EXPERIENCE STUDY ANALYSIS

State Teachers' Retirement System
1995-1999

PERAC

EXPERIENCE STUDY – STATE TEACHERS' RETIREMENT SYSTEM

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EXPERIENCE STUDY – STATE TEACHERS' RETIREMENT SYSTEM

Introduction

The Public Employee Retirement Administration Commission (PERAC) has completed an Experience Study of the State Teachers' Retirement System and Boston teachers. This study reflects the second part of our analysis of the actuarial assumptions used in determining Commonwealth liabilities.

This report presents the results of the experience study for members of the State Teachers' Retirement System and Boston teachers over the five-year period from January 1, 1995 through December 31, 1999. The results of the experience study for the Boston teachers yielded comparable results to that of the State teachers. Therefore, we have not shown the results separately. Our analysis and discussion focuses on the results of the State Teachers' study. Two elements were essential in performing this study: software capable of performing a thorough analysis for such a large group and accurate data.

One of PERAC's first initiatives was the procurement of new software for performing actuarial valuations and experience studies. After an RFP process, the new software was purchased in 1998, customized for Chapter 32, and implemented and tested throughout 1999. Apart from improving the quality and efficiency of valuations, the new software has the capability of performing a detailed historical experience analysis that the prior system could not produce due to software constraints.

The nature of an experience study is to track how members leave a system (retirement, death, disability, or withdrawal). This task requires not only accurate data but also more detailed data than a regular actuarial valuation requires. We received data counts from the State Teachers' Retirement Board of the number of members leaving service each year for each decrement outlined above to aid us in our data reconciliations and confirm our results.

In the past few actuarial valuations, PERAC has needed to estimate salary for a significant number of members due to questionable reported pay. In addition, since actual credited service is not provided to us, each year we estimate service based on a member's original date of hire as recorded by the State Teachers' System. For these reasons, the salary analysis and any experience results based on service may not be as reliable as the other components of this study.

This report, in conjunction with the State Experience Study, represents the first detailed experience study completed by PERAC. However, each year as part of the actuarial valuation, we test how well the assumptions are working by performing a gain/loss analysis. If plan liabilities increase more than assumed, there is an actuarial loss. If plan liabilities increase less than assumed, there is an actuarial gain. If each year the results consistently produced an actuarial loss (or an actuarial gain), then this would indicate that the assumptions are not properly reflecting actual experience. In this way, the gain/loss analysis serves as a proxy to the performance of a detailed experience study.

Introduction (continued)

We reviewed the gains and losses on plan liabilities (excluding asset gains and losses) from 1990 (the first PERA actuarial valuation for the Commonwealth) through 1999. PERA/PERAC performed Commonwealth valuations in 1990, 1992, 1993, 1995, 1996, 1998, 1999, and 2000. Our review of the past gains and losses shows the results to be within a reasonable range. For the State Teachers' Retirement System, there is a cumulative gain (experience better than anticipated) of approximately $500 million over the 10 year period. This amount is quite small considering the total accrued liability of approximately $16.4 billion as of January 1, 2000.

As part of this experience study, we performed a detailed member reconciliation of actual retirements, terminations, and disabilities over the 5-year period. We analyzed these results using not only our valuation data from each year, but also listings generated by the PERAC disability unit, and additional information provided by the State Teachers' Retirement Board regarding the number of retirements, terminations, deaths and disabilities for each year of the study period.

The annual funding schedule appropriation (the total plan cost) reflects two sources. The first is the amortization of the unfunded liability. The actuarial accrued liability less plan assets equals the unfunded liability. The unfunded liability is amortized through FY2017 under the current schedule. In addition to the amortization of the unfunded liability, the annual appropriation also reflects the normal cost (or current cost), which represents the value of benefits accruing during the coming year. The measure of the impact on the total plan cost of any change in assumptions is the impact of that change on these two components.

Although the normal cost and accrued liability directly determine the appropriation under the funding schedule, these items are components that make up a portion of the present value of future benefits (PVFB). The PVFB may be the most accurate measure of the "true" total cost of a plan since it represents the present value of total projected benefits for all active, inactive and retired members. Any change in the actuarial assumptions will change the PVFB and, accordingly, the normal cost and accrued liability (and thereby the amortization of the unfunded liability).

Our proposed assumptions generally increase turnover rates, decrease disability rates and decrease the salary increase assumption. These changes decrease total plan cost. For example, higher turnover means that members are more likely to leave service before they become vested, thereby reducing retirement benefits to be paid. Also, our proposed assumptions generally increase retirement rates and decrease mortality rates. These changes serve to increase total plan cost.

Based on the January 1, 2000 actuarial valuation results, the proposed assumptions would produce a total cost (normal cost and amortization of the unfunded liability) that is slightly greater than that produced under the current assumptions. The proposed assumptions will first be implemented in the January 1, 2001 actuarial valuation. That valuation will also reflect investment return experience during 2000, any gains or losses on plan liabilities, and the impact of recent legislation. It should be noted that the passage of Chapter 114 of the Acts of 2000 should have a significant effect on retirement and termination rates. The

Introduction (continued)

proposed rates in this report reflect only the past experience of the State and Boston teachers. We will monitor the experience including Chapter 114 each year and recommend changes to any of the assumptions as necessary.

It is important to note that the results for the State and Boston teachers reflect only one component of the total Commonwealth obligation. The next funding schedule adopted will also include results for State Employees as well as the local COLA liability. The State experience study was released earlier this year and indicated a decrease in total cost would result from the proposed change in assumptions. This decrease, combined with the slight increase reported in this study, results in an overall decrease in total cost to the Commonwealth. In light of the common goal of addressing the pension funding of the Commonwealth in a disciplined and appropriate manner, it is recommended that no change in the existing funding schedule take place at this time that would reduce the current level of appropriation.

We gratefully acknowledge the efforts of the State Teachers' Retirement Board staff in completing this project. We would also like to thank the members of PERAC's *Actuarial Advisory Committee*: David Driscoll, Buck Consultants, Inc.; Wilson Lowry, Watson Wyatt Worldwide; Joseph Macaulay, George Beram & Co., Inc.; Kathy Riley, The Segal Company; Dan Sherman, PricewaterhouseCoopers, LLP; Larry Stone, Stone Consulting; and David Wean, John Hancock Actuarial Consulting Services. We presented our methodology, findings, and proposed assumptions to the Committee at several meetings this year. The Committee provided comments and suggestions with respect to our preparation of this report.

Respectfully submitted,
Public Employee Retirement Administration
Commission

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Member of the American Academy of Actuaries
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Joseph E. Connarton
Executive Director

Dated: November 15, 2000

EXPERIENCE STUDY – STATE TEACHERS' RETIREMENT SYSTEM

Executive Summary

General

The principal results of the five-year experience study can be summarized as follows:

- **Experience indicates that changes should be made for the following:**

  - ❑ Rates of retirement for active members; increase in total plan cost

  - ❑ Rates of disability for active members; decrease in total plan cost

  - ❑ Rates of withdrawal for active members; decrease in total plan cost

  - ❑ Rates of salary increases for active members; decrease in total plan cost

  - ❑ Rates of mortality for retired members; increase in total plan cost

  - ❑ Rates of mortality for disabled members; increase in total plan cost

- **Nature and effect of changes:**

  - ❑ Proposed changes are based on both actual past and anticipated future experience

  - ❑ Overall, proposed changes produce a total plan cost slightly greater than that under the current assumptions

Executive Summary (continued)

- **Retirement**

  ❑ Propose decreasing rate at age 55, increasing rates at other ages, and adding gender distinct rates

  ❑ Propose different rates for members retiring with less than 20 years of service and members retiring with 20 or more years of service

  ❑ Proposed assumptions increase total plan cost

- **Disability**

  ❑ Propose significant decrease in rates at all ages

  ❑ Propose decrease in the ratio of accidental disabilities to total disabilities

  ❑ Proposed assumptions decrease total plan cost

- **Withdrawal**

  ❑ Propose service based table up to 10 years of service and age based thereafter with gender distinct rates

  ❑ Proposed assumptions decrease total plan cost

- **Post-Retirement Mortality**

  ❑ Propose adopting RP-2000 table projected for 10 years with improved mortality (with adjustments based on experience results) until more experience determined

  ❑ Propose separate tables by gender

  ❑ Propose separate tables for members who retired under disability provisions

  ❑ Generally, proposed rates assume longer life expectancy

  ❑ Proposed assumptions increase total plan cost

- **Salary Increases**

  ❑ Current assumption is 6.0% at all ages

  ❑ Propose adopting age/service based table with ultimate assumption of 4.75%

  ❑ Proposed assumptions decrease total plan cost

Methodology

General methodology for all assumptions

❑ Study comprises the years January 1, 1995 through January 1, 2000

❑ Data used in this study was provided by the State Teachers' Retirement Board and Boston Retirement Board and reflects the January 1, 1995, 1996, 1998, 1999 and 2000 data used in the Commonwealth actuarial valuations

❑ Reconciliation of members completed for each year

❑ Adjustment made to account for the two-year period January 1, 1996 to January 1, 1998

❑ For each period in the 5 year experience study period (1/95 to 1/96, 1/96 to 1/98, 1/98 to 1/99, and 1/99 to 1/00), we determined the member experience relating to:
 – Retirement
 – Disability
 – Withdrawal (Turnover)
 – Post-retirement mortality
 – Salary increases

❑ Actual experience determined at each age (and/or completed years of service) for each assumption. For example, for retirement, we determined the actual number of members retiring at each age.

❑ Expected experience determined for each assumption. For example, for retirement, we determined the expected number of members retiring at each age based on the plan assumptions.

❑ An actual/expected (A/E) ratio was computed at each age for each assumption.

❑ Graphed experience results and used various smoothing techniques to select assumptions

Methodology (continued)

In addition to the general methodology that was used for each assumption outlined on the previous page, the following specific analysis was conducted:

- **Retirement**

  - Assumed a member retired if the member was eligible to retire at the beginning of a period and is not in the active data file at the end of the period

  - Analyzed results by gender

  - Analyzed results separately for members retiring before or after age 55

  - Analyzed results separately for members retiring with greater than or less than 20 years of service

- **Disability**

  - Results modified to reflect that some members retire from an inactive status as opposed to an active status

  - Compared results to historical disability counts from PERAC disability unit

  - Analyzed results by the percentage of disabilities that are job related (accidental) compared to non-job-related (ordinary)

- **Withdrawal**

  - Assumed a member withdrew if the member was not eligible to retire at the beginning of the period and is not in the active data file at the end of the period

  - Analyzed results by service and age/service combined in addition to age

  - Analyzed results by gender

- **Post-Retirement Mortality**

  - Analyzed results by gender

  - Adjusted results to reflect retiree deaths with continuing payments to beneficiaries

  - Compared actual experience for each Group to several standard mortality tables (83GAM, 94GAM, UP94 and RP-2000)

  - Performed testing for disabled retired members separately by gender

- **Salary Increases**

  - Determined ratios of salaries at the end of the year to salaries at the beginning of the year for continuing members

  - Analyzed results by service and age/service combined in addition to age

Findings

- **<u>Retirement</u>**

  ❑ Actual retirements generally greater that assumed except at age 55; at age 55 actual rates significantly less than assumed

  ❑ Female rates generally greater than male rates up to age 59, male rates generally greater after age 59

  ❑ Boston teachers' rates similar to State teachers

- **<u>Disability</u>**

  ❑ Actual number of disability retirements significantly less than expected

  ❑ For 5-year period, accidental disabilities about 31% of total disabilities

  ❑ No results available for Boston teachers, assume comparable to State teachers

- **<u>Withdrawal</u>**

  ❑ Actual turnover about twice as high as expected

  ❑ Turnover generally decreases with both age and service with some increasing patterns for members with less than 5 years of service and under age 35.

  ❑ Boston teachers' results comparable to State teachers

- **<u>Post-Retirement Mortality</u>**

  ❑ Male mortality less than expected in each year

  ❑ Female mortality greater than expected in each year

  ❑ Disabled male mortality less than expected

  ❑ Disabled female mortality about as expected

  ❑ Due to data submission issues on 1/98 and 1/99, only 1/95-1/96 and 1/99-1/00 are credible for experience

Findings (continued)

<u>**Salary Increases**</u>

- ❑ Results show salary increases generally decreasing with both age and service

- ❑ Reliability of results questionable due to numerous salary changes made in annual valuation data

Summary of Assumptions

The selection of the actuarial assumptions reflects a work in progress. We expect the assumptions shown here will be used in the January 1, 2001 actuarial valuation. However, we will continue to test and refine the assumptions in future years.

In this section, we show sample rates for each assumption, and where appropriate, an illustration showing a comparison of the current and proposed assumptions. A rate essentially represents the likelihood of an event occurring at a given time. For example, the mortality rates represent the likelihood of death. The complete tables are shown in the Appendix. In all illustrations that follow, the current rates are represented by a dashed line and the proposed rates by a solid line.

1. <u>Rate of Investment Return</u>: Current: 8.25% annually. This assumption is determined by the legislature and was not reviewed as part of this study.

2. <u>Rates of Retirement</u>: The following table and graphs compare current and proposed retirement rates for males and females respectively. The proposed assumptions are gender specific and service based (rates based on whether a member retires with 20 years of service). The proposed rates are less than the current rate at age 55 and generally greater than the current rates at other ages. The proposed rates increase total plan cost.

Age	Current	Proposed (service based)			
		Male		Female	
		Less than 20	20 +	Less than 20	20 +
50	.0000	.00	.01	.00	.01
55	.1255	.02	.03	.02	.04
60	.0784	.12	.20	.12	.16
65	.3568	.40	.50	.40	.40
70	1.0000	1.00	1.00	1.00	1.00

The graphs below show the rates for teachers with more than 20 years of service.

Male

Female
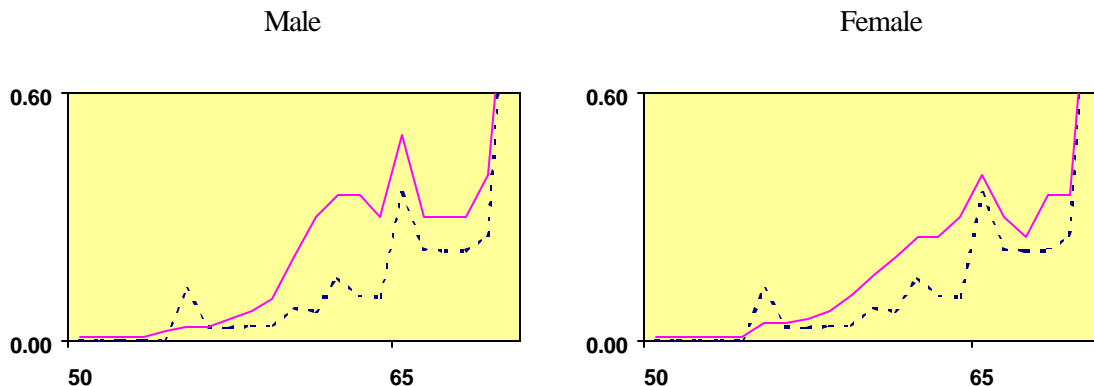
Summary of Assumptions (continued)

3. <u>Rates of Disability</u>: The following table and graph shows that the proposed disability rates are less than the current rates. The proposed rates decrease total plan cost. See the Appendix for complete proposed table. Also, we propose an assumption that 35% of disabilities will be job-related. The proposed rates decrease total plan cost.

<u>Age</u>	<u>Current</u>	<u>Proposed</u>
20	.0003	.00004
30	.0006	.00006
40	.0012	.00010
50	.0031	.00050
60	.0061	.00100
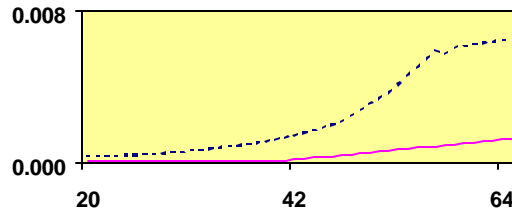
4. <u>Rates of Withdrawal</u>: Current rates are strictly age based. Proposed rates are gender distinct and both age and service based for the first 10 years of service. General trend for members with 0-5 years of service is that rates increase from age 20 to early 30's and decrease with age thereafter. The maximum assumed rate is 0.15. For members with service greater than 5 years, rates generally decrease with age. For service after 10 years, males slightly increase with age. The proposed rates decrease total plan cost.

<u>Age</u>	<u>Current</u>	Proposed (after 10 years)	
		Male	Female
20	.0960	---	---
30	.0444	.010	.040
40	.0185	.015	.031
50	.0117	.019	.019

Summary of Assumptions (continued)

5. Rate of Salary Increase: The following tables and graph compares current and proposed salary increase rates. The proposed rates are less than the current rates after 5 years of service. The proposed rates decrease total plan cost.

Service	Current	Proposed
0	6.00%	9.50%
1	6.00%	8.50%
2	6.00%	8.00%
3	6.00%	7.50%
4	6.00%	7.00%
5	6.00%	6.75%
10	6.00%	5.50%
15	6.00%	5.00%
20	6.00%	5.00%
25+	6.00%	4.75%

6. Pre-Retirement Mortality: Current rates of mortality are in accordance with the 83 Group Annuity Mortality (GAM83) table. The proposed rates reflect the RP-2000 Employees table projected 10 years with Scale AA.

The following table and graphs compare current and proposed mortality rates for active males and females respectively. The proposed male table indicates lower mortality rates and reflects longer life expectancy than the current table. The proposed female table reflects a slightly longer life expectancy than the current table. The proposed rates increase total plan cost.

Age	Male Current	Male Proposed	Female Current	Female Proposed
20	.000377	.000285	.000189	.000163
30	.000607	.000422	.000342	.000239
40	.001238	.000996	.000665	.000607
50	.003909	.001783	.001647	.001412
60	.009158	.004151	.004241	.003739
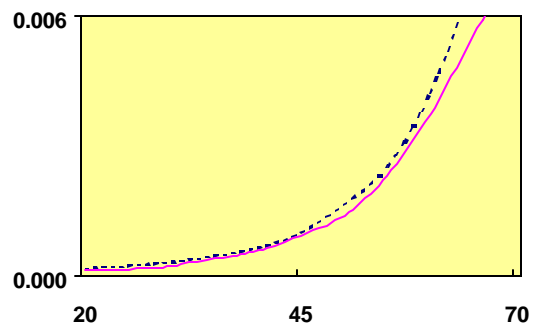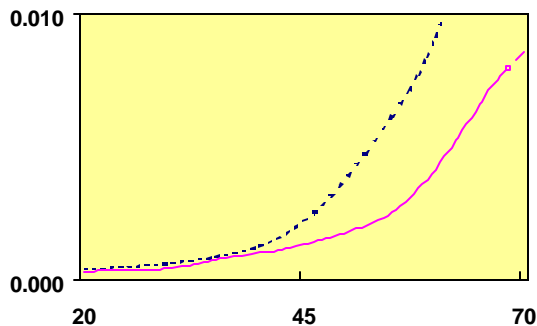
Summary of Assumptions (continued)

7.   <u>Post-Retirement Mortality</u>:   Current rates of mortality are in accordance with the 83 Group Annuity Mortality (GAM83) table. The proposed rates reflect the RP-2000 Healthy Annuitant table projected 10 years with Scale AA for males. For disabled members, current rates are in accordance with GAM83 with rates set forward 10 years. The proposed rates reflect the RP-2000 table set forward 3 years for males.

The following table and graphs compare current and proposed mortality rates for non-disabled retired males and females respectively. The proposed male table reflects a slightly longer life expectancy than the current tables. The proposed female table reflects a slightly shorter life expectancy than the current tables. The proposed rates increase total plan cost.

Non Disabled Age	Male Current	Proposed	Female Current	Proposed
60	.009158	.006975	.004241	.005897
70	.027530	.019091	.012385	.015923
80	.074070	.058213	.042945	.042767
90	.166307	.176202	.111750	.127784
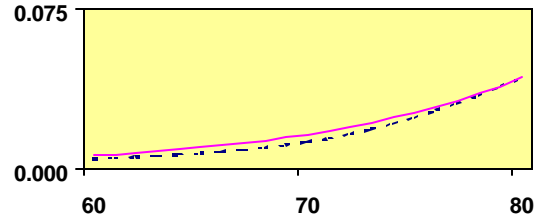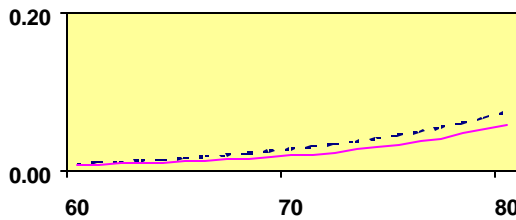
The following table and graphs compare the current and proposed mortality rates for disabled retired males and females respectively. The proposed male and female tables reflect a slightly longer life expectancy than the current tables. The proposed rates increase total plan cost.

Disabled Age	Male Current	Proposed	Female Current	Proposed
60	.027530	.01095	.012385	.006200
70	.074070	.03039	.042945	.016742
80	.166307	.08971	.111750	.045879
90	.319185	.23366	.295187	.131682
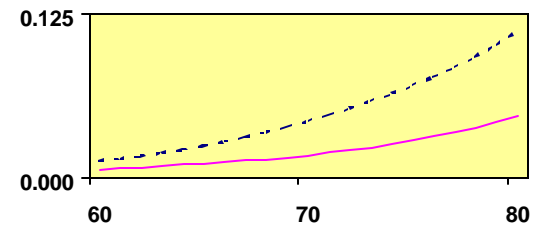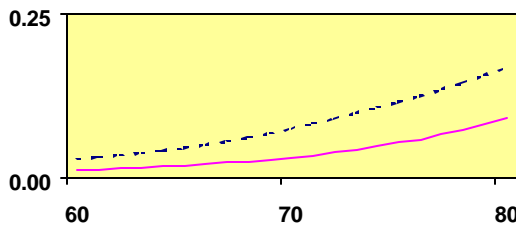
Effect of Proposed Assumptions

For illustration, the effect of the proposed salary scale and demographic assumption changes based on the January 1, 2000 valuation results is shown below. The January 1, 2001 valuation results will reflect the proposed assumptions as well as the actual investment return for 2000, gains or losses on plan liabilities, and the impact of recent legislation. In light of the common goal of addressing the pension funding of the Commonwealth in a disciplined and appropriate manner, it is recommended that no change in the existing funding schedule take place at this time that would reduce the current level of appropriation.

1. Number of Members:			
Active Members		82,242	
Inactive Members		N/A	
Retirees and Survivors		31,746	
Total		113,988	
2. Total Annual Regular Compensation		$3,703,587,000	
3. Average Annual Regular Compensation		$45,033	

Development of Total Cost (in thousands)	Current Assumptions	Proposed Assumptions	Increase/Decrease
4. Normal Cost			
a. Total Normal Cost	$445,481	$380,000	($65,481)
b. Employee Contributions	282,671	276,000	(6,671)
c. Net Normal Cost	$162,810	$104,000	($58,810)
5. Actuarial Accrued Liability			
a. Active Members	$10,588,975	$11,125,900	$536,925
b. Inactive Members	175,000	180,000	5,000
c. Retirees and Survivors	5,656,296	5,738,300	82,004
d. Total Actuarial Liability	$16,420,271	$17,044,200	$623,929
6. Actuarial Value of Assets	13,681,111	13,681,111	$0
	$2,739,160	$3,363,089	$623,929
7. Unfunded Actuarial Liability: (5d)-(6)			
8. Funded Ratio: (6) / (5d)	83.3%	80.3%	(3.0%)
9. Amortization of unfunded liability			
(17 year level)	$282,049	$346,295	$64,246
10. Total Cost: (4c) + (9)	$444,859	$450,295	$5,436

Our results are shown for comparison only and assume a 17 year level dollar schedule on a fresh start basis. The results of the State Teachers' valuation represent only one of the components of the total Commonwealth obligation. The determination of the funding schedule for the Commonwealth would also include the results of the State valuation, Boston Teachers, and the local COLA liability.

Terms and Definitions

ACTUAL/EXPECTED (or A/E) RATIO The ratio of the actual number of occurrences of a particular decrement compared to the expected number of occurrences of that decrement, based upon the current set of assumptions and the applicable exposures.

ACTUARIAL ACCRUED LIABILITY That portion of the Actuarial Present Value of pension plan benefits which is not provided by future Normal Costs or employee contributions. It is the portion of the Actuarial Present Value attributable to service rendered as of the Valuation Date.

ACTUARIAL ASSUMPTIONS Assumptions, based upon past experience or standard tables, used to predict the occurrence of future events affecting the amount and duration of pension benefits, such as: mortality, withdrawal, disablement and retirement; changes in compensation; rates of investment earnings and asset appreciation or depreciation; and any other relevant items.

ACTUARIAL GAIN OR LOSS (or EXPERIENCE GAIN or LOSS) A measure of the difference between actual experience and that expected based upon the set of Actuarial Assumptions, during the period between two Actuarial Valuation dates.

Note: The effect on the Accrued Liability and/or the Normal Cost resulting from changes in the Actuarial Assumptions, the Actuarial Cost Method or pension plan provisions would be described as such, not as an Actuarial Gain (Loss).

DECREMENTS The means by which a member changes status. For active members, the decrements are retirement, disability retirement, withdrawal and death. For retired members, the only decrement is death.

EXPOSURE The number of lives exposed to a given risk of decrement for a particular age (and/or service and gender). It represents the number of members who could have potentially retired, become disabled, withdrawn or died at that particular age.

NORMAL COST Total Normal Cost is that portion of the Actuarial Present Value of pension plan benefits which is to be paid in a single fiscal year. The Employee Normal Cost is the amount of the expected employee contributions for the fiscal year. The Employer Normal Cost is the difference between the Total Normal Cost and the Employee Normal Cost.

RP-2000 Mortality tables recently published by the Society of Actuaries based on a study of uninsured pension plan mortality. The tables reflect data submitted from 10 large pension plans for the years 1990-1994, and the resulting table is projected to the year 2000.

UNFUNDED ACCRUED LIABILITY The excess of the Actuarial Accrued Liability over the Assets.

Appendix

<u>**Retirement Assumptions - Proposed Rates**</u>

	Male		Female	
	Less than 20	20 +	Less than 20	20 +
43	0.00	0.00	0.00	0.00
44	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00
47	0.00	0.00	0.00	0.00
48	0.00	0.00	0.00	0.00
49	0.00	0.00	0.00	0.00
50	0.00	0.01	0.00	0.01
51	0.00	0.01	0.00	0.01
52	0.00	0.01	0.00	0.01
53	0.00	0.01	0.00	0.01
54	0.00	0.02	0.00	0.01
55	0.02	0.03	0.02	0.04
56	0.04	0.03	0.04	0.04
57	0.07	0.05	0.07	0.05
58	0.08	0.07	0.08	0.07
59	0.09	0.10	0.09	0.11
60	0.12	0.20	0.12	0.16
61	0.15	0.30	0.15	0.20
62	0.18	0.35	0.18	0.25
63	0.15	0.35	0.15	0.25
64	0.25	0.30	0.25	0.30
65	0.40	0.50	0.40	0.40
66	0.40	0.30	0.40	0.30
67	0.40	0.30	0.40	0.25
68	0.40	0.30	0.40	0.35
69	0.40	0.40	0.40	0.35
70+	1.00	1.00	1.00	1.00

Appendix (continued)

Disability Assumptions - Proposed Rates

Age	Teachers
19	0.00004
20	0.00004
21	0.00004
22	0.00004
23	0.00004
24	0.00004
25	0.00005
26	0.00005
27	0.00005
28	0.00005
29	0.00005
30	0.00006
31	0.00006
32	0.00006
33	0.00006
34	0.00006
35	0.00006
36	0.00006
37	0.00006
38	0.00006
39	0.00006
40	0.00010
41	0.00010
42	0.00020
43	0.00020
44	0.00030
45	0.00030
46	0.00030
47	0.00040
48	0.00040
49	0.00050
50	0.00050
51	0.00060
52	0.00060
53	0.00070
54	0.00070
55	0.00080
56	0.00080
57	0.00080
58	0.00090
59	0.00090
60	0.00100
61	0.00100
62	0.00110
63	0.00110
64	0.00120
65	0.00120

Appendix (continued)

Turnover Assumptions - Proposed Rates

Male Rates

	0	1	2	3	4	5	6	7	8	9	10+
20	0.090	0.090	0.090	0.080	0.050	0.040	0.020	0.020	0.020	0.015	0.010
21	0.090	0.090	0.090	0.080	0.050	0.040	0.020	0.020	0.020	0.015	0.010
22	0.090	0.090	0.090	0.080	0.050	0.040	0.020	0.020	0.020	0.015	0.010
23	0.090	0.090	0.090	0.080	0.050	0.040	0.020	0.020	0.020	0.015	0.010
24	0.090	0.090	0.090	0.080	0.050	0.040	0.020	0.020	0.020	0.015	0.010
25	0.090	0.090	0.090	0.080	0.050	0.040	0.020	0.020	0.020	0.015	0.010
26	0.090	0.090	0.090	0.080	0.050	0.040	0.020	0.020	0.020	0.015	0.010
27	0.090	0.090	0.090	0.080	0.050	0.040	0.020	0.020	0.020	0.015	0.010
28	0.096	0.096	0.092	0.084	0.051	0.041	0.022	0.020	0.020	0.015	0.010
29	0.102	0.102	0.094	0.088	0.052	0.042	0.024	0.022	0.020	0.015	0.010
30	0.108	0.108	0.096	0.092	0.053	0.043	0.026	0.025	0.023	0.015	0.010
31	0.114	0.114	0.098	0.096	0.054	0.044	0.028	0.027	0.025	0.014	0.010
32	0.120	0.120	0.100	0.100	0.055	0.045	0.030	0.030	0.028	0.013	0.011
33	0.117	0.117	0.098	0.097	0.056	0.046	0.032	0.032	0.030	0.012	0.012
34	0.113	0.113	0.095	0.095	0.057	0.047	0.034	0.035	0.033	0.013	0.013
35	0.110	0.110	0.093	0.092	0.058	0.048	0.036	0.037	0.035	0.013	0.013
36	0.106	0.106	0.090	0.090	0.059	0.049	0.038	0.038	0.038	0.014	0.014
37	0.103	0.103	0.088	0.087	0.060	0.050	0.040	0.040	0.040	0.014	0.014
38	0.100	0.100	0.085	0.084	0.059	0.050	0.040	0.040	0.040	0.014	0.014
39	0.096	0.096	0.083	0.082	0.058	0.050	0.040	0.039	0.039	0.015	0.015
40	0.093	0.093	0.080	0.079	0.057	0.049	0.039	0.039	0.039	0.015	0.015
41	0.089	0.089	0.078	0.077	0.055	0.048	0.039	0.038	0.038	0.015	0.015
42	0.086	0.086	0.075	0.074	0.054	0.048	0.039	0.038	0.038	0.016	0.016
43	0.083	0.083	0.073	0.071	0.053	0.047	0.039	0.037	0.037	0.016	0.016
44	0.079	0.079	0.070	0.069	0.052	0.047	0.038	0.037	0.037	0.016	0.016
45	0.076	0.076	0.068	0.066	0.051	0.046	0.038	0.036	0.036	0.017	0.017
46	0.072	0.072	0.065	0.063	0.050	0.045	0.038	0.036	0.036	0.017	0.017
47	0.069	0.069	0.063	0.061	0.049	0.045	0.038	0.035	0.035	0.018	0.018
48	0.065	0.065	0.060	0.058	0.048	0.044	0.037	0.035	0.035	0.018	0.018
49	0.062	0.062	0.058	0.056	0.047	0.043	0.037	0.034	0.034	0.019	0.019
50	0.059	0.059	0.055	0.053	0.045	0.042	0.037	0.034	0.034	0.019	0.019
51	0.055	0.055	0.053	0.050	0.044	0.041	0.037	0.033	0.033	0.020	0.020
52	0.052	0.052	0.050	0.048	0.043	0.040	0.036	0.033	0.033	0.020	0.020
53	0.050	0.048	0.048	0.045	0.042	0.039	0.036	0.032	0.032	0.021	0.021
54	0.050	0.045	0.045	0.043	0.041	0.038	0.036	0.032	0.032	0.022	0.022
55	0.050	0.045	0.045	0.040	0.040	0.037	0.036	0.031	0.031	0.023	0.023
56	0.050	0.045	0.045	0.040	0.040	0.036	0.035	0.031	0.031	0.024	0.024
57	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025
58	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025
59	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025
60	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025
61	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025
62	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025
63	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025
64	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025
65+	0.050	0.045	0.045	0.040	0.040	0.035	0.035	0.030	0.030	0.025	0.025

Appendix (continued)

Turnover Assumptions - Proposed Rates

Female Rates

	0	1	2	3	4	5	6	7	8	9	10+
20	0.060	0.070	0.090	0.090	0.090	0.090	0.080	0.075	0.070	0.070	0.040
21	0.060	0.070	0.090	0.090	0.090	0.090	0.080	0.075	0.070	0.070	0.040
22	0.060	0.070	0.090	0.090	0.090	0.090	0.080	0.075	0.070	0.070	0.040
23	0.061	0.074	0.090	0.090	0.090	0.090	0.080	0.075	0.070	0.070	0.040
24	0.062	0.078	0.090	0.090	0.090	0.090	0.080	0.075	0.070	0.070	0.040
25	0.063	0.082	0.090	0.090	0.090	0.090	0.080	0.074	0.070	0.070	0.040
26	0.064	0.086	0.090	0.090	0.090	0.090	0.080	0.074	0.070	0.070	0.040
27	0.065	0.090	0.090	0.090	0.090	0.090	0.080	0.073	0.070	0.070	0.040
28	0.082	0.105	0.094	0.094	0.094	0.090	0.079	0.073	0.070	0.070	0.040
29	0.099	0.120	0.098	0.098	0.098	0.090	0.078	0.072	0.070	0.070	0.040
30	0.116	0.135	0.102	0.102	0.102	0.090	0.077	0.072	0.070	0.070	0.040
31	0.133	0.150	0.106	0.106	0.106	0.090	0.076	0.071	0.070	0.070	0.040
32	0.150	0.150	0.110	0.110	0.110	0.090	0.075	0.070	0.070	0.070	0.040
33	0.145	0.145	0.107	0.107	0.107	0.088	0.074	0.070	0.068	0.066	0.039
34	0.141	0.141	0.104	0.104	0.104	0.085	0.073	0.070	0.066	0.062	0.038
35	0.136	0.136	0.101	0.101	0.101	0.083	0.072	0.070	0.064	0.058	0.037
36	0.132	0.132	0.098	0.098	0.098	0.080	0.071	0.070	0.062	0.054	0.036
37	0.127	0.127	0.095	0.095	0.095	0.078	0.070	0.070	0.060	0.050	0.035
38	0.123	0.123	0.093	0.092	0.092	0.075	0.062	0.062	0.054	0.046	0.034
39	0.118	0.118	0.090	0.089	0.088	0.073	0.054	0.054	0.048	0.042	0.033
40	0.114	0.113	0.087	0.086	0.085	0.070	0.046	0.046	0.042	0.038	0.031
41	0.109	0.109	0.084	0.083	0.082	0.068	0.038	0.038	0.036	0.034	0.030
42	0.105	0.104	0.081	0.080	0.079	0.065	0.030	0.030	0.030	0.030	0.029
43	0.100	0.100	0.078	0.077	0.076	0.063	0.028	0.028	0.028	0.028	0.028
44	0.095	0.095	0.075	0.074	0.073	0.060	0.026	0.026	0.026	0.026	0.026
45	0.091	0.091	0.072	0.071	0.070	0.058	0.024	0.024	0.024	0.024	0.025
46	0.086	0.086	0.069	0.068	0.067	0.055	0.022	0.022	0.022	0.022	0.024
47	0.082	0.082	0.066	0.065	0.064	0.053	0.020	0.020	0.020	0.020	0.023
48	0.077	0.077	0.063	0.062	0.061	0.050	0.020	0.020	0.020	0.020	0.021
49	0.073	0.072	0.060	0.059	0.058	0.048	0.020	0.020	0.020	0.020	0.020
50	0.068	0.068	0.058	0.056	0.055	0.045	0.020	0.020	0.020	0.020	0.019
51	0.064	0.063	0.055	0.053	0.052	0.043	0.020	0.020	0.020	0.020	0.018
52	0.059	0.059	0.052	0.050	0.048	0.040	0.020	0.020	0.020	0.020	0.016
53	0.055	0.054	0.049	0.047	0.045	0.038	0.020	0.020	0.020	0.020	0.015
54	0.050	0.050	0.046	0.044	0.042	0.035	0.020	0.020	0.020	0.020	0.015
55	0.050	0.045	0.043	0.041	0.039	0.032	0.020	0.020	0.020	0.020	0.015
56	0.050	0.045	0.040	0.038	0.036	0.030	0.020	0.020	0.020	0.020	0.015
57	0.050	0.045	0.040	0.035	0.033	0.027	0.020	0.020	0.020	0.020	0.015
58	0.050	0.045	0.040	0.035	0.030	0.025	0.020	0.020	0.020	0.020	0.015
59	0.050	0.045	0.040	0.035	0.030	0.025	0.020	0.020	0.020	0.020	0.015
60	0.050	0.045	0.040	0.035	0.030	0.025	0.020	0.020	0.020	0.020	0.015
61	0.050	0.045	0.040	0.035	0.030	0.025	0.020	0.020	0.020	0.020	0.015
62	0.050	0.045	0.040	0.035	0.030	0.025	0.020	0.020	0.020	0.020	0.015
63	0.050	0.045	0.040	0.035	0.030	0.025	0.020	0.020	0.020	0.020	0.015
64	0.050	0.045	0.040	0.035	0.030	0.025	0.020	0.020	0.020	0.020	0.015
65+	0.050	0.045	0.040	0.035	0.030	0.025	0.020	0.020	0.020	0.020	0.015

Appendix (continued)

Salary Increase Assumption - Proposed Rates

Years of Service	Teachers
0	9.50%
1	8.50%
2	8.00%
3	7.50%
4	7.00%
5	6.75%
6	6.50%
7	6.25%
8	6.00%
9	5.75%
10	5.50%
11	5.50%
12	5.25%
13	5.25%
14-24	5.00%
25+	4.75%

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