



TEACHER RETIREMENT SYTSEM OF TEXAS

**ACTUARIAL EXPERIENCE STUDY
FOR THE FOUR YEAR PERIOD
ENDING AUGUST 31, 2003**

May 2004



May 21, 2004

Board of Trustees
Teacher Retirement System of Texas
1000 Red River Street
Austin, TX 78701-2698

Dear Members of the Board:

Subject: Results of 2003 Experience Study

We are pleased to present our report on the results of the 2003 Experience Study for the Teacher Retirement System of Texas (TRS). The report includes our recommendations for new actuarial assumptions to be effective for the August 31, 2004, actuarial valuation, and it describes the actuarial impact produced by these recommendations as though they had been effective for the August 31, 2003, actuarial valuation.

With the Board's approval of the recommendations in this report, we believe the actuarial condition of the System will be more accurately portrayed. The Board's decisions should be based on the appropriateness of each recommendation individually, not on their collective effect on the funding period or the unfunded liability.

We wish to thank the TRS staff for their assistance in providing data for this study.

Respectfully submitted,
Gabriel, Roeder, Smith & Company



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SECTION I

EXECUTIVE SUMMARY

Section I

Executive Summary

- Purpose
 - To review actuarial assumptions and methods and to compare to actual experience
 - Use data from four-year period ending August 31, 2003
- Inflation rate
 - Recommend no change in current 3.00% assumption
 - Component of investment return assumption, salary increase assumption, and assumed payroll growth rate
- Real investment return rate
 - Recommend no change in current 5.00% assumption
 - Justified by current asset allocation and expected returns by asset class
 - Rate is net of administrative and investment expenses
- Investment return rate
 - Recommend no change in current 8.00% assumption
 - Comprised of 3.00% inflation and 5.00% real return assumptions
 - Still most common rate for large public retirement systems
- Payroll growth rate
 - Rate at which total TRS payroll is expected to grow
 - Only affects funding period, not liability
 - Recommend no change in current 3.00% assumption, consistent with assumed inflation
 - Assumes no membership growth, per GASB #25
 - Recommendation is conservative, given that membership growth is expected to continue
- Salary increase rates
 - Comprised of inflation, overall “productivity” increases, and longevity/promotional component
 - Recommend 0.25% increase in “productivity” component of salary scale to 1.25% for both males and females
 - Small changes to the service-related components for both males and females
 - Overall impact of changes to productivity component and service-related components is slightly higher rates of increase

- Post-retirement mortality rates (nondisabled retirees):
 - Current assumption seems too conservative
 - Current tables: 1994 Group Annuity Mortality Table (GAM94), with 4-year setback for males and a 2-year setback for females
 - Recommend change to RP-2000 for males and females with a 1-year setback for males and a 2-year setback for females
 - New A/E ratio for proposed tables is 119% for males and 121% for females
 - Changes still leaves margin for future improvement in life expectancy

- Disabled mortality rates:
 - Recommend no changes
 - 109% A/E ratio for males, 117% A/E ratio for females

- Retirement rates:
 - Current tables produce A/E ratios of 122% for males and 127% for females
 - Ratios under 100% for this assumption are conservative
 - Recommend increasing most rates, particularly for employees with 25 or more years of service who are eligible for an unreduced benefit
 - Recommended rates produce A/E ratio of 96% for males and 95% for females

- Termination rates:
 - Recommend increase in rates
 - A/E ratios at 120% for males and 145% for females
 - Ratios over 100% for this assumption are conservative
 - Propose moderate increase in rates for males and significant increase in rates for females
 - Recommended rates produce A/E ratios of 117% for males and 115% for females

- Refunds:
 - Currently assume all vested terminated members will choose the most valuable benefit
 - Conservative assumption
 - No change recommended

- Other assumptions:
 - Active member mortality, terminate vested refund percentage, etc.
 - Recommend no changes

- Actuarial methods:
 - Entry Age actuarial method still appropriate
 - Most widely used method among public, statewide plans
 - Actuarial asset method (five-year smoothing) still appropriate

- Actuarial impact of recommended changes

Item	2003 Valuation	Recommended Assumptions
(1)	(2)	(3)
New Entrant Normal Cost %	12.46%	11.72%
Unfunded Actuarial Accrued Liability (\$ in Billions)	\$5.2	\$3.2
Funding Period	Never	39.9 Years
Funded Ratio	94.5%	96.5%
GASB ARC (30-year funding period)	7.39%	6.09%

SECTION II
INTRODUCTION

Section II

Introduction

In determining liabilities, contribution rates and funding periods for retirement plans, actuaries must make assumptions about the future. Among the assumptions that must be made are:

- Retirement rates
- Mortality rates
- Turnover rates
- Disability rates
- Investment return rate
- Salary increase rates
- Inflation rate

For some of these assumptions, such as the mortality rates, past experience provides important evidence about the future. For other assumptions, such as the investment return rate, the link between past and future results is much weaker. In either case, though, actuaries should review their assumptions periodically and determine whether these assumptions are consistent with actual past experience and with anticipated future experience.

Section 825.206 of Subchapter C of Chapter 825 of Subtitle C of Title 8 of the Texas Government Code requires that at least once every five years the actuary, on authorization of the Board of Trustees, shall:

1. Investigate the mortality, service, and compensation experience of the members and beneficiaries of the retirement system;
2. On the basis of the investigation made under subdivision (1), recommend to the Board of Trustees tables and rates that are required; and
3. On the basis of tables and rates adopted by the Board of Trustees under Section 825.105, evaluate the assets and liabilities of the retirement system.

This report represents Gabriel, Roeder, Smith & Company's (GRS) study of the experience of the Teacher Retirement System of Texas (TRS) for the four-year period beginning September 1, 1999, and ending August 31, 2003. Throughout this report, the study is referred to as the "2003 Experience Study."

GRS is pleased to present the results of the 2003 Experience Study of the TRS. This report provides a summary of the principal findings of that study and includes recommendations for new assumptions to be adopted as a result of the study.

In an experience study, we first determine the number of deaths, retirements, etc. that occurred during the period. Then we determine the number that were expected, based on the current

actuarial assumptions. Finally we calculate the A/E ratio, where "A" is the actual number (of retirements, for example) and "E" is the expected number. If the current assumptions were exactly met, the A/E ratio would be 100.0%. When it varies significantly from this figure, it is a sign that new assumptions may be needed. Of course we not only look at the assumptions as a whole, but we also review how well they fit the actual results by sex, by age, and by service.

Finally, the actuary "graduates" or smoothes the results, since the raw results can be quite uneven from age to age or from service to service.

SECTION III

ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS

Section III

Analysis of Experience and Recommendations

The assumed inflation rate underlies all of the economic assumptions. Therefore, we will deal with it first. Next we will cover the other economic assumptions: the investment return rate, the salary increase rates, the cost-of-living increases and the payroll growth rate. Then we will discuss the demographic assumptions: mortality, disability, termination and retirement. Finally we will discuss the actuarial methods used.

Inflation rate

The current inflation assumption is 3.00%. Over the four-year period from August 1999 through August 2003, the CPI-U has increased at an average rate of 2.5%. However, the assumed inflation rate is only weakly tied to past results, and this has been a period of relatively low inflation. The average over the ten-year period beginning August 1993 and ending August 2003 is also 2.5%, and the average over the last 20 years is 3.1%.

We recommend that no change be made to the current 3.0% assumption. This is clearly a matter of judgment, but it appears that inflation continues to trend lower. The Federal Reserve has clearly made keeping inflation under control its first priority. Although it is certainly possible to justify an even lower inflation rate, we believe a 3.0% assumption is a reasonable long-term assumption.

Investment return rate

Currently, TRS assumes an investment return rate of 8.00%. This is the rate used in discounting future payments in order to determine the actuarial present value of those payments.

For this assumption, past performance, even averaged over a five or ten year period, is not a reliable indicator of future performance. There are several reasons for this. First, investment returns, at least theoretically, include an allowance for inflation. Returns achieved in a period of high inflation would not necessarily be achieved in a period of low inflation. Second, the asset allocation of the trust will impact the overall performance. If the allocation changes, prior performance figures may become meaningless. Finally, the real rates of return for many asset classes, especially equities, vary so dramatically from year to year that even a ten-year period may not be long enough to provide reasonable guidance.

We looked at the expected real rates of return for the TRS portfolio using three different asset consultants' capital market assumptions. Each of these capital market assumption sets justified a real rate of return assumption of 5.0%. The target allocation of the TRS portfolio and the long-term expected returns provided by the TRS investment consultant are shown in the following table. (Note the expected return numbers for the high yield debt were not provided, so we used the investment grade bond return as a proxy, the high yield debt should provide a higher expected return, so this assumption is conservative.)

The current target asset allocation for the fund is:

Asset Class	Target Allocation	Long-term Geometric Real Return	Net Real Rate of Return by Asset Class (2 x 3)
(1)	(2)	(3)	(4)
Equities – US	48.5%	6.4%	3.10%
Equities – International	13.0%	6.4%	0.83%
Private Equity	4.0%	8.7%	0.35%
Strategically Traded Securities	1.5%	5.4%	0.08%
Real Estate	3.0%	3.8%	0.11%
High Yield Debt	2.0%	2.6%	0.05%
Investment Grade Fixed Income	28.0%	2.6%	0.73%
Total	100.0%		5.25%

A real rate of return assumption of 5.0% combined with the current inflation assumption of 3.0% produces a nominal investment return assumption of 8.0%. Therefore, this model will support an 8.00% investment return assumption, and we have therefore decided to recommend no change to the current investment return rate assumption.

You should note that 8.00% is still the most common investment return assumption used by large public pension plans. You should also keep in mind that actual returns from one year to the next can vary significantly from this assumption.

Salary increase rates

The current salary increase rates vary by sex and service. They range from 26.15% for new male employees to 4.00% for both male and female employees with 20 or more years of service.

Theoretically, the salary increase rates can be divided into three components: (i) inflation, (ii) a productivity component that applies to all employees regardless of service, and (iii) a longevity/merit/promotional component that is a function of service.

After reviewing the salary increase information, we decided to use the eight year period from 1995 to 2003 for determining the assumed salary increase rate for males. We used the longer period due to the extremely inconsistent salary increase information for males during the last four years. However, for females it appears that the final three years of the study period produce very consistent results (similar to what would occur if the eight year period was used), therefore we decided to use the most recent three years in determining the salary increase assumption for females (hence excluding the period 1999/2000).

Based on these study periods we are recommending a 0.25% increase in the productivity component of the salary scale from the current 1.0% to 1.25%. We are also recommending modification to the Step Rate/Promotional Rates of increase that vary by years of service. These modifications vary both up and down. The overall impact of these combined changes is slightly larger rates of salary increase.

Payroll growth rate

The salary increase rates discussed above are assumptions applied to individuals. They are used in projecting future benefits. We also use a separate payroll growth assumption, currently 3.00%, in determining the charge needed to amortize the unfunded actuarial accrued liability. The amortization payments are calculated to be a level percentage of payroll, so as payroll increases over time, these charges do too. The amortization percentage is dependent on the rate at which payroll is assumed to increase.

Over the last four years, payroll growth has averaged 7.2%, and it has averaged 6.8% over the last ten years.

Payroll can grow at a rate different than the average pay increase for individual members. There are two reasons for this. First, when older, longer-service members terminate, retire or die, they are generally replaced with new employees who have a lower salary. Because of this, in most populations that are not growing in size, the growth in total payroll will be smaller than the average pay increase for members. Second, payroll can grow due to an increase in the size of the group. However, despite the fact that the System has been experiencing growth in membership (at an average of 2.8% over the last ten years), Governmental Accounting Standards Board Statement 25 (GASB 25) prohibits systems from using anticipated membership growth in setting the payroll growth assumption.

Theoretically, over the long term the total payroll for a population of constant size should grow at about the rate at which starting pay for new members is increasing. For TRS, we assume that this rate equals the inflation rate. Therefore, to be consistent with our inflation assumption of 3.00%, we are recommending no change in the payroll growth rate.

Post-retirement mortality rates

The mortality table currently being used for non-disabled retirees and for beneficiaries receiving benefits is the 1994 Group Annuity Mortality Table. The table has separate rates for males and females. Ages are setback four years for males and two years for females.

There were 6,855 deaths among the male retirees and beneficiaries, and 15,154 deaths among female retirees and beneficiaries during the last four years. (These figures exclude deaths of disabled retirees.) Based on the current tables, we expected 4,092 and 10,544 deaths respectively. This produced A/E ratios of 168% for males and 144% for females.

While it is desirable to have some margin for future mortality improvement, clearly the A/E ratios are too high. Therefore we are recommending that new assumptions be adopted for healthy retirees and beneficiaries.

We are recommending using the new RP-2000 mortality table for males and females. Age setbacks of one year for males and two years for females are also being recommended. The A/E ratios for the recommended mortality assumptions are 120% for males and 122% for females. In choosing a mortality table, we intentionally aim for A/E ratios over 100%, to give some room for future improvement in life expectancy.

Disabled mortality rates

There were 394 deaths among the male disabled retirees, and 767 deaths among the female disabled retirees during the last four years. Based on the current assumptions, we expected 361 and 658 deaths respectively. This produced A/E ratios of 109% for males and 117% for females. These results are very reasonable, and therefore we are recommending no changes in this assumption.

Active mortality rates

There were 265 deaths among male active employees under the age of 68, and 401 deaths among female active employees under the age of 68 during the last four years. Based on the current assumptions, we expected 331 and 472 deaths respectively. This produced A/E ratios of 80% for males and 85% for females.

While the data we reviewed indicated that active mortality rates may be lower than the expected rates produced by the table, we do not believe the differences warrant making a change at this time. Therefore, we recommend that we continue to use the current mortality rates for active members. It should be noted that this is probably the least material of all of the assumptions.

Disability rates

There were 568 disabilities among male active employees and 1,456 disabilities among female active employees during the four year study period. Based on the current assumptions, we expected 691 and 1,978 disabilities respectively. This produced A/E ratios of 82% for males and 74% for females.

We are recommending that the disability rates be decreased so that the expected number of disabilities will be more in line with actual experience. We are proposing to use 85% of the current male rates of disability and 80% of the current female rates of disability. The new assumptions produce A/E ratios of 97% for males and 92% for females respectively.

Retirement rates

We currently use retirement rates that vary by gender, age, and service, and we want to continue this practice.

There were 13,529 retirements among male active employees and 40,093 retirements among female active employees during the four year study period. Based on the current assumptions, we expected 11,092 and 31,489 retirements respectively. This produced A/E ratios of 122% for males and 127% for females.

A/E ratios of less than 100% are conservative, and therefore we believe the retirement rates should be modified so that more retirements are expected. The rates will be modified at most age

and service combinations. In particular, the rates for employees with more than twenty-five years of service who are eligible for an unreduced benefit will be increased significantly. The proposed retirement rates produce A/E ratios of 96% for males and 95% for females.

Termination rates

Termination rates reflect members who leave for any reason other than death, disability, or service retirement. They apply whether the termination is voluntary or involuntary, and whether the member takes a refund or keeps his/her account balance on deposit in the System. The current termination rates reflect the member's age, service, and sex, and we want to continue this practice.

There were 59,481 terminations among male active employees and 156,550 terminations among female active employees during the four year study period. Based on the current assumptions, we expected 49,612 and 107,888 terminations respectively. This produced A/E ratios of 120% for males and 145% for females. For this assumption, A/E ratios over 100% are conservative.

We believe that both of these A/E ratios are too high. We are recommending that the termination rates be modified to better reflect the past (and anticipated future) experience. The proposed assumptions produce A/E ratios of 117% for males and 115% for females. In conjunction with the new withdrawal rates we are also recommending that all employees who terminate after eligibility for retirement be assumed to retire (i.e. there is no longer a probability of withdrawal when a member is eligible for retirement).

Vested terminating members benefit election assumption

Currently it is assumed that all terminated vested members will select the most valuable benefit available to them (either refund of member contributions or a deferred annuity). We believe this assumption is still reasonable and are recommending no change.

Vested terminated members transfer assumption

Currently it is assumed that 10% of all terminated vested members will become members of the Employees Retirement System of Texas and thereby continue to accrue service towards retirement eligibility under TRS. We believe this assumption is still reasonable and are recommending no change.

New entrant profile for normal cost calculation

Currently the normal cost rate for the plan is determined using a new entrant profile. We are recommending that the new entrant profile be updated with information from the four-year study period. The updated profile reflects new entrants during the four-year study period. Before reflecting other recommendations, the updated profile produces no material change in the normal cost as a percent of pay.

DROP election rates

The experience of the last four years shows that very few members are entering into DROP. Therefore, we are recommending that the current 5% DROP participation assumption be eliminated.

Other assumptions

There are other assumptions made in the course of a valuation, such as the election rates for active member death benefits, the handling of new entrant data with missing information, etc. We reviewed these, and decided to recommend no changes to these other assumptions.

Actuarial methods

We have reviewed the actuarial cost method being used – the Entry Age Normal cost method – and we continue to believe that this is the method of choice for this plan, since this method usually does the best job of keeping costs level as a percentage of payroll. We also believe the method used to determine the actuarial value of assets (AVA) is appropriate, since it does a good job of smoothing asset gains and losses, and reduces fluctuations in the funding period.

SECTION IV

ACTUARIAL IMPACT OF RECOMMENDATIONS

Section IV

Actuarial Impact of Recommendations

Shown below is a table that compares key statistics from the August 31, 2003, actuarial valuation before and after taking into account the recommended new assumptions.

Item (1)	Valuation Results as of 8/31/03		Change	
	Current Assumptions (2)	Recommended Assumptions (3)	Amount (4)	Percent (5)
1. Normal cost %	12.46%	11.72%	(0.74%)	(5.9%)
2. Present value of future pay	\$236.1	\$211.2	(\$24.9)	(10.5%)
3. Present value of future benefits for retired members	\$41.5	\$40.0	(\$1.5)	(3.6%)
4. Present value of future benefits for active members	\$80.3	\$75.0	(\$5.3)	(6.6%)
5. Total present value of future benefits	\$123.7	\$117.0	(\$6.7)	(5.4%)
6. Actuarial accrued liability	\$94.3	\$92.2	(\$2.1)	(2.2%)
7. Actuarial value of assets	\$89.0	\$89.0	\$0.0	0.0%
8. Unfunded actuarial accrued liability	\$5.2	\$3.2	(\$2.0)	(38.5%)
9. Funding period	Never	39.9 years	N/A	N/A
10. Funded ratio	94.5%	96.5%	2.0%	2.1%

- All dollar amount in \$ billions

Funding period is based on current State rate of 6%, and current member rate of 6.4%.

- Based on the recommended assumptions:
 - If the member contribution rate remains at 6.40% the State contribution rate would need to increase to 6.09% to produce a funding period of 30 years
 - If the State contribution rate remains at 6.00% the member contribution rate would need to increase to 6.50% to produce a funding period of 30 years

- Note: Due to deferred asset losses, the 30 year contribution rates will need to be increased in the future if no offsetting asset gains arise. The following describes what the calculated rates will be if all deferred losses are recognized with no offsetting gains:
 - If the member contribution rate remains at 6.40% the State contribution rate would need to increase to 8.97% to produce a funding period of 30 years
 - If the State contribution rate remains at 6.00% the member contribution rate would need to increase to 9.72% to produce a funding period of 30 years

SECTION V

SUMMARY OF RECOMMENDATIONS

Section V

Summary of Recommendations

Our recommendations may be summarized as follows:

1. Make no change to the assumed inflation rate of 3.00%.
2. Make no change to the assumed real return on investments – the return in excess of inflation – of 5.00%. (The first two recommendations, taken together, result in no change to the nominal 8.00% investment return rate assumption.)
3. Change the salary increase rates to reflect a larger productivity component (0.25% increase). Also modify the service-based components. The overall impact is to increase assumed salary increase rates for most employees.
4. Make no change in the assumed payroll growth assumption of 3.00%.
5. Increase the rates of mortality for healthy retirees and beneficiaries. Recommend adoption of RP-2000 mortality table for males and females with a one year setback for males and a two year setback for females.
6. Make no change to the rates of mortality for disabled retirees.
7. Make no change to the rates of mortality for active employees.
8. Decrease the rates of disability for active employees. Use 80% of the current rates for males and 85% of the current rates for females.
9. Increase the rates of retirement for both males and females. Larger increases in the rates for employees eligible for unreduced retirement who have at least 25 years of service.
10. Increase the rates of termination for both males and females. Rates for females are being increased significantly.
11. Eliminate the DROP participation assumption.
12. Update the new entrant profile used in determining the System's normal cost. New profile will reflect new entrants from the four year period.
13. No other changes are being made to any other actuarial assumption or method.

SECTION VI

SUMMARY OF ASSUMPTIONS AND METHODS INCORPORATING THE RECOMMENDED ASSUMPTIONS

Section VI

Summary of Assumptions and Methods Incorporating the Recommended Assumptions

Actuarial Assumptions

1. Investment Return Rate: 8.0% per annum, compounded annually, composed of an assumed 3.0% inflation rate and a 5.0% real rate of return
2. Mortality, Withdrawal, Disability Retirement and Service Retirement Rates:

Rates and scales developed in the actuarial investigation as of August 31, 2003, with values at specimen ages shown in the tables below:

Age	Probability of Decrement Due to	
	Death	Disability Retirement
	Male Members	
20	.000430	.000003
30	.000727	.000050
40	.000891	.000448
50	.001899	.001514
60	.005581	.002888
70	.018034	.000000
	Female Members	
20	.000242	.000007
30	.000294	.000081
40	.000512	.000293
50	.001033	.001570
60	.002563	.003045
70	.009694	.000000

Probability of Decrement Due to Withdrawal – Male Members

Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	10+
20	0.2465	0.2458	0.1794	0.1329	0.1058	0.0897	0.0915	0.0947	0.0836	0.0734	0.0818
30	0.2060	0.1955	0.1514	0.1178	0.0900	0.0772	0.0700	0.0655	0.0593	0.0519	0.0565
40	0.1923	0.1831	0.1399	0.1063	0.0832	0.0756	0.0639	0.0549	0.0474	0.0395	0.0242
50	0.1640	0.1562	0.1162	0.0827	0.0620	0.0557	0.0508	0.0475	0.0451	0.0360	0.0151
60	0.1715	0.1633	0.1294	0.0925	0.0659	0.0526	0.0431	0.0380	0.0328	0.0244	0.0108
70	0.1954	0.1861	0.1563	0.1145	0.0795	0.0534	0.0381	0.0315	0.0257	0.0168	0.0079

Probability of Decrement Due to Withdrawal – Female Members

Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	10+
20	0.1957	0.1864	0.1486	0.1275	0.1109	0.1043	0.0973	0.0911	0.0831	0.0737	0.0651
30	0.1912	0.1821	0.1459	0.1199	0.1002	0.0956	0.0870	0.0806	0.0729	0.0642	0.0535
40	0.1682	0.1602	0.1194	0.0933	0.0774	0.0704	0.0643	0.0542	0.0493	0.0439	0.0255
50	0.1498	0.1427	0.1054	0.0841	0.0664	0.0591	0.0520	0.0484	0.0432	0.0371	0.0182
60	0.1767	0.1683	0.1315	0.1036	0.0784	0.0602	0.0534	0.0468	0.0409	0.0313	0.0092
70	0.2094	0.1994	0.1948	0.1521	0.1002	0.0596	0.0448	0.0354	0.0356	0.0303	0.0086

Probability of Decrement Due to Retirement – Male Members

Age	Years of Service							
	0-4	5-9	10-14	15-18	19	20-24	25-29	30+
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.300
55	0.000	0.010	0.010	0.010	0.010	0.070	0.220	0.220
60	0.000	0.020	0.020	0.020	0.020	0.300	0.300	0.300
65	0.000	0.300	0.300	0.300	0.300	0.300	0.300	0.300
70	0.000	0.200	0.200	0.200	0.200	0.200	0.200	0.200
74	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Probability of Decrement Due to Retirement – Female Members

Age	Years of Service							
	0-4	5-9	10-14	15-18	19	20-24	25-29	30+
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.300
55	0.000	0.020	0.020	0.020	0.020	0.080	0.230	0.230
60	0.000	0.030	0.030	0.030	0.030	0.300	0.300	0.300
65	0.000	0.320	0.320	0.320	0.320	0.320	0.320	0.320
70	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250
74	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

3. Rates of Salary Increase

Inflation rate of 3.0%, plus productivity component of 1.25%, plus step-rate/promotional component as shown:

Years of Service	Annual Step-Rate/Promotional Rate of Increase		Total Annual Rate of Increase	
	Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)
1	22.15%	19.60%	26.40%	23.85%
2	3.25%	2.75%	7.50%	7.00%
3	2.55%	2.00%	6.80%	6.25%
4	2.35%	1.75%	6.60%	6.00%
5	2.15%	1.60%	6.40%	5.85%
6	1.85%	1.60%	6.10%	5.85%
7	1.65%	1.40%	5.90%	5.65%
8	1.50%	1.35%	5.75%	5.60%
9	1.25%	1.25%	5.50%	5.50%
10	1.05%	1.15%	5.30%	5.40%
11-19	0.65%	0.50%	4.90%	4.75%
20 or more	0.00%	0.00%	4.25%	4.25%

Disability Annuitants:

Mortality: The PBGC Male Disabled Mortality Table for plan terminations after December 1, 1980, with a six-year setback and the PBGC Female Disabled Mortality Table for plan terminations after December 1, 1980, with a four-year setback

Service Retirement Annuitants, Nominees and Survivors:

Mortality: RP-2000 Male Mortality Table with a one-year setback and the RP-2000 Female Mortality Table with a two-year setback; used for service retirement annuitants, beneficiaries and survivors. These tables are selected to best reflect the experience developed in the actuarial investigation as of August 31, 2003.

ERS/TRS Transfer Assumptions:

A liability for the present value of the potential asset transfer has been calculated assuming that the TRS members who will be eligible for the transfer benefit are approximated by 10% of the inactive TRS members who have at least five years of service and have left their contributions on deposit. The liability is based on the actuarial present value of the deferred benefit assuming future salary increases at the current salary scale rates and that they will retire at the earliest age for which an unreduced benefit will be received.

Handling of Active Data with Missing Information:

As of the close of each fiscal year there is a large number of new TRS entrants for whom no statistical data has been received. The only information TRS has is social security number and initial contributions. Beginning with the valuation as of August 31, 1993, active member results have been imputed for this group according to the following procedures:

1. The count for this group has been added to the active member count.
2. Covered payroll and the present value of future pay have been increased by the product of the number of such members multiplied by average new entrant pay and present value of future pay.
3. The present value of future benefits for active members has been increased by the product of the new entrant normal cost rate multiplied by the imputed present value of future pay for this group, as determined under Item 2 above.

Assumption for DROP Participation:

It is assumed that no members will enter DROP.

Benefit Election of Vested Terminating Members:

In determining the liabilities developed for future terminating vested members, it will be assumed the member elects either a refund or a deferred vested benefit, whichever is more valuable. The deferred benefit is assumed to commence at age 65.

Election Rates for Active Member Death Benefits:

It is assumed that the beneficiary will elect the death benefit option with the greatest value.

Actuarial Value of Assets:

The actuarial value of assets is equal to the market value of assets less a five-year phase-in of the excess (shortfall) between expected investment return and actual income (based on market value), with the resulting value not being less than 80% or more than 120% of the market value of assets.

Payroll Growth for Funding of Unfunded Actuarial Accrued Liability:

1. Total payroll growth rate: 3.00%
2. Portion attributable to inflation: 3.0%
3. Portion attributable to active member growth: No growth

Actuarial Cost Method:

The funding period required to amortize the unfunded actuarial accrued liability (UAAL) is determined using the Entry Age Actuarial Cost Method. This method assigns the plan's total unfunded liabilities (the actuarial present value of future benefits less the actuarial value of assets) to various periods. The unfunded actuarial accrued liability is assigned to years prior to the valuation, and the normal cost is assigned to the year following the valuation. The remaining costs are assigned to future years.

The normal cost is determined as a level percentage of payroll for a group of new entrants, based on actual new entrant experience for the period 2000-2003. This percentage of payroll is then applied to the total compensation for the prior year for all active members, and is then adjusted for the payroll growth assumption.

The actuarial accrued liability is the difference between the total present value of future benefits and the actuarial present value of future normal costs. The unfunded actuarial accrued liability (UAAL) is the excess of the actuarial accrued liability over the actuarial value of assets.

Since the State statutes governing the System establish the current employee and State contribution rates, the actuarial valuation determines the number of years required to amortize (or fund) the UAAL on a level percentage of payroll basis, taking into account the payroll growth assumption and the normal cost expressed as a percent of pay.

Because of this amortization procedure, any change in the unfunded actuarial accrued liability due to (i) actuarial gains and losses, (ii) changes in actuarial assumptions, or (iii) amendments, affects the funding period. The statutory goal is that the State contribution rate be sufficient to keep the funding period below 31 years.

Funding of Unfunded Actuarial Accrued Liability:

Funded by the excess of future State contributions required by Law over amount of such contributions required to fund the normal cost of benefits. Based on a study of all new entrants hired in the period from 1999 through 2003 and taking into account all changes in benefit provisions, the normal cost for benefits provided by the System is 11.72% of payroll (6.40% by members, plus 5.32% by the State), which is 0.68% of payroll less than the total contributions required by Law. It is assumed that the excess amount of 0.68% of payroll will be utilized to fund the unfunded actuarial accrued liability over a period of years in the future, assuming that total payroll increases by 3.0% per year.

SECTION VII
DEFINITIONS OF TERMS

Section VII

Definition of Terms

The following glossary is intended to provide definitions of a number of terms which are used throughout this report and which are somewhat unique to the discussion of an Experience Study.

Actuarial Decrement The actual number of decrements which occurred during the study. This number is a straight tabulation of the actual number of occurrences of the particular decrement in question. Normally, the actual number of decrements will be subdivided by age and sex, and possibly by service.

Actual-to-expected Ratio This is the ratio, expressed as a percent, 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 applicable exposures. Throughout the report, this actual-to-expected ratio will be referred to as the “A/E ratio,” or more simply as just the “A/E.”

Aggregate Assumptions Assumptions which vary only by sex and/or age. The impact of year of service on the decrement is ignored. All experience is combined by age and/or sex without regard to service. Rates of death and disablement are more appropriate to aggregate measurement in a retirement system.

Crude Rate of Decrement The rate of decrement determined by dividing the actual number of the respective decrement for that age (and service) and sex by the corresponding exposure for that age (and service) and sex. The rate is described as a crude rate because no smoothing or elimination of statistical fluctuations has been made. It is indicative of the underlying true rate of the decrement and is the basis used in graduation to obtain the graduated or tabular rate.

Decrements The decrements are the means by which a member ceases to be a member. For active members, the decrements are death, withdrawal, service retirement, and disability retirement. For retired members, the only decrement is death. For disabled participants, the two decrements are death and recovery. The purpose of the Experience Study is to determine the underlying rates of each decrement.

Enders One of four classifications of members during the study period. The Enders are those members who are still covered by the System at the end of the study period. In the active portion of the study, they are the members who are still considered active as of the end of the study period. For the retired and disabled portion of the study, they are the members who are still receiving benefits at the end of the study period.

Expected Decrement This is the number of occurrences of a given decrement expected to occur for a given age (and service) and sex based on the number of lives exposed to the risk of the particular decrement and the current assumed rate for that decrement. It will also be referred to as the tabular number of decrements. It is the number of deaths, withdrawals, retirements, or disabilities (whichever is applicable) that would have actually occurred had the actuarial assumptions been exactly realized.

Exposure The number of lives exposed to a given risk of decrement for a particular age (and service) and sex. It is mathematically calculated as a linear combination of the starters, new entrants, terminations, and enders. It represents the number of members who could have potentially died, retired, become disabled, or withdrawn at that particular age (and service) and for that particular sex. This term will also be described as “the number exposed to a given risk.”

General Salary Increase Rate The general rate of increase in salaries during a year. It is the component of the total select and ultimate salary scale which is independent of age or service. It consists of two components: inflation and productivity increases. It may be viewed as the ultimate rate of increase if there are no more step-rate/promotional increases applicable.

Graduated Rates Graduation is the mathematical process by which a set of crude rates of a particular type is translated into graduated or tabular rates. The graduation process attempts to smooth out statistical fluctuations and to arrive at a set of rates that adequately fit the underlying actual experience of the crude rates that are being graduated. The graduation process involves smoothing the results, but at the same time trying to fit the results to be consistent with the original data. It requires that the actuary exercise his or her judgment in what the underlying shape of the risk curve should look like.

Interpolated Rates For the active rates of decrement (death, disability, retirement, and withdrawal), the actuary will develop graduated rates based on quinquennial age groupings (see definition). To arrive at the rates of decrement for ages between two quinquennial ages, the graduated quinquennial rates must be interpolated for these intermediate ages. The interpolated results are arrived at by applying a mathematical interpolation formula to the quinquennial graduated rates.

New Entrants Those member who first enter the applicable membership category after the starting date of the study but before the ending date of the study. In the active portion of the experience study, these are newly hired employees whose first date of hire is after the beginning date of the study and before the ending date of the study. For the study of the retired mortality, these are members who first start receiving a benefit during the period covered by the study. They may be either (1) new annuitants, (2) beneficiaries of active or disabled members who begin receiving a benefit under one of the death benefit options, or (3) survivors who first start receiving their survivor benefit during the period. For the disabled annuitant study, they are members who first become disabled during the study. Note that in the case of retirement and disability, the same person will be included in the applicable decrement in the active portion of the study and as a new entrant in the retired or disabled annuitant portion of the study.

Quinquennial Age Groupings For the active decrements, it is preferable to group the experience in five-year age groups for graduation and analysis purposes so as to minimize statistical fluctuations resulting from a lack of exposure which may occur for individual ages. Quinquennial age grouping is the five-year age grouping which is used to develop the graduated rates of decrement for active membership. The quinquennial age is the central age of the five-year grouping.

Select and Ultimate Assumptions Assumptions which vary by years of service in addition to sex and/or age. In a retirement system you might expect service to be a factor in the rates of withdrawal, retirement, and salary increase.

Starters That group of the membership which is deemed to be active the purposes of the study as of the starting date of the study. For the active portion of the study, these will be those members who are still classified as active members as of the beginning of the study period. For the retired and disabled portion of the study, these are annuitants who were receiving benefits as of the start of the study

***Step-Rate/
Promotional Salary
Increase Rate*** The portion of the total salary scale which varies by service. It reflects the impact of moving up the salary grid in a given year, rather than the increase in the overall grid. It includes the salary increase associated with promotions during the year.

Tabular Rates The tabular rate of decrement or salary increase is the rate determined by the graduation and interpolation process. It is the expected rate of change as opposed to the crude rate of change. It is deemed to be the underlying rate applicable to the decrement or to the rate of salary increase. In the first phase of the study, the actual results are compared to the expected results based on the tabular rates developed by the previous study. The second phase of the study determines the new tabular rates based on the crude rates. The final phase of the study compares the actual decrement to the expected decrement based on the new tabular rates.

Terminations Those members who were either starters at the beginning of the study period or who were new entrants during the period but who were not still present at the end of the study. Terminations have exited the population by one of the various types of possible decrements. In the active portion of the study, terminations are classified as to the four types of decrements: death, withdrawal, disabilities, or retirements.
