00165	0.00131	85	0.07634	0.05710
51	0.00180	0.00143	86	0.08378	0.06329
52	0.00197	0.00155	87	0.09160	0.07012
53	0.00215	0.00169	88	0.09971	0.07758
54	0.00235	0.00183	89	0.10800	0.08568
55	0.00257	0.00196	90	0.11636	0.09425
56	0.00283	0.00211	91	0.12474	0.10316
57	0.00312	0.00226	92	0.13320	0.11249
58	0.00346	0.00242	93	0.14184	0.12230
59	0.00387	0.00262	94	0.15083	0.13267
60	0.00436	0.00287	95	0.16026	0.14370
61	0.00495	0.00319	96	0.17028	0.15548
62	0.00563	0.00360	97	0.18102	0.16809
63	0.00643	0.00413	98	0.19261	0.18168
64	0.00735	0.00479	99	0.20526	0.19640
65	0.00840	0.00562	100	0.21918	0.21246
66	0.00959	0.00661	101	0.23464	0.23013
67	0.01094	0.00779	102	0.25195	0.24979
68	0.01243	0.00913	103	0.27147	0.27189
69	0.01408	0.01062	104	0.29353	0.29697
70	0.01590	0.01222	105	0.31847	0.32556
71	0.01787	0.01389	106	0.34656	0.35819
72	0.02001	0.01562	107	0.37804	0.39528
73	0.02233	0.01740	108	0.41312	0.43713
74	0.02485	0.01927	109	0.45193	0.48387
75	0.02760	0.02124	110	0.49453	0.53538
76	0.03062	0.02335	111	0.54086	0.59129
77	0.03397	0.02566	112	0.59071	0.65094
78	0.03767	0.02821	113	0.64374	0.71342
79	0.04176	0.03106	114	0.69941	0.77769
80	0.04629	0.03427	115	1.00000	1.00000
81	0.05129	0.03789	116	1.00000	1.00000
82	0.05678	0.04195	117	1.00000	1.00000
83	0.06280	0.04649	118	1.00000	1.00000
84	0.06934	0.05152	119	1.00000	1.00000
85	0.07634	0.05710	120	1.00000	1.00000

RECOMMENDED POST RETIREMENT MORTALITY TABLES
DISABILITY PENSIONERS

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.00000	0.00000	70	0.04914	0.03474
20	0.00000	0.00000	71	0.05170	0.03646
21	0.01688	0.00566	72	0.05450	0.03892
22	0.01716	0.00566	73	0.05755	0.04090
23	0.01772	0.00576	74	0.06086	0.04370
24	0.01831	0.00585	75	0.06549	0.04593
25	0.01922	0.00595	76	0.06939	0.04905
26	0.02050	0.00614	77	0.07474	0.05322
27	0.02083	0.00614	78	0.08049	0.05679
28	0.02083	0.00614	79	0.08662	0.06059
29	0.02083	0.00614	80	0.09313	0.06463
30	0.02083	0.00634	81	0.09998	0.06894
31	0.02083	0.00655	82	0.10718	0.07355
32	0.02083	0.00655	83	0.11287	0.07850
33	0.02083	0.00645	84	0.12058	0.08382
34	0.02083	0.00634	85	0.12655	0.09101
35	0.02083	0.00624	86	0.13260	0.09885
36	0.02083	0.00614	87	0.14099	0.10740
37	0.02083	0.00604	88	0.14969	0.11486
38	0.02050	0.00595	89	0.15619	0.12483
39	0.02017	0.00585	90	0.17202	0.13348
40	0.01985	0.00585	91	0.18736	0.14267
41	0.01953	0.00585	92	0.20644	0.15242
42	0.01922	0.00585	93	0.22270	0.16506
43	0.01891	0.00585	94	0.23893	0.17704
44	0.01861	0.00585	95	0.25906	0.18838
45	0.01831	0.00576	96	0.27496	0.19891
46	0.01903	0.00622	97	0.29040	0.21182
47	0.01973	0.00670	98	0.31029	0.22039
48	0.02040	0.00731	99	0.32496	0.22771
49	0.02104	0.00795	100	0.33908	0.23370
50	0.02167	0.00877	101	0.35863	0.24483
51	0.02227	0.00964	102	0.37169	0.25450
52	0.02285	0.01074	103	0.38304	0.26604
53	0.02378	0.01192	104	0.39200	0.27906
54	0.02472	0.01320	105	0.39789	0.29312
55	0.02608	0.01455	106	0.40000	0.30781
56	0.02747	0.01598	107	0.40000	0.32273
57	0.02890	0.01722	108	0.40000	0.33744
58	0.03039	0.01819	109	0.40000	0.35154
59	0.03142	0.01917	110	0.40000	0.36462
60	0.03248	0.02016	111	0.40000	0.37625
61	0.03414	0.02117	112	0.40000	0.38602
62	0.03532	0.02222	113	0.40000	0.39351
63	0.03718	0.02334	114	0.40000	0.39831
64	0.03855	0.02455	115	0.40000	0.40000
65	0.04004	0.02587	116	0.40000	0.40000
66	0.04235	0.02731	117	0.40000	0.40000
67	0.04416	0.02891	118	0.40000	0.40000
68	0.04542	0.03067	119	0.40000	0.40000
69	0.04757	0.03261	120	1.00000	1.00000

APPENDIX IV

DESCRIPTION OF CAPITAL MARKET MODEL USED IN ANALYSIS

OF EXPECTED RATE OF RETURN ON SYSTEM ASSETS

ABOUT GEMS (GENERAL ECONOMY AND MARKET SIMULATOR)

GEMS is a cutting-edge Economic Scenario Generator (ESG) that enables users to simulate future states of the global economy and financial markets including the pricing of derivatives and alternative assets. It uses financial models that are the most technologically advanced in the industry, ensuring that models perform consistent with history, provide a realistic representation of extreme events and support hedging strategies with market consistent pricing. GEMS includes comprehensive yield curve modeling and is a multifactor arbitrage pricing model that develops asset class return series based on asset class relationships to underlying economic and capital market variables such as GDP, inflation, interest rates, credit spreads, and unemployment. The model is calibrated to current market conditions and trends the economic variables to longer term historical norms – simulating a variety of economic environments and concomitant asset class returns in the process.

Some of the other distinguishing features of GEMS are:

1. Many asset class return distributions are non-normal even though many models historically have treated them as such. Asset classes exhibit non-normal return distribution characteristics such as skew and kurtosis. GEMS is more effective at capturing these characteristics. In doing so, it more effectively captures outlier fat tail events (leptokurtosis) and positive or negative skew in a manner that more closely resembles what actually occurs.

2. Asset class returns are linked to underlying economic conditions in the model so the user can related a specific asset class or portfolio return path to conditions that can be described in terms of economic variables.

3. GEMS is calibrated to current levels of economic activity and trends to a longer-term state of equilibrium. As a result, shorter term asset returns forecasts in GEMS are more reflective of

recent market activity and short term characteristics and trends in economic and market

variables and longer term returns reflect asset performance over complete market cycles.

4. There is empirical evidence that asset correlations are dynamic and move closer to unity when

markets are volatile and under stress. GEMS models correlations dynamically.

Detail of how GEMS models specific asset classes is provided below.

Cash

Cash is modeled as an investment in short term government paper paying a nominal or inflation linked

rate.

Treasury Model

GEMS employs a three factor affine model of interest rates to model treasuries. This approach has

many advantages over other commonly used methodologies such as the Libor Market Model (LMM)

or the Cox, Ingersol, Ross (CIR) models, particularly in generating realistic distributions of yields. The

GEMS parameterization has overcome the common problems of interest rate models, namely yields

approaching infinity over long simulations (LMM) and an inability of some models to produce low

interest rates (CIR), particularly when the starting values are low.

Corporate Bond Model

There are two corporate bond models available within GEMS, The Jarrow-Lando-Turnbull (JLT) model and the DFA Bond Model. The DFA Bond Model is used for GEMS standard real-world parameterizations.

The DFA Bond Model is based on a reduced form approach that was first explored in a paper by Duffie and Singleton (see Duffie and Singleton, Modeling Term Structures of Defaultable Bonds, The Review of Financial Studies, 1999). In this model individual bonds are modeled and zero coupon corporate yields are generated by adding the credit spreads to the corresponding zero coupon treasury yield. The credit spread is driven by a default intensity process, which also determines each bond's rating. The evolution of the default intensity determines the migration, if any, of a bond's rating from one class to another.

Equity Indices

All equity return series are generated using stochastic volatility with jumps (SVJ). The equity models generate extreme behavior (fat tails) via the specification of an independent stochastic jump (SVJ) process. The features of the returns generated by the model include volatility clustering, low frequency/high severity jumps, and jump clustering behaviors, all of which are observed in actual markets.

GEMS includes the major equity indices for all the economies it models. In addition, clients can create their own user-specified models of equity sectors, single stocks, or alternative investment classes (e.g., hedge funds) using the GEMS Market Indices facility.

Market Indices

Items such as private equity, hedge funds and mutual funds can be modeled within the GEMS market indices framework. Market indices allows users to define an autoregressive or vector autoregressive model in the system using other GEMS "core" or user defined variables as explanatory variables. The market indices functionality also incorporates cointegration relationships between the auxiliary variable (i.e. the variable to be modeled) and the explanatory variables. A number of GEMS variables are calculated using this functionality, including;

- MSCI EAFE Equity Index
- US Red Rocks US Private Equity Index
- European Private Equity Index
- CISDM Global Fund of Hedge Funds Index
- Barra Value Index

Property

The models that drive simulated property prices and rents are of the ARX type. The GEMS Property model was designed to model "bricks and mortar" as opposed to REITS. Price and rent are modeled in GEMS for residential, retail and office buildings. The actual dynamic portfolio of the firm is modeled in the Investments module of ADVISE. The combination (GEMS with Investments) produces yields, returns, etc. on the actual portfolio.

Foreign Exchange

GEMS contains two FX models, a vector autoregression (VAR) model and a stochastic differential

equation-based (SDE) model. Within the VAR, the explanatory variables are yields, lagged exchange

rates, and macroeconomic variables. The model produces the long-run exchange rate dynamics and

cross economy relationships observed in the data. The SDE model shows a greater degree of diffusion

over long simulations and is generally used in shorter simulations.

APPENDIX V

COMPARATIVE VALUATION RESULTS

RESULTS FOR THE ACTUARIAL VALUATION
PREPARED AS OF JUNE 30, 2010 ON
CURRENT AND RECOMMENDED ASSUMPTIONS

	Current	Recommended Assumptions			
Item	8.25%	8.25%	8.00%	7.90%	Select and Ultimate
1. Liabilities:					
Active and Inactive Members	$ 1,110,481,546	$1,137,076,963	$1,173,596,743	$ 1,188,702,305	$ 1,112,368,280
Retired Members	$ 1,011,709,949	$1,020,388,655	$1,041,610,386	$ 1,050,326,425	$ 1,056,056,441
Total	$ 2,122,191,495	$2,157,465,618	$2,215,207,129	$ 2,239,028,730	$ 2,168,424,721
2. Assets	$ 1,410,368,434	$1,410,368,434	$1,410,368,434	$ 1,410,368,434	$ 1,410,368,434
3. Unfunded Accrued Liability	$ 711,823,061	$ 747,097,184	$ 804,838,695	$ 828,660,296	$ 758,056,287
4. Normal Contribution	$ 10,574,040	$ 8,635,466	$ 10,691,529	$ 11,572,699	$ 13,100,061
5. Accrued Liability Contribution	$ 40,667,892	$ 42,683,175	$ 44,712,667	$ 45,518,302	$ 43,789,852
6. Total FYE2012 Contribution (4. + 5.)	$ 51,241,932	$ 51,318,640	$ 55,404,197	$ 57,091,001	$ 56,889,913