Illinois Municipal Retirement Fund

Triennial Experience Study

2014 – 2016

GRS

November 8, 2017

Board of Trustees
Illinois Municipal Retirement Fund
Oak Brook, Illinois 60523

Ladies and Gentlemen:

The results of the 3-year *investigation of experience* of the Illinois Municipal Retirement Fund are presented in this report. The investigation was made for the purpose of updating the actuarial assumptions used in valuing the actuarial liabilities of IMRF in compliance with Section 7-213 of the Illinois Pension Code.

The investigation was based upon the statistical data furnished for annual actuarial valuations, and upon supplemental information furnished by IMRF staff, concerning members who died, withdrew, became disabled or retired during the last 3 years and on published economic historical data.

The investigation covered the 3-year period from *January 1, 2014 to December 31, 2016* and was carried out using generally accepted actuarial principles and techniques.

We believe that the new actuarial assumptions that are the result of this investigation represent a reasonable estimate of future experience of IMRF based upon the data reviewed in the study and general trends among Public Employee Retirement Systems.

Brian Murphy, Mark Buis, and Francois Pieterse are independent of the plan sponsor and are Members of the American Academy of Actuaries (MAAA) who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

Respectfully submitted,

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BBM/MB:bd

Table of Contents

Executive Summary

The Board of Trustees has established a policy of reviewing the actuarial assumptions every three years. The last review was prepared for the period from January 1, 2011 to December 31, 2013. In this report, we review the current actuarial assumptions and methods and compare them to the actual experience of the Retirement Fund for the years 2014-2016.

The table below lists each of the primary assumptions and methods that we analyzed, including our recommendations for each item, and the impact of any recommended changes on average liabilities and contribution rates.

Assumption	Recommendation	Financial Impact
Withdrawal rates	Various	Decrease
Disability rates	Lower Rates	Decrease
Pay increases due to seniority	Various	Decrease
Retirement rates	Various	Increase
Pre and post-retirement mortality rates	Various	Decrease
Interest rate	Lower Rates	Increase
Wage inflation	Lower Rate	Decrease
Price inflation	Lower Rate	Decrease
Total	**Various**	**Increase**

The overall impact on the contribution rate for various scenarios are shown on page 15. The effect on each employer will vary.

Introduction

Each year as of December 31, the liabilities of the Illinois Municipal Retirement Fund are valued. The purpose of the valuation is to adjust the contribution rates for IMRF employers to take into account changes in participant demographics and recent financial results as well as to measure the financial soundness of the benefit programs. In order to perform the valuation, assumptions must be made regarding the future experience of the system with regard to the following risk areas:

Non-Economic Assumptions

- Rates of quitting among active members.
- Rates of disability among active members.
- Patterns of merit & longevity pay increases to active members.
- Rates of retirement among active members.
- Rates of mortality among active members, retirees and beneficiaries.

Economic Assumptions

- Long-term rates of investment return to be generated by the assets of the Fund.
- Long-term rates of growth of total payroll also called wage inflation.
- Price Inflation.

Assumptions should be carefully chosen and continually monitored. Use of outdated assumptions can lead to:

- Understated costs resulting in either an inability to pay benefits when due, or sharp increases in required contributions at some point in the future.
- Overstated costs resulting in either benefit levels that are kept below the level that could be supported by the computed rate, or an unnecessarily large burden on the current generation of members, employers and taxpayers.

A single set of assumptions will not be suitable indefinitely. Things change, and our understanding of things (whether or not they are changing) also changes.

In recognition of this, Illinois statutes require that assumptions used to value the liabilities of IMRF be studied in depth every three years. The package of assumptions is then adjusted to reflect basic experience trends -- but not random year to year fluctuations. Actuarial assumptions were last revised following the December 31, 2013 regular actuarial valuation.

Summary of Findings – Non-Economic Assumptions

In general, the present assumptions provide a reasonable match to the experience of the past three years and recommended adjustments to assumptions are relatively minor. In most cases, when adjustments are indicated, the proposed assumptions give partial recognition to present assumptions as well as to results from actual experience. Complete recognition is rarely given to actual experience over a limited period. In general, the rates were moved about half way to the observed experience, except for the case of mortality which is discussed in further detail later in this report.

In most recent experience studies, we have noticed that in order to develop assumptions that reduce the size of the gain or loss in a particular decrement it is necessary to consider the relative magnitude of the liability of the members that decrement, rather than number counts alone. For example, consider a plan with only two members who are both the same age and assume member one has a liability of $10,000 and member two has a liability of $90,000.   If one of the members leaves and forfeits all of his or her liability, the net rate of decrement is one out of two for a rate of 50%. However, the net gain or loss to the system will be 10% if member one leaves versus 90% if member two leaves.

As a result, some of our tables include a column entitled 'liability weighted rate'. This represents the crude rate of decrement on a liability weighted basis as opposed to strictly a number count basis. The liability weighted rates were found to be most highly correlated with age based withdrawal and retirement decrements. This makes some intuitive sense, since retirement and termination decisions are often made based on how much the members have to gain or lose if they retire or change jobs, whereas death and disability is typically not a decision at all, rather an event that happens to someone. Comments on specific assumptions are provided on the following page. Tabular results are presented in summary form on page 6.

Withdrawal Rates: A "withdrawal" or a quit is a separation from service without entitlement to an immediate monthly benefit. For age based withdrawal, experience was found to be more highly correlated with the liability weighted method described above. Rates for the age based tables were adjusted accordingly to be closer to the liability weighted rates. For service based withdrawal, the traditional method based on counts was used. Rates for the service based tables were adjusted to move closer to actual experience. The changes in withdrawal rates had downward pressure on contribution rates.

Disability Rates: A disability can be either a temporary disability or a permanent disability. Disabilities are initially reported as temporary and are not reclassified as permanent until after the end of the experience period. The actuary then adjusted disability rates to bring the number of expected permanent disabilities closer to the number of actual approved permanent disabilities. The changes in disability rates had downward pressure on contribution rates.

Summary of Findings – Non-Economic Assumptions (Continued)

Pay Increase Rates (portion related to the employee's age and seniority): These rates are difficult to analyze because of the non-homogeneous nature of the IMRF population. For Regular members, rates were adjusted slightly to be closer to the actual rates. The change exerts downward pressure on contribution rates. For SLEP members, rates were not adjusted. Therefore there was no impact on contribution rates.

Retirement Experience: Retirement experience was found to be highly correlated with the liability weighted method described on page 3. As such, we modified the retirement rates slightly for most groups to move closer to the liability weighted rates. As more experience emerges, we will monitor these rates to see if further adjustments are necessary. The changes in retirement assumptions were minor and had upward pressure on contribution rates for Regular members and SLEP members.

Mortality Among Retirees: Mortality rates among retired public employees have been declining for years. Additionally, and perhaps consequently, the Actuarial Standards of Practice with regard to the mortality assumption has recently been revised. ASOP No. 35 Disclosure Section 4.1.1 now states: ***"…The disclosure of the mortality assumption should contain sufficient detail to permit another qualified actuary to understand the provision made for future mortality improvement. If the actuary assumes zero mortality improvement after the measurement date, the actuary should state that no provision was made for future mortality improvement."*** Prior to the last experience study, the Society of Actuaries recently released a set of mortality tables (RP-2014) and recommended the use of a 'fully generational' (2 dimensional) projection scale (MP-2014). Because the RP-2014 table did not match current IMRF experience, we recommended the use of an IMRF specific mortality table. This table was developed from the RP-2014 blue collar mortality table with adjustments to match current IMRF experience. After reviewing experience for the last 3 years, we recommend no change in the IMRF specific mortality table for males and recommend using 102% of current rates for females. In addition, we are recommending updating the projection scale from the MP-2014 projection scale to the MP-2017 projection scale to produce an appropriate margin for future experience. Since there was not as much improvement in the mortality scale during the last 3 years as was projected from the prior study, this change produced downward pressure on contribution rates.

Data for disabled retirees was insufficient to use as a basis for judgment. Therefore, we developed an IMRF disabled mortality table from the RP-2014 disabled mortality table (applying the same adjustments for healthy lives) and project future rates with the MP-2017 fully generational projection scale.

Data for active members was insufficient to use as a basis for judgment. Therefore, we developed an IMRF pre-retirement mortality table from the RP-2014 pre-retirement mortality table (applying the same adjustments for retired lives) and project future rates with the MP-2017 fully generational projection scale.

Option Factors: The calculation of retirement benefit amounts involves the computation of survivor benefit options. If a retiring member elects an optional form of benefit, the standard form of benefit is multiplied by the appropriate option factor to produce the benefit actually payable. Currently, option factors for survivor benefits are calculated using a 7.5% interest rate assumption and assumed rates of mortality. As a matter of common practice, optional benefit reduction factors are usually revised to correspond with the new interest and mortality assumptions adopted after the last experience study. The use of a fully generational mortality table can make the development of option factors more complicated. Since there are many alternatives to consider, we recommend developing a set of alternative option factors after the Board has adopted the recommended mortality table and interest rate. Consistent with past practice, any change in option factors would be adopted for retirements on or after October 1, 2018 to allow time for administrative changes.

Other Risk factors: Historically, the gain/loss reports have indicated a pattern of non-decrement losses. These have been attributed to various factors, including changes in final average compensation, rehire of former employees, addition of new employers, data refinements and differences between actual, increasing service due to sick leave and estimated reserve transfers. In the 2005-2007 Experience Study, we recommended a contingency reserve of 0.25% of pay be added to the normal cost component. This change resulted in a significantly reduced "Other" loss category in 2008, 2009, 2012 and 2013. During the 2014-2016 study, IMRF was able to provide additional detail on the amount of sick leave credits included in retirement benefits. As a result, we recommend removing the current contingency reserve of .25% and replacing this with a 1.25% load on active liabilities and normal cost due to increased service at retirement due to sick leave. We will continue to monitor this assumption to see if future experience indicates a need for further change. We also recommend lowering the marriage assumption for males from 80% to 75% while leaving the assumption for females at 70%.

Assumptions for Tier 2 members: Tier 2 members have different retirement eligibilities and benefits and will likely have different experience with regard to withdrawal, turnover, retirement and other assumptions. Currently, there is insufficient data to perform an experience review for Tier 2 retirement assumption. Current assumptions for Tier 2 are shown at the end of the report. Additionally, we recommend lowering the wage cap growth assumption from 1.40% to 1.35% (see discussion of price inflation assumption on page 9).

Active Member Decrements
Comparison of Actual, Present, and Proposed Experience

Decrement	Regular & ECO						SLEP & ECO		
	Males			Females					
		Assumed			Assumed			Assumed	
	Actual	Present	Proposed	Actual	Present	Proposed	Actual	Present	Proposed
Normal Retirement	4,669	5,214	0	8,302	8,504	0	460	355	51
Early Retirement	979	1,297	1,270	2,180	2,451	2,558	-	-	-
Withdrawals	13,521	11,993	10	28,156	24,588	4	362	340	0
Permanent Disability	51	96	78	49	102	77	1	8	5

This page compares actual total decrement experience during the 3-year experience period with experience that was assumed by the present assumption package and with experience that would have been assumed if the proposed assumptions had been in force throughout the experience period. ECO experience is blended in with Regular and SLEP experience in the above chart. The actual and assumed retirement counts include only people who retired directly from active service. People who retired after having previously separated from service with deferred vested benefits are excluded from all of the counts. Please note that due to the use of liability weighted rates, looking at people counts alone is not the best indicator for the appropriateness of a particular assumption. Assumptions for normal retirement, early retirement and withdrawal after 8 years for Regular (7 years for SLEP) use liability weighted rates.

Summary of Findings – Economic Assumptions

Economic assumptions include **long-term rates of investment return** (net of administrative and investment expenses), **wage inflation** (the across-the-board portion of salary increases), and pay increases due to **merit and seniority**. Unlike demographic activities, economic activities do not lend themselves to analysis solely on the basis of internal historical patterns because both salary increases and investment return are affected more by external forces; namely inflation (both wage and price), general productivity changes, and the local economic environment, all of which defy accurate long-term prediction. Estimates of economic activities are generally selected on the basis of the expectations in an inflation-free environment and then both long-term rates of investment return and wage inflation are increased by some provision for long-term inflation.

If inflation and/or productivity increases are lower than expected, it will probably result in both actual rates of salary increases and investment return below the assumed rates. Salaries increasing at rates less than expected produce lower liabilities. However, actual investment return below the assumed rate of investment return (whether due to manager performance, change in the mix of assets, or general market conditions) results in lower than expected asset amounts.

Sources considered in the analysis of the economic assumptions included:

- Actual system experience over the last 3 years (i.e., merit and seniority pay increases)
- Future expectations of the investment consultant for IMRF and future expectations of other investment consultants
- 2017 Social Security Trustees Report
- Historical observations of inflation statistics (both price and wage) and investment returns

Current economic assumptions for the System are as follows:

Investment Return	7.50%
Wage Inflation (and payroll growth)	3.50%
Price Inflation	2.75%
Spread Between Investment Return and Wage Inflation	4.00%
Spread Between Investment Return and Price Inflation	4.75%

The remainder of this section addresses the economic assumptions other than pay increases due to merit and seniority. Pay increases due to merit and seniority are addressed on pages 43 to 45.

Economic Assumptions – ASOP No. 27

Guidance regarding the selection of economic assumptions for measuring pension obligations is provided by Actuarial Standards of Practice (ASOP) No. 27. The standard requires that the selected economic assumptions be consistent with each other. That is, the selection of the investment return assumption should be consistent with the selection of the wage inflation and price inflation assumptions.

The recently adopted revision of ASOP No. 27 (applicable to valuation dates on or after September 30, 2014) defines a reasonable economic assumption as an assumption that has the following characteristics:

(a) It is appropriate for the purpose of the measurement;

(b) It reflects the actuary's professional judgment;

(c) It takes into account historical and current economic data that is relevant as of the valuation date;

(d) It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and

(e) It has no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included and disclosed under Section 3.5.1, or when alternative assumptions are used for the assessment of risk.

Summary of Findings – Economic Assumptions (Continued)

Price Inflation.   Price inflation underlies both the wage inflation and investment return assumptions. Since price inflation underlies the wage inflation assumption and the investment return assumption, we recommend that a specific price inflation assumption be adopted in conjunction with this Experience Study. The chart below shows historical averages of both price and wage inflation. Over the past 50 years, price inflation has averaged 4.1%. This result is heavily affected by the high inflationary period of the 1970's and early 1980's. During the past decade, price inflation averaged 1.9%. The 2016 Social Security Trustees report uses 2.6% as the long-range intermediate price inflation assumption. Additionally, the average future price inflation of the investment consultants shown on page 12 is 2.3%. **Based upon the reviewed data, we recommend that the price inflation assumption be lowered from 2.75% to 2.50%.** (Remember that the selected wage inflation and investment return assumptions should be consistent with the final selected price inflation assumption.)

Year	Annual Increase in		
	Prices (CPI-U)	Wages (NAE)	Difference
1961-1970	2.9%	4.4%	1.5%
1971-1980	8.1%	7.3%	-0.8%
1981-1990	4.5%	5.3%	0.8%
1991-2000	2.7%	4.3%	1.6%
2001-2010	2.3%	2.6%	0.3%
2011-2016	2.3%	2.4%	0.1%
3-Year Avg	1.2%	3.1%	1.9%
5-Year Avg	1.5%	2.8%	1.3%
10-Year Avg	1.9%	2.6%	0.7%
20-Year Avg	2.2%	3.4%	1.2%
30-Year Avg	2.6%	3.5%	0.9%
50-Year Avg	4.1%	4.8%	0.7%

Wage Inflation and Payroll Growth. Wage inflation consists of two components, 1) a portion due to pure price inflation (i.e., increases due to changes in the CPI), and 2) increases in average salary levels in excess of pure price inflation (i.e., increases due to changes in productivity levels, supply and demand in the labor market and other macroeconomic factors). The long-term rate of increase in National Average Earnings over the last 50 years is somewhat higher than the current IMRF assumption, although shorter term averages are below it. It is expected that, in the long run, salary increases in all parts of the country will be close to the national averages. However, few economists are forecasting a repeat of the high inflation rates experienced in the 1970s. In addition, average salaries in IMRF have risen at approximately 3.0% a year since 1989 - a slower pace than the assumed 3.5% a year, although, the active member group has increased in size, which distorts this statistic. **Given our recommendation for a 2.50% price inflation assumption, we believe a reasonable range for this assumption is from 3.00% to 3.50% a year. We recommend a change in the wage inflation assumption to 3.25%.**

This change has downward pressure on the contribution rate. We have illustrated the approximate impact on contribution requirements if the wage inflation assumption were changed from 3.50% to 3.25% on page 15.

The payroll growth assumption differs from the wage inflation assumption in that the payroll growth assumption is used in the amortization method to project wages for the purposes of determining the contribution rate as a percentage of total payroll, whereas the wage inflation is used to project each member's future salary for estimating retirement benefits. Historically, the payroll growth assumption has mirrored the wage inflation assumption. However, there are a couple of reasons that might cause these rates to be different. First, if there is a decline in the active population, the total payroll might not grow as fast as individual wages. Also, even if there isn't a decline in the active population, the retirements of the baby boom generation often result in a large cohort of new hires with low wages replacing older members at higher wages, putting downward pressure on the total payroll. If this payroll growth rate is overstated, this can result in insufficient contributions. For IMRF, the average increase in total payroll was 1.7% for the last 5 years, and 2.2% for the last 10 years. Therefore, we recommend decreasing the payroll growth assumption used in the amortization factors from 3.5% to 2.5%. This change has upward pressure on the contribution rate.

Summary of Findings – Economic Assumptions (Continued)

Investment Return. The investment return assumption is the actuarial assumption that has the largest impact on actuarial valuation results. As more of the actuarial accrued liabilities are related to non-active members, the <u>nominal</u> (as opposed to real) investment return assumption becomes a more prominent factor. Since one of IMRF's fundamental financial objectives is the receipt of level contributions over time, the discount rate assumption is set equal to the investment return assumption (with perhaps a margin for adverse deviation).

Presented below is the approximate current asset allocation for IMRF:

Asset Class	Approximate Asset Allocation
Domestic Equity	38.0%
International Equity	16.0
Fixed Income	29.0
Real Estate	8.0
Alternative Investments	8.0
Cash Equivalents	1.0

Based upon the approximate asset allocation, future expectations of various investment consultants (including Callan) were analyzed. The next few exhibits show the results of this analysis. Final expected nominal investment return results are based upon a 2.50% price inflation assumption. We used the actuarial assumption for price inflation rather than the consultant assumption, in order to be consistent with the calculation of liabilities. Investment results presented are net of expenses and are based upon an expense assumption of 8 basis points

Summary of Findings – Economic Assumptions (Continued)

The exhibits presented below are based upon the approximate asset allocation and the capital market assumptions of various investment consultants (identified by numbers 1 through 8 below) other than Callan.

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Plan Incurred Administrative Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	6.62%	2.50%	4.12%	2.50%	6.62%	0.08%	6.54%	13.15%
2	6.66%	2.25%	4.41%	2.50%	6.91%	0.08%	6.83%	12.95%
3	6.88%	2.26%	4.62%	2.50%	7.12%	0.08%	7.04%	11.48%
4	6.89%	2.00%	4.89%	2.50%	7.39%	0.08%	7.31%	11.99%
5	7.40%	2.21%	5.19%	2.50%	7.69%	0.08%	7.61%	13.71%
6	7.44%	2.20%	5.24%	2.50%	7.74%	0.08%	7.66%	13.37%
7	7.61%	2.25%	5.36%	2.50%	7.86%	0.08%	7.78%	12.82%
8	8.23%	2.75%	5.48%	2.50%	7.98%	0.08%	7.90%	13.26%
Average	**7.22%**	**2.30%**	**4.91%**	**2.50%**	**7.41%**	**0.08%**	**7.33%**	**12.84%**

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of exceeding 7.50%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	5.01%	5.74%	6.48%	27.40%
2	5.33%	6.05%	6.78%	30.79%
3	5.79%	6.43%	7.07%	33.75%
4	5.97%	6.65%	7.32%	37.43%
5	5.98%	6.75%	7.52%	40.22%
6	6.09%	6.84%	7.59%	41.13%
7	6.31%	7.03%	7.75%	43.37%
8	6.35%	7.09%	7.84%	44.46%
Average	**5.85%**	**6.57%**	**7.29%**	**37.32%**

* Plan's current return assumption net of expenses.

Summary of Findings – Economic Assumptions (Concluded)

The current version of ASOP No. 27 (applicable to valuation dates on or after September 30, 2014) suggests that either the expected geometric return (i.e., 50th percentile) or the expected arithmetic return is suitable for use as a reasonable investment return assumption. Based on the average of each of the investment consultants' expectations, this would result in a range of 6.57% to 7.33%. While the current assumption of 7.5% is slightly above the upper end of this range, keep in mind that this analysis is based on broad ranges and average of averages. For example, Wilshire's 11/18/2016 report (page 28) states that "None of the illustrated portfolios would be expected to earn the actuary's assumed rate of return over a 10-year period. However, over a longer (30-year) period, the Current Target and the Recommended Policy would be expected to meet a 7.00%, 7.25% or 7.50% return objective." Since at the present time, just over half of IMRF liabilities are related to benefits in pay status, the next ten years are important and should be considered when formulating an earnings assumption. **Thus, while we think 7.5% can be supported, we suggest that IMRF consider a modest reduction in the earnings assumption to 7.25%.**

We have illustrated the approximate impact on contribution requirements for a change in the investment return assumption to 7.25% on page 15. While this change puts upward pressure on contribution rates by itself, we believe this to be an opportune time to change this assumption since the demographic changes are putting downward pressure on contribution rates.

Administrative Expenses. The current assumption is that the investment return used in the valuation is net of both investment and administrative expenses. Due to new GASB standards there is a growing trend in the public sector to change this to be net of investment expenses only and add an explicit load to the normal cost to account for administrative expenses. The average administrative expense has been about 0.08% of assets. Since assets are about 5 times payroll, this would convert to a normal cost of 40 basis points.

The illustrations on page 15 currently do not include any administrative expense load. However, if this change were adopted, the impact on the contribution rates would be 0.4% of payroll higher than the rates shown on page 15.

Historical Patterns of Investment Return, Pay Increases & Inflation

The statistics on this page are presented for their general interest only. In the case of economic assumptions, prior experience is at best a very weak indicator of future results.

Calendar Year Period	Gross Market Returns			Stocks (S&P 500)	Price Inflation (CPI)	National Average Earnings	Sample Balanced Fund	
	Bonds (Long)		Cash Equiv. (T Bills)				Total Return (I)	Spread: I - NAE - e
	U.S. Treasury	Corp. (S&P AA)						
1962-1971	2.5 %	3.1 %	4.5 %	7.1 %	3.2 %	4.7 %	5.7 %	0.6 %
1972-1981	2.8 %	3.0 %	7.8 %	6.5 %	8.6 %	7.8 %	5.6 %	(2.6)%
1982-1991	15.6 %	16.2 %	7.7 %	17.6 %	3.9 %	4.7 %	17.0 %	11.9 %
1992-2001	8.7 %	8.1 %	4.6 %	12.9 %	2.5 %	4.2 %	11.6 %	7.0 %
2002-2011	8.9 %	8.3 %	1.8 %	2.9 %	2.5 %	2.7 %	5.9 %	2.8 %
2012	3.3 %	10.7 %	0.1 %	16.0 %	1.7 %	3.1 %	12.6 %	9.1 %
2013	(11.4)%	(7.1)%	0.0	32.4 %	1.5 %	1.3 %	17.1 %	15.4 %
2014	23.9 %	17.3 %	0.0	13.7 %	0.8 %	3.6 %	16.0 %	12.0 %
2015	(1.3)%	(4.8)%	0.5 %	1.4 %	0.7 %	3.5 %	(0.2)%	(4.1)%
2016	1.2 %	10.8 %	1.1 %	12.0 %	2.1 %	2.1 %	9.7 %	7.2 %
Last 5 Years	2.5 %	4.9 %	0.3 %	14.7 %	1.4 %	2.7 %	10.9 %	7.8 %
Last 10 Years	6.5 %	6.9 %	0.8 %	6.9 %	1.8 %	2.4 %	7.7 %	4.9 %
Last 55 Years	7.1 %	7.4 %	4.8 %	9.7 %	3.9 %	4.6 %	9.2 %	4.2 %

Sample Balanced Fund	
Equities	63%
Bonds -	18%
- Corporate	18%
Cash Equivalents	1%
	100%
Fund expenses(e)	0.40%

Historical Spread	
Observed spread is very sensitive to the observation period, even over long periods, illustrated below:	
Observation Period	Spread
55 years	4.2%
45 years	5.0%
35 years	7.2%

Summary of Findings
Average Effect on Contribution Rates
(Results Based upon December 31, 2016 Data)

REGULAR

Employer Contributions for	Percent of Active Member Payroll			
	Current Assumptions	New Decrement		
		7.50%/3.50%	7.50%/3.25%	7.25%/3.25%
Normal Cost	6.61%	6.03%	5.79%	6.30%
Lump Sum Death-In-Service Benefits	0.12%	0.12%	0.12%	0.12%
Temporary Disability	0.07%	0.07%	0.07%	0.07%
13th Checks	0.62%	0.62%	0.62%	0.62%
Unfunded Liabilities	3.82%	3.06%	3.23%	4.15%
Total	11.24%	9.90%	9.83%	11.26%

SLEP

Employer Contributions for	Percent of Active Member Payroll			
	Current Assumptions	New Decrement		
		7.50%/3.50%	7.50%/3.25%	7.25%/3.25%
Normal Cost	11.63%	11.66%	11.16%	12.28%
Lump Sum Death-In-Service Benefits	0.12%	0.12%	0.12%	0.12%
Temporary Disability	0.07%	0.07%	0.07%	0.07%
13th Checks	0.62%	0.62%	0.62%	0.62%
Unfunded Liabilities	9.05%	8.82%	9.62%	11.32%
Total	21.49%	21.29%	21.59%	24.41%

The above results are presented as an aid in understanding the average combined effects of the changes in assumptions that have been proposed in this experience study. The results are approximate and indicate only the general direction and approximate average magnitude of the effects of the assumption changes. *Contribution rates for 2018 have already been scheduled based upon the December 31, 2016 regular valuation and are not affected by the experience study*. The experience study would begin to affect rates in 2019.

Standard Deviation Graph
Example
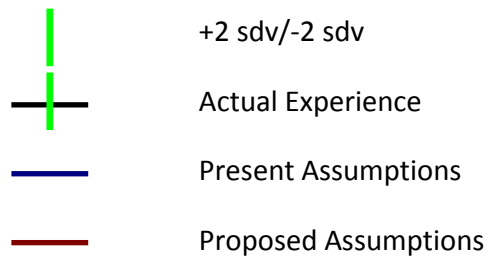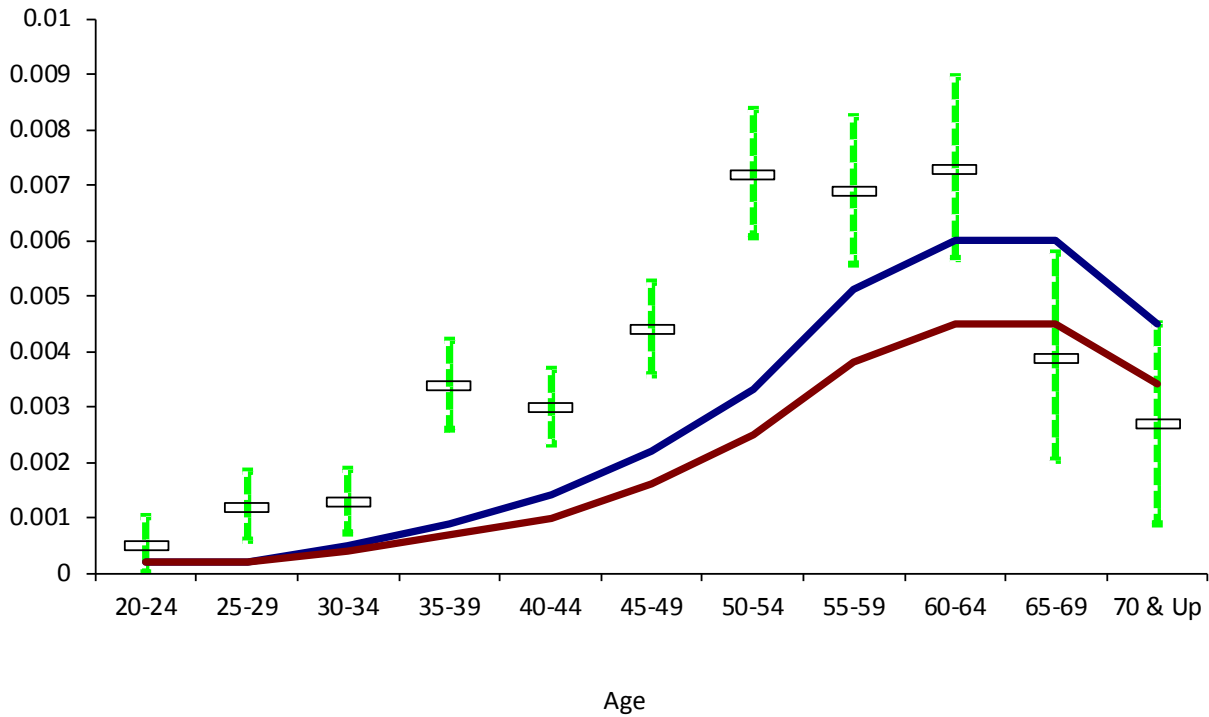
Standard Deviation graphs of the type shown above appear frequently in this report. The navy blue line represents the present assumptions used in the valuation. After experience is reviewed for a given decrement, an actual value is computed (based on actual experience) along with its standard deviation value. The green vertical bars on the graph above represent the standard deviation value. If the standard deviation value is large, this means that the group being tested is from a small population. A small group should have less influence on deriving the new proposed value than a large group. In comparison, if the standard deviation has a small value, this means the group being tested is from a large population and should have a greater impact on the decision of the proposed value.

WITHDRAWAL EXPERIENCE

Regular Males Withdrawal Experience

There were 11,486 withdrawals and 77,395 years of exposure included in the male service-based withdrawal investigation for members with less than 8 years of service. Currently, the threshold for the service based table is 8 years. The proposed rates recommend the same threshold and slightly higher rates of withdrawal.

Male Service-Based Withdrawals

Service Index	Withdrawals	Exposure	Actual Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	2,378	9,668	0.2460	0.2450	0.0000	2,369	-
2	3,178	15,734	0.2020	0.1900	0.0000	2,989	-
3	1,890	12,307	0.1536	0.1450	0.0000	1,785	-
4	1,349	9,764	0.1382	0.1200	0.0000	1,172	-
5	893	8,088	0.1104	0.0950	0.0000	768	-
6	710	7,579	0.0937	0.0800	0.0000	606	-
7	589	7,717	0.0763	0.0700	0.0000	540	-
8	499	6,538	0.0763	0.0650	0.0000	425	-
9	392	5,103	0.0768	0.0000	0.0000	-	-
10	292	4,554	0.0641	0.0000	0.0000	-	-
11	229	4,098	0.0559	0.0000	0.0000	-	-
12	189	3,624	0.0522	0.0000	0.0000	-	-
13	182	3,476	0.0524	0.0000	0.0000	-	-
14	195	3,524	0.0553	0.0000	0.0000	-	-
15	150	3,524	0.0426	0.0000	0.0000	-	-
16	145	3,388	0.0428	0.0000	0.0000	-	-
17	105	3,030	0.0347	0.0000	0.0000	-	-
18	85	2,629	0.0323	0.0000	0.0000	-	-
19	75	2,290	0.0328	0.0000	0.0000	-	-
20	75	2,018	0.0372	0.0000	0.0000	-	-
21	52	1,763	0.0295	0.0000	0.0000	-	-
22	39	1,498	0.0260	0.0000	0.0000	-	-
23	35	1,350	0.0259	0.0000	0.0000	-	-
24	31	1,339	0.0232	0.0000	0.0000	-	-
25	40	1,430	0.0280	0.0000	0.0000	-	-
26	44	1,443	0.0305	0.0000	0.0000	-	-
27	36	1,310	0.0275	0.0000	0.0000	-	-
28	23	1,099	0.0209	0.0000	0.0000	-	-
29	21	936	0.0224	0.0000	0.0000	-	-
30 & over	131	3,000	0.0437	0.0000	0.0000	-	-
Totals (Less Than or Equal to 8)	11,486	77,395	0.1484	0.1377	0.0000	10,654	-

Regular Males Withdrawal Experience

There were 2,000 withdrawals and 56,418 years of exposure included in the male age-based withdrawal investigation for members with 8 or more years of service. Age based withdrawal was found to be more highly correlated with the liability weighted rates and therefore the proposed rates were increased to be closer to these rates.

Male Age-Based Withdrawals
With More Than 8 Years of Service

Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	37	559	0.0662	0.0489	0.0490	0.0000	25	-
30-34	258	4,612	0.0559	0.0439	0.0360	0.0000	165	-
35-39	380	8,614	0.0441	0.0328	0.0290	0.0000	251	-
40-44	396	10,314	0.0384	0.0288	0.0240	0.0000	248	-
45-49	392	13,701	0.0286	0.0217	0.0200	0.0000	278	-
50-54	537	18,618	0.0288	0.0193	0.0190	0.0000	356	-
Totals	2,000	56,418	0.0354	0.0236	0.0234	0.0000	1,323	-

	Actual	Liability	Proposed
Current	0.0354	0.0236	0.0000
Previous Investigation Results	0.0297	0.0204	0.0232
2008-2010	0.0278	0.0193	0.0241
2005-2007	0.0305	0.0217	0.0270

* *Sample rates are taken from midpoint of age group.*

Regular Males Withdrawal Experience

Male Service-Based Withdrawals

Male Age-Based Withdrawals

Regular Females Withdrawal Experience

There were 23,631 withdrawals and 137,255 years of exposure included in the female service-based withdrawal investigation for members with less than 8 years of service. Currently, the threshold for the service based table is 8 years. The proposed rates recommend the same threshold and slightly higher rates of withdrawal.

Female Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates Present	Sample Rates Proposed	Expected Withdrawals Present	Expected Withdrawals Proposed
1	5,214	18,628	0.2799	0.2900	0.0000	5,402	-
2	6,224	27,834	0.2236	0.2200	0.0000	6,123	-
3	3,864	20,951	0.1844	0.1700	0.0000	3,562	-
4	2,626	16,361	0.1605	0.1300	0.0000	2,127	-
5	1,745	13,544	0.1288	0.1100	0.0000	1,490	-
6	1,498	13,109	0.1143	0.0900	0.0000	1,180	-
7	1,350	14,264	0.0946	0.0750	0.0000	1,070	-
8	1,110	12,564	0.0883	0.0700	0.0000	879	-
9	1,053	10,597	0.0994	0.0000	0.0000	-	-
10	794	9,163	0.0867	0.0000	0.0000	-	-
11	610	7,627	0.0800	0.0000	0.0000	-	-
12	496	6,536	0.0759	0.0000	0.0000	-	-
13	416	6,136	0.0678	0.0000	0.0000	-	-
14	406	6,122	0.0663	0.0000	0.0000	-	-
15	350	6,033	0.0580	0.0000	0.0000	-	-
16	287	5,383	0.0533	0.0000	0.0000	-	-
17	212	4,466	0.0475	0.0000	0.0000	-	-
18	159	3,667	0.0434	0.0000	0.0000	-	-
19	141	2,998	0.0470	0.0000	0.0000	-	-
20	120	2,395	0.0501	0.0000	0.0000	-	-
21	97	1,965	0.0494	0.0000	0.0000	-	-
22	75	1,584	0.0473	0.0000	0.0000	-	-
23	56	1,321	0.0424	0.0000	0.0000	-	-
24	44	1,152	0.0382	0.0000	0.0000	-	-
25	45	1,110	0.0405	0.0000	0.0000	-	-
26	37	1,020	0.0363	0.0000	0.0000	-	-
27	34	880	0.0386	0.0000	0.0000	-	-
28	23	701	0.0328	0.0000	0.0000	-	-
29	29	572	0.0507	0.0000	0.0000	-	-
30 & over	115	1,687	0.0682	0.0000	0.0000	-	-
Totals (Less Than or Equal to 8)	23,631	137,255	0.1722	0.1591	0.0000	21,833	-

Regular Females Withdrawal Experience

There were 4,512 withdrawals and 83,108 years of exposure included in the female age-based withdrawal investigation for members with more than 8 years of service. Age based withdrawal was found to be highly correlated with the liability weighted rates and therefore the proposed rates were increased to be closer to those rates.

Female Age-Based Withdrawals
With More Than 8 Years of Service

Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	55	442	0.1244	0.1109	0.0620	0.0000	27	-
30-34	421	4,548	0.0926	0.0752	0.0600	0.0000	261	-
35-39	639	8,836	0.0723	0.0570	0.0450	0.0000	400	-
40-44	813	12,847	0.0633	0.0443	0.0350	0.0000	457	-
45-49	1,088	21,397	0.0508	0.0337	0.0320	0.0000	673	-
50-54	1,496	35,038	0.0427	0.0307	0.0260	0.0000	933	-
Totals	4,512	83,108	0.0543	0.0369	0.0331	0.0000	2,751	-

	Actual	Liability		Proposed
Current	0.0543	0.0369		0.0000
Previous Investigation Results	0.0440	0.0325		0.0327
2008-2010	0.0372	0.0262		0.0315
2005-2007	0.0418	0.0304		0.0361

* *Sample rates are taken from midpoint of age group.*

Regular Females Withdrawal Experience

Female Service-Based Withdrawals

Legend: Actual Experience | Present Assumptions | Proposed Assumptions

Female Age-Based Withdrawals
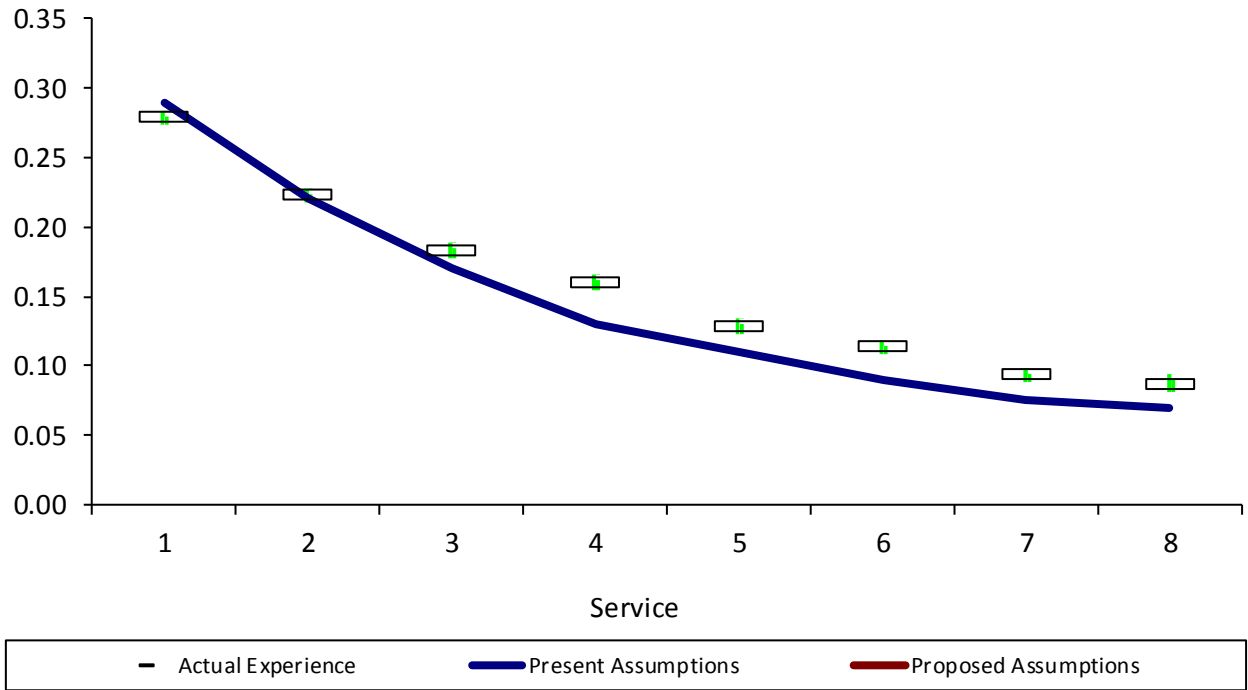
Legend: Actual Experience | Present Assumptions | Proposed Assumptions

SLEP Withdrawal Experience

There were 236 withdrawals and 3,213 years of exposure included in the service based withdrawal investigation for SLEP members with less than 7 years of service. Currently, the threshold for the service based table is 7 years. The proposed rates recommend the same threshold and slightly higher rates of withdrawal.

SLEP Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates Present	Sample Rates Proposed	Expected Withdrawals Present	Expected Withdrawals Proposed
1	44	276	0.1594	0.1800	0.0000	49.7	-
2	55	559	0.0984	0.1000	0.0000	55.9	-
3	33	503	0.0656	0.0650	0.0000	32.7	-
4	30	469	0.0640	0.0600	0.0000	28.1	-
5	27	425	0.0635	0.0470	0.0000	20.0	-
6	26	448	0.0580	0.0350	0.0000	15.7	-
7	21	533	0.0394	0.0330	0.0000	17.6	-
8	19	579	0.0328	0.0000	0.0000	-	-
9	16	580	0.0276	0.0000	0.0000	-	-
10	9	537	0.0168	0.0000	0.0000	-	-
11	10	534	0.0187	0.0000	0.0000	-	-
12	11	510	0.0216	0.0000	0.0000	-	-
13	12	494	0.0243	0.0000	0.0000	-	-
14	5	465	0.0108	0.0000	0.0000	-	-
15	4	452	0.0088	0.0000	0.0000	-	-
16	4	441	0.0091	0.0000	0.0000	-	-
17	4	432	0.0093	0.0000	0.0000	-	-
18	5	449	0.0111	0.0000	0.0000	-	-
19	3	426	0.0070	0.0000	0.0000	-	-
20	5	369	0.0136	0.0000	0.0000	-	-
21	4	258	0.0155	0.0000	0.0000	-	-
22	4	225	0.0178	0.0000	0.0000	-	-
23	1	173	0.0058	0.0000	0.0000	-	-
24	1	165	0.0061	0.0000	0.0000	-	-
25	3	165	0.0182	0.0000	0.0000	-	-
26	3	128	0.0234	0.0000	0.0000	-	-
27	-	96	0.0000	0.0000	0.0000	-	-
28	3	51	0.0588	0.0000	0.0000	-	-
29	-	25	0.0000	0.0000	0.0000	-	-
30 & over	2	13	0.1538	0.0000	0.0000	-	-
Totals (Less Than or Equal to 7)	236	3,213	0.0735	0.0684	0.0000	219.7	-

SLEP Withdrawal Experience

There were 123 withdrawals and 7,561 years of exposure included in the age based withdrawal investigation for SLEP members with more than 7 years of service. Age based withdrawal was found to be more highly correlated with the liability weighted rates and therefore the proposed rates were lowered to be closer to these rates.

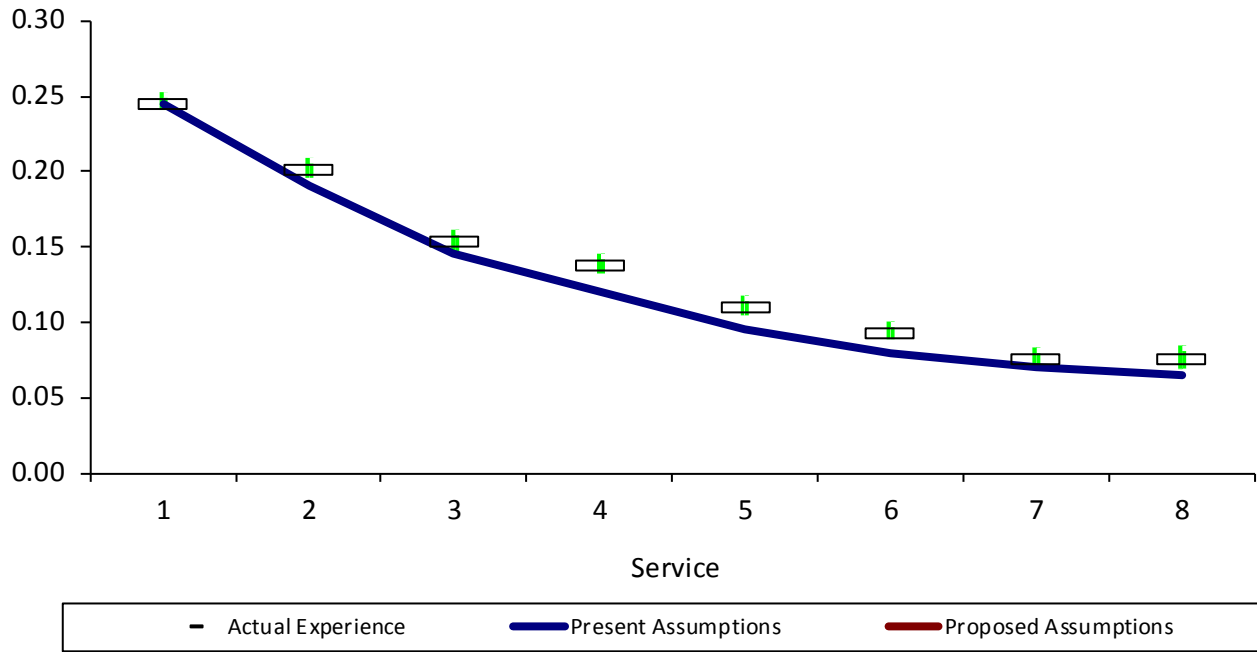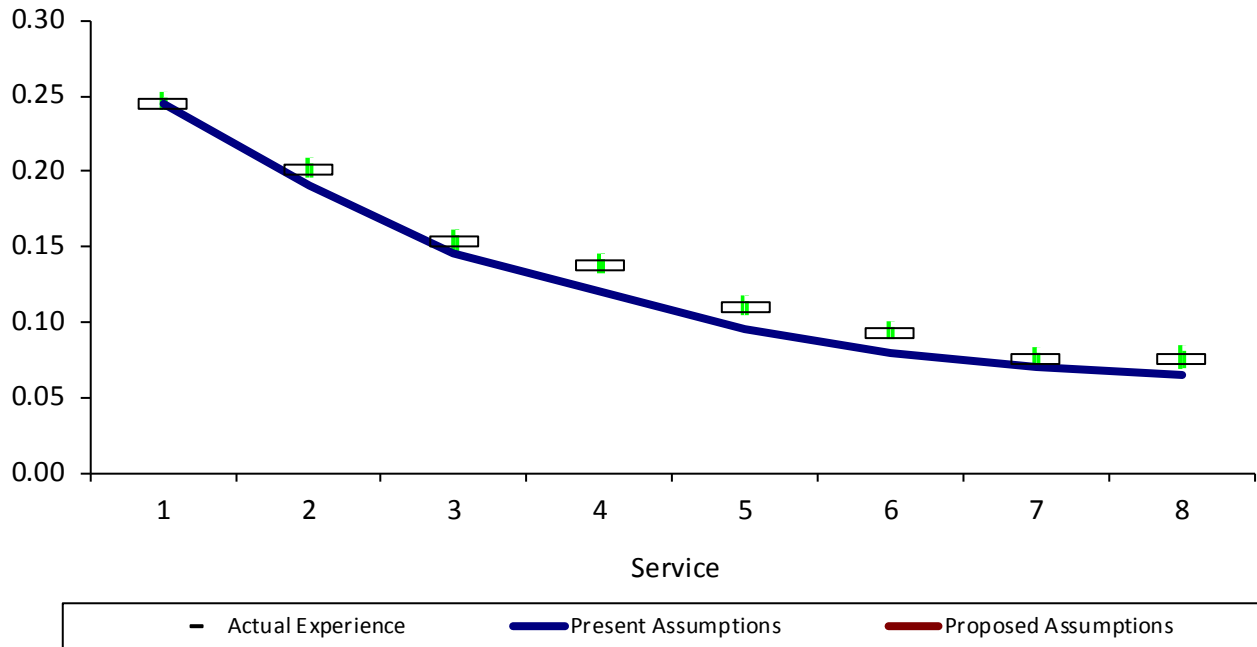## SLEP Age-Based Withdrawals
With More Than 7 Years of Service

Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	1	63	0.0159	0.0273	0.0250	0.0000	1.5	-
30-34	30	1,021	0.0294	0.0263	0.0200	0.0000	20.0	-
35-39	27	1,533	0.0176	0.0145	0.0150	0.0000	23.9	-
40-44	22	1,992	0.0110	0.0084	0.0150	0.0000	29.9	-
45-49	30	2,147	0.0140	0.0125	0.0150	0.0000	32.2	-
50-54	11	527	0.0209	0.0233	0.0150	0.0000	7.9	-
55-59	2	278	0.0072	0.0060	0.0140	0.0000	3.9	-
Totals	123	7,561	0.0163	0.0130	0.0158	0.0000	119.3	-

	Actual	Liability	Proposed
Current	0.0163	0.0130	0.0000
Previous Investigation Results	0.0157	0.0116	0.0158
2008-2010	0.0179	0.0130	0.0183
2005-2007	0.0203	0.0160	0.0198

* *Sample rates are taken from midpoint of age group.*

SLEP Withdrawal Experience

SLEP Service-Based Withdrawals

SLEP Age-Based Withdrawals
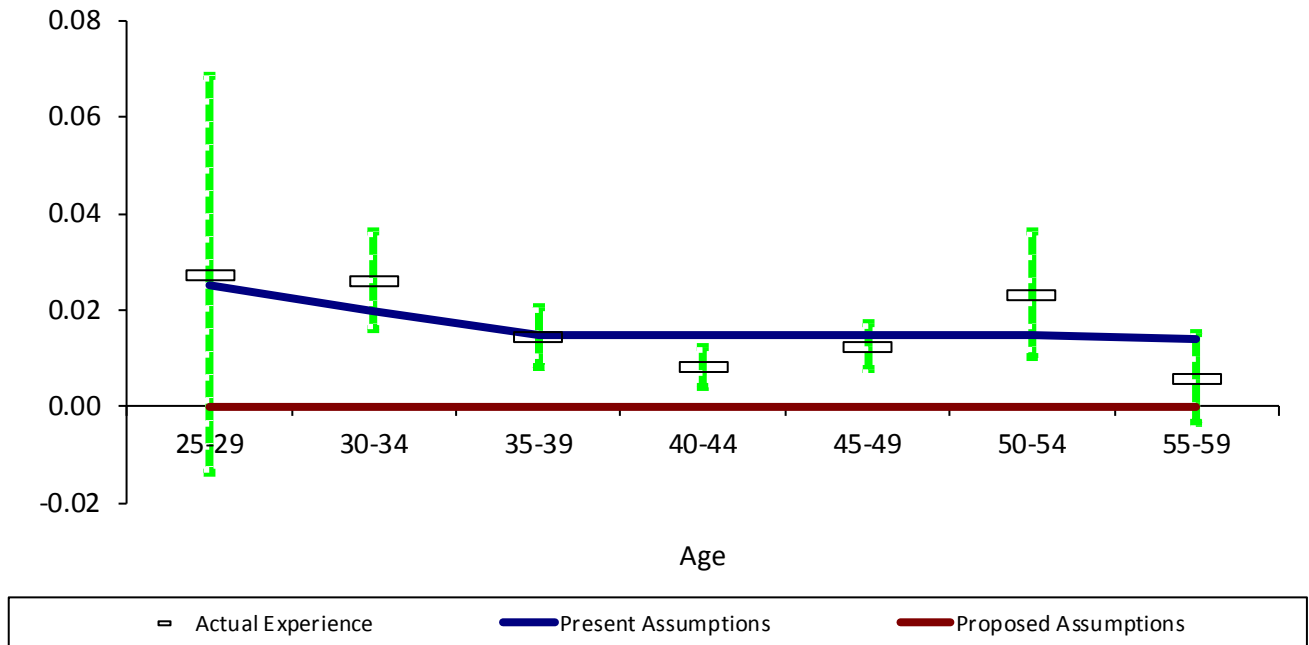
ECO Males Withdrawal Experience

There were 26 withdrawals and 134 years of exposure included in the male service based withdrawal investigation for ECO members with less than 8 years of service.   Currently, the threshold for the service based table is 8 years. The proposed rates recommend the same threshold and higher rates of withdrawal.

Male Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates Present	Sample Rates Proposed	Expected Withdrawals Present	Expected Withdrawals Proposed
1	2	3	0.6667	0.2000	0.0000	0.6	-
2	1	3	0.3333	0.1200	0.0000	0.4	-
3	-	2	0.0000	0.1000	0.0000	0.2	-
4	2	19	0.1053	0.0900	0.0000	1.7	-
5	3	27	0.1111	0.0800	0.0000	2.2	-
6	10	39	0.2564	0.0700	0.0000	2.7	-
7	3	25	0.1200	0.0600	0.0000	1.5	-
8	5	16	0.3125	0.0550	0.0000	0.9	-
9	-	5	0.0000	0.0000	0.0000	-	-
10	-	8	0.0000	0.0000	0.0000	-	-
11	2	6	0.3333	0.0000	0.0000	-	-
12	3	6	0.5000	0.0000	0.0000	-	-
13	2	3	0.6667	0.0000	0.0000	-	-
14	3	6	0.5000	0.0000	0.0000	-	-
15	-	8	0.0000	0.0000	0.0000	-	-
16	1	8	0.1250	0.0000	0.0000	-	-
17	2	5	0.4000	0.0000	0.0000	-	-
18	3	1	3.0000	0.0000	0.0000	-	-
19	1	2	0.5000	0.0000	0.0000	-	-
20	1	3	0.3333	0.0000	0.0000	-	-
21	-	6	0.0000	0.0000	0.0000	-	-
22	-	7	0.0000	0.0000	0.0000	-	-
23	1	7	0.1429	0.0000	0.0000	-	-
24	3	5	0.6000	0.0000	0.0000	-	-
25	1	1	1.0000	0.0000	0.0000	-	-
26	1	1	1.0000	0.0000	0.0000	-	-
27	-	-	N\A	0.0000	0.0000	-	-
28	-	1	0.0000	0.0000	0.0000	-	-
29	-	1	0.0000	0.0000	0.0000	-	-
30 & over	2	10	0.2000	0.0000	0.0000	-	-
Totals (Less Than or Equal to 8)	26	134	0.1940	0.0761	0.0000	10.2	-

ECO Males Withdrawal Experience

There were 9 withdrawals and 100 years of exposure included in the male age based withdrawal investigation for ECO members with more than 8 years of service. Age based withdrawal was found to be more highly correlated with the liability weighted rates and therefore the proposed rates were increased to be closer to these rates.

Male Age-Based Withdrawals
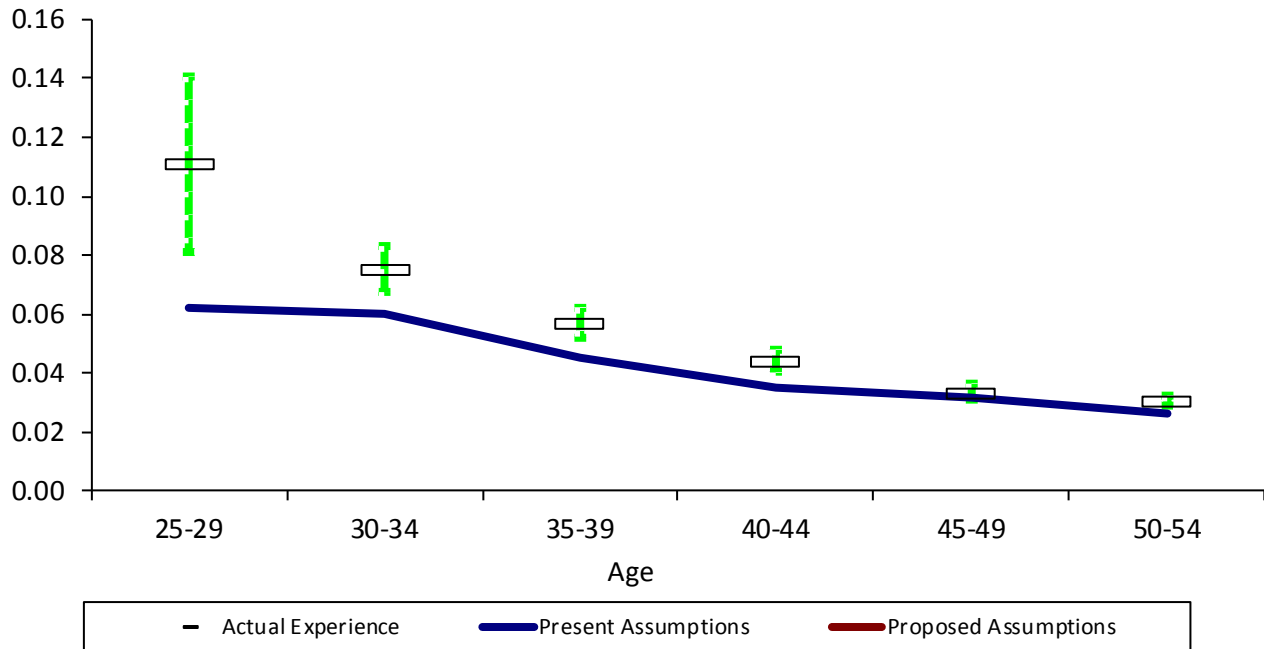## With More Than 8 Years of Service

Age	Withdrawal	Exposure	Actual Rates Weighted by Population	Liability	Sample Rates* Present	Proposed	Expected Withdrawals Present	Proposed
25-29	-	-	0.0000	0.0000	0.0600	0.0950	-	-
30-34	-	-	0.0000	0.0000	0.0600	0.0950	-	-
35-39	-	8	0.0000	0.0000	0.0600	0.0950	0.5	0.8
40-44	1	15	0.0667	0.0180	0.0600	0.0950	0.9	1.4
45-49	2	28	0.0714	0.0946	0.0600	0.0950	1.7	2.7
50-54	6	49	0.1224	0.1890	0.0600	0.0950	2.9	4.7
Totals	9	100	0.0900	0.1293	0.0601	0.0960	6.0	9.6

	Actual	Liability	Proposed
Current	0.0900	0.1293	0.0960
Previous Investigation Results	0.1029	0.0666	0.0600
2008-2010	0.0846	0.0818	0.0550
2005-2007	0.0590	0.0404	0.0450

*   *Sample rates are taken from midpoint of age group.*

ECO Males Withdrawal Experience

Male Service-Based Withdrawals

| | Actual Experience | Present Assumptions | Proposed Assumptions |

Male Age-Based Withdrawals
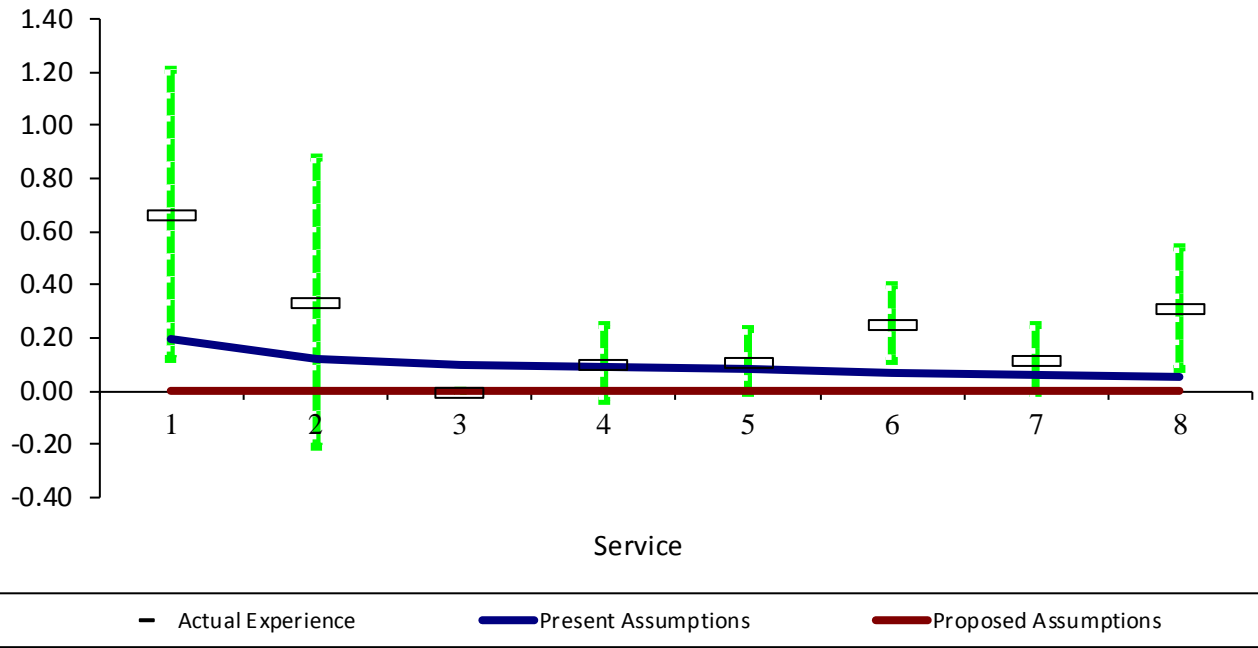
| | Actual Experience | Present Assumptions | Proposed Assumptions |
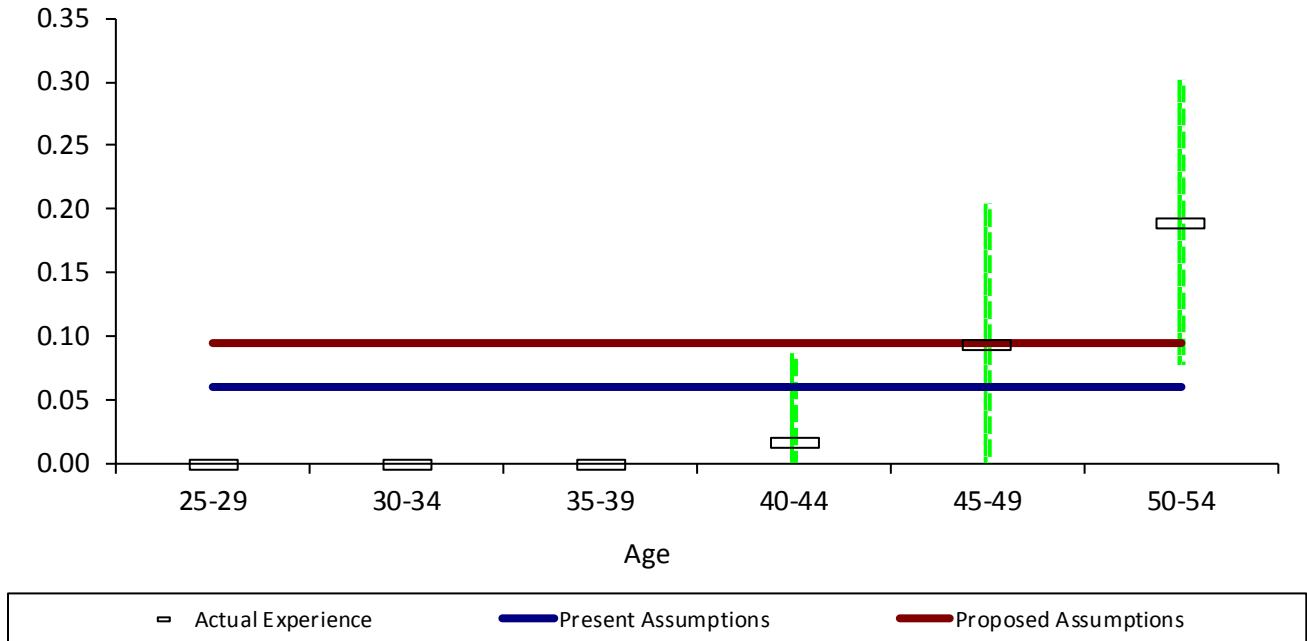
ECO Females Withdrawal Experience

There were 6 withdrawals and 50 years of exposure included in the female service based withdrawal investigation for ECO members with less than 8 years of service. Currently, the threshold for the service based table is 8 years. The proposed rates recommend the same threshold and higher rates of withdrawal.

Female Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates Present	Sample Rates Proposed	Expected Withdrawals Present	Expected Withdrawals Proposed
1	1	1	1.0000	0.1500	0.0000	0.2	-
2	-	-	N\A	0.1000	0.0000	-	-
3	-	-	N\A	0.0800	0.0000	-	-
4	-	5	0.0000	0.0700	0.0000	0.4	-
5	1	7	0.1429	0.0600	0.0000	0.4	-
6	1	14	0.0714	0.0500	0.0000	0.7	-
7	1	13	0.0769	0.0400	0.0000	0.5	-
8	2	10	0.2000	0.0350	0.0000	0.4	-
9	1	4	0.2500	0.0000	0.0000	-	-
10	-	1	0.0000	0.0000	0.0000	-	-
11	-	2	0.0000	0.0000	0.0000	-	-
12	2	5	0.4000	0.0000	0.0000	-	-
13	-	4	0.0000	0.0000	0.0000	-	-
14	-	5	0.0000	0.0000	0.0000	-	-
15	-	4	0.0000	0.0000	0.0000	-	-
16	2	4	0.5000	0.0000	0.0000	-	-
17	-	2	0.0000	0.0000	0.0000	-	-
18	1	3	0.3333	0.0000	0.0000	-	-
19	-	2	0.0000	0.0000	0.0000	-	-
20	2	2	1.0000	0.0000	0.0000	-	-
21	-	1	0.0000	0.0000	0.0000	-	-
22	-	1	0.0000	0.0000	0.0000	-	-
23	-	1	0.0000	0.0000	0.0000	-	-
24	-	-	N\A	0.0000	0.0000	-	-
25	1	1	1.0000	0.0000	0.0000	-	-
26	-	1	0.0000	0.0000	0.0000	-	-
27	-	2	0.0000	0.0000	0.0000	-	-
28	-	2	0.0000	0.0000	0.0000	-	-
29	-	1	0.0000	0.0000	0.0000	-	-
30 & over	-	8	0.0000	0.0000	0.0000	-	-
Totals (Less Than or Equal to 8)	6	50	0.1200	0.0520	0.0000	2.6	-

ECO Females Withdrawal Experience

There were 7 withdrawals and 56 years of exposure included in the female age based withdrawal investigation for ECO members with more than 8 years of service. Age based withdrawal was found to be more highly correlated with the liability weighted rates and therefore the proposed rates were increased to be closer to these rates.

Female Age-Based Withdrawals
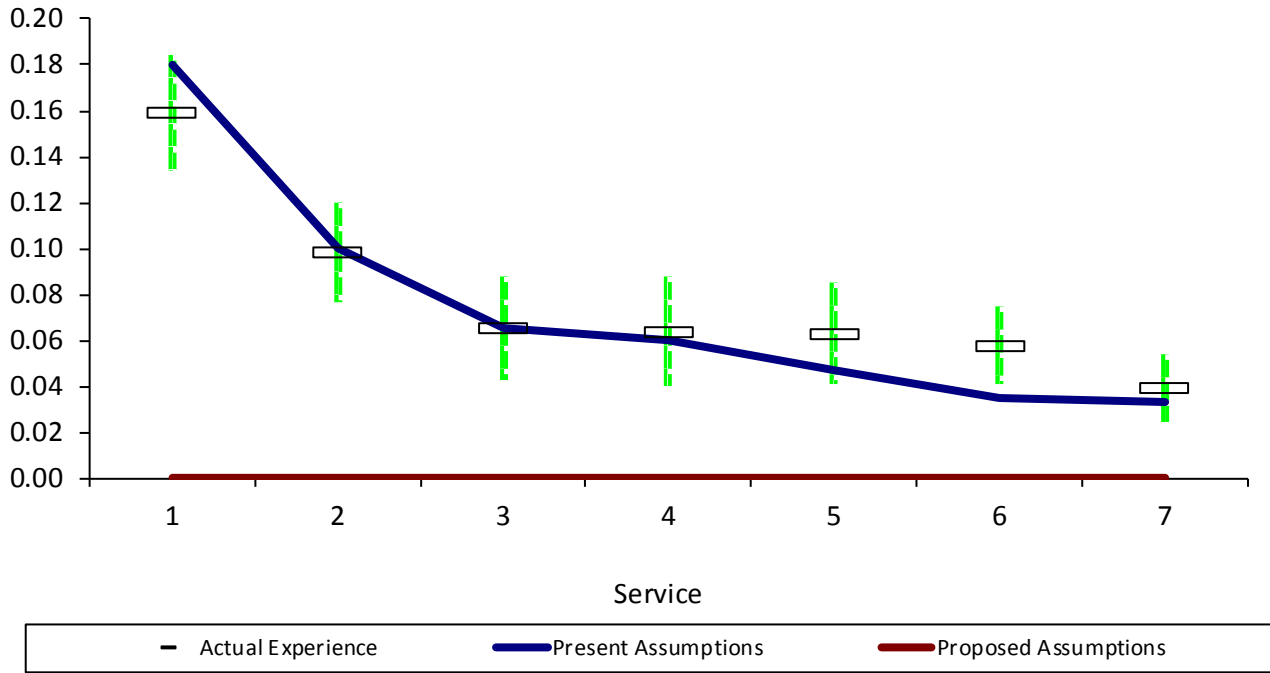## With More Than 8 Years of Service

Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	-	-	0.0000	0.0000	0.0320	0.0675	-	-
30-34	-	-	0.0000	0.0000	0.0320	0.0675	-	-
35-39	-	-	0.0000	0.0000	0.0320	0.0675	-	-
40-44	-	4	0.0000	0.0000	0.0320	0.0675	0.1	0.3
45-49	1	12	0.0833	0.0979	0.0320	0.0675	0.4	0.8
50-54	6	40	0.1500	0.1093	0.0320	0.0675	1.3	2.7
Totals	7	56	0.1250	0.1030	0.0320	0.0682	1.8	3.8

	Actual	Liability		Proposed
Current	0.1250	0.1030		0.0682
Previous Investigation Results	0.0722	0.0289		0.0320
2008-2010	0.0544	0.0494		0.0350
2005-2007	0.0263	0.0162		0.0180

*   *Sample rates are taken from midpoint of age group.*

ECO Females Withdrawal Experience

Female Service-Based Withdrawals

| | Actual Experience | Present Assumptions | Proposed Assumptions |

Service

Female Age-Based Withdrawals

| | Actual Experience | Present Assumptions | Proposed Assumptions |

Age

GRS Retirement Consulting
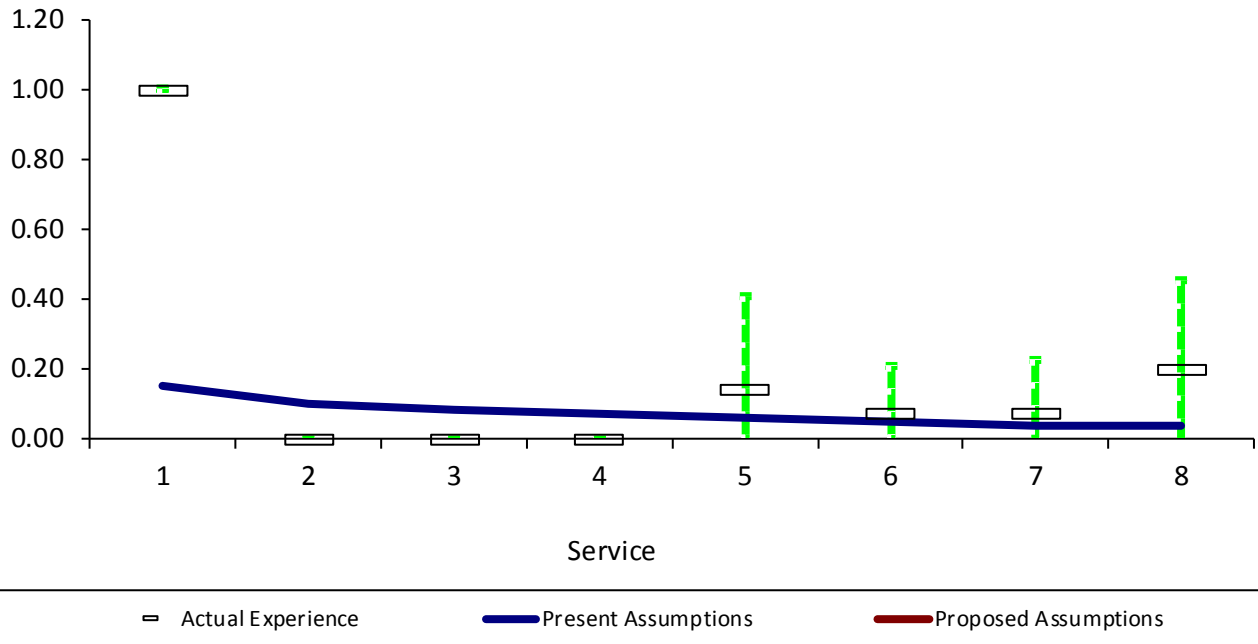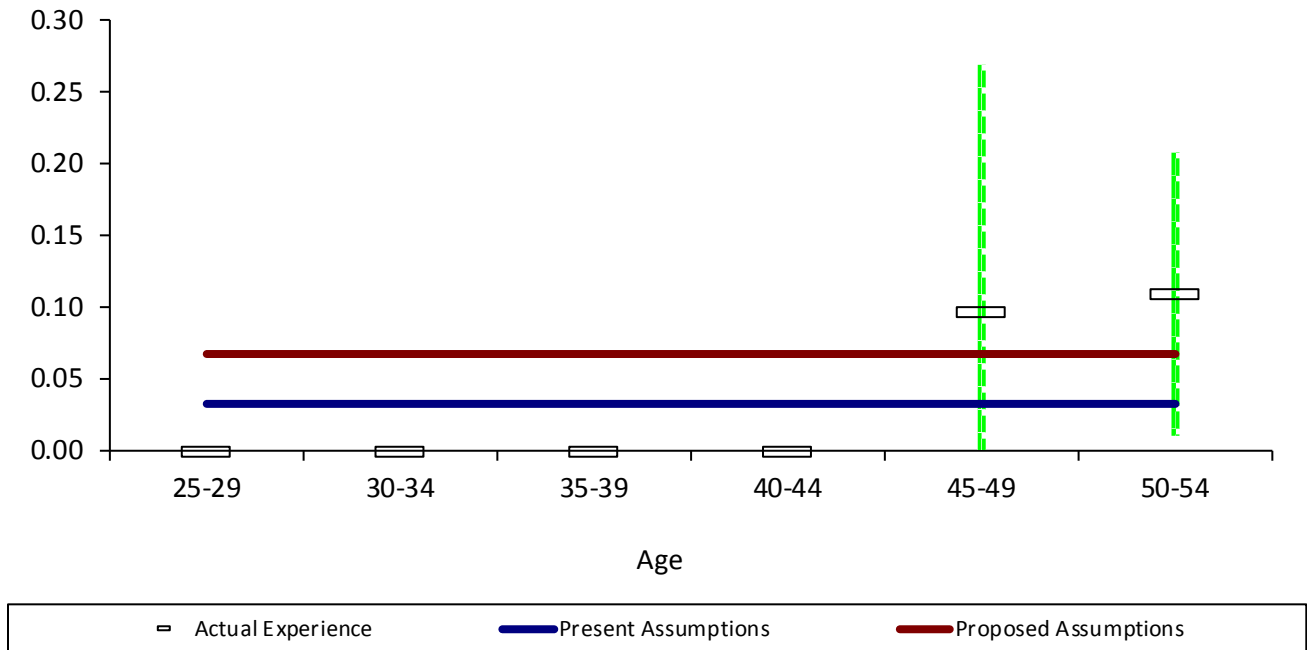
ECO-SLEP Withdrawal Experience

There were 2 withdrawals and 10 years of exposure included in the service based withdrawal investigation for ECO-SLEP members with less than 7 years of service. Exposure for this group is very limited.

Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	-	-	0.0000	0.1800	0.0000	-	-
2	-	-	0.0000	0.1000	0.0000	-	-
3	-	-	0.0000	0.0650	0.0000	-	-
4	1	4	0.2500	0.0600	0.0000	0.2	-
5	1	3	0.3333	0.0470	0.0000	0.1	-
6	-	3	0.0000	0.0350	0.0000	0.1	-
7	-	-	0.0000	0.0330	0.0000	-	-
8	-	2	0.0000	0.0000	0.0000	-	-
9	-	1	0.0000	0.0000	0.0000	-	-
10	-	1	0.0000	0.0000	0.0000	-	-
11	1	1	1.0000	0.0000	0.0000	-	-
12	1	2	0.5000	0.0000	0.0000	-	-
13	-	1	0.0000	0.0000	0.0000	-	-
14	-	-	0.0000	0.0000	0.0000	-	-
15	-	1	0.0000	0.0000	0.0000	-	-
16	1	1	1.0000	0.0000	0.0000	-	-
17	-	1	0.0000	0.0000	0.0000	-	-
18	-	-	0.0000	0.0000	0.0000	-	-
19	-	-	0.0000	0.0000	0.0000	-	-
20	-	1	0.0000	0.0000	0.0000	-	-
21	-	-	0.0000	0.0000	0.0000	-	-
22	-	-	0.0000	0.0000	0.0000	-	-
23	-	-	0.0000	0.0000	0.0000	-	-
24	-	-	0.0000	0.0000	0.0000	-	-
25	-	-	0.0000	0.0000	0.0000	-	-
26	-	-	0.0000	0.0000	0.0000	-	-
27	-	-	0.0000	0.0000	0.0000	-	-
28	-	-	0.0000	0.0000	0.0000	-	-
29	-	-	0.0000	0.0000	0.0000	-	-
30 & over	1	-	0.0000	0.0000	0.0000	-	-
Totals (Less Than or Equal to 7)	2	10	0.2000	0.0400	0.0000	0.4	-

ECO SLEP Withdrawal Experience

There was 1 withdrawal and 12 years of exposure included in the age based withdrawal investigation for members with more than 7 years of service. Exposure is very limited for this group.

ECO SLEP Age-Based Withdrawals
With More Than 7 Years of Service

Age	Withdrawal	Exposure	Actual Rates Weighted by Population	Liability	Sample Rates* Present	Proposed	Expected Withdrawals Present	Proposed
25-29	-	-	0.0000	0.0000	0.0250	0.0000	-	-
30-34	-	-	0.0000	0.0000	0.0200	0.0000	-	-
35-39	-	-	0.0000	0.0000	0.0150	0.0000	-	-
40-44	-	-	0.0000	0.0000	0.0150	0.0000	-	-
45-49	-	6	0.0000	0.0000	0.0150	0.0000	0.1	-
50-54	1	6	0.1667	0.1555	0.0150	0.0000	0.1	-
Totals	1	12	0.0833	0.0628	0.0150	-0.0017	0.2	-

	Actual	Liability		Proposed
Current	0.0833	0.0628		-0.0017
Previous Investigation Results	0.0000	0.0000		0.0150
2008-2010	0.0417	0.0620		0.0192
2005-2007	0.0000	0.0000		0.0150

Sample rates are taken from midpoint of age group.

ECO SLEP Withdrawal Experience

ECO SLEP Service-Based Withdrawals

| Actual Experience | Present Assumptions | Proposed Assumption |

ECO SLEP Age-Based Withdrawals
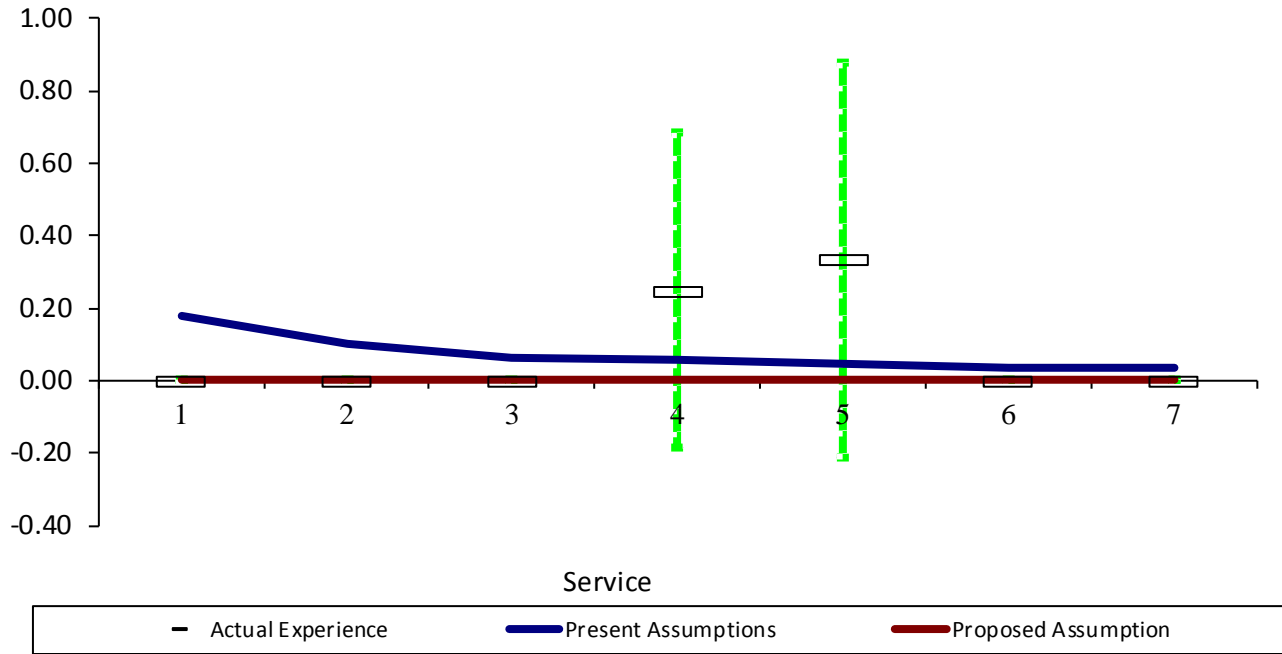
| Actual Experience | Present Assumptions | Proposed Assumptions |
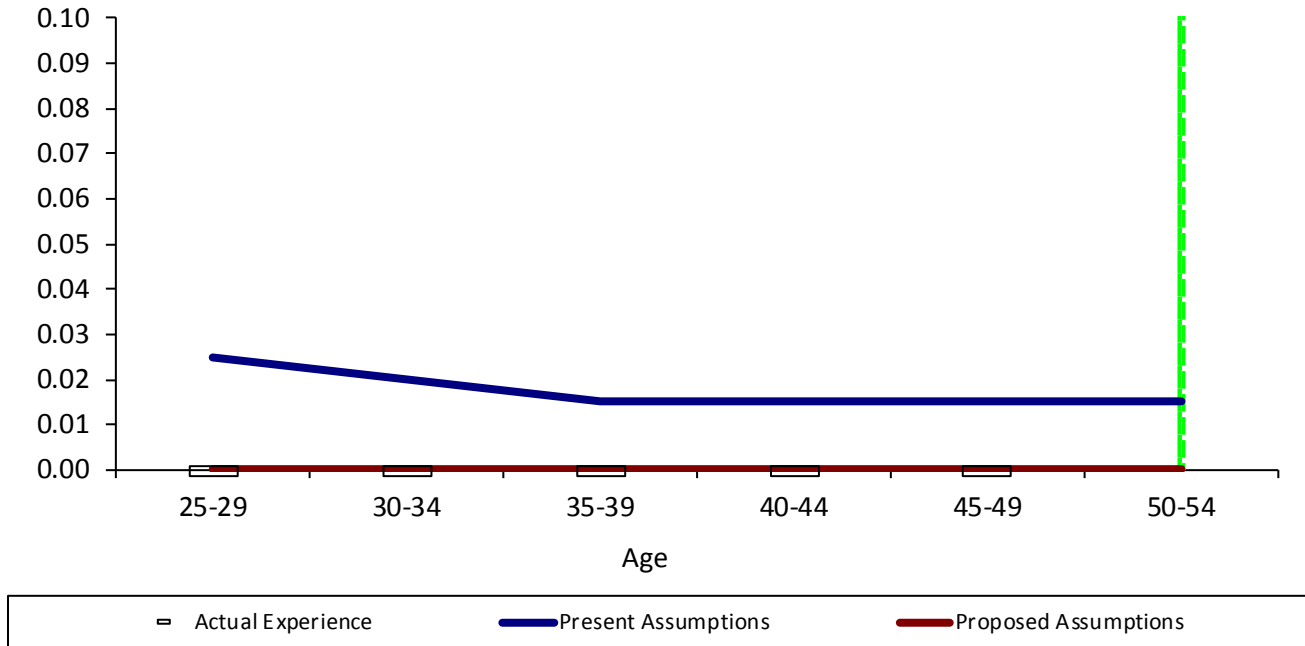
DISABILITY EXPERIENCE

Regular Males – Disability Retirement Experience

There were 571 temporary disability benefit claims reported for the 3-year period and 177,839 years of exposure. However, there were approximately 51 permanent disabilities. The proposed rates recommend lower rates of permanent disability.

| | | | Actual Rates Weighted by | | Permanent Disabilities | | | | |
| | Temporary | | | | Sample Rates* | | Actual | Expected | |
Age	Disabilities	Exposure	Population	Liability	Old	New		Present	Propose
Under 20	-	180	0.0000	0.0000	0.0000	0.0000		-	-
20-24	1	5,167	0.0002	0.0000	0.0000	0.0000		-	-
25-29	4	13,778	0.0003	0.0002	0.0000	0.0000		1	-
30-34	16	16,075	0.0010	0.0014	0.0001	0.0001		2	1
35-39	27	16,527	0.0016	0.0010	0.0002	0.0001		3	2
40-44	33	17,062	0.0019	0.0015	0.0003	0.0002		4	4
45-49	63	20,327	0.0031	0.0028	0.0004	0.0003		8	7
50-54	120	25,935	0.0046	0.0046	0.0006	0.0005		16	13
55-59	136	27,081	0.0050	0.0048	0.0009	0.0008		25	20
60-64	126	20,875	0.0060	0.0052	0.0011	0.0009		22	18
65-69	29	9,191	0.0032	0.0027	0.0011	0.0009		10	8
70-74	12	3,655	0.0033	0.0016	0.0008	0.0007		3	3
75 & over	4	1,986	0.0020	0.0015	0.0006	0.0005		1	1
Totals	571	177,839	0.0032	0.0038	0.0005	0.0004	51	95	77

	Actual	Liability		Proposed
Current	0.0003	0.0003		0.0004
Previous Investigation Results	0.0004	0.0004		0.0005
2008-2010	0.0005	0.0005		0.0007
2005-2007	0.0005	0.0005		0.0009

Sample rates are taken from midpoint of age group.

Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

Regular Females – Disability Retirement Experience

There were 638 temporary disability benefit claims reported for the 3-year period and 312,345 years of exposure. However, there were approximately 49 permanent disabilities. The proposed rates recommend lower rates of permanent disability.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by Population	Actual Rates Weighted by Liability	Sample Rates* Old	Sample Rates* New	Actual	Expected Present	Expected Propose
Under 20	-	222	0.0000	0.0000	0.0000	0.0000		-	-
20-24	1	6,752	0.0001	0.0000	0.0000	0.0000		-	-
25-29	19	18,138	0.0010	0.0020	0.0000	0.0000		-	-
30-34	25	20,436	0.0012	0.0022	0.0000	0.0000		1	1
35-39	27	24,106	0.0011	0.0017	0.0001	0.0001		2	1
40-44	48	30,977	0.0015	0.0020	0.0001	0.0001		4	3
45-49	83	42,218	0.0020	0.0025	0.0002	0.0001		8	6
50-54	125	54,179	0.0023	0.0024	0.0003	0.0002		17	12
55-59	154	56,215	0.0027	0.0025	0.0004	0.0003		26	20
60-64	118	38,969	0.0030	0.0020	0.0008	0.0006		30	22
65-69	22	14,606	0.0015	0.0007	0.0008	0.0006		11	9
70-74	13	4,010	0.0032	0.0018	0.0006	0.0005		2	2
75 & over	3	1,517	0.0020	0.0006	0.0004	0.0003		1	1
Totals	638	312,345	0.0020	0.0021	0.0003	0.0002	49	102	77

	Actual	Liability		Proposed
Current	0.0002	0.0002		0.0002
Previous Investigation Results	0.0002	0.0002		0.0003
2008-2010	0.0003	0.0003		0.0004
2005-2007	0.0003	0.0003		0.0005

Sample rates are taken from midpoint of age group.

Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

SLEP Males – Disability Retirement Experience

There were 24 temporary disability benefit claims reported for the 3-year period and 10,768 years of exposure. However, there was one permanent disability. The proposed rates recommend lower rates of permanent disability.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by		Permanent Disabilities				
			Population	Liability	Sample Rates*		Actual	Expected	
					Old	New		Present	Propose
Under 20	-	-	0.0000	0.0000	0.0000	0.0000		-	-
20-24	-	122	0.0000	0.0000	0.0001	0.0000		-	-
25-29	1	865	0.0012	0.0028	0.0002	0.0001		0.1	0.1
30-34	2	1,716	0.0012	0.0016	0.0002	0.0001		0.4	0.2
35-39	2	1,709	0.0012	0.0009	0.0003	0.0002		0.5	0.3
40-44	6	1,938	0.0031	0.0029	0.0005	0.0003		0.9	0.5
45-49	4	2,053	0.0019	0.0015	0.0006	0.0004		1.3	0.8
50-54	3	1,242	0.0024	0.0012	0.0010	0.0006		1.2	0.7
55-59	2	642	0.0031	0.0050	0.0013	0.0008		0.8	0.5
60-64	3	362	0.0083	0.0046	0.0009	0.0005		0.3	0.2
65-69	1	116	0.0086	0.0021	0.0006	0.0004		0.1	-
70-74	-	3	0.0000	0.0000	0.0003	0.0002		-	-
75 & over	-	-	0.0000	0.0000	0.0000	0.0000		-	-
Totals	24	10,768	0.0022	0.0021	0.0005	0.0003	1	5.6	3.3

	Actual	Liability		Proposed
Current	0.0001	0.0001		0.0003
Previous Investigation Results	0.0003	0.0003		0.0005
2008-2010	0.0000	0.0000		0.0007
2005-2007	0.0000	0.0000		0.0008

 Sample rates are taken from midpoint of age group.

Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

SLEP Females — Disability Retirement Experience

There were 10 temporary disability benefit claims reported for the 3-year period and 1,775 years of exposure. However, there were no permanent disabilities. The proposed rates recommend lower rates of permanent disability.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by Population	Liability	Permanent Disabilities Sample Rates* Old	New	Actual	Expected Present	Propose
Under 20	-	-	0.0000	0.0000	0.0001	0.0001		-	-
20-24	-	21	0.0000	0.0000	0.0002	0.0001		-	-
25-29	-	124	0.0000	0.0000	0.0004	0.0003		-	-
30-34	1	263	0.0038	0.0059	0.0005	0.0004		0.1	0.1
35-39	3	307	0.0098	0.0106	0.0008	0.0005		0.2	0.2
40-44	3	327	0.0092	0.0133	0.0011	0.0008		0.4	0.3
45-49	-	279	0.0000	0.0000	0.0016	0.0011		0.5	0.3
50-54	2	262	0.0076	0.0080	0.0024	0.0017		0.6	0.4
55-59	1	118	0.0085	0.0033	0.0033	0.0023		0.4	0.3
60-64	-	58	0.0000	0.0000	0.0023	0.0016		0.1	0.1
65-69	-	16	0.0000	0.0000	0.0015	0.0011		-	-
70-74	-	-	0.0000	0.0000	0.0008	0.0005		-	-
75 & over	-	-	0.0000	0.0000	0.0000	0.0000		-	-
Totals	10	1,775	0.0056	0.0062	0.0013	0.0010	-	2.3	1.7

	Actual	Liability	Proposed
Current	0.0000	0.0000	0.0010
Previous Investigation Results	0.0000	0.0000	0.0013
2008-2010	0.0000	0.0000	0.0012
2005-2007	0.0000	0.0000	0.0017

Sample rates are taken from midpoint of age group.

Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

ECO Males – Disability Retirement Experience

There were 0 temporary disability benefit claims reported for the 3-year period and 486 years of exposure. However, there were no permanent disabilities. The proposed rates recommend no changes for this group.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by		Permanent Disabilities				
			Population	Liability	Sample Rates*		Actual	Expected	
					Old	New		Present	Propose
Under 20	-	-	0.0000	0.0000	0.0001	0.0001		-	-
20-24	-	-	0.0000	0.0000	0.0001	0.0001		-	-
25-29	-	4	0.0000	0.0000	0.0001	0.0001		-	-
30-34	-	4	0.0000	0.0000	0.0002	0.0002		-	-
35-39	-	21	0.0000	0.0000	0.0003	0.0003		-	-
40-44	-	24	0.0000	0.0000	0.0005	0.0005		-	-
45-49	-	42	0.0000	0.0000	0.0007	0.0007		-	-
50-54	-	86	0.0000	0.0000	0.0011	0.0011		0.1	0.1
55-59	-	102	0.0000	0.0000	0.0017	0.0017		0.2	0.2
60-64	-	107	0.0000	0.0000	0.0020	0.0020		0.2	0.2
65-69	-	56	0.0000	0.0000	0.0020	0.0020		0.1	0.1
70-74	-	20	0.0000	0.0000	0.0015	0.0015		-	-
75 & over	-	20	0.0000	0.0000	0.0010	0.0010		-	-
Totals	-	486	0.0000	0.0000	0.0012	0.0012	-	0.6	0.6

	Actual	Liability		Proposed
Current	0.0000	0.0000		0.0012
Previous Investigation Results	0.0000	0.0000		0.0013
2008-2010	0.0000	0.0000		0.0014
2005-2007	0.0000	0.0000		0.0020

* *Sample rates are taken from midpoint of age group.*

Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

ECO Females – Disability Retirement Experience

There were 0 disability benefit claims reported for the 3-year period and 236 years of exposure. The proposed rates recommend no changes for this group.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by Population	Actual Rates Weighted by Liability	Permanent Disabilities Sample Rates* Old	Permanent Disabilities Sample Rates* New	Permanent Disabilities Actual	Permanent Disabilities Expected Present	Permanent Disabilities Expected Propose
Under 20	-	-	0.0000	0.0000	0.0001	0.0001		-	-
20-24	-	-	0.0000	0.0000	0.0001	0.0001		-	-
25-29	-	-	0.0000	0.0000	0.0001	0.0001		-	-
30-34	-	-	0.0000	0.0000	0.0001	0.0001		-	-
35-39	-	4	0.0000	0.0000	0.0002	0.0002		-	-
40-44	-	11	0.0000	0.0000	0.0003	0.0003		-	-
45-49	-	19	0.0000	0.0000	0.0004	0.0004		-	-
50-54	-	49	0.0000	0.0000	0.0008	0.0008		-	-
55-59	-	65	0.0000	0.0000	0.0011	0.0011		0.1	0.1
60-64	-	46	0.0000	0.0000	0.0020	0.0020		0.1	0.1
65-69	-	25	0.0000	0.0000	0.0020	0.0020		-	-
70-74	-	7	0.0000	0.0000	0.0015	0.0015		-	-
75 & over	-	10	0.0000	0.0000	0.0010	0.0010		-	-
Totals	-	236	0.0000	0.0000	0.0012	0.0012	-	0.2	0.2

	Actual	Liability	Proposed
Current	0.0000	0.0000	0.0012
Previous Investigation Results	0.0000	0.0000	0.0011
2008-2010	0.0000	0.0000	0.0010
2005-2007	0.0000	0.0000	0.0015

*   *Sample rates are taken from midpoint of age group.*

Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

ECO SLEP Males – Disability Retirement Experience

There were 0 disability benefit claims reported for the 3-year period and 49 years of exposure. The proposed rates recommend no changes for this group.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by Population	Liability	Sample Rates* Old	New	Actual	Expected Present	Propose
Under 20	-	-	0.0000	0.0000	0.0001	0.0001		-	-
20-24	-	-	0.0000	0.0000	0.0001	0.0001		-	-
25-29	-	-	0.0000	0.0000	0.0001	0.0001		-	-
30-34	-	-	0.0000	0.0000	0.0002	0.0002		-	-
35-39	-	-	0.0000	0.0000	0.0003	0.0003		-	-
40-44	-	-	0.0000	0.0000	0.0005	0.0005		-	-
45-49	-	13	0.0000	0.0000	0.0007	0.0007		-	-
50-54	-	9	0.0000	0.0000	0.0011	0.0011		-	-
55-59	-	8	0.0000	0.0000	0.0017	0.0017		-	-
60-64	-	11	0.0000	0.0000	0.0020	0.0020		-	-
65-69	-	8	0.0000	0.0000	0.0020	0.0020		-	-
70-74	-	-	0.0000	0.0000	0.0015	0.0015		-	-
75 & over	-	-	0.0000	0.0000	0.0010	0.0010		-	-
Totals	-	49	0.0000	0.0000	0.0014	0.0014	-	-	-

	Actual	Liability		Proposed
Current	0.0000	0.0000		0.0014
Previous Investigation Results	0.0000	0.0000		0.0014
2008-2010	0.0000	0.0000		0.0023
2005-2007	0.0000	0.0000		0.0031

*   Sample rates are taken from midpoint of age group.

Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

There were 0 disability benefit claims reported for the 3-year period and 0 years of exposure.

PAY INCREASES

MERIT AND LONGEVITY PORTION

Regular Members
Merit & Longevity Pay Increase Assumptions
Service Related Portion

Service Index	Pay Increase During the Next Year		
	Actual	Sample Values	
		Present	Proposed
1	7.21 %	7.00 %	0.00 %
2	7.29 %	5.50 %	0.00 %
3	3.99 %	3.25 %	0.00 %
4	2.94 %	2.50 %	0.00 %
5	2.50 %	2.00 %	0.00 %
6	2.10 %		
7	1.79 %		
8	1.36 %		
9	1.20 %		
10	1.10 %		
11	0.96 %		
12	0.73 %		
13	0.50 %		
14	0.53 %		
15	0.41 %		
16	0.27 %		
17	0.31 %		
18	(0.04)%		
19	0.23 %		
20	(0.01)%		
21	0.23 %		
22	(0.01)%		
23	(0.04)%		
24	0.09 %		
25	(0.22)%		
26	0.10 %		
27	(0.35)%		
28	(0.26)%		
29	(0.10)%		
30	(0.45)%		
31	(0.12)%		
32	(0.19)%		
33	(0.51)%		
34	(0.01)%		
35	0.21 %		
36	0.14 %		
37	(0.05)%		
38	(0.35)%		
39	(0.65)%		
40	0.02 %		

Exposure weighted average of all ages.

Regular Members
Merit & Longevity Pay Increase Assumptions
Age Related Portion

More Than 5 Years of Service

Age Group Beginning of Year	Pay Increase During the Next Year		
		Sample Values*	
	Actual	Present	Proposed
25-29	2.79 %	2.00 %	0.00 %
30-34	1.95 %	1.50 %	0.00 %
35-39	1.28 %	1.00 %	0.00 %
40-44	1.05 %	0.80 %	0.00 %
45-49	0.57 %	0.60 %	0.00 %
50-54	0.38 %	0.50 %	0.00 %
55-59	0.10 %	0.30 %	0.00 %
60-64	0.07 %	0.25 %	0.00 %

* Sample values are selected from midpoint of age group.

SLEP Members
Merit & Longevity Pay Increase Assumptions
Service Related Portion

Service Index	Total Pay Increase During the Next Year		
	Actual	Sample Values	
		Present	Proposed
1	10.42 %	11.00 %	11.00 %
2	8.43 %	8.50 %	8.50 %
3	2.77 %	4.00 %	4.00 %
4	3.71 %	3.50 %	3.50 %
5	1.36 %	3.00 %	3.00 %
6	3.39 %	2.50 %	2.50 %
7	3.85 %	2.00 %	2.00 %
8	1.83 %	1.50 %	1.50 %
9	1.17 %	1.25 %	1.25 %
10	2.19 %	1.00 %	1.00 %
11	1.77 %	0.75 %	0.75 %
12	1.63 %	0.75 %	0.75 %
13	(0.13)%	0.50 %	0.50 %
14	0.90 %	0.50 %	0.50 %
15	(0.07)%	0.50 %	0.50 %
16	2.59 %	0.50 %	0.50 %
17	0.62 %	0.50 %	0.50 %
18	0.26 %	0.50 %	0.50 %
19	(0.10)%	0.50 %	0.50 %
20	0.69 %	0.50 %	0.50 %
21	0.83 %	0.50 %	0.50 %
22	1.10 %	0.50 %	0.50 %
23	0.62 %	0.50 %	0.50 %
24	2.54 %	0.50 %	0.50 %
25	0.96 %	0.50 %	0.50 %
26	2.64 %	0.50 %	0.50 %
27	4.09 %	0.50 %	0.50 %
28	2.82 %	0.50 %	0.50 %
29	4.37 %	0.50 %	0.50 %
30	1.66 %	0.50 %	0.50 %
31	5.14 %	0.50 %	0.50 %
32	(0.88)%	0.50 %	0.50 %
33	(0.02)%	0.50 %	0.50 %
34	(0.82)%	0.50 %	0.50 %
35	11.30 %	0.50 %	0.50 %
36	(0.08)%	0.50 %	0.50 %
37	4.09 %	0.50 %	0.50 %
38	(6.49)%	0.50 %	0.50 %
39	2.10 %	0.50 %	0.50 %
40	0.00 %	0.50 %	0.50 %

Exposure weighted average of all ages.

NORMAL & EARLY RETIREMENT EXPERIENCE

Regular Males
Normal Retirement Experience

There were 4,634 age and service unreduced retirements and 26,139 life years of exposure (exposure includes active members eligible for unreduced retirement) in the male retirement investigation. Retirement rates were found to be more highly correlated with the liability weighted rates and therefore the proposed rates were adjusted slightly at various ages.

| Age | Retirement | Exposure | Actual Rates Weighted by | | Sample Rates | | Expected Retirements | |
			Population	Liability	Present	Proposed	Present	Proposed
Under 55	65	65	1.0000	1.0000	N\A	N\A	-	-
55	143	374	0.3824	0.4021	0.3300	0.0000	123	-
56	93	319	0.2915	0.3132	0.2500	0.0000	80	-
57	62	355	0.1746	0.1753	0.2500	0.0000	89	-
58	70	442	0.1584	0.1755	0.2500	0.0000	111	-
59	86	439	0.1959	0.2121	0.2500	0.0000	110	-
60	351	3,457	0.1015	0.1414	0.1200	0.0000	415	-
61	318	3,222	0.0987	0.1447	0.1200	0.0000	387	-
62	537	3,013	0.1782	0.2020	0.2200	0.0000	663	-
63	428	2,568	0.1667	0.1833	0.2000	0.0000	514	-
64	287	2,193	0.1309	0.1600	0.2000	0.0000	439	-
65	447	1,881	0.2376	0.2595	0.2500	0.0000	470	-
66	409	1,458	0.2805	0.3169	0.3000	0.0000	437	-
67	285	1,093	0.2608	0.2625	0.2500	0.0000	273	-
68	183	862	0.2123	0.2701	0.2000	0.0000	172	-
69	160	732	0.2186	0.2428	0.2000	0.0000	146	-
70	128	593	0.2159	0.2449	0.2000	0.0000	119	-
71	113	508	0.2224	0.2470	0.2000	0.0000	102	-
72	83	464	0.1789	0.1824	0.2000	0.0000	93	-
73	79	410	0.1927	0.2025	0.2000	0.0000	82	-
74	68	353	0.1926	0.2161	0.2000	0.0000	71	-
75 & over	304	1,403	0.2167	0.2144	0.2000	0.0000	281	-
Total (55 & over)	4,634	26,139	0.1773	0.2027	0.1981	0.0000	5,177	-

	Actual	Liability	Proposed
Current	0.1773	0.2027	0.0000
Previous Investigation Results	0.1712	0.1962	0.1965
2008-2010	0.1775	0.1943	0.1958
2005-2007	0.1739	0.2002	0.1985

Regular Males
Early Retirement Experience

There were 979 age and service reduced retirements and 17,884 life years of exposure (exposure includes active members eligible for reduced retirement) in the male retirement investigation. Retirement rates were found to be more highly correlated with the liability weighted rates. We recommend lowering the proposed rates.

Age	Retirement	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
55	240	3,928	0.0611	0.0782	0.0725	0.0000	285	279
56	205	3,691	0.0555	0.0722	0.0725	0.0000	268	262
57	164	3,536	0.0464	0.0567	0.0725	0.0000	256	251
58	178	3,450	0.0516	0.0660	0.0725	0.0000	250	245
59	192	3,279	0.0586	0.0704	0.0725	0.0000	238	233
Total	979	17,884	0.0547	0.0691	0.0725	0.0710	1,297	1,270

	Actual	Liability	Proposed
Current	0.0547	0.0691	0.0710
Previous Investigation Results	0.0564	0.0741	0.0725
2008-2010	0.0510	0.0705	0.0725
2005-2007	0.0620	0.0821	0.0750

Rates of Normal Retirement
Regular Males

| | Actual Experience | Present Assumptions | Proposed Assumptions |

Rates of Early Retirement
Regular Males
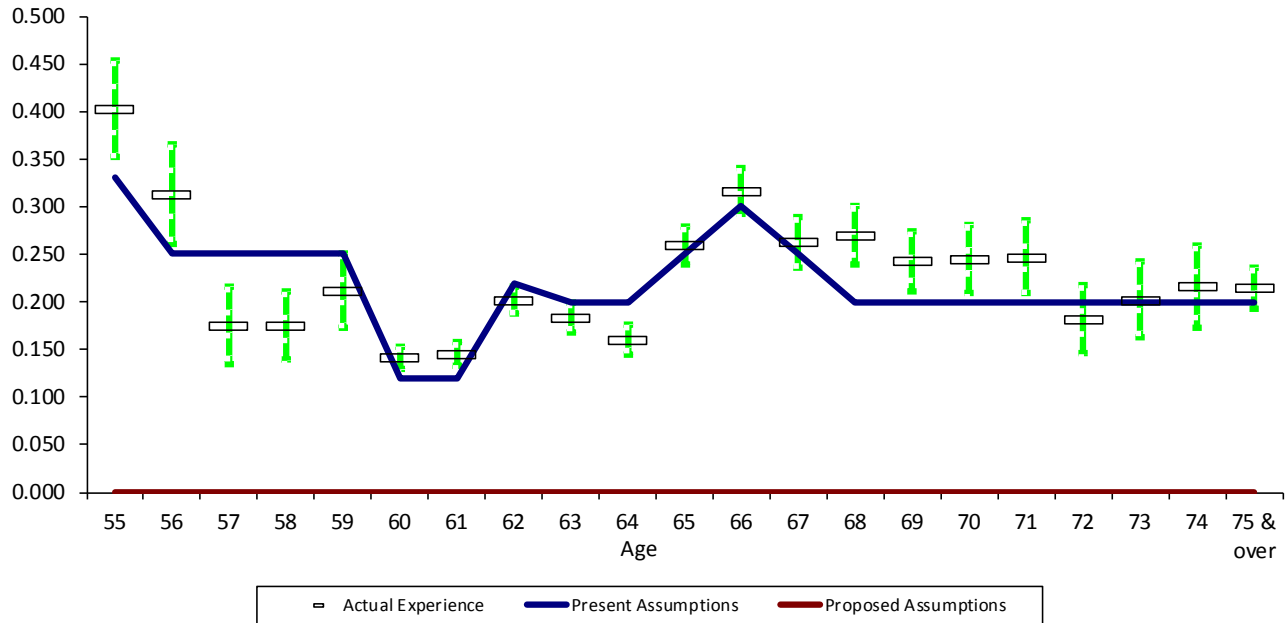
| | Actual Experience | Present Assumptions | Proposed Assumptions |

Regular Females
Normal Retirement Experience

There were 8,276 age and service reduced retirements and 49,349 life years of exposure (exposure includes active members eligible for reduced retirement) in the female retirement investigation. Retirement rates were found to be highly correlated with the liability weighted rates and therefore the proposed rates were adjusted slightly at various ages.

Age	Retirement	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 55	51	51	1.0000	1.0000	N\A	N\A	-	-
55	44	174	0.2529	0.2501	0.2700	0.0000	47	-
56	40	203	0.1970	0.1905	0.2000	0.0000	41	-
57	29	220	0.1318	0.1456	0.2000	0.0000	44	-
58	39	258	0.1512	0.1472	0.2000	0.0000	52	-
59	55	271	0.2030	0.1860	0.2000	0.0000	54	-
60	752	7,944	0.0947	0.1153	0.1000	0.0000	794	-
61	659	7,176	0.0918	0.1069	0.1000	0.0000	718	-
62	1,079	6,581	0.1640	0.1762	0.1800	0.0000	1,185	-
63	844	5,575	0.1514	0.1752	0.1800	0.0000	1,004	-
64	685	4,714	0.1453	0.1593	0.1800	0.0000	849	-
65	1,001	3,940	0.2541	0.2725	0.2500	0.0000	985	-
66	840	2,858	0.2939	0.3161	0.2500	0.0000	715	-
67	529	2,175	0.2432	0.2694	0.2500	0.0000	544	-
68	384	1,654	0.2322	0.2438	0.2000	0.0000	331	-
69	288	1,226	0.2349	0.2660	0.2000	0.0000	245	-
70	222	890	0.2494	0.2640	0.2000	0.0000	178	-
71	156	716	0.2179	0.2230	0.2000	0.0000	143	-
72	127	594	0.2138	0.2242	0.2000	0.0000	119	-
73	120	543	0.2210	0.2523	0.2000	0.0000	109	-
74	88	412	0.2136	0.2205	0.2000	0.0000	82	-
75 & over	295	1,225	0.2408	0.2403	0.2000	0.0000	245	-
Total (55 & over)	8,276	49,349	0.1677	0.1831	0.1719	0.0000	8,484	-

|	Actual	Liability		Proposed
Current	0.1677	0.1831		0.0000
Previous Investigation Results	0.1551	0.1729		0.1714
2008-2010	0.1467	0.1539		0.1637
2005-2007	0.1606	0.1758		0.1719

Regular Females
Early Retirement Experience

There were 2,180 age and service reduced retirements and 42,629 life years of exposure (exposure includes active members eligible for reduced retirement) in the female retirement investigation. Retirement rates were found to be highly correlated with the liability weighted rates. We recommend increasing the proposed rates.
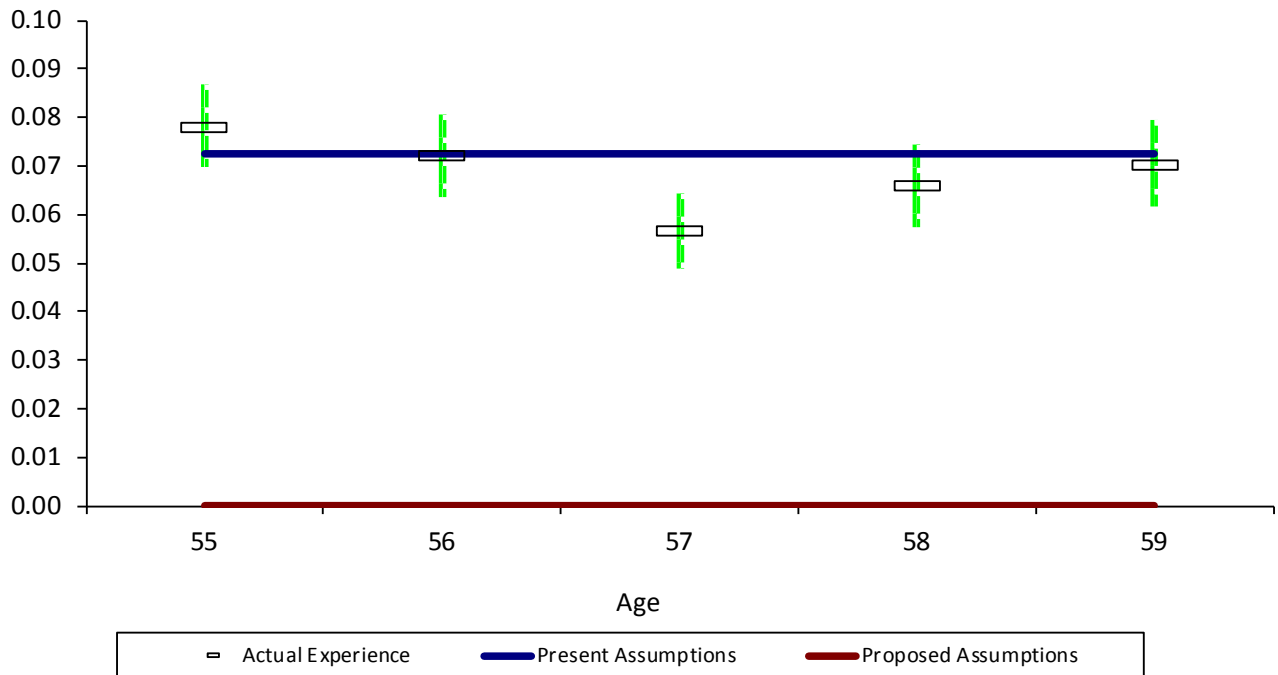
Age	Retirement	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
55	406	8,725	0.0465	0.0621	0.0575	0.0000	502	524
56	463	8,632	0.0536	0.0620	0.0575	0.0000	496	518
57	407	8,562	0.0475	0.0582	0.0575	0.0000	492	514
58	443	8,502	0.0521	0.0661	0.0575	0.0000	489	510
59	461	8,208	0.0562	0.0574	0.0575	0.0000	472	492
Total	2,180	42,629	0.0511	0.0612	0.0575	0.0600	2,451	2,558

	Actual	Liability	Proposed
Current	0.0511	0.0612	0.0600
Previous Investigation Results	0.0443	0.0567	0.0575
2008-2010	0.0387	0.0504	0.0575
2005-2007	0.0547	0.0651	0.0650

Rates of Normal Retirement
Regular Females

Rates of Early Retirement
Regular Females
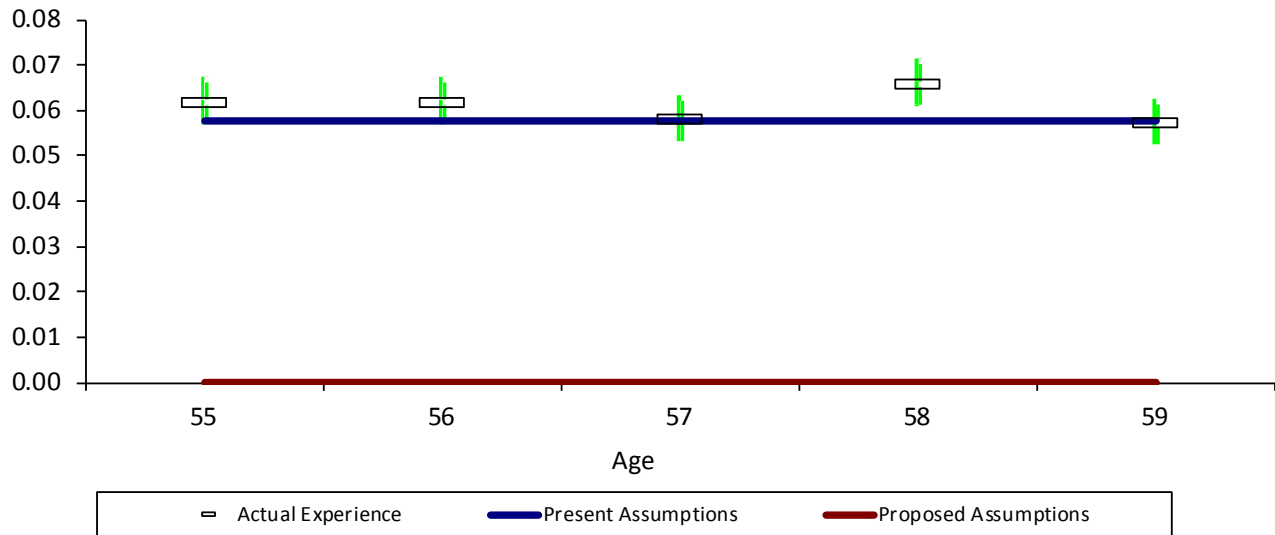
SLEP Members
Normal Retirement Experience

There were 451 age and service unreduced retirements and 1,777 life years of exposure (exposure includes active members eligible for unreduced retirement) in the retirement investigation. Of these 51 retired after attaining 32 years of service and therefore a maximum of 80% of FAC. We recommend increasing the proposed rates for members with less than 32 years of service, and no change in the rates for members with greater than 32 years of service. We are also recommending the same table be used for both males and females.

Service	Age	Retirements	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
				Population	Liability	Present	Proposed	Present	Proposed
	50	69	265	0.2604	0.3033	0.2300	0.0000	60.9	-
	51	67	208	0.3221	0.3745	0.1800	0.0000	37.5	-
	52	45	162	0.2778	0.3340	0.1300	0.0000	21.1	-
	53	17	116	0.1466	0.1978	0.0800	0.0000	9.3	-
	54	25	105	0.2381	0.2869	0.2300	0.0000	24.2	-
	55	21	95	0.2211	0.2577	0.2300	0.0000	21.8	-
	56	13	78	0.1667	0.2093	0.1800	0.0000	14.1	-
	57	15	70	0.2143	0.2384	0.2300	0.0000	16.1	-
	58	12	53	0.2264	0.2590	0.3300	0.0000	17.5	-
	59	21	51	0.4118	0.3482	0.1300	0.0000	6.6	-
	60	19	93	0.2043	0.3182	0.0800	0.0000	7.5	-
	61	12	79	0.1519	0.2575	0.0800	0.0000	6.4	-
less than	62	11	63	0.1746	0.2271	0.2300	0.0000	14.5	-
32 years	63	10	52	0.1923	0.2426	0.1800	0.0000	9.3	-
	64	9	43	0.2093	0.2247	0.1800	0.0000	7.7	-
	65	14	35	0.4000	0.4197	0.2300	0.0000	8.1	-
	66	8	28	0.2857	0.2222	0.2300	0.0000	6.5	-
	67	8	20	0.4000	0.2762	0.2300	0.0000	4.6	-
	68	3	11	0.2727	0.3237	0.2300	0.0000	2.6	-
	69	1	5	0.2000	0.1579	0.2300	0.0000	1.3	-
	70	-	-	0.0000	0.0000	1.0000	0.0000	-	-
	71	-	-	0.0000	0.0000	1.0000	0.0000	-	-
	72	-	-	0.0000	0.0000	1.0000	0.0000	-	-
	73	-	-	0.0000	0.0000	1.0000	0.0000	-	-
	74	-	-	0.0000	0.0000	1.0000	0.0000	-	-
	75 & over	-	-	0.0000	0.0000	1.0000	0.0000	-	-
	Total	400	1,632	0.2451	0.2935	0.1824	0.0000	297.6	-
more than 32 years	All	51	145	0.3517	0.3727	0.3500	0.3500	50.8	50.8

	Actual	Liability		Proposed
Current	0.2451	0.2935		0.0000
Previous Investigation Results	0.1894	0.2168		0.2034
2008-2010	0.1935	0.2130		0.1790
2005-2007	0.2093	0.2180		0.1830

**SLEP Members
Normal Retirement Experience**
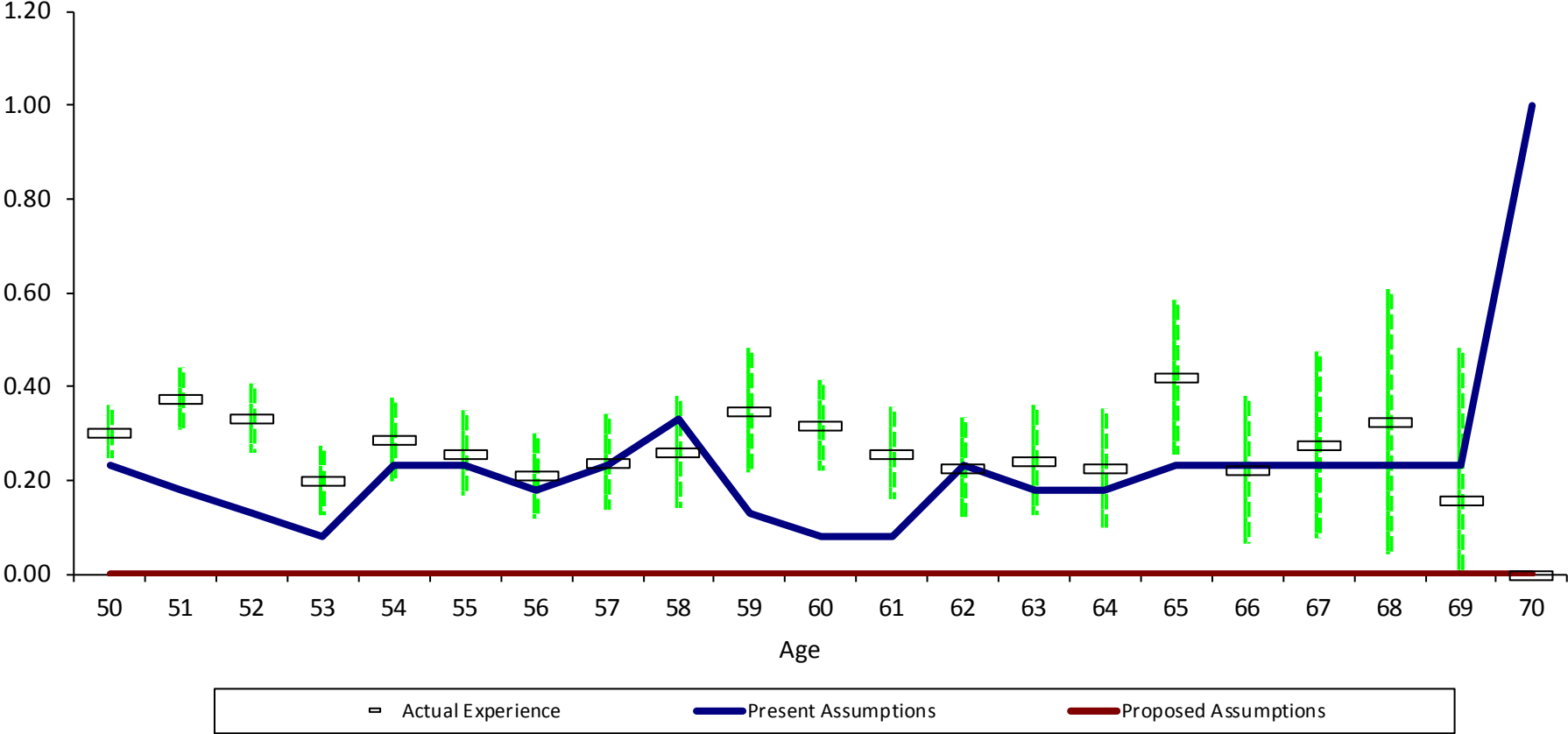
ECO Males
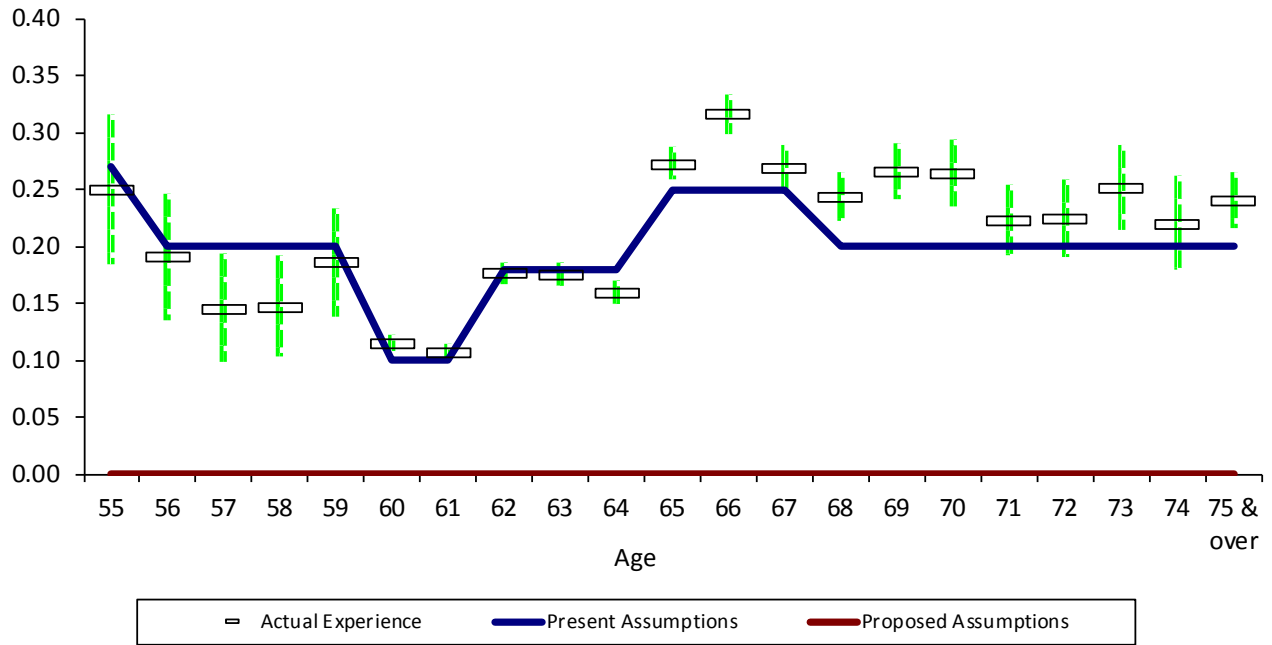# Normal Retirement Experience

There were 35 age and service unreduced retirements and 252 life years of exposure (exposure includes active members eligible for unreduced retirement) in the male retirement investigation. Retirement rates were found to be highly correlated with the liability weighted rates and therefore the proposed rates were adjusted slightly at various ages.

Age	Retirements	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 55	-	-	N\A	N/A	N\A	N\A	-	-
55	1	11	0.0909	0.1514	0.2500	0.0000	2.8	-
56	3	16	0.1875	0.3381	0.2500	0.0000	4.0	-
57	2	19	0.1053	0.1405	0.2000	0.0000	3.8	-
58	2	21	0.0952	0.2124	0.2000	0.0000	4.2	-
59	1	18	0.0556	0.0321	0.2000	0.0000	3.6	-
60	1	23	0.0435	0.1030	0.0500	0.0000	1.2	-
61	3	19	0.1579	0.2139	0.0500	0.0000	1.0	-
62	3	20	0.1500	0.2952	0.1000	0.0000	2.0	-
63	3	11	0.2727	0.3133	0.1500	0.0000	1.7	-
64	1	11	0.0909	0.0169	0.1500	0.0000	1.7	-
65	1	15	0.0667	0.0740	0.1500	0.0000	2.3	-
66	2	12	0.1667	0.2258	0.1300	0.0000	1.6	-
67	3	10	0.3000	0.2937	0.1300	0.0000	1.3	-
68	-	4	0.0000	0.0000	0.1300	0.0000	0.5	-
69	-	4	0.0000	0.0000	0.1300	0.0000	0.5	-
70	1	4	0.2500	0.5462	0.1300	0.0000	0.5	-
71	1	5	0.2000	0.1260	0.1300	0.0000	0.7	-
72	-	3	0.0000	0.0000	0.1300	0.0000	0.4	-
73	2	5	0.4000	0.3501	0.1300	0.0000	0.7	-
74	-	1	0.0000	0.0000	0.1300	0.0000	0.1	-
75 & over	5	20	0.2500	0.2713	0.1300	0.0000	2.6	-
Total	35	252	0.1389	0.1889	0.1476	0.0000	37.2	-

	Actual	Liability	Proposed
Current	0.1389	0.1889	0.0000
Previous Investigation Results	0.1024	0.1367	0.1599
2008-2010	0.1717	0.1817	0.1837
2005-2007	0.0986	0.0958	0.1884

ECO Females
Normal Retirement Experience

There were 26 age and service unreduced retirements and 133 life years of exposure (exposure includes active members eligible for unreduced retirement) in the female retirement investigation. Retirement rates were found to be highly correlated with the liability weighted rates and therefore the proposed rates were adjusted higher at various ages.

Age	Retirements	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 55	-	-	N\A	N/A	N\A	N\A	-	-
55	3	12	0.2500	0.4501	0.2500	0.0000	2.3	-
56	2	7	0.2857	0.4077	0.2500	0.0000	1.8	-
57	-	8	0.0000	0.0000	0.2000	0.0000	1.6	-
58	1	14	0.0714	0.1306	0.2000	0.0000	2.8	-
59	1	13	0.0769	0.0484	0.2000	0.0000	2.6	-
60	2	11	0.1818	0.2031	0.0500	0.0000	0.6	-
61	4	9	0.4444	0.4368	0.0500	0.0000	0.5	-
62	-	6	0.0000	0.0000	0.1000	0.0000	0.6	-
63	1	8	0.1250	0.1907	0.1500	0.0000	1.2	-
64	3	7	0.4286	0.4791	0.1500	0.0000	1.1	-
65	1	5	0.2000	0.2603	0.1500	0.0000	0.8	-
66	-	4	0.0000	0.0000	0.1300	0.0000	0.5	-
67	1	5	0.2000	0.3362	0.1300	0.0000	0.7	-
68	4	5	0.8000	0.9791	0.1300	0.0000	0.7	-
69	-	2	0.0000	0.0000	0.1300	0.0000	0.3	-
70	-	2	0.0000	0.0000	0.1300	0.0000	0.3	-
71	-	2	0.0000	0.0000	0.1300	0.0000	0.3	-
72	1	1	1.0000	1.0000	0.1300	0.0000	0.1	-
73	-	1	0.0000	0.0000	0.1300	0.0000	0.1	-
74	-	1	0.0000	0.0000	0.1300	0.0000	0.1	-
75 & over	2	10	0.2000	0.0741	0.1300	0.0000	1.3	-
Total	26	133	0.1955	0.2414	0.1495	0.0000	19.9	-

	Actual	Liability	Proposed
Current	0.1955	0.2414	0.0000
Previous Investigation Results	0.1272	0.1356	0.1624
2008-2010	0.1705	0.1587	0.1889
2005-2007	0.1117	0.1212	0.1844

Rates of Normal Retirement
ECO Males

Legend: Actual Experience — Present Assumptions — Proposed Assumptions

Rates of Normal Retirement
ECO Females

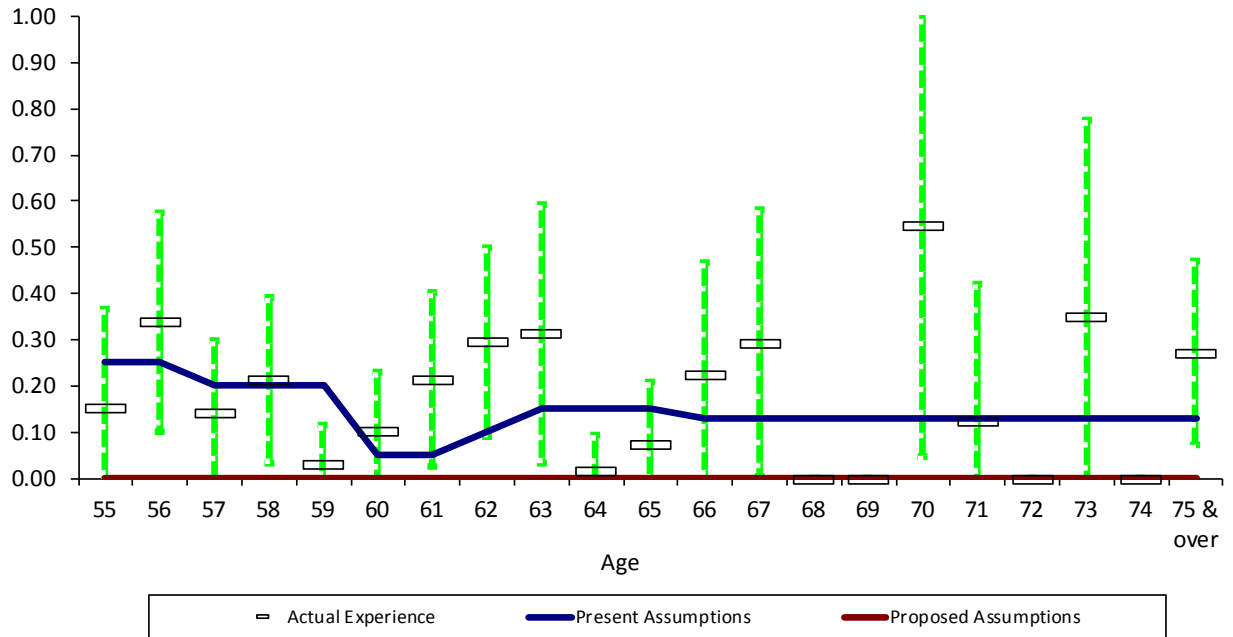Legend: Actual Experience — Present Assumptions — Proposed Assumptions
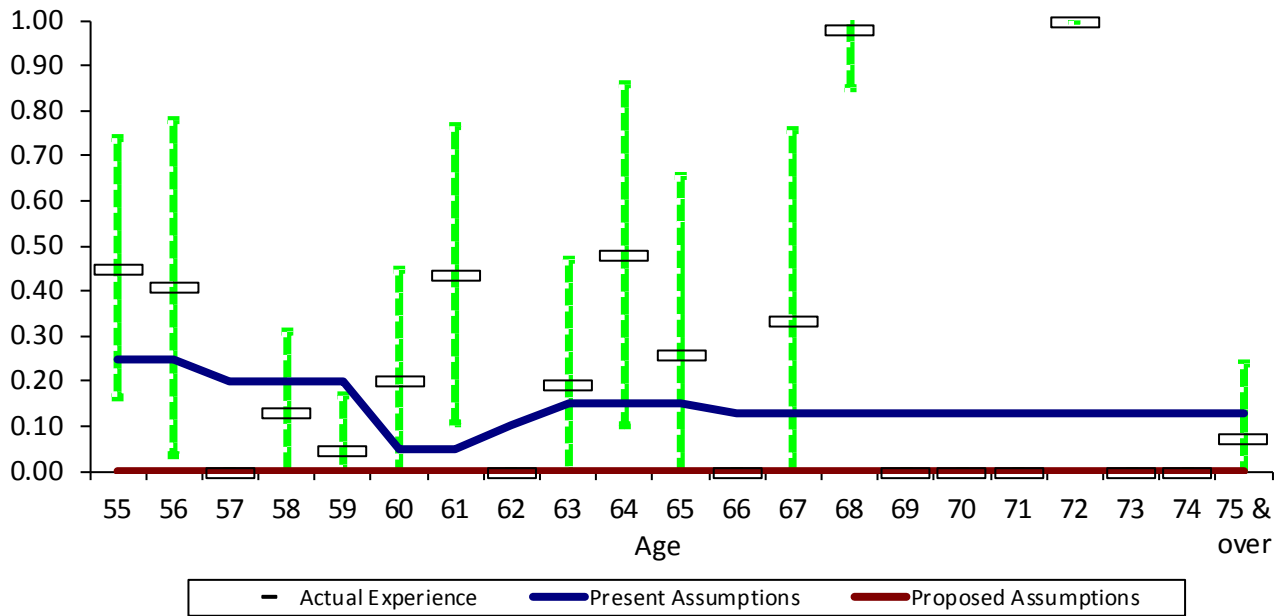
All ECO-SLEP
Normal Retirement Experience

There were 9 age and service unreduced retirements and 28 life years of exposure (exposure includes active members eligible for unreduced retirement) in the retirement investigation. We recommend increasing the proposed rates.

Age	Retirements	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 50	-	-	0.0000	0.0000	N\A	N\A	-	-
50	-	1	0.0000	0.0000	0.2300	0.0000	0.2	-
51	3	2	1.5000	0.8768	0.1800	0.0000	0.4	-
52	-	-	0.0000	0.0000	0.1300	0.0000	-	-
53	-	-	0.0000	0.0000	0.0800	0.0000	-	-
54	-	-	0.0000	0.0000	0.2300	0.0000	-	-
55	-	1	0.0000	0.0000	0.2300	0.0000	0.2	-
56	-	-	0.0000	0.0000	0.1800	0.0000	-	-
57	1	1	1.0000	1.0000	0.2300	0.0000	0.2	-
58	-	2	0.0000	0.0000	0.3300	0.0000	0.7	-
59	1	2	0.5000	0.5443	0.1300	0.0000	0.3	-
60	-	2	0.0000	0.0000	0.0800	0.0000	0.2	-
61	-	-	0.0000	0.0000	0.0800	0.0000	-	-
62	-	1	0.0000	0.0000	0.2300	0.0000	0.2	-
63	1	4	0.2500	0.0749	0.1800	0.0000	0.7	-
64	1	4	0.2500	0.2787	0.1800	0.0000	0.7	-
65	-	3	0.0000	0.0000	0.2300	0.0000	0.7	-
66	-	2	0.0000	0.0000	0.2300	0.0000	0.5	-
67	-	1	0.0000	0.0000	0.2300	0.0000	0.2	-
68	1	1	1.0000	1.0000	0.2300	0.0000	0.2	-
69	-	-	0.0000	0.0000	0.2300	0.0000	-	-
70	-	-	0.0000	0.0000	1.0000	0.0000	-	-
71	-	-	0.0000	0.0000	1.0000	0.0000	-	-
72	-	-	0.0000	0.0000	1.0000	0.0000	-	-
73	1	1	1.0000	1.0000	1.0000	0.0000	1.0	-
74	-	-	0.0000	0.0000	1.0000	0.0000	-	-
75 & over	-	-	0.0000	0.0000	1.0000	0.0000	-	-
Total	9	28	0.3214	0.2732	0.2286	0.0000	6.4	-

	Actual	Liability	Proposed
Current	0.3214	0.2732	0.0000
Previous Investigation Results	0.0000	0.0000	0.2279
2008-2010	0.1897	0.2094	0.1897
2005-2007	0.1940	0.1524	0.1940

GRS Retirement Consulting

Rates of Normal Retirement
All ECO-SLEP

Age

Legend: Actual Experience | Present Assumptions | Proposed Assumptions

GRS Retirement Consulting
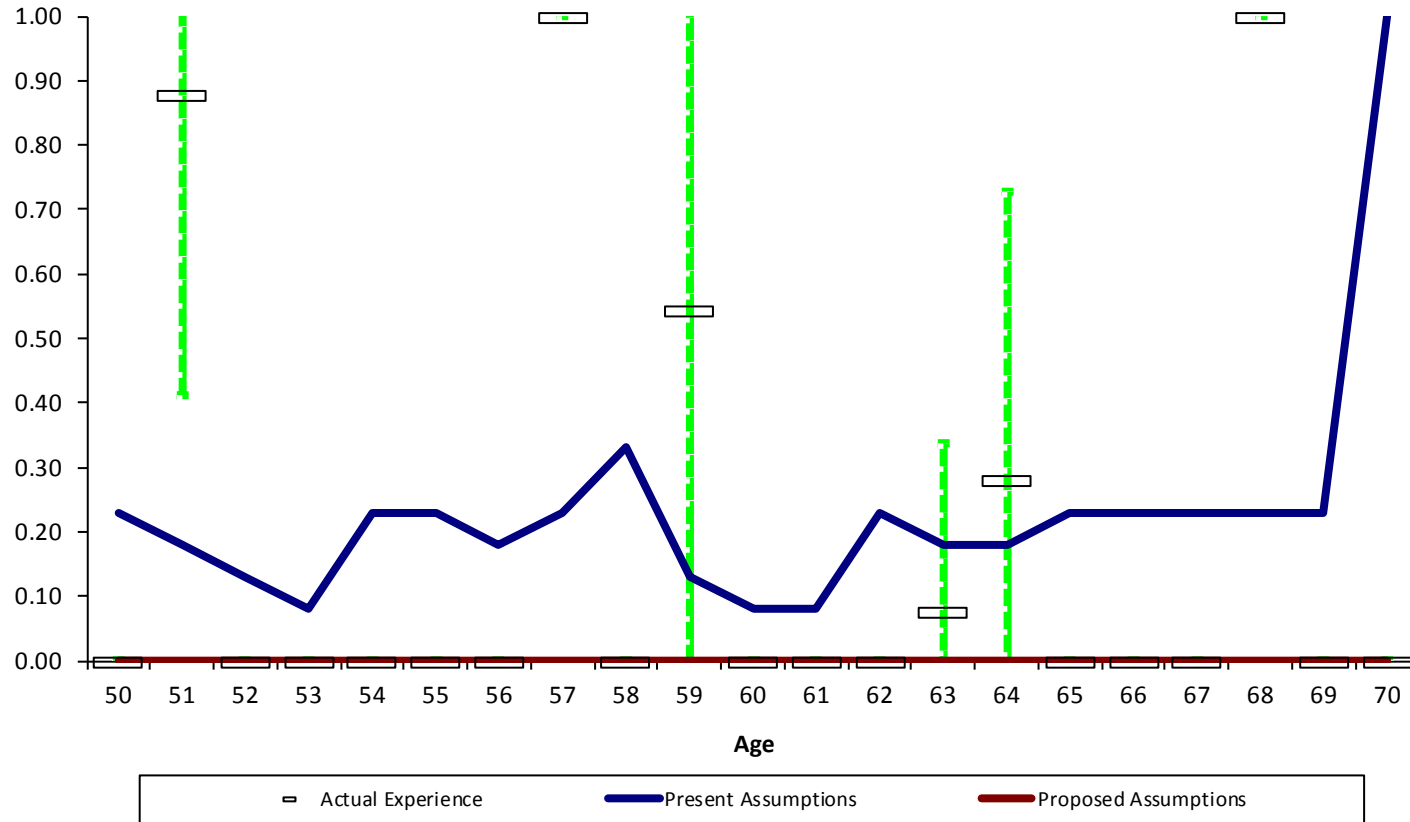
MORTALITY EXPERIENCE

Post-Retirement Mortality – Males
(Original Retirees; Non Disabled Cases)

There were more deaths than expected among retired males. The current rates are based on generational projection for future improvements in mortality. The proposed rates represent the recommended base table only. Margin for future improvements in mortality will be built into the 'fully generational' projection which cannot be displayed in a table with this format. Please note that while the present and proposed rates are from the same base mortality table, the proposed expected deaths will differ from the present expected deaths due to the change in the improvement scale from MP-2014 to MP-2017.

Age	Deaths	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Deaths	
			Population	Liability	Present	Proposed	Present	Proposed
50-54	10	1,108	0.009025	0.007065	0.005370	0.005370	6	6
55-59	118	10,256	0.011505	0.008721	0.007172	0.007172	75	76
60-64	286	19,543	0.014634	0.011490	0.010708	0.010708	212	217
65-69	409	23,511	0.017396	0.013769	0.017698	0.017698	402	416
70-74	496	17,936	0.027654	0.025829	0.028960	0.028960	494	508
75-79	557	13,272	0.041968	0.038966	0.047391	0.047391	595	612
80-84	703	9,305	0.075551	0.070687	0.077829	0.077829	679	700
85-89	740	5,795	0.127696	0.119425	0.128403	0.128403	695	718
90-94	469	2,333	0.201029	0.188473	0.207113	0.207113	441	455
95-99	123	433	0.284065	0.286680	0.291004	0.291004	114	117
100-104	21	49	0.428571	0.358156	0.384058	0.384058	18	18
105 & over	-	-	0.000000	0.000000	0.470810	0.470810	-	-
Totals	3,932	103,541	0.037975	0.021301	0.036034	0.037116	3,731	3,843

	Actual	Liability	Proposed
Current	0.0380	0.0213	0.0371
Previous Investigation Results	0.0391	0.0206	0.0390
2008-2010	0.0424	0.0226	0.0402
2005-2007	0.0461	0.0250	0.0426

Sample values are selected from midpoint of age group.

Rates of Post-Retirement Mortality – Males
(Original Retirees; Non Disabled Cases)

Post-Retirement Mortality – Females
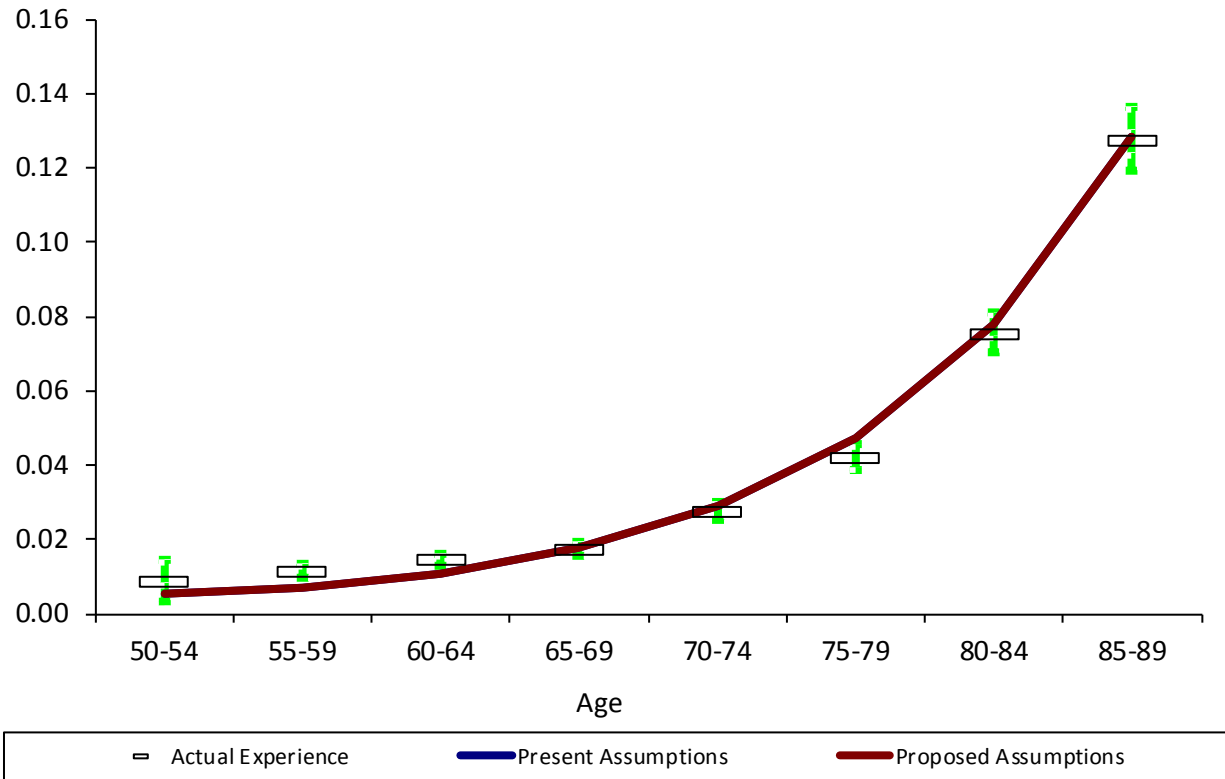# (Original Retirees; Non Disabled Cases)

There were more deaths than expected among retired females. The current rates are based on generational projection for future improvements in mortality. The proposed rates represent the recommended base table only and include an adjustment of 102% of the current female mortality table. Margin for future improvements in mortality will be built into the 'fully generational' projection which cannot be displayed in a table with this format.

Age	Deaths	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Deaths	
			Population	Liability	Present	Proposed	Present	Proposed
50-54	10	631	0.015848	0.010091	0.003242	0.003307	2	2
55-59	111	14,287	0.007769	0.005627	0.004561	0.004652	67	70
60-64	229	34,211	0.006694	0.006238	0.006670	0.006803	226	241
65-69	385	46,929	0.008204	0.007528	0.010371	0.010578	466	492
70-74	508	37,667	0.013487	0.012337	0.016850	0.017187	601	628
75-79	706	27,738	0.025452	0.023207	0.027800	0.028356	731	765
80-84	913	19,939	0.045790	0.043325	0.046621	0.047553	881	930
85-89	1,188	13,968	0.085052	0.079803	0.079957	0.081556	1,042	1,108
90-94	1,150	7,162	0.160570	0.154842	0.136221	0.138945	893	950
95-99	477	1,929	0.247278	0.247329	0.211904	0.216142	370	391
100-104	67	224	0.299107	0.288666	0.308330	0.314497	62	65
105 & over	6	15	0.400000	0.493976	0.406741	0.414876	6	6
Totals	5,750	204,700	0.028090	0.015809	0.026121	0.027592	5,347	5,648

	Actual	Liability	Proposed
Current	0.0281	0.0158	0.0276
Previous Investigation Results	0.0284	0.0164	0.0284
2008-2010	0.0292	0.0175	0.0278
2005-2007	0.0301	0.0183	0.0269

Sample values are selected from midpoint of age group.

Rates of Post-Retirement Mortality – Females
(Original Retirees; Non Disabled Cases)
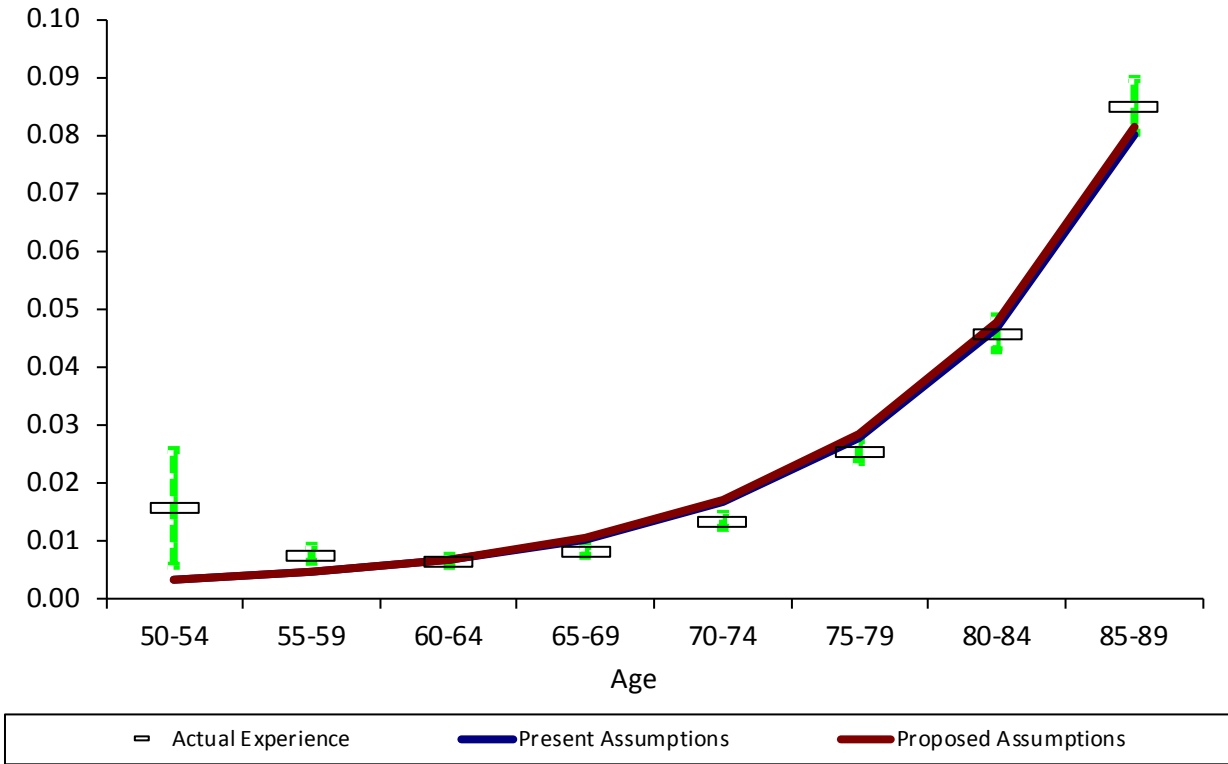
COMPLETE LISTS OF PROPOSED DECREMENT ASSUMPTIONS

Proposed Retirement Rates – Tier 1 Only

Age	Regular Male Normal	Regular Male Early	Regular Female Normal	Regular Female Early	SLEP Male Normal	SLEP Female Normal	ECO Regular Male Normal	ECO Regular Female Normal	ECO SLEP Male Normal	ECO SLEP Female Normal
50					0.2300	0.2300			0.0000	0.2300
51					0.1800	0.1800			0.0000	0.1800
52					0.1300	0.1300			0.0000	0.1300
53					0.0800	0.0800			0.0000	0.0800
54					0.2300	0.2300			0.0000	0.2300
55	0.0000	0.0000	0.0000	0.0000	0.2300	0.2300	0.0000	0.0000	0.0000	0.2300
56	0.0000	0.0000	0.0000	0.0000	0.1800	0.1800	0.0000	0.0000	0.0000	0.1800
57	0.0000	0.0000	0.0000	0.0000	0.2300	0.2300	0.0000	0.0000	0.0000	0.2300
58	0.0000	0.0000	0.0000	0.0000	0.3300	0.3300	0.0000	0.0000	0.0000	0.3300
59	0.0000	0.0000	0.0000	0.0000	0.1300	0.1300	0.0000	0.0000	0.0000	0.1300
60	0.0000		0.0000		0.0800	0.0800	0.0000	0.0000	0.0000	0.0800
61	0.0000		0.0000		0.0800	0.0800	0.0000	0.0000	0.0000	0.0800
62	0.0000		0.0000		0.2300	0.2300	0.0000	0.0000	0.0000	0.2300
63	0.0000		0.0000		0.1800	0.1800	0.0000	0.0000	0.0000	0.1800
64	0.0000		0.0000		0.1800	0.1800	0.0000	0.0000	0.0000	0.1800
65	0.0000		0.0000		0.2300	0.2300	0.0000	0.0000	0.0000	0.2300
66	0.0000		0.0000		0.2300	0.2300	0.0000	0.0000	0.0000	0.2300
67	0.0000		0.0000		0.2300	0.2300	0.0000	0.0000	0.0000	0.2300
68	0.0000		0.0000		0.2300	0.2300	0.0000	0.0000	0.0000	0.2300
69	0.0000		0.0000		0.2300	0.2300	0.0000	0.0000	0.0000	0.2300
70	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
71	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
72	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
73	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
74	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
75	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
76	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
77	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
78	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
79	0.0000		0.0000		1.0000	1.0000	0.0000	0.0000	0.0000	1.0000
80+	0.0000		0.0000		1.0000	1.0000	1.0000	1.0000	0.0000	1.0000

Proposed Retirement Rates – Tier 2 Only

	Regular								SLEP					
	Male				Female				Male			Female		
	Normal			Early	Normal			Early	Normal		Early	Normal		Early
Age	Service Less Than 30 Years	Service Between 30 and 35 Years	Service 35 Years or More		Service Less Than 30 Years	Service Between 30 and 35 Years	Service 35 Years or More		Service Less Than 30 Years	Service 30 Years or More		Service Less Than 30 Years	Service 30 Years or More	
50											0.1200			0.1200
51											0.0900			0.0900
52											0.0700			0.0700
53											0.0400			0.0400
54											0.1200			0.1200
55									0.6000	0.8000		0.6000	0.8000	
56									0.1800	0.5500		0.1800	0.5500	
57									0.2300	0.5500		0.2300	0.5500	
58									0.3300	0.5500		0.3300	0.5500	
59									0.1300	0.5500		0.1300	0.5500	
60									0.0800	0.5500		0.0800	0.5500	
61									0.0800	0.5500		0.0800	0.5500	
62			0.7500	0.1500			0.7500	0.1300	0.2300	0.5500		0.2300	0.5500	
63			0.7500	0.1500			0.7500	0.1300	0.1800	0.5500		0.1800	0.5500	
64			0.7500	0.1500			0.7500	0.1300	0.1800	0.5500		0.1800	0.5500	
65			0.7500	0.1500			0.7500	0.1300	0.2300	0.5500		0.2300	0.5500	
66			0.7500	0.1500			0.7500	0.1300	0.2300	0.5500		0.2300	0.5500	
67	0.3000	0.5000	0.7500		0.2500	0.5000	0.7500		0.2300	0.5500		0.2300	0.5500	
68	0.3000	0.5000	0.7500		0.2500	0.5000	0.7500		0.2300	0.5500		0.2300	0.5500	
69	0.2500	0.5000	0.7500		0.2000	0.5000	0.7500		0.2300	0.5500		0.2300	0.5500	
70	0.2000	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
71	0.2000	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
72	0.2000	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
73	0.1800	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
74	0.1800	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
75	0.1800	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
76	0.1800	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
77	0.1800	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
78	0.1800	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
79	0.1800	0.5000	0.7500		0.1800	0.5000	0.7500		1.0000	1.0000		1.0000	1.0000	
80+	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000		1.0000	1.0000		1.0000	1.0000	

Proposed Withdrawal Rates – Tier 1 & 2

| | Regular Rates | | SLEP Rates | | ECO Rates | | ECO-SLEP Rates | |
| | Less Than 8 Years of Service | | Less Than 7 Years of Service | | Less Than 8 Years of Service | | Less Than 7 Years of Service | |
Service	Male	Female	Male	Female	Male	Female	Male	Female
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000			0.0000	0.0000		

| | 8 or More Years of Service | | 7 or More Years of Service | | 8 or More Years of Service | | 7 or More Years of Service | |
Age	Male	Female	Male	Female	Male	Female	Male	Female
25 & under	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
26	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
27	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
28	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
29	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
31	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
32	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
33	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
34	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
36	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
37	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
38	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
39	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
40	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
41	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
42	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
43	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
44	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
45	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
46	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
47	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
48	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
49	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
51	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
52	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
53	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
54	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
55	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
56	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
57	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
58	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
59	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000
60+	0.0000	0.0000	0.0000	0.0000	0.0600	0.0320	0.0000	0.0000

Proposed Disability Rates - Regular & SLEP – Tier 1 & 2

Rates of Disability For Regular and SLEP Memebers

Age	Regular Male	Regular Female	SLEP Male	SLEP Female	Age	Regular Male	Regular Female	SLEP Male	SLEP Female
21	0.0000	0.0000	0.0000	0.0001	51	0.0005	0.0002	0.0005	0.0016
22	0.0000	0.0000	0.0000	0.0001	52	0.0005	0.0002	0.0006	0.0017
23	0.0000	0.0000	0.0001	0.0002	53	0.0005	0.0002	0.0006	0.0018
24	0.0000	0.0000	0.0001	0.0002	54	0.0006	0.0003	0.0007	0.0020
25	0.0000	0.0000	0.0001	0.0002	55	0.0007	0.0003	0.0007	0.0021
26	0.0000	0.0000	0.0001	0.0002	56	0.0007	0.0003	0.0008	0.0022
27	0.0000	0.0000	0.0001	0.0003	57	0.0008	0.0003	0.0008	0.0023
28	0.0000	0.0000	0.0001	0.0003	58	0.0008	0.0004	0.0007	0.0022
29	0.0000	0.0000	0.0001	0.0003	59	0.0008	0.0005	0.0007	0.0020
30	0.0000	0.0000	0.0001	0.0003	60	0.0008	0.0005	0.0006	0.0019
31	0.0001	0.0000	0.0001	0.0004	61	0.0009	0.0006	0.0006	0.0017
32	0.0001	0.0000	0.0001	0.0004	62	0.0009	0.0006	0.0005	0.0016
33	0.0001	0.0000	0.0001	0.0004	63	0.0009	0.0006	0.0005	0.0015
34	0.0001	0.0000	0.0001	0.0004	64	0.0009	0.0006	0.0005	0.0014
35	0.0001	0.0000	0.0002	0.0005	65	0.0009	0.0006	0.0004	0.0013
36	0.0001	0.0000	0.0002	0.0005	66	0.0009	0.0006	0.0004	0.0012
37	0.0001	0.0001	0.0002	0.0005	67	0.0009	0.0006	0.0004	0.0011
38	0.0001	0.0001	0.0002	0.0006	68	0.0009	0.0006	0.0003	0.0010
39	0.0002	0.0001	0.0002	0.0006	69	0.0008	0.0005	0.0003	0.0008
40	0.0002	0.0001	0.0002	0.0007	70	0.0008	0.0005	0.0003	0.0007
41	0.0002	0.0001	0.0003	0.0007	71	0.0007	0.0005	0.0002	0.0006
42	0.0002	0.0001	0.0003	0.0008	72	0.0007	0.0005	0.0002	0.0005
43	0.0002	0.0001	0.0003	0.0008	73	0.0006	0.0004	0.0001	0.0004
44	0.0003	0.0001	0.0003	0.0009	74	0.0006	0.0004	0.0001	0.0003
45	0.0003	0.0001	0.0003	0.0010	75	0.0005	0.0004	0.0001	0.0002
46	0.0003	0.0001	0.0004	0.0011	76	0.0005	0.0003	0.0000	0.0001
47	0.0003	0.0001	0.0004	0.0011	77	0.0005	0.0003	0.0000	0.0000
48	0.0004	0.0002	0.0004	0.0012	78	0.0005	0.0003	0.0000	0.0000
49	0.0004	0.0002	0.0005	0.0013	79	0.0005	0.0003	0.0000	0.0000
50	0.0004	0.0002	0.0005	0.0015	80	0.0005	0.0003	0.0000	0.0000

GRS Retirement Consulting

Proposed Disability Rates - ECO & ECO SLEP – Tier 1 & 2

Rates of Disability For ECO and ECO-SLEP Memebers

	ECO		ECO-SLEP			ECO		ECO-SLEP	
Age	Male	Female	Male	Female	Age	Male	Female	Male	Female
21	0.0001	0.0001	0.0001	0.0001	51	0.0010	0.0007	0.0010	0.0007
22	0.0001	0.0001	0.0001	0.0001	52	0.0011	0.0008	0.0011	0.0008
23	0.0001	0.0001	0.0001	0.0001	53	0.0012	0.0008	0.0012	0.0008
24	0.0001	0.0001	0.0001	0.0001	54	0.0013	0.0009	0.0013	0.0009
25	0.0001	0.0001	0.0001	0.0001	55	0.0015	0.0010	0.0015	0.0010
26	0.0001	0.0001	0.0001	0.0001	56	0.0016	0.0010	0.0016	0.0010
27	0.0001	0.0001	0.0001	0.0001	57	0.0017	0.0011	0.0017	0.0011
28	0.0001	0.0001	0.0001	0.0001	58	0.0018	0.0013	0.0018	0.0013
29	0.0001	0.0001	0.0001	0.0001	59	0.0018	0.0015	0.0018	0.0015
30	0.0001	0.0001	0.0001	0.0001	60	0.0019	0.0017	0.0019	0.0017
31	0.0001	0.0001	0.0001	0.0001	61	0.0019	0.0019	0.0019	0.0019
32	0.0002	0.0001	0.0002	0.0001	62	0.0020	0.0020	0.0020	0.0020
33	0.0002	0.0001	0.0002	0.0001	63	0.0020	0.0020	0.0020	0.0020
34	0.0002	0.0001	0.0002	0.0001	64	0.0020	0.0020	0.0020	0.0020
35	0.0003	0.0002	0.0003	0.0002	65	0.0020	0.0020	0.0020	0.0020
36	0.0003	0.0002	0.0003	0.0002	66	0.0020	0.0020	0.0020	0.0020
37	0.0003	0.0002	0.0003	0.0002	67	0.0020	0.0020	0.0020	0.0020
38	0.0003	0.0002	0.0003	0.0002	68	0.0019	0.0019	0.0019	0.0019
39	0.0004	0.0002	0.0004	0.0002	69	0.0018	0.0018	0.0018	0.0018
40	0.0004	0.0003	0.0004	0.0003	70	0.0017	0.0017	0.0017	0.0017
41	0.0004	0.0003	0.0004	0.0003	71	0.0016	0.0016	0.0016	0.0016
42	0.0005	0.0003	0.0005	0.0003	72	0.0015	0.0015	0.0015	0.0015
43	0.0005	0.0003	0.0005	0.0003	73	0.0014	0.0014	0.0014	0.0014
44	0.0006	0.0004	0.0006	0.0004	74	0.0013	0.0013	0.0013	0.0013
45	0.0006	0.0004	0.0006	0.0004	75	0.0012	0.0012	0.0012	0.0012
46	0.0007	0.0004	0.0007	0.0004	76	0.0011	0.0011	0.0011	0.0011
47	0.0007	0.0004	0.0007	0.0004	77	0.0010	0.0010	0.0010	0.0010
48	0.0008	0.0005	0.0008	0.0005	78	0.0010	0.0010	0.0010	0.0010
49	0.0009	0.0006	0.0009	0.0006	79	0.0010	0.0010	0.0010	0.0010
50	0.0009	0.0006	0.0009	0.0006	80	0.0010	0.0010	0.0010	0.0010

Proposed Pay Increases – Regular and ECO – Tier 1 & 2

	% Increase in Pay Next Year				
	5 or More Years Service			Less Than 5 Years of Service	
Age	Merit & Longevity	Economic	Total	Service	% Increase
25	0.00%	3.50%	3.50%	0	0.00%
30	0.00%	3.50%	3.50%	1	0.00%
35	0.00%	3.50%	3.50%	2	0.00%
40	0.00%	3.50%	3.50%	3	0.00%
45	0.00%	3.50%	3.50%	4	0.00%
50	0.00%	3.50%	3.50%		
55	0.00%	3.50%	3.50%		
60	0.00%	3.50%	3.50%		

Proposed Pay Increases – SLEP & ECO SLEP – Tier 1 & 2

% Increase in Pay Next Year Years of Service			
Service	Economic	Merit and Longevity	% Total Increase
1	3.50%	11.00%	14.50%
2	3.50%	8.50%	12.00%
3	3.50%	4.00%	7.50%
4	3.50%	3.50%	7.00%
5	3.50%	3.00%	6.50%
6	3.50%	2.50%	6.00%
7	3.50%	2.00%	5.50%
8	3.50%	1.50%	5.00%
9	3.50%	1.25%	4.75%
10	3.50%	1.00%	4.50%
11	3.50%	0.75%	4.25%
12	3.50%	0.75%	4.25%
13	3.50%	0.50%	4.00%
14	3.50%	0.50%	4.00%
15	3.50%	0.50%	4.00%
16	3.50%	0.50%	4.00%
17	3.50%	0.50%	4.00%
18	3.50%	0.50%	4.00%
19	3.50%	0.50%	4.00%
20	3.50%	0.50%	4.00%
21	3.50%	0.50%	4.00%
22	3.50%	0.50%	4.00%
23	3.50%	0.50%	4.00%
24	3.50%	0.50%	4.00%
25	3.50%	0.50%	4.00%
26	3.50%	0.50%	4.00%
27	3.50%	0.50%	4.00%
28	3.50%	0.50%	4.00%
29	3.50%	0.50%	4.00%
30	3.50%	0.50%	4.00%

Proposed Pre-Retirement Mortality Rates – Tier 1 & 2

Sample Ages	Regular & ECO Male	Regular & ECO Female	SLEP & ECO SLEP Male	SLEP & ECO SLEP Female	Sample Ages	Regular & ECO Male	Regular & ECO Female	SLEP & ECO SLEP Male	SLEP & ECO SLEP Female
20	0.07%	0.02%	0.07%	0.02%	50	0.26%	0.13%	0.26%	0.13%
21	0.07%	0.02%	0.07%	0.02%	51	0.28%	0.14%	0.28%	0.14%
22	0.08%	0.02%	0.08%	0.02%	52	0.30%	0.15%	0.30%	0.15%
23	0.08%	0.02%	0.08%	0.02%	53	0.33%	0.16%	0.33%	0.16%
24	0.08%	0.02%	0.08%	0.02%	54	0.35%	0.18%	0.35%	0.18%
25	0.07%	0.02%	0.07%	0.02%	55	0.38%	0.19%	0.38%	0.19%
26	0.07%	0.02%	0.07%	0.02%	56	0.42%	0.21%	0.42%	0.21%
27	0.06%	0.02%	0.06%	0.02%	57	0.46%	0.23%	0.46%	0.23%
28	0.06%	0.02%	0.06%	0.02%	58	0.51%	0.26%	0.51%	0.26%
29	0.06%	0.02%	0.06%	0.02%	59	0.57%	0.28%	0.57%	0.28%
30	0.06%	0.02%	0.06%	0.02%	60	0.64%	0.31%	0.64%	0.31%
31	0.06%	0.02%	0.06%	0.02%	61	0.73%	0.34%	0.73%	0.34%
32	0.06%	0.03%	0.06%	0.03%	62	0.83%	0.38%	0.83%	0.38%
33	0.07%	0.03%	0.07%	0.03%	63	0.94%	0.41%	0.94%	0.41%
34	0.07%	0.03%	0.07%	0.03%	64	1.08%	0.45%	1.08%	0.45%
35	0.07%	0.03%	0.07%	0.03%	65	1.23%	0.50%	1.23%	0.50%
36	0.08%	0.04%	0.08%	0.04%	66	1.37%	0.55%	1.37%	0.55%
37	0.08%	0.04%	0.08%	0.04%	67	1.53%	0.62%	1.53%	0.62%
38	0.08%	0.04%	0.08%	0.04%	68	1.70%	0.68%	1.70%	0.68%
39	0.09%	0.05%	0.09%	0.05%	69	1.89%	0.76%	1.89%	0.76%
40	0.10%	0.05%	0.10%	0.05%	70	2.09%	0.84%	2.09%	0.84%
41	0.11%	0.06%	0.11%	0.06%	71	2.31%	0.93%	2.31%	0.93%
42	0.12%	0.06%	0.12%	0.06%	72	2.56%	1.03%	2.56%	1.03%
43	0.13%	0.07%	0.13%	0.07%	73	2.83%	1.14%	2.83%	1.14%
44	0.14%	0.08%	0.14%	0.08%	74	3.12%	1.26%	3.12%	1.26%
45	0.16%	0.08%	0.16%	0.08%	75	3.44%	1.39%	3.44%	1.39%
46	0.17%	0.09%	0.17%	0.09%	76	3.79%	1.54%	3.79%	1.54%
47	0.19%	0.10%	0.19%	0.10%	77	4.17%	1.70%	4.17%	1.70%
48	0.21%	0.11%	0.21%	0.11%	78	4.59%	1.89%	4.59%	1.89%
49	0.23%	0.12%	0.23%	0.12%	79	5.04%	2.10%	5.04%	2.10%

Proposed Post-Retirement Mortality Rates – Tier 1 & 2

Sample Ages	% Dying Next Year Non-Disabled Lives Males	Females	Disabled Lives Males	Females	Sample Ages	% Dying Next Year Non-Disabled Lives Males	Females	Disabled Lives Males	Females
40	0.2271%	0.1206%	1.5183%	0.6646%	70	2.3818%	1.4103%	4.8812%	2.8479%
41	0.2483%	0.1326%	1.6441%	0.7157%	71	2.6260%	1.5562%	5.1903%	3.0577%
42	0.2708%	0.1455%	1.7665%	0.7678%	72	2.8960%	1.7187%	5.5256%	3.2910%
43	0.2943%	0.1592%	1.8821%	0.8206%	73	3.1943%	1.8990%	5.8873%	3.5493%
44	0.3186%	0.1740%	1.9886%	0.8740%	74	3.5244%	2.0987%	6.2787%	3.8334%
45	0.3436%	0.1898%	2.0850%	0.9281%	75	3.8891%	2.3196%	6.7010%	4.1448%
46	0.3693%	0.2067%	2.1703%	0.9826%	76	4.2926%	2.5642%	7.1585%	4.4848%
47	0.3953%	0.2245%	2.2430%	1.0373%	77	4.7391%	2.8356%	7.6557%	4.8549%
48	0.4220%	0.2436%	2.3042%	1.0923%	78	5.2326%	3.1378%	8.1958%	5.2569%
49	0.4491%	0.2637%	2.3542%	1.1473%	79	5.7772%	3.4755%	8.7830%	5.6924%
50	0.4771%	0.2850%	2.3941%	1.2024%	80	6.3803%	3.8538%	9.4261%	6.1635%
51	0.5059%	0.3075%	2.4254%	1.2573%	81	7.0459%	4.2783%	10.1285%	6.6721%
52	0.5370%	0.3307%	2.4532%	1.3106%	82	7.7829%	4.7553%	10.9003%	7.2207%
53	0.5713%	0.3549%	2.4634%	1.3626%	83	8.5988%	5.2910%	11.7482%	7.8115%
54	0.6044%	0.3800%	2.4719%	1.4129%	84	9.5059%	5.8920%	12.6852%	8.4471%
55	0.6383%	0.4065%	2.4866%	1.4621%	85	10.5069%	6.5648%	13.7102%	9.1306%
56	0.6752%	0.4346%	2.5133%	1.5104%	86	11.6141%	7.3167%	14.8340%	9.8651%
57	0.7172%	0.4652%	2.5572%	1.5591%	87	12.8403%	8.1556%	16.0676%	10.6544%
58	0.7662%	0.4990%	2.6208%	1.6087%	88	14.1910%	9.0913%	17.4113%	11.5025%
59	0.8243%	0.5367%	2.7051%	1.6609%	89	15.6778%	10.1339%	18.8721%	12.4144%
60	0.8935%	0.5792%	2.8111%	1.7166%	90	17.3116%	11.2961%	20.4562%	13.3952%
61	0.9753%	0.6269%	2.9379%	1.7776%	91	19.0054%	12.5542%	22.0193%	14.4826%
62	1.0708%	0.6803%	3.0845%	1.8452%	92	20.7113%	13.8945%	23.5576%	15.6707%
63	1.1810%	0.7400%	3.2498%	1.9215%	93	22.3972%	15.3082%	25.0651%	16.9535%
64	1.3060%	0.8065%	3.4322%	2.0079%	94	24.0471%	16.7898%	26.5374%	18.3252%
65	1.4457%	0.8811%	3.6312%	2.1064%	95	25.6474%	18.3363%	27.9623%	19.7799%
66	1.6005%	0.9644%	3.8464%	2.2191%	96	27.3726%	19.9453%	29.5257%	21.3118%
67	1.7698%	1.0578%	4.0768%	2.3478%	97	29.1004%	21.6142%	31.0877%	22.9147%
68	1.9553%	1.1625%	4.3250%	2.4944%	98	30.8474%	23.4264%	32.6646%	24.5829%
69	2.1589%	1.2795%	4.5931%	2.6607%	99	32.5983%	25.3584%	34.2449%	26.3104%
					100	34.4364%	27.3512%	35.8324%	28.0915%
					101	36.4420%	29.3893%	37.4241%	29.9201%
					102	38.4058%	31.4497%	39.0242%	31.7904%
					103	40.3188%	33.5153%	40.6416%	33.6964%
					104	42.1533%	35.5684%	42.2650%	35.6323%
					105	43.8903%	37.5921%	43.8903%	37.5921%
					106	45.5492%	39.5700%	45.5492%	39.5700%
					107	47.0810%	41.4876%	47.0810%	41.4876%
					108	48.4965%	43.3317%	48.4965%	43.3317%
					109	49.8023%	45.0921%	49.8023%	45.0921%
					110	50.9768%	46.7599%	50.9768%	46.7599%

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