

**PUBLIC SCHOOL EMPLOYEES'  
RETIREMENT SYSTEM OF PENNSYLVANIA**

**EXPERIENCE REVIEW FOR THE PERIOD  
JULY 1, 2005 TO JUNE 30, 2010**

June 22, 2011

The Retirement Board  
Public School Employees'  
Retirement System of Pennsylvania  
5 North 5<sup>th</sup> Street  
Harrisburg, PA 17108-0125

Ladies and Gentlemen:

This report presents the results of the actuarial review of the demographic and economic experience of the active members, annuitants, beneficiaries and survivors covered under the Public School Employees' Retirement System of Pennsylvania for the five-year period July 1, 2005 to June 30, 2010.

This experience review was prepared in accordance with Section 8502(j) of the Retirement Code, which requires the actuary for PSERS to make an actuarial investigation into the mortality, service and compensation experience of the members and beneficiaries covered under the System at least once in each five-year period.

The attached report describes the actuarial process employed and identifies the significant results of the study.

### **Summary of Recommendations**

The results of the experience review show that for many of the assumptions the actual experience of the System has deviated from expected based on the current assumption set. In particular, we have recommended and the Board has adopted changes to the following actuarial assumptions:

- Rates of mortality among active members, annuitants, beneficiaries and survivors.
- Rates of withdrawal, disability and retirement from employment among active members.
- Rates of increase in annual salaries among active members.
- The rate of inflation.
- The interest rate.

In addition, we recommended and the Board adopted changes to the option factors. The new option factors reflect the improved mortality.

A detailed analysis is included in the report. The financial impact of adopting the recommended assumptions and option factors is shown in the table below.

**Public School Employees' Retirement System of Pennsylvania  
Financial Impact of Adopting Recommended Assumptions  
June 30, 2010**

**(\$ Amounts in Thousands)**

Item	Unfunded Accrued Liability	Employer Pension Contribution Rate*
1. Current Assumptions	\$ 19,698,580	18.27%
2. Impact of Change in Assumptions	<u>4,467,070</u>	<u>2.40</u>
3. Revised Assumptions	\$ 24,165,650	20.67%

\* Reflects the funding provisions of Act 120 except for the applicable fiscal year 2012 pension rate collar. The final Employer Pension Contribution Rate, after applying the fiscal year 2012 pension collar, is 8.00%. The health insurance rate is .65%. Note that the recommended assumptions will become effective with the June 30, 2011 actuarial valuation.

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

We would be pleased to discuss the report in detail upon request.

Sincerely,



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**PUBLIC SCHOOL EMPLOYEES'  
RETIREMENT SYSTEM OF PENNSYLVANIA**

**EXPERIENCE REVIEW FOR THE PERIOD  
JULY 1, 2005 TO JUNE 30, 2010**

**TABLE OF CONTENTS**

<u>Section</u>	<u>Page</u>
I Introduction .....	1
II Discussion of Experience Review Demographic Assumptions For Active Employees .....	4
III Discussion of Experience Review Mortality Experience Among Annuitants .....	8
IV Discussion of Experience Review Economic Factors .....	9
V Option Factors .....	11
VI Financial Impact of Recommended Assumptions.....	12
VII Comparison of Actual and Expected Experience During Five-Year Period from July 1, 2005 Through June 30, 2010.....	16
Table 1(a) Summary of Experience for Termination From Employment Before Retirement Non-Vested Withdrawals With Less Than Five Years of Service .....	17
Table 1(b) Summary of Experience for Termination From Employment Before Retirement Vested Withdrawals With At Least Five but Less Than Ten Years of Service.....	19
Table 1(c) Summary of Experience for Termination From Employment Before Retirement Vested Withdrawals With At Least Ten Years of Service .....	21

**PUBLIC SCHOOL EMPLOYEES'  
RETIREMENT SYSTEM OF PENNSYLVANIA**

**EXPERIENCE REVIEW FOR THE PERIOD  
JULY 1, 2005 TO JUNE 30, 2010**

**TABLE OF CONTENTS**  
**(Continued)**

<u>Section</u>		<u>Page</u>
VII	(Continued)	
Table 2	Summary of Experience for Death in Active Service .....	23
Table 3	Summary of Experience for Disability Retirement .....	25
Table 4	Summary of Experience for Superannuation .....	27
Table 5	Summary of Experience for Early Retirement.....	29
Table 6	Summary of Mortality Experience Among Annuitants - Superannuation, Early, and Withdrawal.....	31
Table 7	Summary of Mortality Experience Among Annuitants – Disability .....	33
Table 8	Summary of Inflation and Investment Returns .....	35
Table 9	Salary Increase Rates of Active Members .....	36
VIII	Recommended Demographic and Active Salary Increase Assumptions.....	37

**PUBLIC SCHOOL EMPLOYEES'  
RETIREMENT SYSTEM OF PENNSYLVANIA**

**EXPERIENCE REVIEW FOR THE PERIOD  
JULY 1, 2005 TO JUNE 30, 2010**

**SECTION I - INTRODUCTION**

Section 8502(j) of the Retirement Code provides that in every five-year period, the actuary of the System is to make an actuarial investigation and evaluation of the mortality, service and compensation experience of the members and beneficiaries covered under the System during the preceding five years. This report presents the results of the experience review of the System for the five-year period July 1, 2005 through June 30, 2010.

The objectives of the investigation are to:

- Determine appropriate rates to anticipate the following events among active members:
  - withdrawal from employment;
  - death in active service;
  - disability retirement;
  - superannuation retirement; and
  - early retirement
- Determine appropriate rates to anticipate mortality among annuitants, survivor annuitants, beneficiaries and disability annuitants.
- Determine appropriate economic assumptions to anticipate future trends in active members' salary increases and the investment return assumption in relation to the current underlying economic conditions.
- Make recommendations regarding the adoption of refinements to the actuarial basis of the System, which are deemed appropriate by the actuary for adoption by the Board.

**Methodology**

Data is supplied annually to the actuary by the System for purposes of the actuarial valuation report. This data includes demographic characteristics of the current and past membership, including any changes in the members' status or relationship with the System. The data also includes a salary history for active members and System asset information. These demographic changes and economic history are the basis for the experience review.

Tabulations were compiled which show the distribution by age of the number of members who were **exposed** during the five-year period to the events of withdrawal from employment, retirement, death and disability. A member is considered exposed to an event if the member meets the age and service requirements for that event. The assumed rates of occurrence for each event, which are currently used in the annual actuarial valuations, were then applied to the number of members exposed to determine the number of members **expected** to separate from service for each category.

The **actual** number of members who separated from service due to withdrawal from employment, retirement, death or disability was then compared to the expected number. The results were then

expressed as a ratio of actual experience over expected experience. A ratio of actual to expected of 100% means the actual occurrence of the event is exactly as anticipated, higher than 100% means actual occurrence of the event was more than expected, and less than 100% means fewer actual incidence of the event occurred than expected. In some instances a high ratio is favorable for the financial experience of the System and in others, a high ratio is unfavorable. Data is generally grouped by age in five-year increments to provide statistically significant results.

The expected and actual salaries as of the end of each year were also compared to actual salaries as of the end of each previous year. The comparisons show an average annual total increase in both expected and actual salaries for the five-year period.

The System's fund performance was also examined. The interest rate assumption was then analyzed in relation to the current underlying economic conditions.

The results of the experience review are the basis for the actuary's recommendation of assumption changes. In recommending assumptions the actuary must also take into account special plan benefits as well as past economic factors.

In addition to comparing actual to expected experience and adjusting the results for special plan benefits and economic conditions, the actuary must consider future expectations of experience due to future plan changes or changes in the economy.

To summarize, the actuary's recommendation of assumptions is based on the following:

- comparison of actual to expected experience,
- adjustment for special plan benefits and past economic conditions, and
- adjustment for future plan changes and economic conditions.

Generally, actuarial assumptions are selected with a slight margin for adverse experience so that the financial strength of the System can be maintained.

### **Summary of Experience Review**

The summaries included in Section VII show the comparisons and results of the experience investigation for:

- the actual and expected cases of separation from active service,
- the actual and expected mortality among annuitants and disability annuitants,
- the average annual increases in salaries among active members, and
- the annual rates of return on assets.

## Recommendations

Based on the results of our investigation, we recommend revisions to the rates of:

- withdrawal,
- death in active service,
- disability,
- superannuation and early retirement, and
- death after retirement.

We also recommend that the salary increase assumption be reduced to an average of 5.50%, the rate of inflation be reduced to 3.00% and the investment return assumption be reduced to 7.50%.

## Financial Impact

We have determined the financial impact on the System of adopting the recommended set of assumptions. The calculations are based on the results of the June 30, 2010 actuarial valuation and are shown in the table below.

**Public School Employees' Retirement System of Pennsylvania**  
**Financial Impact of Adopting Recommended Assumptions**  
**June 30, 2010 Valuation**

(\$ Amounts in Thousands)

Item	Unfunded Accrued Liability	Employer Pension Contribution Rate*
1. Current Assumptions	\$ 19,698,580	18.27%
2. Impact of Change:		
• Demographic Assumptions	1,068,993	.60
• Economic Assumptions	3,323,709	1.76
• Option Factors	<u>74,368</u>	<u>.04</u>
3. Revised Assumptions (1) + (2)	\$ 24,165,650	20.67%

\* Reflects the funding provisions of Act 120 except for the applicable fiscal year 2012 pension rate collar. The health insurance rate is .65%. Note that the recommended assumptions will become effective with the June 30, 2011 actuarial valuation.



## SECTION II - DISCUSSION OF EXPERIENCE REVIEW

### DEMOGRAPHIC ASSUMPTIONS FOR ACTIVE MEMBERS

Tables 1 through 5 included in Section VII summarize the actual and expected separations from active service due to withdrawal from employment, death, disability, superannuation and early retirement during the five-year period ended June 30, 2010. Separate summaries for males and females are presented for all of these categories. In addition, Tables 6 and 7 included in Section VII summarize mortality experience for annuitants and disability annuitants. The tables also show the ratio of actual to expected experience under each current assumption. We have also presented the same information under the recommended change for each of the assumptions.

The following table summarizes the ratio of actual to expected cases of separation from active service and mortality among annuitants based on current assumptions.

#### Summary Comparison of Actual to Expected Cases Males and Females Combined

Event	Ratio of Actual To Expected Experience	
	Males	Females
Withdrawal from Employment		
• Non-Vested with Less than Five Years of Service	113%	95%
• Vested with at least Five but less than Ten Years of Service	116	112
• Vested with at least Ten Years of Service	122	121
Death in Active Service	95	79
Disability Retirement	100	69
Superannuation Retirement	82	92
Early Retirement	115	125
Death after Retirement:		
• Withdrawal, Early, or Superannuation Annuitants	94	96
• Disability Annuitants	105	81

For purposes of the comparison, the ratio of the actual to expected experience is expressed as a percentage for each type of event. A percentage in excess of 100% indicates that the actual experience was greater than the expected experience, whereas a percentage of less than 100% indicates that the actual experience was less than expected.

For example, in regard to withdrawal from employment for all vested members with at least ten years of service for males, Table 1(c) on Page 21 shows an entry of 122%. This means that during the five-year experience review period, the actual number of vested members with at least ten years of service who withdrew from employment was more than the expected number of vested withdrawals with at least ten years of service by 22% (i.e., 122% minus 100%).

The comments presented below under each category discuss the results of the experience study with respect to the demographic factors, along with our recommendations for modifying the assumptions.

### **Rates of Withdrawal from Employment**

We examined the actual experience of terminations separately for non-vested members, vested members with at least five but less than ten years of service, and vested members with at least ten years of service. The results of the study still show differences between the withdrawal rates for all three categories. For this reason, we recommend the continued use of separate rates of withdrawal.

Table 1(a) shows that during the five-year period, the actual rate of termination of non-vested male was 113% of what was expected. In contrast, the ratio was 95% among females. In addition, the ratio of actual to expected experience varied by age. Therefore, we recommend the following adjustments to the withdrawal rates to reflect the experience.

- Male members: We recommend increasing the rates since the total incidence of actual non-vested withdrawals was more than expected. The actual withdrawals in the age 20 group were 230% of the number expected. However, due to the relative size of exposures we only recommend a minor increase to the rates to smooth the progression of the rates into the higher ages.
- Female members: The actual withdrawals in the age 20 group were 222% of the number expected. However, due to the relative size of exposures we recommend no adjustments be made to the current rates. Actual withdrawals during ages 25 through 35 were lower than expected and we recommend decreasing the rates at these ages. The actual experience above age 35 were within an acceptable range of that expected and no changes are recommended.

Table 1(b) shows that during the five-year period, the actual rates of termination of vested members with at least five but less than ten years of service were more than expected. Among males, the ratio of actual to expected experience was 116%. Among females, the ratio was 112%. Therefore, we recommend the following adjustments to the withdrawal rates to reflect the experience.

- Male members: Actual withdrawals were higher than expected for all ages, except during ages 30 and 35, and we recommend increasing the rates at these ages. Actual withdrawals at age 30 were lower than expected and we recommend decreasing the rate at that age. Actual experience at age 35 is within an acceptable range and no change is recommended.
- Female members: Actual withdrawals were less than expected for all ages up to age 35 and we recommend decreasing the rates at these ages. Actual withdrawals above age 35 were higher than expected and we recommend increasing the rates at these ages.

Table 1(c) shows that during the five-year period, the actual rates of termination of vested members with at least ten years of service were greater than expected. Among males, the ratio of actual to expected experience was 122%. Among females, the ratio was 121%. In addition, the ratio of actual to expected experience varied by age. Therefore, we recommend the following adjustments to the withdrawal rates to reflect the experience.

- Male members: Actual total withdrawals were higher than expected. The difference occurs mostly at the younger ages. We recommend an increase to the rates through age 45 and smooth the rates after age 45 to reflect the withdrawal pattern after that age.
- Female members: Actual total withdrawals were higher than expected. The difference occurs during all ages, except age 60. We recommend an increase to the rates through age 55 and smooth the rates after age 55 to reflect the withdrawal pattern.

### **Rates of Mortality Among Active Members**

Table 2 shows the actual incidence of deaths in active service was less than expected for both males and females. For males, the ratio of actual to expected experience was 95%. Among females, the ratio was 79%. In total, the lower rates of actual mortality reflect the increases in life expectancies for people in the United States that have occurred. We also expect that future advances in medical technology will continue to improve life expectancies. In addition, the current mortality table used, UP94 Mortality Table, is no longer widely used since it is now considered an “older” table. Therefore, we recommend the following updates to the active member mortality rates to reflect recent experience and anticipate future improvements in mortality.

- Male members: Update the mortality table to the RP-2000 Employee Pre-Retirement Male Mortality Table with a 3-year age set back.
- Female members: Update the mortality table to the RP-2000 Employee Pre-Retirement Female Mortality Table with an 8-year age set back.

### **Disability Retirement**

Table 3 shows the summary of experience for disability retirements among members who have at least five years of service. The five-year study shows that actual incidence of disability retirements among males were in-line with what was expected and that there were fewer disability retirements among females than expected. For males, the ratio of actual to expected experience was 100%. For females, the ratio was 69%. Therefore, we recommend the following adjustments to the active disability rates to reflect the experience.

- Male members: No change to the rates since the total incidence of actual disability retirements is close to expected.
- Female members: A general decrease in the rates since the incidence of actual disability retirements is less than expected.

### **Superannuation Retirement**

Table 4 shows the summary of experience for superannuation retirement. For males, the ratio of actual to expected experience was 82%. For females, the ratio was 92%. Therefore, we recommend the following adjustments to the active superannuation rates to reflect the experience.

- Male members: Actual retirements after age 53 and prior to age 65 were higher than expected and we recommend an increase to the rates for these ages. Actual retirements after age 60 were less than expected and we recommend a decrease to these rates.

- Female members: Actual retirements prior to age 65 were higher than expected and we recommend an increase to the rates for these ages. Actual retirements after age 60 were less than expected and we recommend a decrease to these rates.

### **Early Retirement**

Table 5 shows a comparison of actual cases of early retirement to that expected. For males, the actual cases of early retirement were 15% greater than expected. For females, the actual cases of early retirement were 25% greater than expected. Therefore, we recommend the following adjustments to the active early retirement rates to reflect the experience.

- Male members: Actual total retirements were higher than expected. The difference occurs during all ages, except at age 61. We recommend an increase to the rates through age 58 and smooth the rates after age 58 to reflect the withdrawal pattern.
- Female members: Actual total retirements were higher than expected. The difference occurs during all ages, except age 61. We recommend an increase to the rates through age 58 and smooth the rates after age 58 to reflect the withdrawal pattern.

## SECTION III – DISCUSSION OF EXPERIENCE REVIEW

### MORTALITY EXPERIENCE AMONG ANNUITANTS

Tables 6 and 7 included in Section VII summarize the mortality experience among service and disability retirements during the five-year period ended June 30, 2010. The mortality experience is shown separately for males and females.

A summary of the results is shown in the table below:

**Overall Ratios of Actual to Expected Mortality Experience  
Service and Disability Annuitants**

Death After	Males	Females
Service Retirement	94%	96%
Disability Retirement	105%	81%

The experience study showed the following facts concerning service and disability annuitants:

- The actual cases of death among male and female service annuitants were less than expected. Mortality has improved over the last decade and is expected to continue improving.
- The actual cases of death among disability annuitants were more than expected for males and lower than expected for females.

### **Recommendations**

On the basis of actual experience among annuitants during the five-year period and in anticipation of future expected increases in life expectancy, we recommend the following updates to the annuitant mortality rates to reflect recent experience and anticipate future improvements in mortality.

#### Service Annuitants:

- Male annuitants: Update the mortality table to the RP-2000 Combined Healthy Annuitant Male Table with a 3-year age set back.
- Female annuitants: Update the mortality table to the RP-2000 Combined Healthy Annuitant Female Table with a 3-year age set back.

#### Disability Annuitants:

- Male annuitants: Update the mortality table to the RP-2000 Disabled Male Table with a 7-year age set back.
- Female annuitants: Update the mortality table to the RP-2000 Disabled Female Table with a 3-year age set back.

## SECTION IV – DISCUSSION OF EXPERIENCE REVIEW

### ECONOMIC FACTORS

Tables 8 and 9 in Section VII summarize the actual results for the key economic factors affecting the operation of the System during the five-year period ended June 30, 2010. Table 8 shows a summary of annual investment rates of returns and average annual increases in the CPI-U. Table 9 shows a comparison of actual and expected salaries of active full-time members.

#### **Rates of Investment Return**

The current interest rate assumption is 8.00% which includes an inflation component of 3.25%. The average annual increase in the CPI-U and rates of investment return during the five-year period ended June 30, 2010 are shown below. The actual returns on the actuarial value and market value of assets fluctuated during the five-year study period. The average return on the market value of assets was below the expected return of 8.00% while the average return on the actuarial value of assets exceeded it.

Fiscal Year	CPI-U	Return on Assets	
		Actuarial Value*	Market Value**
2005/2006	4.3%	7.90%	15.30%
2006/2007	2.7	13.94	22.93
2007/2008	5.0	12.43	(2.82)
2008/2009	(1.4)	3.54	(26.54)
2009/2010	<u>1.1</u>	<u>3.09</u>	<u>14.59</u>
Average	2.3%	8.18%	4.69%

\* Based on a five-year asset smoothing method.

\*\* Provided by Wilshire Associates Incorporated, the PSERS investment consultant.

The table above shows the annual increase in the CPI-U during the five-year period ending June 30, 2010. The average increase in the CPI-U was 2.3%.

Also shown are the historic investment rates of return, measured on an actuarial asset value basis. The return on the actuarial value of assets was volatile during the five years that ended June 30, 2010. The return on the actuarial value exceeded the 8.00% assumed return rate during fiscal years 2007 and 2008 but underperformed during the other fiscal years. The arithmetic average rate of return on investments based on the actuarial value of assets during the five-year examination period was equal to 8.18%.

As a comparison, also shown are the rates of investment return based on the market value of assets. The actual rate of return based on the market value of assets was also volatile during the same five-year period. The average rate of return on the market value of assets during the five-year examination period was equal to 4.69%.

The 8.00% interest rate assumption is made up of two components – the rate of inflation and the real rate of return. The rate of inflation (based on the CPI-U) is currently 3.25% and the real rate of return is 4.75%.

The historical returns on the funds should not be used as the sole basis for selecting the interest rate for calculating costs in future years. The reason for this is that the interest rate is an assumption that is used to fund the present value of benefits payable many years into the future, in some instances, for as long as 80 years. Thus, while a review of past experience is useful and indicates that the actual rate of investment return over the past five years was in excess of the assumed rate of 8.00%, we do not believe that these investment returns signal a major change in the long-term earnings prospects of the System. However, we do believe that the 3.25% inflation assumption is high based on historical increases in the CPI-U.

Recently, there has been increased scrutiny of both public fund assumptions and aggressive risk taking. In addition, public systems' investment advisors believe that long-term capital market assumptions are declining. This has caused public systems to adopt a more conservative long-term investment expectation. Current surveys of public funds show a trend towards lower investment return assumptions as a prudent measure against added volatility and risk. The System's investment advisors believe the System would undergo increased volatility and risk bearing in order to achieve the current assumed 8.00% return.

We recommend that the inflation assumption be reduced from the current 3.25% to 3.00% and the interest rate assumption be reduced from 8.00% to 7.50%. This means that the real return assumption will decrease from the current 4.75% to 4.50%. The following table shows the current and recommended components of the interest rate assumption:

**Components of  
Interest Rate Assumption**

Item	Current Assumptions	Recommended Assumptions
Inflation	3.25%	3.00%
Real Return	<u>4.75</u>	<u>4.50</u>
Total	8.00%	7.50%

### **Rates of Salary Increase**

The growth in average annual salary is presented in Table 9 of Section VII. The assumed salary increase assumption is an effective average of 6.00%. Table 9 shows that the actual average annual salary increase over the examination period for all age groups is 5.2%.

The salary increase assumption should be selected with an eye towards past experience and with considerable emphasis placed on judgment concerning future expectations. The salary increase assumption should be consistent with the interest rate assumption as both assumptions are based on a long-term inflation assumption. The recommended long-term inflation assumption is 3.00%.

We recommend that the current 6.00% salary increase assumption be reduced by 0.50% to 5.50%. The reduction reflects the recommended 0.25% decrease in the long-term inflation assumption (from 3.25% to 3.00%).

It is generally accepted in actuarial practice that a reasonable spread between the investment return assumption and the salary increase assumption falls in the range of 2% to 3%. We believe the recommended use of a salary scale averaging 5.50%, along with a gross investment return assumption of 7.50%, represents a proper balance between a realistic assessment of future annual pay increases and the long-term investment returns on the assets of the fund.



## **SECTION V – OPTION FACTORS**

Members can elect to receive their retirement annuity for their lifetime only (i.e., the Maximum Option) or under various optional forms of payment that would provide a death benefit. Under the partial lump sum option, the member receives a refund of his accumulated deductions and his benefit is reduced. The member's monthly annuity is reduced by the amount of monthly annuity that could have been provided by his accumulated deductions.

When a member elects to receive his annuity under an optional form of payment that provides a death benefit, his maximum option annuity is reduced to reflect the cost of providing the death benefit. When a member elects to retire early by commencing his annuity before superannuation age, his annuity is reduced to reflect the longer time period of his retirement.

Option factors are used to 1) reduce the Maximum Option annuity to pay for the cost of providing the death benefit, 2) determine the monthly annuity that could be provided by a member's accumulated deductions, and 3) convert the benefit payable at superannuation age to the benefit paid at withdrawal or early retirement. The option factors are based on two assumptions – mortality and statutory interest.

The PSERS Code requires the option factors to be based on 4% statutory interest. The current mortality basis is the 1995 George B. Buck mortality tables with the male table set forward 1 year. We recommend that the mortality table be updated to a blend of the recommended RP-2000 Healthy Annuitant Mortality Tables with both the male and female tables set back three years assuming the population consists of 25% males and 75% females to reflect improved mortality.

Updating the mortality table used in the option factors produces:

- Minimal effect on members who withdraw from the plan electing to receive benefits prior to superannuation;
- Minimal effect on members who elect to receive an annuity under Options 1 and 4;
- Lower Option 2 and 3 benefits than the current factors.

The financial impact of updating the option factors is shown in Section VI.



## SECTION VI – FINANCIAL IMPACT OF RECOMMENDED ASSUMPTIONS

Based on the results of the experience review, we recommend revisions to the rates of:

- Withdrawal
- Death in active service
- Disability
- Superannuation and early retirement
- Death after retirement

We also recommend that the salary increase assumption be reduced to an average of 5.50%, the inflation assumption be reduced to 3.00% and the investment return assumption be reduced to 7.50%. A summary of the current assumptions is as follows:

### CURRENT ASSUMPTIONS

**Interest Rate:** 8.00% per annum, compounded annually (adopted as of June 30, 2009). The components are 3.25% for inflation and 4.75% for the real rate of return. Actuarial equivalent benefits are determined based on 4% (since 1960).

**Separation from Service:** Illustrative rates of assumed separation from service are shown in the following table. (Rates of non-vested withdrawal, of death, and of disability were adopted as of June 30, 2005; other rates were adopted as of June 30, 2000):

Age	Annual Rate of:						
	Non-Vested Withdrawal	Vested Withdrawal*		Death	Disability	Early Retirement**	Superannuation Retirement
		Less Than 10 Years of Service	10 or More Years of Service				
<b>MALES</b>							
25	12.40%	5.50%	1.40%	.042%	.024%		
30	10.00	3.00	1.40	.057	.024		
35	11.00	3.00	1.10	.062	.100		
40	11.00	3.00	.80	.072	.180		
45	11.00	3.00	.50	.100	.180		
50	11.00	3.00	1.78	.152	.280		24.00%
55	10.50	3.00	3.50	.252	.430	10.00	24.00
60	10.00	2.40	4.50	.467	.580	10.00	28.00
65				.870	.100		20.00
69				1.335	.100		20.00
<b>FEMALES</b>							
25	14.10%	9.50%	4.00%	.019%	.040%		
30	14.10	7.50	4.00	.023	.040		
35	14.10	5.50	2.00	.031	.080		
40	10.90	3.50	1.00	.043	.130		
45	10.90	3.00	.55	.061	.180		
50	10.90	3.00	1.50	.085	.250		10.00%
55	10.90	3.00	3.00	.146	.480	10.00	10.00
60	10.90	3.50	5.90	.284	.480	15.00	25.00
65				.561	.160		28.00
69				.866	.160		20.00

\* Vested Withdrawal – At least 5 years of service but not eligible for Early or Superannuation retirement.

\*\* Early Retirement – Age 55 with 25 years of service, but not eligible for Superannuation retirement.

**Death after Retirement:** The Uninsured Pensioners 1994 Mortality Table (UP94) with mortality improvements projected 10 years, and with age set back one year for males and females, adopted in 2005, are used to project mortality for healthy annuitants and for dependent beneficiaries. Special mortality tables based on PSERS' experience are used for disability retirements. (The 1995 George B. Buck Mortality Tables, rated forward one year for males and unadjusted for females, adopted in 2000, are used to determine actuarial equivalent benefits.)

**Salary Increase:** Effective average of 6.00% per annum, compounded annually (adopted as of June 30, 2005). The components are 3.25% for inflation, 1% for real wage growth and 1.75% for merit or seniority increases. Representative values are as follows:

Age	Annual Rate of Salary Increase
20	12.00%
30	9.00
40	7.00
50	4.75
55	4.50
60	4.25
65	4.25
70	4.25

A summary of the recommended assumptions is as follows. A complete set of the recommended assumptions are presented in Section VIII.

### RECOMMENDED ASSUMPTIONS

**Interest Rate:** 7.50% per annum, compounded annually. The components are 3.00% for inflation and 4.50% for the real rate of return. Actuarial equivalent benefits are determined based on 4% (since 1960).

**Separation from Service:** Illustrative rates of assumed separation from service are shown in the following table.

Age	Annual Rate of:						
	Non-Vested Withdrawal	Vested Withdrawal*		Death	Disability	Early Retirement**	Superannuation Retirement
		Less Than 10 Years of Service	10 or More Years of Service				
<b>MALES</b>							
25	12.50%	5.50%	2.00%	.037%	.024%		
30	10.50	3.20	2.00	.038	.024		
35	11.00	3.00	1.50	.056	.100		
40	13.00	3.50	1.25	.090	.180		
45	13.00	3.50	1.25	.121	.180		25.00%
50	13.00	3.50	1.70	.173	.280		25.00
55	11.00	3.50	3.00	.245	.430	15.00	30.00
60	10.50	3.50	4.50	.363	.580	12.00	28.00
65				.592	.100		20.00
69				.810	.100		18.00
<b>FEMALES</b>							
25	13.00%	8.50%	5.00%	.018%	.030%		
30	13.00	6.50	4.00	.019	.040		
35	13.00	5.50	3.00	.022	.060		
40	10.90	4.50	1.50	.035	.100		
45	10.90	4.00	1.50	.055	.150		30.00%
50	10.90	3.75	1.75	.085	.200		30.00%
55	10.90	3.75	3.00	.133	.380	15.00	30.00
60	10.90	4.50	5.50	.197	.380	15.00	30.00
65				.301	.130		25.00
69				.428	.130		20.00

\* Vested Withdrawal – At least 5 years of service but not eligible for Early or Superannuation retirement.

\*\* Early Retirement – Age 55 with 25 years of service, but not eligible for Superannuation retirement.

**Death after Retirement:** The RP-2000 Combined Healthy Annuitant Tables (Male and Female) with age set back 3 years for both genders for healthy annuitants and for dependent beneficiaries. The RP-2000 Combined Disabled Tables (Male and Female) with age set back 7 years for males and set back 3 years for females for disabled annuitants. (A unisex table based on the RP-2000 Combined Healthy Annuitant Tables (Male and Female) with age set back 3 years for both genders assuming a population comprised of 25% males and 75% females is used to determine actuarial equivalent benefits.)

**Salary Increase:** Effective average of 5.50% per annum, compounded annually. The components are 3.00% for inflation, 1% for real wage growth and 1.50% for merit or seniority increases. Representative values are as follows:

Age	Annual Rate of Salary Increase
20	10.75%
30	8.25
40	6.25
50	4.25
55	3.75
60	3.75
65	3.75
70	3.75

### Financial Impact of Recommended Assumption Changes

The table below shows the impact on the employer contribution rate for each recommended assumption change:

#### INCREASE (DECREASE) IN EMPLOYER CONTRIBUTION RATE

Assumption	Normal Rate	Total Contribution Rate*
<b>Demographic Changes</b>		
Non-Vested Withdrawal	.02%	.00%
Withdrawal/Early Retirement	(.12)	(.12)
Death in Active Service	(.03)	(.08)
Disability Retirement	(.03)	(.04)
Superannuation Retirement	.04	.02
Post-Retirement Mortality	<u>.18</u>	<u>.82</u>
<b>Total Demographic Changes</b>	.06%	.60%
<b>Economic Changes</b>		
Interest Rate	1.54%	3.04%
Annual Salary Increases	(.91)	(1.28)
<b>Option Factors</b>	<u>.00</u>	<u>.04</u>
<b>Total Change</b>	.69%	2.40%

\* Reflects the funding provisions of Act 120 except for the applicable fiscal year 2012 pension rate collar.

**SECTION VII**

**COMPARISON OF ACTUAL AND EXPECTED  
EXPERIENCE DURING FIVE-YEAR PERIOD  
FROM JULY 1, 2005 THROUGH JUNE 30, 2010**

**TABLE 1(a)****SUMMARY OF EXPERIENCE FOR TERMINATION FROM  
EMPLOYMENT BEFORE RETIREMENT****NON-VESTED WITHDRAWALS WITH LESS THAN FIVE YEARS OF SERVICE****MALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
20	752	327	350	2,502	230%	215%
25	3,022	3,000	3,102	24,812	101	97
30	1,860	1,818	1,866	17,767	102	100
35	1,284	1,160	1,172	10,656	111	110
40	1,147	931	1,100	8,464	123	104
45	1,206	967	1,143	8,790	125	106
50	1,139	996	1,177	9,054	114	97
55	963	848	947	8,148	114	102
60	614	546	590	5,770	112	104
<b>Total</b>	11,987	10,593	11,447	95,963	113%	105%

**Recommendation:** Increase the rates since the total incidence of actual non-vested withdrawals was more than expected. Actual withdrawals in the age 20 group were 230% of the number expected. However, due to the relative size of exposures we recommend a minor increase to the rates to smooth the progression of the rates into the higher ages.

**TABLE 1(a)**  
**(continued)**

**SUMMARY OF EXPERIENCE FOR TERMINATION FROM  
EMPLOYMENT BEFORE RETIREMENT**

**NON-VESTED WITHDRAWALS WITH LESS THAN FIVE YEARS OF SERVICE**

**FEMALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
20	866	390	390	2,768	222%	222%
25	7,787	9,797	9,033	69,482	79	86
30	5,127	5,749	5,300	40,771	89	97
35	3,910	4,040	3,837	29,514	97	102
40	4,561	4,316	4,316	38,356	106	106
45	4,597	4,639	4,639	42,560	99	99
50	3,540	3,521	3,521	32,305	101	101
55	2,092	2,090	2,090	19,174	100	100
60	1,155	1,004	1,004	9,215	115	115
<b>Total</b>	33,635	35,546	34,130	284,145	95%	99%

**Recommendation:** Actual withdrawals in the age 20 group were 222% of the number expected. However, due to the relative size of exposures we recommend no adjustments be made to the current rates. Actual withdrawals during ages 25 through 35 were lower than expected and we recommend decreasing the rates at these ages. Actual withdrawals above age 35 were within acceptable range of that expected and no changes are recommended.

**TABLE 1(b)**

**SUMMARY OF EXPERIENCE FOR TERMINATION FROM  
EMPLOYMENT BEFORE RETIREMENT**

**VESTED WITHDRAWALS  
WITH AT LEAST FIVE BUT LESS THAN TEN YEARS OF SERVICE**

**MALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 28	116	85	98	1,777	136%	118%
30	545	617	614	19,183	88	89
35	410	471	471	15,705	87	87
40	329	275	321	9,181	120	102
45	336	221	258	7,380	152	130
50	286	227	265	7,562	126	108
55	266	179	225	6,431	149	118
60	233	103	150	4,293	226	155
<b>Total</b>	2,521	2,178	2,402	71,512	116%	105%

**Recommendation:** Actual withdrawals were higher than expected for all ages, except at ages 30 and 35, and we recommend increasing the rates at all ages, except at ages 30 and 35. Actual withdrawals during age 30 were lower than expected and we recommend decreasing the rate at that age. Actual experience at age 35 was within an acceptable range and no change is recommended.



**TABLE 1(b)**  
**(continued)**

**SUMMARY OF EXPERIENCE FOR TERMINATION FROM  
EMPLOYMENT BEFORE RETIREMENT**

**VESTED WITHDRAWALS  
WITH AT LEAST FIVE BUT LESS THAN TEN YEARS OF SERVICE**

**FEMALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 28	306	362	350	4,115	85%	87%
30	2,602	3,250	2,839	43,672	80	92
35	1,670	1,755	1,732	31,486	95	96
40	1,293	943	1,155	25,661	137	112
45	1,582	1,067	1,398	34,946	148	113
50	1,567	1,130	1,412	37,664	139	111
55	1,062	724	905	24,139	147	117
60	630	349	449	9,971	180	140
<b>Total</b>	<b>10,712</b>	<b>9,580</b>	<b>10,240</b>	<b>211,654</b>	<b>112%</b>	<b>105%</b>

**Recommendation:** Actual withdrawals were less than expected for all ages up to age 35 and we recommend decreasing the rates at these ages. Actual withdrawals after age 35 were higher than expected and we recommend increasing the rates at these ages.

**TABLE 1(c)**

**SUMMARY OF EXPERIENCE FOR TERMINATION FROM  
EMPLOYMENT BEFORE RETIREMENT**

**VESTED WITHDRAWALS WITH AT LEAST TEN YEARS OF SERVICE**

**MALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 33	37	16	24	1,223	231%	154%
35	235	167	232	15,490	141	101
40	326	180	282	22,565	181	116
45	346	170	301	24,075	204	115
50	530	540	540	31,757	98	98
55	909	635	602	26,606	143	151
60	409	580	480	9,196	71	85
<b>Total</b>	<b>2,792</b>	<b>2,288</b>	<b>2,461</b>	<b>130,912</b>	<b>122%</b>	<b>113%</b>

**Recommendation:** Actual total withdrawals were higher than expected. The difference occurs mostly during the younger ages. We recommend an increase to the rates through age 45 and smooth the rates after age 45 to reflect the withdrawal pattern after that age.

**TABLE 1(c)**  
**(continued)**

**SUMMARY OF EXPERIENCE FOR TERMINATION FROM  
EMPLOYMENT BEFORE RETIREMENT**

**VESTED WITHDRAWALS WITH AT LEAST TEN YEARS OF SERVICE**

**FEMALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 33	75	56	67	1,692	134%	112%
35	801	546	823	27,436	147	97
40	720	427	604	40,243	169	119
45	844	377	730	48,660	224	116
50	1,532	1,282	1,461	83,496	120	105
55	3,103	2,198	2,530	88,898	141	123
60	1,974	2,569	2,165	37,458	77	91
<b>Total</b>	<b>9,049</b>	<b>7,455</b>	<b>8,380</b>	<b>327,883</b>	<b>121%</b>	<b>108%</b>

**Recommendation:** Actual total withdrawals were higher than expected. The difference occurs during all ages, except at age 60. We recommend an increase to the rates through age 55 and smooth the rates after age 55 to reflect the withdrawal pattern.

**TABLE 2**  
**SUMMARY OF EXPERIENCE FOR**  
**DEATH IN ACTIVE SERVICE**

**MALES**  
**2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
20	0	1	1	2,512	0%	0%
25	7	12	10	26,589	58	70
30	13	22	15	38,163	59	87
35	15	26	24	41,851	58	63
40	25	29	36	40,210	86	69
45	52	41	49	40,245	127	106
50	98	75	84	48,395	131	117
55	142	150	144	58,792	95	98
60	131	161	127	35,552	81	103
65	104	107	73	12,712	97	142
Over 65	93	95	67	7,760	98	139
<b>Total</b>	<b>680</b>	<b>719</b>	<b>630</b>	<b>352,781</b>	<b>95%</b>	<b>108%</b>

**Recommendation:** Mortality has continually been improving over the last decade and is expected to improve in the future. We recommend the use of the RP-2000 Employee Pre-Retirement Mortality Tables with the age set back 3 years.

**TABLE 2**

(continued)

**SUMMARY OF EXPERIENCE FOR  
DEATH IN ACTIVE SERVICE****FEMALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
20	1	1	1	2,774	100%	100%
25	8	14	14	73,599	57	57
30	16	20	17	86,127	80	94
35	20	28	20	88,436	71	100
40	40	46	36	104,260	87	111
45	65	78	70	126,166	83	93
50	150	133	132	153,486	113	114
55	210	243	218	165,419	86	97
60	169	252	177	91,763	67	95
65	98	135	74	25,482	73	132
Over 65	67	122	58	11,720	55	114
<b>Total</b>	844	1,072	817	929,232	79%	103%

**Recommendation:** Mortality has continually been improving over the last decade and is expected to improve in the future. We recommend the use of the RP-2000 Employee Pre-Retirement Mortality Tables with the age set back 8 years.

**TABLE 3**  
**SUMMARY OF EXPERIENCE FOR**  
**DISABILITY RETIREMENT**  
**WITH AT LEAST FIVE YEARS OF SERVICE**  
**MALES**  
**2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 33	4	8	8	22,183	50%	50%
35	9	32	32	31,195	28	28
40	25	54	54	31,746	46	46
45	65	61	61	31,455	107	107
50	156	114	114	39,341	137	137
55	227	218	218	50,644	104	104
60	140	143	143	29,782	98	98
65	19	19	19	12,712	100	100
70	9	4	4	3,527	225	225
<b>Total</b>	654	653	653	252,585	100%	100%

**Recommendation:** No change to the rates since the total incidence of actual disability retirements is close to expected.

**TABLE 3**  
**(continued)**

**SUMMARY OF EXPERIENCE FOR  
DISABILITY RETIREMENT**

**WITH AT LEAST FIVE YEARS OF SERVICE**

**FEMALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 33	14	22	19	49,479	64%	74%
35	34	48	35	58,922	71	97
40	39	86	66	65,904	45	59
45	124	154	125	83,606	81	99
50	254	310	242	121,181	82	105
55	415	626	495	146,245	66	84
60	239	352	280	82,548	68	85
65	18	41	33	25,482	44	55
70	8	9	6	5,456	89	133
<b>Total</b>	1,145	1,648	1,301	638,823	69%	88%

**Recommendation:** Decrease rates since the incidence of actual disability retirements is less than expected.

**TABLE 4****SUMMARY OF EXPERIENCE FOR  
SUPERANNUATION****AGE 62, AGE 60 WITH 30 YEARS, OR 35 YEARS****MALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 53	2	5	6	22	40%	33%
55	1,356	659	816	2,746	206	166
60	3,617	3,372	3,266	10,960	107	111
65	2,199	3,066	2,473	12,726	72	89
68	220	273	246	1,367	81	89
69	<u>165</u>	<u>229</u>	<u>206</u>	<u>1,147</u>	<u>72</u>	<u>80</u>
Subtotal under 70	7,559	7,604	7,013	28,968	99	108
70+	961	2,817	1,840	5,257	34	52
<b>Total All Ages</b>	8,520	10,421	8,853	34,225	82%	96%

**Recommendation:** Actual retirements after age 53 and prior to age 65 were higher than expected and we recommend an increase to the rates for these ages. Actual retirements after age 60 were less than expected and we recommend a decrease to these rates.



**TABLE 4**  
**(continued)**

**SUMMARY OF EXPERIENCE FOR  
SUPERANNUATION**

**AGE 62, AGE 60 WITH 30 YEARS, OR 35 YEARS**

**FEMALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 53	7	2	6	21	350%	117%
55	1,667	627	1,009	3,206	266	165
60	6,963	6,066	6,271	20,230	115	111
65	5,279	5,990	5,340	25,482	88	99
68	402	434	434	2,171	93	93
69	<u>352</u>	<u>362</u>	<u>362</u>	<u>1,808</u>	<u>97</u>	<u>97</u>
Subtotal under 70	14,670	13,481	13,422	52,918	109	109
70+	1,527	4,120	2,709	7,741	37	56
<b>Total All Ages</b>	16,197	17,601	16,131	60,659	92%	100%

**Recommendation:** Actual retirements prior to age 65 were higher than expected and we recommend an increase to the rates for these ages. Actual retirements after age 60 were less than expected and we recommend a decrease to these rates.

**TABLE 5**

**SUMMARY OF EXPERIENCE FOR  
EARLY RETIREMENT**

**AGE 55 WITH AT LEAST 25 YEARS OF SERVICE, BUT INELIGIBLE FOR  
SUPERANNUATION**

**MALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
55	911	603	904	6,029	151%	101%
56	953	861	890	5,740	111	107
57	600	560	579	3,735	107	104
58	422	390	403	2,600	108	105
59	333	323	323	1,797	103	103
60	92	52	62	518	177	148
61	58	129	107	429	45	54
<b>Total</b>	<b>3,369</b>	<b>2,918</b>	<b>3,268</b>	<b>20,848</b>	<b>115%</b>	<b>103%</b>

**Recommendation:** Actual total retirements were higher than expected. The difference occurs during all ages, except at age 61. We recommend an increase to the rates through age 58 and smooth the rates after age 58 to reflect the withdrawal pattern.

**TABLE 5**  
**(continued)**

**SUMMARY OF EXPERIENCE FOR  
EARLY RETIREMENT**

**AGE 55 WITH AT LEAST 25 YEARS OF SERVICE, BUT INELIGIBLE FOR  
SUPERANNUATION**

**FEMALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
55	1,813	1,173	1,759	11,725	155%	103%
56	1,707	1,276	1,649	10,636	134	104
57	1,333	917	1,184	7,641	145	113
58	894	690	892	5,752	130	100
59	832	791	791	4,653	105	105
60	402	350	350	2,330	115	115
61	331	646	539	2,154	51	61
<b>Total</b>	7,312	5,843	7,164	44,891	125%	102%

**Recommendation:** Actual total retirements were higher than expected. The difference occurs during all ages, except age 61. We recommend an increase to the rates through age 58 and smooth the rates after age 58 to reflect the withdrawal pattern.

**TABLE 6****SUMMARY OF MORTALITY EXPERIENCE  
AMONG ANNUITANTS****SUPERANNUATION, EARLY AND WITHDRAWAL  
MALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 35	1	0	0	328	0%	0%
35	3	1	0	838	300	0
40	3	1	1	1,421	300	300
45	8	3	3	2,084	267	267
50	15	7	6	3,179	214	250
55	51	46	34	11,580	111	150
60	295	356	257	52,820	83	115
65	470	687	500	56,857	68	94
70	728	897	712	44,284	81	102
75	1,033	1,213	1,051	38,251	85	98
80	1,470	1,570	1,370	29,375	94	107
85	1,505	1,435	1,285	16,404	105	117
90	991	888	844	6,410	112	117
95	447	395	379	1,839	113	118
Over 95	93	93	87	298	100	107
<b>Total</b>	<b>7,113</b>	<b>7,592</b>	<b>6,529</b>	<b>265,968</b>	<b>94%</b>	<b>109%</b>

**Recommendation:** RP-2000 Combined Healthy Male Table set back 3 years.

**TABLE 6**  
(continued)

**SUMMARY OF MORTALITY EXPERIENCE  
AMONG ANNUITANTS**

**SUPERANNUATION, EARLY AND WITHDRAWAL  
FEMALES  
2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 35	0	0	0	565	0%	0%
35	1	1	1	1,735	100	100
40	2	2	2	2,693	100	100
45	5	3	3	3,917	167	167
50	17	8	9	6,748	213	189
55	55	55	54	24,608	100	102
60	218	301	264	73,732	72	83
65	457	660	567	83,806	69	81
70	734	962	901	74,189	76	81
75	1,126	1,370	1,387	66,500	82	81
80	1,901	2,101	2,022	59,269	90	94
85	2,579	2,561	2,348	41,936	101	110
90	2,706	2,609	2,315	24,524	104	117
95	1,955	1,761	1,542	10,158	111	127
Over 95	794	702	550	2,610	113	144
<b>Total</b>	12,550	13,096	11,965	476,990	96%	105%

**Recommendation:** RP-2000 Combined Healthy Female Table set back 3 years.

**TABLE 7**  
**SUMMARY OF MORTALITY EXPERIENCE**  
**AMONG ANNUITANTS**

**DISABILITY**

**MALES**  
**2005 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 35	1	0	0	9	0%	0%
35	2	1	1	34	200	200
40	1	2	3	131	50	33
45	9	7	8	373	129	113
50	23	21	22	980	110	105
55	64	47	54	2,016	136	119
60	82	77	91	2,767	106	90
65	71	69	78	1,987	103	91
70	66	63	59	1,280	105	112
75	66	56	45	802	118	147
80	52	56	40	542	93	130
85	33	39	25	262	85	132
90	7	15	9	69	47	78
95	2	2	1	7	100	200
Over 95	0	0	0	1	0	0
<b>Total</b>	479	455	436	11,260	105%	110%

**Recommendation:** RP-2000 Disabled Male Table set back 7 years.

**TABLE 7**  
**(continued)**

**SUMMARY OF MORTALITY EXPERIENCE  
AMONG ANNUITANTS**

**DISABILITY**

**FEMALES  
2006 – 2010**

Average Age	Number of Separations			Exposed	Ratio of Actual to Expected Experience	
	Actual	Expected			Current	Proposed
		Current	Proposed			
Under 35	0	1	0	14	0%	0%
35	0	4	1	94	0	0
40	2	10	2	322	20	100
45	8	18	6	817	44	133
50	25	33	16	1,735	76	156
55	56	91	60	4,335	62	93
60	113	134	105	5,656	84	108
65	77	121	101	4,194	64	76
70	90	100	85	2,734	90	106
75	76	101	89	2,068	75	85
80	83	94	83	1,405	88	100
85	77	76	65	796	101	118
90	53	59	47	419	90	113
95	30	24	18	120	125	167
Over 95	13	5	4	19	260	325
<b>Total</b>	703	871	682	24,728	81%	103%

**Recommendation:** RP-2000 Disabled Female Table set back 3 years.

**TABLE 8**

**SUMMARY OF INFLATION AND INVESTMENT RETURNS**

Fiscal Year	Average Annual Increase in CPI-U	Return on Assets	
		Actuarial Value*	Market Value**
2005/2006	4.3%	7.90%	15.30%
2006/2007	2.7	13.94	22.93
2007/2008	5.0	12.43	(2.82)
2008/2009	(1.4)	3.54	(26.54)
2009/2010	1.1	3.09	14.59
Average	2.3%	8.18%	4.69%

\* Based on a five-year asset smoothing method.

\*\* Provided by Wilshire Associates Incorporated, the PSERS investment consultant.



**TABLE 9****SALARY INCREASE RATES OF ACTIVE MEMBERS****MALES AND FEMALES  
2005 - 2010**

Average Age	Actual Increase						Expected Increase	Proposed Increase
	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	Total		
20	14.7%	17.7%	24.6%	15.2%	15.7%	17.6%	11.21%	10.75%
25	6.7	8.7	12.4	10.3	8.9	9.5	10.00	9.75
30	5.8	6.3	10.1	7.7	6.9	7.4	9.00	8.25
35	5.4	5.6	9.0	7.0	6.4	6.7	8.00	7.25
40	4.6	4.9	8.2	6.5	5.8	6.1	7.00	6.25
45	4.0	4.0	7.2	5.8	5.0	5.2	5.50	5.25
50	3.1	3.0	6.2	4.9	4.5	4.3	4.75	4.25
55	2.7	2.1	5.4	4.3	3.8	3.6	4.50	3.75
60	3.5	2.1	5.0	4.1	3.6	3.7	4.25	3.75
65	4.0	2.0	4.7	4.0	3.3	3.6	4.25	3.75
Over 70	6.8	3.0	4.3	3.9	2.7	4.0	4.25	3.75
Total	4.0%	3.9%	7.3%	5.8%	5.2%	5.2%	6.00%	5.50%

**SECTION VIII**

**RECOMMENDED DEMOGRAPHIC AND ACTIVE SALARY INCREASE ASSUMPTIONS**

**Active Service Termination Assumptions**

Age	Non-Vested with less than Five Years of Service		Vested with at least Five but less than Ten Years of Service		Vested with at least Ten Years of Service	
	Male	Female	Male	Female	Male	Female
19	0.1400	0.1410	0.0600	0.1200	0.0000	0.0000
20	0.1400	0.1410	0.0600	0.1200	0.0000	0.0000
21	0.1400	0.1410	0.0600	0.1200	0.0000	0.0000
22	0.1400	0.1410	0.0600	0.1200	0.0000	0.0000
23	0.1250	0.1300	0.0550	0.0850	0.0200	0.0500
24	0.1250	0.1300	0.0550	0.0850	0.0200	0.0500
25	0.1250	0.1300	0.0550	0.0850	0.0200	0.0500
26	0.1250	0.1300	0.0550	0.0850	0.0200	0.0500
27	0.1250	0.1300	0.0550	0.0850	0.0200	0.0500
28	0.1050	0.1300	0.0320	0.0650	0.0200	0.0400
29	0.1050	0.1300	0.0320	0.0650	0.0200	0.0400
30	0.1050	0.1300	0.0320	0.0650	0.0200	0.0400
31	0.1050	0.1300	0.0320	0.0650	0.0200	0.0400
32	0.1050	0.1300	0.0320	0.0650	0.0200	0.0400
33	0.1100	0.1300	0.0300	0.0550	0.0150	0.0300
34	0.1100	0.1300	0.0300	0.0550	0.0150	0.0300
35	0.1100	0.1300	0.0300	0.0550	0.0150	0.0300
36	0.1100	0.1300	0.0300	0.0550	0.0150	0.0300
37	0.1100	0.1280	0.0300	0.0550	0.0150	0.0300
38	0.1300	0.1220	0.0350	0.0450	0.0125	0.0150
39	0.1300	0.1150	0.0350	0.0450	0.0125	0.0150
40	0.1300	0.1090	0.0350	0.0450	0.0125	0.0150
41	0.1300	0.1090	0.0350	0.0450	0.0125	0.0150
42	0.1300	0.1090	0.0350	0.0450	0.0125	0.0150
43	0.1300	0.1090	0.0350	0.0400	0.0125	0.0150
44	0.1300	0.1090	0.0350	0.0400	0.0125	0.0150
45	0.1300	0.1090	0.0350	0.0400	0.0125	0.0150
46	0.1300	0.1090	0.0350	0.0400	0.0125	0.0150
47	0.1300	0.1090	0.0350	0.0400	0.0125	0.0150
48	0.1300	0.1090	0.0350	0.0375	0.0170	0.0175
49	0.1300	0.1090	0.0350	0.0375	0.0170	0.0175
50	0.1300	0.1090	0.0350	0.0375	0.0170	0.0175
51	0.1300	0.1090	0.0350	0.0375	0.0170	0.0175
52	0.1300	0.1090	0.0350	0.0375	0.0170	0.0175
53	0.1300	0.1090	0.0350	0.0375	0.0170	0.0200
54	0.1300	0.1090	0.0350	0.0375	0.0200	0.0300
55	0.1100	0.1090	0.0350	0.0375	0.0300	0.0300
56	0.1100	0.1090	0.0350	0.0375	0.0300	0.0325
57	0.1000	0.1090	0.0350	0.0375	0.0300	0.0350
58	0.1000	0.1090	0.0350	0.0450	0.0300	0.0400
59	0.1000	0.1090	0.0350	0.0450	0.0450	0.0500
60	0.1050	0.1090	0.0350	0.0450	0.0450	0.0550
61	0.1050	0.1090	0.0350	0.0450	0.1000	0.1000

**Active Service Termination Assumptions  
(continued)**

Age	Early Retirement		Superannuation Retirement		Disability Retirement		Death in Active Service*	
	Male	Female	Male	Female	Male	Female	Male	Female
19	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00028	0.00014
20	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00030	0.00015
21	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00032	0.00015
22	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00033	0.00016
23	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00034	0.00017
24	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00036	0.00018
25	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00037	0.00018
26	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00037	0.00019
27	0.0000	0.0000	0.0000	0.0000	0.00024	0.00030	0.00038	0.00019
28	0.0000	0.0000	0.0000	0.0000	0.00024	0.00040	0.00038	0.00019
29	0.0000	0.0000	0.0000	0.0000	0.00024	0.00040	0.00038	0.00019
30	0.0000	0.0000	0.0000	0.0000	0.00024	0.00040	0.00038	0.00019
31	0.0000	0.0000	0.0000	0.0000	0.00039	0.00040	0.00039	0.00020
32	0.0000	0.0000	0.0000	0.0000	0.00054	0.00040	0.00041	0.00020
33	0.0000	0.0000	0.0000	0.0000	0.00070	0.00060	0.00044	0.00021
34	0.0000	0.0000	0.0000	0.0000	0.00085	0.00060	0.00050	0.00021
35	0.0000	0.0000	0.0000	0.0000	0.00100	0.00060	0.00056	0.00022
36	0.0000	0.0000	0.0000	0.0000	0.00116	0.00060	0.00063	0.00024
37	0.0000	0.0000	0.0000	0.0000	0.00132	0.00060	0.00070	0.00025
38	0.0000	0.0000	0.0000	0.0000	0.00148	0.00100	0.00077	0.00026
39	0.0000	0.0000	0.0000	0.0000	0.00164	0.00100	0.00084	0.00031
40	0.0000	0.0000	0.0000	0.0000	0.00180	0.00100	0.00090	0.00035
41	0.0000	0.0000	0.0000	0.0000	0.00180	0.00100	0.00096	0.00039
42	0.0000	0.0000	0.0000	0.0000	0.00180	0.00100	0.00102	0.00043
43	0.0000	0.0000	0.0000	0.0000	0.00180	0.00150	0.00108	0.00047
44	0.0000	0.0000	0.0000	0.0000	0.00180	0.00150	0.00114	0.00051
45	0.0000	0.0000	0.2500	0.3000	0.00180	0.00150	0.00121	0.00055
46	0.0000	0.0000	0.2500	0.3000	0.00200	0.00150	0.00130	0.00060
47	0.0000	0.0000	0.2500	0.3000	0.00220	0.00150	0.00140	0.00065
48	0.0000	0.0000	0.2500	0.3000	0.00240	0.00200	0.00151	0.00071
49	0.0000	0.0000	0.2500	0.3000	0.00260	0.00200	0.00162	0.00077
50	0.0000	0.0000	0.2500	0.3000	0.00280	0.00200	0.00173	0.00085
51	0.0000	0.0000	0.2500	0.3000	0.00310	0.00200	0.00186	0.00094
52	0.0000	0.0000	0.2500	0.3000	0.00340	0.00200	0.00200	0.00103
53	0.0000	0.0000	0.2500	0.1000	0.00370	0.00260	0.00214	0.00112
54	0.0000	0.0000	0.2500	0.1000	0.00400	0.00300	0.00229	0.00122
55	0.1500	0.1500	0.3000	0.3000	0.00430	0.00380	0.00245	0.00133
56	0.1550	0.1550	0.3000	0.3000	0.00460	0.00380	0.00262	0.00143
57	0.1550	0.1550	0.3000	0.3500	0.00490	0.00380	0.00281	0.00155
58	0.1550	0.1550	0.3000	0.3500	0.00520	0.00380	0.00303	0.00168
59	0.1800	0.1700	0.3000	0.3500	0.00550	0.00380	0.00331	0.00181
60	0.1200	0.1500	0.2800	0.3000	0.00580	0.00380	0.00363	0.00197
61	0.2500	0.2500	0.5000	0.6000	0.00360	0.00290	0.00400	0.00213
62	0.0000	0.0000	0.2500	0.2500	0.00310	0.00190	0.00441	0.00232
63	0.0000	0.0000	0.2000	0.2000	0.00200	0.00130	0.00488	0.00253
64	0.0000	0.0000	0.2000	0.2000	0.00200	0.00130	0.00538	0.00276
65	0.0000	0.0000	0.2000	0.2500	0.00100	0.00130	0.00592	0.00301
66	0.0000	0.0000	0.1800	0.2000	0.00100	0.00130	0.00647	0.00329
67	0.0000	0.0000	0.1800	0.2000	0.00100	0.00130	0.00703	0.00360
68	0.0000	0.0000	0.1800	0.2000	0.00100	0.00130	0.00757	0.00393
69	0.0000	0.0000	0.1800	0.2000	0.00100	0.00130	0.00810	0.00428
70	0.0000	0.0000	0.1800	0.2000	0.00100	0.00130	0.00860	0.00466
71	0.0000	0.0000	0.1800	0.2000	0.00100	0.00130	0.00907	0.00504
72	0.0000	0.0000	0.1800	0.2000	0.00100	0.00130	0.00951	0.00543
73	0.0000	0.0000	0.1800	0.2000	0.00100	0.00130	0.00992	0.00582
74	0.0000	0.0000	1.0000	1.0000	0.00000	0.00000	0.00000	0.00000

\* RP-2000 Employee Pre-Retirement Mortality Tables with the age set back 3 years for males and age set back 8 years for females.

### Post-Retirement Mortality Assumptions

Age	Healthy*		Disability**	
	Male	Female	Male	Female
50	0.00173	0.00133	0.02257	0.00896
51	0.00186	0.00143	0.02257	0.00977
52	0.00200	0.00155	0.02257	0.01063
53	0.00214	0.00168	0.02385	0.01153
54	0.00245	0.00185	0.02512	0.01248
55	0.00267	0.00202	0.02640	0.01346
56	0.00292	0.00221	0.02769	0.01446
57	0.00320	0.00242	0.02898	0.01550
58	0.00362	0.00272	0.03027	0.01654
59	0.00420	0.00309	0.03156	0.01760
60	0.00469	0.00348	0.03286	0.01865
61	0.00527	0.00392	0.03415	0.01971
62	0.00595	0.00444	0.03544	0.02077
63	0.00675	0.00506	0.03673	0.02184
64	0.00768	0.00581	0.03803	0.02294
65	0.00876	0.00666	0.03933	0.02408
66	0.01001	0.00765	0.04067	0.02529
67	0.01128	0.00862	0.04204	0.02660
68	0.01274	0.00971	0.04347	0.02803
69	0.01441	0.01095	0.04498	0.02959
70	0.01608	0.01216	0.04658	0.03132
71	0.01787	0.01345	0.04831	0.03323
72	0.01980	0.01486	0.05017	0.03534
73	0.02221	0.01674	0.05221	0.03763
74	0.02457	0.01858	0.05445	0.04014
75	0.02728	0.02066	0.05691	0.04285
76	0.03039	0.02297	0.05961	0.04577
77	0.03390	0.02546	0.06258	0.04890
78	0.03783	0.02811	0.06584	0.05223
79	0.04217	0.03097	0.06941	0.05578
80	0.04691	0.03411	0.07329	0.05954
81	0.05212	0.03759	0.07751	0.06354
82	0.05793	0.04151	0.08207	0.06779
83	0.06437	0.04588	0.08695	0.07231
84	0.07204	0.05078	0.09215	0.07713
85	0.08049	0.05629	0.09764	0.08230
86	0.08972	0.06251	0.10339	0.08784
87	0.09978	0.06952	0.10937	0.09379
88	0.11076	0.07745	0.11554	0.10020
89	0.12280	0.08638	0.12188	0.10710
90	0.13604	0.09634	0.12834	0.11451
91	0.15059	0.10730	0.13492	0.12246
92	0.16642	0.11915	0.14160	0.13097
93	0.18341	0.13168	0.14837	0.14005
94	0.19977	0.14460	0.15523	0.14970
95	0.21661	0.15762	0.16219	0.15992
96	0.23366	0.17043	0.16923	0.17043
97	0.25069	0.18280	0.18341	0.18280
98	0.26749	0.19451	0.19977	0.19451
99	0.28391	0.20538	0.21661	0.20538
100	0.29985	0.21524	0.23366	0.21524
101	0.31530	0.22395	0.25069	0.22395
102	0.33021	0.23139	0.26749	0.23139
103	0.34456	0.23747	0.28391	0.23747
104	0.35863	0.24483	0.29985	0.24483
105	0.37169	0.25450	0.31530	0.25450
106	0.38304	0.26604	0.33021	0.26604
107	0.39200	0.27905	0.34456	0.27905
108	0.39789	0.29312	0.35863	0.29312
109	0.40000	0.30781	0.37169	0.30781
110	0.40000	0.32272	0.38304	0.32272
111	0.40000	0.33744	0.39200	0.33744
112	0.40000	0.35154	0.39789	0.35154
113	0.40000	0.36462	0.40000	0.36462
114	0.40000	0.37625	0.40000	0.37625
115	0.40000	0.38601	0.40000	0.38601

\* RP-2000 Combined Healthy Annuitant Tables with age set back 3 years for both genders.

\*\* RP-2000 Disabled Tables with age set back 7 years for Males and age set back 3 years for Females.

**Active Salary Increase Assumptions**

<b>Age</b>	<b>Salary Scale Male and Female</b>
19	1.1075
20	1.1075
21	1.1055
22	1.1035
23	1.1015
24	1.0995
25	1.0975
26	1.0945
27	1.0915
28	1.0885
29	1.0855
30	1.0825
31	1.0805
32	1.0785
33	1.0765
34	1.0745
35	1.0725
36	1.0705
37	1.0685
38	1.0665
39	1.0645
40	1.0625
41	1.0605
42	1.0585
43	1.0565
44	1.0545
45	1.0525
46	1.0505
47	1.0485
48	1.0465
49	1.0445
50	1.0425
51	1.0415
52	1.0405
53	1.0395
54	1.0385
55	1.0375
56	1.0375
57	1.0375
58	1.0375
59	1.0375
60	1.0375
61	1.0375
62	1.0375
63	1.0375
64	1.0375
65	1.0375
66	1.0375
67	1.0375
68	1.0375
69	1.0375
70	1.0375
71	1.0375
72	1.0375
73	1.0375