

# Illinois Municipal Retirement Fund

Triennial Experience Study

2017 – 2019

Revised for December 18, 2020 Board Meeting





December 14, 2020

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, 2017 to December 31, 2019** 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 B. 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,

A handwritten signature in black ink that reads "Brian B. Murphy". The signature is written in a cursive style with a large initial "B".

Brian B. Murphy, FSA, EA, FCA, MAAA

A handwritten signature in black ink that reads "Mark Buis". The signature is written in a cursive style with a large initial "M".

Mark Buis, FSA, EA, FCA, MAAA

A handwritten signature in black ink that reads "Pieterse". The signature is written in a cursive style with a large initial "P".

Francois Pieterse, ASA, FCA, MAAA

BBM/MB:sc

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## Executive Summary

Statutes (40 ILCS 5/7-213) require that the actuary conduct a general review of the experience of the fund "Experience Study" at least every three years. The last review was prepared for the period from January 1, 2014 to December 31, 2016. 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 2017-2019.

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          | No change      | No change        |
| Retirement rates                        | Various        | Increase         |
| Pre and post-retirement mortality rates | Various        | Decrease         |
| Interest rate                           | Lower Rate     | Increase         |
| Wage inflation                          | Lower Rate     | Decrease         |
| Price inflation                         | Lower Rate     | Decrease         |
| <b>Total</b>                            | <b>Various</b> | <b>Decrease</b>  |

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, 2016 regular actuarial valuation and the interest rate assumption was last revised following the December 31, 2017 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' or 'benefit weighted'. This represents the crude rate of decrement on a liability or benefit 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 7.

**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 slight 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. While actual experience varied by age and service, the overall impact was minimal and no change is recommended at this time.

**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. Retirement data for Tier 2 members is limited and no changes were recommended for Tier 2 members at this time.

**Mortality Experience:** Post-retirement mortality is an important component in cost calculations and should be updated from time to time to reflect current and expected future longevity improvements. Pre-retirement mortality is a relatively minor component in cost calculations. The frequency of pre-retirement deaths is so low that mortality assumptions based on actual experience can only be produced for very large retirement systems, if at all.

**Actuarial Standards of Practice:** Actuarial Standards of Practice (ASOP) No. 35 Disclosure Section 4.1.1 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." The current mortality rates used in the valuation include a provision for future mortality improvement.

**New Mortality Tables and Projection Scale:** Recently, the Society of Actuaries (SOA) published a mortality study specific to public sector retirement systems. This very comprehensive study includes numerous mortality tables created for each classification of employee (General members, Public Safety, Teachers, Survivors, Juvenile, headcount-weighted, benefit-weighted, above median, below median). In addition, the SOA updates mortality projection scales annually – which accounts for future improvements in mortality that are expected to occur.

**Discussion:** The mortality assumption used in the annual valuation of IMRF measures the probabilities of members dying before retirement and the probability of each benefit payment being made after retirement. The mortality tables currently used in the annual valuation are an IMRF-specific mortality table based on a version of the RP-2014 Mortality Table, using projection scale MP-2017. As noted above, newer mortality tables have been released since the year 2006, reflecting declining mortality rates among retired public employees. This is reflected in the most recent published mortality tables released in 2019 by the SOA (Pub-2010 mortality tables). Since data for retirees was sufficient, IMRF Specific tables were developed for male and female healthy retirees. These tables take into account improvements in mortality that have occurred over the experience study period and exert slight downward pressure on liabilities. In addition, we are recommending updating the projection scale from MP-2017 to MP-2020.

Data for disabled retirees was insufficient to use as a basis for judgment.

## Summary of Findings – Non-Economic Assumptions (Continued)

Data for active members was insufficient to use as a basis for judgment.

**Proposal:** We recommend the following mortality tables for use in future valuations of the Retirement System; this change will increase measured liabilities:

- **Healthy Post-Retirement:** The Pub-2010, Amount-Weighted, below-median income, General, Retiree, Male (adjusted 106%) and Female (adjusted 105%) tables, and future mortality improvements projected using scale MP-2020.
- **Healthy Pre-Retirement:** The Pub-2010, Amount-Weighted, below-median income, General, Employee, Male and Female tables, and future mortality improvements projected using scale MP-2020.
- **Disability Retirement:** The Pub-2010, Amount-Weighted, below-median income, General, Disabled Retiree, Male (adjusted 100%) and Female tables, and future mortality improvements projected using scale MP-2020.



## Summary of Findings – Non-Economic Assumptions (Continued)

**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 7.25% 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, 2021 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 2014-2016 Experience Study, we recommended a contingency reserve of 0.25% of pay be added to the normal cost component. This change resulted in a load of 1.25% for increased service at retirement due to sick leave. After reviewing the data for the last 3 years, we recommend increasing this load from 1.25% to 1.5%. 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 and COLA assumption for Tier 2 members from 1.35% to 1.13% (50% of the Inflation assumption, see discussion of price inflation assumption on page 10).

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

| Decrement            | Regular & ECO |         |          |         |         |          | SLEP & ECO |         |          |
|----------------------|---------------|---------|----------|---------|---------|----------|------------|---------|----------|
|                      | Males         |         |          | Females |         |          |            |         |          |
|                      | Actual        | Assumed |          | Actual  | Assumed |          | Actual     | Assumed |          |
|                      |               | Present | Proposed |         | Present | Proposed |            | Present | Proposed |
| Normal Retirement    | 4,736         | 5,337   | 5,439    | 8,708   | 9,379   | 9,686    | 451        | 421     | 466      |
| Early Retirement     | 933           | 1,244   | 1,227    | 2,012   | 2,371   | 2,390    | -          | -       | -        |
| Withdrawals          | 14,430        | 13,112  | 13,481   | 29,905  | 28,458  | 28,581   | 544        | 355     | 426      |
| Permanent Disability | 35            | 77      | 57       | 28      | 81      | 52       | 2          | 5       | 4        |

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
- 2020 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                                    | 7.25% |
| Wage Inflation                                       | 3.25% |
| Payroll Growth                                       | 2.50% |
| Price Inflation                                      | 2.50% |
| 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.

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. For that reason, we recommend that a specific price inflation assumption be adopted in conjunction with this Experience Study. The current price inflation assumption is 2.5%. The chart below shows forward looking inflation expectations from various published sources as of December 31, 2019. Over the past 50 years, price inflation has averaged 3.9%. 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 1.8%. The 2020 Social Security Trustees report uses 2.4% as the long-range intermediate price inflation assumption. Additionally, the average future price inflation of the investment firms we surveyed is 2.1%. **Based upon the reviewed data, we recommend that the price inflation assumption be lowered from 2.5% to 2.25%.**

| <b>Forward-Looking Price Inflation Forecasts<sup>a</sup></b> |       |
|--|-------|
| <b>Congressional Budget Office<sup>b</sup></b>               |       |
| 5-Year Annual Average  | 2.46% |
| 10-Year Annual Average                                       | 2.38% |
| <b>Federal Reserve Bank of Philadelphia<sup>c</sup></b>      |       |
| 5-Year Annual Average  | 2.20% |
| 10-Year Annual Average                                       | 2.20% |
| <b>Federal Reserve Bank of Cleveland<sup>d</sup></b>         |       |
| 10-Year Expectation  | 1.71% |
| 20-Year Expectation  | 1.93% |
| 30-Year Expectation  | 2.09% |
| <b>Federal Reserve Bank of St. Louis<sup>e</sup></b>         |       |
| 10-Year Breakeven Inflation                                  | 1.61% |
| 20-Year Breakeven Inflation                                  | 1.81% |
| 30-Year Breakeven Inflation                                  | 1.78% |
| <b>U.S. Department of the Treasury<sup>f</sup></b>           |       |
| 10-Year Breakeven Inflation                                  | 1.65% |
| 20-Year Breakeven Inflation                                  | 1.78% |
| 30-Year Breakeven Inflation                                  | 1.87% |

## Summary of Findings – Economic Assumptions (Continued)

**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 2.25% price inflation assumption, we believe a reasonable range for this assumption is from 2.5% to 3.50% a year. We recommend a change in the wage inflation assumption to 2.75% and have illustrated the approximate impact on page 15.**

| 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%       |
| 2011-2019   | 1.8%               | 2.9%        | 1.1%       |
| 3-Year Avg  | 2.1%               | 3.5%        | 1.4%       |
| 5-Year Avg  | 1.8%               | 3.0%        | 1.2%       |
| 10-Year Avg | 1.8%               | 2.8%        | 1.0%       |
| 20-Year Avg | 2.1%               | 2.9%        | 0.8%       |
| 30-Year Avg | 2.4%               | 3.3%        | 0.9%       |
| 50-Year Avg | 3.9%               | 4.5%        | 0.6%       |

**Payroll Growth.** 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 and vice-versa. Also, even if there is not 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 2.3% for the last 5 years. Therefore, we recommend no change at this time to the payroll growth assumption used in the amortization factors.

## 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 nominal (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).

The analysis of the investment return assumption in this study is based on forward-looking measures of expected investment return outcomes for the asset classes in the System's Current Target investment policy. Our analysis is based on the GRS Capital Market Assumption Modeler (CMAM). Because GRS is a benefits consulting firm and does not develop or maintain its own capital market expectations, we request and monitor the forward-looking capital market assumptions of several major investment firms. We update our CMAM tool annually. The capital market assumptions in the 2020 CMAM are from the following investment firms (in alphabetical order): Aon Hewitt, Blackrock, BNY Mellon, Callan, Cambridge, JPMorgan, Meketa, Mercer, NEPC, RVK, Verus, Voya and Wilshire. We believe that the benefit of performing this analysis using multiple investment firms is that it recognizes the uncertain nature of the items affecting the selection of the investment return assumption and it avoids giving undue weight to the opinion of any single investment firm.

Each investment firm provided capital market assumptions over an investment horizon of approximately 10 years. We refer to these as short-term expectations, although that terminology may not be uniform among practitioners. In general, our understanding is that the methodology for developing capital market expectations is forward-looking, as it must be for actuarial purposes. In recent times, we have observed a general decreasing trend in capital market expectations. However, we have also observed that some of the investment firms' assumption sets are dependent on the market conditions at the time they are developed. Consequently, they may be sensitive to short term market fluctuations. Some investment firms appear to be contrarian – meaning that when the market is high, future expectations are lowered and when the market is low, future expectations are raised. In particular, markets did well in 2019, which may have introduced some pessimism into the capital market expectations of certain of the firms in our 2020 data base.

A subset of 6 of the 13 investment firms also provided capital market expectations over a longer horizon – with two firms providing 20-year expectations and four firms providing 30-year expectations. In our understanding, the ten-year assumptions tend to be more data driven than the longer-term assumptions, with longer term assumptions being partly based on mean reversion. Since the true long term mean investment return is unknown and cannot be known, and finally since in most of the plans we work on, including IMRF, very significant cash flows are expected to occur within the next ten to 15 years, we tend to give more credibility to the shorter-term assumptions than to the longer-term assumptions

## Summary of Findings – Economic Assumptions (Continued)

For purposes of this study, we have reviewed the following investment allocation as described by the Wilshire Associates in their February 2020 presentation to the Board of Trustees. If there are material changes in the Current Targets, the findings in this report would need to be reconsidered.

Presented below is the approximate current asset allocation for IMRF:

| Asset Class             | Approximate Asset Allocation |
|-------------------------|------------------------------|
| Domestic Equity         | 37.0%                        |
| International Equity    | 18.0                         |
| Fixed Income            | 28.0                         |
| Real Estate             | 9.0                          |
| Alternative Investments | 7.0                          |
| Cash Equivalents        | 1.0                          |

Based upon the approximate asset allocation, future expectations of various investment firms were analyzed. Given the large drop in expectations from 2019 to 2020, we take the additional step in this study of citing results from a report issued by Horizon Actuarial Services, LLC (2020 Edition), which compiles and averages the return and risk forecasts of 39 major investment consulting firms. We mapped the Retirement System’s asset allocation to the average Horizon survey assumptions and calculated “Horizon 2020 Survey” expected geometric rates of return. Please note that Horizon Actuarial Services has not reviewed this work and has no responsibility for our results. Investment results presented are net of expense and are based upon an expense assumption of 8 basis points.

### Forward Looking Expected Geometric Returns for IMRF Portfolio

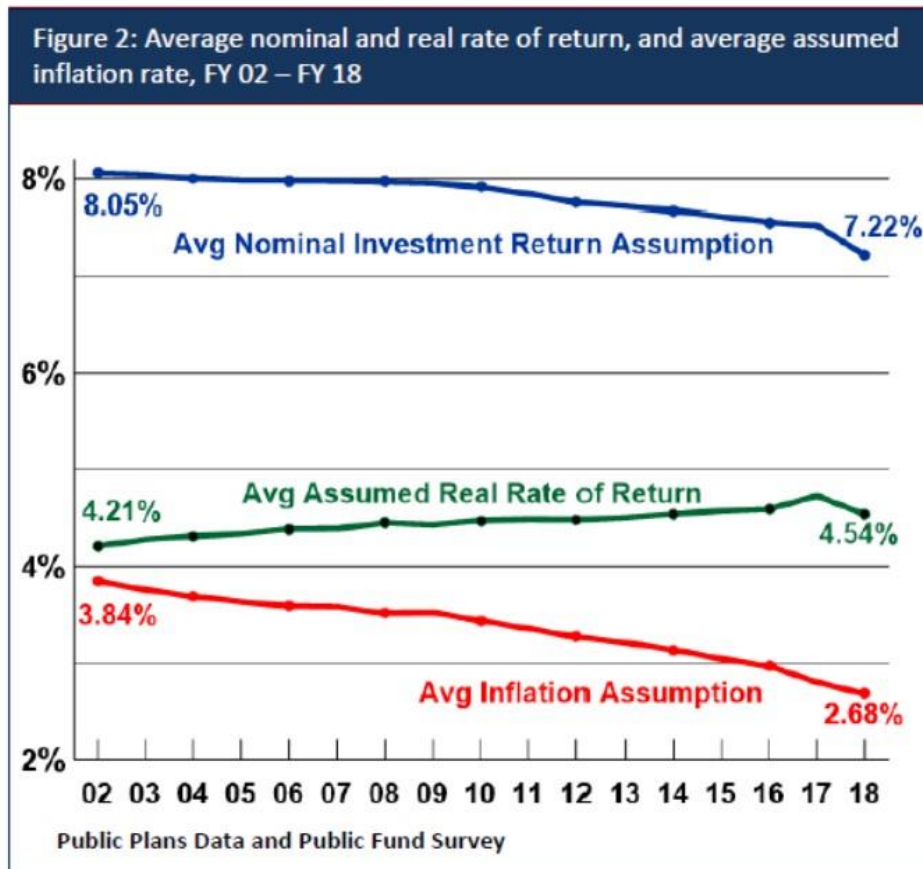
|           | Wilshire* | GRS CMAM<br>2019 Survey | GRS CMAM<br>2020 Survey | 39 Firm<br>Average Result |
|-----------|-----------|-------------------------|-------------------------|---------------------------|
| 10-Years  | 5.09%     | 6.32%                   | 5.85%                   | 6.49%                     |
| 20-Years  | 5.81%     | 7.07%                   | 6.71%                   | 7.16%                     |
| Inflation | 1.80%     | 2.25%                   | 2.25%                   | 2.25%                     |

\* 3<sup>rd</sup> Quarter Performance Report presented on 11/12/2020.



## Summary of Findings – Economic Assumptions (Continued)

While there is a wide range of outcomes regarding future expected return, the current assumption of 7.25% is currently above all 10 year expected geometric returns and slightly above the 20 year expected geometric returns. In addition, we also reviewed information for the most recent NASRA survey. According to this survey, the average assumed return for all Statewide Retirement Systems is 7.22% (see chart below). It is important to understand though that NASRA survey reflects national average assumed rates of return, which may not be indicative of IMRF's asset allocation.



**Taking everything into account, while we think 7.25% can be supported for the upcoming year, we recommend consideration be given to lowering this assumption 10 to 50 basis points.** However, the analysis indicates that if the assumption remains at 7.25% it is likely that IMRF could see an extended period of failing to meet its return assumption. The result would be an erosion of the funded status, and the deferral of contributions into the future.

We have illustrated the approximate impact on contribution requirements for a change in the investment return assumption to 6.75%, 7.00% or 7.15% on page 15.

## Summary of Findings

### Average Effect on Contribution Rates

#### (Results Based upon December 31, 2019 Data)

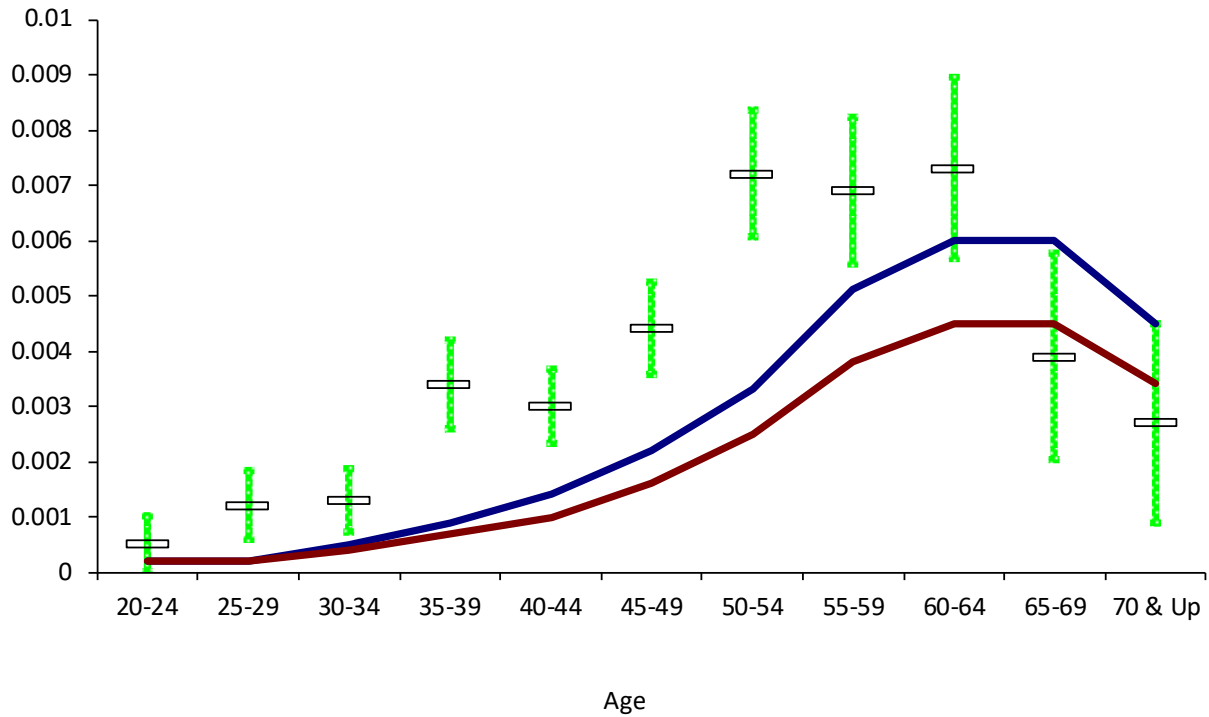
|                                | 12/31/2019     | OPTION 1                                      | OPTION 2                 | OPTION 3                       | OPTION 4           | OPTION 5       | OPTION 6**         |
|--------------------------------|----------------|---|--------------------------|--------------------------------|--------------------|----------------|--------------------|
|                                |                | Hypothetical Results as of December 31, 2020* |                          |                                |                    |                |                    |
|                                |                | Actual Results                                | Demographic Changes Only | Potential Economic Assumptions |                    |                |                    |
| <b>Demographic Assumptions</b> | <b>Current</b> | <b>New: -10 bp</b>                            | <b>New: -10 bp</b>       | <b>New: -10 bp</b>             | <b>New: -10 bp</b> | <b>Current</b> | <b>New: -10 bp</b> |
| Price Inflation                | 2.50%          | 2.50%   | 2.25%                    | 2.25%                          | 2.25%              | 2.50%          | 2.25%              |
| Wage Inflation                 | 3.25%          | 3.25%   | 2.75%                    | 2.75%                          | 2.75%              | 3.25%          | 2.75%              |
| Investment Return              | 7.25%          | 7.25%   | 7.15%                    | 7.00%                          | 6.75%              | 7.25%          | 7.25%              |
| <b>Regular Employers</b>       |                |   |                          |                                |                    |                |                    |
| - Contribution Rate            | 10.6%          | 10.0%   | 9.8%                     | 10.6%                          | 12.1%              | 10.1%          | 9.2%               |
| <b>SLEP Employers</b>          |                |   |                          |                                |                    |                |                    |
| - Contribution Rate            | 23.7%          | 22.4%   | 22.2%                    | 23.9%                          | 27.1%              | 22.8%          | 21.2%              |
| <b>Total Plan</b>              |                |   |                          |                                |                    |                |                    |
| - Funded Status                | 90.7%          | 91.1%   | 91.0%                    | 90.2%                          | 88.2%              | 91.4%          | 92.4%              |





\* Adjusted for the effect of increased Tier 2 participation. Results for individual employers will be different. New assumptions would first be used in the December 31, 2020 valuation which would first impact rates in 2022 and will also be affected by 2020 investment performance and other effects.

\*\* Scenario requested by a Board member – not recommended or endorsed by GRS. Actuarial standards may require GRS to issue a qualified report.

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. Results are approximate and indicate only the general direction and approximate average magnitude of the effects of the assumption changes. *Contribution rates for 2021 have already been scheduled based upon the December 31, 2019 regular valuation and are not affected by the experience study.*

## Standard Deviation Graph Example



-  +2 sdv/-2 sdv
-  Actual Experience
-  Present Assumptions
-  Proposed Assumptions

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**

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## Regular Males Withdrawal Experience

There were 12,347 withdrawals and 82,173 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                                | 2,460       | 9,781    | 0.2515       | 0.2450       | 0.2480   | 2,396                | 2,426    |
| 2                                | 3,318       | 16,556   | 0.2004       | 0.1950       | 0.1980   | 3,228                | 3,278    |
| 3                                | 2,122       | 13,545   | 0.1567       | 0.1500       | 0.1530   | 2,032                | 2,072    |
| 4                                | 1,581       | 11,675   | 0.1354       | 0.1300       | 0.1330   | 1,518                | 1,553    |
| 5                                | 1,087       | 9,782    | 0.1111       | 0.1025       | 0.1070   | 1,003                | 1,047    |
| 6                                | 732         | 8,350    | 0.0877       | 0.0875       | 0.0875   | 731                  | 731      |
| 7                                | 589         | 7,189    | 0.0819       | 0.0725       | 0.0770   | 521                  | 554      |
| 8                                | 458         | 5,295    | 0.0865       | 0.0700       | 0.0770   | 371                  | 408      |
| 9                                | 327         | 4,051    | 0.0807       |              |          | -                    | -        |
| 10                               | 299         | 3,926    | 0.0762       |              |          | -                    | -        |
| 11                               | 272         | 4,108    | 0.0662       |              |          | -                    | -        |
| 12                               | 235         | 3,935    | 0.0597       |              |          | -                    | -        |
| 13                               | 196         | 3,595    | 0.0545       |              |          | -                    | -        |
| 14                               | 151         | 3,193    | 0.0473       |              |          | -                    | -        |
| 15                               | 143         | 2,825    | 0.0506       |              |          | -                    | -        |
| 16                               | 120         | 2,686    | 0.0447       |              |          | -                    | -        |
| 17                               | 116         | 2,753    | 0.0421       |              |          | -                    | -        |
| 18                               | 102         | 2,769    | 0.0368       |              |          | -                    | -        |
| 19                               | 92          | 2,656    | 0.0346       |              |          | -                    | -        |
| 20                               | 79          | 2,382    | 0.0332       |              |          | -                    | -        |
| 21                               | 75          | 2,028    | 0.0370       |              |          | -                    | -        |
| 22                               | 78          | 1,761    | 0.0443       |              |          | -                    | -        |
| 23                               | 51          | 1,502    | 0.0340       |              |          | -                    | -        |
| 24                               | 51          | 1,282    | 0.0398       |              |          | -                    | -        |
| 25                               | 33          | 1,047    | 0.0315       |              |          | -                    | -        |
| 26                               | 31          | 947      | 0.0327       |              |          | -                    | -        |
| 27                               | 25          | 921      | 0.0271       |              |          | -                    | -        |
| 28                               | 24          | 948      | 0.0253       |              |          | -                    | -        |
| 29                               | 29          | 897      | 0.0323       |              |          | -                    | -        |
| 30 & over                        | 153         | 2,685    | 0.0570       |              |          | -                    | -        |
| Totals (Less Than or Equal to 8) | 12,347      | 82,173   | 0.1503       | 0.1436       | 0.1469   | 11,800               | 12,069   |

## Regular Males Withdrawal Experience

There were 2,071 withdrawals and 52,594 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

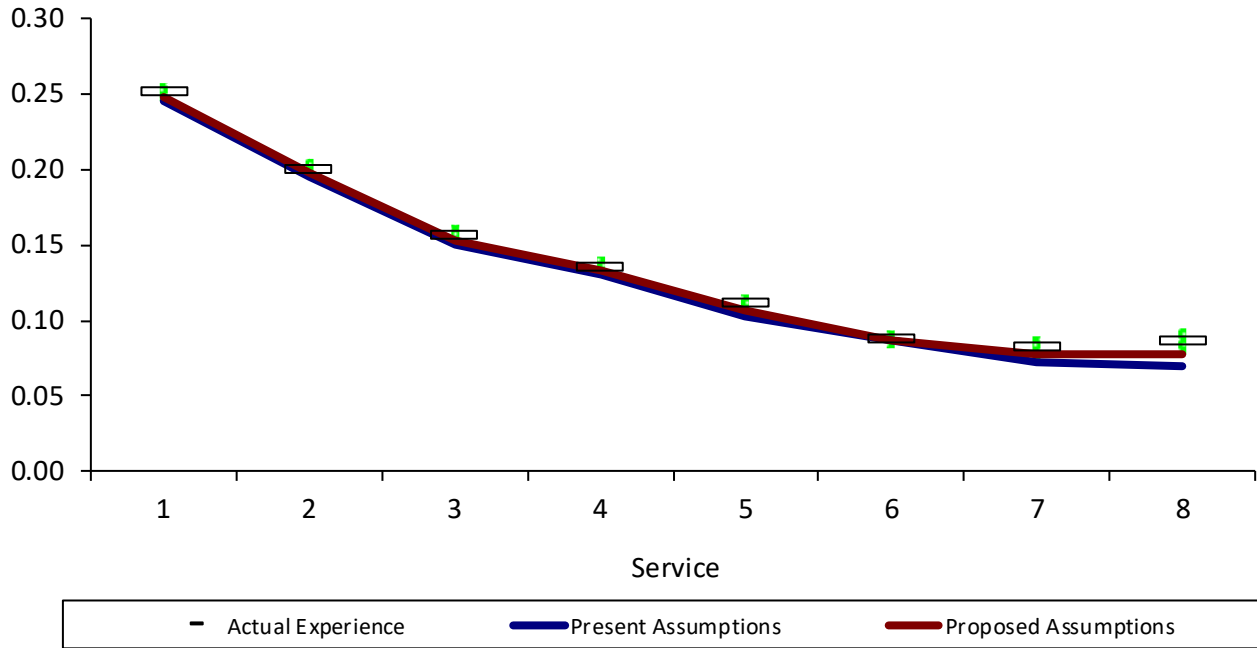
| Age    | Withdrawals | Exposure | Actual Rates Weighted by |           | Sample Rates* |          | Expected Withdrawals |          |
|--------|-------------|----------|--------------------------|-----------|---------------|----------|----------------------|----------|
|        |             |          | Population               | Liability | Present       | Proposed | Present              | Proposed |
| 25-29  | 31          | 444      | 0.0698                   | 0.0557    | 0.0490        | 0.0520   | 21                   | 22       |
| 30-34  | 268         | 4,121    | 0.0650                   | 0.0521    | 0.0400        | 0.0460   | 161                  | 182      |
| 35-39  | 391         | 8,650    | 0.0452                   | 0.0340    | 0.0310        | 0.0325   | 271                  | 288      |
| 40-44  | 415         | 10,489   | 0.0396                   | 0.0300    | 0.0260        | 0.0280   | 272                  | 292      |
| 45-49  | 432         | 12,768   | 0.0338                   | 0.0241    | 0.0205        | 0.0225   | 267                  | 290      |
| 50-54  | 534         | 16,122   | 0.0331                   | 0.0222    | 0.0190        | 0.0200   | 309                  | 327      |
| Totals | 2,071       | 52,594   | 0.0394                   | 0.0263    | 0.0247        | 0.0266   | 1,301                | 1,401    |

|                                       | Actual | Liability | Proposed |
|---------------------------------------|--------|-----------|----------|
| <b>Current</b>                        | 0.0394 | 0.0263    | 0.0266   |
| <b>Previous Investigation Results</b> | 0.0354 | 0.0236    | 0.0246   |
| <b>2011-2013</b>                      | 0.0297 | 0.0204    | 0.0232   |
| <b>2008-2010</b>                      | 0.0278 | 0.0193    | 0.0241   |

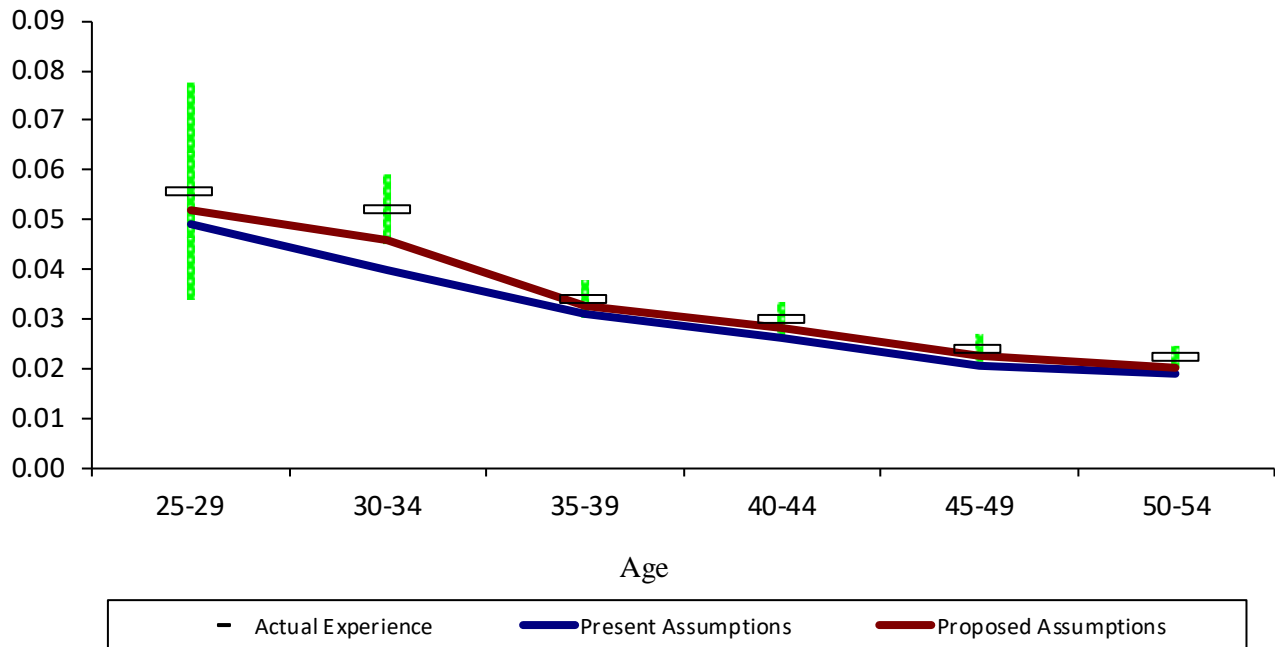
\* Sample rates are taken from midpoint of age group.

# Regular Males Withdrawal Experience

## Male Service-Based Withdrawals



## Male Age-Based Withdrawals



## Regular Females Withdrawal Experience

There were 25,716 withdrawals and 150,621 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 were adjusted slightly to be closer to actual.

### Female Service-Based Withdrawals

| Service Index                    | Withdrawals | Exposure | Actual Rates | Sample Rates |          | Expected Withdrawals |          |
|----------------------------------|-------------|----------|--------------|--------------|----------|----------------------|----------|
|                                  |             |          |              | Present      | Proposed | Present              | Proposed |
| 1                                | 5,648       | 21,055   | 0.2682       | 0.2850       | 0.2770   | 6,001                | 5,832    |
| 2                                | 6,939       | 31,956   | 0.2171       | 0.2220       | 0.2200   | 7,094                | 7,030    |
| 3                                | 4,521       | 25,276   | 0.1789       | 0.1775       | 0.1775   | 4,486                | 4,486    |
| 4                                | 2,992       | 20,636   | 0.1450       | 0.1450       | 0.1450   | 2,992                | 2,992    |
| 5                                | 2,118       | 17,007   | 0.1245       | 0.1175       | 0.1200   | 1,998                | 2,041    |
| 6                                | 1,499       | 14,075   | 0.1065       | 0.1025       | 0.1045   | 1,443                | 1,471    |
| 7                                | 1,160       | 11,784   | 0.0984       | 0.0850       | 0.0920   | 1,002                | 1,084    |
| 8                                | 839         | 8,832    | 0.0950       | 0.0800       | 0.0880   | 707                  | 777      |
| 9                                | 742         | 7,103    | 0.1045       |              |          | -                    | -        |
| 10                               | 766         | 7,295    | 0.1050       |              |          | -                    | -        |
| 11                               | 602         | 7,593    | 0.0793       |              |          | -                    | -        |
| 12                               | 566         | 7,223    | 0.0784       |              |          | -                    | -        |
| 13                               | 506         | 6,204    | 0.0816       |              |          | -                    | -        |
| 14                               | 361         | 5,125    | 0.0704       |              |          | -                    | -        |
| 15                               | 312         | 4,343    | 0.0718       |              |          | -                    | -        |
| 16                               | 237         | 4,038    | 0.0587       |              |          | -                    | -        |
| 17                               | 238         | 4,006    | 0.0594       |              |          | -                    | -        |
| 18                               | 219         | 3,907    | 0.0561       |              |          | -                    | -        |
| 19                               | 164         | 3,400    | 0.0482       |              |          | -                    | -        |
| 20                               | 142         | 2,848    | 0.0499       |              |          | -                    | -        |
| 21                               | 103         | 2,252    | 0.0457       |              |          | -                    | -        |
| 22                               | 83          | 1,827    | 0.0454       |              |          | -                    | -        |
| 23                               | 71          | 1,493    | 0.0476       |              |          | -                    | -        |
| 24                               | 51          | 1,199    | 0.0425       |              |          | -                    | -        |
| 25                               | 52          | 973      | 0.0534       |              |          | -                    | -        |
| 26                               | 43          | 789      | 0.0545       |              |          | -                    | -        |
| 27                               | 31          | 714      | 0.0434       |              |          | -                    | -        |
| 28                               | 24          | 692      | 0.0347       |              |          | -                    | -        |
| 29                               | 31          | 642      | 0.0483       |              |          | -                    | -        |
| 30 & over                        | 118         | 1,609    | 0.0733       |              |          | -                    | -        |
| Totals (Less Than or Equal to 8) | 25,716      | 150,621  | 0.1707       | 0.1708       | 0.1707   | 25,723               | 25,713   |



## Regular Females Withdrawal Experience

There were 4,184 withdrawals and 74,921 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

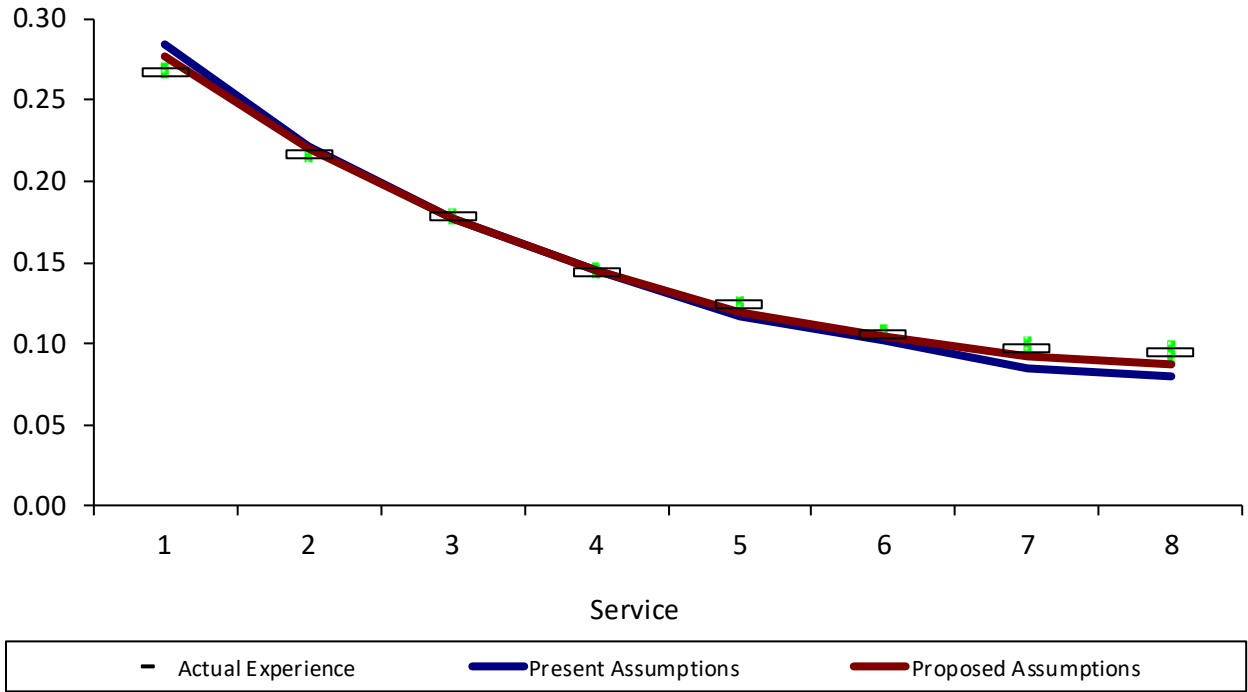
| Age    | Withdrawals | Exposure | Actual Rates Weighted by |           | Sample Rates* |          | Expected Withdrawals |          |
|--------|-------------|----------|--------------------------|-----------|---------------|----------|----------------------|----------|
|        |             |          | Population               | Liability | Present       | Proposed | Present              | Proposed |
| 25-29  | 39          | 308      | 0.1266                   | 0.1231    | 0.0800        | 0.0880   | 23                   | 26       |
| 30-34  | 324         | 3,740    | 0.0866                   | 0.0728    | 0.0675        | 0.0700   | 244                  | 253      |
| 35-39  | 618         | 9,000    | 0.0687                   | 0.0507    | 0.0510        | 0.0510   | 460                  | 467      |
| 40-44  | 749         | 12,275   | 0.0610                   | 0.0464    | 0.0395        | 0.0430   | 490                  | 525      |
| 45-49  | 1,074       | 19,366   | 0.0555                   | 0.0360    | 0.0330        | 0.0345   | 639                  | 672      |
| 50-54  | 1,380       | 30,232   | 0.0456                   | 0.0310    | 0.0285        | 0.0300   | 875                  | 921      |
| Totals | 4,184       | 74,921   | 0.0558                   | 0.0374    | 0.0365        | 0.0382   | 2,731                | 2,864    |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0558        | 0.0374           | 0.0382          |
| <b>Previous Investigation Results</b> | 0.0543        | 0.0369           | 0.0363          |
| <b>2011-2013</b>                      | 0.0440        | 0.0325           | 0.0327          |
| <b>2008-2010</b>                      | 0.0372        | 0.0262           | 0.0315          |

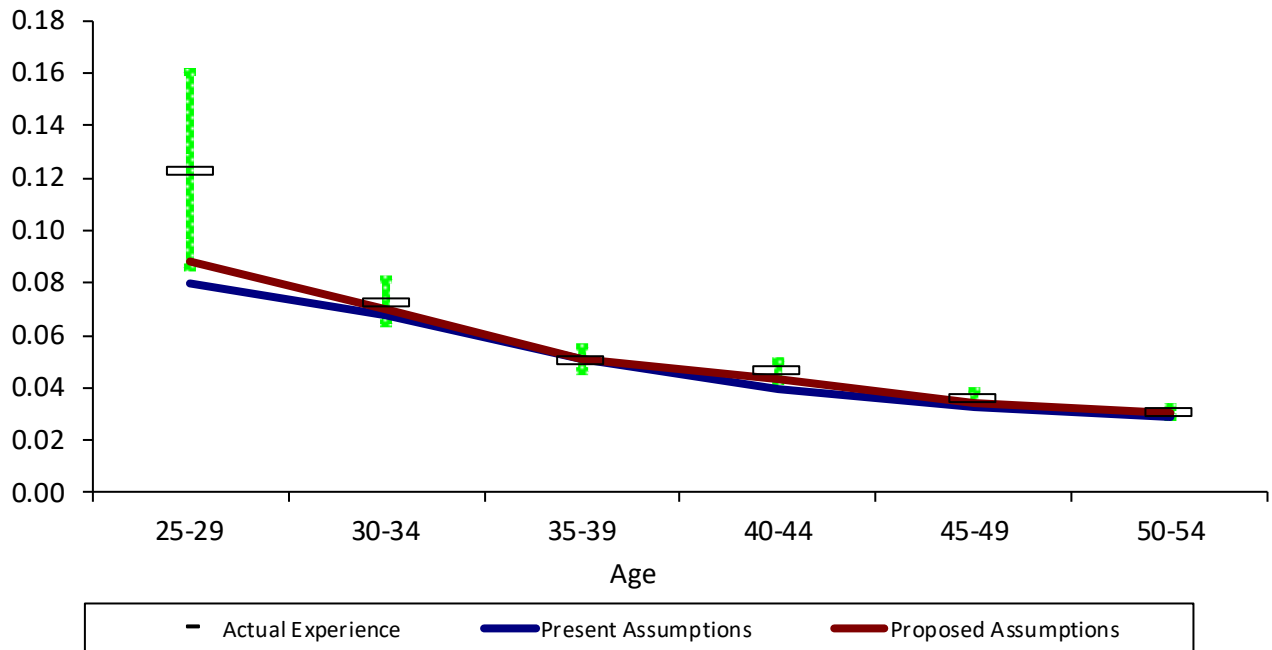
\* Sample rates are taken from midpoint of age group.

# Regular Females Withdrawal Experience

## Female Service-Based Withdrawals



## Female Age-Based Withdrawals



## SLEP Withdrawal Experience

There were 350 withdrawals and 3,452 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                    | Withdrawals | Exposure | Actual Rates | Sample Rates |          | Expected Withdrawals |          |
|----------------------------------|-------------|----------|--------------|--------------|----------|----------------------|----------|
|                                  |             |          |              | Present      | Proposed | Present              | Proposed |
| 1                                | 67          | 341      | 0.1965       | 0.1700       | 0.1833   | 58.0                 | 62.5     |
| 2                                | 77          | 634      | 0.1215       | 0.1000       | 0.1100   | 63.4                 | 69.7     |
| 3                                | 51          | 579      | 0.0881       | 0.0650       | 0.0800   | 37.6                 | 46.3     |
| 4                                | 69          | 563      | 0.1226       | 0.0620       | 0.0800   | 34.9                 | 45.0     |
| 5                                | 36          | 484      | 0.0744       | 0.0550       | 0.0650   | 26.6                 | 31.5     |
| 6                                | 31          | 453      | 0.0684       | 0.0460       | 0.0570   | 20.8                 | 25.8     |
| 7                                | 19          | 398      | 0.0477       | 0.0360       | 0.0410   | 14.3                 | 16.3     |
| 8                                | 17          | 362      | 0.0470       |              |          | -                    | -        |
| 9                                | 20          | 385      | 0.0519       |              |          | -                    | -        |
| 10                               | 20          | 455      | 0.0440       |              |          | -                    | -        |
| 11                               | 16          | 519      | 0.0308       |              |          | -                    | -        |
| 12                               | 25          | 531      | 0.0471       |              |          | -                    | -        |
| 13                               | 17          | 495      | 0.0343       |              |          | -                    | -        |
| 14                               | 5           | 490      | 0.0102       |              |          | -                    | -        |
| 15                               | 12          | 463      | 0.0259       |              |          | -                    | -        |
| 16                               | 4           | 444      | 0.0090       |              |          | -                    | -        |
| 17                               | 4           | 424      | 0.0094       |              |          | -                    | -        |
| 18                               | 4           | 426      | 0.0094       |              |          | -                    | -        |
| 19                               | 3           | 419      | 0.0072       |              |          | -                    | -        |
| 20                               | 12          | 363      | 0.0331       |              |          | -                    | -        |
| 21                               | 7           | 319      | 0.0219       |              |          | -                    | -        |
| 22                               | 8           | 266      | 0.0301       |              |          | -                    | -        |
| 23                               | 6           | 242      | 0.0248       |              |          | -                    | -        |
| 24                               | 1           | 177      | 0.0056       |              |          | -                    | -        |
| 25                               | 3           | 134      | 0.0224       |              |          | -                    | -        |
| 26                               | -           | 102      | 0.0000       |              |          | -                    | -        |
| 27                               | 4           | 83       | 0.0482       |              |          | -                    | -        |
| 28                               | 3           | 49       | 0.0612       |              |          | -                    | -        |
| 29                               | 1           | 25       | 0.0400       |              |          | -                    | -        |
| 30 & over                        | 1           | 15       | 0.0667       |              |          | -                    | -        |
| Totals (Less Than or Equal to 7) | 350         | 3,452    | 0.1014       | 0.0740       | 0.0861   | 255.6                | 297.1    |

## SLEP Withdrawal Experience

There were 192 withdrawals and 7,172 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

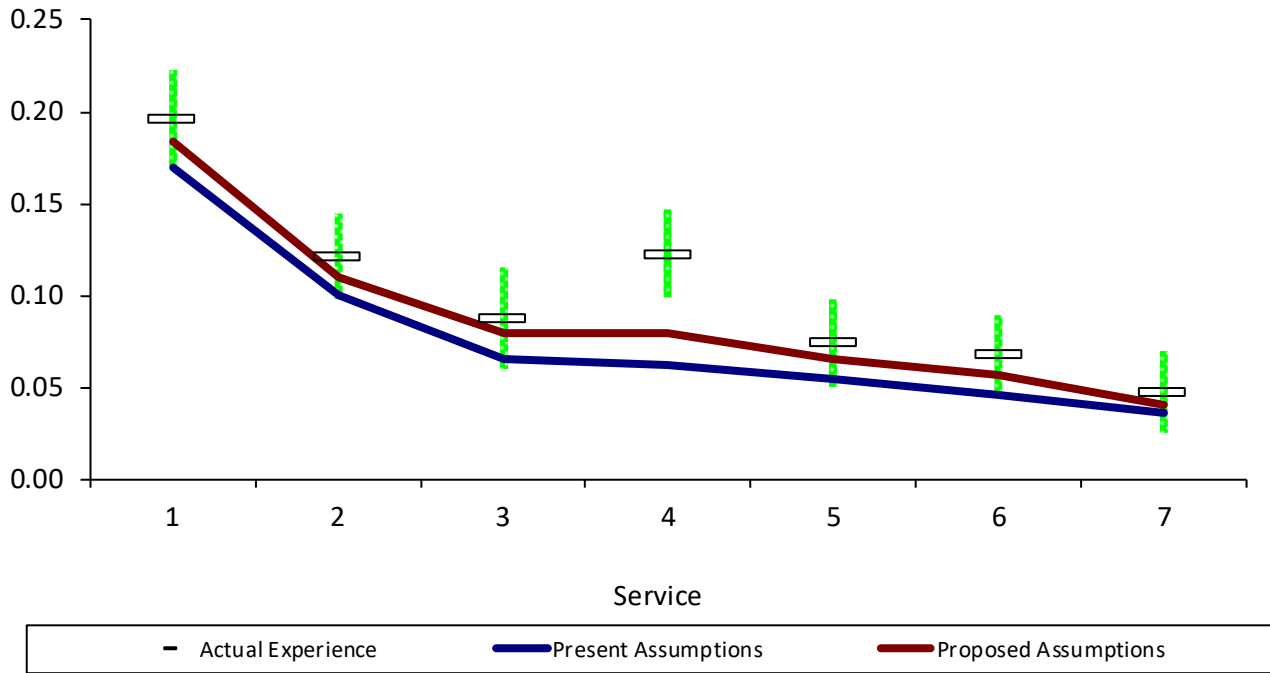
| Age    | Withdrawals | Exposure | Actual Rates Weighted by |           | Sample Rates* |          | Expected Withdrawals |          |
|--------|-------------|----------|--------------------------|-----------|---------------|----------|----------------------|----------|
|        |             |          | Population               | Liability | Present       | Proposed | Present              | Proposed |
| 25-29  | 4           | 34       | 0.1176                   | 0.1040    | 0.0260        | 0.0410   | 0.9                  | 1.3      |
| 30-34  | 40          | 772      | 0.0518                   | 0.0470    | 0.0230        | 0.0350   | 16.5                 | 24.4     |
| 35-39  | 41          | 1,618    | 0.0253                   | 0.0202    | 0.0148        | 0.0175   | 24.7                 | 30.8     |
| 40-44  | 32          | 1,685    | 0.0190                   | 0.0157    | 0.0120        | 0.0150   | 20.8                 | 25.8     |
| 45-49  | 47          | 2,256    | 0.0208                   | 0.0184    | 0.0120        | 0.0150   | 27.1                 | 33.8     |
| 50-54  | 17          | 521      | 0.0326                   | 0.0391    | 0.0120        | 0.0150   | 6.2                  | 7.8      |
| 55-59  | 11          | 286      | 0.0385                   | 0.0229    | 0.0100        | 0.0150   | 2.9                  | 4.3      |
| Totals | 192         | 7,172    | 0.0268                   | 0.0209    | 0.0138        | 0.0179   | 99.1                 | 128.2    |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0268        | 0.0209           | 0.0179          |
| <b>Previous Investigation Results</b> | 0.0163        | 0.0130           | 0.0142          |
| <b>2011-2013</b>                      | 0.0157        | 0.0116           | 0.0158          |
| <b>2008-2010</b>                      | 0.0179        | 0.0130           | 0.0183          |

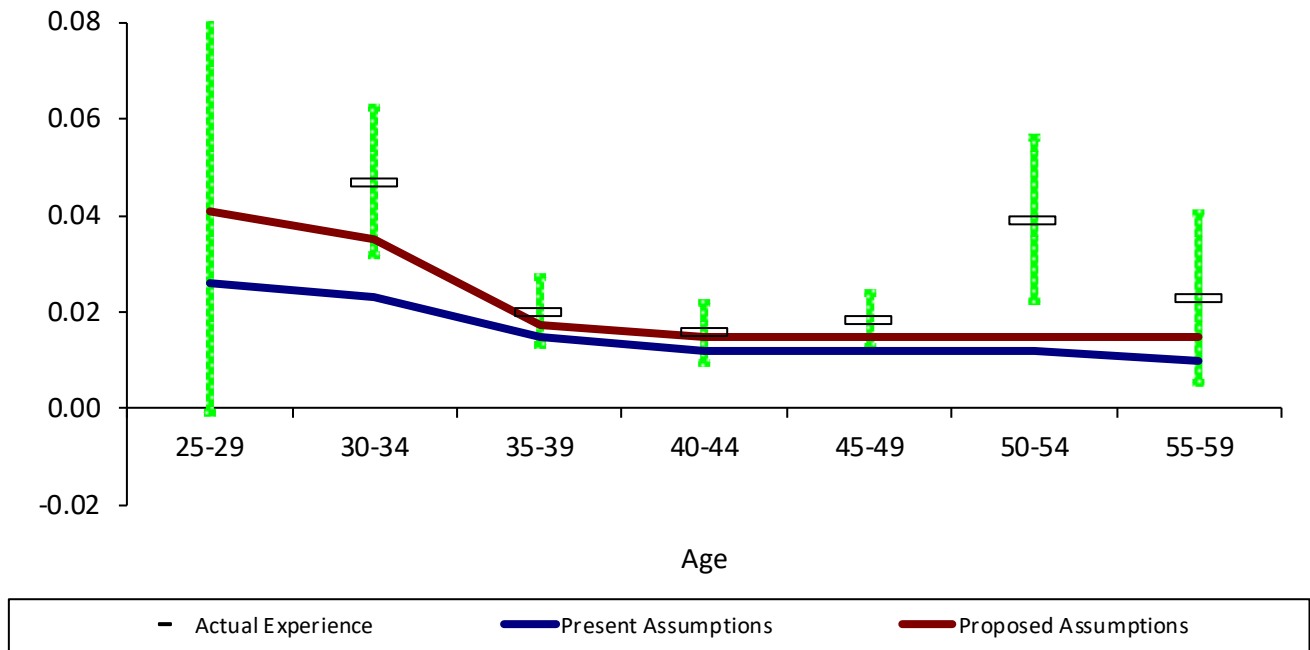
\* Sample rates are taken from midpoint of age group.

# SLEP Withdrawal Experience

## SLEP Service-Based Withdrawals



## SLEP Age-Based Withdrawals



## ECO Males Withdrawal Experience

There were 2 withdrawals and 23 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.

### Male Service-Based Withdrawals

| Service Index                    | Withdrawals | Exposure | Actual Rates | Sample Rates |          | Expected Withdrawals |          |
|----------------------------------|-------------|----------|--------------|--------------|----------|----------------------|----------|
|                                  |             |          |              | Present      | Proposed | Present              | Proposed |
| 1                                | -           | -        | N\A          | 0.4000       | 0.4000   | -                    | -        |
| 2                                | -           | 1        | 0.0000       | 0.2000       | 0.2000   | 0.2                  | 0.2      |
| 3                                | -           | 2        | 0.0000       | 0.1500       | 0.1500   | 0.3                  | 0.3      |
| 4                                | -           | 2        | 0.0000       | 0.1400       | 0.1400   | 0.3                  | 0.3      |
| 5                                | -           | 2        | 0.0000       | 0.1300       | 0.1300   | 0.3                  | 0.3      |
| 6                                | -           | 3        | 0.0000       | 0.1200       | 0.1200   | 0.4                  | 0.4      |
| 7                                | -           | 9        | 0.0000       | 0.1100       | 0.1100   | 1.0                  | 1.0      |
| 8                                | 2           | 4        | 0.5000       | 0.1000       | 0.1000   | 0.4                  | 0.4      |
| 9                                | 1           | 9        | 0.1111       |              |          | -                    | -        |
| 10                               | 1           | 8        | 0.1250       |              |          | -                    | -        |
| 11                               | 2           | 10       | 0.2000       |              |          | -                    | -        |
| 12                               | -           | 4        | 0.0000       |              |          | -                    | -        |
| 13                               | -           | 6        | 0.0000       |              |          | -                    | -        |
| 14                               | 1           | 2        | 0.5000       |              |          | -                    | -        |
| 15                               | 2           | 3        | 0.6667       |              |          | -                    | -        |
| 16                               | -           | -        | N\A          |              |          | -                    | -        |
| 17                               | -           | 3        | 0.0000       |              |          | -                    | -        |
| 18                               | 2           | 7        | 0.2857       |              |          | -                    | -        |
| 19                               | 1           | 6        | 0.1667       |              |          | -                    | -        |
| 20                               | 1           | 5        | 0.2000       |              |          | -                    | -        |
| 21                               | 1           | -        | N\A          |              |          | -                    | -        |
| 22                               | -           | 1        | 0.0000       |              |          | -                    | -        |
| 23                               | -           | 3        | 0.0000       |              |          | -                    | -        |
| 24                               | -           | 3        | 0.0000       |              |          | -                    | -        |
| 25                               | -           | 5        | 0.0000       |              |          | -                    | -        |
| 26                               | -           | 2        | 0.0000       |              |          | -                    | -        |
| 27                               | 2           | 3        | 0.6667       |              |          | -                    | -        |
| 28                               | 1           | -        | N\A          |              |          | -                    | -        |
| 29                               | -           | -        | N\A          |              |          | -                    | -        |
| 30 & over                        | 2           | 3        | 0.6667       |              |          | -                    | -        |
| Totals (Less Than or Equal to 8) | 2           | 23       | 0.0870       | 0.1261       | 0.1261   | 2.9                  | 2.9      |

## ECO Males Withdrawal Experience

There were 10 withdrawals and 83 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

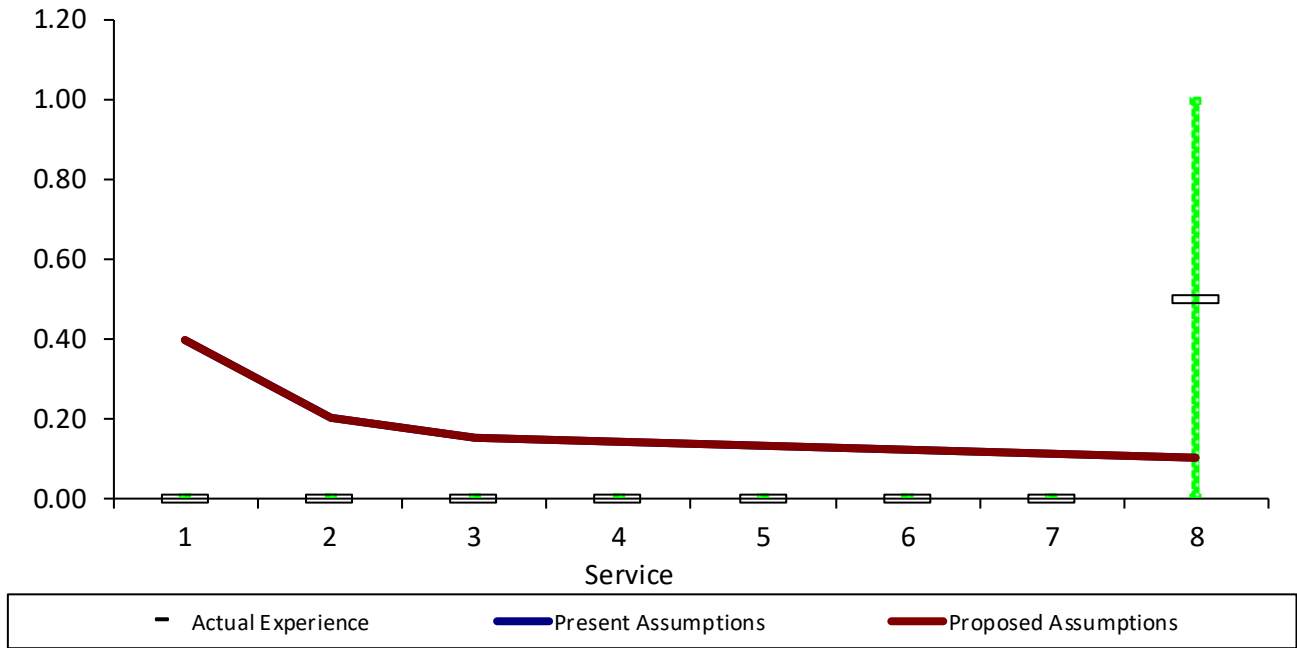
| Age    | Withdrawals | Exposure | Actual Rates Weighted by |           | Sample Rates* |          | Expected Withdrawals |          |
|--------|-------------|----------|--------------------------|-----------|---------------|----------|----------------------|----------|
|        |             |          | Population               | Liability | Present       | Proposed | Present              | Proposed |
| 25-29  | -           | -        | 0.0000                   | 0.0000    | 0.0950        | 0.1000   | -                    | -        |
| 30-34  | -           | -        | 0.0000                   | 0.0000    | 0.0950        | 0.1000   | -                    | -        |
| 35-39  | 2           | 8        | 0.2500                   | 0.2531    | 0.0950        | 0.1000   | 0.8                  | 0.8      |
| 40-44  | 4           | 17       | 0.2353                   | 0.3701    | 0.0950        | 0.1000   | 1.6                  | 1.7      |
| 45-49  | -           | 16       | 0.0000                   | 0.0000    | 0.0950        | 0.1000   | 1.5                  | 1.6      |
| 50-54  | 4           | 42       | 0.0952                   | 0.0735    | 0.0950        | 0.1000   | 4.0                  | 4.2      |
| Totals | 10          | 83       | 0.1205                   | 0.1251    | 0.0953        | 0.1000   | 7.9                  | 8.3      |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.1205        | 0.1251           | 0.1000          |
| <b>Previous Investigation Results</b> | 0.0900        | 0.1293           | 0.0960          |
| <b>2011-2013</b>                      | 0.1029        | 0.0666           | 0.0600          |
| <b>2008-2010</b>                      | 0.0846        | 0.0818           | 0.0550          |

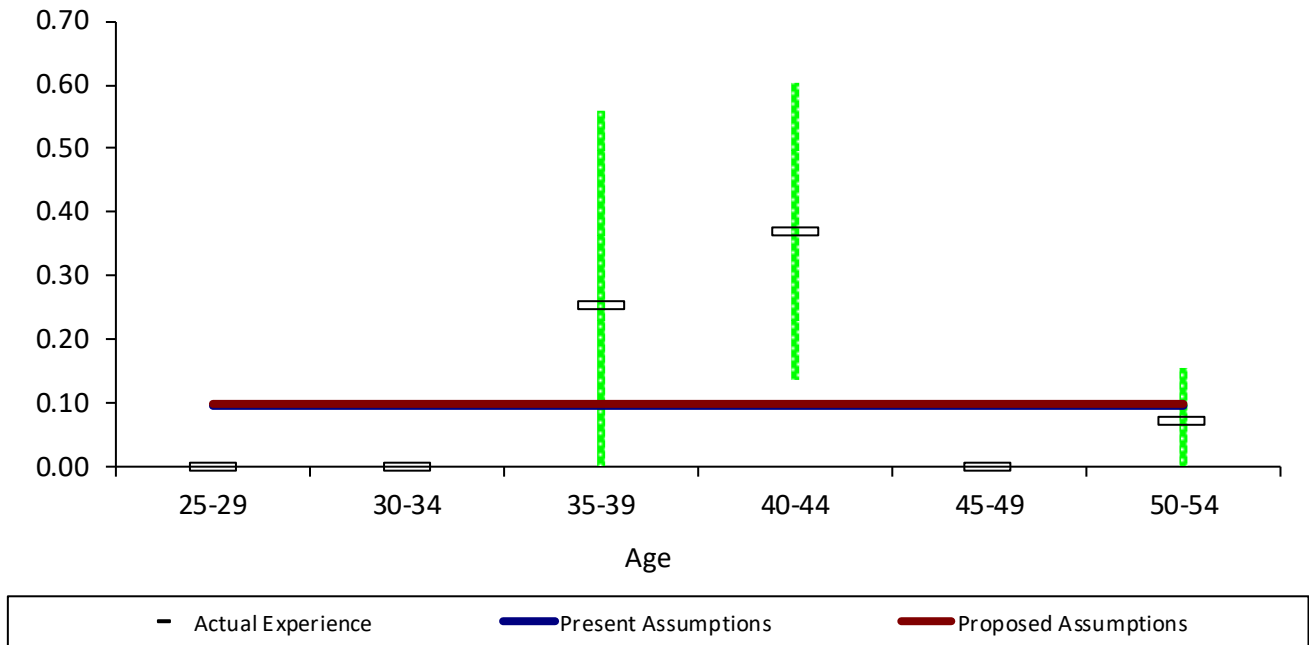
\* Sample rates are taken from midpoint of age group.

# ECO Males Withdrawal Experience

## Male Service-Based Withdrawals



## Male Age-Based Withdrawals





## ECO Females Withdrawal Experience

There were 2 withdrawals and 9 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.

### Female Service-Based Withdrawals

| Service Index                    | Withdrawals | Exposure | Actual Rates | Sample Rates |          | Expected Withdrawals |          |
|----------------------------------|-------------|----------|--------------|--------------|----------|----------------------|----------|
|                                  |             |          |              | Present      | Proposed | Present              | Proposed |
| 1                                | -           | -        | N\A          | 0.4000       | 0.4000   | -                    | -        |
| 2                                | -           | 1        | 0.0000       | 0.2000       | 0.2000   | 0.2                  | 0.2      |
| 3                                | -           | -        | N\A          | 0.1500       | 0.1500   | -                    | -        |
| 4                                | -           | -        | N\A          | 0.1400       | 0.1400   | -                    | -        |
| 5                                | -           | -        | N\A          | 0.1300       | 0.1300   | -                    | -        |
| 6                                | -           | -        | N\A          | 0.1200       | 0.1200   | -                    | -        |
| 7                                | -           | 5        | 0.0000       | 0.1100       | 0.1100   | 0.6                  | 0.6      |
| 8                                | 2           | 3        | 0.6667       | 0.1000       | 0.1000   | 0.3                  | 0.3      |
| 9                                | 2           | 5        | 0.4000       |              |          | -                    | -        |
| 10                               | -           | 5        | 0.0000       |              |          | -                    | -        |
| 11                               | -           | 5        | 0.0000       |              |          | -                    | -        |
| 12                               | 1           | 3        | 0.3333       |              |          | -                    | -        |
| 13                               | -           | 1        | 0.0000       |              |          | -                    | -        |
| 14                               | -           | 2        | 0.0000       |              |          | -                    | -        |
| 15                               | -           | 4        | 0.0000       |              |          | -                    | -        |
| 16                               | 2           | 3        | 0.6667       |              |          | -                    | -        |
| 17                               | -           | 3        | 0.0000       |              |          | -                    | -        |
| 18                               | -           | 3        | 0.0000       |              |          | -                    | -        |
| 19                               | -           | 1        | 0.0000       |              |          | -                    | -        |
| 20                               | -           | -        | N\A          |              |          | -                    | -        |
| 21                               | -           | -        | N\A          |              |          | -                    | -        |
| 22                               | -           | -        | N\A          |              |          | -                    | -        |
| 23                               | -           | -        | N\A          |              |          | -                    | -        |
| 24                               | -           | -        | N\A          |              |          | -                    | -        |
| 25                               | -           | -        | N\A          |              |          | -                    | -        |
| 26                               | -           | -        | N\A          |              |          | -                    | -        |
| 27                               | -           | -        | N\A          |              |          | -                    | -        |
| 28                               | -           | 1        | 0.0000       |              |          | -                    | -        |
| 29                               | -           | -        | N\A          |              |          | -                    | -        |
| 30 & over                        | 1           | 2        | 0.5000       |              |          | -                    | -        |
| Totals (Less Than or Equal to 8) | 2           | 9        | 0.2222       | 0.1222       | 0.1222   | 1.1                  | 1.1      |

## ECO Females Withdrawal Experience

There were 3 withdrawals and 38 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

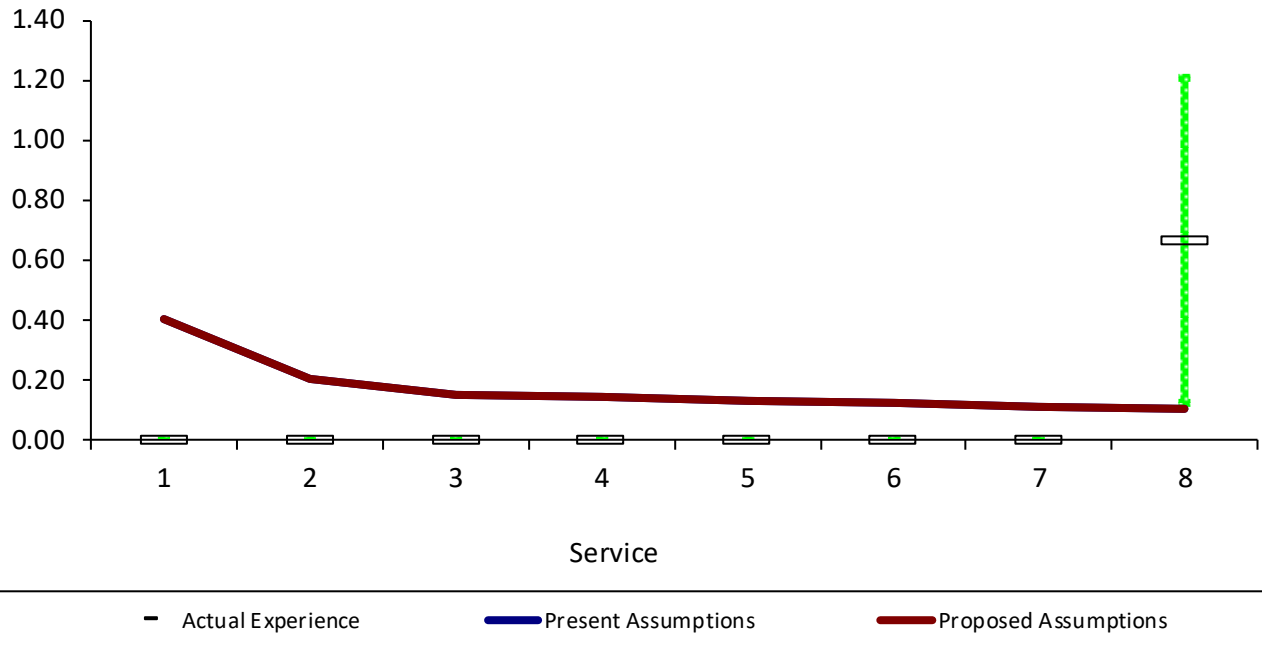
| Age    | Withdrawals | Exposure | Actual Rates Weighted by |           | Sample Rates* |          | Expected Withdrawals |          |
|--------|-------------|----------|--------------------------|-----------|---------------|----------|----------------------|----------|
|        |             |          | Population               | Liability | Present       | Proposed | Present              | Proposed |
| 25-29  | -           | -        | 0.0000                   | 0.0000    | 0.0675        | 0.0735   | -                    | -        |
| 30-34  | -           | -        | 0.0000                   | 0.0000    | 0.0675        | 0.0735   | -                    | -        |
| 35-39  | -           | -        | 0.0000                   | 0.0000    | 0.0675        | 0.0735   | -                    | -        |
| 40-44  | -           | 4        | 0.0000                   | 0.0000    | 0.0675        | 0.0735   | 0.3                  | 0.3      |
| 45-49  | 2           | 13       | 0.1538                   | 0.0565    | 0.0675        | 0.0735   | 0.9                  | 1.0      |
| 50-54  | 1           | 21       | 0.0476                   | 0.0806    | 0.0675        | 0.0735   | 1.4                  | 1.5      |
| Totals | 3           | 38       | 0.0789                   | 0.0661    | 0.0683        | 0.0743   | 2.6                  | 2.8      |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0789        | 0.0661           | 0.0743          |
| <b>Previous Investigation Results</b> | 0.1250        | 0.1030           | 0.0682          |
| <b>2011-2013</b>                      | 0.0722        | 0.0289           | 0.0320          |
| <b>2008-2010</b>                      | 0.0544        | 0.0494           | 0.0350          |

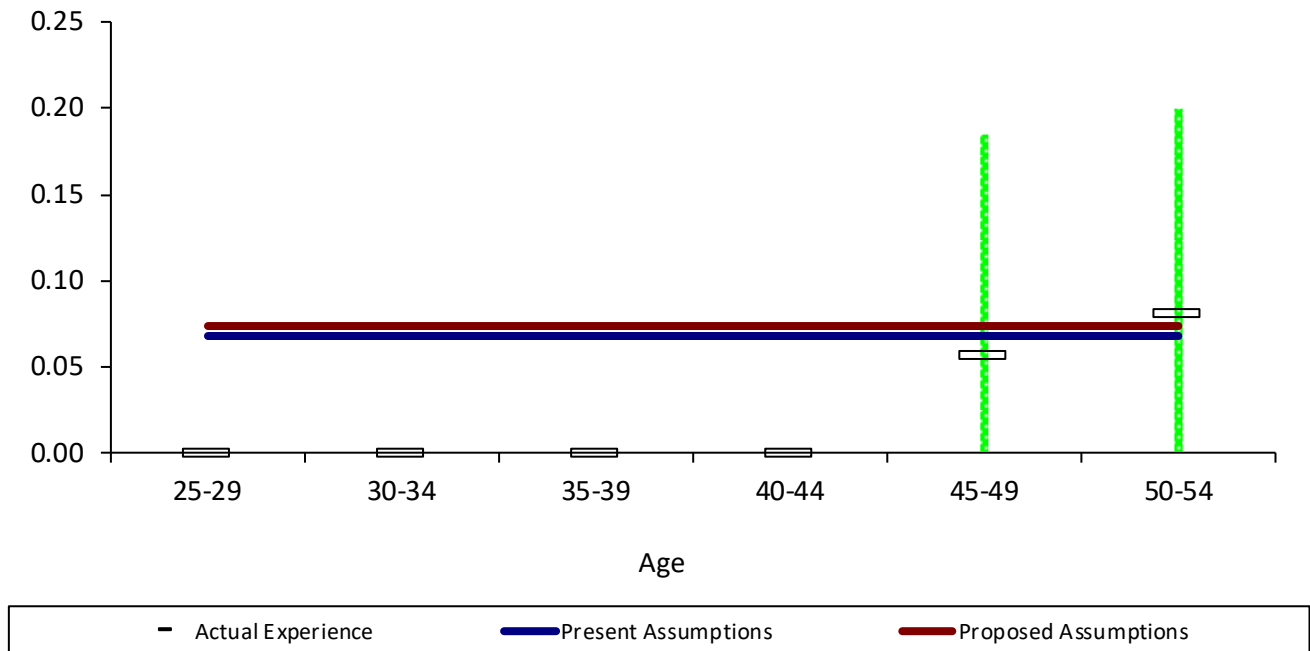
\* Sample rates are taken from midpoint of age group.

# ECO Females Withdrawal Experience

## Female Service-Based Withdrawals



## Female Age-Based Withdrawals



## ECO-SLEP Withdrawal Experience

There were 0 withdrawals and 2 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                    | Withdrawals | Exposure | Actual Rates | Sample Rates |          | Expected Withdrawals |          |
|----------------------------------|-------------|----------|--------------|--------------|----------|----------------------|----------|
|                                  |             |          |              | Present      | Proposed | Present              | Proposed |
| 1                                | -           | -        | 0.0000       | 0.1700       | 0.1700   | -                    | -        |
| 2                                | -           | -        | 0.0000       | 0.1000       | 0.1000   | -                    | -        |
| 3                                | -           | -        | 0.0000       | 0.0650       | 0.0650   | -                    | -        |
| 4                                | -           | -        | 0.0000       | 0.0620       | 0.0620   | -                    | -        |
| 5                                | -           | -        | 0.0000       | 0.0550       | 0.0550   | -                    | -        |
| 6                                | -           | -        | 0.0000       | 0.0460       | 0.0460   | -                    | -        |
| 7                                | -           | 2        | 0.0000       | 0.0360       | 0.0360   | 0.1                  | 0.1      |
| 8                                | 2           | 2        | 1.0000       | 0.0000       | 0.0000   | -                    | -        |
| 9                                | -           | -        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 10                               | -           | -        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 11                               | -           | 1        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 12                               | -           | 1        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 13                               | 1           | 1        | 1.0000       | 0.0000       | 0.0000   | -                    | -        |
| 14                               | -           | -        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 15                               | -           | -        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 16                               | -           | -        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 17                               | -           | -        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 18                               | 1           | 1        | 1.0000       | 0.0000       | 0.0000   | -                    | -        |
| 19                               | -           | 1        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| 20                               | -           | -        | 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                        | -           | -        | 0.0000       | 0.0000       | 0.0000   | -                    | -        |
| Totals (Less Than or Equal to 7) | -           | 2        | 0.0000       | 0.0500       | 0.0500   | 0.1                  | 0.1      |

## ECO SLEP Withdrawal Experience

There was 2 withdrawal and 6 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

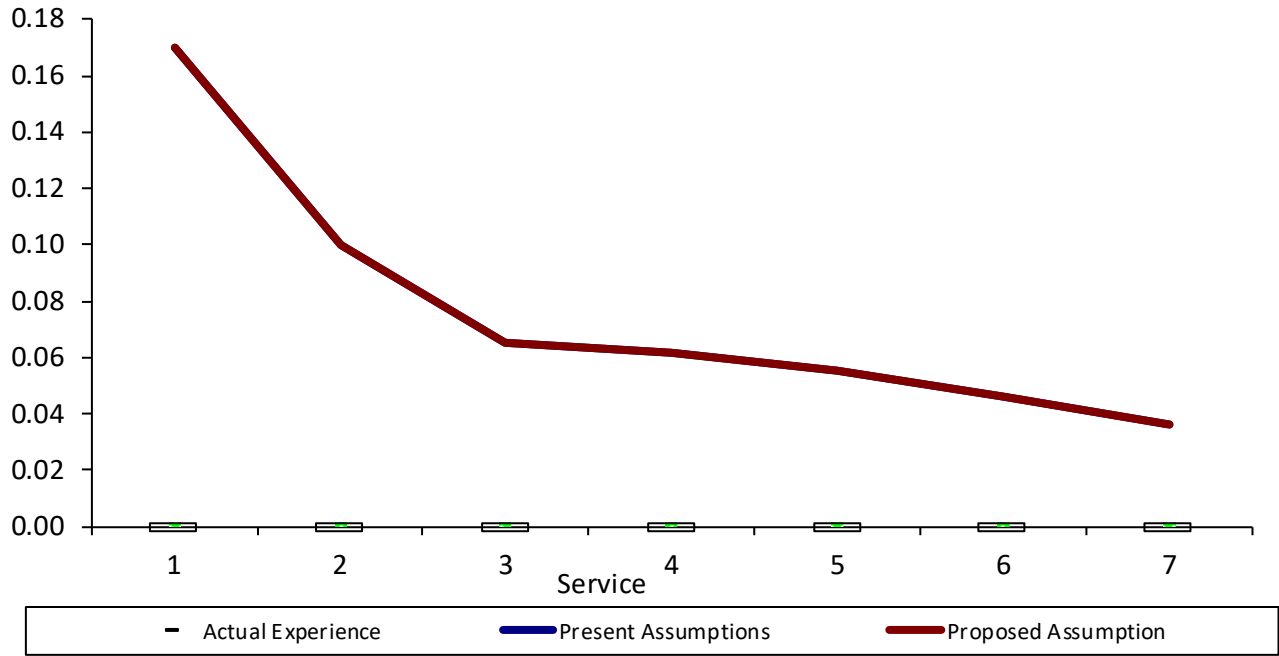
| Age    | Withdrawals | Exposure | Actual Rates<br>Weighted by |           | Sample Rates* |          | Expected<br>Withdrawals |          |
|--------|-------------|----------|-----------------------------|-----------|---------------|----------|-------------------------|----------|
|        |             |          | Population                  | Liability | Present       | Proposed | Present                 | Proposed |
| 25-29  | -           | -        | 0.0000                      | 0.0000    | 0.0260        | 0.0260   | -                       | -        |
| 30-34  | -           | -        | 0.0000                      | 0.0000    | 0.0230        | 0.0230   | -                       | -        |
| 35-39  | -           | -        | 0.0000                      | 0.0000    | 0.0148        | 0.0148   | -                       | -        |
| 40-44  | -           | -        | 0.0000                      | 0.0000    | 0.0120        | 0.0120   | -                       | -        |
| 45-49  | -           | -        | 0.0000                      | 0.0000    | 0.0120        | 0.0120   | -                       | -        |
| 50-54  | 2           | 6        | 0.3333                      | 0.2329    | 0.0120        | 0.0120   | 0.1                     | 0.1      |
| Totals | 2           | 6        | 0.3333                      | 0.2329    | 0.0150        | 0.0150   | 0.1                     | 0.1      |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.3333        | 0.2329           | 0.0150          |
| <b>Previous Investigation Results</b> | 0.0833        | 0.0628           | 0.0150          |
| <b>2011-2013</b>                      | 0.0000        | 0.0000           | 0.0150          |
| <b>2008-2010</b>                      | 0.0417        | 0.0620           | 0.0192          |

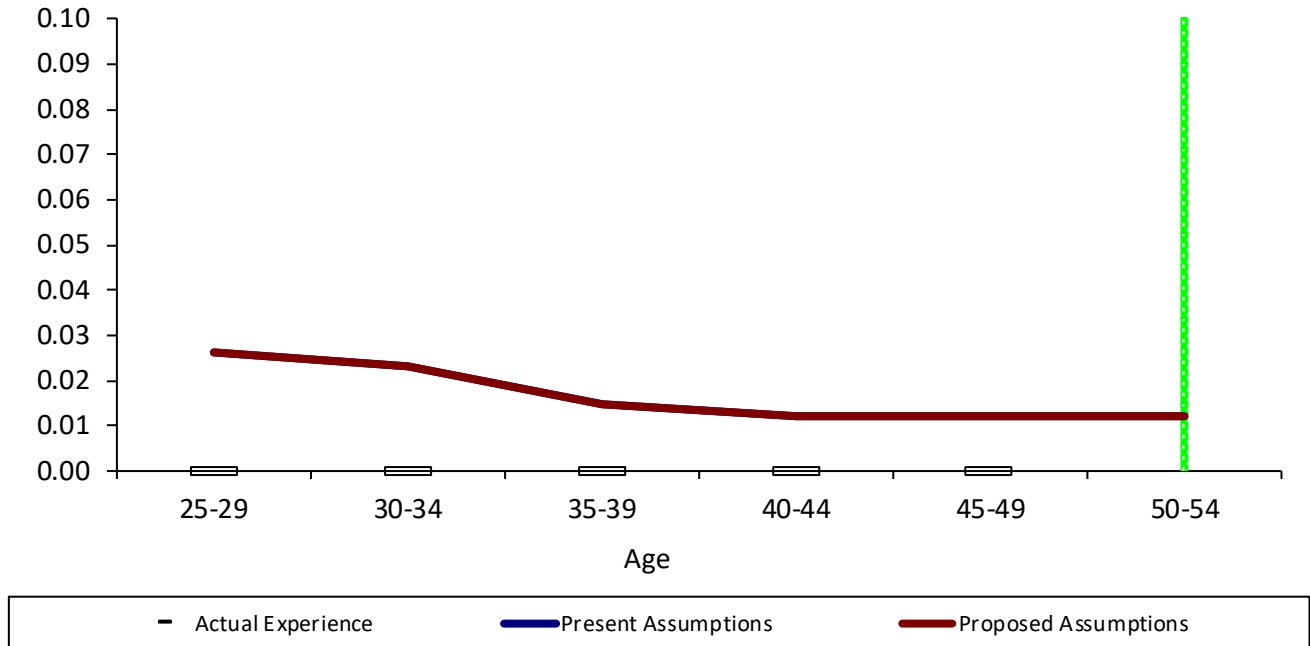
\* Sample rates are taken from midpoint of age group.

# ECO SLEP Withdrawal Experience

## ECO SLEP Service-Based Withdrawals



## ECO SLEP Age-Based Withdrawals



## **DISABILITY EXPERIENCE**

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## Regular Males – Disability Retirement Experience

There were 428 temporary disability benefit claims reported for the 3-year period and 179,139 years of exposure. However, there were approximately 35 permanent disabilities. The proposed rates recommend lower rates of permanent disability.

| Age       | Temporary Disabilities | Exposure | Actual Rates |           | Permanent Disabilities |        |        |          |          |
|-----------|------------------------|----------|--------------|-----------|------------------------|--------|--------|----------|----------|
|           |                        |          | Weighted by  |           | Sample Rates*          |        | Actual | Expected |          |
|           |                        |          | Population   | Liability | Old                    | New    |        | Present  | Proposed |
| Under 20  | -                      | 229      | 0.0000       | 0.0000    | 0.0000                 | 0.0000 |        | -        | -        |
| 20-24     | 1                      | 5,812    | 0.0002       | 0.0005    | 0.0000                 | 0.0000 |        | -        | -        |
| 25-29     | 8                      | 14,394   | 0.0006       | 0.0008    | 0.0000                 | 0.0000 |        | -        | -        |
| 30-34     | 9                      | 16,103   | 0.0006       | 0.0007    | 0.0001                 | 0.0001 |        | 1        | 1        |
| 35-39     | 19                     | 17,816   | 0.0011       | 0.0012    | 0.0001                 | 0.0001 |        | 2        | 2        |
| 40-44     | 30                     | 17,464   | 0.0017       | 0.0019    | 0.0002                 | 0.0001 |        | 4        | 3        |
| 45-49     | 47                     | 19,411   | 0.0024       | 0.0025    | 0.0003                 | 0.0002 |        | 6        | 5        |
| 50-54     | 82                     | 22,922   | 0.0036       | 0.0041    | 0.0005                 | 0.0004 |        | 12       | 8        |
| 55-59     | 116                    | 26,804   | 0.0043       | 0.0039    | 0.0008                 | 0.0005 |        | 20       | 14       |
| 60-64     | 78                     | 21,620   | 0.0036       | 0.0031    | 0.0009                 | 0.0006 |        | 19       | 14       |
| 65-69     | 26                     | 10,518   | 0.0025       | 0.0017    | 0.0009                 | 0.0006 |        | 9        | 7        |
| 70-74     | 8                      | 3,924    | 0.0020       | 0.0008    | 0.0007                 | 0.0005 |        | 3        | 2        |
| 75 & over | 4                      | 2,122    | 0.0019       | 0.0003    | 0.0005                 | 0.0003 |        | 1        | 1        |
| Totals    | 428                    | 179,139  | 0.0024       | 0.0030    | 0.0004                 | 0.0003 | 35     | 77       | 57       |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0002        | 0.0002           | 0.0003          |
| <b>Previous Investigation Results</b> | 0.0003        | 0.0003           | 0.0004          |
| <b>2011-2013</b>                      | 0.0004        | 0.0004           | 0.0005          |
| <b>2008-2010</b>                      | 0.0005        | 0.0005           | 0.0007          |

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

Exposures were not available for permanent disabilities. 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 494 temporary disability benefit claims reported for the 3-year period and 317,620 years of exposure. However, there were approximately 28 permanent disabilities. The proposed rates recommend lower rates of permanent disability.

| Age       | Temporary Disabilities | Exposure | Actual Rates |           | Permanent Disabilities |        |        |          |          |
|-----------|------------------------|----------|--------------|-----------|------------------------|--------|--------|----------|----------|
|           |                        |          | Weighted by  |           | Sample Rates*          |        | Actual | Expected |          |
|           |                        |          | Population   | Liability | Old                    | New    |        | Present  | Proposed |
| Under 20  | -                      | 315      | 0.0000       | 0.0000    | 0.0000                 | 0.0000 |        | -        | -        |
| 20-24     | 2                      | 7,463    | 0.0003       | 0.0002    | 0.0000                 | 0.0000 |        | -        | -        |
| 25-29     | 11                     | 19,185   | 0.0006       | 0.0009    | 0.0000                 | 0.0000 |        | -        | -        |
| 30-34     | 16                     | 21,700   | 0.0007       | 0.0011    | 0.0000                 | 0.0000 |        | 1        | 1        |
| 35-39     | 23                     | 27,033   | 0.0009       | 0.0009    | 0.0001                 | 0.0000 |        | 2        | 1        |
| 40-44     | 34                     | 31,704   | 0.0011       | 0.0017    | 0.0001                 | 0.0001 |        | 3        | 2        |
| 45-49     | 57                     | 40,531   | 0.0014       | 0.0016    | 0.0001                 | 0.0001 |        | 6        | 4        |
| 50-54     | 93                     | 49,113   | 0.0019       | 0.0022    | 0.0002                 | 0.0002 |        | 11       | 8        |
| 55-59     | 133                    | 55,084   | 0.0024       | 0.0024    | 0.0003                 | 0.0002 |        | 20       | 13       |
| 60-64     | 94                     | 42,890   | 0.0022       | 0.0020    | 0.0006                 | 0.0004 |        | 25       | 16       |
| 65-69     | 24                     | 16,254   | 0.0015       | 0.0009    | 0.0006                 | 0.0004 |        | 10       | 6        |
| 70-74     | 4                      | 4,601    | 0.0009       | 0.0001    | 0.0005                 | 0.0003 |        | 2        | 1        |
| 75 & over | 3                      | 1,747    | 0.0017       | 0.0006    | 0.0003                 | 0.0002 |        | 1        | -        |
| Totals    | 494                    | 317,620  | 0.0016       | 0.0019    | 0.0003                 | 0.0002 | 28     | 81       | 52       |

|                                | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|--------------------------------|---------------|------------------|-----------------|
| Current                        | 0.0001        | 0.0001           | 0.0002          |
| Previous Investigation Results | 0.0002        | 0.0002           | 0.0002          |
| 2011-2013                      | 0.0002        | 0.0002           | 0.0003          |
| 2008-2010                      | 0.0003        | 0.0003           | 0.0004          |

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

Exposures were not available for permanent disabilities. 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 12 temporary disability benefit claims reported for the 3-year period and 10,593 years of exposure. However, there were two permanent disabilities. 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    | Proposed   |
| Under 20      | -                      | 1             | 0.0000                   | 0.0000        | 0.0000                 | 0.0000        |          | -          | -          |
| 20-24         | -                      | 142           | 0.0000                   | 0.0000        | 0.0000                 | 0.0000        |          | -          | -          |
| 25-29         | -                      | 1,002         | 0.0000                   | 0.0000        | 0.0001                 | 0.0001        |          | 0.1        | 0.1        |
| 30-34         | -                      | 1,474         | 0.0000                   | 0.0000        | 0.0001                 | 0.0001        |          | 0.2        | 0.2        |
| 35-39         | 1                      | 1,835         | 0.0005                   | 0.0007        | 0.0002                 | 0.0002        |          | 0.3        | 0.3        |
| 40-44         | 2                      | 1,661         | 0.0012                   | 0.0013        | 0.0003                 | 0.0002        |          | 0.4        | 0.4        |
| 45-49         | 6                      | 2,121         | 0.0028                   | 0.0022        | 0.0004                 | 0.0003        |          | 0.8        | 0.7        |
| 50-54         | 1                      | 1,341         | 0.0007                   | 0.0003        | 0.0006                 | 0.0005        |          | 0.8        | 0.6        |
| 55-59         | 2                      | 582           | 0.0034                   | 0.0032        | 0.0008                 | 0.0007        |          | 0.4        | 0.4        |
| 60-64         | -                      | 321           | 0.0000                   | 0.0000        | 0.0005                 | 0.0005        |          | 0.2        | 0.1        |
| 65-69         | -                      | 108           | 0.0000                   | 0.0000        | 0.0004                 | 0.0003        |          | -          | -          |
| 70-74         | -                      | 5             | 0.0000                   | 0.0000        | 0.0002                 | 0.0002        |          | -          | -          |
| 75 & over     | -                      | -             | 0.0000                   | 0.0000        | 0.0000                 | 0.0000        |          | -          | -          |
| <b>Totals</b> | <b>12</b>              | <b>10,593</b> | <b>0.0011</b>            | <b>0.0013</b> | <b>0.0003</b>          | <b>0.0003</b> | <b>2</b> | <b>3.2</b> | <b>2.8</b> |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0002        | 0.0002           | 0.0003          |
| <b>Previous Investigation Results</b> | 0.0001        | 0.0001           | 0.0003          |
| <b>2011-2013</b>                      | 0.0003        | 0.0003           | 0.0005          |
| <b>2008-2010</b>                      | 0.0000        | 0.0000           | 0.0007          |

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

Exposures were not available for permanent disabilities. 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 7 temporary disability benefit claims reported for the 3-year period and 1,728 years of exposure. However, there were no permanent disabilities. The proposed rates recommend lower rates of permanent disability.

| Age           | Temporary Disabilities | Exposure     | Actual Rates  |               | Permanent Disabilities |               |          |            |            |
|---------------|------------------------|--------------|---------------|---------------|------------------------|---------------|----------|------------|------------|
|               |                        |              | Weighted by   |               | Sample Rates*          |               | Actual   | Expected   |            |
|               |                        |              | Population    | Liability     | Old                    | New           |          | Present    | Proposed   |
| Under 20      | -                      | -            | 0.0000        | 0.0000        | 0.0001                 | 0.0000        | -        | -          | -          |
| 20-24         | -                      | 35           | 0.0000        | 0.0000        | 0.0001                 | 0.0001        | -        | -          | -          |
| 25-29         | -                      | 147          | 0.0000        | 0.0000        | 0.0003                 | 0.0002        | -        | -          | -          |
| 30-34         | -                      | 236          | 0.0000        | 0.0000        | 0.0004                 | 0.0002        | 0.1      | 0.1        | -          |
| 35-39         | 2                      | 280          | 0.0071        | 0.0099        | 0.0005                 | 0.0004        | 0.2      | 0.1        | -          |
| 40-44         | 1                      | 306          | 0.0033        | 0.0017        | 0.0008                 | 0.0005        | 0.2      | 0.2        | -          |
| 45-49         | 3                      | 302          | 0.0099        | 0.0071        | 0.0011                 | 0.0007        | 0.3      | 0.2        | -          |
| 50-54         | -                      | 209          | 0.0000        | 0.0000        | 0.0017                 | 0.0011        | 0.4      | 0.2        | -          |
| 55-59         | -                      | 145          | 0.0000        | 0.0000        | 0.0023                 | 0.0015        | 0.3      | 0.2        | -          |
| 60-64         | 1                      | 54           | 0.0185        | 0.0098        | 0.0016                 | 0.0011        | 0.1      | 0.1        | -          |
| 65-69         | -                      | 14           | 0.0000        | 0.0000        | 0.0011                 | 0.0007        | -        | -          | -          |
| 70-74         | -                      | -            | 0.0000        | 0.0000        | 0.0005                 | 0.0004        | -        | -          | -          |
| 75 & over     | -                      | -            | 0.0000        | 0.0000        | 0.0000                 | 0.0000        | -        | -          | -          |
| <b>Totals</b> | <b>7</b>               | <b>1,728</b> | <b>0.0041</b> | <b>0.0036</b> | <b>0.0009</b>          | <b>0.0006</b> | <b>-</b> | <b>1.6</b> | <b>1.1</b> |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0000        | 0.0000           | 0.0006          |
| <b>Previous Investigation Results</b> | 0.0000        | 0.0000           | 0.0010          |
| <b>2011-2013</b>                      | 0.0000        | 0.0000           | 0.0013          |
| <b>2008-2010</b>                      | 0.0000        | 0.0000           | 0.0012          |

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

Exposures were not available for permanent disabilities. 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 242 years of exposure. However, there were no permanent disabilities. The proposed rates recommend no changes for this group.

| Age       | Temporary Disabilities | Exposure | Actual Rates |           | Permanent Disabilities |        |        |          |          |
|-----------|------------------------|----------|--------------|-----------|------------------------|--------|--------|----------|----------|
|           |                        |          | Weighted by  |           | Sample Rates*          |        | Actual | Expected |          |
|           |                        |          | Population   | Liability | Old                    | New    |        | Present  | Proposed |
| 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     | -                      | 2        | 0.0000       | 0.0000    | 0.0002                 | 0.0002 | -      | -        | -        |
| 35-39     | -                      | 8        | 0.0000       | 0.0000    | 0.0003                 | 0.0003 | -      | -        | -        |
| 40-44     | -                      | 18       | 0.0000       | 0.0000    | 0.0005                 | 0.0005 | -      | -        | -        |
| 45-49     | -                      | 18       | 0.0000       | 0.0000    | 0.0007                 | 0.0007 | -      | -        | -        |
| 50-54     | -                      | 44       | 0.0000       | 0.0000    | 0.0011                 | 0.0011 | -      | -        | -        |
| 55-59     | -                      | 52       | 0.0000       | 0.0000    | 0.0017                 | 0.0017 | 0.1    | 0.1      | 0.1      |
| 60-64     | -                      | 61       | 0.0000       | 0.0000    | 0.0020                 | 0.0020 | 0.1    | 0.1      | 0.1      |
| 65-69     | -                      | 29       | 0.0000       | 0.0000    | 0.0020                 | 0.0020 | 0.1    | 0.1      | 0.1      |
| 70-74     | -                      | 7        | 0.0000       | 0.0000    | 0.0015                 | 0.0015 | -      | -        | -        |
| 75 & over | -                      | 3        | 0.0000       | 0.0000    | 0.0010                 | 0.0010 | -      | -        | -        |
| Totals    | -                      | 242      | 0.0000       | 0.0000    | 0.0012                 | 0.0012 | -      | 0.3      | 0.3      |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0000        | 0.0000           | 0.0012          |
| <b>Previous Investigation Results</b> | 0.0000        | 0.0000           | 0.0012          |
| <b>2011-2013</b>                      | 0.0000        | 0.0000           | 0.0013          |
| <b>2008-2010</b>                      | 0.0000        | 0.0000           | 0.0014          |

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

Exposures were not available for permanent disabilities. 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 131 years of exposure. The proposed rates recommend no changes for this group.

| Age       | Temporary Disabilities | Exposure | Actual Rates |           | Permanent Disabilities |        |        |          |          |
|-----------|------------------------|----------|--------------|-----------|------------------------|--------|--------|----------|----------|
|           |                        |          | Weighted by  |           | Sample Rates*          |        | Actual | Expected |          |
|           |                        |          | Population   | Liability | Old                    | New    |        | Present  | Proposed |
| 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     | -                      | -        | 0.0000       | 0.0000    | 0.0002                 | 0.0002 |        | -        | -        |
| 40-44     | -                      | 6        | 0.0000       | 0.0000    | 0.0003                 | 0.0003 |        | -        | -        |
| 45-49     | -                      | 15       | 0.0000       | 0.0000    | 0.0004                 | 0.0004 |        | -        | -        |
| 50-54     | -                      | 21       | 0.0000       | 0.0000    | 0.0008                 | 0.0008 |        | -        | -        |
| 55-59     | -                      | 31       | 0.0000       | 0.0000    | 0.0011                 | 0.0011 |        | -        | -        |
| 60-64     | -                      | 40       | 0.0000       | 0.0000    | 0.0020                 | 0.0020 |        | 0.1      | 0.1      |
| 65-69     | -                      | 13       | 0.0000       | 0.0000    | 0.0020                 | 0.0020 |        | -        | -        |
| 70-74     | -                      | 3        | 0.0000       | 0.0000    | 0.0015                 | 0.0015 |        | -        | -        |
| 75 & over | -                      | 2        | 0.0000       | 0.0000    | 0.0010                 | 0.0010 |        | -        | -        |
| Totals    | -                      | 131      | 0.0000       | 0.0000    | 0.0013                 | 0.0013 | -      | 0.1      | 0.1      |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0000        | 0.0000           | 0.0013          |
| <b>Previous Investigation Results</b> | 0.0000        | 0.0000           | 0.0012          |
| <b>2011-2013</b>                      | 0.0000        | 0.0000           | 0.0011          |
| <b>2008-2010</b>                      | 0.0000        | 0.0000           | 0.0010          |

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

Exposures were not available for permanent disabilities. 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 27 years of exposure. 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  | Proposed |
| 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     | -                      | -        | 0.0000                   | 0.0000    | 0.0007                 | 0.0007 |        | -        | -        |
| 50-54     | -                      | 10       | 0.0000                   | 0.0000    | 0.0011                 | 0.0011 |        | -        | -        |
| 55-59     | -                      | 2        | 0.0000                   | 0.0000    | 0.0017                 | 0.0017 |        | -        | -        |
| 60-64     | -                      | 7        | 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    | -                      | 27       | 0.0000                   | 0.0000    | 0.0016                 | 0.0016 | -      | -        | -        |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0000        | 0.0000           | 0.0016          |
| <b>Previous Investigation Results</b> | 0.0000        | 0.0000           | 0.0014          |
| <b>2011-2013</b>                      | 0.0000        | 0.0000           | 0.0014          |
| <b>2008-2010</b>                      | 0.0000        | 0.0000           | 0.0023          |

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

Exposures were not available for permanent disabilities. 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 Females – Disability Retirement Experience

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

**PAY INCREASES**

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**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             | 10.62 %                           | 7.10 %        | 7.10 %   |
| 2             | 6.57 %                            | 6.40 %        | 6.40 %   |
| 3             | 3.93 %                            | 3.60 %        | 3.60 %   |
| 4             | 2.96 %                            | 2.70 %        | 2.70 %   |
| 5             | 2.66 %                            | 2.20 %        | 2.20 %   |
| 6             | 2.42 %                            |               |          |
| 7             | 1.67 %                            |               |          |
| 8             | 1.65 %                            |               |          |
| 9             | 1.31 %                            |               |          |
| 10            | 1.23 %                            |               |          |
| 11            | 1.12 %                            |               |          |
| 12            | 0.79 %                            |               |          |
| 13            | 0.63 %                            |               |          |
| 14            | 0.55 %                            |               |          |
| 15            | 0.24 %                            |               |          |
| 16            | 0.39 %                            |               |          |
| 17            | 0.17 %                            |               |          |
| 18            | 0.04 %                            |               |          |
| 19            | 0.12 %                            |               |          |
| 20            | 0.08 %                            |               |          |
| 21            | (0.03)%                           |               |          |
| 22            | (0.29)%                           |               |          |
| 23            | (0.13)%                           |               |          |
| 24            | (0.17)%                           |               |          |
| 25            | (0.02)%                           |               |          |
| 26            | (0.32)%                           |               |          |
| 27            | (0.14)%                           |               |          |
| 28            | (0.39)%                           |               |          |
| 29            | (0.30)%                           |               |          |
| 30            | (0.28)%                           |               |          |
| 31            | (0.23)%                           |               |          |
| 32            | (0.65)%                           |               |          |
| 33            | (0.54)%                           |               |          |
| 34            | (0.23)%                           |               |          |
| 35            | (0.24)%                           |               |          |
| 36            | (0.36)%                           |               |          |
| 37            | (0.58)%                           |               |          |
| 38            | 0.20 %                            |               |          |
| 39            | (0.50)%                           |               |          |
| 40            | 0.00 %                            |               |          |

*Exposure weighted average of all ages.*

# Regular Members Merit & Longevity Pay Increase Assumptions Age Related Portion

## More Than 5 Years of Service

| Age Group<br>Beginning<br>of Year | Pay Increase During the Next Year |                |          |
|-----------------------------------|-----------------------------------|----------------|----------|
|                                   | Actual                            | Sample Values* |          |
|                                   |                                   | Present        | Proposed |
| 25-29                             | 3.08 %                            | 2.50 %         | 2.50 %   |
| 30-34                             | 2.16 %                            | 1.70 %         | 1.70 %   |
| 35-39                             | 1.47 %                            | 1.10 %         | 1.10 %   |
| 40-44                             | 1.04 %                            | 0.90 %         | 0.90 %   |
| 45-49                             | 0.79 %                            | 0.60 %         | 0.60 %   |
| 50-54                             | 0.49 %                            | 0.40 %         | 0.40 %   |
| 55-59                             | 0.26 %                            | 0.20 %         | 0.20 %   |
| 60-64                             | 0.10 %                            | 0.10 %         | 0.10 %   |

*\* 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             | 10.52 %                                 | 11.00 %       | 11.00 %  |
| 2             | 6.80 %                                  | 8.50 %        | 8.50 %   |
| 3             | 2.97 %                                  | 4.00 %        | 4.00 %   |
| 4             | 2.99 %                                  | 3.50 %        | 3.50 %   |
| 5             | 1.90 %                                  | 3.00 %        | 3.00 %   |
| 6             | 2.85 %                                  | 2.50 %        | 2.50 %   |
| 7             | 1.82 %                                  | 2.00 %        | 2.00 %   |
| 8             | 1.57 %                                  | 1.50 %        | 1.50 %   |
| 9             | 2.37 %                                  | 1.25 %        | 1.25 %   |
| 10            | 2.13 %                                  | 1.00 %        | 1.00 %   |
| 11            | 1.40 %                                  | 0.75 %        | 0.75 %   |
| 12            | 1.97 %                                  | 0.75 %        | 0.75 %   |
| 13            | 0.50 %                                  | 0.50 %        | 0.50 %   |
| 14            | 0.25 %                                  | 0.50 %        | 0.50 %   |
| 15            | (0.41)%                                 | 0.50 %        | 0.50 %   |
| 16            | 1.44 %                                  | 0.50 %        | 0.50 %   |
| 17            | 0.96 %                                  | 0.50 %        | 0.50 %   |
| 18            | 0.92 %                                  | 0.50 %        | 0.50 %   |
| 19            | 0.62 %                                  | 0.50 %        | 0.50 %   |
| 20            | 0.32 %                                  | 0.50 %        | 0.50 %   |
| 21            | 1.05 %                                  | 0.50 %        | 0.50 %   |
| 22            | 0.59 %                                  | 0.50 %        | 0.50 %   |
| 23            | (0.06)%                                 | 0.50 %        | 0.50 %   |
| 24            | (0.14)%                                 | 0.50 %        | 0.50 %   |
| 25            | 1.50 %                                  | 0.50 %        | 0.50 %   |
| 26            | 1.39 %                                  | 0.50 %        | 0.50 %   |
| 27            | 1.61 %                                  | 0.50 %        | 0.50 %   |
| 28            | 2.55 %                                  | 0.50 %        | 0.50 %   |
| 29            | 3.52 %                                  | 0.50 %        | 0.50 %   |
| 30            | 2.30 %                                  | 0.50 %        | 0.50 %   |
| 31            | 1.82 %                                  | 0.50 %        | 0.50 %   |
| 32            | (1.46)%                                 | 0.50 %        | 0.50 %   |
| 33            | (1.04)%                                 | 0.50 %        | 0.50 %   |
| 34            | 1.41 %                                  | 0.50 %        | 0.50 %   |
| 35            | 2.14 %                                  | 0.50 %        | 0.50 %   |
| 36            | 0.70 %                                  | 0.50 %        | 0.50 %   |
| 37            | 8.04 %                                  | 0.50 %        | 0.50 %   |
| 38            | 6.74 %                                  | 0.50 %        | 0.50 %   |
| 39            | (9.31)%                                 | 0.50 %        | 0.50 %   |
| 40            | (2.52)%                                 | 0.50 %        | 0.50 %   |

*Exposure weighted average of all ages.*

# **NORMAL & EARLY RETIREMENT EXPERIENCE**

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## Regular Males Normal Retirement Experience (Tier 1)

There were 4,708 age and service unreduced retirements and 26,542 life years of exposure (exposure includes active members eligible for unreduced retirement) in the male Tier 1 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                     | 32           | 32            | 1.0000                   | 1.0000        | N\A           | N\A           | -                    | -            |
| 55                           | 65           | 225           | 0.2889                   | 0.2856        | 0.3700        | 0.3300        | 83                   | 74           |
| 56                           | 58           | 257           | 0.2257                   | 0.2520        | 0.2800        | 0.2650        | 72                   | 68           |
| 57                           | 47           | 294           | 0.1599                   | 0.1607        | 0.2100        | 0.1850        | 62                   | 54           |
| 58                           | 78           | 350           | 0.2229                   | 0.2374        | 0.2100        | 0.2250        | 74                   | 79           |
| 59                           | 77           | 369           | 0.2087                   | 0.2087        | 0.2300        | 0.2200        | 85                   | 81           |
| 60                           | 320          | 3,515         | 0.0910                   | 0.1248        | 0.1300        | 0.1300        | 457                  | 457          |
| 61                           | 322          | 3,326         | 0.0968                   | 0.1225        | 0.1300        | 0.1250        | 432                  | 416          |
| 62                           | 565          | 3,111         | 0.1816                   | 0.2216        | 0.2100        | 0.2150        | 653                  | 669          |
| 63                           | 423          | 2,578         | 0.1641                   | 0.2123        | 0.1900        | 0.2000        | 490                  | 516          |
| 64                           | 311          | 2,239         | 0.1389                   | 0.1781        | 0.1800        | 0.1800        | 403                  | 403          |
| 65                           | 473          | 2,079         | 0.2275                   | 0.2738        | 0.2500        | 0.2600        | 520                  | 541          |
| 66                           | 490          | 1,665         | 0.2943                   | 0.3305        | 0.3100        | 0.3200        | 516                  | 533          |
| 67                           | 284          | 1,220         | 0.2328                   | 0.2589        | 0.2600        | 0.2600        | 317                  | 317          |
| 68                           | 196          | 934           | 0.2099                   | 0.2171        | 0.2400        | 0.2300        | 224                  | 215          |
| 69                           | 152          | 737           | 0.2062                   | 0.2277        | 0.2200        | 0.2250        | 162                  | 166          |
| 70                           | 163          | 618           | 0.2638                   | 0.3004        | 0.2200        | 0.2600        | 136                  | 161          |
| 71                           | 117          | 514           | 0.2276                   | 0.2619        | 0.2200        | 0.2400        | 113                  | 123          |
| 72                           | 71           | 415           | 0.1711                   | 0.1585        | 0.1900        | 0.1750        | 79                   | 73           |
| 73                           | 83           | 362           | 0.2293                   | 0.2441        | 0.2000        | 0.2200        | 72                   | 80           |
| 74                           | 63           | 309           | 0.2039                   | 0.1916        | 0.2100        | 0.2000        | 65                   | 62           |
| 75 & over                    | 350          | 1,425         | 0.2456                   | 0.2526        | 0.2100        | 0.2300        | 299                  | 328          |
| <b>Total (55 &amp; over)</b> | <b>4,708</b> | <b>26,542</b> | <b>0.1774</b>            | <b>0.2009</b> | <b>0.2002</b> | <b>0.2041</b> | <b>5,314</b>         | <b>5,416</b> |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.1774        | 0.2009           | 0.2041          |
| <b>Previous Investigation Results</b> | 0.1773        | 0.2027           | 0.2003          |
| <b>2011-2013</b>                      | 0.1712        | 0.1962           | 0.1965          |
| <b>2008-2010</b>                      | 0.1775        | 0.1943           | 0.1958          |

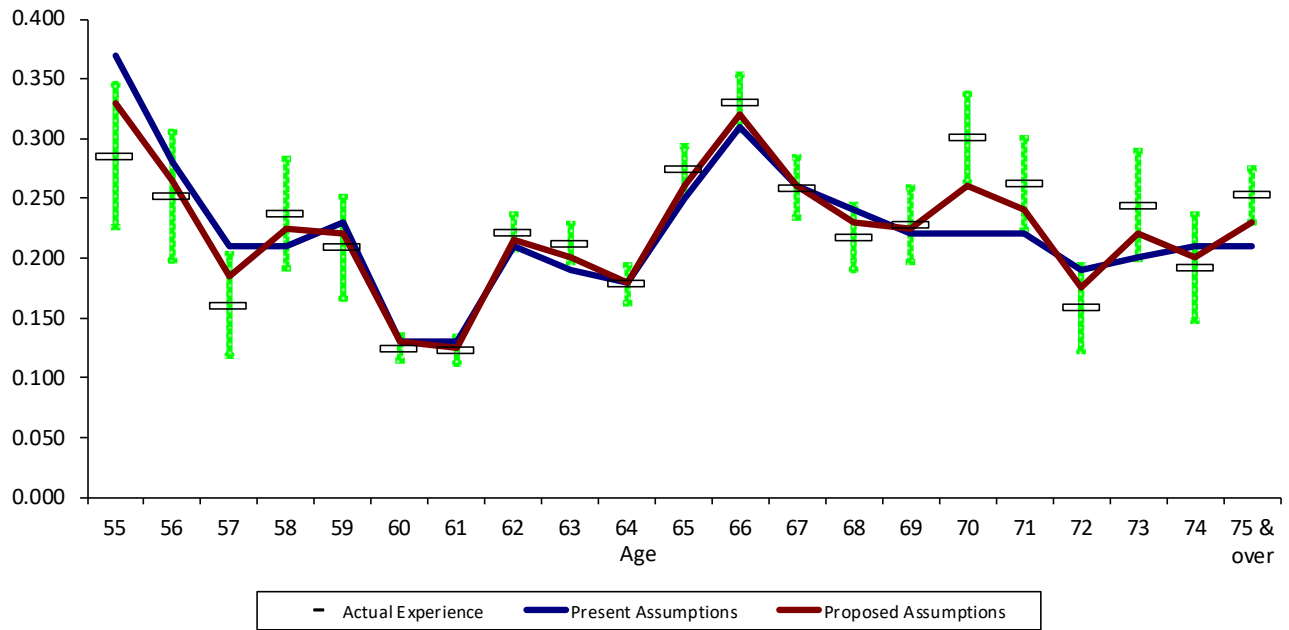
## Regular Males Early Retirement Experience (Tier 1)

There were 933 age and service reduced retirements and 17,521 life years of exposure (exposure includes active members eligible for reduced retirement) in the male Tier 1 retirement investigation. Retirement rates were found to be more highly correlated with the liability weighted rates. We recommend lowering the proposed rates.

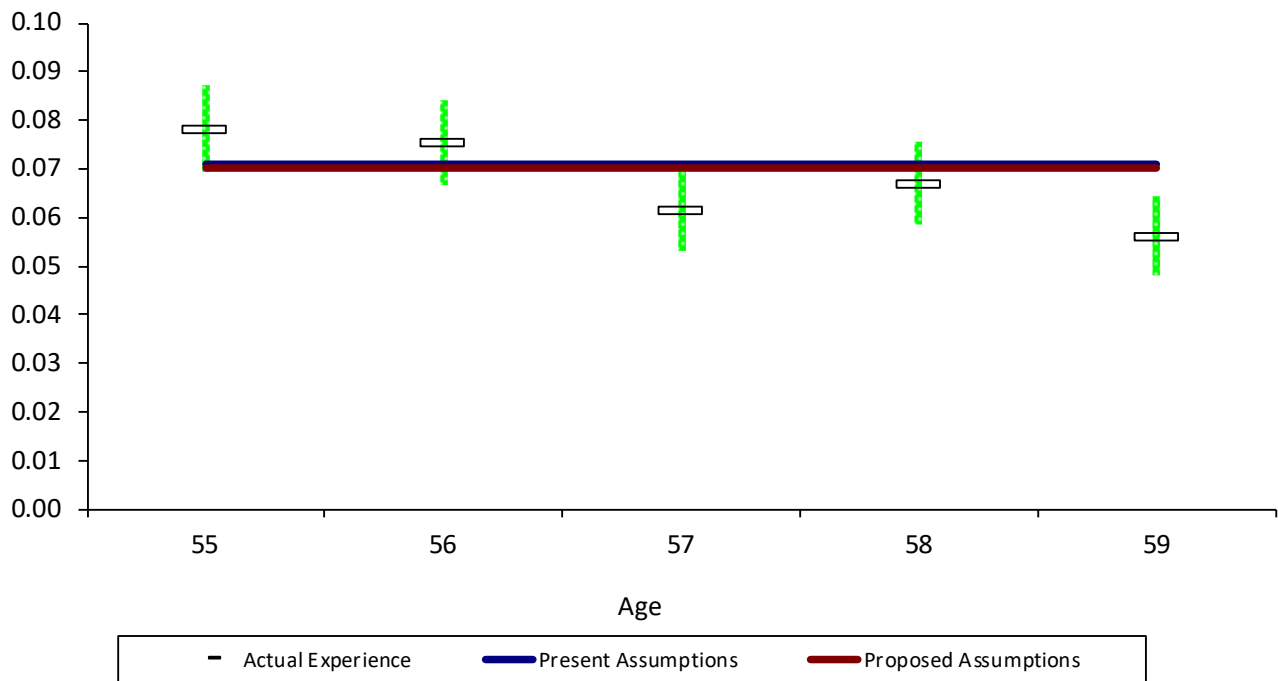
| Age   | Retirement | Exposure | Actual Rates Weighted by |           | Sample Rates |          | Expected Retirements |          |
|-------|------------|----------|--------------------------|-----------|--------------|----------|----------------------|----------|
|       |            |          | Population               | Liability | Present      | Proposed | Present              | Proposed |
| 55    | 215        | 3,735    | 0.0576                   | 0.0782    | 0.0710       | 0.0700   | 265                  | 261      |
| 56    | 211        | 3,693    | 0.0571                   | 0.0755    | 0.0710       | 0.0700   | 262                  | 259      |
| 57    | 174        | 3,566    | 0.0488                   | 0.0613    | 0.0710       | 0.0700   | 253                  | 250      |
| 58    | 183        | 3,332    | 0.0549                   | 0.0670    | 0.0710       | 0.0700   | 237                  | 233      |
| 59    | 150        | 3,195    | 0.0469                   | 0.0561    | 0.0710       | 0.0700   | 227                  | 224      |
| Total | 933        | 17,521   | 0.0533                   | 0.0682    | 0.0710       | 0.0700   | 1,244                | 1,227    |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0533        | 0.0682           | 0.0700          |
| <b>Previous Investigation Results</b> | 0.0547        | 0.0691           | 0.0710          |
| <b>2011-2013</b>                      | 0.0564        | 0.0741           | 0.0725          |
| <b>2008-2010</b>                      | 0.0510        | 0.0705           | 0.0725          |

## Rates of Normal Retirement Regular Males



## Rates of Early Retirement Regular Males



## Regular Females Normal Retirement Experience (Tier 1)

There were 8,691 age and service reduced retirements and 52,208 life years of exposure (exposure includes active members eligible for reduced retirement) in the female Tier 1 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<br>Weighted by |               | Sample Rates  |               | Expected<br>Retirements |              |
|------------------------------|--------------|---------------|-----------------------------|---------------|---------------|---------------|-------------------------|--------------|
|                              |              |               | Population                  | Liability     | Present       | Proposed      | Present                 | Proposed     |
| Under 55                     | 13           | 13            | 1.0000                      | 1.0000        | N\A           | N\A           | -                       | -            |
| 55                           | 44           | 146           | 0.3014                      | 0.3315        | 0.2600        | 0.2950        | 38                      | 43           |
| 56                           | 29           | 156           | 0.1859                      | 0.2050        | 0.2000        | 0.2025        | 31                      | 32           |
| 57                           | 29           | 195           | 0.1487                      | 0.1431        | 0.1700        | 0.1550        | 33                      | 30           |
| 58                           | 41           | 240           | 0.1708                      | 0.1579        | 0.1700        | 0.1650        | 41                      | 40           |
| 59                           | 46           | 256           | 0.1797                      | 0.1560        | 0.1900        | 0.1750        | 49                      | 45           |
| 60                           | 780          | 8,074         | 0.0966                      | 0.1217        | 0.1100        | 0.1150        | 888                     | 929          |
| 61                           | 645          | 7,539         | 0.0856                      | 0.1069        | 0.1000        | 0.1050        | 754                     | 792          |
| 62                           | 1,001        | 7,058         | 0.1418                      | 0.1673        | 0.1800        | 0.1750        | 1,270                   | 1,235        |
| 63                           | 858          | 6,033         | 0.1422                      | 0.1654        | 0.1800        | 0.1750        | 1,086                   | 1,056        |
| 64                           | 657          | 5,057         | 0.1299                      | 0.1484        | 0.1700        | 0.1600        | 860                     | 809          |
| 65                           | 1,175        | 4,378         | 0.2684                      | 0.2799        | 0.2600        | 0.2700        | 1,139                   | 1,182        |
| 66                           | 1,048        | 3,254         | 0.3221                      | 0.3633        | 0.2800        | 0.3200        | 911                     | 1,041        |
| 67                           | 623          | 2,236         | 0.2786                      | 0.3097        | 0.2600        | 0.2850        | 581                     | 637          |
| 68                           | 352          | 1,653         | 0.2129                      | 0.2414        | 0.2200        | 0.2300        | 364                     | 380          |
| 69                           | 305          | 1,289         | 0.2366                      | 0.2711        | 0.2300        | 0.2500        | 296                     | 322          |
| 70                           | 267          | 1,079         | 0.2475                      | 0.2775        | 0.2300        | 0.2550        | 248                     | 275          |
| 71                           | 172          | 804           | 0.2139                      | 0.2509        | 0.2100        | 0.2300        | 169                     | 185          |
| 72                           | 122          | 601           | 0.2030                      | 0.2385        | 0.2100        | 0.2250        | 126                     | 135          |
| 73                           | 89           | 444           | 0.2005                      | 0.2327        | 0.2300        | 0.2100        | 102                     | 93           |
| 74                           | 85           | 377           | 0.2255                      | 0.2383        | 0.2100        | 0.2250        | 79                      | 85           |
| 75 & over                    | 323          | 1,339         | 0.2412                      | 0.2609        | 0.2200        | 0.2400        | 295                     | 321          |
| <b>Total (55 &amp; over)</b> | <b>8,691</b> | <b>52,208</b> | <b>0.1665</b>               | <b>0.1886</b> | <b>0.1793</b> | <b>0.1852</b> | <b>9,360</b>            | <b>9,667</b> |

|                                       | Actual | Liability | Proposed |
|---------------------------------------|--------|-----------|----------|
| <b>Current</b>                        | 0.1665 | 0.1886    | 0.1852   |
| <b>Previous Investigation Results</b> | 0.1677 | 0.1831    | 0.1783   |
| <b>2011-2013</b>                      | 0.1551 | 0.1729    | 0.1714   |
| <b>2008-2010</b>                      | 0.1467 | 0.1539    | 0.1637   |



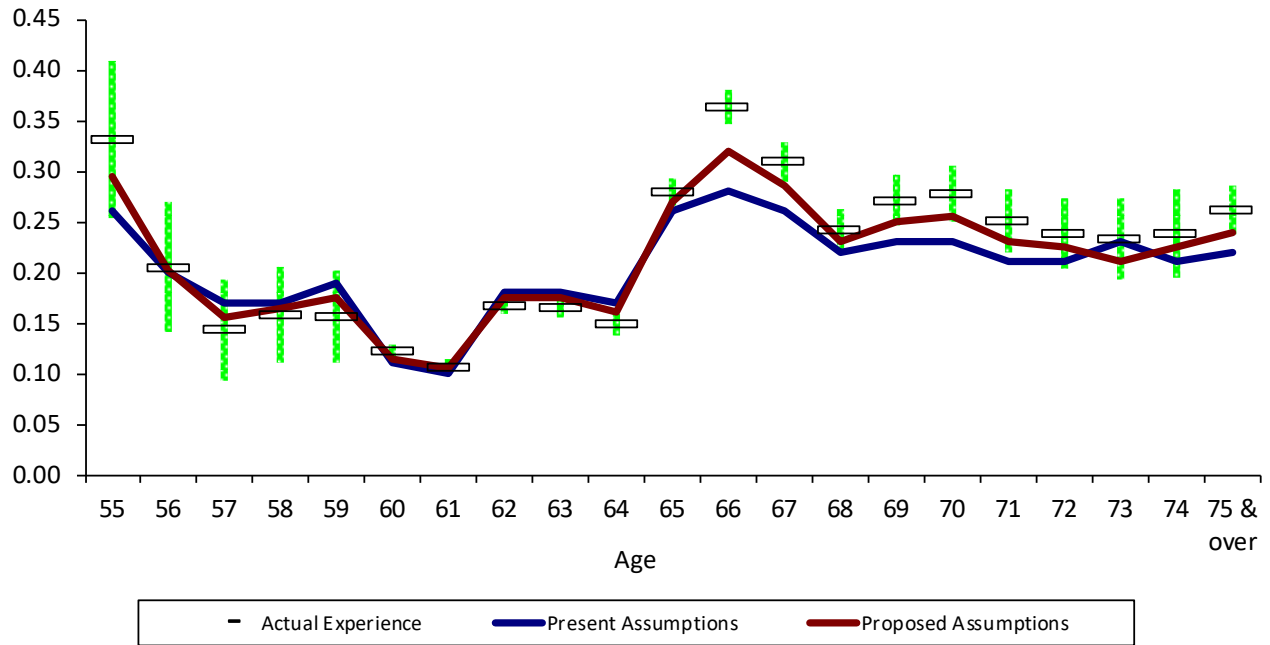
## Regular Females Early Retirement Experience (Tier 1)

There were 2,012 age and service reduced retirements and 39,515 life years of exposure (exposure includes active members eligible for reduced retirement) in the female Tier 1 retirement investigation. Retirement rates were found to be highly correlated with the liability weighted rates. We recommend increasing the proposed rates.

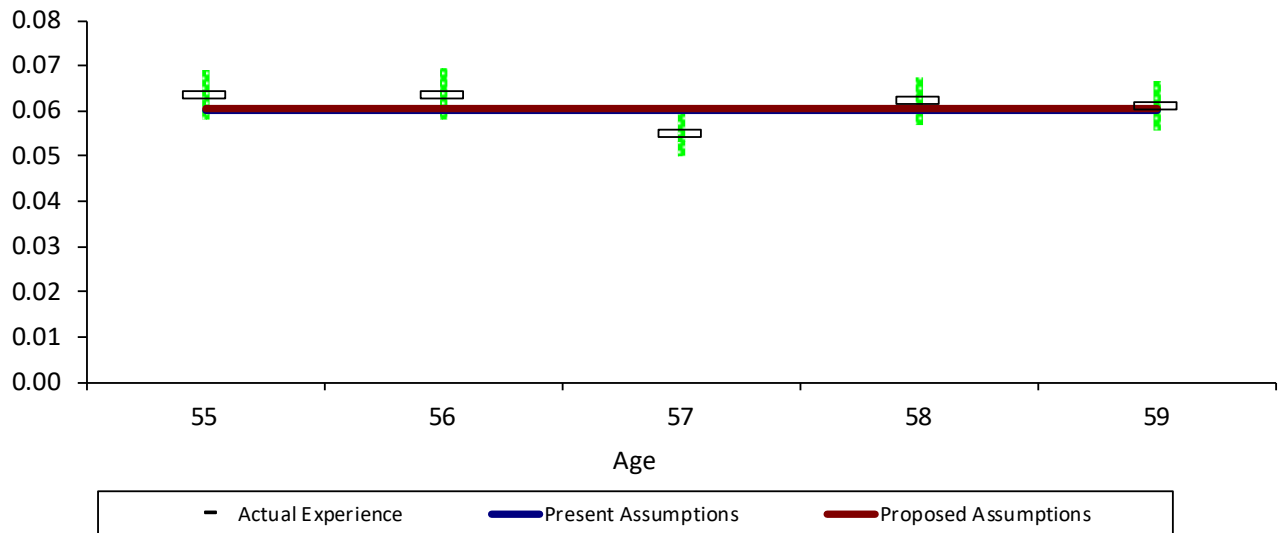
| Age   | Retirement | Exposure | Actual Rates<br>Weighted by |           | Sample Rates |          | Expected<br>Retirements |          |
|-------|------------|----------|-----------------------------|-----------|--------------|----------|-------------------------|----------|
|       |            |          | Population                  | Liability | Present      | Proposed | Present                 | Proposed |
| 55    | 386        | 7,710    | 0.0501                      | 0.0636    | 0.0600       | 0.0605   | 463                     | 466      |
| 56    | 424        | 7,851    | 0.0540                      | 0.0637    | 0.0600       | 0.0605   | 471                     | 475      |
| 57    | 361        | 7,920    | 0.0456                      | 0.0550    | 0.0600       | 0.0605   | 475                     | 479      |
| 58    | 427        | 8,090    | 0.0528                      | 0.0622    | 0.0600       | 0.0605   | 485                     | 489      |
| 59    | 414        | 7,944    | 0.0521                      | 0.0612    | 0.0600       | 0.0605   | 477                     | 481      |
| Total | 2,012      | 39,515   | 0.0509                      | 0.0611    | 0.0600       | 0.0605   | 2,371                   | 2,390    |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.0509        | 0.0611           | 0.0605          |
| <b>Previous Investigation Results</b> | 0.0511        | 0.0612           | 0.0600          |
| <b>2011-2013</b>                      | 0.0443        | 0.0567           | 0.0575          |
| <b>2008-2010</b>                      | 0.0387        | 0.0504           | 0.0575          |

## Rates of Normal Retirement Regular Females



## Rates of Early Retirement Regular Females



## SLEP Members

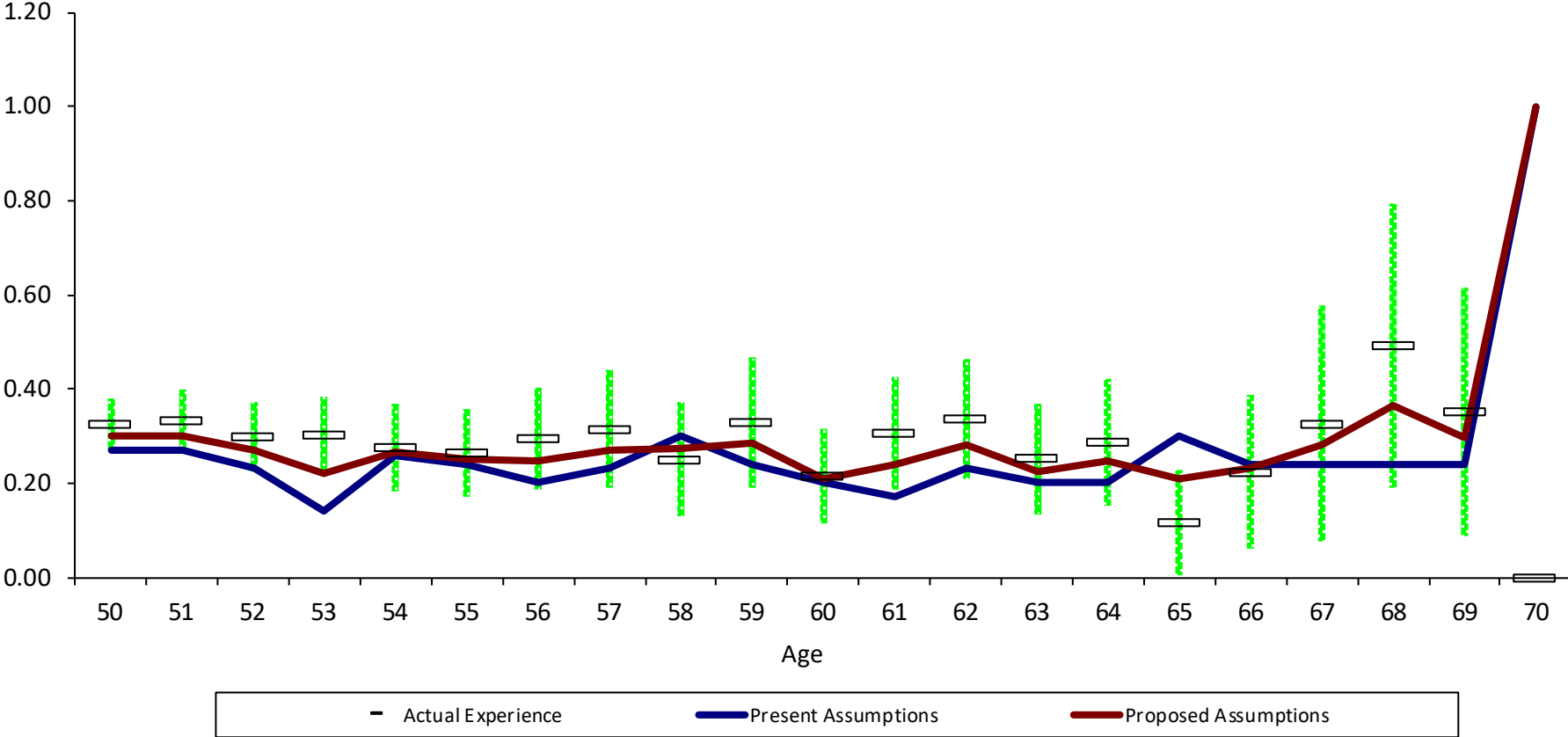
### Normal Retirement Experience (Tier 1)

There were 445 age and service unreduced retirements and 1,701 life years of exposure (exposure includes active members eligible for unreduced retirement) in the Tier 1 retirement investigation. Of these 42 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 |
| less than<br>32 years | 50    | 81          | 289      | 0.2803                   | 0.3259    | 0.2700       | 0.3000   | 78.1                 | 86.7     |
|                       | 51    | 61          | 221      | 0.2760                   | 0.3341    | 0.2700       | 0.3000   | 59.6                 | 66.3     |
|                       | 52    | 37          | 147      | 0.2517                   | 0.2985    | 0.2300       | 0.2700   | 33.9                 | 39.7     |
|                       | 53    | 32          | 122      | 0.2623                   | 0.3012    | 0.1400       | 0.2200   | 17.0                 | 26.8     |
|                       | 54    | 21          | 94       | 0.2234                   | 0.2754    | 0.2600       | 0.2650   | 24.4                 | 24.9     |
|                       | 55    | 21          | 90       | 0.2333                   | 0.2654    | 0.2400       | 0.2500   | 22.3                 | 22.5     |
|                       | 56    | 22          | 72       | 0.3056                   | 0.2941    | 0.2000       | 0.2450   | 14.4                 | 17.6     |
|                       | 57    | 17          | 55       | 0.3091                   | 0.3149    | 0.2300       | 0.2700   | 12.7                 | 14.9     |
|                       | 58    | 13          | 51       | 0.2549                   | 0.2495    | 0.3000       | 0.2750   | 15.3                 | 14.0     |
|                       | 59    | 15          | 46       | 0.3261                   | 0.3295    | 0.2400       | 0.2850   | 10.8                 | 13.1     |
|                       | 60    | 10          | 68       | 0.1471                   | 0.2153    | 0.2000       | 0.2100   | 13.4                 | 14.3     |
|                       | 61    | 13          | 59       | 0.2203                   | 0.3051    | 0.1700       | 0.2400   | 10.0                 | 14.2     |
|                       | 62    | 16          | 55       | 0.2909                   | 0.3342    | 0.2300       | 0.2800   | 12.7                 | 15.4     |
|                       | 63    | 12          | 53       | 0.2264                   | 0.2511    | 0.2000       | 0.2250   | 10.6                 | 11.9     |
|                       | 64    | 11          | 45       | 0.2444                   | 0.2867    | 0.2000       | 0.2450   | 9.0                  | 11.0     |
|                       | 65    | 2           | 33       | 0.0606                   | 0.1171    | 0.3000       | 0.2100   | 9.8                  | 6.9      |
|                       | 66    | 7           | 26       | 0.2692                   | 0.2229    | 0.2400       | 0.2300   | 6.2                  | 6.0      |
|                       | 67    | 3           | 14       | 0.2143                   | 0.3257    | 0.2400       | 0.2800   | 3.4                  | 3.9      |
|                       | 68    | 4           | 11       | 0.3636                   | 0.4932    | 0.2400       | 0.3650   | 2.7                  | 4.0      |
|                       | 69    | 4           | 13       | 0.3077                   | 0.3520    | 0.2400       | 0.2950   | 3.1                  | 3.8      |
| 70                    | -     | -           | 0.0000   | 0.0000                   | 1.0000    | 1.0000       | -        | -                    |          |
| 71                    | 1     | -           | 0.0000   | 0.0000                   | 1.0000    | 1.0000       | -        | -                    |          |
| 72                    | -     | -           | 0.0000   | 0.0000                   | 1.0000    | 1.0000       | -        | -                    |          |
| 73                    | -     | -           | 0.0000   | 0.0000                   | 1.0000    | 1.0000       | -        | -                    |          |
| 74                    | -     | -           | 0.0000   | 0.0000                   | 1.0000    | 1.0000       | -        | -                    |          |
| 75 & over             | -     | -           | 0.0000   | 0.0000                   | 1.0000    | 1.0000       | -        | -                    |          |
|                       | Total | 403         | 1,564    | 0.2577                   | 0.3041    | 0.2362       | 0.2672   | 369.4                | 417.9    |
| more than<br>32 years | All   | 42          | 137      | 0.3066                   | 0.3021    | 0.3500       | 0.3260   | 48.0                 | 44.7     |

|                                       | Actual | Liability | Proposed |
|---------------------------------------|--------|-----------|----------|
| <b>Current</b>                        | 0.2577 | 0.3041    | 0.2672   |
| <b>Previous Investigation Results</b> | 0.2451 | 0.2935    | 0.2344   |
| <b>2011-2013</b>                      | 0.1894 | 0.2168    | 0.2034   |
| <b>2008-2010</b>                      | 0.1935 | 0.2130    | 0.1790   |

# SLEP Members Normal Retirement Experience



## ECO Males

### Normal Retirement Experience (Tier 1)

There were 28 age and service unreduced retirements and 136 life years of exposure (exposure includes active members eligible for unreduced retirement) in the male Tier 1 retirement investigation.

| Age          | Retirements | Exposure   | Actual Rates<br>Weighted by |               | Sample Rates  |               | Expected<br>Retirements |             |
|--------------|-------------|------------|-----------------------------|---------------|---------------|---------------|-------------------------|-------------|
|              |             |            | Population                  | Liability     | Present       | Proposed      | Present                 | Proposed    |
| Under 55     | -           | -          | N\A                         | N/A           | N\A           | N\A           | -                       | -           |
| 55           | 3           | 9          | 0.3333                      | 0.4144        | 0.2500        | 0.2500        | 2.3                     | 2.3         |
| 56           | 1           | 11         | 0.0909                      | 0.1309        | 0.2500        | 0.2500        | 2.8                     | 2.8         |
| 57           | 1           | 9          | 0.1111                      | 0.2047        | 0.1500        | 0.1500        | 1.4                     | 1.4         |
| 58           | 1           | 5          | 0.2000                      | 0.1117        | 0.1500        | 0.1500        | 0.8                     | 0.8         |
| 59           | 1           | 7          | 0.1429                      | 0.2789        | 0.1500        | 0.1500        | 1.1                     | 1.1         |
| 60           | 2           | 11         | 0.1818                      | 0.1646        | 0.1500        | 0.1500        | 1.7                     | 1.7         |
| 61           | 4           | 13         | 0.3077                      | 0.0818        | 0.1500        | 0.1500        | 2.0                     | 2.0         |
| 62           | 1           | 9          | 0.1111                      | 0.1227        | 0.1500        | 0.1500        | 1.4                     | 1.4         |
| 63           | -           | 11         | 0.0000                      | 0.0000        | 0.1500        | 0.1500        | 1.7                     | 1.7         |
| 64           | 4           | 14         | 0.2857                      | 0.2380        | 0.1500        | 0.1500        | 2.1                     | 2.1         |
| 65           | 2           | 11         | 0.1818                      | 0.2681        | 0.1500        | 0.1500        | 1.7                     | 1.7         |
| 66           | 1           | 4          | 0.2500                      | 0.0999        | 0.1500        | 0.1500        | 0.6                     | 0.6         |
| 67           | 1           | 3          | 0.3333                      | 0.3499        | 0.1500        | 0.1500        | 0.5                     | 0.5         |
| 68           | 1           | 4          | 0.2500                      | 0.3307        | 0.1500        | 0.1500        | 0.6                     | 0.6         |
| 69           | -           | 5          | 0.0000                      | 0.0000        | 0.1500        | 0.1500        | 0.8                     | 0.8         |
| 70           | 1           | 4          | 0.2500                      | 0.0516        | 0.1500        | 0.1500        | 0.6                     | 0.6         |
| 71           | 1           | 2          | 0.5000                      | 0.1334        | 0.1500        | 0.1500        | 0.3                     | 0.3         |
| 72           | -           | -          | N\A                         | N/A           | 0.1500        | 0.1500        | -                       | -           |
| 73           | -           | -          | N\A                         | N/A           | 0.1500        | 0.1500        | -                       | -           |
| 74           | 1           | 1          | 1.0000                      | 1.0000        | 0.1500        | 0.1500        | 0.2                     | 0.2         |
| 75 & over    | 2           | 3          | 0.6667                      | 0.6872        | 0.1700        | 0.1700        | 0.5                     | 0.5         |
| <b>Total</b> | <b>28</b>   | <b>136</b> | <b>0.2059</b>               | <b>0.1875</b> | <b>0.1699</b> | <b>0.1699</b> | <b>23.1</b>             | <b>23.1</b> |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.2059        | 0.1875           | 0.1699          |
| <b>Previous Investigation Results</b> | 0.1389        | 0.1889           | 0.1647          |
| <b>2011-2013</b>                      | 0.1024        | 0.1367           | 0.1599          |
| <b>2008-2010</b>                      | 0.1717        | 0.1817           | 0.1837          |

## ECO Females

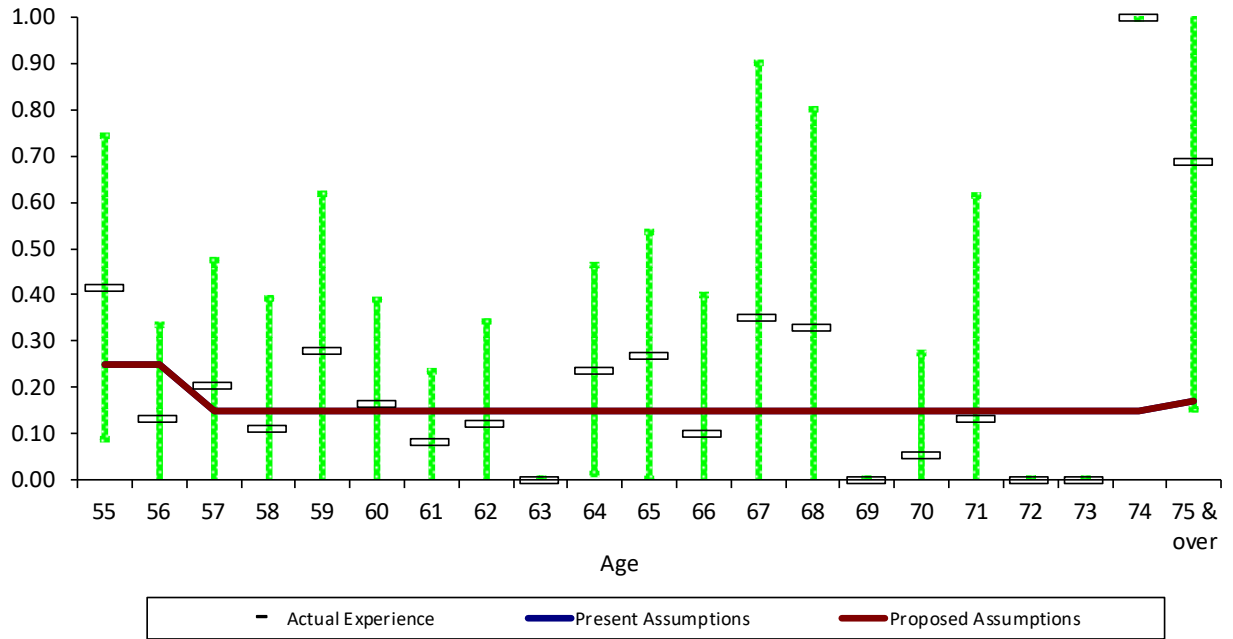
### Normal Retirement Experience (Tier 1)

There were 17 age and service unreduced retirements and 85 life years of exposure (exposure includes active members eligible for unreduced retirement) in the female Tier 1 retirement investigation.

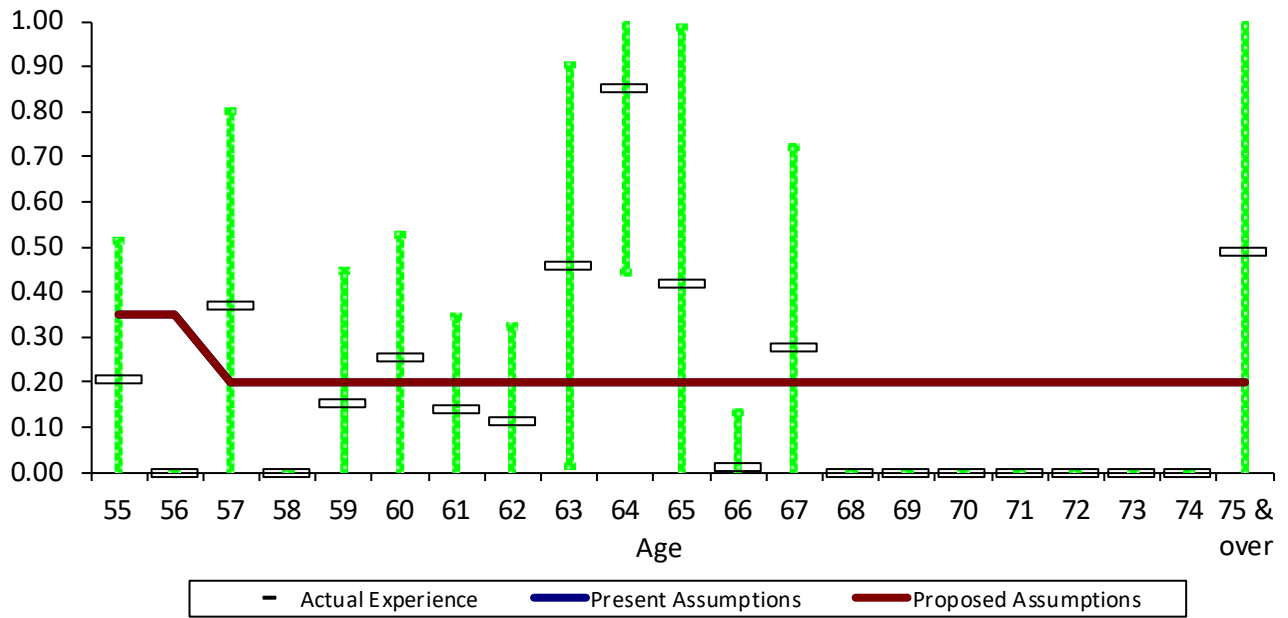
| Age          | Retirements | Exposure  | Actual Rates Weighted by |               | Sample Rates  |               | Expected Retirements |             |
|--------------|-------------|-----------|--------------------------|---------------|---------------|---------------|----------------------|-------------|
|              |             |           | Population               | Liability     | Present       | Proposed      | Present              | Proposed    |
| Under 55     | 1           | 1         | 1.0000                   | N/A           | N\A           | N\A           | -                    | -           |
| 55           | 1           | 7         | 0.1429                   | 0.2065        | 0.3500        | 0.3500        | 2.1                  | 2.1         |
| 56           | -           | 8         | 0.0000                   | 0.0000        | 0.3500        | 0.3500        | 2.8                  | 2.8         |
| 57           | 2           | 5         | 0.4000                   | 0.3691        | 0.2000        | 0.2000        | 1.0                  | 1.0         |
| 58           | -           | 4         | 0.0000                   | 0.0000        | 0.2000        | 0.2000        | 0.8                  | 0.8         |
| 59           | 1           | 6         | 0.1667                   | 0.1536        | 0.2000        | 0.2000        | 1.2                  | 1.2         |
| 60           | 2           | 10        | 0.2000                   | 0.2526        | 0.2000        | 0.2000        | 2.0                  | 2.0         |
| 61           | 1           | 11        | 0.0909                   | 0.1385        | 0.2000        | 0.2000        | 2.2                  | 2.2         |
| 62           | 1           | 9         | 0.1111                   | 0.1114        | 0.2000        | 0.2000        | 1.8                  | 1.8         |
| 63           | 2           | 5         | 0.4000                   | 0.4582        | 0.2000        | 0.2000        | 1.0                  | 1.0         |
| 64           | 2           | 3         | 0.6667                   | 0.8516        | 0.2000        | 0.2000        | 0.6                  | 0.6         |
| 65           | 2           | 3         | 0.6667                   | 0.4168        | 0.2000        | 0.2000        | 0.6                  | 0.6         |
| 66           | 1           | 3         | 0.3333                   | 0.0113        | 0.2000        | 0.2000        | 0.6                  | 0.6         |
| 67           | 1           | 4         | 0.2500                   | 0.2762        | 0.2000        | 0.2000        | 0.8                  | 0.8         |
| 68           | -           | 2         | 0.0000                   | 0.0000        | 0.2000        | 0.2000        | 0.4                  | 0.4         |
| 69           | -           | -         | N\A                      | N/A           | 0.2000        | 0.2000        | -                    | -           |
| 70           | -           | -         | N\A                      | N/A           | 0.2000        | 0.2000        | -                    | -           |
| 71           | -           | -         | N\A                      | N/A           | 0.2000        | 0.2000        | -                    | -           |
| 72           | -           | 1         | 0.0000                   | 0.0000        | 0.2000        | 0.2000        | 0.2                  | 0.2         |
| 73           | -           | 1         | 0.0000                   | 0.0000        | 0.2000        | 0.2000        | 0.2                  | 0.2         |
| 74           | -           | 1         | 0.0000                   | 0.0000        | 0.2000        | 0.2000        | 0.2                  | 0.2         |
| 75 & over    | 1           | 2         | 0.5000                   | 0.4881        | 0.2000        | 0.2000        | 0.4                  | 0.4         |
| <b>Total</b> | <b>17</b>   | <b>85</b> | <b>0.2000</b>            | <b>0.1998</b> | <b>0.2224</b> | <b>0.2224</b> | <b>18.9</b>          | <b>18.9</b> |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.2000        | 0.1998           | 0.2224          |
| <b>Previous Investigation Results</b> | 0.1955        | 0.2414           | 0.2135          |
| <b>2011-2013</b>                      | 0.1272        | 0.1356           | 0.1624          |
| <b>2008-2010</b>                      | 0.1705        | 0.1587           | 0.1889          |

## Rates of Normal Retirement ECO Males



## Rates of Normal Retirement ECO Females



## All ECO-SLEP Normal Retirement Experience (Tier 1)

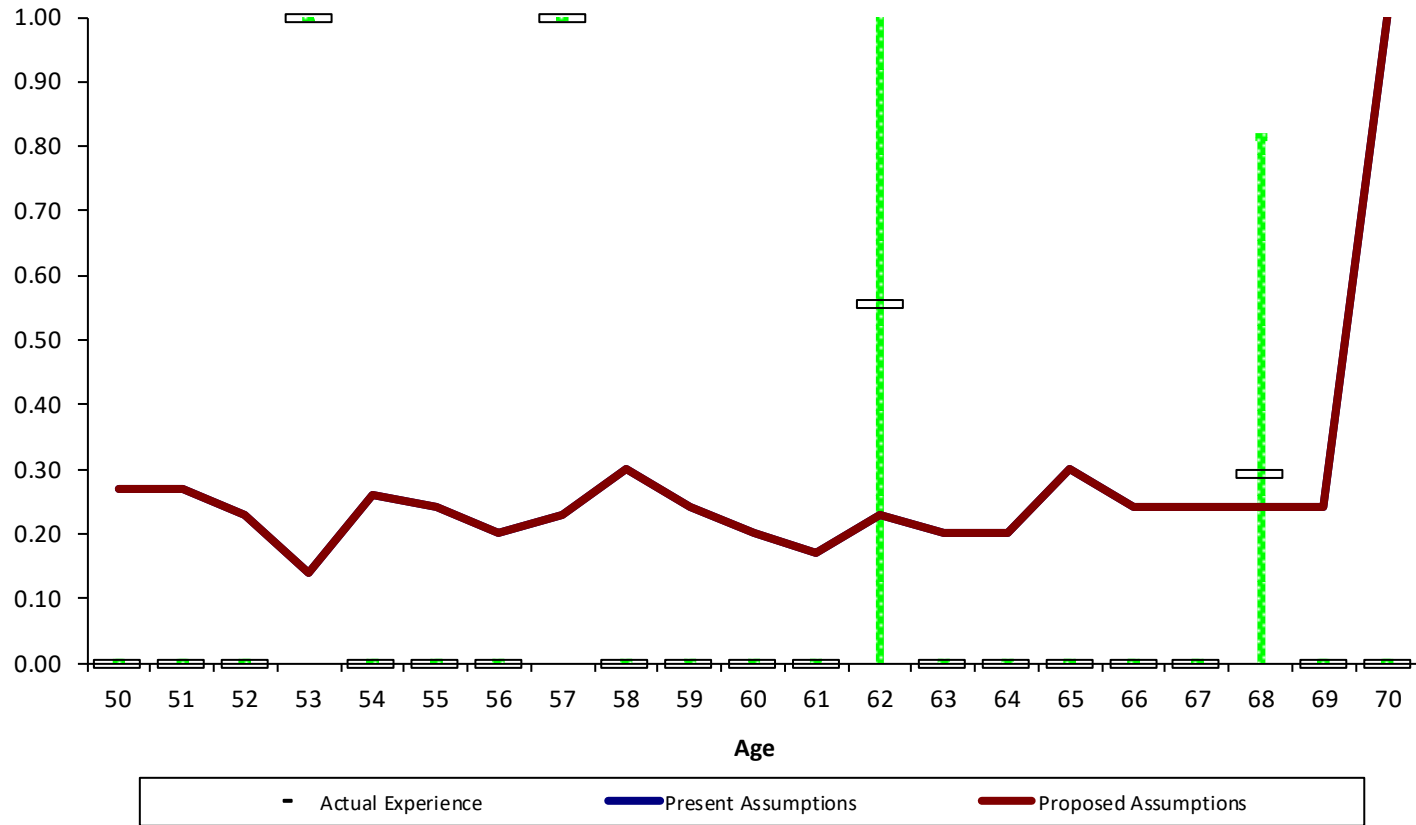
There were 6 age and service unreduced retirements and 18 life years of exposure (exposure includes active members eligible for unreduced retirement) in the Tier 1 retirement investigation.

| Age          | Retirements | Exposure  | Actual Rates<br>Weighted by |               | Sample Rates  |               | Expected<br>Retirements |            |
|--------------|-------------|-----------|-----------------------------|---------------|---------------|---------------|-------------------------|------------|
|              |             |           | Population                  | Liability     | Present       | Proposed      | Present                 | Proposed   |
| Under 50     | -           | -         | 0.0000                      | 0.0000        | N\A           | N\A           | -                       | -          |
| 50           | 1           | -         | 0.0000                      | N/A           | 0.2700        | 0.2700        | -                       | -          |
| 51           | 1           | -         | 0.0000                      | N/A           | 0.2700        | 0.2700        | -                       | -          |
| 52           | -           | 1         | 0.0000                      | 0.0000        | 0.2300        | 0.2300        | 0.2                     | 0.2        |
| 53           | 1           | 1         | 1.0000                      | 1.0000        | 0.1400        | 0.1400        | 0.1                     | 0.1        |
| 54           | -           | -         | 0.0000                      | 0.0000        | 0.2600        | 0.2600        | -                       | -          |
| 55           | -           | -         | 0.0000                      | 0.0000        | 0.2400        | 0.2400        | -                       | -          |
| 56           | -           | 1         | 0.0000                      | 0.0000        | 0.2000        | 0.2000        | 0.2                     | 0.2        |
| 57           | 1           | 1         | 1.0000                      | 1.0000        | 0.2300        | 0.2300        | 0.2                     | 0.2        |
| 58           | -           | -         | 0.0000                      | 0.0000        | 0.3000        | 0.3000        | -                       | -          |
| 59           | -           | -         | 0.0000                      | 0.0000        | 0.2400        | 0.2400        | -                       | -          |
| 60           | -           | -         | 0.0000                      | 0.0000        | 0.2000        | 0.2000        | -                       | -          |
| 61           | -           | 3         | 0.0000                      | 0.0000        | 0.1700        | 0.1700        | 0.5                     | 0.5        |
| 62           | 1           | 2         | 0.5000                      | 0.5564        | 0.2300        | 0.2300        | 0.5                     | 0.5        |
| 63           | -           | 1         | 0.0000                      | 0.0000        | 0.2000        | 0.2000        | 0.2                     | 0.2        |
| 64           | -           | -         | 0.0000                      | 0.0000        | 0.2000        | 0.2000        | -                       | -          |
| 65           | -           | -         | 0.0000                      | 0.0000        | 0.3000        | 0.3000        | -                       | -          |
| 66           | -           | 2         | 0.0000                      | 0.0000        | 0.2400        | 0.2400        | 0.5                     | 0.5        |
| 67           | -           | 3         | 0.0000                      | 0.0000        | 0.2400        | 0.2400        | 0.7                     | 0.7        |
| 68           | 1           | 3         | 0.3333                      | 0.2911        | 0.2400        | 0.2400        | 0.7                     | 0.7        |
| 69           | -           | -         | 0.0000                      | 0.0000        | 0.2400        | 0.2400        | -                       | -          |
| 70           | -           | -         | 0.0000                      | 0.0000        | 1.0000        | 1.0000        | -                       | -          |
| 71           | -           | -         | 0.0000                      | 0.0000        | 1.0000        | 1.0000        | -                       | -          |
| 72           | -           | -         | 0.0000                      | 0.0000        | 1.0000        | 1.0000        | -                       | -          |
| 73           | -           | -         | 0.0000                      | 0.0000        | 1.0000        | 1.0000        | -                       | -          |
| 74           | -           | -         | 0.0000                      | 0.0000        | 1.0000        | 1.0000        | -                       | -          |
| 75 & over    | -           | -         | 0.0000                      | 0.0000        | 1.0000        | 1.0000        | -                       | -          |
| <b>Total</b> | <b>6</b>    | <b>18</b> | <b>0.3333</b>               | <b>0.3154</b> | <b>0.2111</b> | <b>0.2111</b> | <b>3.8</b>              | <b>3.8</b> |

|                                       | <u>Actual</u> | <u>Liability</u> | <u>Proposed</u> |
|---------------------------------------|---------------|------------------|-----------------|
| <b>Current</b>                        | 0.3333        | 0.3154           | 0.2111          |
| <b>Previous Investigation Results</b> | 0.3214        | 0.2732           | 0.2607          |
| <b>2011-2013</b>                      | 0.0000        | 0.0000           | 0.2279          |
| <b>2008-2010</b>                      | 0.1897        | 0.2094           | 0.1897          |



## Rates of Normal Retirement All ECO-SLEP



# MORTALITY EXPERIENCE

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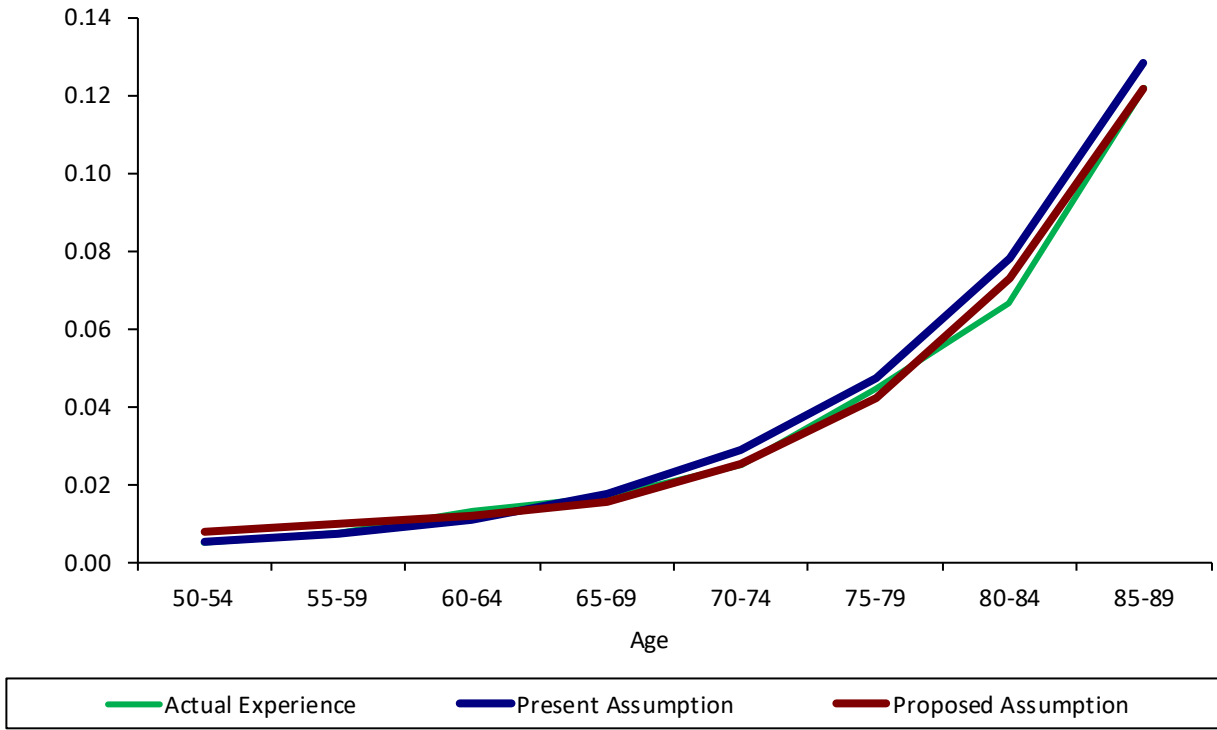
## Post-Retirement Mortality – Males (Original Retirees; Non Disabled Cases)

There were slightly less deaths than expected among retired males. Rates were evaluated on a headcount and benefit weighted basis. Given that there were minimal gains or losses due to mortality during the experience study period, rates were decreased slightly from current basis to take into account improvements in mortality. The proposed rates were projected to the middle of the experience study period with Generational Improvement Scale MP-2020.

| Age        | Deaths | Exposure | Actual Rates Weighted by |          | Sample Rates* |          | Expected Deaths |          | Ratio of Actuals/Expecteds |        |
|------------|--------|----------|--------------------------|----------|---------------|----------|-----------------|----------|----------------------------|--------|
|            |        |          | Headcount                | Benefit  | Present       | Proposed | Present         | Proposed | Old                        | New    |
| 50-54      | 5      | 987      | 0.005066                 | 0.003118 | 0.005370      | 0.007979 | 5               | 8        | 100.0%                     | 62.5%  |
| 55-59      | 72     | 9,417    | 0.007646                 | 0.005752 | 0.007172      | 0.010449 | 70              | 101      | 102.9%                     | 71.3%  |
| 60-64      | 279    | 20,827   | 0.013396                 | 0.011406 | 0.010708      | 0.012820 | 232             | 267      | 120.3%                     | 104.5% |
| 65-69      | 467    | 27,668   | 0.016879                 | 0.013927 | 0.017698      | 0.016182 | 494             | 446      | 94.5%                      | 104.7% |
| 70-74      | 557    | 22,162   | 0.025133                 | 0.023271 | 0.028960      | 0.025146 | 624             | 542      | 89.3%                      | 102.8% |
| 75-79      | 677    | 15,226   | 0.044463                 | 0.040813 | 0.047391      | 0.041804 | 698             | 622      | 97.0%                      | 108.8% |
| 80-84      | 678    | 10,223   | 0.066321                 | 0.063104 | 0.077829      | 0.072862 | 772             | 724      | 87.8%                      | 93.6%  |
| 85-89      | 696    | 5,701    | 0.122084                 | 0.123811 | 0.128403      | 0.123535 | 707             | 684      | 98.4%                      | 101.8% |
| 90-94      | 510    | 2,537    | 0.201025                 | 0.195760 | 0.207113      | 0.194256 | 495             | 470      | 103.0%                     | 108.5% |
| 95-99      | 170    | 555      | 0.306306                 | 0.281785 | 0.291004      | 0.272613 | 152             | 144      | 111.8%                     | 118.1% |
| 100-104    | 17     | 43       | 0.395349                 | 0.536357 | 0.384058      | 0.376808 | 15              | 15       | 113.3%                     | 113.3% |
| 105 & over | 1      | 4        | 0.250000                 | 0.216815 | 0.470810      | 0.475329 | 2               | 2        | 50.0%                      | 50.0%  |
| Totals     | 4,129  | 115,350  | 0.035795                 | 0.026069 | 0.036983      | 0.034894 | 4,266           | 4,025    | 96.8%                      | 102.6% |

\* Sample values are selected from midpoint of age group.

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



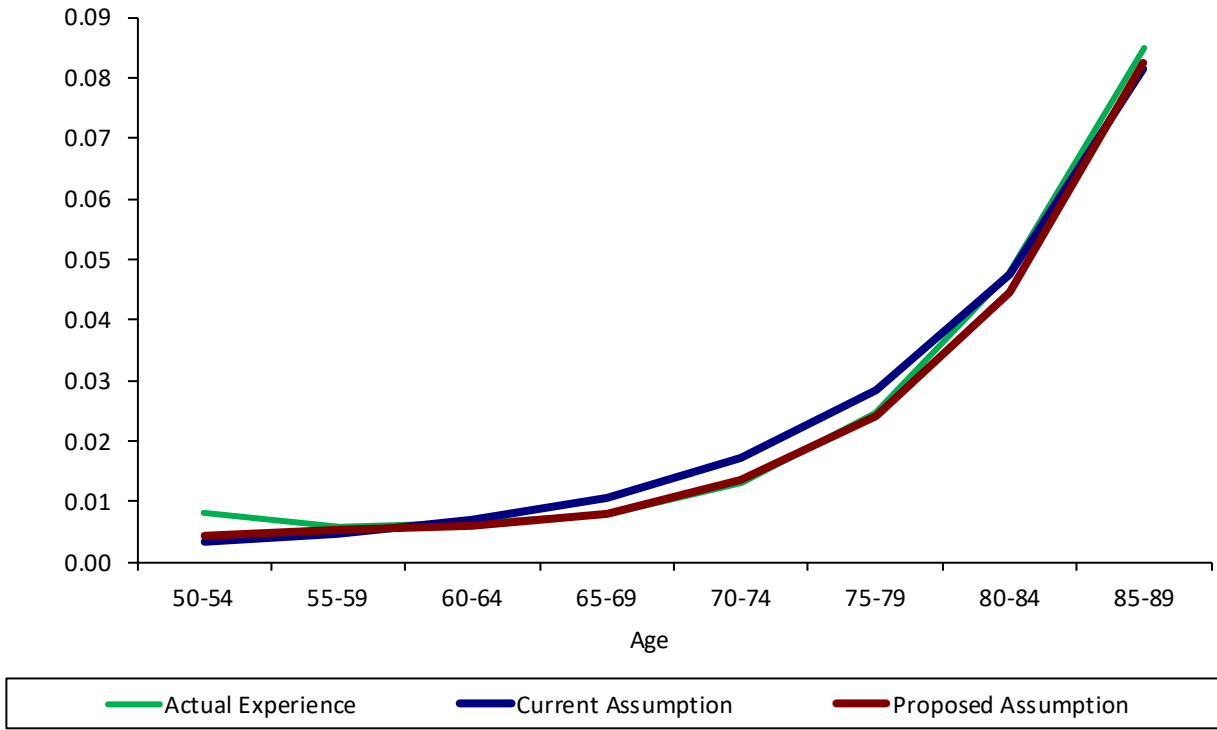
## Post-Retirement Mortality – Females (Original Retirees; Non Disabled Cases)

There were slightly less deaths than expected among retired females. Rates were evaluated on a headcount and benefit weighted basis. Given that there were minimal gains or losses due to mortality during the experience study period, rates were decreased slightly from the current basis to take into account improvements in mortality. The proposed rates were projected to the middle of the experience study period with Generational Improvement Scale MP-2020.

| Age        | Deaths | Exposure | Actual Rates Weighted by |          | Sample Rates* |          | Expected Deaths |          | Ratio of Actuals/Expecteds |        |
|------------|--------|----------|--------------------------|----------|---------------|----------|-----------------|----------|----------------------------|--------|
|            |        |          | Headcount                | Benefit  | Present       | Proposed | Present         | Proposed | Old                        | New    |
| 50-54      | 2      | 249      | 0.008032                 | 0.008159 | 0.003307      | 0.004574 | 1               | 1        | 200.0%                     | 200.0% |
| 55-59      | 83     | 14,567   | 0.005698                 | 0.004653 | 0.004652      | 0.005459 | 72              | 80       | 115.3%                     | 103.8% |
| 60-64      | 235    | 37,115   | 0.006332                 | 0.005931 | 0.006803      | 0.006242 | 262             | 232      | 89.7%                      | 101.3% |
| 65-69      | 434    | 54,798   | 0.007920                 | 0.007074 | 0.010578      | 0.008358 | 578             | 458      | 75.1%                      | 94.8%  |
| 70-74      | 617    | 46,657   | 0.013224                 | 0.013366 | 0.017187      | 0.014271 | 777             | 649      | 79.4%                      | 95.1%  |
| 75-79      | 803    | 32,505   | 0.024704                 | 0.023648 | 0.028356      | 0.025398 | 896             | 811      | 89.6%                      | 99.0%  |
| 80-84      | 1,049  | 21,952   | 0.047786                 | 0.044503 | 0.047553      | 0.046688 | 1,022           | 1,006    | 102.6%                     | 104.3% |
| 85-89      | 1,216  | 14,328   | 0.084869                 | 0.082619 | 0.081556      | 0.086622 | 1,148           | 1,221    | 105.9%                     | 99.6%  |
| 90-94      | 1,130  | 7,408    | 0.152538                 | 0.147439 | 0.138945      | 0.151800 | 985             | 1,078    | 114.7%                     | 104.8% |
| 95-99      | 537    | 2,249    | 0.238773                 | 0.234953 | 0.216142      | 0.227790 | 457             | 487      | 117.5%                     | 110.3% |
| 100-104    | 106    | 337      | 0.314540                 | 0.316345 | 0.314497      | 0.332268 | 99              | 105      | 107.1%                     | 101.0% |
| 105 & over | 10     | 18       | 0.555556                 | 0.596111 | 0.414876      | 0.439576 | 7               | 7        | 142.9%                     | 142.9% |
| Totals     | 6,222  | 232,183  | 0.026798                 | 0.021529 | 0.027151      | 0.026423 | 6,304           | 6,135    | 98.7%                      | 101.4% |

\* 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**

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## Proposed Retirement Rates – Tier 1 Only

| Age | Regular |        |        |        | SLEP   |        | ECO Regular |        | ECO SLEP |        |
|-----|---------|--------|--------|--------|--------|--------|-------------|--------|----------|--------|
|     | Male    |        | Female |        | Male   | Female | Male        | Female | Male     | Female |
|     | Normal  | Early  | Normal | Early  | Normal |        | Normal      |        | Normal   |        |
| 50  |         |        |        |        | 0.3000 | 0.3000 |             |        | 0.2700   | 0.2700 |
| 51  |         |        |        |        | 0.3000 | 0.3000 |             |        | 0.2700   | 0.2700 |
| 52  |         |        |        |        | 0.2700 | 0.2700 |             |        | 0.2300   | 0.2300 |
| 53  |         |        |        |        | 0.2200 | 0.2200 |             |        | 0.1400   | 0.1400 |
| 54  |         |        |        |        | 0.2650 | 0.2650 |             |        | 0.2600   | 0.2600 |
| 55  | 0.3300  | 0.0700 | 0.2950 | 0.0605 | 0.2500 | 0.2500 | 0.2500      | 0.3500 | 0.2400   | 0.2400 |
| 56  | 0.2650  | 0.0700 | 0.2025 | 0.0605 | 0.2450 | 0.2450 | 0.2500      | 0.3500 | 0.2000   | 0.2000 |
| 57  | 0.1850  | 0.0700 | 0.1550 | 0.0605 | 0.2700 | 0.2700 | 0.1500      | 0.2000 | 0.2300   | 0.2300 |
| 58  | 0.2250  | 0.0700 | 0.1650 | 0.0605 | 0.2750 | 0.2750 | 0.1500      | 0.2000 | 0.3000   | 0.3000 |
| 59  | 0.2200  | 0.0700 | 0.1750 | 0.0605 | 0.2850 | 0.2850 | 0.1500      | 0.2000 | 0.2400   | 0.2400 |
| 60  | 0.1300  |        | 0.1150 |        | 0.2100 | 0.2100 | 0.1500      | 0.2000 | 0.2000   | 0.2000 |
| 61  | 0.1250  |        | 0.1050 |        | 0.2400 | 0.2400 | 0.1500      | 0.2000 | 0.1700   | 0.1700 |
| 62  | 0.2150  |        | 0.1750 |        | 0.2800 | 0.2800 | 0.1500      | 0.2000 | 0.2300   | 0.2300 |
| 63  | 0.2000  |        | 0.1750 |        | 0.2250 | 0.2250 | 0.1500      | 0.2000 | 0.2000   | 0.2000 |
| 64  | 0.1800  |        | 0.1600 |        | 0.2450 | 0.2450 | 0.1500      | 0.2000 | 0.2000   | 0.2000 |
| 65  | 0.2600  |        | 0.2700 |        | 0.2100 | 0.2100 | 0.1500      | 0.2000 | 0.3000   | 0.3000 |
| 66  | 0.3200  |        | 0.3200 |        | 0.2300 | 0.2300 | 0.1500      | 0.2000 | 0.2400   | 0.2400 |
| 67  | 0.2600  |        | 0.2850 |        | 0.2800 | 0.2800 | 0.1500      | 0.2000 | 0.2400   | 0.2400 |
| 68  | 0.2300  |        | 0.2300 |        | 0.3650 | 0.3650 | 0.1500      | 0.2000 | 0.2400   | 0.2400 |
| 69  | 0.2250  |        | 0.2500 |        | 0.2950 | 0.2950 | 0.1500      | 0.2000 | 0.2400   | 0.2400 |
| 70  | 0.2600  |        | 0.2550 |        | 1.0000 | 1.0000 | 0.1500      | 0.2000 | 1.0000   | 1.0000 |
| 71  | 0.2400  |        | 0.2300 |        | 1.0000 | 1.0000 | 0.1500      | 0.2000 | 1.0000   | 1.0000 |
| 72  | 0.1750  |        | 0.2250 |        | 1.0000 | 1.0000 | 0.1500      | 0.2000 | 1.0000   | 1.0000 |
| 73  | 0.2200  |        | 0.2100 |        | 1.0000 | 1.0000 | 0.1500      | 0.2000 | 1.0000   | 1.0000 |
| 74  | 0.2000  |        | 0.2250 |        | 1.0000 | 1.0000 | 0.1500      | 0.2000 | 1.0000   | 1.0000 |
| 75  | 0.2300  |        | 0.2400 |        | 1.0000 | 1.0000 | 0.1700      | 0.2000 | 1.0000   | 1.0000 |
| 76  | 0.2300  |        | 0.2400 |        | 1.0000 | 1.0000 | 0.1700      | 0.2000 | 1.0000   | 1.0000 |
| 77  | 0.2300  |        | 0.2400 |        | 1.0000 | 1.0000 | 0.1700      | 0.2000 | 1.0000   | 1.0000 |
| 78  | 0.2300  |        | 0.2400 |        | 1.0000 | 1.0000 | 0.1700      | 0.2000 | 1.0000   | 1.0000 |
| 79  | 0.2300  |        | 0.2400 |        | 1.0000 | 1.0000 | 0.1700      | 0.2000 | 1.0000   | 1.0000 |
| 80+ | 1.0000  |        | 1.0000 |        | 1.0000 | 1.0000 | 1.0000      | 1.0000 | 1.0000   | 1.0000 |



## Proposed Retirement Rates – Tier 2 Only

| Age | Regular                    |                         |                          |                            |                         |                          | SLEP                       |                          |                            |                          |        |
|-----|----------------------------|-------------------------|--------------------------|----------------------------|-------------------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|--------|
|     | Male                       |                         |                          | Female                     |                         |                          | Male                       |                          | Female                     |                          |        |
|     | Normal Service             | Early                   |                          | Normal Service             | Early                   |                          | Normal                     | Early                    | Normal                     | Early                    |        |
|     | Service Less Than 30 Years | Between 30 and 35 Years | Service 35 Years or More | Service Less Than 30 Years | 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                   | 0.2300                     | 0.5500                   |        |
| 63  |                            |                         | 0.7500                   | 0.1500                     |                         | 0.7500                   | 0.1300                     | 0.1800                   | 0.1800                     | 0.5500                   |        |
| 64  |                            |                         | 0.7500                   | 0.1500                     |                         | 0.7500                   | 0.1300                     | 0.1800                   | 0.1800                     | 0.5500                   |        |
| 65  |                            |                         | 0.7500                   | 0.1500                     |                         | 0.7500                   | 0.1300                     | 0.2300                   | 0.2300                     | 0.5500                   |        |
| 66  |                            |                         | 0.7500                   | 0.1500                     |                         | 0.7500                   | 0.1300                     | 0.2300                   | 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

| Service | Regular Rates      |        | SLEP Rates         |        | ECO Rates          |        | ECO-SLEP Rates     |        |
|---------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|         | Less Than          |        | Less Than          |        | Less Than          |        | Less Than          |        |
|         | 8 Years of Service |        | 7 Years of Service |        | 8 Years of Service |        | 7 Years of Service |        |
|         | Male               | Female | Male               | Female | Male               | Female | Male               | Female |
| 1       | 0.2480             | 0.2770 | 0.1833             | 0.1833 | 0.4000             | 0.4000 | 0.1700             | 0.1700 |
| 2       | 0.1980             | 0.2200 | 0.1100             | 0.1100 | 0.2000             | 0.2000 | 0.1000             | 0.1000 |
| 3       | 0.1530             | 0.1775 | 0.0800             | 0.0800 | 0.1500             | 0.1500 | 0.0650             | 0.0650 |
| 4       | 0.1330             | 0.1450 | 0.0800             | 0.0800 | 0.1400             | 0.1400 | 0.0620             | 0.0620 |
| 5       | 0.1070             | 0.1200 | 0.0650             | 0.0650 | 0.1300             | 0.1300 | 0.0550             | 0.0550 |
| 6       | 0.0875             | 0.1045 | 0.0570             | 0.0570 | 0.1200             | 0.1200 | 0.0460             | 0.0460 |
| 7       | 0.0770             | 0.0920 | 0.0410             | 0.0410 | 0.1100             | 0.1100 | 0.0360             | 0.0360 |
| 8       | 0.0770             | 0.0880 |                    |        | 0.1000             | 0.1000 |                    |        |

| Age        | 8 or More        |        | 7 or More        |        | 8 or More        |        | 7 or More        |        |
|------------|------------------|--------|------------------|--------|------------------|--------|------------------|--------|
|            | Years of Service |        | Years of Service |        | Years of Service |        | Years of Service |        |
|            | Male             | Female | Male             | Female | Male             | Female | Male             | Female |
| 25 & under | 0.0520           | 0.0880 | 0.0410           | 0.0410 | 0.1000           | 0.0735 | 0.0260           | 0.0260 |
| 26         | 0.0520           | 0.0880 | 0.0410           | 0.0410 | 0.1000           | 0.0735 | 0.0260           | 0.0260 |
| 27         | 0.0520           | 0.0880 | 0.0410           | 0.0410 | 0.1000           | 0.0735 | 0.0260           | 0.0260 |
| 28         | 0.0508           | 0.0844 | 0.0398           | 0.0398 | 0.1000           | 0.0735 | 0.0254           | 0.0254 |
| 29         | 0.0496           | 0.0808 | 0.0386           | 0.0386 | 0.1000           | 0.0735 | 0.0248           | 0.0248 |
| 30         | 0.0484           | 0.0772 | 0.0374           | 0.0374 | 0.1000           | 0.0735 | 0.0242           | 0.0242 |
| 31         | 0.0472           | 0.0736 | 0.0362           | 0.0362 | 0.1000           | 0.0735 | 0.0236           | 0.0236 |
| 32         | 0.0460           | 0.0700 | 0.0350           | 0.0350 | 0.1000           | 0.0735 | 0.0230           | 0.0230 |
| 33         | 0.0433           | 0.0662 | 0.0315           | 0.0315 | 0.1000           | 0.0735 | 0.0214           | 0.0214 |
| 34         | 0.0406           | 0.0624 | 0.0280           | 0.0280 | 0.1000           | 0.0735 | 0.0197           | 0.0197 |
| 35         | 0.0379           | 0.0586 | 0.0245           | 0.0245 | 0.1000           | 0.0735 | 0.0181           | 0.0181 |
| 36         | 0.0352           | 0.0548 | 0.0210           | 0.0210 | 0.1000           | 0.0735 | 0.0164           | 0.0164 |
| 37         | 0.0325           | 0.0510 | 0.0175           | 0.0175 | 0.1000           | 0.0735 | 0.0148           | 0.0148 |
| 38         | 0.0316           | 0.0494 | 0.0170           | 0.0170 | 0.1000           | 0.0735 | 0.0142           | 0.0142 |
| 39         | 0.0307           | 0.0478 | 0.0165           | 0.0165 | 0.1000           | 0.0735 | 0.0137           | 0.0137 |
| 40         | 0.0298           | 0.0462 | 0.0160           | 0.0160 | 0.1000           | 0.0735 | 0.0131           | 0.0131 |
| 41         | 0.0289           | 0.0446 | 0.0155           | 0.0155 | 0.1000           | 0.0735 | 0.0126           | 0.0126 |
| 42         | 0.0280           | 0.0430 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 43         | 0.0269           | 0.0413 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 44         | 0.0258           | 0.0396 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 45         | 0.0247           | 0.0379 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 46         | 0.0236           | 0.0362 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 47         | 0.0225           | 0.0345 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 48         | 0.0220           | 0.0336 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 49         | 0.0215           | 0.0327 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 50         | 0.0210           | 0.0318 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 51         | 0.0205           | 0.0309 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 52         | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0120           | 0.0120 |
| 53         | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0116           | 0.0116 |
| 54         | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0112           | 0.0112 |
| 55         | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0108           | 0.0108 |
| 56         | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0104           | 0.0104 |
| 57         | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0100           | 0.0100 |
| 58         | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0100           | 0.0100 |
| 59         | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0100           | 0.0100 |
| 60+        | 0.0200           | 0.0300 | 0.0150           | 0.0150 | 0.1000           | 0.0735 | 0.0100           | 0.0100 |

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

Rates of Disability For Regular and SLEP Members

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

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

### Rates of Disability For ECO and ECO-SLEP Members

| Age | ECO    |        | ECO-SLEP |        | Age | ECO    |        | ECO-SLEP |        |
|-----|--------|--------|----------|--------|-----|--------|--------|----------|--------|
|     | Male   | Female | Male     | Female |     | 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                          | 2.50%             | 2.75%    | 5.25% | 0                            | 7.10%      |
| 30                          | 2.02%             | 2.75%    | 4.77% | 1                            | 6.40%      |
| 35                          | 1.34%             | 2.75%    | 4.09% | 2                            | 3.60%      |
| 40                          | 0.98%             | 2.75%    | 3.73% | 3                            | 2.70%      |
| 45                          | 0.72%             | 2.75%    | 3.47% | 4                            | 2.20%      |
| 50                          | 0.48%             | 2.75%    | 3.23% |                              |            |
| 55                          | 0.28%             | 2.75%    | 3.03% |                              |            |
| 60                          | 0.14%             | 2.75%    | 2.89% |                              |            |

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

| <b>% Increase in Pay Next Year</b> |                 |                            |                         |
|------------------------------------|-----------------|----------------------------|-------------------------|
| <b>Years of Service</b>            |                 |                            |                         |
| <b>Service</b>                     | <b>Economic</b> | <b>Merit and Longevity</b> | <b>% Total Increase</b> |
| 1                                  | 2.75%           | 11.00%                     | 13.75%                  |
| 2                                  | 2.75%           | 8.50%                      | 11.25%                  |
| 3                                  | 2.75%           | 4.00%                      | 6.75%                   |
| 4                                  | 2.75%           | 3.50%                      | 6.25%                   |
| 5                                  | 2.75%           | 3.00%                      | 5.75%                   |
| 6                                  | 2.75%           | 2.50%                      | 5.25%                   |
| 7                                  | 2.75%           | 2.00%                      | 4.75%                   |
| 8                                  | 2.75%           | 1.50%                      | 4.25%                   |
| 9                                  | 2.75%           | 1.25%                      | 4.00%                   |
| 10                                 | 2.75%           | 1.00%                      | 3.75%                   |
| 11                                 | 2.75%           | 0.75%                      | 3.50%                   |
| 12                                 | 2.75%           | 0.75%                      | 3.50%                   |
| 13                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 14                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 15                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 16                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 17                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 18                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 19                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 20                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 21                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 22                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 23                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 24                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 25                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 26                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 27                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 28                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 29                                 | 2.75%           | 0.50%                      | 3.25%                   |
| 30                                 | 2.75%           | 0.50%                      | 3.25%                   |

## Proposed Pre-Retirement Mortality Rates – Tier 1 & 2

| Sample<br>Ages | % Dying       |        |                 |        | Sample<br>Ages | % Dying       |        |                 |        |
|----------------|---------------|--------|-----------------|--------|----------------|---------------|--------|-----------------|--------|
|                | Regular & ECO |        | SLEP & ECO SLEP |        |                | Regular & ECO |        | SLEP & ECO SLEP |        |
|                | Male          | Female | Male            | Female |                | Male          | Female | Male            | Female |
| 20             | 0.04%         | 0.01%  | 0.04%           | 0.01%  | 50             | 0.22%         | 0.11%  | 0.22%           | 0.11%  |
| 21             | 0.04%         | 0.01%  | 0.04%           | 0.01%  | 51             | 0.24%         | 0.12%  | 0.24%           | 0.12%  |
| 22             | 0.04%         | 0.01%  | 0.04%           | 0.01%  | 52             | 0.26%         | 0.12%  | 0.26%           | 0.12%  |
| 23             | 0.04%         | 0.01%  | 0.04%           | 0.01%  | 53             | 0.28%         | 0.13%  | 0.28%           | 0.13%  |
| 24             | 0.04%         | 0.01%  | 0.04%           | 0.01%  | 54             | 0.30%         | 0.15%  | 0.30%           | 0.15%  |
| 25             | 0.04%         | 0.01%  | 0.04%           | 0.01%  | 55             | 0.32%         | 0.16%  | 0.32%           | 0.16%  |
| 26             | 0.04%         | 0.01%  | 0.04%           | 0.01%  | 56             | 0.35%         | 0.17%  | 0.35%           | 0.17%  |
| 27             | 0.05%         | 0.01%  | 0.05%           | 0.01%  | 57             | 0.37%         | 0.19%  | 0.37%           | 0.19%  |
| 28             | 0.05%         | 0.02%  | 0.05%           | 0.02%  | 58             | 0.40%         | 0.20%  | 0.40%           | 0.20%  |
| 29             | 0.05%         | 0.02%  | 0.05%           | 0.02%  | 59             | 0.43%         | 0.22%  | 0.43%           | 0.22%  |
| 30             | 0.05%         | 0.02%  | 0.05%           | 0.02%  | 60             | 0.47%         | 0.24%  | 0.47%           | 0.24%  |
| 31             | 0.06%         | 0.02%  | 0.06%           | 0.02%  | 61             | 0.50%         | 0.26%  | 0.50%           | 0.26%  |
| 32             | 0.06%         | 0.02%  | 0.06%           | 0.02%  | 62             | 0.54%         | 0.29%  | 0.54%           | 0.29%  |
| 33             | 0.06%         | 0.03%  | 0.06%           | 0.03%  | 63             | 0.59%         | 0.31%  | 0.59%           | 0.31%  |
| 34             | 0.07%         | 0.03%  | 0.07%           | 0.03%  | 64             | 0.63%         | 0.34%  | 0.63%           | 0.34%  |
| 35             | 0.07%         | 0.03%  | 0.07%           | 0.03%  | 65             | 0.68%         | 0.38%  | 0.68%           | 0.38%  |
| 36             | 0.07%         | 0.03%  | 0.07%           | 0.03%  | 66             | 0.74%         | 0.42%  | 0.74%           | 0.42%  |
| 37             | 0.08%         | 0.04%  | 0.08%           | 0.04%  | 67             | 0.80%         | 0.46%  | 0.80%           | 0.46%  |
| 38             | 0.08%         | 0.04%  | 0.08%           | 0.04%  | 68             | 0.87%         | 0.51%  | 0.87%           | 0.51%  |
| 39             | 0.09%         | 0.04%  | 0.09%           | 0.04%  | 69             | 0.94%         | 0.57%  | 0.94%           | 0.57%  |
| 40             | 0.10%         | 0.05%  | 0.10%           | 0.05%  | 70             | 1.03%         | 0.63%  | 1.03%           | 0.63%  |
| 41             | 0.10%         | 0.05%  | 0.10%           | 0.05%  | 71             | 1.12%         | 0.69%  | 1.12%           | 0.69%  |
| 42             | 0.11%         | 0.06%  | 0.11%           | 0.06%  | 72             | 1.22%         | 0.77%  | 1.22%           | 0.77%  |
| 43             | 0.12%         | 0.06%  | 0.12%           | 0.06%  | 73             | 1.34%         | 0.85%  | 1.34%           | 0.85%  |
| 44             | 0.13%         | 0.07%  | 0.13%           | 0.07%  | 74             | 1.46%         | 0.94%  | 1.46%           | 0.94%  |
| 45             | 0.14%         | 0.07%  | 0.14%           | 0.07%  | 75             | 1.60%         | 1.04%  | 1.60%           | 1.04%  |
| 46             | 0.16%         | 0.08%  | 0.16%           | 0.08%  | 76             | 1.75%         | 1.15%  | 1.75%           | 1.15%  |
| 47             | 0.17%         | 0.08%  | 0.17%           | 0.08%  | 77             | 1.92%         | 1.27%  | 1.92%           | 1.27%  |
| 48             | 0.19%         | 0.09%  | 0.19%           | 0.09%  | 78             | 2.10%         | 1.40%  | 2.10%           | 1.40%  |
| 49             | 0.20%         | 0.10%  | 0.20%           | 0.10%  | 79             | 2.30%         | 1.54%  | 2.30%           | 1.54%  |

*Life expectancy in future years is determined by a fully generational projection scale. The sample values shown are for individuals with the indicated attained ages in 2019.*

## Proposed Post-Retirement Mortality Rates – Tier 1 & 2

| Sample<br>Ages | % Dying Next Year  |         |                |         | Sample<br>Ages | % Dying Next Year  |          |                |          |
|----------------|--------------------|---------|----------------|---------|----------------|--------------------|----------|----------------|----------|
|                | Non-Disabled Lives |         | Disabled Lives |         |                | Non-Disabled Lives |          | Disabled Lives |          |
|                | Males              | Females | Males          | Females |                | Males              | Females  | Males          | Females  |
| 40             | 0.1018%            | 0.0494% | 0.6450%        | 0.6290% | 70             | 2.2112%            | 1.2485%  | 3.9010%        | 2.8620%  |
| 41             | 0.1092%            | 0.0536% | 0.7000%        | 0.6890% | 71             | 2.4454%            | 1.3955%  | 4.1130%        | 3.0390%  |
| 42             | 0.1187%            | 0.0578% | 0.7630%        | 0.7540% | 72             | 2.7062%            | 1.5593%  | 4.3440%        | 3.2390%  |
| 43             | 0.1283%            | 0.0630% | 0.8340%        | 0.8250% | 73             | 2.9977%            | 1.7441%  | 4.5990%        | 3.4640%  |
| 44             | 0.1399%            | 0.0693% | 0.9160%        | 0.9020% | 74             | 3.3231%            | 1.9509%  | 4.8800%        | 3.7180%  |
| 45             | 0.1855%            | 0.0945% | 1.0070%        | 0.9850% | 75             | 3.6867%            | 2.1819%  | 5.1920%        | 4.0030%  |
| 46             | 0.2459%            | 0.1292% | 1.1090%        | 1.0730% | 76             | 4.0937%            | 2.4402%  | 5.5370%        | 4.3220%  |
| 47             | 0.3265%            | 0.1754% | 1.2210%        | 1.1670% | 77             | 4.5474%            | 2.7290%  | 5.9210%        | 4.6780%  |
| 48             | 0.4335%            | 0.2384% | 1.3420%        | 1.2670% | 78             | 5.0551%            | 3.0555%  | 6.3470%        | 5.0750%  |
| 49             | 0.5756%            | 0.3245% | 1.4700%        | 1.3730% | 79             | 5.6244%            | 3.4230%  | 6.8220%        | 5.5170%  |
| 50             | 0.7643%            | 0.4410% | 1.6050%        | 1.4830% | 80             | 6.2614%            | 3.8409%  | 7.3480%        | 6.0070%  |
| 51             | 0.8003%            | 0.4515% | 1.7120%        | 1.5350% | 81             | 6.9759%            | 4.3176%  | 7.9290%        | 6.5500%  |
| 52             | 0.8385%            | 0.4620% | 1.8180%        | 1.5870% | 82             | 7.7709%            | 4.8605%  | 8.5650%        | 7.1500%  |
| 53             | 0.8777%            | 0.4725% | 1.9210%        | 1.6400% | 83             | 8.6528%            | 5.4810%  | 9.2590%        | 7.8110%  |
| 54             | 0.9158%            | 0.4830% | 2.0200%        | 1.6920% | 84             | 9.6216%            | 6.1887%  | 10.0100%       | 8.5360%  |
| 55             | 0.9551%            | 0.4935% | 2.1140%        | 1.7420% | 85             | 10.6774%           | 6.9962%  | 10.8150%       | 9.3310%  |
| 56             | 0.9943%            | 0.5030% | 2.2010%        | 1.7890% | 86             | 11.8190%           | 7.9170%  | 11.6780%       | 10.1630% |
| 57             | 1.0324%            | 0.5135% | 2.2800%        | 1.8330% | 87             | 13.0454%           | 8.9555%  | 12.6050%       | 11.0140% |
| 58             | 1.0706%            | 0.5250% | 2.3550%        | 1.8740% | 88             | 14.3566%           | 10.1147% | 13.6030%       | 11.8780% |
| 59             | 1.1088%            | 0.5408% | 2.4280%        | 1.9140% | 89             | 15.7527%           | 11.3904% | 14.8610%       | 12.7570% |
| 60             | 1.1480%            | 0.5597% | 2.5030%        | 1.9560% | 90             | 17.2282%           | 12.7722% | 16.2530%       | 13.6650% |
| 61             | 1.1883%            | 0.5838% | 2.5840%        | 2.0000% | 91             | 18.7419%           | 14.2034% | 17.6810%       | 14.6170% |
| 62             | 1.2307%            | 0.6132% | 2.6770%        | 2.0510% | 92             | 20.2736%           | 15.6576% | 19.1260%       | 15.6350% |
| 63             | 1.2773%            | 0.6479% | 2.7850%        | 2.1100% | 93             | 21.8233%           | 17.1297% | 20.5880%       | 16.7400% |
| 64             | 1.3282%            | 0.6867% | 2.9080%        | 2.1780% | 94             | 23.4027%           | 18.6312% | 22.0780%       | 17.9550% |
| 65             | 1.3865%            | 0.7298% | 3.0440%        | 2.2560% | 95             | 25.0340%           | 20.1863% | 23.6170%       | 19.2980% |
| 66             | 1.5084%            | 0.8096% | 3.1930%        | 2.3460% | 96             | 26.7396%           | 21.8222% | 25.2260%       | 20.7840% |
| 67             | 1.6515%            | 0.8999% | 3.3530%        | 2.4500% | 97             | 28.5394%           | 23.5662% | 26.9240%       | 22.4440% |
| 68             | 1.8147%            | 1.0028% | 3.5240%        | 2.5690% | 98             | 30.4464%           | 25.4373% | 28.7230%       | 24.2260% |
| 69             | 2.0013%            | 1.1183% | 3.7060%        | 2.7060% | 99             | 32.4614%           | 27.4418% | 30.6240%       | 26.1350% |
|                |                    |         |                |         | 100            | 34.5655%           | 29.5680% | 32.6090%       | 28.1600% |
|                |                    |         |                |         | 101            | 36.7142%           | 31.7783% | 34.6360%       | 30.2650% |
|                |                    |         |                |         | 102            | 38.8384%           | 34.0011% | 36.6400%       | 32.3820% |
|                |                    |         |                |         | 103            | 40.9202%           | 36.2187% | 38.6040%       | 34.4940% |
|                |                    |         |                |         | 104            | 42.9427%           | 38.4101% | 40.5120%       | 36.5810% |
|                |                    |         |                |         | 105            | 44.8931%           | 40.5563% | 42.3520%       | 38.6250% |
|                |                    |         |                |         | 106            | 46.7598%           | 42.6395% | 44.1130%       | 40.6090% |
|                |                    |         |                |         | 107            | 48.5332%           | 44.6450% | 45.7860%       | 42.5190% |
|                |                    |         |                |         | 108            | 50.2058%           | 46.5581% | 47.3640%       | 44.3410% |
|                |                    |         |                |         | 109            | 51.7736%           | 48.3704% | 48.8430%       | 46.0670% |
|                |                    |         |                |         | 110            | 53.0000%           | 50.0745% | 50.0000%       | 47.6900% |

*Life expectancy in future years is determined by a fully generational projection scale. The sample values shown are for individuals with the indicated attained ages in 2019.*





December 14, 2020

Mr. Mark Nannini  
Chief Financial Officer  
Illinois Municipal Retirement Fund  
2211 York Road - Suite 500  
Oak Brook, Illinois 60523-2374

**Re: Triennial Experience Study**

Dear Mark:

Enclosed are 5 copies of the 2017 – 2019 Experience Study.

Sincerely,

A handwritten signature in black ink that reads "Mark Buis". The signature is written in a cursive, slightly slanted style.

Mark Buis, FSA, EA, FCA, MAAA

MB:sc

Enclosures