



Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve



Virginia Retirement System

Experience Study

For the Four-Year Period

July 1, 2016 to June 30, 2020





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

September 10, 2021

Board of Trustees
Virginia Retirement System
1200 E. Main Street
Richmond, VA 23219

Dear Trustees:

Statute (§ 51.1-124.22.A.4) requires preparation of an experience study at least once every four years. The most recent experience study covered the period from July 1, 2012 through June 30, 2016. We are pleased to submit the results of a study of the economic and demographic experience which covers the period from July 1, 2016 through June 30, 2020. This experience study covers the following divisions of the Virginia Retirement System:

- State Employees
- Teachers
- State Police (SPORS)
- Virginia Law Officers (VaLORS)
- Judicial (JRS)
- Political Subdivisions
- Group Life Insurance Program (GLI)
- Line of Duty Act Fund (LODA Fund)
- Health Insurance Credit Program (HIC)
- Virginia Sickness and Disability Program (VSDP)
- Virginia Local Disability Program (VLDP)

The purpose of this investigation is to assess the reasonability of the actuarial assumptions for each division. This investigation covers the four-year period ending June 30, 2020. The purpose of the study is to review the most recent experience to make judgments about future experience. This report presents the results, analysis, and resulting recommendations of our study. The VRS Board of Trustees approved these changes at its April 20, 2021 meeting. CMC will reflect these recommendations in the June 30, 2021 actuarial valuations.



The experience studies for each division include all active members, retired members and beneficiaries of deceased members. The mortality experience was studied separately for pre-retirement, post-retirement, disability, and contingent annuitants and also separately for males and females. Incidences of withdrawal, disability, retirement and compensation increases were generally investigated separately for males and females in most instances. Assumptions specific to OPEB Plans were studied separately by population segment, e.g. State, SPORS, VaLORS, etc.

This report shows comparisons between the actual and expected cases of separation from active service, actual and expected number of deaths, and actual and expected salary increases. Tables and graphs are used to show the actual decrement rates, the expected decrement rates and, where applicable, the proposed decrement rates.

The newly proposed rates of decrement are shown in the Appendix of this report. In the actuary's judgment, the recommended rates are suitable for use until further experience indicates that modifications are needed.

Actuarial assumptions are used to measure and budget future costs. Changing assumptions will not change the actual cost of future benefits.

In order to prepare the results in this report we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

We note that as we are preparing this report, the world is in the midst of a pandemic. The impact of the COVID-19 pandemic was considered in this experience review. However, no explicit changes were incorporated mainly due to the level of uncertainty surrounding the effect of the virus on both health care costs and decremental experience such as mortality, retirement, and disability. We have considered available information, but do not believe that there is yet sufficient data to warrant the further modification of any assumptions other than to retain margin in certain assumptions such as disability incidence and presumptive approval for LODA benefits. We will continue to monitor the situation as data emerges and advise the Board in the future of any adjustments that we believe would be appropriate.



Board of Trustees
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The experience study was performed by, and under the supervision of, independent actuaries who are Members of the American Academy of Actuaries with experience in performing valuations for public retirement systems. The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

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

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'L. Langer'.

Larry F. Langer, ASA, EA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink, appearing to read 'Alisa Bennett'.

Alisa Bennett, FSA, EA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Micki R. Taylor'.

Micki R. Taylor, ASA, FCA, EA, MAAA
Consulting Actuary

A handwritten signature in blue ink, appearing to read 'Bradley R. Wild'.

Bradley R. Wild, ASA, EA, FCA, MAAA
Senior Actuary



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SUMMARY OF RESULTS

Introduction

This investigation covers the four-year period ending June 30, 2020. The purpose of an actuarial valuation is to provide a timely best estimate of the ultimate costs of a retirement system. Actuarial valuations of the Virginia Retirement System (VRS) plans are prepared annually to determine the actuarial recommended contribution, funded status, and amortization periods necessary to achieve a 100% funded status. The valuations require the use of certain assumptions with respect to the occurrence of future events, such as rates of death, termination of employment, retirement age, and salary changes to estimate the obligations of the system.

The basic purpose of an experience study is to determine whether the actuarial assumptions currently in use have adequately anticipated the actual emerging experience. This information, along with the professional judgment of system personnel and advisors, is used to evaluate the appropriateness of continued use of the current actuarial assumptions. When analyzing experience and assumptions, it is important to recognize that actual experience is reported in the short term while assumptions are intended to be long-term estimates of experience. Therefore, actual experience is expected to vary from study period to study period, without necessarily indicating a change in assumptions is needed.

At the request of VRS, Cavanaugh Macdonald Consulting, LLC (CMC) performed a study of the experience for the four-year period ending June 30, 2020. This report presents the results, analysis, and resulting recommendations of our study. The VRS Board of Trustees approved these changes at its April 20, 2021 meeting. CMC will reflect these recommendations in the July 1, 2021 actuarial valuations.

These assumptions have been developed in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the applicable Actuarial Standards of Practice adopted by the Actuarial Standards Board (ASB). While the recommended assumptions represent our best estimate of future experience, there are other reasonable assumption sets that could be supported by the results of this experience study. Those other sets of reasonable assumptions could produce liabilities and costs that are either higher or lower than the recommended assumptions.

Our Philosophy

Similar to an actuarial valuation, the calculation of actual and expected experience is a fairly mechanical process, and differences between actuaries in this area are generally minor. However,



Section I: Summary of Results

the setting of assumptions differs, as it is more art than science. We reviewed all the current assumptions, and in this report, we have recommended changes to certain assumptions. To explain our thought process, we offer a brief summary of our philosophy:

- **Don't Overreact:** When we see significant changes in experience, we generally do not adjust our rates to reflect the entire difference. We will typically recommend rates somewhere between the old rates and the new experience. If the experience during the next study period shows the same result, we will probably recognize the trend at that point in time or at least move further in the direction of the observed experience. On the other hand, if experience returns closer to its prior level, we will not have overreacted, possibly causing volatility in the actuarial contribution rates.
- **Anticipate Trends:** If there is an identified trend that is expected to continue, we believe that this should be recognized. An example is the retiree mortality assumption. It is an established trend that people are living longer. Therefore, we believe the best estimate of liabilities in the valuation should reflect the expected increase in life expectancy.
- **Simplify:** In general, we attempt to identify which factors are significant and eliminate or ignore the ones that do not materially improve the accuracy of the liability projections.

Following are summaries of findings and recommendations regarding assumptions utilized by the VRS plans. Explanations of the recommendations are found in the sections that follow.

Recommended Economic Assumption Changes

The table below lists the four economic assumptions used in all the actuarial valuations and their current rates. We recommend no change in these economic assumptions.

Assumption	Current and Proposed
Price Inflation	2.50%
Wage Inflation	3.50%
Investment Return*	6.75%
Payroll Growth	3.00%

* We recommend that the investment return assumption for LODA be increased from 4.75% to 6.75%.



Section I: Summary of Results

Recommended Demographic Assumption Changes

The tables below list the recommended demographic assumption changes based on experience during the last four years.

System	Assumption	Description
State	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Update to PUB2010 public sector mortality tables. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience for Plan 1; set separate rates based on experience for Plan 2/Hybrid; changed final retirement age from 75 to 80 for all
	3. Withdrawal Rates	Adjusted rates to better fit experience at each year age and service through 9 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
Teachers	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Update to PUB2010 public sector mortality tables. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience for Plan 1; set separate rates based on experience for Plan 2/Hybrid; changed final retirement age from 75 to 80 for all
	3. Withdrawal Rates	Adjusted rates to better fit experience at each year age and service through 9 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
SPORS	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Update to PUB2010 public sector mortality tables. Increased disability life expectancy. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Increased rates for ages 55 to 61, 63, and 64 with 26 or more years of service; changed final retirement age from 65 to 70
	3. Withdrawal Rates	Decreased rate for 0 years of service and increased rates for 1 to 6 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
VaLORS	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Update to PUB2010 public sector mortality tables. Increased disability life expectancy. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Increased rates at some younger ages, decreased at age 62, and changed final retirement age from 65 to 70
	3. Withdrawal Rates	Adjusted rates to better fit experience at each year age and service through 9 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
JRS	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Review separately from State employees because exhibit fewer deaths. Update to PUB2010 public sector mortality tables. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Decreased rates for ages 60-66 and 70-72
	3. Withdrawal Rates	No change
	4. Disability Rates	No change
	5. Salary Increases	Reduce increases across all ages by 0.50%



Section I: Summary of Results

System	Assumption	Description
Locals Largest 10 (Non-Hazardous Duty)	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Update to PUB2010 public sector mortality tables. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience for Plan 1; set separate rates based on experience for Plan 2/Hybrid; changed final retirement age
	3. Withdrawal Rates	Adjusted rates to better fit experience at each year age and service through 9 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
Locals Largest 10 (Hazardous Duty)	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Update to PUB2010 public sector mortality tables. Increased disability life expectancy. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience and changed final retirement age from 65 to 70
	3. Withdrawal Rates	Decreased rates
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
Locals Non 10 Largest (Non- Hazardous Duty)	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Update to PUB2010 public sector mortality tables. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience for Plan 1; set separate rates based on experience for Plan 2/Hybrid; changed final retirement age
	3. Withdrawal Rates	Adjusted rates to better fit experience at each year age and service through 9 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
Locals Non 10 Largest (Hazardous Duty)	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Update to PUB2010 public sector mortality tables. Increased disability life expectancy. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience and changed final retirement age from 65 to 70
	3. Withdrawal Rates	Decreased rates and changed from rates based on age and service to rates based on service only to better fit experience and to be more consistent with Locals Largest 10 Hazardous Duty
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change



Section I: Summary of Results

Recommended OPEB Specific Assumptions

We recommend the following changes specific to OPEB for the OPEB programs. As noted in the chart, these are in addition to the recommendations we have made for the pension plans above.

System	Assumption	Description
GLI	1. Pension economic and demographic assumptions	Adjusted in the same manner as the pension plans
	2. Retiree liability estimation for Life Only	Adjusted to estimate based on actual benefit payments for this group compared to actual benefit payments for total group
LODA	1. Pension wage, inflation and demographic assumptions	Adjusted in the same manner as the pension plans
	2. Discount rate for funding	Adjusted to 6.75% since assets are invested in the same manner as the pension plan assets
	3. Percentage of disabilities qualifying for benefits	Increased based on available data and considering pension assumptions. Includes margin for presumptions to be added as well as any future COVID-19 impact on disabilities.
	4. Percentage of qualifying deaths that are a direct result of the performance of duty	Increased to 50% based on available data
	5. Spouse participation rates	Increased to 80% of disabilities and 80% of deaths result in spouse coverage
HIC	1. Pension economic and demographic assumptions	Adjusted in the same manner as the pension plan
	2. Benefit election (from deferred vested)	Adjusted election from deferred vested status to a flat 95% for State & Teachers and a flat 85% for Locals & Special Coverage Codes
	3. Benefit election (from disability)	Adjusted election to 80% for SPORS/VaLORS and 50% for Locals and Special Coverage Codes
	4. Benefit utilization	Increase in utilization for all groups
	5. Percentage of deferred vested members electing to withdraw from VRS	Bifurcated assumption for above or below 50 years of age; in general, withdrawal rate increased for those below 50 and decreased for those above 50
	6. Benefit increase in the first year	Reduction to 4.50% for all groups
VSDP / VLDP LTD	1. Pension economic and demographic assumptions	Adjusted in the same manner as the pension plans
	2. Rates of disability claim termination	Adjusted for credible VSDP experience
	3. Benefit offsets	Increased and extended period in which offset may be received based on available experience
	4. Catastrophic claims	Increased based on available experience
	5. Percentage eligible for additional 1% defined contribution	Reduction in number assumed to meet Social Security definition of disability and receive the additional 1% defined contribution
	*Until adequate experience emerges, VLDP calculations are based upon the data, actuarial assumptions and methods used in the actuarial valuation of the VSDP benefit.	

Recommended Method Changes

We recommend that decrements occur at mid-year (which is an approximation for throughout the year) rather than beginning of the year for all plans except Teachers.

More information on this recommendation can be found in Section III under Decrement Timing.

Recommended Actuarial Methods & Funding Policy

We are recommending no changes to the funding policy at this time.



Section I: Summary of Results

Financial Impact

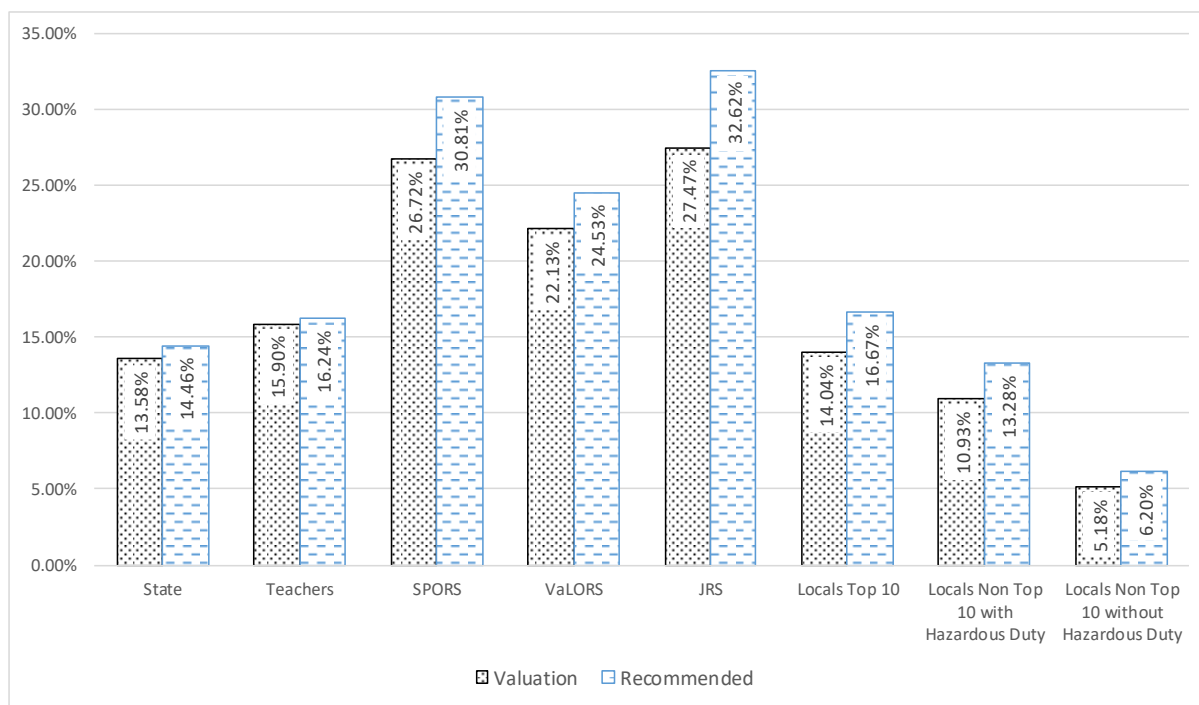
The following tables and graphs highlight the impact of recommended changes on the unfunded actuarial accrued liabilities, funded status and employer contribution rates for the plans.

**Financial Impact of Assumption/Method Changes
Pension Plans
(\$ in Thousands)**

System		Before Assumption/Method Changes	After Assumption/Method Changes	Change
State	Unfunded Accrued Liability	\$ 6,418	\$ 6,791	\$ 374
	Funded Status	75.08%	74.00%	(1.08%)
	DB Employer Contribution Rate	13.58%	14.46%	0.88%
Teachers	Unfunded Accrued Liability	\$ 13,279	\$ 14,105	\$ 826
	Funded Status	73.88%	72.70%	(1.18%)
	DB Employer Contribution Rate	15.90%	16.24%	0.34%
SPORS	Unfunded Accrued Liability	\$ 326	\$ 379	\$ 53
	Funded Status	73.01%	69.94%	(3.07%)
	DB Employer Contribution Rate	26.72%	30.81%	4.09%
VaLORS	Unfunded Accrued Liability	\$ 712	\$ 771	\$ 59
	Funded Status	68.47%	66.72%	(1.75%)
	DB Employer Contribution Rate	22.13%	24.53%	2.40%
Judicial	Unfunded Accrued Liability	\$ 112	\$ 161	\$ 49
	Funded Status	83.53%	77.90%	(5.63%)
	DB Employer Contribution Rate	27.47%	32.62%	5.15%
Locals Top 10	Unfunded Accrued Liability	\$ 1,918	\$ 2,324	\$ 406
	Funded Status	81.90%	78.87%	(3.03%)
	DB Employer Contribution Rate	14.04%	16.67%	2.63%
Locals Non Top 10 With Hazardous Duty	Unfunded Accrued Liability	\$ 1,222	\$ 1,566	\$ 344
	Funded Status	87.45%	84.47%	(2.98%)
	DB Employer Contribution Rate	10.93%	13.28%	2.35%
Locals Non Top 10 Without Hazardous Duty	Unfunded Accrued Liability	\$ 297	\$ 445	\$ 148
	Funded Status	94.03%	91.32%	(2.71%)
	DB Employer Contribution Rate	5.18%	6.20%	1.02%



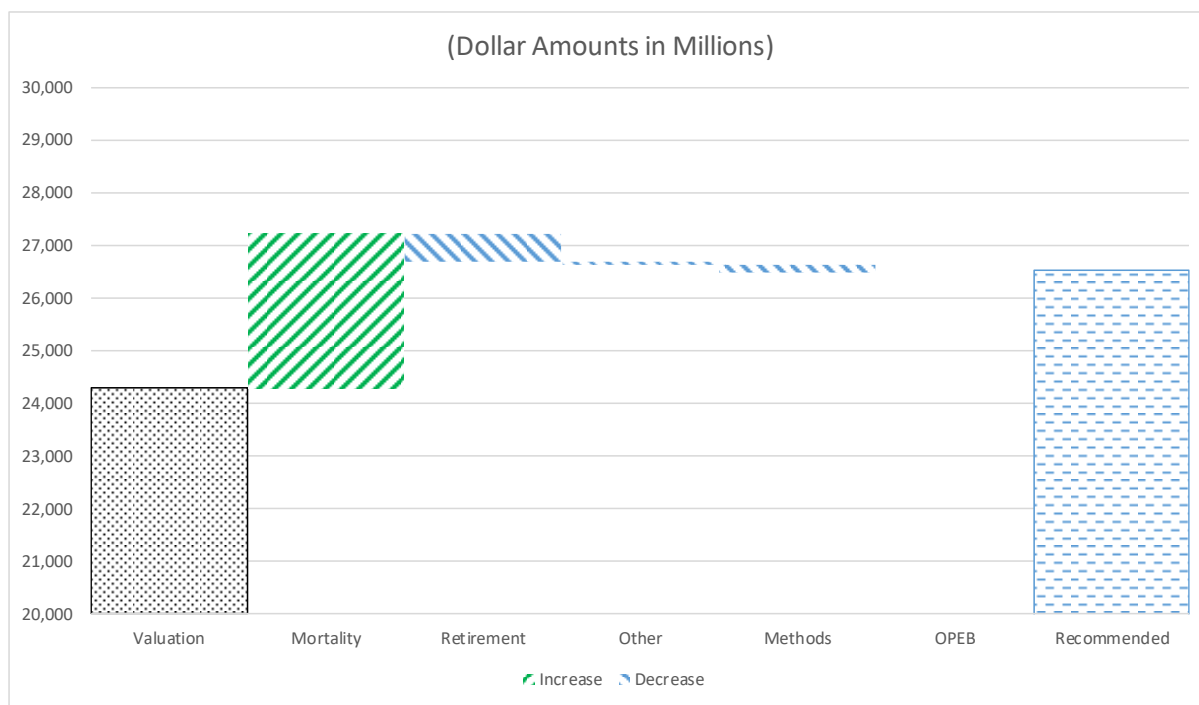
Financial Impact of Assumption/Method Changes Pension Plans Change in Employer Defined Benefit Contribution Rate by Plan



The impact of the mortality recommendation was to increase costs. The impact was not consistent across all plans. In particular, plans which covered judges and Hazardous Duty members incurred larger cost increases. The impact of other assumptions was mixed.



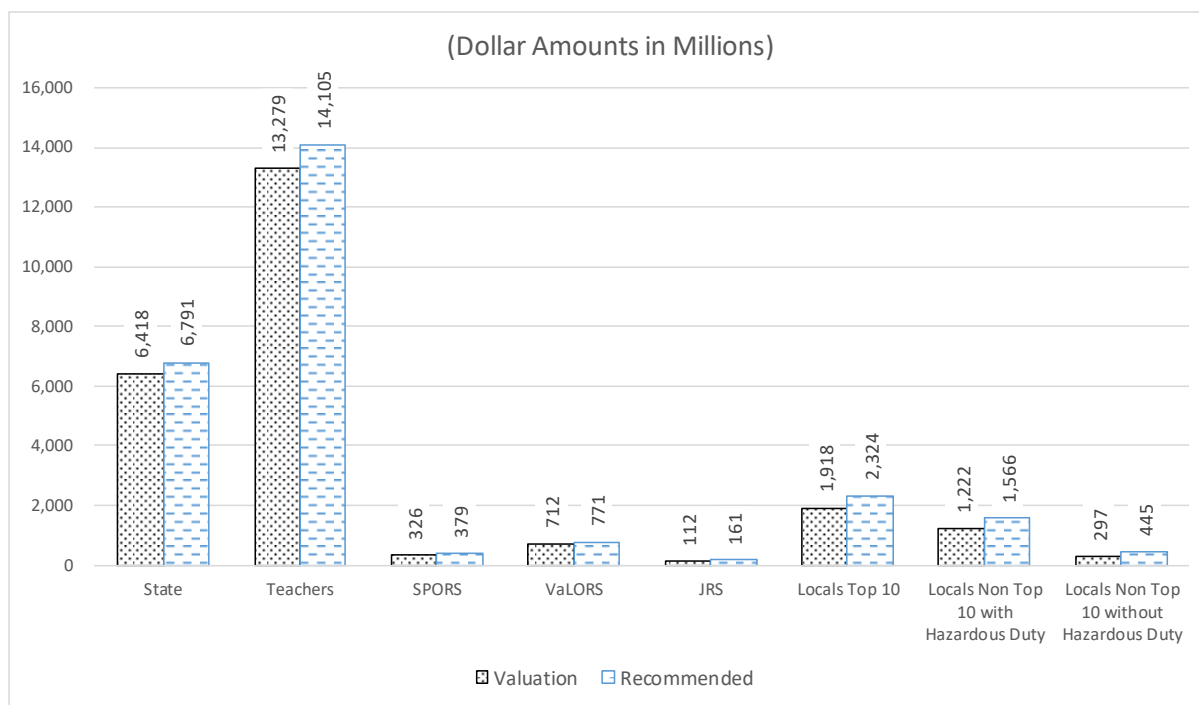
**Financial Impact of Assumption/Method Changes
Pension Plans
Change in Unfunded Actuarial Accrued Liability (UAAL) by Source**



The mortality recommendation was the largest driver of the costs for the pension plans, with other sources partially offsetting the increase. Decrease due to retirement was caused by longer careers.



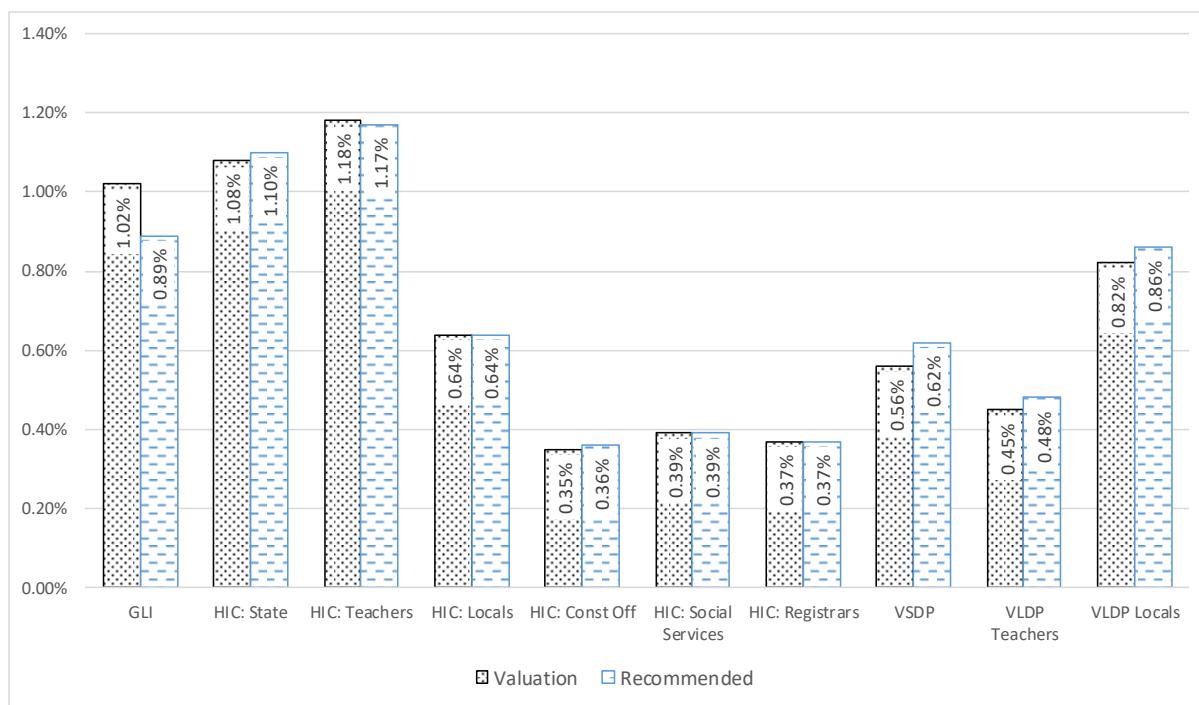
**Financial Impact of Assumption/Method Changes
Pension Plans (continued)
Change in Unfunded Actuarial Accrued Liability (UAAL) by Plan**



The impact of the recommendations was an increase in the actuarial accrued liability and as a result the UAAL. The increase in UAAL is leveraged – the increase in Locals UAAL was much larger than that of State or Teachers. This is due to Locals being well funded compared to State or Teachers.



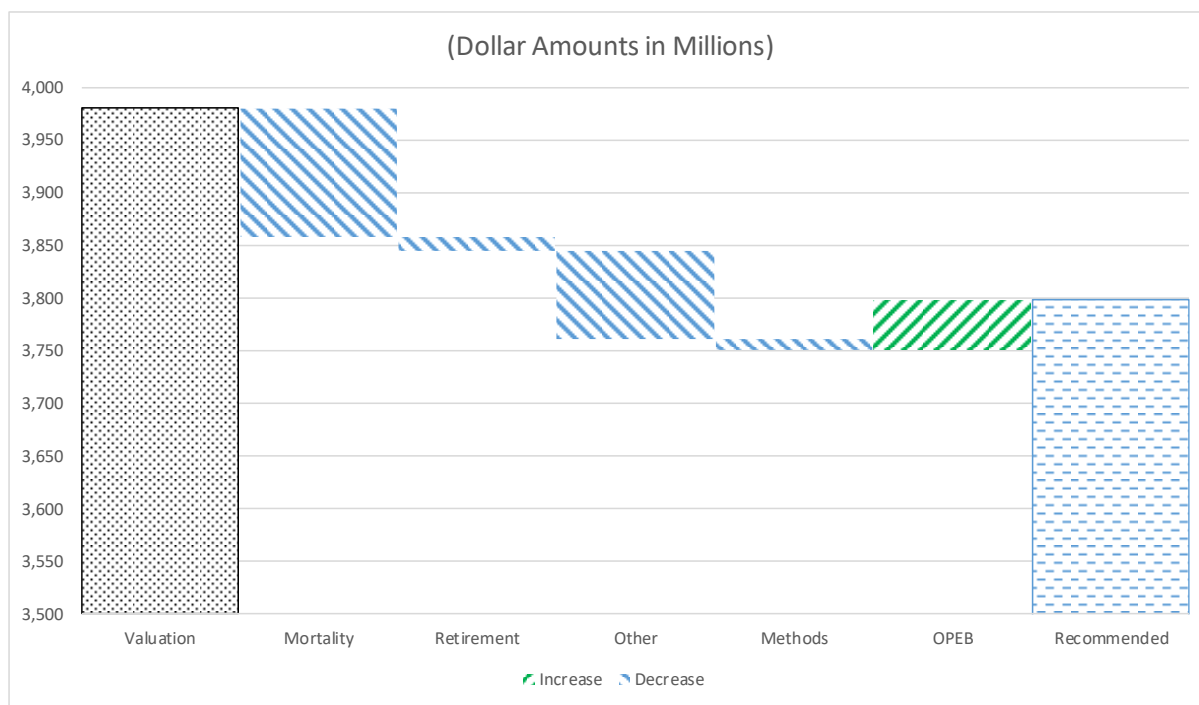
Financial Impact of Assumption/Method Changes OPEB Plans Change in Employer Contribution Rate by Plan



The impact of the recommendations was generally not as pronounced for the OPEB plans, other than LODA which is not included above. The Contribution Rate per FTE for LODA increased from \$758.03 to \$783.14 based on our recommendations. The largest impact was an increase in percentage of deaths and disabilities approved for LODA benefits.



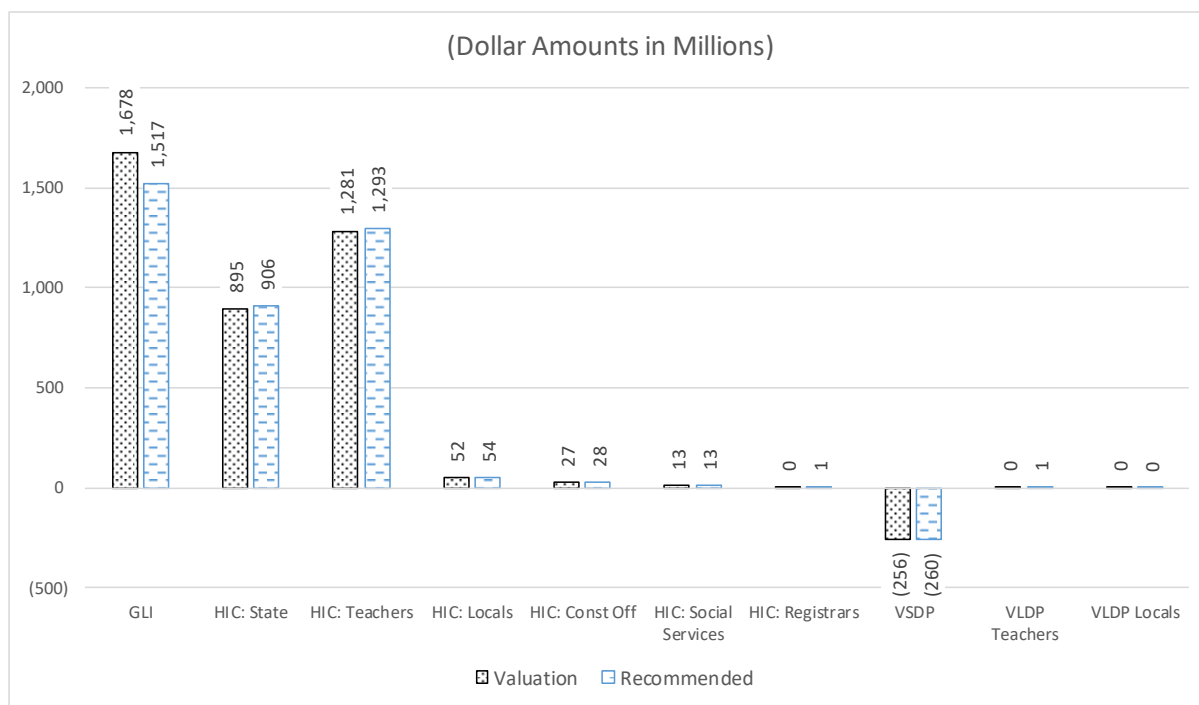
**Financial Impact of Assumption/Method Changes
OPEB Plans
Change in Unfunded Actuarial Accrued Liability (UAAL) by Source**



The impact of the recommendations on UAAL was mixed. Unlike pension, mortality decreased UAAL due to reflecting longer life expectancies for Group Life Insurance. "Other" is the change in disabilities and withdrawals.



**Financial Impact of Assumption/Method Changes
OPEB Plans (continued)
Change in Unfunded Actuarial Accrued Liability (UAAL) by Plan**



The impact of the recommendations on UAAL was modest compared to pension with the exception of Group Life Insurance. UAAL for Group Life Insurance decreased due to reflecting longer life expectancies.

More exhibits regarding fiscal impact can be found in Section VIII.

The remainder of this report provides supporting material for the recommendations made.



ECONOMIC ASSUMPTIONS



ECONOMIC ASSUMPTIONS

Economic assumptions include:

- Price inflation
- Investment return (net of investment expenses)
- Retiree cost of living adjustment
- Wage inflation (the across-the-board portion of salary increases)

The salary increase assumption is made up of both wage inflation and a merit salary scale. The merit salary scale is a demographic assumption and will be discussed with the demographic assumptions. Unlike demographic assumptions, economic assumptions do not lend themselves to analysis based heavily upon internal historical patterns. Because both general wage increases and investment return are influenced more by external forces which are difficult to accurately predict over the long term, the investment return and general wage increase assumptions are typically selected based on expectations in an inflation-free environment and then increased by the long-term expectation for price inflation.

Sources of data considered in the analysis and selection of the economic assumptions included:

- Historical observations of price and wage inflation statistics and investment returns
- The 2020 Social Security Trustees Report
- U. S. Department of the Treasury bond rates
- Data from the Bureau of Labor Statistics
- Assumptions used by other large public retirement systems, based on the Public Fund Survey, published by the National Association of State Retirement Administrators

Guidance regarding the selection of economic assumptions for measuring pension obligations is provided by Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*. Because no one knows what the future holds, the actuary must use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment.

Actuarial Standard of Practice Number 27

Actuarial Standards of Practice are issued by the Actuarial Standards Board to provide guidance to actuaries with respect to certain aspects of performing actuarial work. As mentioned earlier, Actuarial Standard of Practice Number 27 (ASOP 27) is the standard that addresses the selection of economic assumptions for measuring pension obligations. Therefore, our analysis of the expected rate of return, as well as other economic assumptions, was performed following the guidance in ASOP 27.



Section II: Economic Assumptions

ASOP 27 applies to the selection of economic assumptions to measure obligations under any defined benefit pension plan that is not a social insurance program (e.g., Social Security).

The standard recommends the actuary review appropriate recent and long-term historical economic data, but advises the actuary not to give undue weight to recent experience. Furthermore, it advises the actuary to consider that some historical economic data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment. Each economic assumption should individually satisfy this standard. In addition, with respect to any particular valuation, each economic assumption should be consistent with all other economic assumptions over the measurement period.

ASOP 27 recognizes that economic data and analyses are available from a variety of sources, including representatives of the plan sponsor, investment advisors, economists, and other professionals. The actuary is permitted to incorporate the views of experts, but the selection or advice must reflect the actuary's professional judgment.

ASOP 27 calls for the actuary to select a "reasonable" assumption. For this purpose, an assumption is reasonable if it 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 measurement 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 neither significantly optimistic nor pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included.

The standard goes on to discuss a "range of reasonable assumptions" which in part states "the actuary should also recognize that different actuaries will apply different professional judgment and may choose different reasonable assumptions. As a result, a range of reasonable assumptions may develop both for an individual actuary and across actuarial practice."

The remaining section of this report will address the relevant types of economic assumptions used in the actuarial valuation to determine the obligations of VRS. In our opinion, the economic assumptions proposed in this report have been developed in accordance with ASOP No. 27.



Section II: Economic Assumptions

The following table summarizes the current and proposed economic assumptions.

Item	Current and Proposed
Price Inflation	2.50%
Real Rate of Return (net)	<u>4.25</u>
Investment Return (net of investment expenses)*	6.75%
Retiree Cost-of-Living Adjustment	
Plan 1 Members	2.50%
All Other Members	2.25%
Price Inflation	2.50%
Real Wage Growth	<u>1.00</u>
Wage Inflation	3.50%
Payroll Growth	3.00%

We recommend maintaining the current economic assumptions other than the investment return assumption for LODA.

*For the LODA plan we recommend changing the investment return assumption from 4.75% to 6.75%. Please see page 29 for details.



PRICE INFLATION

Use in the Valuation: Future price inflation has an indirect impact on the results of the actuarial valuation through the development of the assumptions for investment return, cost-of-living adjustments, wage inflation, and individual salary increases. The consistency of the price inflation assumption throughout the economic assumptions utilized in an actuarial valuation is required to meet the requirements of ASOP No. 27 and for determining pension liabilities and expense under Governmental Accounting Standards Board (GASB) Statements No. 67 and 68.

The long-term relationship between price inflation and investment return has long been recognized by economists. The basic principle is that the investor demands a more or less level “real return” – the excess of actual investment return over price inflation. If inflation rates are expected to be high, investment return rates are also expected to be high, while low inflation rates are expected to result in lower expected investment returns, at least in the long run.

The current assumption for price inflation is 2.50% per year.

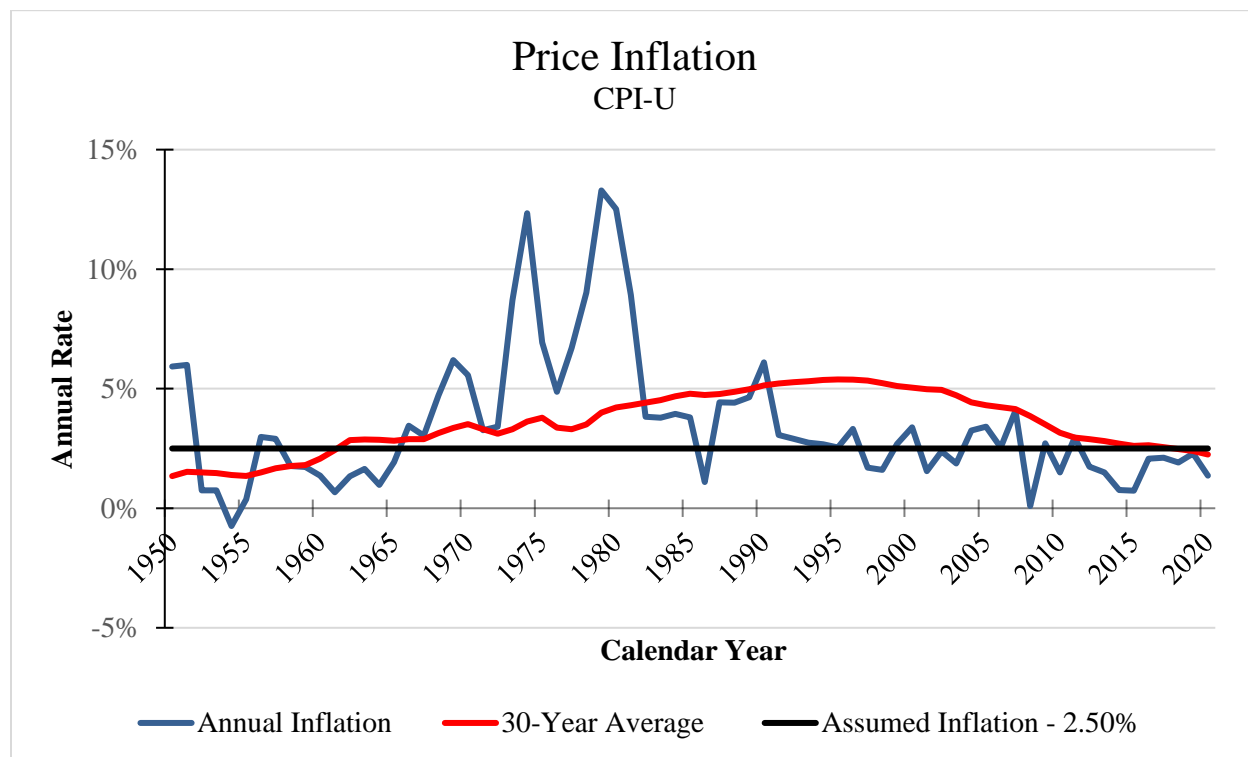
Past Experience: Although economic activities, in general, and inflation in particular, do not lend themselves to prediction solely on the basis of historical analysis, historical patterns and long-term trends are factors to be considered in developing the inflation assumption. The Consumer Price Index, US City Average, All Urban Consumers, CPI (U), has been used as the basis for reviewing historical levels of price inflation. The following table provides historical annualized rates and annual standard deviations of the CPI-U over periods ending June 30th.

Period	Number of Years	Annualized Rate of Inflation	Annual Standard Deviation
1930 - 2020	90	3.03%	4.06%
1960 - 2020	60	3.67%	2.88%
1970 - 2020	50	3.86%	3.02%
1980 - 2020	40	2.88%	1.89%
1990 - 2020	30	2.31%	1.36%
2000 - 2020	20	2.03%	1.48%
2010 - 2020	10	1.69%	1.00%



Section II: Economic Assumptions

The following graph illustrates the historical annual change in price inflation, measured as of December 31st for each of the last 70 years, as well as the thirty-year rolling average, as compared to the current assumption.



Over more recent periods, measured from December 31, 2020, the average annual rate of increase in the CPI-U has been 2.50% or lower. The period of high inflation from 1973 to 1981 has a significant impact on the averages over periods which include these rates. Over the last 10- and 20-year periods, the average annual rate of increase in the CPI-U has been below the current assumption of 2.50% (1.69% and 2.13%, respectively).

Forecasts of Inflation

Additional information to consider in formulating this assumption is obtained from measuring the spread on Treasury Inflation Protected Securities (TIPS) and from the prevailing economic forecasts. The spread between the nominal yield on treasury securities (bonds) and the inflation indexed yield on TIPS of the same maturity is referred to as the “breakeven rate of inflation” and represents the bond market’s expectation of inflation over the period to maturity. Current market prices as of December 31, 2020 suggest that investors expect inflation to be 2.02% over the next 30 years as seen in the following chart. The bond market expectations may be heavily influenced by the low interest rate environment created by the Federal Reserve Bank’s manipulation of the

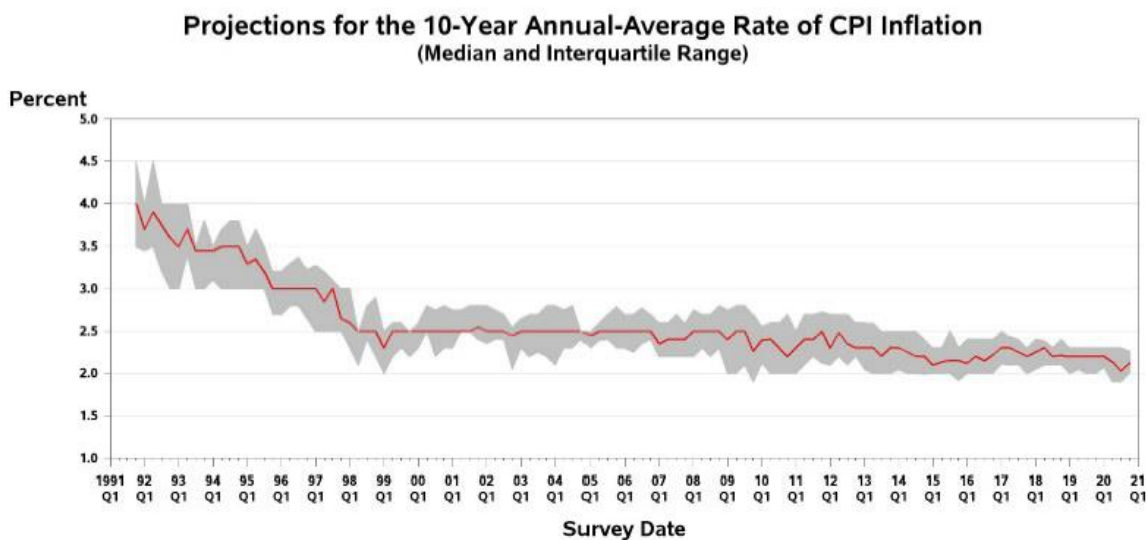


Section II: Economic Assumptions

bond market. Whether inflation will return to the higher rates observed historically remains to be seen.

Years to Maturity	Bond Yield	TIPS Yield	Breakeven Rate of Inflation
10	0.93%	-1.06%	1.99%
20	1.45%	-0.61%	2.06%
30	1.65%	-0.37%	2.02%

Additionally, based upon information provided from the “Survey of Professional Forecasters” published by the Philadelphia Federal Reserve Bank, the median expected annual rate of inflation for the 10 years beginning January 1, 2021 is 2.12%. A history of this metric can be found on the following chart.



Horizon Actuarial Services, LLC publishes a survey of capital market assumptions obtained from various investment consultants. The 2020 Horizon Survey includes the assumptions, including the expected rate of inflation, for 18 advisors who develop longer-term assumptions (20 years or more). The survey showed a range of expected inflation for the next 20 years, for these 18 consultants, of 1.7% to 3.0%, with a median of 2.1%. Inflation over a shorter time horizon, for the next 10 years, was a very similar range of 0.9% to 3.0%, with a median of 2.0%.



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Although many economists forecast lower inflation than the assumption used by retirement plans, they are generally looking at a shorter time horizon than is appropriate for a pension valuation. To consider a longer, similar time frame, we looked at the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the most recent report (April 2020), the projected average annual increase in the CPI over the next 75 years was estimated to be 2.40%, under the intermediate cost assumption. The range of inflation assumptions used in the Social Security 75-year modeling, which includes a low and high-cost scenario, in addition to the intermediate cost projection, was 1.80% to 3.00% for 2020, as seen in the following chart.

Report Year	Low-Cost	Intermediate-Cost	High-Cost
2020	3.00%	2.40%	1.80%
2019	3.20%	2.60%	2.00%
2018	3.20%	2.60%	2.00%
2017	3.20%	2.60%	2.00%
2016	3.20%	2.60%	2.00%
2015	3.40%	2.70%	2.00%

Recommendation

The following table provides a comparison of the current levels of expected inflation.

Source	Expected Inflation
2020 Horizon Survey	2.10%
Bond Market	2.02%
2020 SSA Trustees Report	2.40%
Survey of Professional Forecasters	2.12%



Section II: Economic Assumptions

It is difficult to accurately predict inflation. While actuarial standards caution against too much consideration of recent events, the lower inflation over the last 10, 20 and even 30 years, coupled with the low future inflation anticipated by the bond markets, professional economic forecasters and the Social Security actuary, suggests that there may have been a fundamental change away from the longer-term historical norms. Based on the information presented above, **we recommend maintaining the current inflation assumption of 2.50%.**

As such, **we also recommend maintaining the current cost-of-living increase assumption:**

The provisions of the plans outlined below provide an adjustment to retiree benefits to increase at a rate known as the cost-of-living adjustment (COLA). This benefit adjustment can maintain or stabilize the purchasing power of the member's benefit by offsetting increasing costs due to general inflation over time.

Plan 1 Members (Vested as of January 1, 2013)

In-payment retirees, disableds, and beneficiaries automatically receive a COLA in an amount that is tied to actual price inflation, with a cap of 5% and minimum of 0% (first 3% of Consumer Price Index increase plus half of each percentage increase from 3% to 7% with total increase capped at 5%). The COLA on July 1 is determined as the ratio of the average of the monthly CPI-U for the current calendar year to the average of the monthly CPI-U for the most recent calendar year used in determination of a COLA.

Recognizing that annual inflation has a random component, we simulated the expected effective (compound) COLAs, that would apply to Plan 1 members with the cap and floor reflected. Based on the recommended price inflation assumption of 2.50% and the estimated standard deviation of 1.25%, we estimate a COLA of 2.50% over the next 30 years. **We recommend maintaining the current COLA assumption for Plan 1 members of 2.50%.**

Plan 1 Members (Not vested as of January 1, 2013), Plan 2 and Hybrid Members

In-payment retirees, disableds, and beneficiaries automatically receive a COLA in an amount that is tied to actual price inflation, with a cap of 3% and minimum of 0% (first 2% of Consumer Price Index increase plus half of each percentage increase from 2% to 4% with total increase capped at 3%). The COLA on July 1 is determined as the ratio of the average of the monthly CPI-U for the current calendar year to the average of the monthly CPI-U for the most recent calendar year used in determination of a COLA.

Recognizing that annual inflation has a random component, we simulated the expected effective (compound) COLAs that would apply to Plan 1 members not vested as of January 1, 2013, Plan 2 and Hybrid members with the cap and floor reflected. Based on the recommended price inflation assumption of 2.50% and the estimated standard deviation of 1.25%, we estimate a COLA of 2.22% over the next 30 years. **We recommend maintaining the current COLA assumption for Plan 1 members not vested as of January 1, 2013, Plan 2 and Hybrid members of 2.25%.**



INVESTMENT RETURN

Use in the Valuation: The investment return assumption reflects the anticipated returns on the current and future assets. It is one of the primary determinants in the allocation of the expected cost of VRS's benefits, providing a discount of the estimated future benefit payments to reflect the time value of money. Minor changes in this assumption can have a major impact on valuation results. Generally, the investment return assumption should be set with consideration of the asset allocation policy, expected long-term real rates of return on the specific asset classes, the underlying price inflation rate, and investment expenses.

The long-term relationship between price inflation and investment return, recognized by economists, is that the investor demands a "real return" – excess of actual investment return over price inflation. If inflation rates are expected to be high, investment returns are also expected to be high, while lower inflation rates are expected to result in lower expected investment returns, at least in the long run.

The current investment return assumption for all plans except LODA is 6.75%, consisting of a price inflation assumption of 2.50% and a real rate of return assumption of 4.25%. The current investment return assumption for LODA is 4.75%. The return is net of all investment expenses.

Long and Short Term Perspective

Because the economy is constantly changing, assumptions regarding what may occur in the near term are volatile. Asset managers and investment consultants usually focus on this near-term horizon in order to make prudent choices regarding how to invest the trust funds (asset allocation). For actuarial calculations, we typically consider very long periods of time as some current employees will still be receiving benefit payments more than 60 to 80 years from now. For example, a newly hired member who is 25 years old may work for 30 years, to age 55, and live another 30 years, to age 85. The retirement system would receive contributions for the first 30 years and then pay out benefits for the next 30 years. During the entire 60-year period, VRS is investing assets on behalf of the member. In addition, in an open ongoing system like VRS, the stream of benefit payments is continually increasing as new hires replace current members who leave covered employment due to death, termination of employment, and retirement. This difference in the time horizon used by actuaries and investment consultants is frequently a source of debate and confusion when setting economic assumptions.

That being said, the short-term is also very important as much of the liability of the fund will be paid out over the next 10-15 years. Short-term return expectations tend to be lower than long-term expectations. VRS investment staff periodically provides short-term capital market assumptions (CMAs). Since the last experience review the short-term return from these CMAs have been higher than the current 6.75% assumption. However, a CMA that is higher or lower than the current 6.75% assumption is not sufficient on its own to consider increasing or decreasing the investment return assumption.



Section II: Economic Assumptions

VRS completed an Asset Liability Management (ALM) study in 2019, which culminated in a recommendation to lower the assumed long-term rate of return from 7.00% to 6.75%. Due to the uncertainty surrounding the potential for and timing, length, or severity of a near-term recession, a discount rate based on a blend of short- and long-term expectations warranted a lowering of the plans' long-term investment rate of return assumption. Historically, investment return assumptions have targeted the median of the expected range of outcomes. However, reflecting a blended discount rate to incorporate near-term uncertainty in the markets required selecting a discount rate below the median expected long-term rate. VRS selected a discount rate closer to the 40th percentile of future returns, providing approximately a 60% chance of achieving the long-term rate of return over time. We think that the current assumption gives due consideration to the short-term.

Analysis Using VRS Assumptions

Since ASOP 27 allows the actuary to rely on outside experts, it is appropriate to consider the market outlook and expectations provided by the investment staff of the Virginia Retirement System. Using the investment staff's capital market assumptions and asset allocation, provided by VRS as of February 2021, statistical analysis provides a percentile ranking of real rates of return over various time horizons. The following table provides a summary of the statistical analysis performed. It is important to note the capital market assumptions are short term (10 years) in nature and may reflect a bias based upon recent experience. In contrast, the obligations of the System are anticipated to be very long term in nature. As stated by ASOP 27, the actuary must consider the purpose of the measurement and reflect that the capital market assumptions represent a shorter-term economic outlook compared to the benefit obligation of the System.

Time Span In Years	Mean Real Return	Standard Deviation	Real Returns by Percentile				
			5th	25th	50th	75th	95th
1	4.63%	8.73%	-9.05%	-1.39%	4.30%	10.32%	19.61%
5	4.34%	3.89%	-1.89%	1.71%	4.30%	6.95%	10.89%
10	4.31%	2.75%	-0.12%	2.47%	4.30%	6.17%	8.92%
20	4.29%	1.94%	1.16%	3.00%	4.30%	5.62%	7.54%
30	4.28%	1.59%	1.73%	3.24%	4.30%	5.38%	6.94%
50	4.28%	1.23%	2.30%	3.48%	4.30%	5.13%	6.34%

Again, the chart above is based on the capital market assumptions of the investment professionals serving the System. We note that the assumptions provided above are for expected returns in the next 10 years. We utilize those assumptions to produce the percentile ranks of expected returns over longer future time periods. The analysis suggests a median long-term rate of return of 4.30% based on VRS target allocation.



Section II: Economic Assumptions

This analysis is based on the capital market assumptions and asset allocation provided by VRS, shown below:

Rates of Return and Standard Deviation by Asset Class

Asset Class	Real Return	Standard Deviation
Public Equity	4.61%	11.92%
Fixed Income	0.46%	3.54%
Credit Strategies	5.39%	4.29%
Real Assets	5.01%	11.54%
Private Equity	8.34%	19.97%
MAPS	2.99%	5.47%
PIP	6.51%	15.39%

MAPS - Multi-asset Public Strategies

PIP - Private Investment Partnership

Asset Class Correlation Coefficients

	Public Equity	Fixed Income	Credit Strategies	Real Assets	Private Equity	MAPS	PIP
Public Equity	1.000	-0.097	0.697	0.804	0.738	0.892	0.842
Fixed Income	-0.097	1.000	0.171	0.025	-0.086	0.105	-0.092
Credit Strategies	0.697	0.171	1.000	0.609	0.585	0.661	0.656
Real Assets	0.804	0.025	0.609	1.000	0.599	0.737	0.723
Private Equity	0.738	-0.086	0.585	0.599	1.000	0.663	0.925
MAPS	0.892	0.105	0.661	0.737	0.663	1.000	0.752
PIP	0.842	-0.092	0.656	0.723	0.925	0.752	1.000

MAPS - Multi-asset Public Strategies

PIP - Private Investment Partnership



Asset Allocation Targets

Asset Class	Policy Allocation
Public Equity	34.00%
Fixed Income	15.00%
Credit Strategies	14.00%
Real Assets	14.00%
Private Equity	14.00%
MAPS	6.00%
PIP	3.00%

MAPS - Multi-asset Public Strategies

PIP - Private Investment Partnership

Many investment firms and investment consulting firms produce estimates of future asset returns. While it might seem desirable to directly compare these estimates, asset class expectations are dependent on the construction of the portfolio. Other investment consultants may have in mind a different blend of large versus small stocks or growth versus value equities. There are also comparison challenges in certain asset classes such as international stock (emerging or developed markets), bonds (duration and credit quality), and alternatives (a very broadly interpreted category). For this reason, we believe trying to compare the expected return developed by VRS with the assumptions of another group of investment professionals may lead to an invalid comparison. Since VRS has qualified professionals on its staff and is in the best position to understand its own portfolio and the reasonable expectations given their investment style, we prefer to rely heavily on their analysis.

While we like the idea of using a forward-looking model, the weakness with that approach is that the assumptions being used are set by investment managers and consultants who are typically focusing on a much shorter time period (five to ten years). Therefore, those assumptions may not necessarily be appropriate for the longer timeframe used by actuaries (30 to 50 years). The fact that the capital market assumptions are short-term assumptions is evident by the fact that most investment consulting firms change their capital market assumptions at least annually.

If the investment return assumption was set equal to the expected return based on the capital market assumptions each year or even in every experience study, it could create significant volatility in the funded ratios and amortization periods. Our goal is to choose an assumption that will be reasonable in the long term (30 to 50 years) with adjustment only when there are compelling changes to investment policy or evidence of a change in the long-term trends in the capital markets.

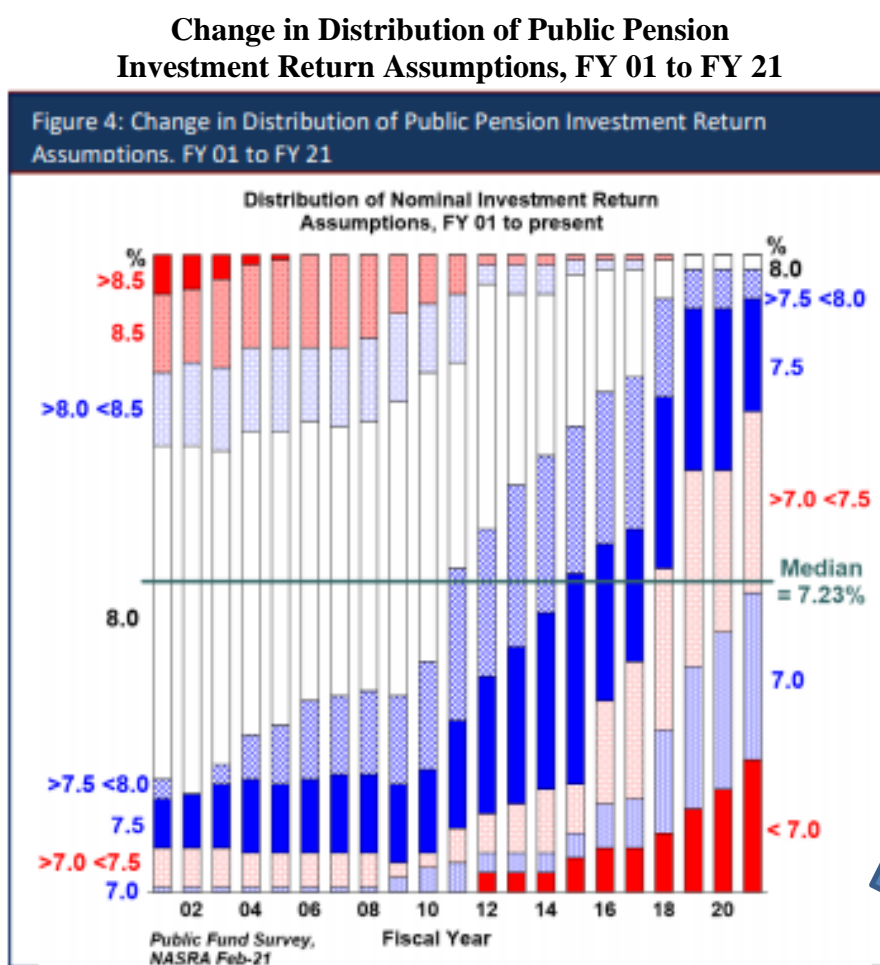


Section II: Economic Assumptions

Peer System Comparison

While we do not recommend that the selection of an investment return assumption be based on the assumptions used by other systems, it does provide another set of relevant information to consider. The following graph shows the change in the distribution of the investment return assumption from fiscal year 2001 through 2021 for the 120+ large public retirement systems included in the National Association of State Retirement Administrators (NASRA) Public Fund Survey. It is worth noting that the median investment return assumption is 7.25%.

Below is a graph published by NASRA in the *Public Fund Survey* which shows the decreases in the investment return assumptions used by public plans over the last several years.

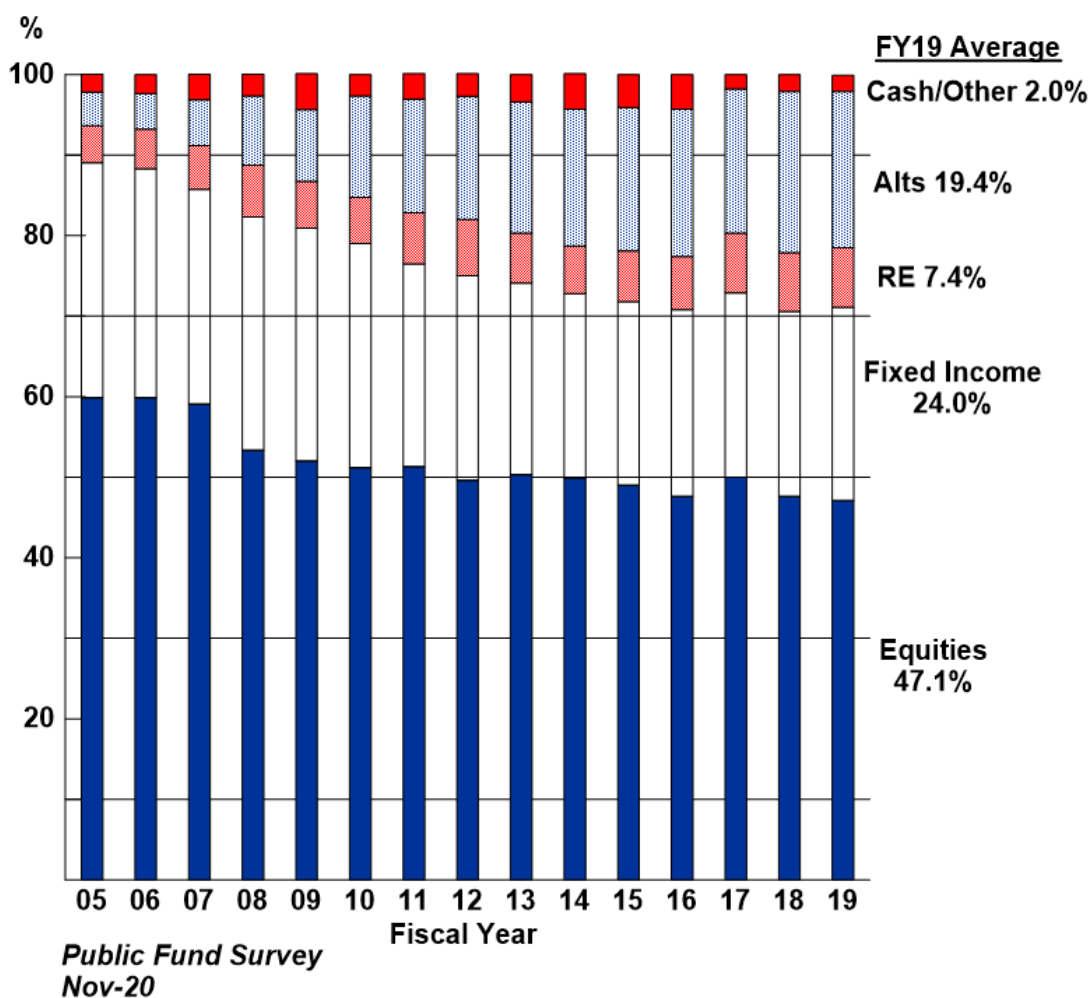


The assumed rate of return is heavily influenced by each Systems' asset allocation. The average asset allocation for the systems in the Public Fund Survey is 2.0% cash/other, 47.1% equities, 24.0% fixed income, 7.4% real estate, and 19.4% alternative investments which has an impact on the expected return of the systems. Note the increased allocation to alternative investment classes since 2006. The target asset allocation for VRS is 34% equities, 15% fixed income, 14% credit



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strategies, 14% real assets, 14% private equities, 6% multi-asset public strategies and 3% private investment partnership, which is comparable with the portfolio of an average system. The chart below shows the asset allocation for 90+ funds surveyed in the *Public Fund Survey* since 2005.

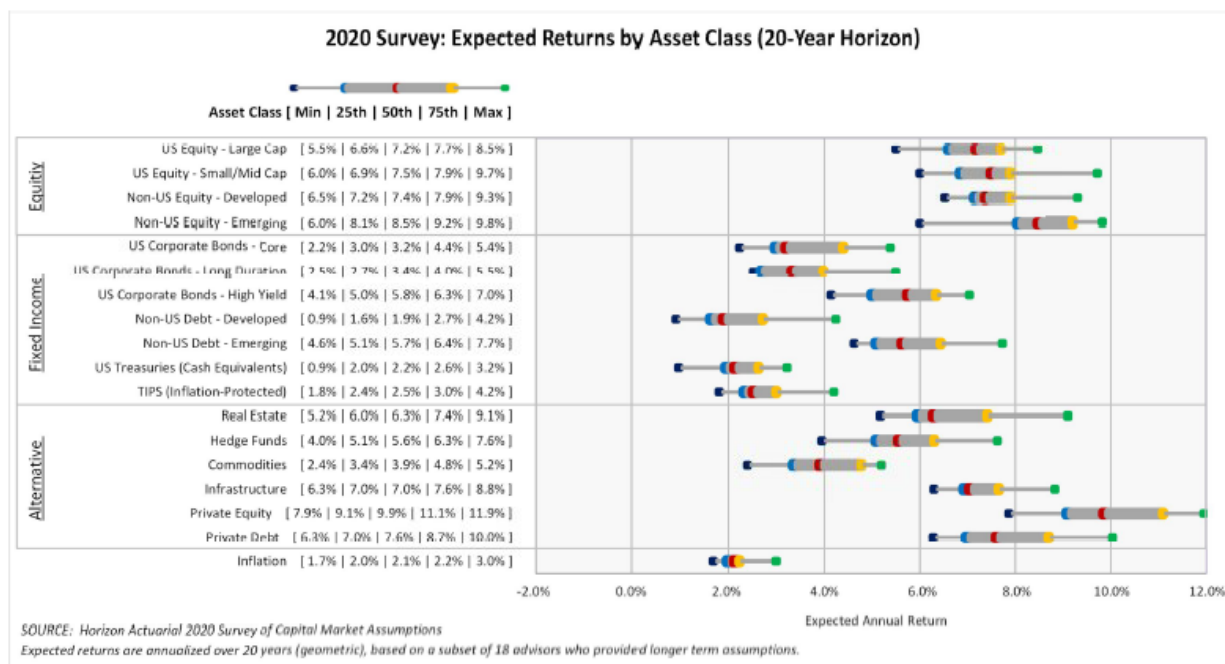


This is a challenging time to develop a recommendation for the investment return assumption. We need to recognize that there is no right answer to the question as no one knows what the future holds. This is evident with the wide range of forward-looking capital market assumptions produced by various investment consultants. Horizon Actuarial Services prepares an annual study in which they survey various investment advisors and provide ranges of results as well as averages. The 2020 Survey included a total of 39 investment advisors who provided their capital market assumptions of which 18 provided both short-term and long-term assumptions. It is worth noting that this Survey has historically been prepared for the multiemployer (Taft-Hartley) plan community and initially included assumptions only from investment advisors serving those plans. The Survey has expanded over the years and now includes assumptions from investment advisors outside of the Taft-Hartley community including consultants such as Aon Hewitt, New England Pension Consultants (NEPC), Callan Associates, Willis Towers Watson, JP Morgan, RVK, SEI, UBS, Graystone Consulting, Blackrock and Marquette Associates who work with public plans.



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The graph below shows the minimum, maximum and median return assumption for each asset class for the 18 firms providing long-term assumptions in the Horizon Survey. Expected returns shown below are annualized (geometric).



The 25th to 75th percentile real returns projected over a 50-year time span utilizing the capital market assumptions provided by the System's investment staff plus the recommended inflation assumption using the building block approach of ASOP 27 is shown below.

Item	25 th Percentile	50 th Percentile	75 th Percentile
Real Rate of Return	3.48%	4.30%	5.13%
Inflation	<u>2.50%</u>	<u>2.50%</u>	<u>2.50%</u>
Net Investment Return	5.98%	6.80%	7.63%



Section II: Economic Assumptions

Recommendation

By actuarial standards we are required to maintain a long-term perspective in setting all assumptions, including the investment return assumption. Therefore, we believe we must be careful not to let recent experience or the short-term expectations impact our judgment regarding the appropriateness of the current assumption over the long term.

After reviewing all the available information, **we recommend maintaining the current investment return assumption of 6.75%**. As noted above, there is no consensus amongst the various economic assumptions produced by investment consultants. We do realize that, in general, there is an overall pessimism about the future performance regarding the financial markets. This has been reflected by large public state-wide retirement systems lowering the assumed rate of return assumptions - a trend that may continue. The capital market assumptions of investment professionals are typically produced for nearer-term expectations, whereas the actuarial assumptions are pertinent for much longer time periods. In our experience, the longer-term expected returns are higher in most data we have available to review.

Investment Return	
Current Assumption	6.75%
Recommended Assumption	6.75%

LODA Fund – Discount Rate

Prior to the implementation of GASB 74 and 75, the prior accounting standards (GASB 43 and 45), required the discount rate for plans not contributing the full Annual Required Contribution (ARC) to be based on a rate of return assumption that was blended between the long-term rate of return and a short-term rate of return, with the methodology being ambiguous. Under this framework, most OPEB plans used GASB 43 and 45 liabilities as default funding liabilities and a 4.75% investment rate of return was determined for LODA based on the blend. However, now that GASB 74 and 75 accounting standards are separate from funding standards, we recommend that the LODA Fund uses the investment rate of return of 6.75% for funding and pay-as-you-go cash flow projections since the LODA Fund is invested in the same manner as the pension funds (see Section II for more information on determining the 6.75% investment rate of return). On a current disbursement funding basis, the LODA Fund will be projected to be depleted every two years; thus, for accounting disclosure purposes under GASB 74 and 75, the LODA Fund will utilize the Municipal Bond Index Rate.



ADMINISTRATIVE EXPENSES

The contribution rate developed in the annual actuarial valuation includes a component of the normal cost to cover the administrative expenses of VRS. The actual expense amount for the year ending on the valuation date is projected to the appropriate fiscal year as an estimate of the administrative expense in that fiscal year. This is a commonly used approach, and we recommend it be retained. Consequently, no adjustment to the investment return assumption is needed to reflect payment of administrative expenses from the System's investment return.

For the LODA Fund, the annual administrative expense assumption recognizes that actual administrative expenses include variable costs, such as opt outs, which are reimbursed. We recommend that we continue to set this assumption annually based on actual experience regarding administrative expenses and miscellaneous revenue, which includes reimbursements.



WAGE INFLATION

Background: Wage inflation, thought of as the “across the board” rate of salary increases, is composed of the price inflation assumption and combined with an assumption for the real rate of wage increases. In constructing the salary increase assumption, the wage inflation assumption is further combined with an assumption for service-based salary increases (called a merit scale). The service-based salary increase assumption is discussed in Section III. The current assumption for real rate of wage increase is 1.00% (3.50% wage increase minus 2.50% inflation).

The excess of wage growth over price inflation represents the increase in the standard of living, also called productivity growth. There has been debate on the issue of whether public sector employees will receive, over the long term, the same rewards for productivity as employees in the private sector, where productivity is more readily measurable. To our knowledge, no definitive research has been completed on this topic. Nevertheless, it is our opinion that public sector employees will eventually be rewarded, even if there is a time lag, with the same or nearly the same productivity increases as those participating in the remainder of the economy.

Historical Perspective: We have used statistics from the Social Security System on the National Average Wage. Because the National Average Wage is based on all wage earners in the country, it can be influenced by the mix of jobs (full-time vs. part-time, manufacturing vs. service, etc.) as well as by changes in some segments of the workforce that are not seen in all segments (e.g., regional changes or growth in computer technology). Further, if compensation is shifted between wages and benefits, the wage index would not accurately reflect increases in total compensation. However, we feel the National Average Wage is an accurate measure.

There are numerous ways to review this data. For consistency with our observations of CPI, the table below shows the compound annual rates of wage growth for various periods ended in 2019 (most recent available data).

Period	Number of Years	Wage Inflation	Price Inflation	Real Wage Growth
1959 - 2019	60	4.50%	3.69%	0.81%
1969 - 2019	50	4.53%	3.97%	0.57%
1979 - 2019	40	3.95%	3.21%	0.74%
1989 - 2019	30	3.36%	2.44%	0.91%
1999 - 2019	20	2.91%	2.19%	0.73%
2009 - 2019	10	2.88%	1.73%	1.15%

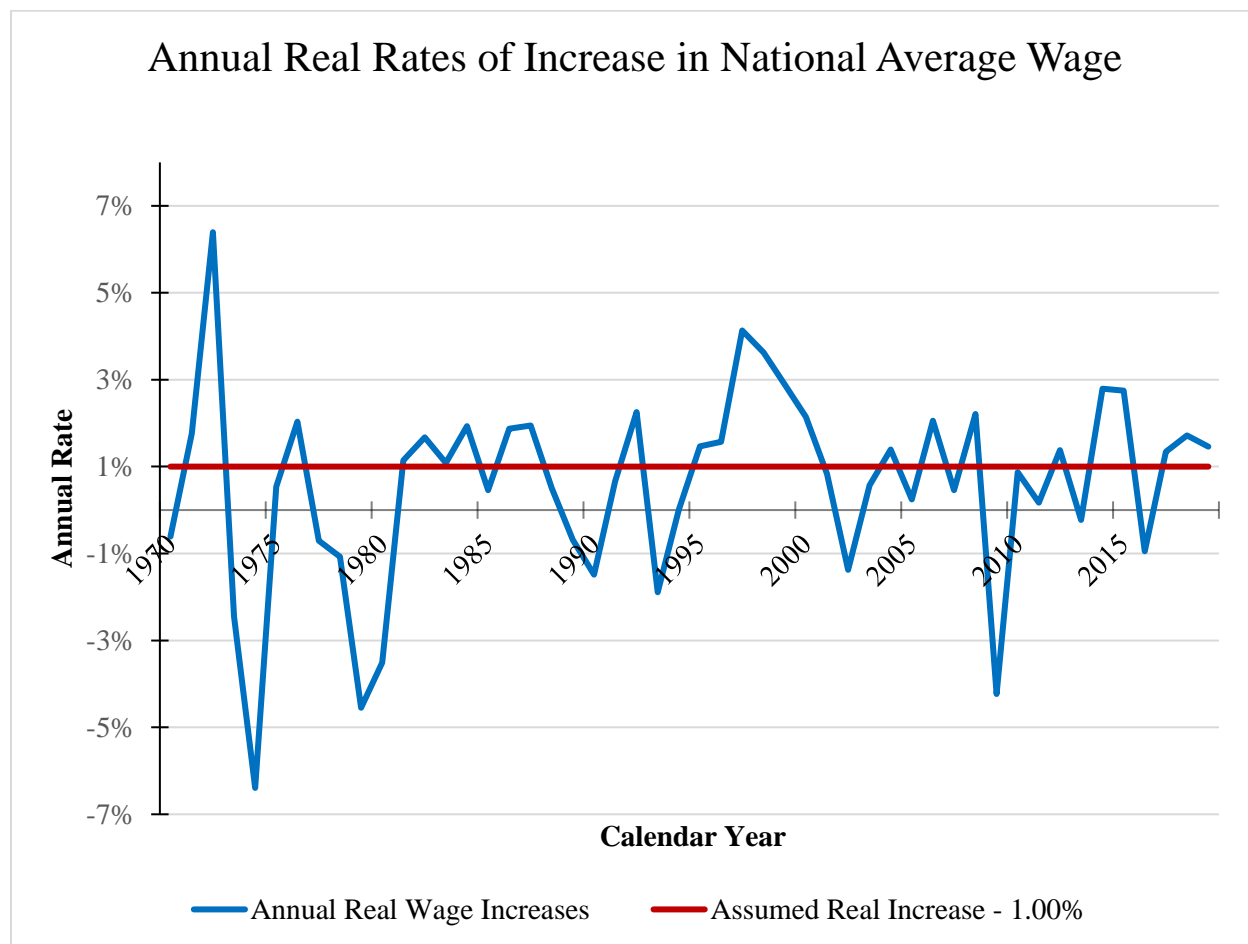
The excess of wage growth over price inflation represents the real wage inflation rate. Although real wage inflation has been very low in recent years, likely due to the recovery from the 2008 financial crisis, our focus must remain on the long term. The above table shows the compounded



Section II: Economic Assumptions

wage growth over various periods, along with the comparable price inflation rate for the same period. The differences represent the real wage inflation rate. The data for each year is documented in Appendix B.

Over the last 50 years, annual real wage growth has averaged 0.6%. The graph below shows the annual increases in real wage growth over the entire 50-year period.





Section II: Economic Assumptions

Over the study period, the plans experienced higher “across the board” real wage inflation increases than expected for all groups except JRS.

Calculation of Apparent Real Wage Inflation Over Study Period							
	State	Teachers	SPORS	VaLORS	JRS	Locals - Non LEOs	Locals - LEOs
1. Ultimate Rate* of Average Annual Salary Increase	2.81%	3.08%	5.41%	3.31%	1.59%	3.27%	4.21%
2. Actual Annualized Price Inflation	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
3. Apparent Real Wage Inflation (1 - 2)	1.11%	1.39%	3.71%	1.62%	-0.10%	1.57%	2.51%
Current Assumed Rate	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
* Ultimate Rate is the average annual rate for active members with at least 20 years of service							



Section II: Economic Assumptions

Average change in annual salaries above CPI-U show lower than expected salary increases compared to the table above.

Average Change in Annual Salaries							
Year	State	% Increase	Teachers	% Increase	SPORS	% Increase	CPI-U %
2003	\$37,763		\$38,336		\$45,756		
2004	\$38,837	2.84%	\$40,420	5.44%	\$46,781	2.24%	3.27%
2005	\$40,353	3.90%	\$41,740	3.27%	\$50,174	7.25%	2.53%
2006	\$42,383	5.03%	\$43,274	3.68%	\$52,224	4.09%	4.32%
2007	\$44,263	4.44%	\$45,290	4.66%	\$53,325	2.11%	2.69%
2008	\$46,112	4.18%	\$46,650	3.00%	\$55,327	3.76%	5.02%
2009	\$46,203	0.20%	\$48,136	3.19%	\$55,237	-0.16%	-1.43%
2010	\$46,222	0.04%	\$47,958	-0.37%	\$55,235	0.00%	1.05%
2011	\$48,619	5.18%	\$47,363	-1.24%	\$57,347	3.82%	3.56%
2012	\$48,681	0.13%	\$47,580	0.46%	\$55,390	-3.41%	1.66%
2013	\$48,972	0.60%	\$48,973	2.93%	\$54,449	-1.70%	1.75%
2014	\$50,902	3.94%	\$50,095	2.29%	\$55,845	2.56%	2.07%
2015	\$51,461	1.10%	\$50,720	1.25%	\$55,438	-0.73%	0.12%
2016	\$53,389	3.75%	\$51,449	1.44%	\$59,215	6.81%	1.00%
2017	\$53,967	1.08%	\$52,650	2.34%	\$58,589	-1.06%	1.63%
2018	\$55,803	3.40%	\$53,349	1.33%	\$67,121	14.56%	2.87%
2019	\$58,491	4.82%	\$54,955	3.01%	\$69,086	2.93%	1.65%
2020	\$58,992	0.86%	\$56,401	2.63%	\$68,220	-1.25%	0.65%
Average		2.68%		2.31%		2.46%	2.02%
Apparent Increase in Average Salaries above CPI-U		0.66%		0.29%		0.44%	



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Average Change in Annual Salaries									
Year	VaLORS	% Increase	JRS	% Increase	Locals - Non LEOs	% Increase	Locals - LEOs	% Increase	CPI-U %
2003	\$30,314		\$116,588						
2004	\$30,609	0.97%	\$119,188	2.23%					3.27%
2005	\$31,222	2.00%	\$125,300	5.13%					2.53%
2006	\$32,398	3.77%	\$130,818	4.40%					4.32%
2007	\$33,392	3.07%	\$136,054	4.00%					2.69%
2008	\$35,512	6.35%	\$146,811	7.91%					5.02%
2009	\$35,597	0.24%	\$148,952	1.46%					-1.43%
2010	\$35,550	-0.13%	\$149,561	0.41%					1.05%
2011	\$36,989	4.05%	\$149,541	-0.01%					3.56%
2012	\$36,728	-0.71%	\$149,889	0.23%					1.66%
2013	\$36,508	-0.60%	\$149,896	0.00%					1.75%
2014	\$37,407	2.46%	\$154,214	2.88%					2.07%
2015	\$37,460	0.14%	\$154,316	0.07%	\$40,725		\$50,596		0.12%
2016	\$38,730	3.39%	\$157,510	2.07%	\$41,754	2.53%	\$51,064	0.93%	1.00%
2017	\$38,902	0.44%	\$157,455	-0.04%	\$42,749	2.38%	\$51,772	1.39%	1.63%
2018	\$39,700	2.05%	\$162,078	2.94%	\$43,668	2.15%	\$52,784	1.96%	2.87%
2019	\$42,542	7.16%	\$166,338	2.63%	\$45,301	3.74%	\$55,346	4.85%	1.65%
2020	\$42,541	0.00%	\$166,445	0.06%	\$46,340	2.29%	\$56,850	2.72%	0.65%
Average		2.04%		2.14%		2.62%		2.37%	2.02%
Apparent Increase in Average Salaries above CPI-U		0.02%		0.12%		0.60%		0.35%	

Note that the amounts here differ from the previous table because we include average change for all active members, not just those with over 20 years. Taking both into account, 1% is a reasonable assumption.



Section II: Economic Assumptions

Long Term Perspective

To consider a longer, similar time frame, we looked at the expected increase in the real wage growth by the Office of the Chief Actuary for the Social Security Administration. In the most recent report (April 2020), the projected average annual increase in the CPI over the next 75 years was estimated to be 1.14%, under the intermediate cost assumption. The range of real wage growth assumptions used in the Social Security 75-year modeling, which includes a low and high-cost scenario, in addition to the intermediate cost projection, was 0.52% to 1.76% for 2020, as seen in the following chart.

Report year	Low-Cost	Intermediate-Cost	High-Cost
2020	1.76%	1.14%	0.52%
2019	1.84%	1.21%	0.60%
2018	1.82%	1.20%	0.58%
2017	1.82%	1.20%	0.58%
2016	1.83%	1.20%	0.58%
2015	1.80%	1.17%	0.55%



Section II: Economic Assumptions

Recommendation for Wage Inflation: As with price inflation, we again look at the 2020 OASDI Trustees Report. The Chief Actuary for Social Security bases the 75-year cost projections on an intermediate national wage growth assumption 1.14% greater than the price inflation assumption of 2.40%. We concur in general with a range of 0.52% - 1.76%. We recommend continued use of a real wage increase of 1.00% per year. The proposed real wage increase of 1.00% per year combined with the proposed price inflation assumption of 2.50% per year results in a recommendation of 3.50% for the wage inflation assumption.

Wage Inflation Assumption		
Current		3.50%
		Range
Real Wage Growth	0.52%	1.76%
Inflation	<u>2.25%</u>	<u>2.25%</u>
Total	2.77%	4.01%
Recommended		3.50%



DEMOGRAPHIC ASSUMPTIONS



DEMOGRAPHIC ASSUMPTIONS

There are several demographic assumptions used in the actuarial valuations performed for the divisions of the Virginia Retirement System. They are:

- Mortality
 - Post-retirement
 - Contingent Annuitant
 - Pre-retirement
 - Disabled
- Retirement
- Termination
- Disability Incidence
- Rates of Salary Increase for Merit and Promotions

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 35, “*Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*,” which provides guidance to actuaries in selecting demographic assumptions for measuring obligations under defined benefit plans. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP No. 35.

The purpose of a study of demographic experience is to compare what actually happened to the membership during the study period (July 1, 2016 through June 30, 2020) with what was expected to happen based on the assumptions used in the most recent actuarial valuations.

Studies of demographic experience generally involve three steps:

- First, the number of members changing membership status, called decrements, during the study is tabulated by age, duration, gender, group, and membership class (active, retired, etc.).
- Next, the number of members expected to change status is calculated by multiplying certain membership statistics, called exposure, by the expected rates of decrement.
- Finally, the number of actual decrements is compared with the number of expected decrements. The comparison is called the actual to expected ratio (A/E Ratio) and is expressed as a percentage.

In general, if the actual experience differs significantly from the overall expected results or if the pattern of actual decrements, or rates of decrement, by age, gender, or duration deviates significantly from the expected pattern, new assumptions are considered. Recommended revisions are normally not an exact representation of the experience during the observation period. Professional judgment is required to set assumptions for future experience from past trends and



Section III: Demographic Assumptions

current evidence, including a determination of the amount of weight to assign to the most recent experience.

The remainder of this section presents the results of the demographic study. Charts supporting our recommendation can be found in Section VI. These charts and graphs show a comparison of the actual and expected decrements and the overall ratio of actual-to-expected results under the current assumptions. In addition, we show a comparison of the results under the proposed assumptions.



MORTALITY

Mortality tables are a fundamental assumption in actuarial valuations. Benefits are typically paid over a retiree's lifetime, so it is important to appropriately reflect what a typical lifetime looks like. In addition, deaths before retirement typically result in the payout of benefits to a spouse or survivor. For this review, we considered the following mortality:

- Post-retirement – project the percentage of healthy participants in pay status expected to die each year
- Contingent Annuitant – project the percentage of spouses or survivors in pay status expected to die each year
- Pre-retirement – project the percentage of active employees expected to die each year
- Disabled – project the percentage of disabled retirees expected to die each year

Method

The current mortality assumption is based on a Margin approach on a headcount-weighted basis. We are recommending changing to a Generational Mortality approach on a benefits-weighted basis.

- Under the Margin approach life expectancy is static, while under the Generational approach life expectancy increases.
- Under the headcount-weighted basis experience is weighted relative to the number of members who die at a certain age, while under the benefits-weighted basis mortality experience is weighted based on the amount of benefits that is released from the plan per death at a certain age.

The Margin approach is based on standard mortality tables published by the Society of Actuaries (SOA), adjusted using various techniques to provide a better fit. Reflection of expected future mortality improvements then involves expecting fewer deaths than the mortality analysis would otherwise suggest. For example, in the last experience study the mortality tables were “adjusted to produce a 10% to 12% margin over the experience”. Said another way – we selected mortality tables that projected fewer deaths than what we observed.

Over the past four years, VRS has experienced consistent mortality gains across the larger plans. Given the Margin approach, we would expect gains in the first few years after the assumption is set, and as mortality improves, we would eventually – after several years – observe losses. If the Margin approach were to be continued, we would study the amount of margin and increase life expectancy even if gains had been observed with each experience study.



Section III: Demographic Assumptions

We are recommending changing to a Generational Mortality approach on a benefits-weighted basis. This method involves two steps:

- 1) Selecting a mortality table based on standard mortality tables published by the Society of Actuaries adjusted using various techniques such as age setbacks/set forwards and loads to provide a better fit BUT no adjustment for expected future mortality improvements. The mortality table selected is based on a benefits-weighted basis. Said another way, the age at death for retirees with larger benefits are weighted more than the age at death for retirees with smaller benefits. This weighting resulted in selecting tables with longer life expectancies than tables that would have been selected based on a head-count weighted basis.
- 2) Applying a “Mortality Projection” Scale which is an explicit assumption that future generations live longer than current generations. Beginning in 2014, the SOA has released an updated mortality improvement scale every year. We are proposing using the most recently released scale, MP-2020, adjusted to 75% of the standard rates. This adjustment results in improvements that are less than those suggested by the MP-2020 scale. We have suggested this adjustment because each year since 2014 the SOA has scaled back the amount of mortality improvement in subsequent Mortality Projection Scales.

Generational mortality tables tend to reflect actual life expectancies of plan members more accurately and since future mortality improvements are built into the tables future updates to the tables tend to be on a smaller scale. Incorporating generational mortality into the System’s mortality assumption increased liabilities on average 3.5%.

Tables

Along with changing the method used to determine the mortality assumptions, we are also recommending use of the Pub-2010 mortality tables that were released by the SOA in late-2018. These tables represent the first time the SOA has studied public plan experience separately from the private sector. Further, there are specific tables for teachers, public safety employees and general employees. Because these tables are geared toward the public sector, they allow us to use the standard version of the tables with fewer backend adjustments.

Changing the mortality table basis to the Pub-2010 benefits-weighted tables offset the increase from applying generational mortality 0.6% on average.



Section III: Demographic Assumptions

Experience

Subsections 1, 2, 3, and 4 of Section VI summarize the post-retirement, pre-retirement, disabled, and contingent annuitant mortality experience of the study period. The charts below summarize the experience by showing the ratio of the actual amount of benefits released for employees during the study period over the expected amount of benefits released for employees over the study period, compiled for males and females. In these charts, a ratio greater/(less) than 100% indicates that there were more/(fewer) benefits released than expected by the current assumption.

Post-retirement and contingent annuitant mortality are the biggest contributors to mortality experience in the plans.

The post-retirement mortality gains and losses over the study period are as follows and are consistent with our analysis of actual to expected:

Post-Retirement and Disabled Mortality Gain (Loss)					
(in millions)	2017	2018	2019	2020	Total Gain (Loss)
State	(35.6)	(29.1)	21.1	(26.4)	(70.0)
Teachers	(40.8)	5.1	59.3	6.9	30.5
VaLORS	1.0	0.3	0.0	0.1	1.4
SPORS	(4.4)	(8.1)	(5.0)	(7.7)	(25.2)
JRS	(4.1)	(4.3)	(7.2)	(2.2)	(17.8)
Locals (In Aggregate)	(27.5)	(35.4)	(29.4)	(52.9)	(145.2)

Division	POST-RETIREMENT MORTALITY			
	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	0.94	1.00	1.00	0.99
Teachers	1.02	1.00	1.00	1.00
JRS	0.70	0.95	0.36	0.52
Hazardous Duty	0.88	0.96	1.14	1.05
Locals Non Hazardous Duty	0.86	0.98	0.88	0.99

We would have anticipated experience gains over the study period due to the Margin approach. However, experience indicates that the current post-retirement mortality assumption primarily produced losses during the study period.



Section III: Demographic Assumptions

In past experience studies, mortality for judges was commingled with state employees, and we witnessed consistent losses on mortality for JRS since the last experience study. We separately analyzed mortality for judges and determined a mortality table with longer life expectancy than state employees was warranted.

The contingent annuitant mortality gains and losses over the study period are as follows and are consistent with our analysis of actual to expected:

Post-Retirement Contingent Annuitant Mortality Gain (Loss)					
(in millions)	2017	2018	2019	2020	Total Gain (Loss)
State	65.9	62.4	65.5	63.7	257.5
Teachers	31.3	29.2	45.7	53.6	159.8
VaLORS	4.4	4.3	4.6	6.2	19.5
SPORS	3.0	3.5	3.2	3.4	13.1
JRS	2.7	2.9	1.4	2.2	9.2
Locals (In Aggregate)	37.5	44.9	44.3	52.1	178.8

CONTINGENT ANNUITANT MORTALITY				
Division	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	1.25	1.04	1.13	1.05
Teachers	1.37	1.02	1.24	1.06
JRS	0.00	0.00	1.02	1.07
Hazardous Duty	4.17	2.91	1.05	0.99
Locals Non Hazardous Duty	0.86	0.93	0.99	1.05

In the past the same mortality assumption used for post-retirement mortality was also used for contingent annuitants. A new feature of the Pub-2010 tables is a contingent annuitant specific table. We propose using these tables for contingent annuitants. In most cases we have made assumptions that tie closely to the actual experience, but the data is not sufficient enough to be expected to closely predict mortality rates in the future for this group.



Section III: Demographic Assumptions

Charts summarizing the pre-retirement and disabled mortality are as follows:

PRE-RETIREMENT MORTALITY				
Division	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	0.93	0.93	1.20	1.10
Teachers	0.95	0.97	0.85	0.97
JRS	1.05	1.07	0.00	0.00
Hazardous Duty	0.85	0.99	1.13	1.05
Locals Non Hazardous Duty	1.07	1.11	1.21	1.08

DISABLED MORTALITY				
Division	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	1.00	0.99	0.97	0.97
Teachers	0.88	0.93	1.05	1.03
JRS	4.93	5.91	0.00	0.00
Hazardous Duty	0.59	0.84	0.30	0.57
Locals Non Hazardous Duty	1.02	0.98	1.02	0.95

As is typical with most large public pension plans, a small number of deaths occur, and thus a small amount of liability is released amongst the active and disabled member population during the experience period. We recommend changing the base tables to the Pub-2010 employee and disabled tables respectively and have applied minimal adjustments to better fit the experience.

For hazardous duty disability mortality, the Pub-2010 public safety tables suggest that hazardous duty disabilities do not impair life expectancy as much as the general population due to the less strict definition of disability which specifies disability related to current occupation rather than any occupation. In the past there was not sufficient data available when analyzing VRS data to come to that conclusion. While the actual amount of liability released due to disabled mortality was about two-thirds of what was expected it was still significantly more than the amount that would be expected with the Pub-2010 public safety disability mortality table. The actual experience was much more in line with the Pub-2010 general disability mortality table and we recommend this table which resulted in increased liabilities for hazardous duty members. In most cases we have made assumptions that tie more closely to the actual experience, but the data on its own is not sufficient to predict mortality rates in the future for these groups.



Section III: Demographic Assumptions

Recommendations

The current mortality assumption is based on a Margin approach on a headcount-weighted basis. We are recommending changing to a Generational Mortality approach on a benefits-weighted basis.

We recommend updating the base mortality table from RP 2014 to the Pub-2010 tables (with different plan groups using the appropriate table for their member population – teachers, public safety or general) which is the latest table produced by the Society of Actuaries.

We also recommend switching to a generational mortality approach and implementing the MP-2020 mortality improvement scale adjusted to 75% of the standard rates. In total the recommended changes to the mortality assumptions increased liabilities by 3.90%

The complete tables of recommended mortality rates are shown in the Appendix.



RETIREMENT

The retirement rates used in the actuarial valuations project the percentage of employees who are expected to retire during a given year. This assumption does not include the retirement patterns of individuals who terminated or became disabled from active membership prior to retirement. Rates are developed for eligibility for unreduced and reduced benefits.

Experience

Subsection 5 of Section VI summarizes the retirement experience on both an unreduced and reduced benefit basis for all members except for Plan 2 and Hybrid general employees and teachers. For the previous experience study, there was little experience for Plan 2 and Hybrid so we used the same rates as Plan 1 for these members. With emerging experience for Plan 2 and Hybrid retirements, we analyzed those members separately for general employees and teachers for this study period and developed separate rates on a combined basis (males and females together).

The charts below summarize the experience by showing the ratio of the actual number of retirements to the expected number of retirements as well as actual number of retirements to the proposed number of retirements for employees during the study period, compiled for males and females for all employees except SPORS and JRS. For SPORS and JRS we did not compile results split by males and females; we compiled results in total and display those combined results under the male results below. We have compiled statistics both “at” and “after” first eligibility (SPORS and JRS are compiled in total and displayed under “at” first eligibility). In these charts, a ratio greater/(less) than 100% indicates that there were more/(fewer) retirements than expected by the current assumption.



Section III: Demographic Assumptions

RETIREMENT RATES IF ELIGIBLE FOR AN UNREDUCED BENEFIT FIRST ELIGIBILITY				
Division	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	1.04	1.02	0.99	1.02
Teachers	0.98	1.00	1.11	1.00
VaLORS	1.15	1.10	1.04	1.06
SPORS	0.92	0.94	N/A	N/A
JRS	0.58	0.87	N/A	N/A
Top 10 Non Hazardous Duty	1.01	1.01	1.21	1.03
Top 10 Hazardous Duty	0.87	0.99	0.75	0.90
Non Top 10 Non Hazardous Duty	1.12	1.00	1.03	1.02
Non Top 10 Hazardous Duty	0.93	0.97	0.69	0.99

RETIREMENT RATES IF ELIGIBLE FOR AN UNREDUCED BENEFIT AFTER FIRST ELIGIBILITY				
Division	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	0.86	0.99	0.91	0.99
Teachers	0.91	0.99	0.97	0.98
VaLORS	0.68	0.97	0.72	0.96
SPORS	N/A	N/A	N/A	N/A
JRS	N/A	N/A	N/A	N/A
Top 10 Non Hazardous Duty	0.85	1.01	0.93	1.00
Top 10 Hazardous Duty	0.80	0.97	0.71	0.89
Non Top 10 Non Hazardous Duty	0.73	0.99	0.77	1.00
Non Top 10 Hazardous Duty	0.80	0.97	0.80	1.00

Experience indicates that the current retirement assumption produced gains in general for teachers, judges, and SPORS but mostly losses for State, VaLORS and Political Subdivisions.

The above rates are also used for all Plan 2 and Hybrid members except for general employees and teachers as noted on the next page.



Section III: Demographic Assumptions

This chart summarizes experience for Plan 2 and Hybrid on a combined male/female basis for the study period:

RETIREMENT RATES IF ELIGIBLE FOR AN UNREDUCED/REDUCED BENEFIT (PLAN 2 AND HYBRID)				
Division	FIRST ELIGIBILITY		AFTER FIRST ELIGIBILITY	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
	State	0.84	0.89	0.75
Teachers	0.93	0.98	0.77	0.98
Top 10 Non Hazardous Duty	0.79	0.88	0.92	0.96
Non Top 10 Non Hazardous Duty	0.93	0.99	0.60	0.97

Experience for Plan 2 and Hybrid indicates fewer retirements than expected. This group of members is currently a smaller subset of the total membership and thus has a minimal impact on the total gain/loss.

The retirement gain/loss for the study period is as follows and is consistent with our analysis of actual to expected:

(in millions)	Retirement Gain (Loss)				Total Gain (Loss)
	2017	2018	2019	2020	
State	9.0	(11.0)	(12.3)	(15.1)	(29.4)
Teachers	82.6	71.3	25.3	(6.4)	172.8
VaLORS	(11.6)	(14.5)	(13.8)	(11.1)	(51.0)
SPORS	2.4	0.8	0.0	0.3	3.5
JRS	6.2	5.8	6.8	2.7	21.5
Locals (In Aggregate)	(32.6)	(48.6)	(32.8)	(40.2)	(154.2)

Recommendations

We recommend adjusting the retirement rates to reflect the retirement experience more closely over the study period. This generally reduced the rates of retirement. We set rates such that the actual vs. proposed ratios are closer to 1.00 than the actual versus expected in the charts above as well as Subsection 5 of Section VI. In addition, we propose that the final retirement age, or the age when the rate of retirement is 100%, be extended to age 70 for hazardous duty and to age 80



Section III: Demographic Assumptions

for non-hazardous duty. For judges, where the mandatory retirement age is 73, we recommend keeping a final retirement age of 73.

The complete tables of recommended retirement rates are shown in the Appendix.



TERMINATION

The rates of termination are used to determine the expected number of separations from active service **not** due to disability, retirement or death.

Experience

Subsection 6 of Section VI summarizes the termination experience for 0-9 and 10+ years of service. The charts on the next page summarize the experience; they show the ratio of the actual number of terminations to the expected number of terminations for employees during the study period along with the ratio of the actual number of terminations to the proposed number of terminations for employees during the study period compiled for males and females for all employees except SPORS and JRS. We reviewed the structure of the termination rates to determine if the rates could be simplified and concluded that the complexity of the current structure is merited due to different eligibilities and different patterns of termination at various age and service combinations. Typically, terminations for the first 5 years are somewhat consistent across all age groups and merit the use of one select table. VRS experience suggests that rates of termination over the first ten years of a career decreases with hire age, meriting the complex structure. For SPORS, we compiled results in total and display those combined results under the male results; JRS does not currently utilize rates of termination and we recommend no change to that assumption.



Section III: Demographic Assumptions

In these charts, a ratio greater/(less) than 100% indicates that there were more/(fewer) terminations than expected under the current assumption.

TERMINATION RATES - 0-9 YEARS OF SERVICE				
Division	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	1.05	1.00	1.01	1.00
Teachers	1.14	1.00	1.15	1.00
VaLORS	1.16	1.00	1.21	1.00
SPORS	1.12	1.03	N/A	N/A
JRS	N/A	N/A	N/A	N/A
Top 10 Non Hazardous Duty	1.25	1.01	1.08	1.00
Top 10 Hazardous Duty	0.80	0.97	0.71	0.89
Non Top 10 Non Hazardous Duty	1.30	1.00	1.14	1.00
Non Top 10 Hazardous Duty	0.71	0.99	0.86	0.97

TERMINATION RATES - 10+ YEARS OF SERVICE				
Division	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	1.34	1.01	1.28	1.01
Teachers	1.20	1.05	1.33	1.09
VaLORS	1.24	1.08	1.60	1.09
SPORS	N/A	N/A	N/A	N/A
JRS	N/A	N/A	N/A	N/A
Top 10 Non Hazardous Duty	1.65	1.16	1.33	1.00
Top 10 Hazardous Duty	N/A	N/A	N/A	N/A
Non Top 10 Non Hazardous Duty	1.76	1.01	1.42	1.01
Non Top 10 Hazardous Duty	N/A	N/A	N/A	N/A



Section III: Demographic Assumptions

The termination gain/loss for the study period is as follows and is generally consistent with our analysis of actual to expected:

(in millions)	Termination Gain (Loss)				Total
	2017	2018	2019	2020	Gain (Loss)
State	(37.3)	(38.0)	(11.7)	(27.3)	(114.3)
Teachers	(116.5)	(107.5)	45.7	(41.9)	(220.2)
VaLORS	1.9	3.4	10.4	6.6	22.3
SPORS	1.2	(0.6)	(0.1)	(0.6)	(0.1)
JRS	0.0	0.0	0.0	(1.1)	(1.1)
Locals (In Aggregate)	2.2	(22.0)	2.4	(4.6)	(22.0)

When comparing the gain/loss analysis which shows consistent losses due to termination over the study period with the Actual versus Expected analysis which tends to indicate gains occurred, the results appear inconsistent. This can occur due to the combined effect of the interaction of termination and retirement decrements and if termination occurs more frequently in lower paid positions.

Recommendations

We recommend proposed termination rates which more closely reflect the termination experience over the study period. This generally reduced the rates of termination. We set rates such that in the actual versus expected charts in Subsection 6 of Section VI, the proposed rates will generate expected ratios that are closer to one than those developed under the current rates.

JRS does not currently utilize rates of termination and we recommend no change to that assumption.

The complete tables of recommended termination rates are shown in the Appendix.



DISABILITY INCIDENCE

The rates of disability incidence used in the actuarial valuation project the percentage of employees who are expected to become disabled each year.

Experience

Subsection 7 of Section VI summarizes actual versus expected disability experience. Since disability incidence is a low frequency event, the number of disabilities in each age and gender band is small. Therefore, we used data from the prior experience study as well as the current experience period to analyze the current rates. The chart below summarizes the experience; it shows the ratio of the actual number of disabilities to the expected number of disabilities for employees during the current and prior study periods along with the ratio of the actual number of disabilities to the proposed number of disabilities for employees during the current and prior study periods compiled for males and females for all employees except SPORS and JRS. For SPORS, we compiled results in total and display those combined results under the male results; JRS does not currently utilize rates of disability and we recommend no change to that assumption. In these charts, a ratio greater/(less) than 100% indicates that there were more/(fewer) disabilities than expected under the current assumption.

Division	DISABILITY RATES			
	MALES		FEMALES	
	Ratio of actual to expected	Ratio of actual to proposed	Ratio of actual to expected	Ratio of actual to proposed
State	0.89	0.89	0.89	0.89
Teachers	0.85	0.85	0.81	0.81
VaLORS	0.92	0.92	0.81	0.81
SPORS	0.87	0.87	N/A	N/A
JRS	N/A	N/A	N/A	N/A
Top 10 Non Hazardous Duty	0.71	0.71	0.71	0.71
Top 10 Hazardous Duty	0.77	0.77	0.77	0.77
Non Top 10 Non Hazardous Duty	0.82	0.82	0.78	0.78
Non Top 10 Hazardous Duty	0.82	0.82	0.85	0.85



Section III: Demographic Assumptions

Disability gains and losses for the study period are as follows:

(in millions)	Disability Gain (Loss)				Total
	2017	2018	2019	2020	Gain (Loss)
State	(2.9)	3.9	6.2	3.0	10.2
Teachers	(1.5)	4.4	11.9	13.5	28.3
VaLORS	(0.6)	0.7	2.0	0.1	2.2
SPORS	(0.8)	(0.6)	(0.4)	(1.1)	(2.9)
JRS	0.7	0.0	0.0	0.0	0.7
Locals (In Aggregate)	(11.4)	2.0	16.8	18.0	25.4

Disability experience generally produced gains over the study period except for SPORS where we saw small losses.

Recommendations

Using experience over the current and prior periods indicates there were fewer disabilities than expected, creating margin in the rates. The current rates are based on the prior experience study. We recommend retaining the current rates because we prefer maintaining a margin since the number of incidences is small, but the liability associated with an occurrence can be large. In addition, we removed the disability assumption for JRS in the last experience study and still consider this to be the appropriate assumption since JRS has not experienced a disability in several years.

The complete tables of recommended disability rates are shown in the Appendix.



RATES OF SALARY INCREASE FOR MERIT AND PROMOTIONS

Under the “building block” approach recommended in ASOP 27, the salary increase assumption is composed of three components: inflation, productivity (real wage increases), and merit/promotion. The inflation and productivity components are combined to produce the assumed rates of wage inflation. The rate represents the “across the board” average annual increase in salaries shown in the experience data. The merit component includes the additional increases in salary due to performance, seniority, promotions, etc.

Experience

Subsection 8 of Section VI summarizes actual versus expected salary experience for the study period. Like inflation and investment return, the salary increase assumption can have a significant impact on results. While recent experience has shown some increases less than the current assumption, we recommend caution when considering lowering this assumption. Proposed State budgets include salary increases for many VRS members which appear to be above those provided in recent years which could influence future results.

The current salary increase assumptions are based on the results of the last experience review. Experience was reasonably close to expected in total for all except JRS which has had salary increases lower than the assumed flat rate of 4.5% for several years. While other employee groups have salary assumptions structured based on age and service which incorporates increases associated with merit and promotions, judicial positions do not typically reflect the promotion component which leads to more across-the-board increases for these members which is reflected in a flat salary scale assumption.

Recommendations

We recommend no change in the rates of salary increase for all plans except JRS. We suggest lowering the assumption from 4.5% to 4.0% for JRS.

BENEFICIARY AGE DIFFERENCE

Deaths before retirement typically result in the payout of benefits to a spouse or other beneficiary. With certain payment forms, deaths after retirement will also result in payment of benefits to a beneficiary. The beneficiary age difference is used for estimating these benefits when the beneficiary date of birth is not available.



Section III: Demographic Assumptions

Experience and Recommendation

The current assumption is males are two years older than females. Based on the current data for all inactive members with a beneficiary date of birth on file, males are 2.3 years older than females on average; therefore, we recommend no change to the current assumption.



WORK-RELATED DEATH OR DISABILITY

A work-related death or disability occurs as the result of an occupational illness or injury on the job with the cause being determined to be compensable under the Virginia Workers’ Compensation Act. The benefits are different for work-related and non-work-related causes thus we need assumptions for determining the percentages related to each.

Experience and Recommendation

The current assumptions and experience are shown in the following table. We do not have data for work-related deaths thus we use the same assumption used for work-related disabilities. Based on the most recent data available, we recommend no changes to these assumptions.

Work-Related Death/Disability Assumption				
Division	Current	Experience		Proposed
		Disabilities During the Experience Period	All Disabilities	
State	25%	33.3%	25.7%	25%
Teachers	5%	3.2%	4.6%	5%
VaLORS	35%	42.9%	24.9%	35%
SPORS	85%	70.0%	82.5%	85%
JRS	5%	0.0%	0.0%	5%
Top 10 Non Hazardous Duty	20%	22.0%	21.6%	20%
Top 10 Hazardous Duty	70%	75.9%	66.9%	70%
Non Top 10 Non Hazardous Duty	15%	10.0%	11.9%	15%
Non Top 10 Hazardous Duty	45%	44.4%	43.3%	45%

ASSUMED PAYMENT FORM

The assumed payment form for all members is a modified cash refund annuity in which the total benefit received by a member and his or her estate cannot be less than the total contributions made by the member while he or she was an active participant.

Experience and Recommendation

In reviewing the data, approximately 70% of members in pay status elected the basic benefit payment option which is a life annuity with a modified cash refund; therefore, we find this an appropriate assumption to use for future members in pay status. For members in pay status, we



Section III: Demographic Assumptions

currently assume the modified cash refund will be in effect for two years after retirement for Judicial members and three years for all others. After reviewing the current contribution balances versus the annuity payments for current members in pay status, we find this assumption to still be valid and recommend no changes.

Modified Cash Refund Period (Years)			
Division	Current	Actual	Proposed
State	3	3.4	3
Teachers	3	3.3	3
VaLORS	3	3.2	3
SPORS	3	2.7	3
JRS	2	2.0	2
Political Subdivisions	3	3.3	3

TERMINATED VESTED MEMBER BENEFIT

Vested members who terminate employment before being eligible for retirement may elect to receive an annuity on their early or normal retirement date or withdraw their contributions at any time. Currently we assume all vested members will take an annuity on their normal retirement date. However, in some cases a refund of contributions would be more valuable to the member. We recommend assuming terminated vested members will elect a return of contributions or a deferred annuity, whichever is more valuable on the valuation date.

DECREMENT TIMING

“Decrement” is the actuarial term for the reason members leave the active population: termination, retirement, disability, or death. Currently, we expect decrements to occur at the beginning of the year. Based on actual dates of decrement, we recommend changing this so that decrements are assumed to occur at mid-year (which is an approximation for throughout the year) for all plans except Teachers. We found that for Teachers, decrements tend to occur near the valuation date and therefore beginning of year timing is still appropriate.



OPEB SPECIFIC ASSUMPTIONS



OPEB SPECIFIC ASSUMPTIONS

The valuation of the OPEB plans for VRS relies heavily on the assumptions used for pensions. For assumptions specific to OPEB benefits, the Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, “*Measuring Retiree Group Benefit Obligations*,” which provides guidance to actuaries in selecting economic, demographic, and coverage assumptions for measuring obligations of postemployment plans other than pensions. Additionally, ASOP No. 5, “*Incurred Health and Disability Claims*” and ASOP No. 18, “*Long-Term Care Insurance*” provide guidance. In our opinion, the OPEB specific assumptions recommended in this report have been developed in accordance with ASOPs No. 5, 6 and 18.

The assumptions specific to OPEB Benefits for VRS include the following:

- Group Life Insurance (GLI)
 - Life Only & ORP Retiree Benefit Estimation
- Line of Duty Act Fund (LODA)
 - Investment Rate of Return (reviewed with the Economic Assumptions in Section II)
 - Administrative Expenses (reviewed with the Economic Assumptions in Section II)
 - Percentage of Death and Disabilities Qualifying for Benefits
 - Percentage of Qualifying Deaths that are a Direct Result of the Performance of Duty
 - Spouse Participation Rates
 - Spouse Age Difference
 - Per Capita Health Care Costs, Including Health Care Inflation (Trend)
- Health Insurance Credit Program (HIC)
 - Benefit Election
 - Benefit Utilization
 - Terminated Vested Member Withdrawals and Retirement Age
 - Asset Valuation Method
- Virginia Sickness and Disability Program (VSDP)/Virginia Local Disability Program (VLDP) LTD*
 - Benefit Offsets
 - Rates of Disability Claim Termination
 - Catastrophic Claims
 - VLDP Defined Contribution Benefit Utilization
- Virginia Sickness and Disability Program (VSDP)/Virginia Local Disability Program (VLDP) LTC*
 - Morbidity, Claim Incidence, Porting Rates
 - Porting Premiums

*Until adequate experience emerges, most VLDP calculations are based upon the actuarial assumptions and methods used in the actuarial valuation of the VSDP benefit.



Section IV: OPEB Specific Assumptions

The impact of the COVID-19 pandemic was considered in this experience review however no explicit changes were incorporated at this time due to the level of uncertainty regarding the effect of the pandemic on both health care costs and decremental experience such as mortality, retirement and disability. We have considered available information but do not believe that there is yet sufficient data to warrant the further modification of any of the assumptions other than to retain margin in certain assumptions such as disability incidence and presumptive approval for LODA benefits and claims incidence, morbidity and porting rates for VSDP and VLDP benefits. We will continue to monitor the situation as data emerges and advise the Board in the future of any adjustments that we believe would be appropriate.

The remainder of this section is devoted to our recommendations. More detail regarding our recommendations may be found in Section VII of this report.



GLI – LIFE ONLY RETIREE & ORP BENEFIT ESTIMATION

Currently, results include an estimate of retiree liability for those groups not providing retiree census data. A liability equaling 10% of the active employee liability times the average retiree to active liability ratio is assumed.

Experience and Recommendation

We recommend the estimation of liability for the Life Only group to be based on actual benefit payments for this group provided by Securian for the last three years of information. We found that the Insurance Amount paid for the Life Only group was 1.618% of the amounts paid for all other groups (see Section VII for more details). Therefore, we will implement this percentage to estimate the Life Only group retiree liability, and closely monitor new incoming Securian payment information for any changes and update, if necessary, in the next experience study. Due to the inability to fully narrow the ORP group by the Securian actual benefit payments we were provided, we recommend making no changes to this assumption for the ORP group.



LODA FUND – PERCENTAGE OF DEATH AND DISABILITIES QUALIFYING FOR BENEFITS

To qualify for LODA benefits, the qualifying death or disability must occur in the line of duty as the direct or proximate result of performance of duty, including presumptions as applicable (respiratory diseases, hypertension, infectious diseases, certain cancers and heart disease). These assumptions estimate the percentage of disabilities and deaths that are qualifying deaths or disabilities.

Experience and Recommendation

We recommend increasing this assumption for most groups based on actual experience and taking into consideration line of duty assumptions for the pension plans. Actual LODA experience is limited, so we are including a margin for additional qualifying presumptions to be added as well as any future COVID-19 impact on disabilities (see Section VII for more details). The current rates and the proposed rates are as follows:

LODA Fund Qualifying Disability Percentage		
Group	Current	Proposed
State	10%	25%
SPORS	70%	85%
VaLORS	10%	35%
Non-Top 10 LEOs	65%	65%
Top 10 LEOs	70%	70%

LODA Fund Qualifying Death Percentage		
Group	Current	Proposed
State	20%	25%
SPORS	50%	85%
VaLORS	20%	35%
Non-Top 10 LEOs	20%	45%
Top 10 LEOs	35%	70%



**LODA FUND – PERCENTAGE OF QUALIFYING DEATHS THAT ARE A
DIRECT RESULT OF THE PERFORMANCE OF DUTY**

The LODA fund provides the following death benefits. Amounts vary as follows:

- \$100,000 when a death occurs as the direct or proximate result of performing duty as of January 1, 2006, or after.
- \$25,000 when the cause of death is attributed to one of the applicable presumptions and occurred earlier than five years after the retirement date.

This assumption is to determine the percentage of deaths that are a result of direct or proximate cause.

Experience and Recommendation

The current assumption is 42% of death benefit payments are paid as a direct or proximate result of duties. Based on emerging experience (see Section VII for more details), we recommend changing this assumption to 50%.



LODA FUND – SPOUSE PARTICIPATION RATES

To estimate spouse benefits we need to estimate the spouse participation rate for members eligible for LODA benefits.

Experience and Recommendation

The current assumption is 67% of service-related deaths and 80% of service-related disabilities are assumed to result in spouse coverage. Based on emerging experience (see Section VII for more details), we recommend changing the percentage of service-related deaths and disabilities resulting in spouse coverage to 80%. The current rates and the proposed rates are as follows:

LODA Fund Spouse Participation Rates		
	Current	Proposed
Deaths with Spouse	67%	80%
Disabs with Spouse	80%	80%

LODA FUND – SPOUSE AGE DIFFERENCE

To estimate spouse benefits we need to estimate spouse age for members eligible for LODA benefits.

Experience and Recommendation

The current assumption is wives are assumed to be three years younger than husbands. We found that on average wives are 2.496 years younger than their husbands. As a result, we do not recommend changing the assumption for spouse age.



LODA FUND
PER CAPITA HEALTH CARE COSTS, INCLUDING HEALTH CARE INFLATION
(TREND)

Health care premium amounts are provided by DHRM. The initial per capita health care costs are expected to increase each year with health care trend. Annually, we review this trend assumption and adjust accordingly.

For LODA, health care cost trend rates are needed to project the future cost of providing health care benefits and Medicare Part B premiums.

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, “Measuring Retiree Group Benefit Obligations,” which provides guidance to actuaries in selecting economic assumptions for measuring obligations of post-retirement plans other than pensions. The actuary should not consider aging of the covered population when selecting the trend assumption for projecting future costs, but should consider the following key components in setting the health care cost trend rate as noted in ASOP No. 6:

- inflation
- medical inflation
- definition of covered charges
- frequency of services
- leveraging caused by plan design features not explicitly modeled
- plan participation

When setting assumptions for projecting medical and prescription drug costs, we assume the health benefit plan cost trend rates will decrease from an initial rate to an ultimate level. Our methodology for setting the initial trend rate includes the use of published annual health care inflation surveys in conjunction with actual plan experience, where credible. The initial trend rate assumption is subject to continued update and review with each valuation performed given the volatile nature of medical and prescription drug costs. There are various approaches used to determine the timing and level of decreases to the ultimate trend rate. The assumed decrease in medical and prescription drug trend rates reflects the belief that health care inflation cannot indefinitely outstrip the growth rate of employer budgets and the overall economy. As a standard of practice, we typically assume a grading period of five to ten years, depending on the level of change (i.e., larger differences between the initial trend rate and the ultimate trend rate are assumed to require a longer reduction period). For the ultimate trend assumption, we look to the “Long-Term Projection Assumptions for Medicare and Aggregate National Health Expenditures” published by Center for Medicare and Medicaid Services on April 22, 2020, which states that:



Section IV: OPEB Specific Assumptions

“One way of analyzing health spending trends is to compare the growth rate of the U.S. health sector with that of the overall economy. Using a definition of “excess cost growth” as the difference between (i) the U.S. per capita growth rate in health-care costs adjusted for demographic factors and (ii) the per capita growth rate in GDP (both in constant dollars), average excess cost growth rates for national health expenditures (NHE) exhibit some volatility depending on which time periods are used for defining averages, but over the long run this differential has for extended periods been above 2 percent per year or just slightly below this level.”

As a standard of practice, we believe the use of a “GDP+1.5%” to “GDP+2.5%” assumption is reasonable and we typically assume an ultimate trend rate of price inflation +2.0% to +2.5%. As with any standard of practice, the specifics of each plan are reviewed to ensure there is nothing unusual that would necessitate a long-term trend rate that is either higher or lower than what is typical. It appears to be reasonable to use an ultimate rate of 4.50% or 4.75%, as there appears to be nothing unusual about the LODA Plan that would necessitate a long-term trend that is either higher or lower than what is typically used for this type of calculation.

Experience and Recommendation

In our opinion, the economic assumptions determined in this report have been developed in accordance with ASOP No. 6. Currently, the health care trend rates are set on an annual basis based on the short-term information and data as previously described, with an ultimate trend rate of price inflation plus excess cost growth that is reached after an appropriate grading period.



Section IV: OPEB Specific Assumptions

HIC – BENEFIT ELECTION

Not all eligible retirees and disabled members elect to receive the HIC benefit. As such, an assumption needs to be made for benefit election.

Experience and Recommendation

The current assumptions for benefit election are as follows:

- Eligible future service retirees from active status – HIC State and Teachers - 95%, HIC Locals and Special Coverage Codes – 85%
- Eligible future disabled members from active status - State/JRS – 95%, Teachers – 90%, SPORS/VaLORS – 75%, Locals and Special Coverage Codes – 45%
- Eligible future service retirees from terminated vested status based on the following:

Current Assumption								
Groups	Year of Retirement							
	1	2	3	4	5	6	7	8+
State/JRS, Teachers, SPORS/VALORS, and Locals/Special Coverage Codes	55%	65%	70%	75%	80%	85%	90%	95%

Based on experience over the study period, the current benefit election assumption for eligible future service retirees from active status is appropriate (see Section VII for more details).

We recommend adjusting the assumption for future disabled members for the SPORS/VaLORS group from 75% to 80% based on an actual rate of roughly 84% and the assumption for the Locals group from 45% to 50% based on an actual rate of roughly 50%. We found the rest of the future disabled member assumptions to be appropriate (see Section VII for more details). The current and proposed assumption for future disabled members is as follows:

HIC Eligible future disabled members			
Group	Current	Proposed	
State/JRS	95%	95%	
Teachers	90%	90%	
SPORS/VaLORS	75%	80%	
Locals/Special Coverage Codes	45%	50%	



HIC – BENEFIT ELECTION (CONTINUED)

For eligible future service retirees from terminated vested status, we recommend a flat percentage rate as opposed to increasing rates based on years of retirement. We found that the rate increases roughly 2% from the first year to the eighth year (see Section VII for more details); therefore, we believe it is appropriate to change this assumption to mirror the assumption for eligible future service retirees from active status. See below for the assumption for future service retirees from terminated vested status:

HIC Eligible Future Service Retirees from Terminated Vested Status – State & Teacher		
Years of Retirement	Current	Proposed
1st Year	55%	95%
2nd Year	65%	95%
3rd Year	70%	95%
4th Year	75%	95%
5th Year	80%	95%
6th Year	85%	95%
7th Year	90%	95%
8th Year & Beyond	95%	95%

HIC Eligible Future Service Retirees from Terminated Vested Status – Locals & Special Coverage Codes		
Years of Retirement	Current	Proposed
1st Year	55%	85%
2nd Year	65%	85%
3rd Year	70%	85%
4th Year	75%	85%
5th Year	80%	85%
6th Year	85%	85%
7th Year	90%	85%
8th Year & Beyond	95%	85%



HIC – BENEFIT UTILIZATION

Not all eligible retirees and disabled members electing HIC benefits receive the maximum HIC benefit for which they are eligible. As such, assumptions need to be made regarding utilization. The HIC utilization assumption is composed of three components:

1. Percentage of members electing HIC benefits but not receiving the full amount
2. Percentage of full benefit received
3. Increase in partial benefit over time

Experience and Recommendation

The rate of members electing less than the full benefit election rate during the study period indicates the assumption percentage of members electing HIC but not receiving the full amount should be updated. We recommend the following changes:

Group	Less Than Full Benefit Actual Election Rate	Current Assumptions	Proposed Assumption
State/JRS	6%	10%	5%
Teachers	15%	20%	15%
SPORS/VaLORS	6%	20%	10%
Locals/Special Coverage Codes	7%	10%	5%

Members who are assumed to utilize less than the full benefit are assumed to utilize 70% of the maximum benefit. We found that this rate was roughly 67% for State/Teacher groups and 63% for Locals & Special Coverage (see Section VII for more details); therefore, we are not recommending changes to this assumption.



HIC – BENEFIT UTILIZATION (CONTINUED)

The increase in partial benefit over time should be updated for the first year. We found that the experience indicated closer to a 4.50% assumption for the first year, with the second, third, and four or more years to still be appropriate. The current and proposed assumptions are as follows:

Current Increase Assumptions				
	Years after Retirement			
	1	2	3	4+
All VRS Groups	6.50%	4.25%	4.25%	3.00%

Proposed Increase Assumptions				
	Years after Retirement			
	1	2	3	4+
All VRS Groups	4.50%	4.25%	4.25%	3.00%



HIC – TERMINATED VESTED MEMBER WITHDRAWALS

Vested members who terminate employment before being eligible for retirement may withdraw their contributions with VRS but are no longer eligible to receive HIC benefits. To receive a pension benefit and an HIC benefit, vested members must elect to leave their contributions with VRS.

Experience and Recommendation

The percentage of future vested members who terminate employment before being eligible for retirement who are assumed to withdraw from VRS is as follows:

Group	Current Assumptions
State/JRS	50%
Teachers	35%
SPORS/VaLORS	70%
Locals/Special Coverage Codes	45%

Based on experience over the study period, we recommend an adjustment to the assumed percentage of terminated vested members who withdraw and lose eligibility for HIC benefits at retirement (see Section VII for detailed charts). Generally, we are recommending a decrease in the assumed withdrawal percentage for members over age 50 at termination and an increase in the assumed withdrawal percentage for members under age 50 at termination. The proposed assumption is as follows:

Group	Proposed Assumptions	
	Under Age 50	Over Age 50
State/JRS	75%	35%
Teachers		
SPORS/VaLORS	90%	55%
Locals/Special Coverage Codes	85%	50%



HIC – TERMINATED VESTED MEMBER RETIREMENT AGE

For those who terminate employment before being eligible for retirement who elect to leave their contributions with VRS, a retirement assumption must be made.

Experience and Recommendation

The following retirement ages are currently being used for the valuation for terminated vested members:

Group	Current Assumption
State/JRS/Teachers/Political Subdivisions/Special Coverage Plan 1 Members Plan 2 and Hybrid Plan Members Born prior to 1938 Born after 1937 and before 1960 Born after 1959	 60 60 61 62
SPORS/VaLORS Members with less than 25 years of service Members with 25 or more years of service	 55 50

For Political Subdivisions and Special Coverage Groups, eligible deferred vested members with LEOs/Fire Pension Benefit Coverage are assumed to receive benefits at age 55 (if the member has less than 25 years of service at retirement) and at age 50 (if the member has 25 or more years of service at retirement).

Based on experience over the study period, we found that the current assumption remains appropriate.



HIC – ASSET VALUATION METHOD

For the Political Subdivisions and Special Coverage Groups the method of asset valuation is market value.

Experience and Recommendation

We recommend continuing to use market value as the method of asset valuation. Typically, we recommend using a smoothed value of assets when the funded ratio increases in order to lower contribution volatility due to annual investment gains and losses and to instead smooth in these gains and losses over a five-year period. For these plans, however, assets are small enough compared to liabilities that there is little inherent contribution volatility due to annual investment performance. As such, there is little to be gained from switching asset valuation methods at this time. This is a method that should be considered each time an experience study is performed.



VSDP/VLDP – BENEFIT OFFSETS

LTD income replacement benefits are adjusted for other disability benefits paid and/or other income received, which reduce the full LTD income replacement. An assumption is made with respect to these benefit offsets.

Experience and Recommendation

During the study period, benefit offset rates for newly disabled members increased (percent of full income replacement benefit decreased) while offset rates for members who have been disabled for more than two years decreased (percent of full income replacement benefit increased). We recommend small adjustments to the current assumption based upon this experience. Since the data regarding offsets has been steadily improving and we anticipate continued improvement in the offset data, we recommend monitoring this assumption annually.

Percentage of Full LTD Income Replacement Benefit Paid

Year of Long-Term Disability	Average Percentage of Full Benefit Paid	Current Assumption	Proposed Assumption
1	70.9%	72.3%	71.0%
2	56.6%	57.5%	57.0%
3	51.7%	46.5%	52.0%
4	49.1%	40.3%	49.0%
5	41.7%	36.7%	42.0%
6-9	35.5%	34.2%	35.0%
10-13	42.6%	40.4%	43.0%
14	45.1%	41.1%	45.0%
15+	50.9%	45.0%	51.0%



VSDP/VLDP – BENEFIT OFFSETS (CONTINUED)

We also reviewed the likelihood of existing beneficiaries without benefit offsets receiving them in the future and the resulting level of expected LTD benefit payment. Based on our review, we recommend small adjustments in assumed rates in which those without offsets are assumed to eventually receive an offset and the average percentage of full benefit paid if in receipt of offsets. See Section VII for more details.

Probability of receiving a benefit offset in the future if not in current receipt and expected VSDP benefit payment amount

Year of Long-Term Disability	Percentage of Beneficiaries Receiving Offsets in the Next Year if Currently Not in Receipt		Average Percentage of Full Benefit Paid if in Receipt of Offsets	
	Current Assumption	Proposed Assumption	Current Assumption	Proposed Assumption
1	35.0%	36.0%	25.0%	27.0%
2	30.0%	27.0%	26.0%	26.0%
3	24.0%	23.0%	27.0%	26.0%
4	14.0%	16.0%	27.0%	26.0%
5	14.0%	14.0%	27.0%	26.0%
6	9.2%	9.0%	27.0%	26.0%
7	6.3%	4.0%	27.0%	26.0%
8+	0.0%	0.0%	30.0%	30.0%



VSDP/VLDP LTD – RATES OF DISABILITY CLAIM TERMINATION

Claim termination rates are the rates at which those on long-term disability (LTD) are assumed to stop receiving VSDP/VLDP LTD income replacement benefits due to recovery or death.

Experience and Recommendation

We propose use of the standard presented by the American Academy of Actuaries Group Long-Term Disability Work Group to the National Association of Insurance Commissioners. This includes the use of the 2012 Group Long-Term Disability Valuation Table (2012 GLTD) as adopted by NAIC April 1, 2014. We have adjusted these rates for recent experience. See Section VII for more details.

	Current Assumption		Proposed Assumption	
Elimination Period	Six Months		Six Months	
Definition of Disability	Own Occupation		Own Occupation	
<i>First 24 Months of Disability</i>	Any Occupation		Any Occupation	
<i>Months 25+ of Disability</i>				
Initial Maximum Guaranteed Benefit*	\$1,900		\$1,900	
Cause of Disability	No Diagnosis		No Diagnosis	
Margin for Recovery	15%		15%	
Margin for Deaths	28%		28%	
Experience Adjustment Factors				
<i>Month of Disability</i>	Male	Female	Male	Female
4-24	0.904	0.907	0.852	0.803
25-60	0.891	0.943	0.811	0.821
61-120	1.052	1.025	1.164	1.184
121 and over	1.021	0.999	1.073	1.126



VSDP/VLDP LTD – CATASTROPHIC CLAIMS

LTD income replacement benefits are higher if disability is determined to be catastrophic

- 80% income replacement level vs. the standard 60%

Experience and Recommendation

Approximately 7% of participants over the past four years had catastrophic coverage. Therefore, $7\% * 80\%$ catastrophic coverage + $93\% * 60\%$ standard coverage = 61.4%, which we rounded up to 62% for conservatism. See Section VII for more details.

Experience	Current Assumption	Proposed Assumption
61.4%	61%	62%



VLDP LTD DEFINED CONTRIBUTION BENEFIT UTILIZATION

Experience and Recommendation

Based on our review of the percentage of members receiving an additional 1% employer contribution, we recommend decreasing the defined contribution utilization assumption from 70.5% to 65%.

Year	Percentage Receiving Additional 1% Employer Contribution
2017	65.8%
2018	66.2%
2019	65.7%
2020	63.3%
Proposed	65.0%



VSDP/VLDP LTC – MORBIDITY, CLAIM INCIDENCE, PORTING RATES

Experience and Recommendation

The purpose of the long-term care (LTC) benefit under VSDP/VLDP is to provide members financial assistance towards long-term care services needed as a result of a catastrophic illness, injury or aging. Specifically, the LTC benefit under VSDP/VLDP provides a \$96 per day indemnity benefit to reimburse qualified nursing home and assisted living costs. Additional LTC benefits are provided for qualified home health care services (50% of the nursing home daily benefit amount) and informal care (25% of the nursing home daily benefit amount).

The valuation of the LTC benefit under VSDP/VLDP utilizes assumptions for LTC claims incidence and morbidity as well as porting rates. Our analysis included claims projections based on current assumptions versus actual claims experience over the four-year study period. This shows higher expected claims than those actually experienced due to higher assumed rates of morbidity, claims incidence and porting rates than those actually experienced.

We prefer maintaining a significant margin in these rates since incidence rates are small, but the liability associated with an occurrence can be large. In addition, we prefer maintaining a margin for uncertainty of future morbidity due to the impact of COVID-19.

The current assumptions for LTC claims incidence, morbidity and porting rates have been maintained since CMC started valuing LTC benefits beginning with the June 30, 2015 valuation. In the prior experience study for the period ending June 30, 2016, no adjustments were made due to the limited data. For this experience study, as described above and as shown in Section VII, we reviewed the appropriateness of the current rates, which appear to fit expectations and maintain margin. Therefore, we recommend making no changes to the current assumed rates.



VSDP/VLDP LTC – PORTING PREMIUMS

While actively employed or receiving LTD benefits, a member receives coverage in the amount currently in place for the entire actively employed group. Upon termination of employment, a member has the option to port the amount of current coverage for the group by paying a premium. If a member elects to continue coverage, the member will pay the premiums directly to the Long Term Care Group, Inc. and will qualify for the same benefits and must meet the same eligibility requirements when submitting a claim for covered services.

Experience and Recommendation

The current assumptions for LTC porting premiums have been maintained since CMC started valuing LTC benefits beginning with the June 30, 2015 valuation. In the prior experience study for the period ending June 30, 2016, no adjustments were made due to the limited data. For this experience study, our analysis consisted of comparing actual LTC benefit costs for ported members to actual porting premiums paid over the four-year experience period as well as projecting future benefit costs for current ported members and comparing these costs to projected future ported premiums. This analysis shows that current porting premiums are expected to be sufficient to cover benefit costs for ported members.

Therefore, we recommend making no changes to the current ported premiums. See Section VII for more details.



ACTUARIAL METHODS AND FUNDING POLICY



Employer Contribution Rate

Employer contribution rates are set on odd year valuations and are effective for the two-year period beginning one year after the valuation date. For example, the June 30, 2021 valuation will set the employer contribution rates for the period July 1, 2022 through June 30, 2024, or fiscal years ending 2023 and 2024. Even year valuations are performed for informational purposes. While most public plans in the United States reset employer contribution rates annually, resetting rates every two years is reasonable.

The recommended employer contribution rate consists of six pieces which are shown below:

- **Employer Normal Cost Rate** - The ongoing annual cost of active employees accruing benefits under the plan. This rate is net of the member contribution rate. The normal cost is developed using the entry age normal cost method, which develops normal costs for active members which stay level during their career if benefit provisions are unchanged and assumptions are realized.
- **Amortization Charge** - The amortization of, or payment towards, the unfunded actuarial accrued liability (UAAL) for the year. The UAAL is the amount by which the actuarial value of assets falls short of, or exceeds, the actuarial accrued liability for this plan. Under the funding arrangement adopted by the Board, the UAAL is being amortized as individual layered bases. The legacy UAAL, which is the UAAL as of June 30, 2013, is amortized over a closed 30-year period beginning June 30, 2013. The amortization period of the legacy UAAL will decrease by one in each subsequent valuation until reaching 0 years. The actuarial gains and losses and other changes in the UAAL due to benefit and actuarial assumption and method changes for each valuation subsequent to the June 30, 2013 valuation will be amortized over a closed 20-year period. The amortization of the UAAL assumes that payroll will increase by 3% annually and the amortization period will decrease by one year until reaching 0 years.
- **Administrative Expenses** - An estimate of the administrative expenses to be paid out of the trust in the upcoming fiscal year.
- **Additional Funding Contribution** - The additional contribution rate needed for political subdivision plans to allow for the use of the 6.75% investment return as the single equivalent investment return assumption for purposes of the GASB 67/68 statements.
- **Plan Surcharge** - The additional contribution rate applied to political subdivision plans with low funding levels to bring the plan to a more sustainable funding position as determined by the Plan Actuary. Currently this entails not reducing contributions for political subdivisions for which the funded ratio is below 75%.
- **DC Contribution for Hybrid Members** - 1% mandatory employer contribution as well as an estimate of the employer match to the voluntary contributions made to the DC plan by Hybrid Plan members.

In addition to ongoing contributions, the funding policy stipulates that any new political subdivision employer must have a funded status of at least 75%. Any past service that is granted



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by the employer or purchased at the time the employer joins VRS must be at least 75% funded at the join date with the remaining amount amortized over no more than 10 years.

Actuarial Cost Method

The systematic financing of a pension plan requires that contributions be made in an orderly fashion while a member is actively employed, so that the accumulation of these contributions, together with investment earnings should be sufficient to provide promised benefits and cover administration expenses. The actuarial valuation is the process used to determine when money should be contributed, i.e., as part of the budgeting process.

The actuarial valuation will not impact the actual amount of benefits paid which is the true cost of the plan. In the long run, actuaries cannot change the costs of the pension plan, regardless of the funding method used or the assumptions selected. However, the choice of actuarial methods and assumptions **will** influence the incidence of costs.

The valuation, or determination of the present value of all future benefits to be paid by the System, reflects the assumptions that best seem to describe anticipated future experience. The choice of a funding method does not impact the determination of the present value of future benefits. The funding method determines only the incidence or allocation of cost. In other words, the purpose of the funding method is to allocate the present value of future benefits determination into annual costs. In order to do this allocation, it is necessary for the funding method to “break down” the present value of future benefits into two components: (1) that which is attributable to the past (2) and that which is attributable to the future. The excess of that portion attributable to the past over the plan assets is then amortized over a period of years. Actuarial terminology calls the part attributable to the past the “past service liability” or the “actuarial accrued liability”. The portion of the present value of future benefits allocated to the future is commonly known as the “present value of future normal costs”, with the specific piece of it allocated to the current year being called the “normal cost”. The difference between the plan assets and actuarial accrued liability is called the “unfunded actuarial accrued liability”.

Two key points should be noted. First, there is no single “correct” funding method. Second, the allocation of the present value of future benefits, and hence cost, to the past for amortization and to the future for annual normal cost payments is not necessarily in a one-to-one relationship with service credits and benefits earned in the past and the future.

There are various actuarial cost methods, each of which has different characteristics, advantages and disadvantages. However, Governmental Accounting Standard Board Statement Numbers 67 and 68 require that the Entry Age Normal cost method be used for financial reporting. Most systems do not want to use a different actuarial cost method for funding and financial reporting. In addition, the Entry Age Normal method has been the most common funding method for public systems for many years. This is the cost method currently used by VRS.

The rationale of the Entry Age Normal (EAN) cost method is that the cost of each member’s benefit is determined to be a level percentage of his salary from date of hire to the end of his



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employment with the employer. This level percentage multiplied by the member's annual salary is referred to as the normal cost and is that portion of the total cost of the employee's benefit which is allocated to the current year. The portion of the present value of future benefits allocated to the future is determined by multiplying this percentage times the present value of the member's assumed earnings for all future years including the current year. The Entry Age Normal actuarial accrued liability is then developed by subtracting from the present value of future benefits the portion of costs allocated to the future. To determine the unfunded actuarial accrued liability, the value of plan assets is subtracted from the Entry Age Normal actuarial accrued liability. The current year's cost to amortize the unfunded actuarial accrued liability is developed by applying an amortization factor.

It is to be expected that future events will not occur exactly as anticipated by the actuarial assumptions in each year. Actuarial gains/losses from experience under this actuarial cost method can be directly calculated and are reflected as a decrease/increase in the unfunded actuarial accrued liability. Consequently, the gain/loss results in a decrease/increase in the amortization payment, and therefore the actuarial contribution rate.

Considering that the Entry Age Normal cost method is (1) the most commonly used cost method by public plans, (2) develops a normal cost rate that tends to be stable and less volatile, and (3) is the required cost method under calculations required by Governmental Accounting Standard Numbers 67 and 68, **we recommend the Entry Age Normal actuarial cost method be retained.**

Actuarial Value of Assets

In preparing an actuarial valuation, the actuary must assign a value to the assets of the fund. An adjusted market value is often used to smooth out the volatility that is reflected in the market value of assets. This is because most employers would rather have annual costs remain relatively smooth, as a percentage of payroll or in actual dollars, as opposed to a cost pattern that is extremely volatile.

The actuary does not have complete freedom in assigning this value. The Actuarial Standards Board also has basic principles regarding the calculation of a smoothed asset value, Actuarial Standard of Practice No. 44 (ASOP 44), *Selection and Use of Asset Valuation Methods for Pension Valuations*.

ASOP 44 provides that the asset valuation method should bear a reasonable relationship to the market value. Furthermore, the asset valuation method should be likely to satisfy both of the following:

- Produce values within a reasonable range around market value, AND
- Recognize differences from market value in a reasonable amount of time.



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In lieu of both of the above, the standard will be met if either of the following requirements is satisfied:

- There is a sufficiently narrow range around the market value, OR
- The method recognizes differences from market value in a sufficiently short period.

These rules or principles prevent the asset valuation methodology from being used to manipulate annual funding patterns. No matter what asset valuation method is used, it is important to note that, like a cost method or actuarial assumptions, the asset valuation method does not affect the true cost of the plan; it only impacts the incidence of cost.

VRS values assets, for actuarial valuation purposes, based on the principle that the difference between actual and expected investment returns should be subject to partial recognition to smooth out fluctuations in the total return achieved by the fund from year to year. This philosophy is consistent with the long-term nature of a retirement system. Under the current method, the dollar amount of the difference between the actual investment return and the assumed investment return on the market value of assets is recognized equally over a five-year period. This methodology is the asset smoothing method most commonly used by public plans and we believe that it meets actuarial standards under ASOP 44. It effectively provides the smoothing of returns desired to provide more stability to the contribution rates. **We recommend the current asset valuation method be retained.**

Amortization of UAAL

As described earlier, actuarial accrued liability is the portion of the actuarial present value of future benefits that are not included in future normal costs. Thus, it represents the liability that, in theory, should have been funded through normal costs for past service. Unfunded actuarial accrued liability (UAAL) exists when the actuarial accrued liability exceeds the actuarial value of plan assets. These deficiencies can result from (i) plan improvements that have not been completely paid for, (ii) experience that is less favorable than expected, (iii) assumption changes that increase liabilities, or (iv) contributions that are less than the actuarial contribution rate.

There are a variety of different methods that can be used to amortize the UAAL. Each method results in a different payment stream and, therefore, has cost implications. For each methodology, there are three characteristics:

- The period over which the UAAL is amortized,
- The rate at which the amortization payment increases, and
- The number of components of UAAL (separate amortization bases).



Amortization Period: The amortization period can be either closed or open. If it is a closed amortization period, the number of years remaining in the amortization period declines by one in each future valuation and at the end of the period, the UAAL is eliminated. Alternatively, if the amortization period is an open or rolling period, the amortization period does not decline but is reset to the same number each year. This approach essentially “refinances” the System’s debt (UAAL) every year and the UAAL is never paid off.

Amortization Payment: The level dollar amortization method is similar to the method in which a homeowner pays off a mortgage. The liability, once calculated, is financed by a constant fixed dollar amount based on the amortization period until the liability is extinguished. This results in the liability steadily decreasing while the payments, though remaining level in dollar terms, in all probability decrease as a percentage of payroll. (Even if a plan sponsor’s population is not growing, inflationary salary increases will usually be sufficient to increase the aggregate covered payroll).

The rationale behind the level percentage of payroll amortization method is that since normal costs are calculated to be a constant percentage of pay and the system is funded with contributions that are a level percentage of payroll, the UAAL should be amortized in the same manner. When this method of amortizing the UAAL is adopted, the initial amortization payments are lower than they would be under a level dollar amortization payment method, but they increase at a fixed rate each year so that ultimately the annual payment far exceeds the level dollar payment. The expectation is that total payroll will increase at the same rate so that the amortization payments will remain constant, as a percentage of payroll. In the initial years, the level percentage of payroll amortization payment is often less than the interest accruing on the UAAL meaning that, even if there are no experience losses, the dollar amount of the UAAL will grow (called negative amortization). This is particularly true if the plan sponsor is paying off the UAAL over a long period, such as 25 or more years. If covered payroll grows slower than expected an increase in contribution rates may be required to generate the necessary payment to pay down the unfunded liabilities.

State and VaLORS plans have shown population decreases in recent years that have contributed to the payroll growth lagging the assumption and increases in contribution rates. Consideration could be given to lowering the UAAL payment increase for these plans if it is anticipated payroll will continue to lag the assumption. At this time, we are not recommending a change in the assumption but suggest that we continue to monitor these plans to determine if the population has stabilized. To the extent that payroll growth lags the current 3% assumption, employer contribution rates will increase. A more detailed discussion supporting the 3% payroll growth assumption follows on page 90.



Amortization Bases: The UAAL can either be amortized as one single amount/base or as components or “layers”, each with a separate amortization base, payment schedule and amortization period. If the UAAL is amortized as one amount, the total UAAL is recalculated each year in the valuation and experience gains/losses or other changes in the UAAL are folded into the single UAAL amortization base. The amortization payment is then the total UAAL divided by an amortization factor for the applicable amortization period.

If separate amortization bases are maintained, the UAAL is composed of multiple amortization bases, each with its own payment schedule and remaining amortization period (called layered amortization). In each valuation, the unexpected change in the UAAL is established as a new amortization base over the appropriate amortization period beginning on that valuation date. The UAAL is then the sum of all of the outstanding amortization bases on the valuation date and the UAAL payment is the sum of all of the amortization payments on the existing amortization bases. This approach provides transparency in that the current UAAL is paid off over a fixed period of time and the remaining components of the UAAL are clearly identified. Adjustments to the UAAL in future years are also separately identified in each future year. One downside of this approach is that it can create some discontinuities in contribution rates when UAAL layers/components are fully paid off.

Current VRS Amortization Method: The System moved to the layered amortization approach beginning with the June 30, 2013 valuation. The UAAL in that valuation (June 30, 2013) is amortized over a closed period of 30 years, with payments determined as a level percent of covered payroll. The period decreases each year so there will be 22 years remaining in the January 1, 2021 valuation. Additional pieces of UAAL, created after the 2013 valuation, are established as a new amortization base with a separate closed amortization period of 20 years and a separate payment schedule with increasing payments.

VRS is financed by contributions that are a percentage of payroll so there is a reason to determine the amortization payment on the UAAL as a level percent of payroll. This produces an actuarial contribution rate that is more consistent with how the System is funded. The use of the layered amortization method with closed amortization periods is consistent with best practices in the public pension industry. **We recommend the current amortization methodology be retained.**



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Payroll Growth

Background: Amortization payments on the unfunded actuarial accrued liability are currently determined as a level percent of payroll. Therefore, the valuation requires an assumption regarding future annual increases in total covered payroll.

The payroll growth assumption is impacted by two factors:

- (1) the size of the group (number of active members); and
- (2) the general wage increase assumption.

Size of Active Member Population: Currently, the assumption is the number of active members will remain the same over the amortization period. The following table shows the actual change in the number of active members from 2012 through 2020, based on the data used in the annual valuations.

Growth in Active Population														
Year	State	% Increase	Teachers	% Increase	VaLORS	% Increase	SPORS	% Increase	JRS	% Increase	Locals - Non LEOs	% Increase	Locals - LEOs	% Increase
2012	76,274		147,216		9,383		1,881		380					
2013	75,812	-0.61%	146,730	-0.33%	9,372	-0.12%	2,002	6.43%	381	0.26%				
2014	75,730	-0.11%	146,977	0.17%	9,429	0.61%	2,011	0.45%	385	1.05%				
2015	75,256	-0.63%	147,645	0.45%	8,820	-6.46%	1,994	-0.85%	401	4.16%	83,025		22,907	
2016	74,968	-0.38%	149,018	0.93%	9,106	3.24%	1,940	-2.71%	416	3.74%	82,699	-0.39%	23,572	2.90%
2017	74,807	-0.21%	150,416	0.94%	8,718	-4.26%	1,882	-2.99%	421	1.20%	82,848	0.18%	24,467	3.80%
2018	74,582	-0.30%	151,585	0.78%	8,718	0.00%	1,885	0.16%	416	-1.19%	83,776	1.12%	24,917	1.84%
2019	74,799	0.29%	149,396	-1.44%	8,692	-0.30%	1,914	1.54%	462	11.06%	84,872	1.31%	25,543	2.51%
2020	75,069	0.36%	150,681	0.86%	8,554	-1.59%	1,924	0.52%	449	-2.81%	84,922	0.06%	25,932	1.52%
Average Annualized Increase														
◦All years		-0.20%		0.29%		-1.15%		0.28%		2.11%		0.45%		2.76%
◦Last four years		0.03%		0.28%		-1.55%		-0.21%		1.93%		0.67%		2.41%

The number of active members over the past 4 and 8 years has been relatively stable for State, Teachers and SPORS. VaLORS has had relatively larger decreases while JRS and Locals have had somewhat significant increases. We often see the number of active members decline during difficult economic periods when the government revenues are depressed, and budgets are tight. Sometimes such reductions are permanent, but often the active membership grows when the economy recovers.

Although this data provides some insight into how the size of the active population has changed in the past 4 and 8 years, the real question is how the size of the active membership will change in the next 20 to 30 years. Given the relatively stable active membership over the past 8 years, it seems reasonable to expect that trend to continue for the next 10 to 20 years absent significant changes such as the State outsourcing many jobs or a severe reduction of basic services provided by the State. We are not aware of any such plans, so for purposes of the valuation, we recommend the size of the active population be assumed to remain constant in projecting covered payroll in future years.



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As with other assumptions, even if the assumption is accurate over the long term there will be years when the number of actives declines and years when the number increases. This experience is captured in each valuation and the contribution rate is adjusted accordingly. In addition, the assumption will be evaluated in future experience studies and modified, if necessary. **We recommend the current assumption that the active population will remain constant be retained.**

Payroll growth: Generally, when the size of the active membership remains constant, total covered payroll is expected to increase at an amount consistent with the general wage increase assumption. The current payroll growth assumption is 3.00% and is based on the prior experience review.

The following table shows actual payroll growth over the last 4 and 8 years.

Growth in Total Payroll (\$ Millions)														
Year	State	% Increase	Teachers	% Increase	VaLORS	% Increase	SPORS	% Increase	JRS	% Increase	Locals - Non LEOs	% Increase	Locals - LEOs	% Increase
2012	\$3,713.12		\$7,004.58		\$344.62		\$104.19		\$56.96					
2013	\$3,716.55	0.09%	\$7,211.54	2.95%	\$342.15	-0.72%	\$109.01	4.63%	\$57.11	0.26%				
2014	\$3,854.78	3.72%	\$7,362.79	2.10%	\$352.71	3.09%	\$112.30	3.02%	\$59.37	3.96%				
2015	\$3,872.72	0.47%	\$7,488.51	1.71%	\$330.40	-6.33%	\$110.54	-1.57%	\$61.88	4.23%	\$3,381.15		\$1,158.99	
2016	\$4,002.48	3.35%	\$7,666.82	2.38%	\$352.68	6.74%	\$114.88	3.93%	\$65.52	5.88%	\$3,453.02	2.13%	\$1,203.67	3.86%
2017	\$4,037.07	0.86%	\$7,919.45	3.30%	\$339.15	-3.84%	\$110.27	-4.01%	\$66.29	1.18%	\$3,541.66	2.57%	\$1,266.70	5.24%
2018	\$4,161.92	3.09%	\$8,086.93	2.11%	\$346.11	2.05%	\$126.52	14.74%	\$67.42	1.70%	\$3,658.34	3.29%	\$1,315.22	3.83%
2019	\$4,375.06	5.12%	\$8,210.13	1.52%	\$369.78	6.84%	\$132.23	4.51%	\$76.85	13.99%	\$3,844.77	5.10%	\$1,413.70	7.49%
2020	\$4,428.50	1.22%	\$8,498.52	3.51%	\$363.90	-1.59%	\$131.25	-0.74%	\$74.73	-2.76%	\$3,935.30	2.35%	\$1,474.24	4.28%
Average Annualized Increase														
°All years		2.23%		2.45%		0.68%		2.93%		3.45%		3.08%		4.93%
°Last four years		2.56%		2.61%		0.79%		3.39%		3.34%		3.32%		5.20%

Over the past 4 years, the total annual payroll of the System as shown in the actuarial valuations has increased by less than the 3.00% assumption for State, Teachers and VaLORS, and greater than expected for the remaining employers. VaLORS was significantly less than expected, however that was primarily due to active headcount reductions.

Recommendation for Payroll Growth: In selecting the assumption, we must keep in mind the statutory requirement to develop a contribution pattern that is relatively stable from generation to generation and to use the level percent of payroll methodology for the UAAL amortization. The general trend of covered payroll increases that are lower than the general wage increase assumption is a valid consideration. Therefore, we recommend the covered payroll growth assumption be set equal to the general wage growth assumption minus 0.50%. If our recommended wage increase assumption of 3.50% is adopted, the recommended payroll growth assumption would be 3.00%. Note that if a different price inflation and/or real wage growth assumption are selected by the



Section V: Actuarial Methods & Funding Policy

Board, our recommended payroll growth assumption would be set no lower than the price inflation assumption.

State and VaLORS plans have shown population decreases in recent years that have contributed to the payroll growth lagging the assumption and increases in contribution rates. Consideration could be given to lowering the UAAL payment increase for these plans if it is anticipated payroll will continue to lag the assumption. At this time, we are not recommending a change in the assumption but suggest that we continue to monitor these plans to determine if the population has stabilized. To the extent that payroll growth lags the current 3% assumption, employer contribution rates will increase.

Payroll Growth Assumption	
Current	3.00%
Recommended	3.00%



SUPPORTING TABLES



Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

STATE POST-RETIREMENT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	21,073	11,543	1.83	13,533	1.56	34,528	9,679	3.57	11,587	2.98
42	130,548	17,440	7.49	18,481	7.06	42,229	14,191	2.98	16,159	2.61
47	59,804	67,110	0.89	40,759	1.47	56,830	33,048	1.72	31,393	1.81
52	217,393	244,128	0.89	164,167	1.32	123,975	173,959	0.71	179,998	0.69
57	685,996	726,730	0.94	554,434	1.24	602,658	622,132	0.97	616,589	0.98
62	2,576,207	2,346,074	1.10	1,945,891	1.32	1,547,373	2,070,631	0.75	1,989,653	0.78
67	5,246,165	7,199,513	0.73	6,074,910	0.86	5,708,111	5,399,006	1.06	5,155,852	1.11
72	11,666,665	12,842,483	0.91	11,272,193	1.03	6,921,041	7,507,447	0.92	7,329,999	0.94
77	13,525,321	15,650,505	0.86	14,705,691	0.92	7,114,093	7,573,156	0.94	7,633,997	0.93
82	17,214,477	16,481,229	1.04	16,493,970	1.04	8,148,632	7,995,124	1.02	8,243,643	0.99
87	13,984,391	14,813,505	0.94	15,028,145	0.93	7,464,363	7,251,313	1.03	7,696,971	0.97
90 & over	13,131,007	12,926,173	1.02	12,488,380	1.05	9,558,548	8,511,516	1.12	8,715,954	1.10
<Total>	78,459,047	83,326,433	0.94	78,800,554	1.00	47,322,381	47,161,203	1.00	47,621,795	0.99

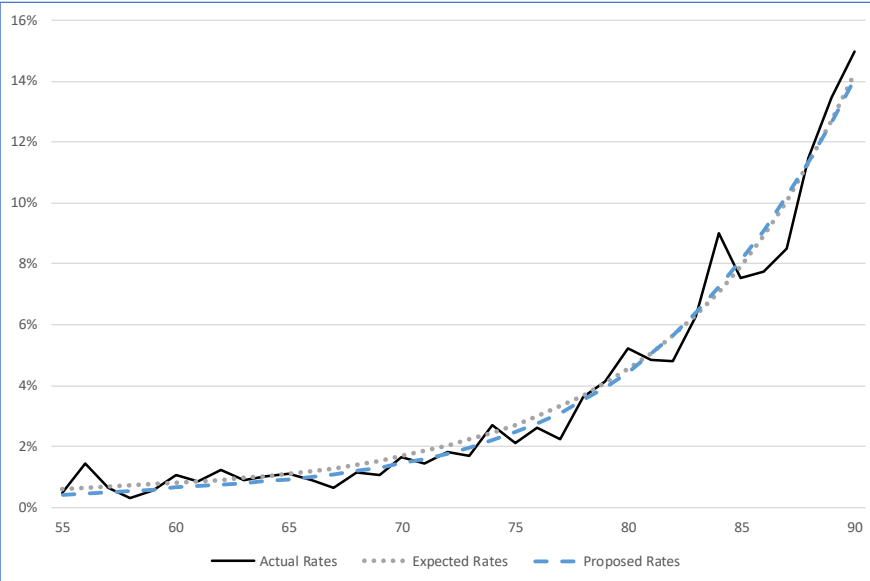
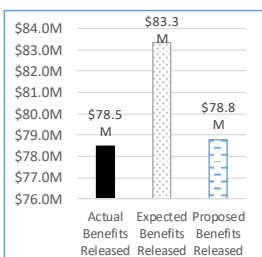
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the benefits released



Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

Post-Retirement Mortality State Males

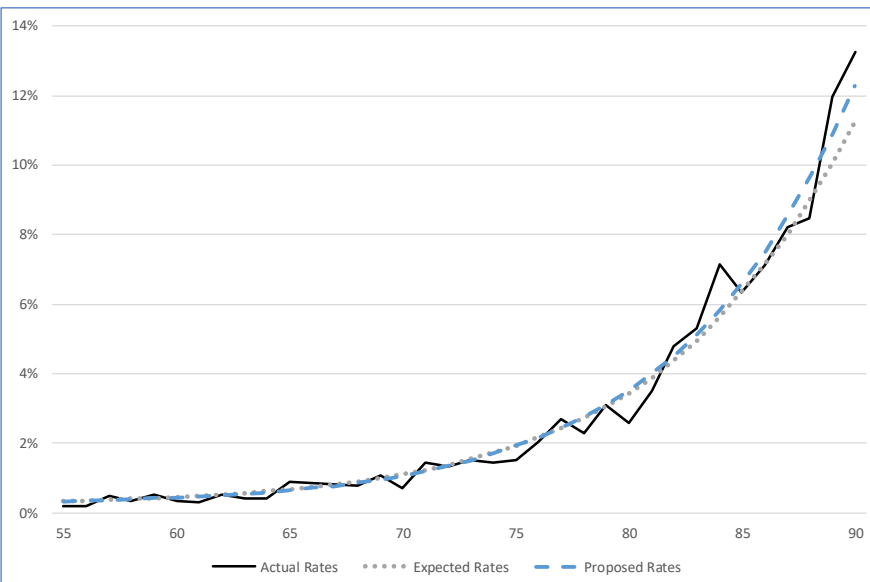
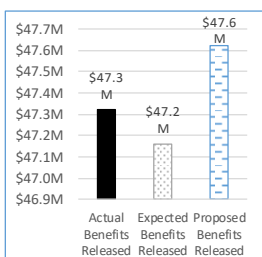
Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent State experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 1yr; F SB 1yr, 1.5% compounding increase from ages 70 to 85
 Proposed: Pub-2010 Ret - General Males, Modified Mortality Improvement Scale MP-2020

Post-Retirement Mortality State Females

Comment: Since the last experience review we have released more liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent State experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 1yr; F SB 1yr, 1.5% compounding increase from ages 70 to 85
 Proposed: Pub-2010 Ret - General Females, 110% for all years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

TEACHERS POST-RETIREMENT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	21,469	9,498	2.26	11,098	1.93	36,180	26,747	1.35	35,661	1.01
42	17,363	11,627	1.49	13,414	1.29	51,173	29,636	1.73	39,329	1.30
47	44,532	25,927	1.72	26,651	1.67	153,186	52,738	2.90	61,798	2.48
52	41,346	100,015	0.41	49,009	0.84	310,937	165,855	1.87	109,929	2.83
57	548,320	358,123	1.53	262,159	2.09	1,138,805	843,450	1.35	859,285	1.33
62	1,328,526	1,420,216	0.94	1,255,691	1.06	4,051,515	3,435,986	1.18	3,605,509	1.12
67	4,401,951	4,367,381	1.01	4,225,080	1.04	9,372,174	11,111,478	0.84	10,313,387	0.91
72	8,118,775	7,962,488	1.02	8,013,037	1.01	14,812,378	16,229,751	0.91	15,408,833	0.96
77	9,609,392	8,422,394	1.14	8,880,297	1.08	15,248,164	16,156,168	0.94	16,666,230	0.91
82	8,511,443	9,051,865	0.94	9,704,591	0.88	16,906,868	16,234,685	1.04	17,371,753	0.97
87	9,173,695	8,765,591	1.05	9,084,592	1.01	18,655,173	17,837,681	1.05	18,581,875	1.00
90 & over	6,560,163	7,099,589	0.92	6,728,255	0.98	24,667,851	23,808,384	1.04	22,714,803	1.09
<Total>	48,376,975	47,594,713	1.02	48,253,876	1.00	105,404,403	105,932,561	1.00	105,768,392	1.00

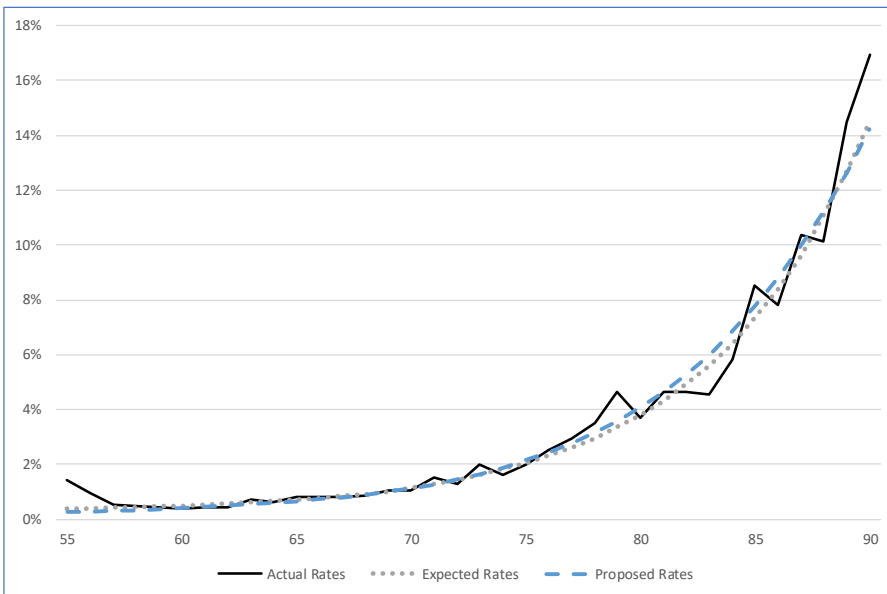
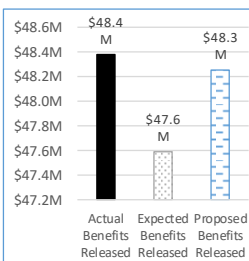
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the benefits released



Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

Post-Retirement Mortality Teachers Males

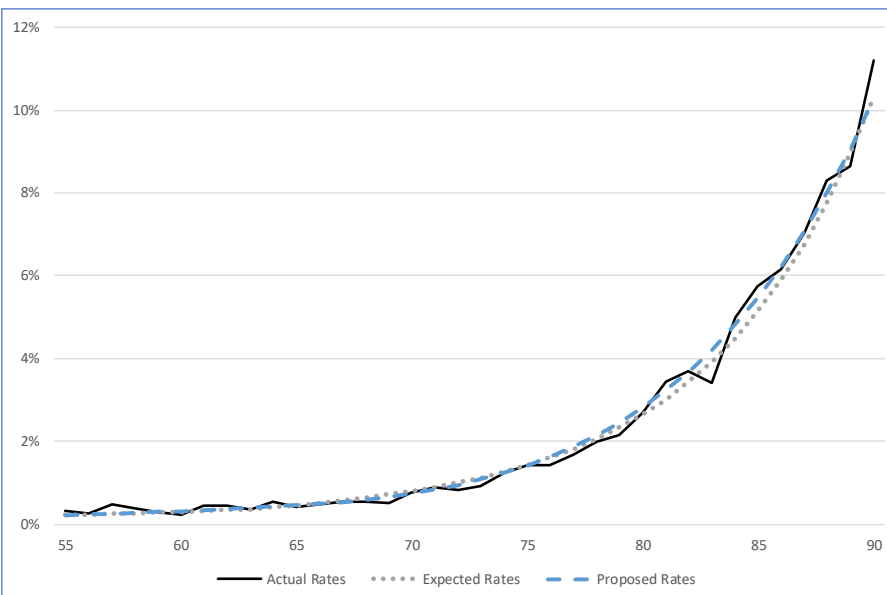
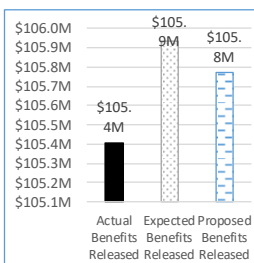
Comment: Since the last experience review we have released more liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Teacher experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 White Collar Employee Rates to age 49, White Collar Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M 1% increase compounded from 70 to 90; F SB 3yr, 1.5% increase compounded from ages 65 to 70, and 2.0% increase
 Proposed: Pub-2010 Ret - Teachers Males, set forward 1 year, Modified Mortality Improvement Scale MP-2020

Post-Retirement Mortality Teachers Females

Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Teacher experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 White Collar Employee Rates to age 49, White Collar Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M 1% increase compounded from 70 to 90; F SB 3yr, 1.5% increase compounded from ages 65 to 70, and 2.0% increase
 Proposed: Pub-2010 Ret - Teachers Females, 105% for all years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

JRS POST-RETIREMENT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	0	0	0.00	0	0.00	0	0	0.00	0	0.00
42	0	0	0.00	0	0.00	0	0	0.00	0	0.00
47	0	225	0.00	98	0.00	0	49	0.00	33	0.00
52	0	419	0.00	190	0.00	0	390	0.00	202	0.00
57	0	1,436	0.00	892	0.00	0	5,271	0.00	3,993	0.00
62	0	27,648	0.00	18,882	0.00	0	20,682	0.00	14,860	0.00
67	100,892	237,296	0.43	160,554	0.63	0	59,214	0.00	40,477	0.00
72	216,190	784,514	0.28	532,135	0.41	0	68,341	0.00	45,877	0.00
77	622,342	962,412	0.65	679,975	0.92	101,849	64,069	1.59	43,915	2.32
82	721,533	1,065,232	0.68	797,268	0.91	0	31,334	0.00	21,753	0.00
87	866,187	919,138	0.94	705,094	1.23	0	33,948	0.00	23,824	0.00
90 & over	1,168,879	1,284,602	0.91	979,785	1.19	0	0	0.00	0	0.00
<Total>	3,696,023	5,282,922	0.70	3,874,873	0.95	101,849	283,298	0.36	194,932	0.52

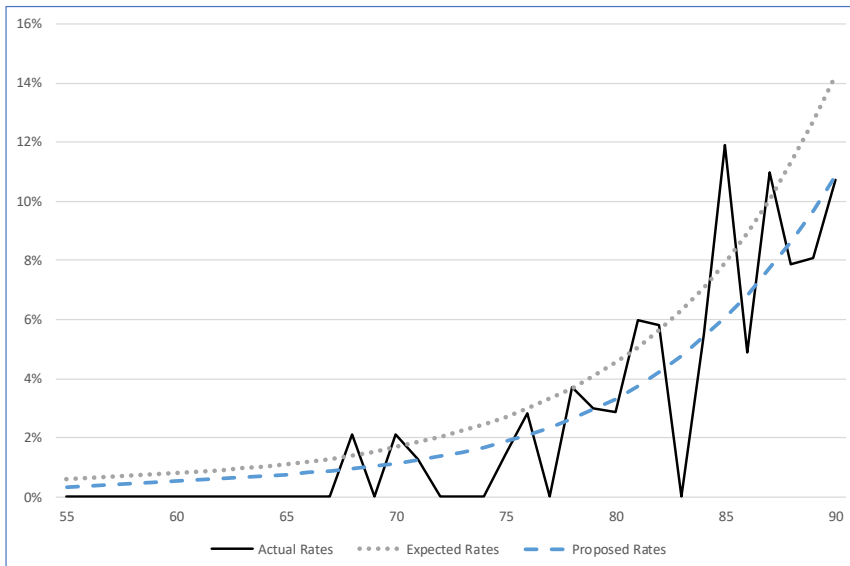
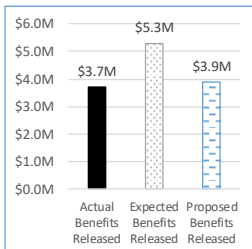
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Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

Post-Retirement Mortality JRS Males

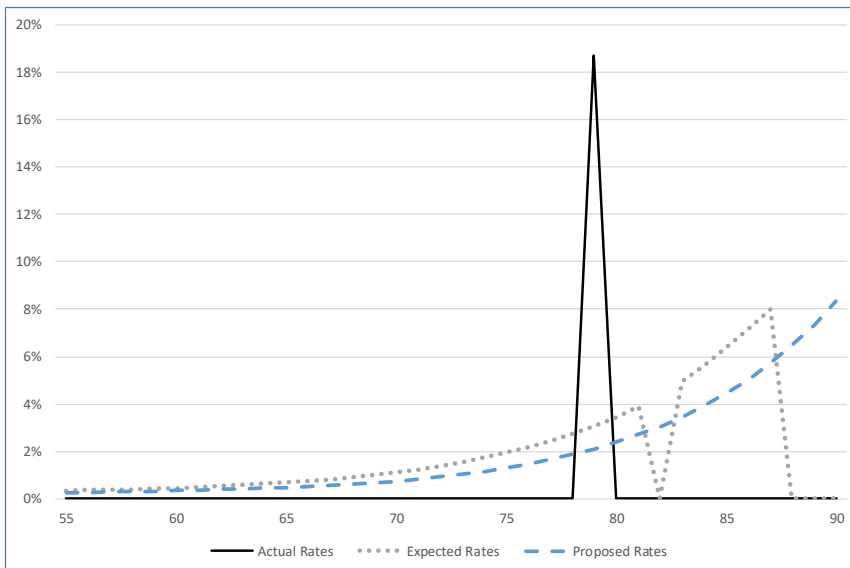
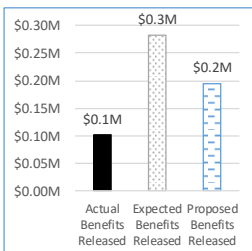
Comment: In the last review we comingled JRS and State members. Since then, JRS members had mortality losses while State did not. Our experience with other systems is that judges have longer life expectancy than other public sector groups. Based on our analysis of JRS, we recommend a Pub-2010 public sector mortality table, modified to reflect JRS experience. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 1yr; F SB 1yr, 1.5% compounding increase from ages 70 to 85
 Proposed: Pub-2010 Ret - General Males, 95% for all years, set back 2 years, Modified Mortality Improvement Scale MP-2020

Post-Retirement Mortality JRS Females

Comment: In the last review we comingled JRS and State members. Since then, JRS members had mortality losses while State did not. Our experience with other systems is that judges have longer life expectancy than other public sector groups. Based on our analysis of JRS, we recommend a Pub-2010 public sector mortality table, modified to reflect JRS experience. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 1yr; F SB 1yr, 1.5% compounding increase from ages 70 to 85
 Proposed: Pub-2010 Ret - General Females, 95% for all years, set back 2 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

CENTRAL AGE OF GROUP	HAZARDOUS DUTY POST-RETIREMENT MORTALITY									
	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	68,871	8,092	8.51	10,235	6.73	16,594	2,182	7.61	3,345	4.96
42	65,718	8,405	7.82	8,436	7.79	25,549	2,695	9.48	3,464	7.38
47	208,130	43,027	4.84	33,598	6.19	46,113	13,720	3.36	9,793	4.71
52	723,017	685,986	1.05	344,453	2.10	113,301	86,693	1.31	72,224	1.57
57	714,190	1,560,838	0.46	985,030	0.73	203,544	195,463	1.04	195,585	1.04
62	1,800,296	2,518,691	0.71	2,040,664	0.88	421,467	311,128	1.35	322,815	1.31
67	3,103,821	3,395,969	0.91	3,137,596	0.99	263,397	346,389	0.76	369,225	0.71
72	3,317,133	3,634,537	0.91	3,539,891	0.94	172,977	275,337	0.63	315,162	0.55
77	2,786,912	3,202,429	0.87	3,249,622	0.86	403,844	224,269	1.80	273,472	1.48
82	2,382,171	2,374,194	1.00	2,450,165	0.97	53,298	109,964	0.48	135,715	0.39
87	1,691,763	1,697,090	1.00	1,690,733	1.00	141,032	53,945	2.61	64,992	2.17
90 & over	560,179	757,510	0.74	708,345	0.79	12,147	17,999	0.67	20,443	0.59
<Total>	17,422,201	19,886,768	0.88	18,198,768	0.96	1,873,261	1,639,784	1.14	1,786,236	1.05

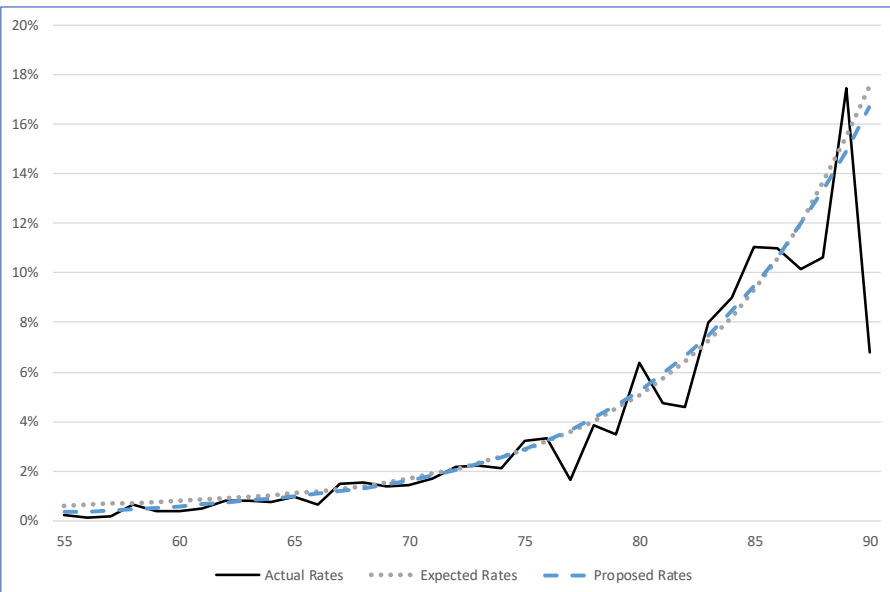
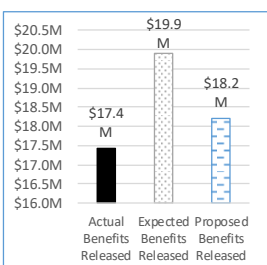
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Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

Post-Retirement Mortality Hazardous Duty Males

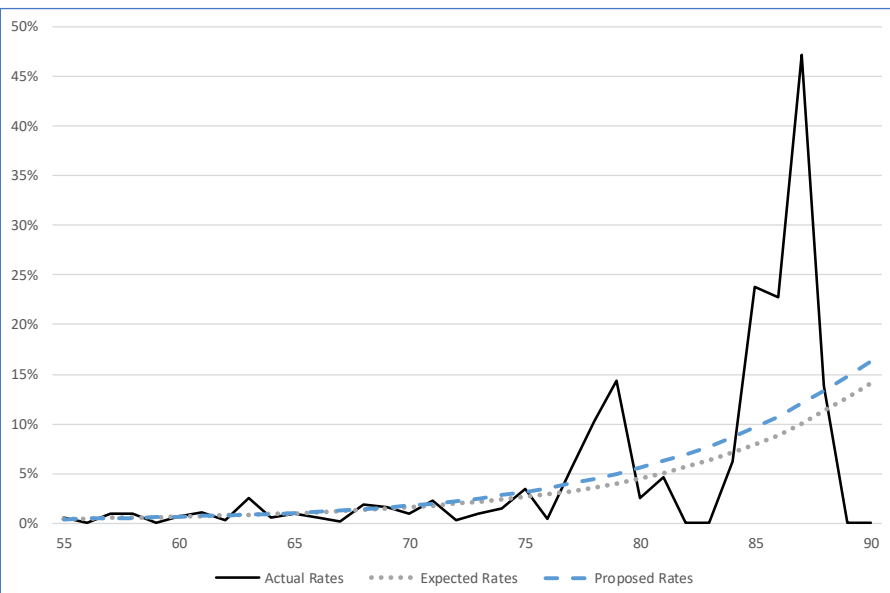
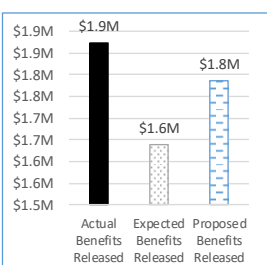
Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Hazardous Duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M SF 1yr, 1% increase compounded from ages 70 to 90; F SF 3yr
 Proposed: Pub-2010 Ret - Safety Males, 110% for all years, Modified Mortality Improvement Scale MP-2020

Post-Retirement Mortality Hazardous Duty Females

Comment: Since the last experience review we have released more liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Hazardous Duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M SF 1yr, 1% increase compounded from ages 70 to 90; F SF 3yr
 Proposed: Pub-2010 Ret - Safety Females, 105% for all years, set forward 3 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

POLITICAL SUBDIVISIONS NON HAZARDOUS DUTY POST-RETIREMENT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	51,058	40,722	1.25	44,944	1.14	16,672	15,293	1.09	15,883	1.05
42	57,366	55,663	1.03	50,395	1.14	127,225	22,278	5.71	21,143	6.02
47	87,685	270,659	0.32	153,300	0.57	70,983	56,294	1.26	64,054	1.11
52	223,550	549,765	0.41	365,769	0.61	162,691	272,429	0.60	225,204	0.72
57	921,419	1,197,423	0.77	908,173	1.01	464,926	617,608	0.75	527,008	0.88
62	2,173,425	2,466,574	0.88	1,956,597	1.11	1,094,537	1,420,881	0.77	1,173,010	0.93
67	4,166,589	5,124,369	0.81	4,153,988	1.00	2,095,788	2,958,580	0.71	2,459,740	0.85
72	5,396,894	6,425,559	0.84	5,492,704	0.98	3,412,635	3,941,482	0.87	3,443,656	0.99
77	6,019,593	5,707,206	1.05	5,226,904	1.15	3,711,754	3,942,203	0.94	3,643,817	1.02
82	4,432,027	5,172,256	0.86	4,995,138	0.89	3,240,260	3,552,942	0.91	3,430,214	0.94
87	3,774,409	4,631,098	0.82	4,387,135	0.86	3,102,905	3,153,041	0.98	3,097,277	1.00
90 & over	2,867,648	3,286,402	0.87	2,994,822	0.96	3,819,668	4,145,727	0.92	3,456,188	1.11
<Total>	30,171,664	34,927,696	0.86	30,729,869	0.98	21,320,045	24,098,759	0.88	21,557,196	0.99

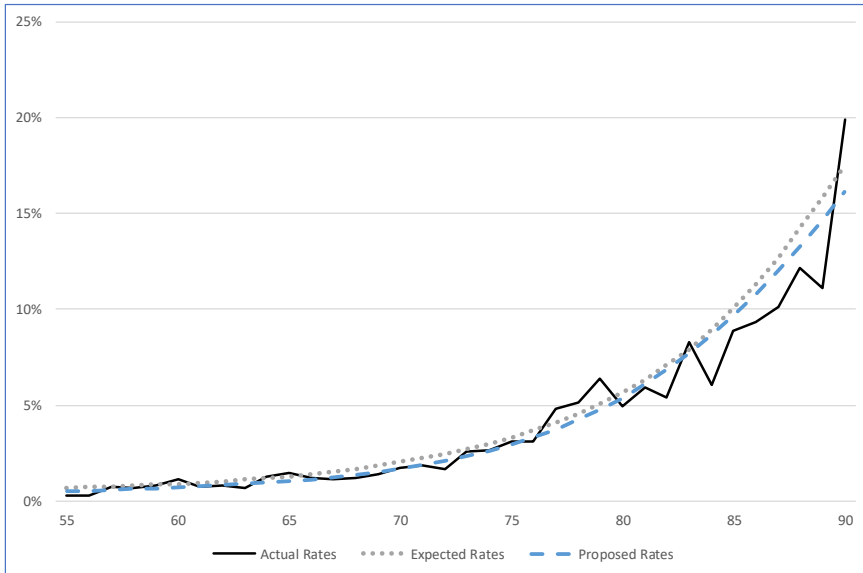
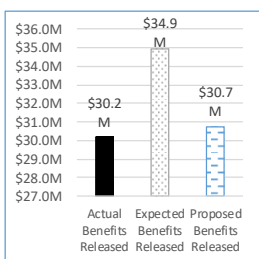
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Section VI: Supporting Tables, Subsection 1 - Post-Retirement Mortality

Post-Retirement Mortality Political Subdivisions Non Hazardous Duty Males

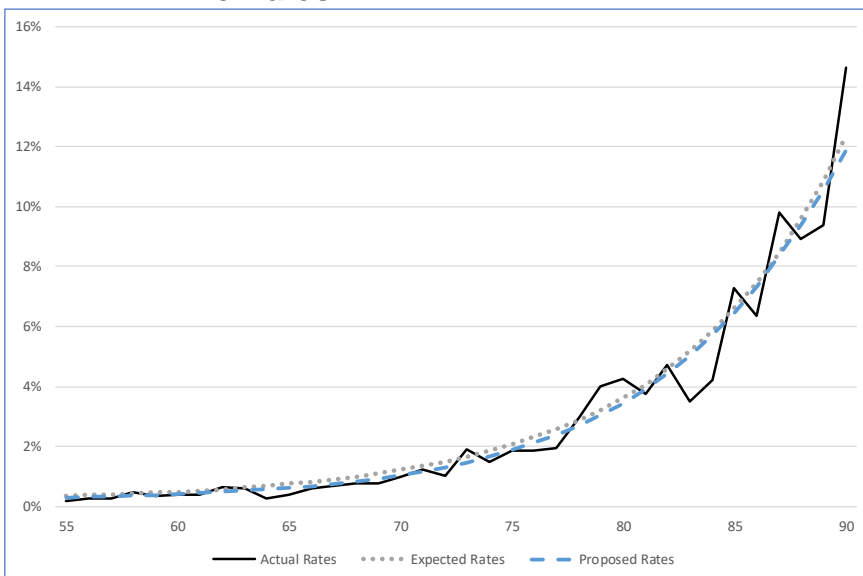
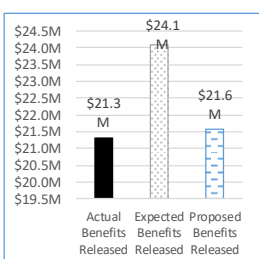
Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Local non hazardous duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 3yr; F 1.0% increase compounded from ages 70 to 90
 Proposed: Pub-2010 Ret - General Males, 95% for all years, set forward 2 years, Modified Mortality Improvement Scale MP-2020

Post-Retirement Mortality Political Subdivisions Non Hazardous Duty Females

Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Local non hazardous duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 3yr; F 1.0% increase compounded from ages 70 to 90
 Proposed: Pub-2010 Ret - General Females, 95% for all years, set forward 1 year, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

STATE PRE-RETIREMENT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
22	40,491	35,662	1.14	30,073	1.35	0	18,530	0.00	13,087	0.00
27	80,739	140,351	0.58	139,139	0.58	0	94,633	0.00	92,154	0.00
32	308,210	233,919	1.32	319,265	0.97	216,396	184,547	1.17	219,108	0.99
37	309,452	340,014	0.91	517,514	0.60	260,598	300,889	0.87	382,417	0.68
42	360,504	479,743	0.75	711,364	0.51	792,189	460,655	1.72	542,542	1.46
47	1,428,843	959,618	1.49	1,173,356	1.22	953,947	924,737	1.03	940,191	1.01
52	1,901,438	1,813,460	1.05	1,930,297	0.99	1,957,050	1,765,526	1.11	1,741,494	1.12
57	3,200,504	3,222,456	0.99	3,234,787	0.99	3,763,704	2,885,984	1.30	2,986,391	1.26
62	4,678,544	4,780,790	0.98	4,323,638	1.08	4,322,680	3,371,587	1.28	3,583,096	1.21
67	2,625,658	3,982,660	0.66	3,002,816	0.87	2,146,744	1,923,541	1.12	2,042,965	1.05
72	1,330,866	2,151,995	0.62	1,414,956	0.94	451,987	631,878	0.72	653,377	0.69
77	259,255	33,967	7.63	625,811	0.41	183,912	7,226	25.45	260,446	0.71
80 & over	441,848	39,225	11.26	828,783	0.53	0	7,988	0.00	280,511	0.00
<Total>	16,966,352	18,213,860	0.93	18,251,799	0.93	15,049,207	12,577,721	1.20	13,737,778	1.10

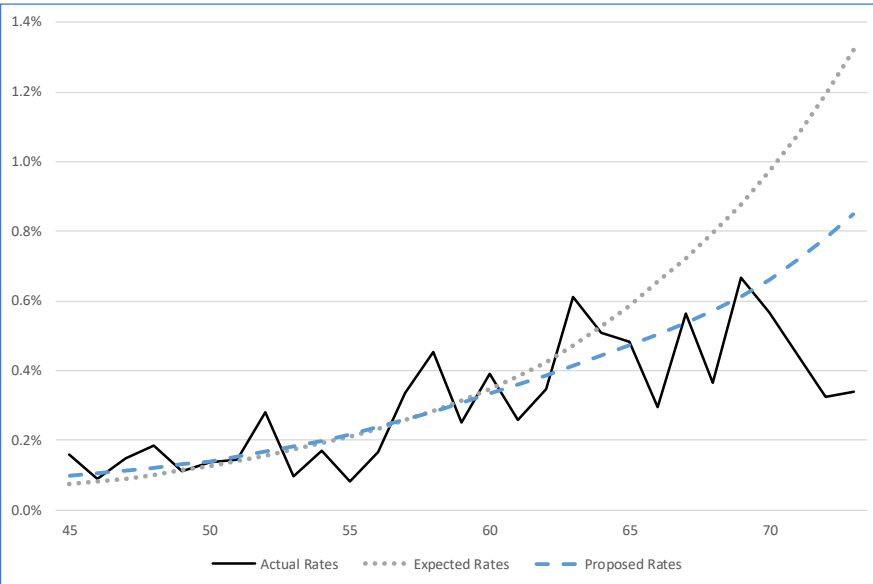
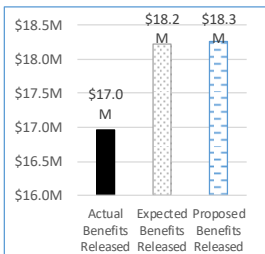
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Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

Pre-Retirement Mortality State Males

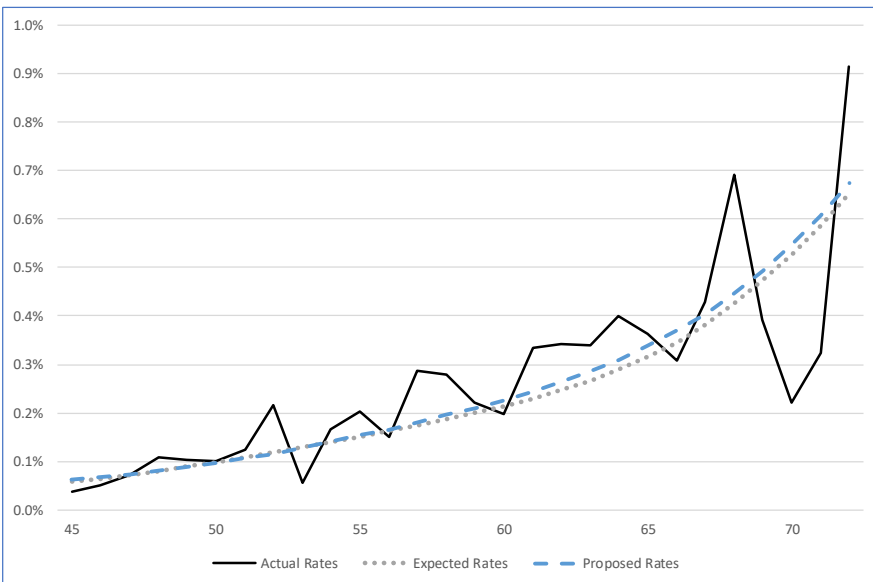
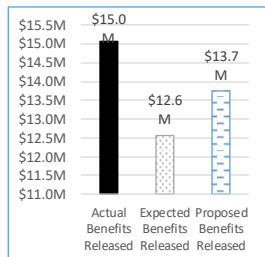
Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for pre-retirement mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older Projected BB to 2020; MSB 1yr, 85% of rates; F SB 1yr
 Proposed: Pub-2010 EE - General Males, Modified Mortality Improvement Scale MP-2020

Pre-Retirement Mortality State Females

Comment: Since the last experience review we have released more liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent State experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older Projected BB to 2020; MSB 1yr, 85% of rates; F SB 1yr
 Proposed: Pub-2010 EE - General Females, set forward 2 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

TEACHERS PRE-RETIREMENT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
22	0	25,088	0.00	17,168	0.00	0	55,329	0.00	41,340	0.00
27	92,261	163,623	0.56	130,338	0.71	220,933	377,626	0.59	310,949	0.71
32	123,899	255,595	0.48	285,274	0.43	326,584	588,031	0.56	604,145	0.54
37	500,205	374,767	1.33	472,920	1.06	655,354	869,259	0.75	947,184	0.69
42	453,080	527,303	0.86	630,308	0.72	1,252,171	1,391,383	0.90	1,340,433	0.93
47	929,837	1,000,941	0.93	1,034,882	0.90	2,331,888	2,873,204	0.81	2,324,257	1.00
52	1,763,986	1,506,814	1.17	1,478,403	1.19	3,747,391	4,250,743	0.88	3,316,482	1.13
57	1,689,854	2,032,362	0.83	1,972,122	0.86	4,441,935	5,518,751	0.80	4,627,382	0.96
62	3,032,371	2,434,988	1.25	2,288,313	1.33	5,066,749	5,701,674	0.89	5,033,715	1.01
67	1,135,428	1,582,591	0.72	1,362,067	0.83	2,589,625	2,917,908	0.89	2,565,571	1.01
72	215,369	588,042	0.37	436,413	0.49	516,426	832,222	0.62	749,268	0.69
77	0	12,418	0.00	143,843	0.00	237,725	10,325	23.02	250,837	0.95
80 & over	86,302	1,614	53.48	105,813	0.82	76,734	13,938	5.51	119,548	0.64
<Total>	10,022,592	10,506,146	0.95	10,357,864	0.97	21,463,515	25,400,396	0.85	22,231,110	0.97

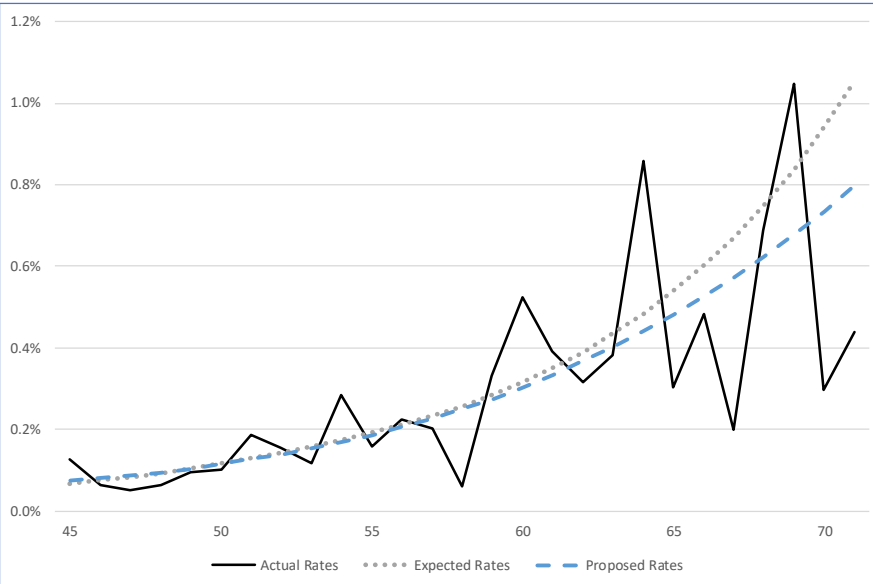
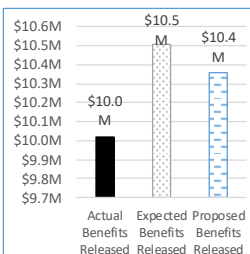
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Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

Pre-Retirement Mortality Teachers Males

Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Teacher experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.

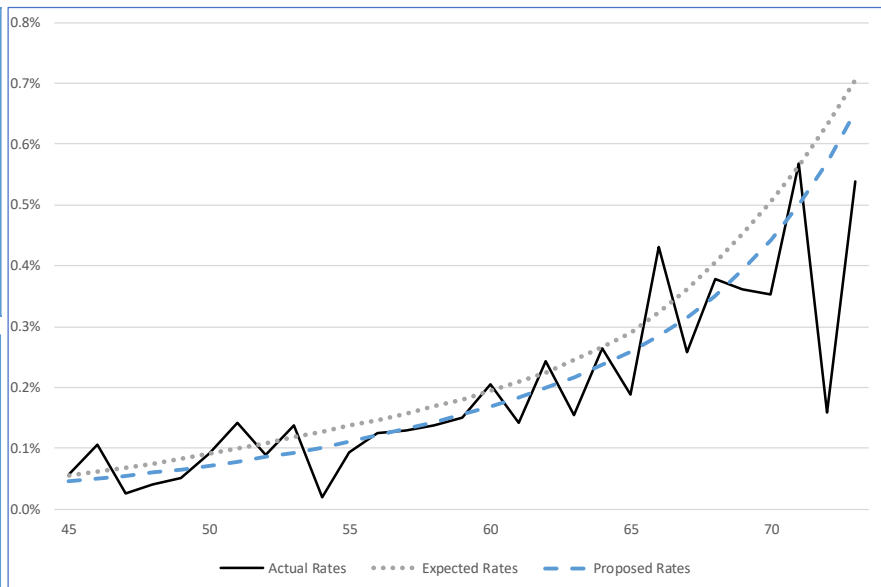
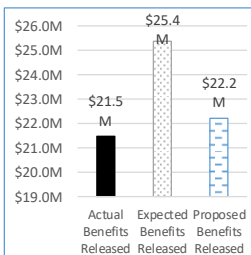


Expected: RP-2014 White Collar Employee Rates to age 80, White Collar Healthy Annuitant Rates at ages 81 and older Projected BB to 2020

Proposed: Pub-2010 EE - Teachers Males, 110% for all years, Modified Mortality Improvement Scale MP-2020

Pre-Retirement Mortality Teachers Females

Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Teacher experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 White Collar Employee Rates to age 80, White Collar Healthy Annuitant Rates at ages 81 and older Projected BB to 2020

Proposed: Pub-2010 EE - Teachers Females, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

JRS PRE-RETIREMENT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
22	0	0	0.00	0	0.00	0	0	0.00	0	0.00
27	0	0	0.00	0	0.00	0	0	0.00	0	0.00
32	0	65	0.00	103	0.00	0	0	0.00	0	0.00
37	0	783	0.00	1,314	0.00	0	686	0.00	771	0.00
42	0	3,801	0.00	6,220	0.00	0	1,828	0.00	1,887	0.00
47	0	19,686	0.00	27,809	0.00	0	7,213	0.00	6,216	0.00
52	149,531	46,012	3.25	58,241	2.57	0	13,314	0.00	10,869	0.00
57	149,531	96,963	1.54	114,880	1.30	0	34,933	0.00	30,691	0.00
62	332,305	236,971	1.40	243,173	1.37	0	45,695	0.00	41,721	0.00
67	303,548	338,252	0.90	290,910	1.04	0	23,913	0.00	21,213	0.00
72	0	148,715	0.00	129,180	0.00	0	6,466	0.00	5,454	0.00
77	0	0	0.00	0	0.00	0	0	0.00	0	0.00
80 & over	0	0	0.00	0	0.00	0	0	0.00	0	0.00
<Total>	934,915	891,248	1.05	871,829	1.07	0	134,047	0.00	118,821	0.00

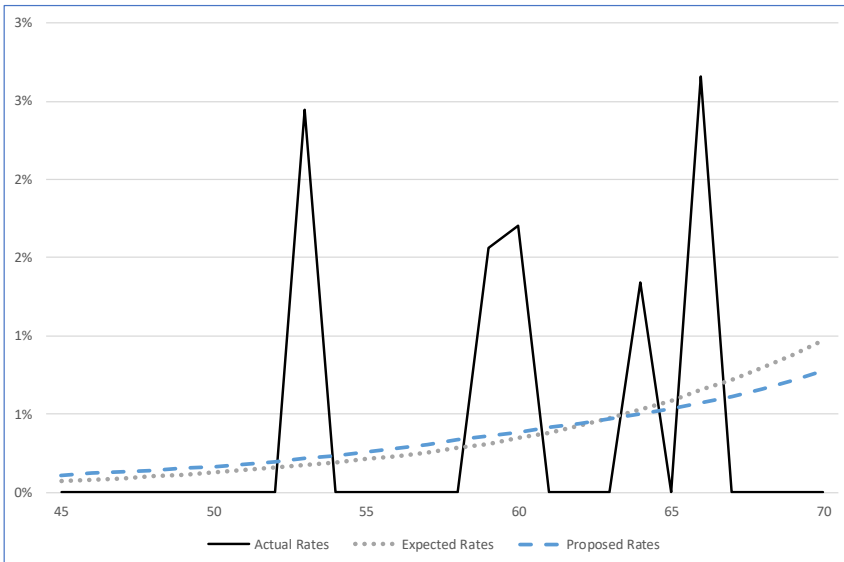
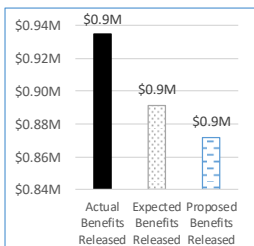
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the benefits released



Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

Pre-Retirement Mortality JRS Males

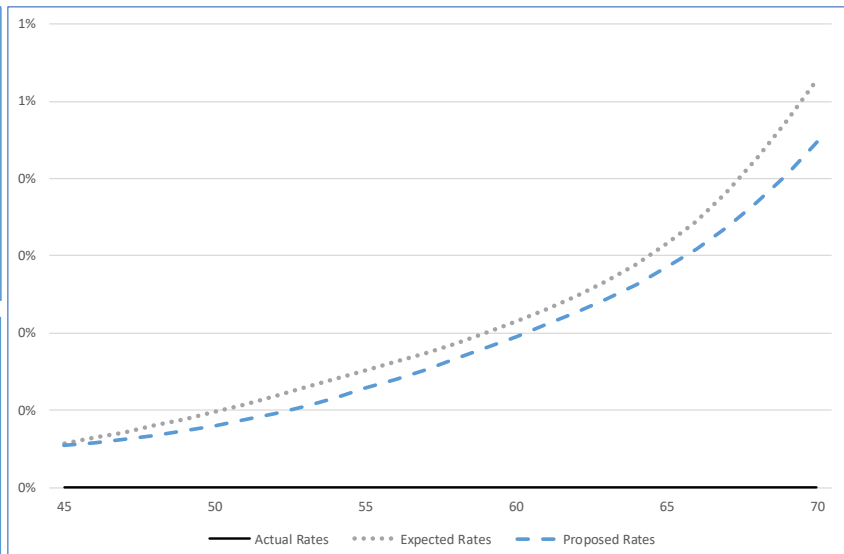
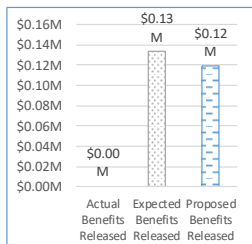
Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for preretirement mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older Projected BB to 2020; M SB 1yr, 85% of rates; F SB 1yr
 Proposed: Pub-2010 EE - General Males, set forward 2 years, Modified Mortality Improvement Scale MP-2020

Pre-Retirement Mortality JRS Females

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for preretirement mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older Projected BB to 2020; M SB 1yr, 85% of rates; F SB 1yr
 Proposed: Pub-2010 EE - General Females, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

CENTRAL AGE OF GROUP	HAZARDOUS DUTY PRE-RETIREMENT MORTALITY									
	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
22	241,372	121,025	1.99	110,820	2.18	42,735	13,683	3.12	20,111	2.12
27	250,759	295,060	0.85	331,318	0.76	31,021	38,527	0.81	66,616	0.47
32	297,299	366,799	0.81	467,955	0.64	66,927	45,872	1.46	82,062	0.82
37	267,278	410,734	0.65	517,312	0.52	37,137	60,943	0.61	99,308	0.37
42	610,023	588,615	1.04	625,080	0.98	186,073	93,402	1.99	116,242	1.60
47	1,359,174	1,178,410	1.15	947,392	1.43	206,285	188,343	1.10	180,865	1.14
52	966,780	1,423,987	0.68	986,681	0.98	172,874	237,177	0.73	212,091	0.82
57	674,082	1,340,425	0.50	886,071	0.76	186,761	197,073	0.95	172,477	1.08
62	658,731	1,028,213	0.64	641,097	1.03	202,383	121,189	1.67	94,438	2.14
67	353,831	21,373	16.56	246,082	1.44	0	1,728	0.00	30,454	0.00
72	98,173	1,371	71.62	63,799	1.54	0	0	0.00	4,454	0.00
77	0	0	0.00	37,612	0.00	0	0	0.00	2,668	0.00
80 & over	0	0	0.00	2,554	0.00	0	0	0.00	0	0.00
<Total>	5,777,502	6,776,012	0.85	5,863,774	0.99	1,132,196	997,937	1.13	1,081,786	1.05

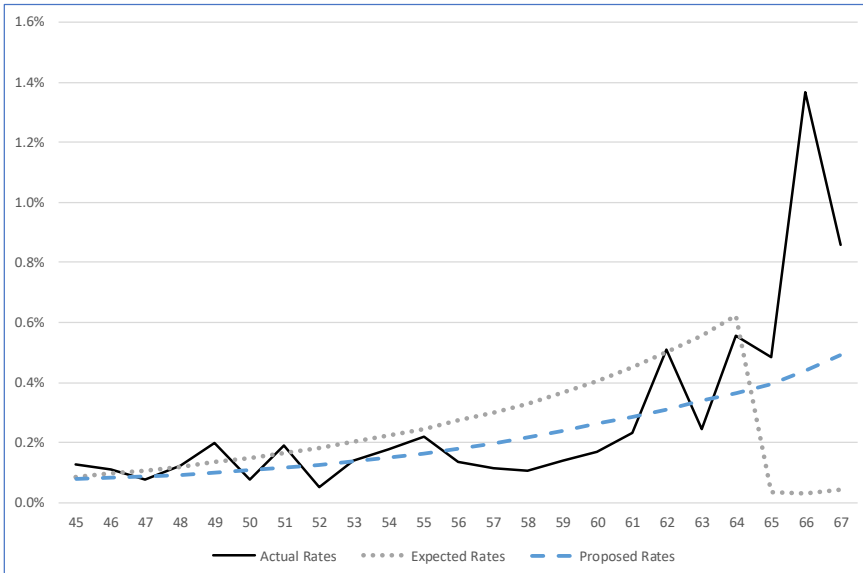
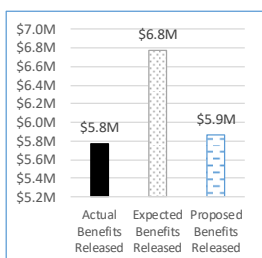
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Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

Pre-Retirement Mortality Hazardous Duty Males

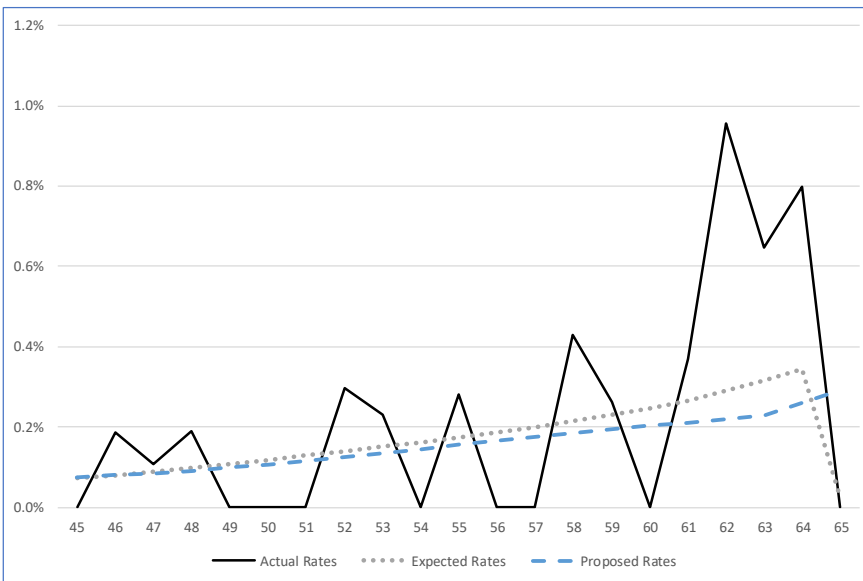
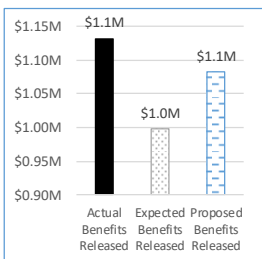
Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Hazardous Duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older Projected BB to 2020; M 90% of Rates; F SF 1yr
 Proposed: Pub-2010 EE - Safety Males, 95% for all years, Modified Mortality Improvement Scale MP-2020

Pre-Retirement Mortality Hazardous Duty Females

Comment: Since the last experience review we have released more liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Hazardous Duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older Projected BB to 2020; M 90% of Rates; F SF 1yr
 Proposed: Pub-2010 EE - Safety Females, 105% for all years, set forward 2 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

POLITICAL SUBDIVISIONS NON HAZARDOUS DUTY PRE-RETIREMENT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
22	134,183	76,962	1.74	57,028	2.35	0	21,810	0.00	16,405	0.00
27	293,874	199,075	1.48	207,866	1.41	75,371	102,915	0.73	107,283	0.70
32	269,961	277,639	0.97	368,159	0.73	359,049	189,806	1.89	229,788	1.56
37	589,207	368,636	1.60	529,695	1.11	569,065	286,427	1.99	362,619	1.57
42	1,228,183	525,060	2.34	709,383	1.73	672,924	480,623	1.40	549,011	1.23
47	1,587,107	1,145,773	1.39	1,305,911	1.22	1,380,974	1,029,684	1.34	1,027,621	1.34
52	2,451,447	2,196,028	1.12	2,246,068	1.09	1,829,520	1,842,304	0.99	1,830,245	1.00
57	4,269,954	3,905,369	1.09	3,769,179	1.13	2,956,536	2,690,327	1.10	2,805,533	1.05
62	4,546,509	5,007,819	0.91	4,189,734	1.09	3,484,979	2,803,634	1.24	2,987,338	1.17
67	2,421,118	3,360,732	0.72	2,357,126	1.03	1,699,237	1,472,372	1.15	1,554,880	1.09
72	1,257,312	1,516,003	0.83	956,447	1.31	651,924	672,563	0.97	693,656	0.94
77	586,660	119,067	4.93	625,188	0.94	371,215	28,002	13.26	486,919	0.76
80 & over	373,456	42,546	8.78	766,318	0.49	78,178	9,754	8.02	378,403	0.21
<Total>	20,008,971	18,740,707	1.07	18,088,102	1.11	14,128,972	11,630,222	1.21	13,029,701	1.08

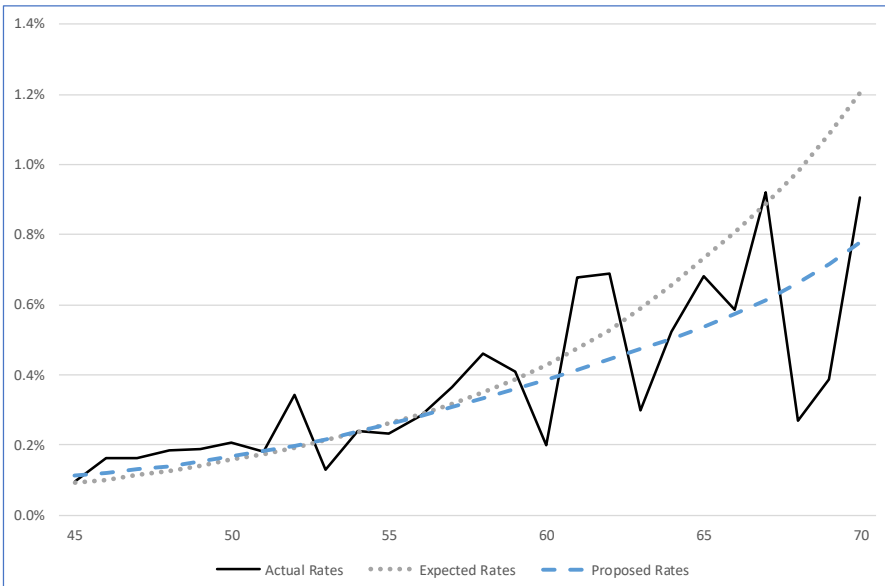
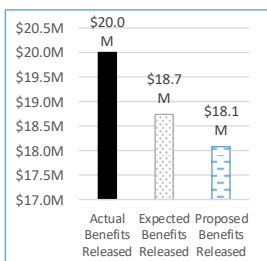
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Section VI: Supporting Tables, Subsection 2 - Pre-Retirement Mortality

Pre-Retirement Mortality Political Subdivisions Non Hazardous Duty Males

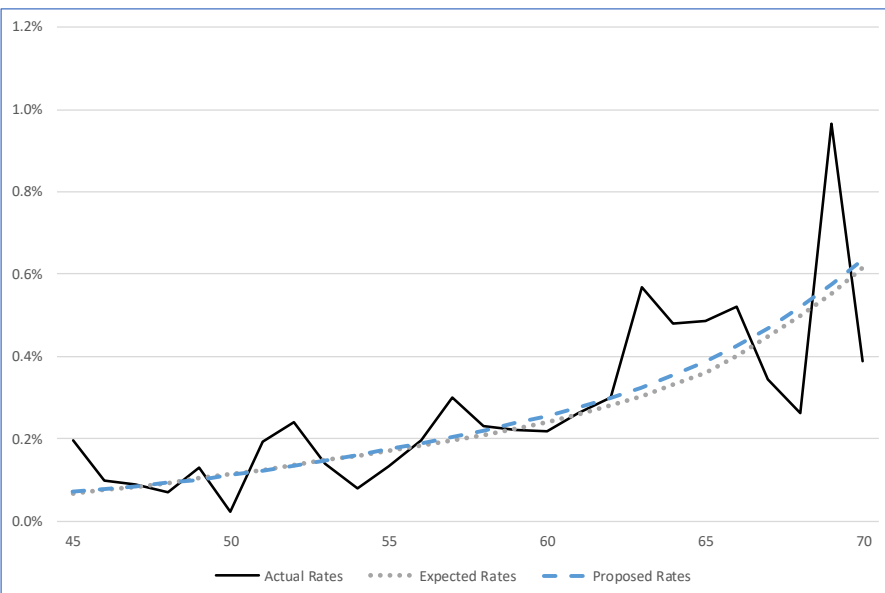
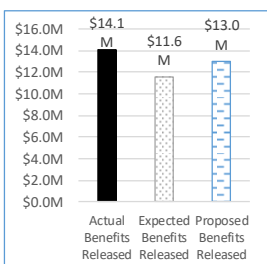
Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for pre-retirement mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older Projected BB to 2020; M 95% of rates; F 105% of rates
 Proposed: Pub-2010 EE - General Males, set forward 2 years, Modified Mortality Improvement Scale MP-2020

Pre-Retirement Mortality Political Subdivisions Non Hazardous Duty Females

Comment: Since the last experience review we have released more liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Local non hazardous duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older Projected BB to 2020; M 95% of rates; F 105% of rates
 Proposed: Pub-2010 EE - General Females, 105% for all years, set forward 3 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

STATE DISABLED MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	0	13,345	0.00	9,175	0.00	47,782	26,847	1.78	32,699	1.46
42	49,005	47,865	1.02	33,063	1.48	69,458	58,802	1.18	65,799	1.06
47	120,611	128,105	0.94	92,695	1.30	172,929	158,369	1.09	170,430	1.01
52	107,314	319,152	0.34	275,027	0.39	374,594	350,910	1.07	383,733	0.98
57	556,781	634,795	0.88	601,845	0.93	797,527	721,722	1.11	765,820	1.04
62	1,327,620	1,022,638	1.30	1,015,854	1.31	1,224,626	1,123,828	1.09	1,098,974	1.11
67	1,056,073	1,024,457	1.03	1,028,601	1.03	1,038,088	991,686	1.05	924,942	1.12
72	955,782	1,166,485	0.82	1,181,194	0.81	896,485	1,125,788	0.80	1,062,010	0.84
77	1,106,617	1,156,360	0.96	1,218,880	0.91	1,130,209	1,116,381	1.01	1,099,353	1.03
82	1,290,992	1,260,016	1.02	1,373,285	0.94	847,077	923,748	0.92	960,082	0.88
87	879,858	750,504	1.17	819,824	1.07	626,666	691,219	0.91	717,956	0.87
90 & over	472,829	378,260	1.25	391,308	1.21	321,619	521,178	0.62	509,630	0.63
<Total>	7,923,481	7,901,983	1.00	8,040,752	0.99	7,547,060	7,810,478	0.97	7,791,428	0.97

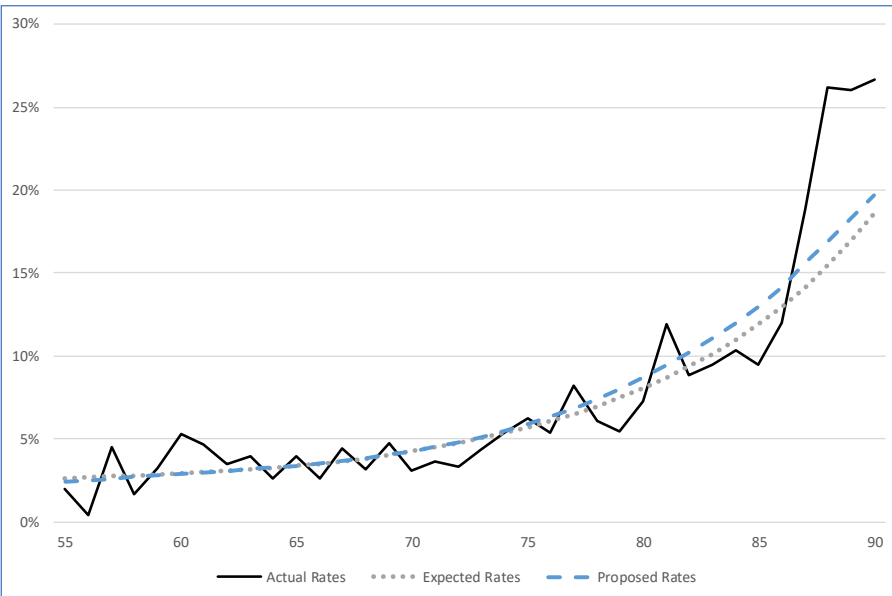
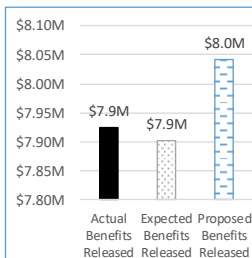
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Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

Disabled Mortality State Males

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for disability mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.

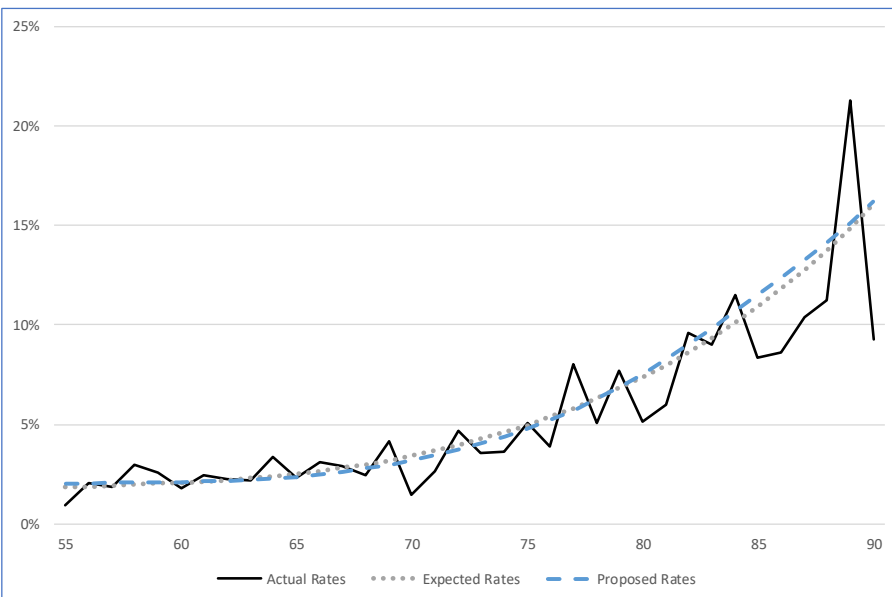
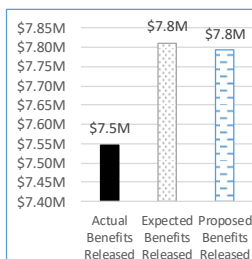


Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; M 115% of rates; F 130% of rates

Proposed: Pub-2010 Dis - General Males, set forward 3 years, Modified Mortality Improvement Scale MP-2020

Disabled Mortality State Females

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for disability mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; M 115% of rates; F 130% of rates

Proposed: Pub-2010 Dis - General Females, set forward 3 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

TEACHERS DISABLED MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	25,710	4,003	6.42	2,614	9.84	69,909	10,056	6.95	12,637	5.53
42	33,787	11,746	2.88	7,398	4.57	67,922	25,928	2.62	29,497	2.30
47	21,768	25,176	0.86	16,019	1.36	93,270	102,749	0.91	110,018	0.85
52	135,601	69,611	1.95	54,913	2.47	540,301	244,513	2.21	290,819	1.86
57	218,634	172,905	1.26	160,836	1.36	740,550	555,282	1.33	693,696	1.07
62	204,526	365,436	0.56	362,843	0.56	1,527,483	1,128,373	1.35	1,311,268	1.16
67	658,394	763,595	0.86	750,094	0.88	2,131,255	1,832,281	1.16	1,851,453	1.15
72	693,792	850,015	0.82	797,630	0.87	1,755,946	2,151,819	0.82	2,019,415	0.87
77	625,373	725,673	0.86	673,238	0.93	1,683,796	1,688,433	1.00	1,585,911	1.06
82	382,070	464,986	0.82	438,096	0.87	1,352,245	1,216,573	1.11	1,200,833	1.13
87	379,209	302,936	1.25	282,868	1.34	687,667	1,016,400	0.68	1,052,777	0.65
90 & over	154,175	256,510	0.60	235,075	0.66	728,615	891,507	0.82	860,878	0.85
<Total>	3,533,039	4,012,591	0.88	3,781,625	0.93	11,378,959	10,863,914	1.05	11,019,200	1.03

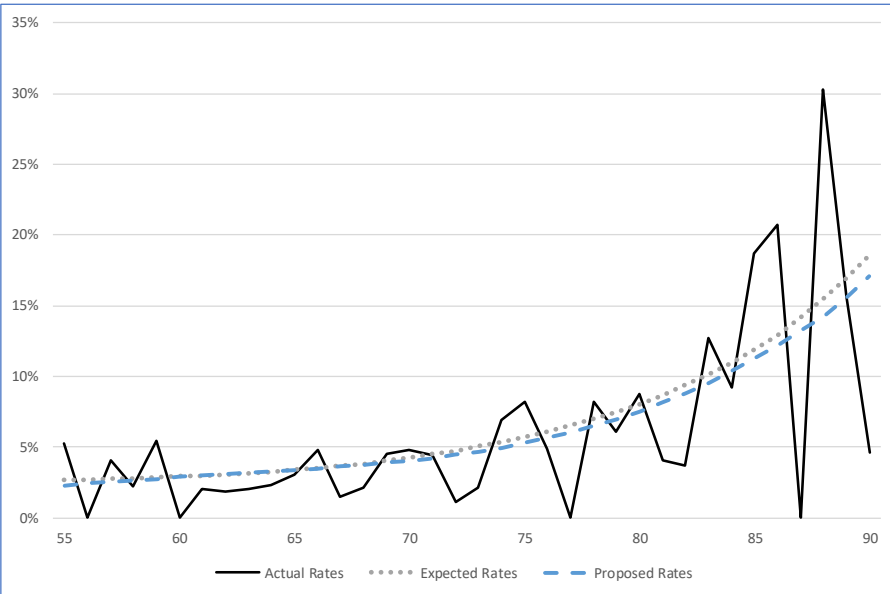
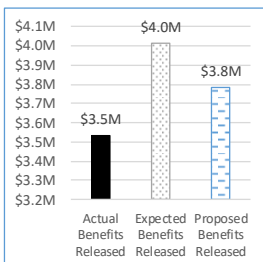
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Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

Disabled Mortality Teachers Males

Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Teacher experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.

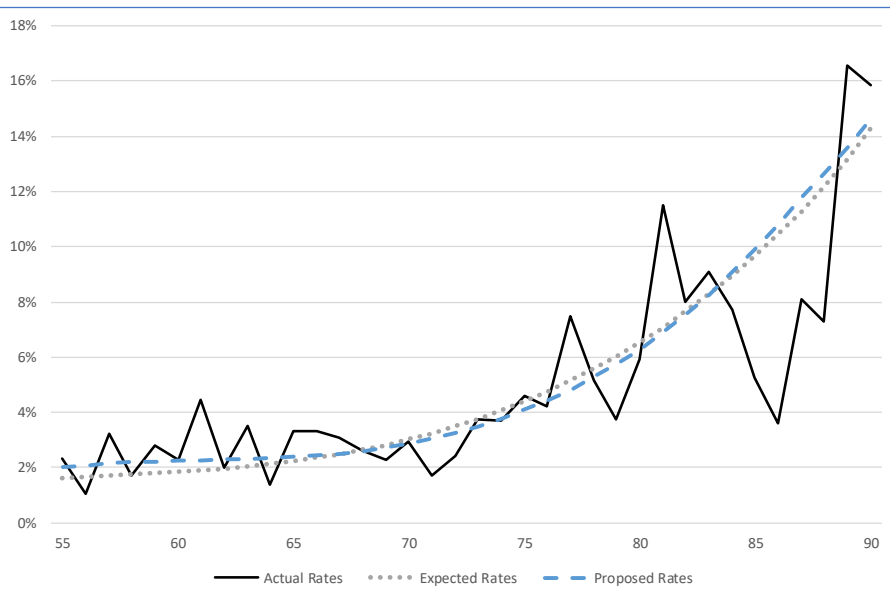
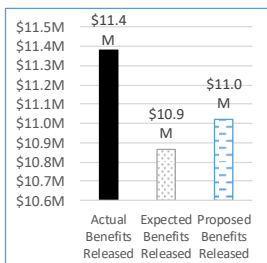


Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; M 115% of rates; F 115% of rates

Proposed: Pub-2010 Dis - Teachers Males, 110% for all years, Modified Mortality Improvement Scale MP-2020

Disabled Mortality Teachers Females

Comment: Since the last experience review we have released more liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Teacher experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; M 115% of rates; F 115% of rates

Proposed: Pub-2010 Dis - Teachers Females, 110% for all years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

JRS DISABLED MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	0	0	0.00	0	0.00	0	0	0.00	0	0.00
42	0	0	0.00	0	0.00	0	0	0.00	0	0.00
47	0	0	0.00	0	0.00	0	0	0.00	0	0.00
52	0	0	0.00	0	0.00	0	0	0.00	0	0.00
57	0	0	0.00	0	0.00	0	0	0.00	0	0.00
62	0	0	0.00	0	0.00	0	0	0.00	0	0.00
67	0	0	0.00	0	0.00	0	0	0.00	0	0.00
72	0	0	0.00	0	0.00	0	0	0.00	0	0.00
77	0	0	0.00	0	0.00	0	0	0.00	0	0.00
82	0	0	0.00	0	0.00	0	0	0.00	0	0.00
87	0	0	0.00	0	0.00	0	0	0.00	0	0.00
90 & over	107,582	21,836	4.93	18,215	5.91	0	0	0.00	0	0.00
<Total>	107,582	21,836	4.93	18,215	5.91	0	0	0.00	0	0.00

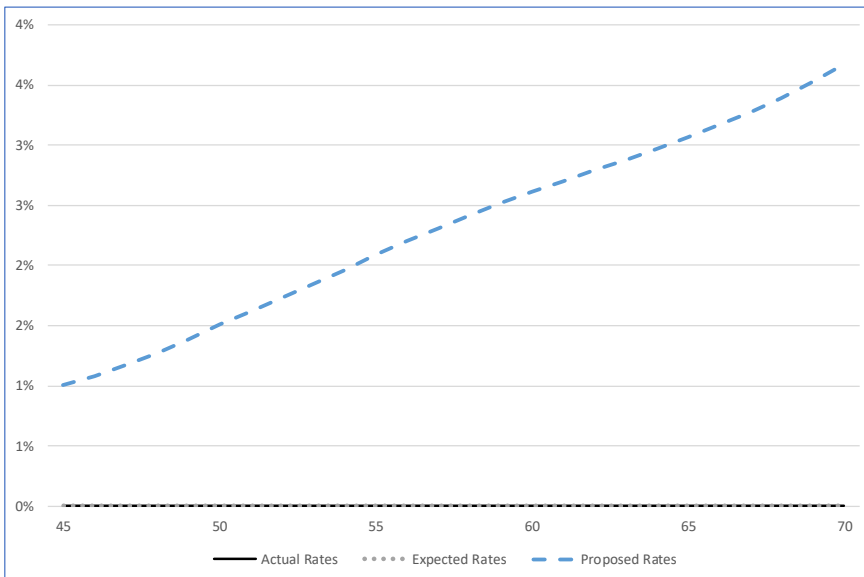
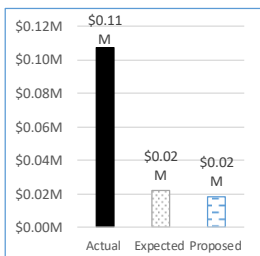
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Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

Disabled Mortality JRS Males

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for disability mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.

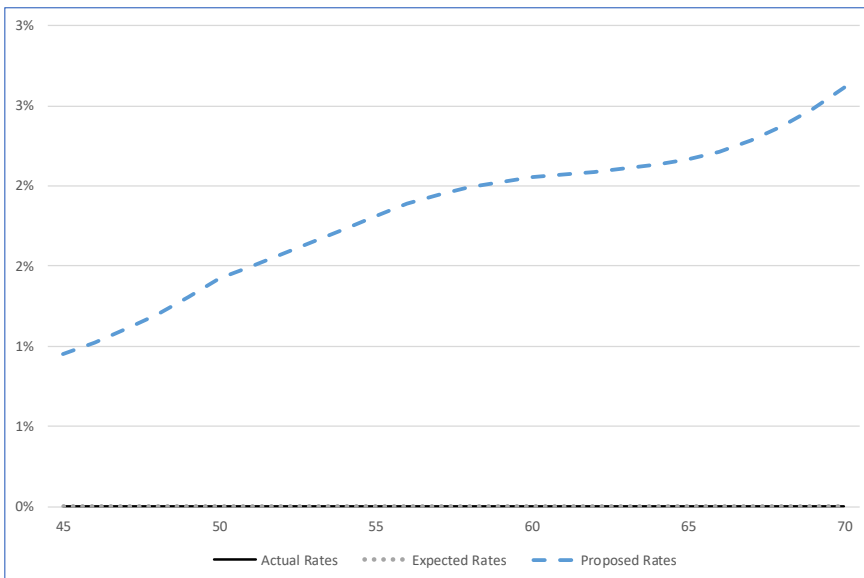
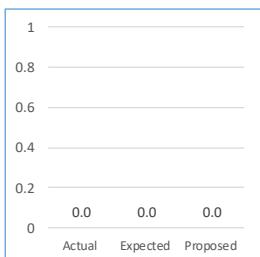


Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; M 115% of rates; F 130% of rates

Proposed: Pub-2010 Dis - General Males, Modified Mortality Improvement Scale MP-2020

Disabled Mortality JRS Females

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for disability mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; M 115% of rates; F 130% of rates

Proposed: Pub-2010 Dis - General Females, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

HAZARDOUS DUTY DISABLED MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	34,265	67,176	0.51	34,236	1.00	17,329	62,887	0.28	23,849	0.73
42	129,020	169,125	0.76	76,627	1.68	18,013	67,962	0.27	26,535	0.68
47	184,401	414,471	0.44	193,948	0.95	16,519	149,437	0.11	62,524	0.26
52	328,246	615,381	0.53	367,215	0.89	32,442	234,032	0.14	123,747	0.26
57	292,170	810,560	0.36	605,324	0.48	50,017	274,607	0.18	170,557	0.29
62	648,201	1,068,053	0.61	892,133	0.73	119,254	166,434	0.72	105,619	1.13
67	760,290	1,271,117	0.60	1,025,578	0.74	34,503	79,650	0.43	44,444	0.78
72	695,916	1,119,171	0.62	810,182	0.86	59,199	85,596	0.69	41,216	1.44
77	594,166	694,329	0.86	460,137	1.29	0	36,268	0.00	17,236	0.00
82	303,063	445,578	0.68	282,226	1.07	0	19,094	0.00	9,375	0.00
87	73,773	133,302	0.55	81,085	0.91	12,376	7,682	1.61	3,858	3.21
90 & over	28,752	68,961	0.42	41,278	0.70	0	0	0.00	0	0.00
<Total>	4,072,262	6,877,223	0.59	4,869,969	0.84	359,651	1,183,649	0.30	628,961	0.57

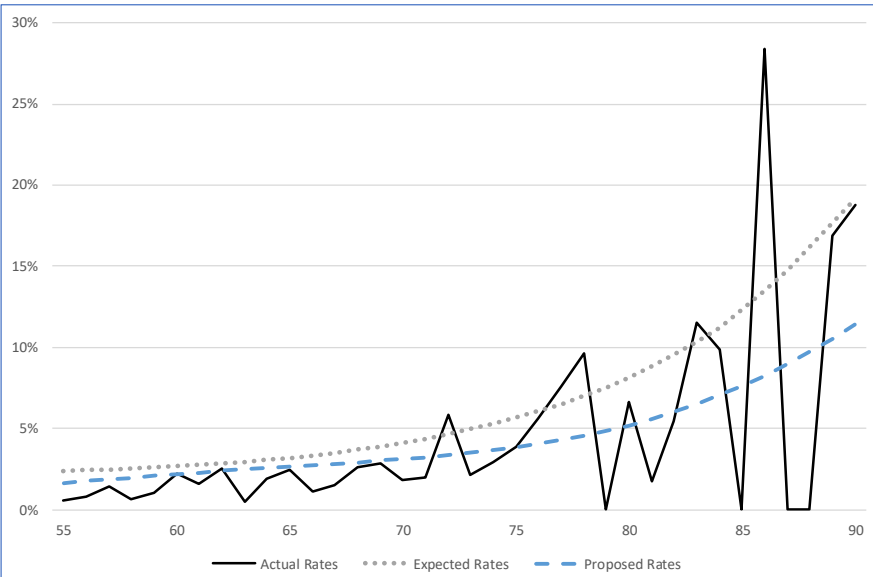
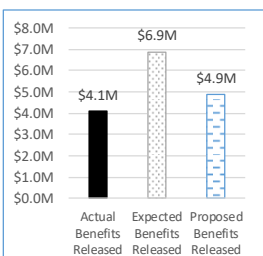
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the benefits released



Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

Disabled Mortality Hazardous Duty Males

Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Hazardous Duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.

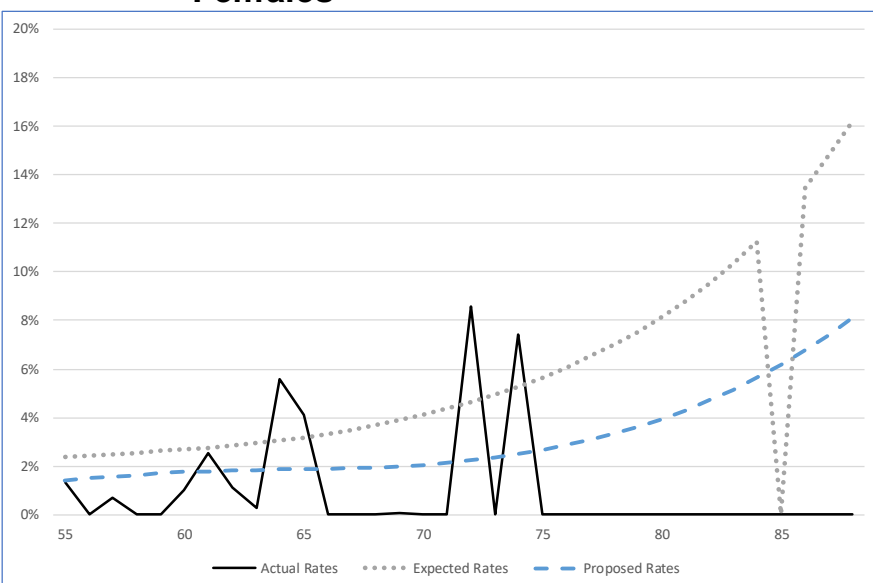
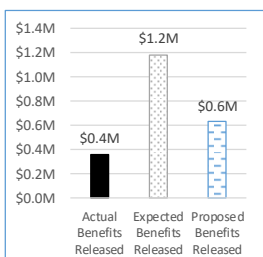


Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; MSF 2yr; Unisex using 100% Male

Proposed: Pub-2010 Dis - General Males, 95% for all years, set back 3 years, Modified Mortality Improvement Scale MP-2020

Disabled Mortality Hazardous Duty Females

Comment: Since the last experience review we have released less liability due to death than expected. We recommend a Pub-2010 public sector mortality table, modified to reflect recent Hazardous Duty experience, which results in expected liability release being closer to actual. For future mortality improvements, we recommend replacing the current load with a modified Mortality Improvement Scale MP-2020.



Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; MSF 2yr; Unisex using 100% Male

Proposed: Pub-2010 Dis - General Females, 95% for all years, set back 3 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

POLITICAL SUBDIVISIONS NON HAZARDOUS DUTY DISABLED MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	0	8,511	0.00	6,139	0.00	5,361	2,667	2.01	3,472	1.54
42	19,827	39,367	0.50	26,316	0.75	9,119	15,316	0.60	18,058	0.51
47	115,179	143,092	0.80	112,696	1.02	49,396	64,735	0.76	74,379	0.66
52	402,272	386,348	1.04	363,074	1.11	305,606	177,862	1.72	213,726	1.43
57	1,094,340	809,883	1.35	847,262	1.29	524,206	418,959	1.25	501,365	1.05
62	1,401,058	1,244,628	1.13	1,338,158	1.05	766,812	677,621	1.13	744,946	1.03
67	1,712,247	1,504,962	1.14	1,582,436	1.08	668,681	767,401	0.87	776,641	0.86
72	1,383,537	1,456,395	0.95	1,503,259	0.92	843,450	863,964	0.98	861,698	0.98
77	1,237,001	1,289,353	0.96	1,356,407	0.91	761,611	824,385	0.92	849,199	0.90
82	928,166	1,002,300	0.93	1,072,603	0.87	544,190	555,656	0.98	603,786	0.90
87	378,531	602,859	0.63	633,749	0.60	239,112	258,252	0.93	286,124	0.84
90 & over	202,664	175,623	1.15	179,696	1.13	137,387	145,070	0.95	151,824	0.90
<Total>	8,874,823	8,663,321	1.02	9,021,795	0.98	4,854,934	4,771,888	1.02	5,085,217	0.95

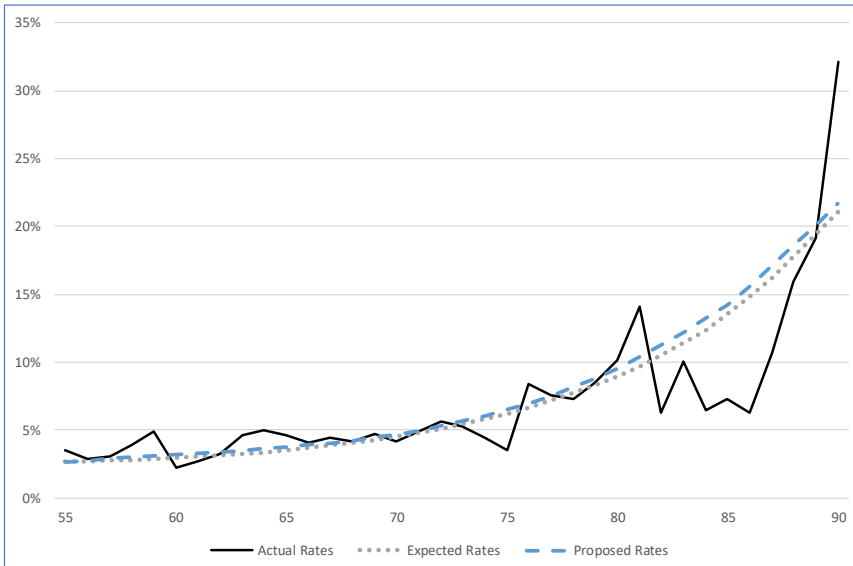
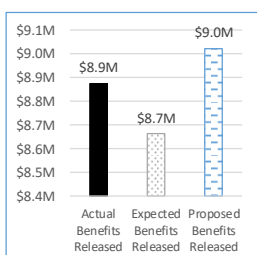
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the benefits released



Section VI: Supporting Tables, Subsection 3 – Disabled Mortality

Disabled Mortality Political Subdivisions Non Hazardous Duty Males

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for disability mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.

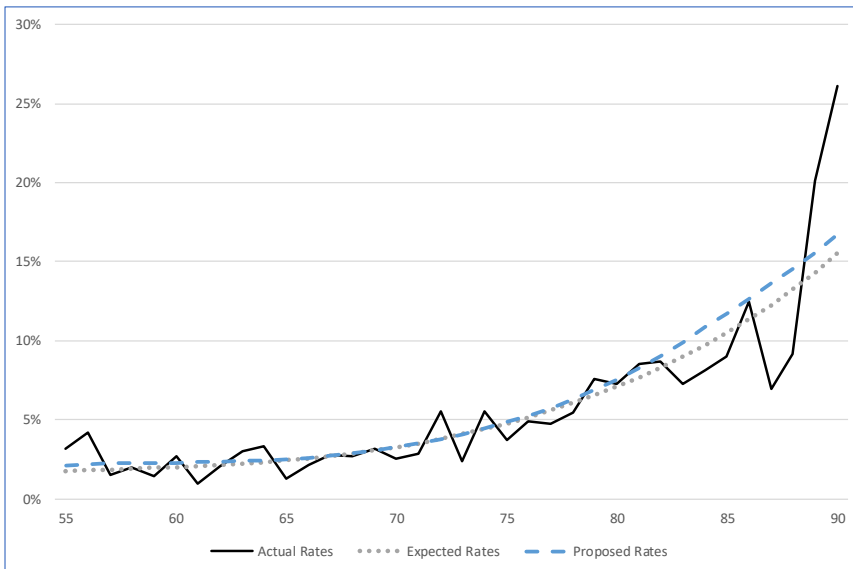
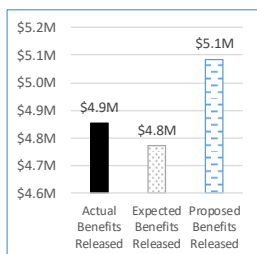


Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; M SF 2yr, 115% of rates; F 125% of rates

Proposed: Pub-2010 Dis - General Males, 110% for all years, set forward 3 years, Modified Mortality Improvement Scale MP-2020

Disabled Mortality Political Subdivisions Non Hazardous Duty Females

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for disability mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Disabled Mortality Rates Projected BB to 2020; M SF 2yr, 115% of rates; F 125% of rates

Proposed: Pub-2010 Dis - General Females, 110% for all years, set forward 2 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 4 – Contingent Annuitant Mortality

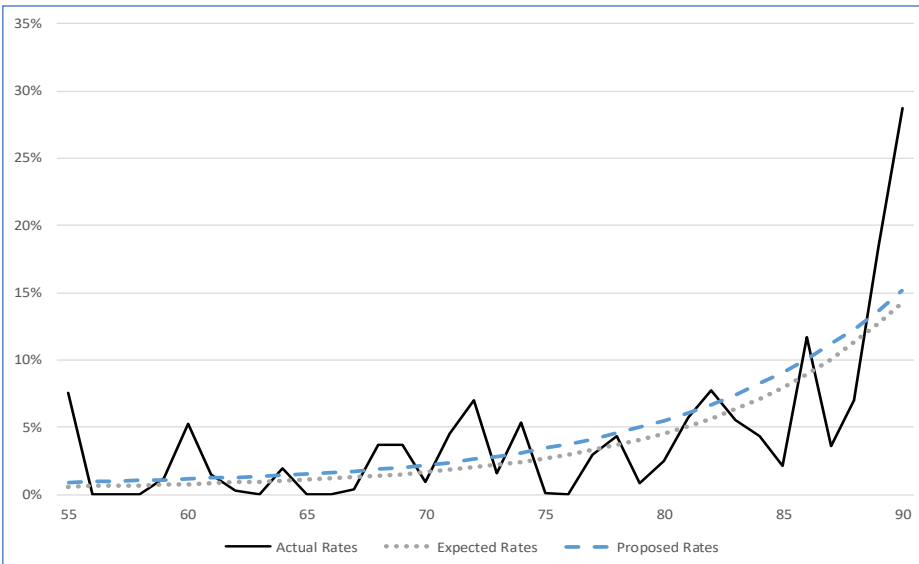
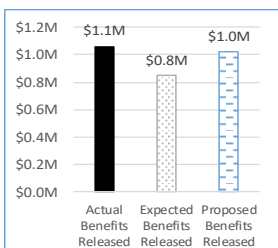
STATE CONTINGENT ANNUITANT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	31,725	214	148.38	253	125.38	0	99	0.00	116	0.00
42	5,264	113	46.56	139	37.92	5,264	129	40.86	148	35.63
47	0	467	0.00	1,319	0.00	0	912	0.00	3,624	0.00
52	7,861	3,828	2.05	6,010	1.31	5,274	9,052	0.58	13,939	0.38
57	28,511	11,740	2.43	17,415	1.64	42,476	32,163	1.32	51,130	0.83
62	59,155	35,260	1.68	50,716	1.17	121,029	103,159	1.17	154,611	0.78
67	101,205	79,823	1.27	108,290	0.93	356,691	277,992	1.28	363,893	0.98
72	264,728	138,781	1.91	179,794	1.47	755,538	628,748	1.20	743,257	1.02
77	48,949	116,451	0.42	145,324	0.34	1,373,076	1,054,033	1.30	1,174,827	1.17
82	128,756	140,228	0.92	166,242	0.77	1,946,772	1,702,715	1.14	1,828,569	1.06
87	146,822	177,552	0.83	196,104	0.75	3,477,340	2,891,459	1.20	3,089,639	1.13
90 & over	235,834	141,730	1.66	148,816	1.58	4,380,199	4,345,180	1.01	4,400,980	1.00
<Total>	1,058,809	846,187	1.25	1,020,421	1.04	12,463,657	11,045,641	1.13	11,824,733	1.05

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Contingent Annuitant Mortality State Males

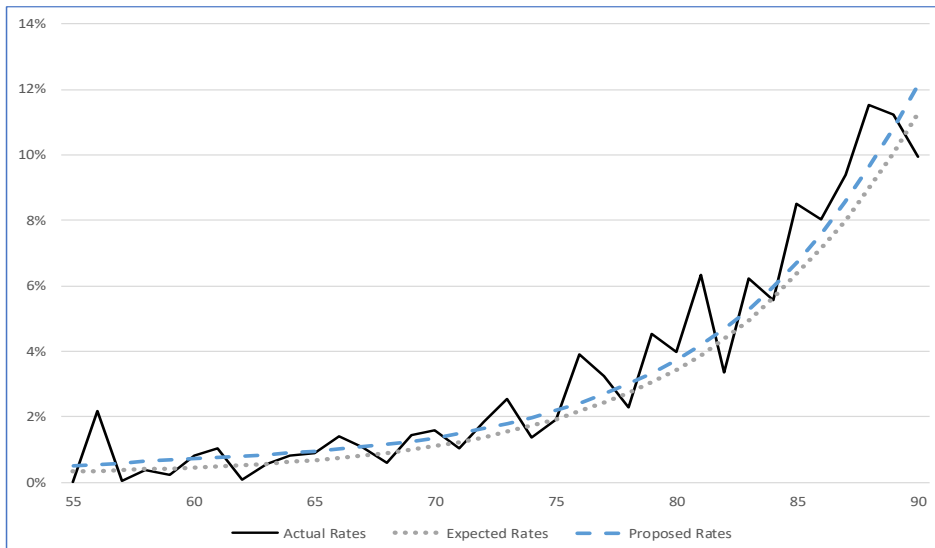
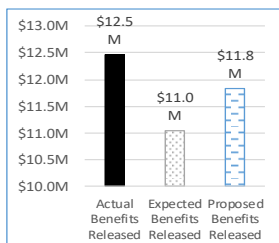
Comment: Rates adjusted to be closer to experience since the last experience review.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 1yr; F SB 1yr, 1.5% compounding increase from ages 70 to 85
 Proposed: Pub-2010 CA - General Males, 110% for all years, Modified Mortality Improvement Scale MP-2020

Contingent Annuitant Mortality State Females

Comment: Rates adjusted to be closer to experience since the last experience review.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 1yr; F SB 1yr, 1.5% compounding increase from ages 70 to 85
 Proposed: Pub-2010 CA - General Females, 110% for all years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 4 – Contingent Annuitant Mortality

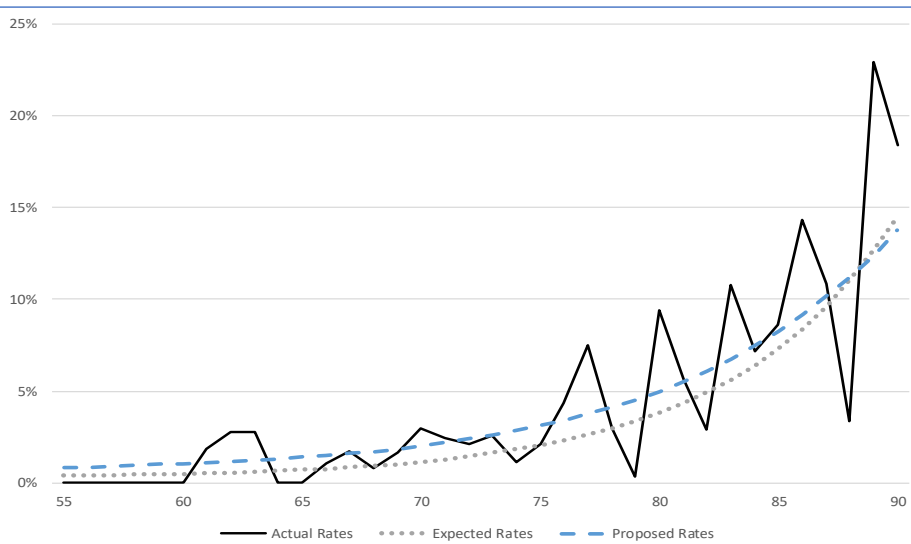
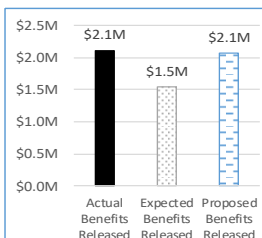
TEACHERS CONTINGENT ANNUITANT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	0	459	0.00	463	0.00	13,476	246	54.75	284	47.49
42	0	521	0.00	567	0.00	0	317	0.00	400	0.00
47	0	1,350	0.00	8,792	0.00	0	1,017	0.00	5,431	0.00
52	8,558	12,747	0.67	28,603	0.30	35,265	3,931	8.97	10,855	3.25
57	0	19,281	0.00	40,799	0.00	7,506	11,625	0.65	25,130	0.30
62	149,986	57,499	2.61	118,391	1.27	79,735	37,392	2.13	78,648	1.01
67	174,153	136,441	1.28	257,855	0.68	114,622	102,251	1.12	172,164	0.67
72	360,061	231,147	1.56	379,452	0.95	308,870	216,552	1.43	319,768	0.97
77	337,042	242,659	1.39	349,584	0.96	523,006	367,006	1.43	496,086	1.05
82	366,798	247,581	1.48	306,896	1.20	515,807	514,015	1.00	637,715	0.81
87	393,075	322,479	1.22	338,045	1.16	1,003,741	863,455	1.16	986,529	1.02
90 & over	325,840	267,240	1.22	241,673	1.35	1,741,184	1,375,577	1.27	1,349,344	1.29
<Total>	2,115,513	1,539,404	1.37	2,071,119	1.02	4,343,211	3,493,385	1.24	4,082,354	1.06

- All numbers in this table are for the four years studied combined
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Contingent Annuitant Mortality Teachers Males

Comment: Rates adjusted to be closer to experience since the last experience review.

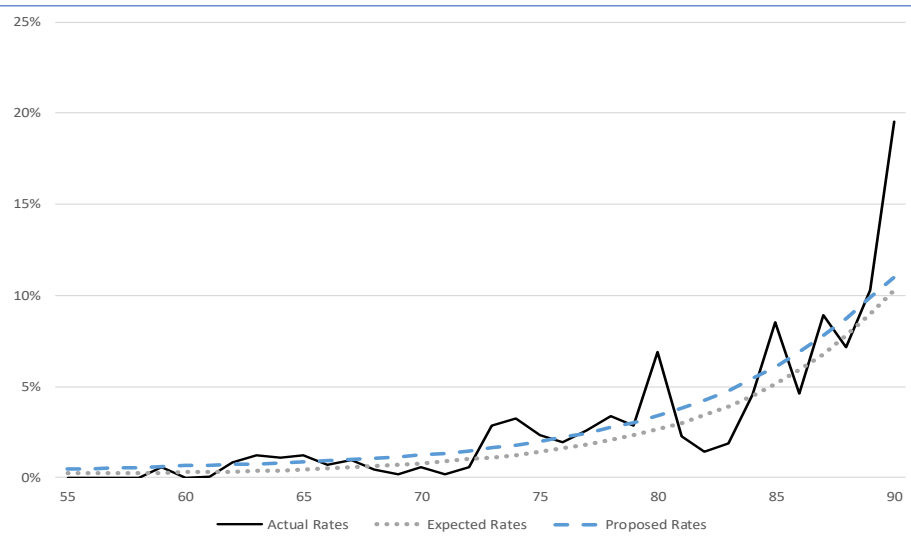
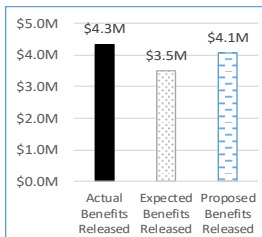


Expected: RP-2014 White Collar Employee Rates to age 49, White Collar Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M 1% increase compounded from 70 to 90; F SB 3yr, 1.5% increase compounded from ages 65 to 70, and 2.0% increase

Proposed: Pub-2010 CA - Teachers Males, Modified Mortality Improvement Scale MP-2020

Contingent Annuitant Mortality Teachers Females

Comment: Rates adjusted to be closer to experience since the last experience review.



Expected: RP-2014 White Collar Employee Rates to age 49, White Collar Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M 1% increase compounded from 70 to 90; F SB 3yr, 1.5% increase compounded from ages 65 to 70, and 2.0% increase

Proposed: Pub-2010 CA - Teachers Females, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 4 – Contingent Annuitant Mortality

JRS CONTINGENT ANNUITANT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	0	0	0.00	0	0.00	0	44	0.00	49	0.00
42	0	19	0.00	20	0.00	0	0	0.00	0	0.00
47	0	0	0.00	0	0.00	0	0	0.00	0	0.00
52	0	185	0.00	257	0.00	0	988	0.00	1,295	0.00
57	0	675	0.00	910	0.00	0	2,606	0.00	3,754	0.00
62	0	0	0.00	0	0.00	0	9,554	0.00	13,058	0.00
67	0	1,338	0.00	1,616	0.00	99,458	10,879	9.14	13,158	7.56
72	0	4,840	0.00	5,740	0.00	0	47,512	0.00	50,646	0.00
77	0	0	0.00	0	0.00	82,041	89,973	0.91	90,943	0.90
82	0	0	0.00	0	0.00	112,643	241,810	0.47	236,378	0.48
87	0	0	0.00	0	0.00	472,684	389,494	1.21	378,094	1.25
90 & over	0	0	0.00	0	0.00	1,059,062	996,324	1.06	917,859	1.15
<Total>	0	7,056	0.00	8,543	0.00	1,825,888	1,789,184	1.02	1,705,233	1.07

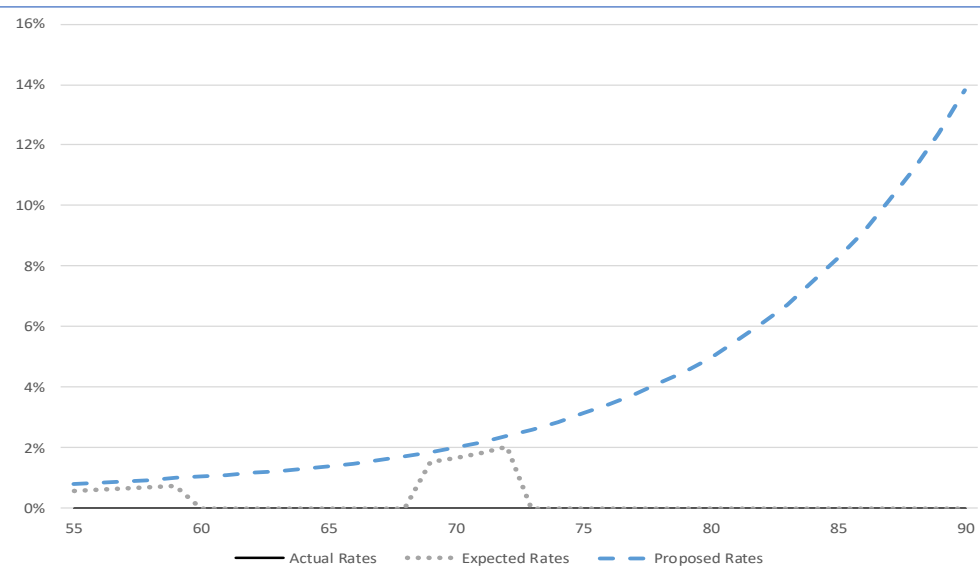
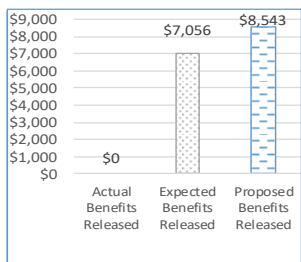
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Section VI: Supporting Tables, Subsection 4 – Contingent Annuitant Mortality

Contingent Annuitant Mortality JRS Males

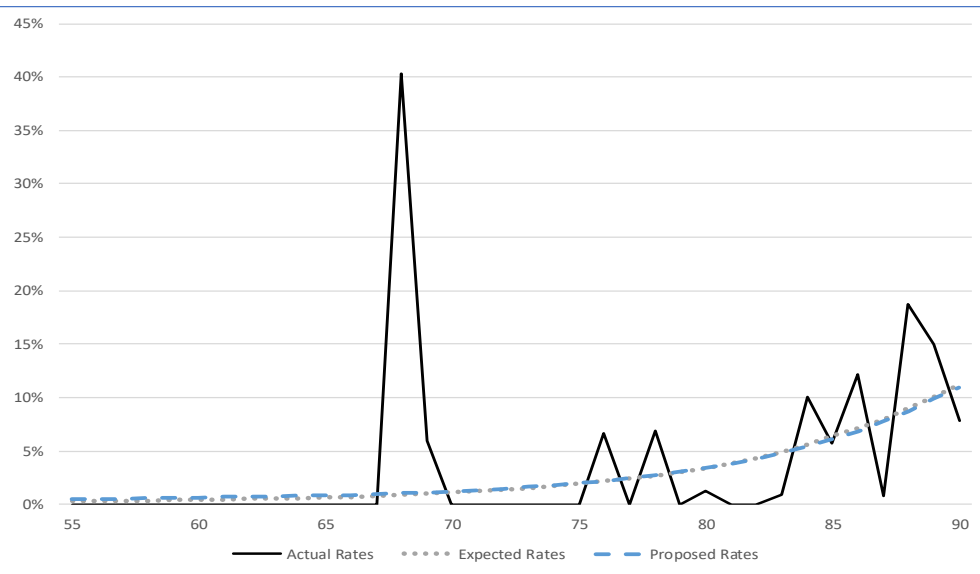
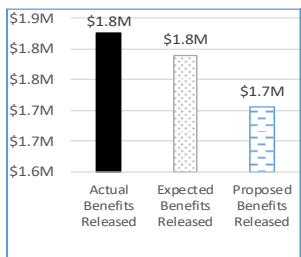
Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for contingent annuitant mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M SF 1yr; F SB 1yr, 1.5% compounding increase from ages 70 to 85
 Proposed: Pub-2010 CA - General Males, Modified Mortality Improvement Scale MP-2020

Contingent Annuitant Mortality JRS Females

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for contingent annuitant mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M SF 1yr; F SB 1yr, 1.5% compounding increase from ages 70 to 85
 Proposed: Pub-2010 CA - General Females, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 4 – Contingent Annuitant Mortality

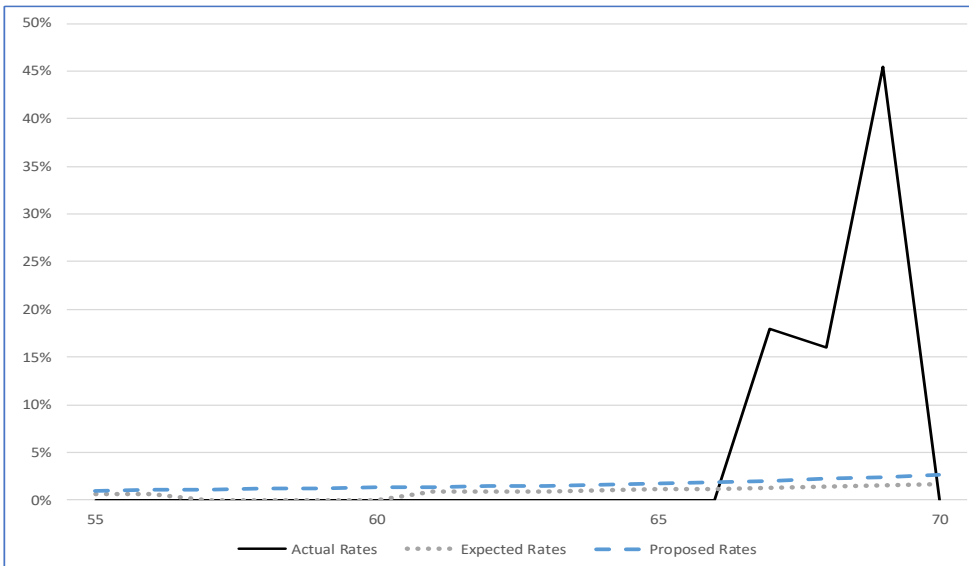
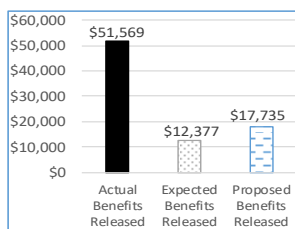
HAZARDOUS DUTY CONTINGENT ANNUITANT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	18,675	49	384.10	71	262.03	0	91	0.00	132	0.00
42	0	1	0.00	5	0.00	0	203	0.00	535	0.00
47	0	88	0.00	248	0.00	2,400	940	2.55	1,416	1.69
52	0	1,251	0.00	2,151	0.00	54,170	6,599	8.21	8,878	6.10
57	0	2	0.00	3	0.00	18,066	12,591	1.43	17,230	1.05
62	0	587	0.00	944	0.00	39,601	25,956	1.53	30,969	1.28
67	19,928	1,579	12.62	2,493	7.99	40,601	54,078	0.75	56,466	0.72
72	3,850	3,244	1.19	4,868	0.79	113,877	88,413	1.29	90,119	1.26
77	0	1,345	0.00	1,867	0.00	142,550	105,039	1.36	108,821	1.31
82	0	2,632	0.00	3,399	0.00	155,415	201,338	0.77	213,158	0.73
87	0	0	0.00	0	0.00	108,115	146,925	0.74	157,923	0.68
90 & over	9,116	1,601	5.70	1,687	5.40	200,509	191,391	1.05	199,074	1.01
<Total>	51,569	12,377	4.17	17,735	2.91	875,305	833,563	1.05	884,722	0.99

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- The amounts in the actual, expected, proposed columns are the benefits released



Contingent Annuitant Mortality Hazardous Duty Males

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for contingent annuitant mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.

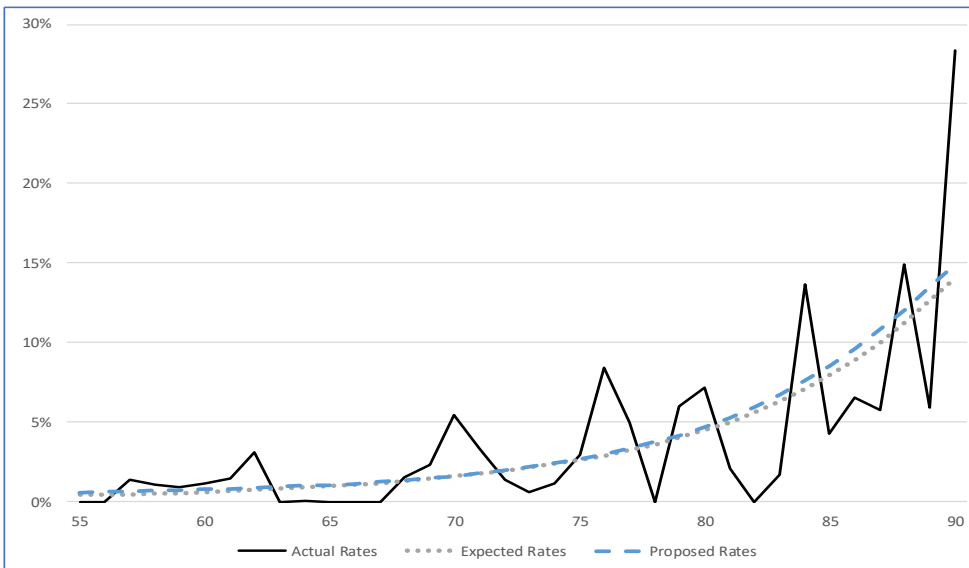
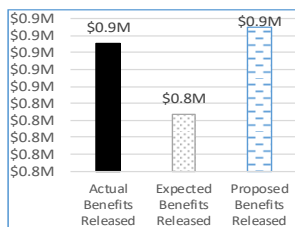


Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 1yr, 1% increase compounded from ages 70 to 90; F SF 3yr

Proposed: Pub-2010 CA - Safety Males, 110% for all years, set forward 2 years, Modified Mortality Improvement Scale MP-2020

Contingent Annuitant Mortality Hazardous Duty Females

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for contingent annuitant mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; MSF 1yr, 1% increase compounded from ages 70 to 90; F SF 3yr

Proposed: Pub-2010 CA - Safety Females, 110% for all years, set forward 2 years, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 4 – Contingent Annuitant Mortality

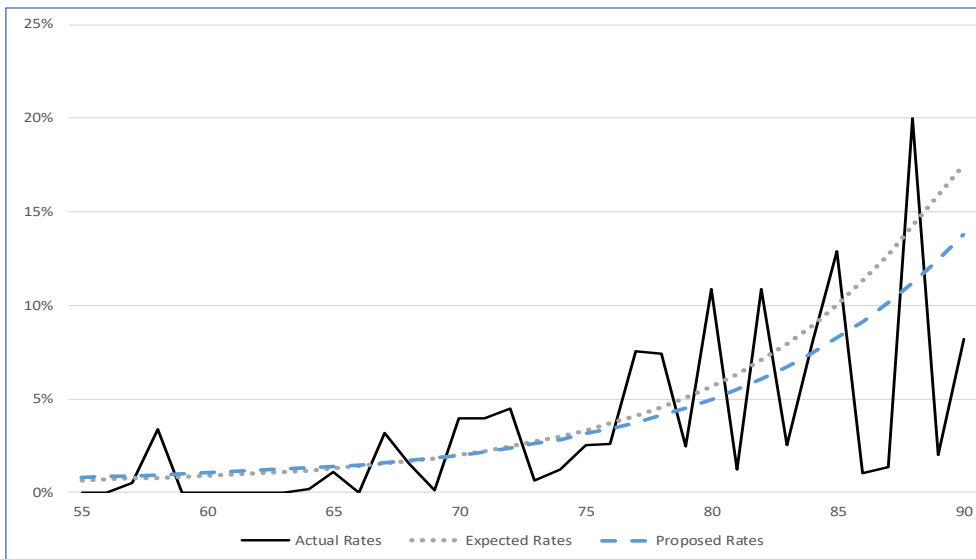
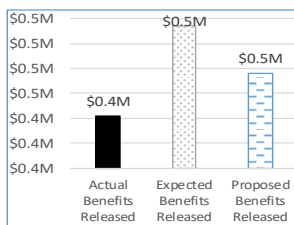
POLITICAL SUBDIVISIONS NON HAZARDOUS DUTY CONTINGENT ANNUITANT MORTALITY										
CENTRAL AGE OF GROUP	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
Under 40	9,300	236	39.40	241	38.55	0	329	0.00	322	0.00
42	0	218	0.00	187	0.00	0	975	0.00	912	0.00
47	0	1,046	0.00	1,830	0.00	0	2,872	0.00	9,317	0.00
52	720	5,108	0.14	6,441	0.11	25,080	24,891	1.01	30,287	0.83
57	23,466	17,448	1.34	21,024	1.12	127,062	61,253	2.07	82,934	1.53
62	952	32,717	0.03	37,416	0.03	75,207	126,400	0.59	158,999	0.47
67	32,255	45,260	0.71	47,012	0.69	206,857	218,003	0.95	237,638	0.87
72	96,342	82,045	1.17	79,644	1.21	457,307	390,480	1.17	387,119	1.18
77	113,336	102,940	1.10	94,843	1.19	488,742	523,066	0.93	499,120	0.98
82	83,726	88,911	0.94	76,358	1.10	757,713	712,825	1.06	666,073	1.14
87	41,647	63,885	0.65	51,257	0.81	1,070,731	968,222	1.11	889,287	1.20
90 & over	39,696	74,056	0.54	59,664	0.67	1,045,591	1,269,842	0.82	1,086,093	0.96
<Total>	441,441	513,869	0.86	475,918	0.93	4,254,289	4,299,160	0.99	4,048,100	1.05

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the benefits released



Contingent Annuitant Mortality Political Subdivisions Non Hazardous Duty Males

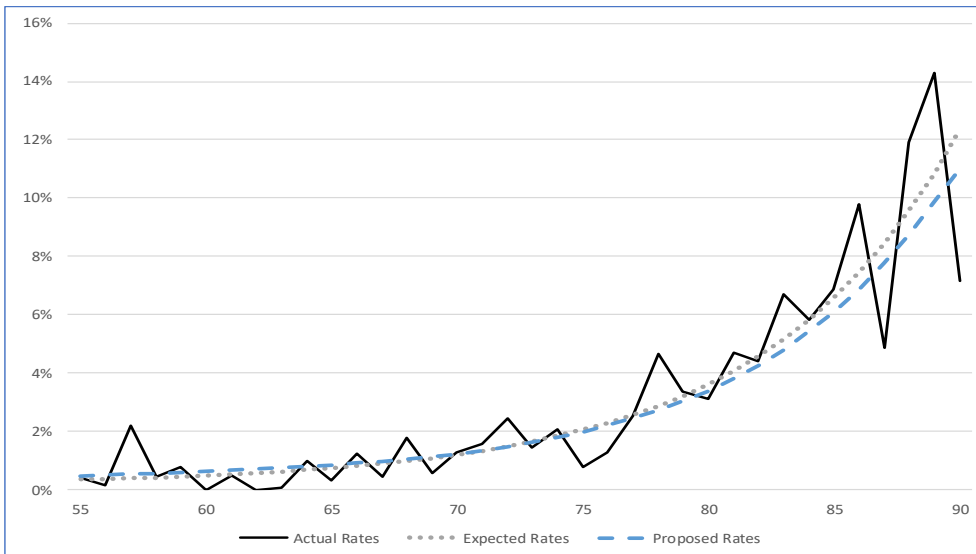
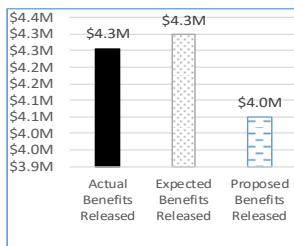
Comment: Rates adjusted to be closer to experience since the last experience review.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M SF 3yr; F 1.0% increase compounded from ages 70 to 90
 Proposed: Pub-2010 CA - General Males, Modified Mortality Improvement Scale MP-2020

Contingent Annuitant Mortality Political Subdivisions Non Hazardous Duty Females

Comment: Because we are switching to a new set of tables (Pub-2010) and adding in a generational mortality component, some groups may not match as closely as others. Due to the small amount of credibility for contingent annuitant mortality it is harder to get a good fit for all groups and we did not want to overengineer the tables and thus imply more credibility to the results than exists.



Expected: RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older Projected BB to 2020; M SF 3yr; F 1.0% increase compounded from ages 70 to 90
 Proposed: Pub-2010 CA - General Females, Modified Mortality Improvement Scale MP-2020



Section VI: Supporting Tables, Subsection 5 – Retirement

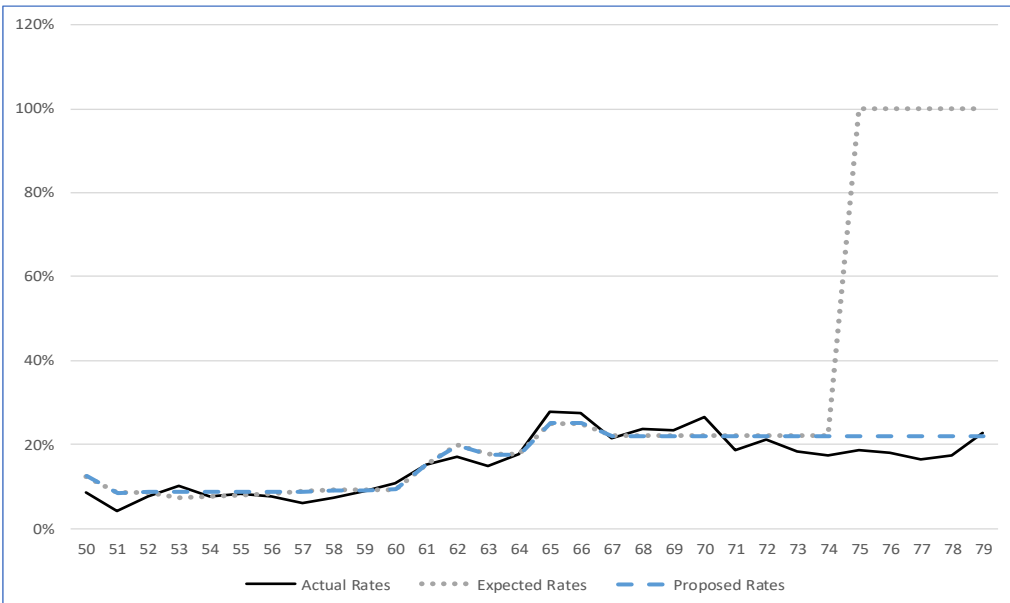
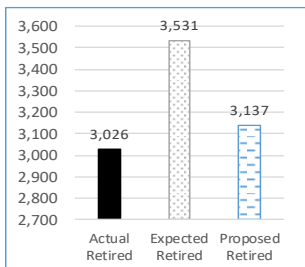
AGE	STATE MALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT									
	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	6	8.63	0.70	8.63	0.70	0	0.00	0.00	0.00	0.00
51	3	4.64	0.65	4.64	0.65	2	5.49	0.36	5.49	0.36
52	4	4.96	0.81	4.96	0.81	10	11.25	0.89	11.25	0.89
53	17	6.15	2.76	9.84	1.73	14	16.47	0.85	16.47	0.85
54	8	6.35	1.26	10.16	0.79	22	24.39	0.90	24.39	0.90
55	10	5.65	1.77	9.04	1.11	30	32.76	0.92	32.76	0.92
56	8	4.45	1.80	7.12	1.12	33	40.59	0.81	40.59	0.81
57	8	9.00	0.89	9.60	0.83	32	48.33	0.66	48.33	0.66
58	10	10.80	0.93	10.80	0.93	46	58.41	0.79	58.41	0.79
59	7	10.60	0.66	10.60	0.66	69	68.04	1.01	68.04	1.01
60	13	11.16	1.16	11.16	1.16	81	70.20	1.15	70.20	1.15
61	16	14.85	1.08	15.30	1.05	123	122.85	1.00	122.85	1.00
62	11	15.00	0.73	12.75	0.86	141	161.40	0.87	161.40	0.87
63	11	15.00	0.73	12.75	0.86	109	129.33	0.84	129.33	0.84
64	11	16.40	0.67	13.94	0.79	131	126.00	1.04	126.00	1.04
65	327	310.00	1.05	310.00	1.05	201	166.50	1.21	166.50	1.21
66	0	0.00	0.00	0.00	0.00	398	361.00	1.10	361.00	1.10
67	0	0.00	0.00	0.00	0.00	232	239.14	0.97	239.14	0.97
68	1	0.20	5.00	0.20	5.00	212	197.34	1.07	197.34	1.07
69	0	0.00	0.00	0.00	0.00	166	156.42	1.06	156.42	1.06
70	0	0.00	0.00	0.00	0.00	149	124.08	1.20	124.08	1.20
71	0	0.00	0.00	0.00	0.00	74	87.12	0.85	87.12	0.85
72	0	0.00	0.00	0.00	0.00	68	71.06	0.96	71.06	0.96
73	0	0.00	0.00	0.00	0.00	49	58.52	0.84	58.52	0.84
74	0	0.00	0.00	0.00	0.00	38	48.18	0.79	48.18	0.79
75	0	0.00	0.00	0.00	0.00	35	188.00	0.19	41.36	0.85
76	0	0.00	0.00	0.00	0.00	23	128.00	0.18	28.16	0.82
77	0	0.00	0.00	0.00	0.00	15	91.00	0.16	20.02	0.75
78	0	0.00	0.00	0.00	0.00	11	63.00	0.17	13.86	0.79
79	0	0.00	0.00	0.00	0.00	10	44.00	0.23	9.68	1.03
<Total>	471	453.84	1.04	461.49	1.02	2,524	2,938.87	0.86	2,537.95	0.99

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced State Males

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 80.





Section VI: Supporting Tables, Subsection 5 – Retirement

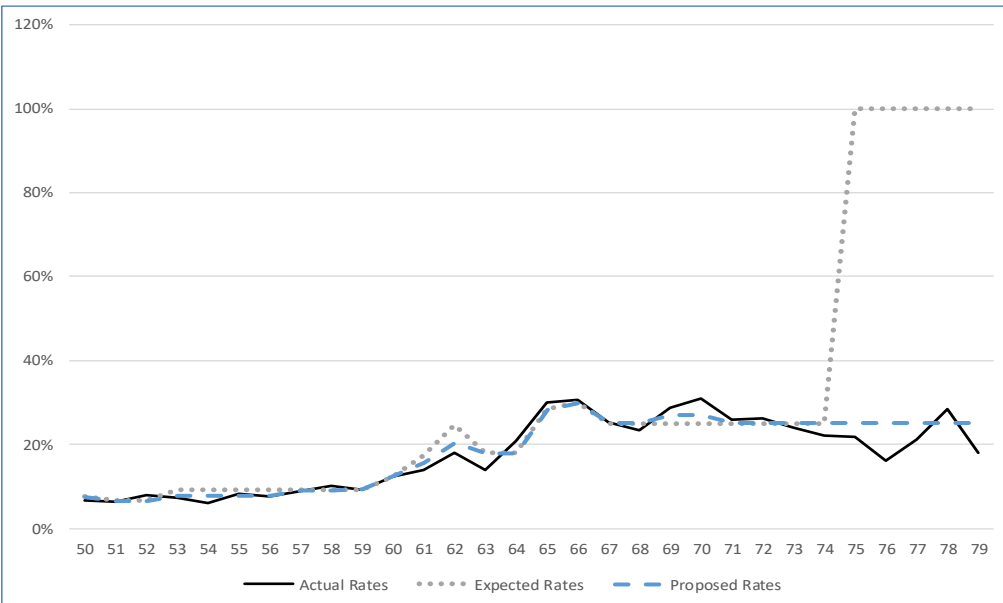
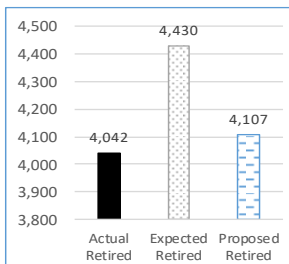
STATE FEMALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	6	6.90	0.87	6.90	0.87	0	0.00	0.00	0.00	0.00
51	5	5.48	0.91	5.48	0.91	6	6.00	1.00	6.00	1.00
52	5	6.90	0.72	6.90	0.72	16	10.08	1.59	10.08	1.59
53	9	13.40	0.67	10.05	0.90	20	23.31	0.86	20.72	0.97
54	17	18.70	0.91	14.03	1.21	19	35.46	0.54	31.52	0.60
55	9	18.00	0.50	13.50	0.67	55	53.46	1.03	47.52	1.16
56	13	16.30	0.80	12.23	1.06	57	66.42	0.86	59.04	0.97
57	16	16.90	0.95	16.90	0.95	78	80.55	0.97	80.55	0.97
58	18	15.50	1.16	15.50	1.16	97	89.37	1.09	89.37	1.09
59	20	13.30	1.50	15.96	1.25	94	98.82	0.95	98.82	0.95
60	17	15.96	1.07	15.96	1.07	145	146.63	0.99	146.63	0.99
61	16	21.12	0.76	15.36	1.04	161	200.90	0.80	183.68	0.88
62	26	27.23	0.95	27.23	0.95	199	283.75	0.70	227.00	0.88
63	20	25.20	0.79	25.20	0.79	137	178.85	0.77	178.85	0.77
64	20	17.55	1.14	17.55	1.14	199	169.22	1.18	169.23	1.18
65	486	470.25	1.03	470.25	1.03	275	249.30	1.10	249.30	1.10
66	0	0.00	0.00	0.00	0.00	556	542.40	1.03	542.40	1.03
67	1	0.30	3.33	0.30	3.33	310	307.50	1.01	307.50	1.01
68	0	0.00	0.00	0.00	0.00	217	231.25	0.94	231.25	0.94
69	0	0.00	0.00	0.00	0.00	208	181.00	1.15	195.48	1.06
70	0	0.00	0.00	0.00	0.00	163	131.25	1.24	141.75	1.15
71	0	0.00	0.00	0.00	0.00	94	91.00	1.03	91.00	1.03
72	0	0.00	0.00	0.00	0.00	77	73.25	1.05	73.25	1.05
73	0	0.00	0.00	0.00	0.00	49	51.00	0.96	51.00	0.96
74	0	0.00	0.00	0.00	0.00	32	36.25	0.88	36.25	0.88
75	0	0.00	0.00	0.00	0.00	23	106.00	0.22	26.50	0.87
76	0	0.00	0.00	0.00	0.00	12	74.00	0.16	18.50	0.65
77	0	0.00	0.00	0.00	0.00	12	57.00	0.21	14.25	0.84
78	0	0.00	0.00	0.00	0.00	12	42.00	0.29	10.50	1.14
79	0	0.00	0.00	0.00	0.00	6	33.00	0.18	8.25	0.73
<Total>	704	708.99	0.99	689.30	1.02	3,329	3,649.02	0.91	3,346.19	0.99

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced State Females

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 80.





Section VI: Supporting Tables, Subsection 5 – Retirement

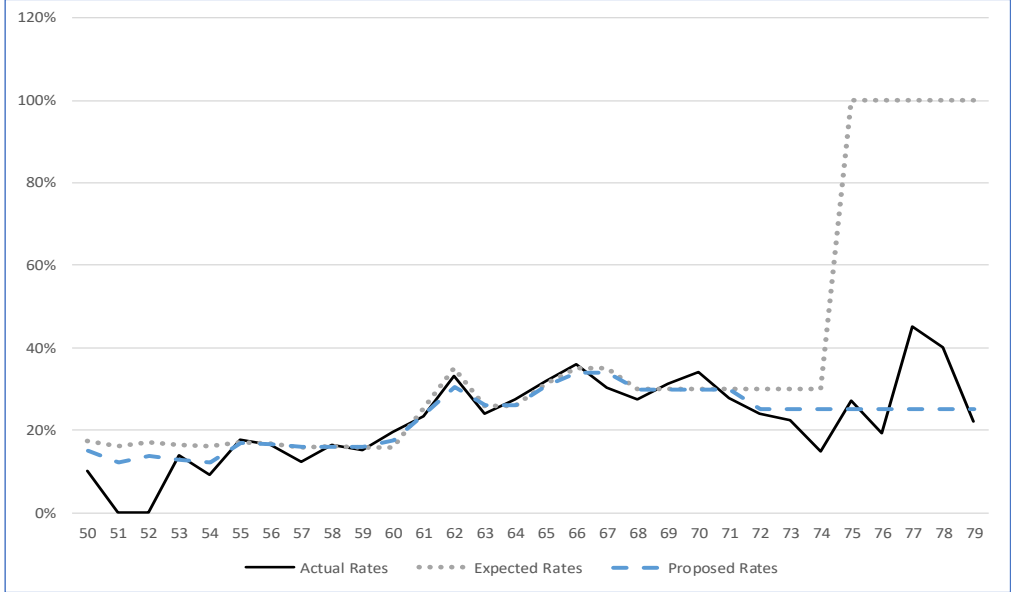
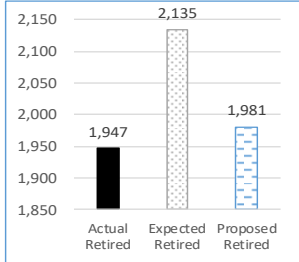
TEACHERS MALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	1	1.74	0.57	1.50	0.67	0	0.00	0.00	0.00	0.00
51	0	1.22	0.00	1.05	0.00	0	1.35	0.00	0.90	0.00
52	0	8.93	0.00	7.65	0.00	0	2.25	0.00	1.50	0.00
53	16	18.03	0.89	15.45	1.04	8	10.50	0.76	7.00	1.14
54	11	20.13	0.55	17.25	0.64	15	24.75	0.61	16.50	0.91
55	21	22.95	0.92	22.95	0.92	45	40.80	1.10	40.80	1.10
56	22	22.05	1.00	22.05	1.00	49	49.65	0.99	49.65	0.99
57	8	11.93	0.67	11.93	0.67	43	54.45	0.79	54.45	0.79
58	12	13.28	0.90	13.28	0.90	60	57.00	1.05	57.00	1.05
59	9	11.25	0.80	11.25	0.80	60	60.30	1.00	60.30	1.00
60	15	11.03	1.36	11.03	1.36	74	60.90	1.22	69.02	1.07
61	11	9.30	1.18	10.85	1.01	88	98.50	0.89	90.62	0.97
62	26	17.50	1.49	17.50	1.49	111	126.70	0.88	108.60	1.02
63	8	10.50	0.76	10.50	0.76	70	73.25	0.96	73.25	0.96
64	12	10.85	1.11	10.85	1.11	74	70.25	1.05	70.25	1.05
65	231	219.60	1.05	219.60	1.05	73	78.40	0.93	76.16	0.96
66	0	0.00	0.00	0.00	0.00	256	247.80	1.03	240.72	1.06
67	0	0.00	0.00	0.00	0.00	144	165.90	0.87	161.16	0.89
68	1	0.60	1.67	0.60	1.67	93	102.00	0.91	102.00	0.91
69	0	0.00	0.00	0.00	0.00	82	78.60	1.04	78.60	1.04
70	0	0.00	0.00	0.00	0.00	68	59.70	1.14	59.70	1.14
71	0	0.00	0.00	0.00	0.00	35	37.80	0.93	37.80	0.93
72	0	0.00	0.00	0.00	0.00	24	30.00	0.80	25.00	0.96
73	0	0.00	0.00	0.00	0.00	17	22.80	0.75	19.00	0.89
74	0	0.00	0.00	0.00	0.00	8	16.20	0.49	13.50	0.59
75	0	0.00	0.00	0.00	0.00	13	48.00	0.27	12.00	1.08
76	0	0.00	0.00	0.00	0.00	6	31.00	0.19	7.75	0.77
77	0	0.00	0.00	0.00	0.00	9	20.00	0.45	5.00	1.80
78	0	0.00	0.00	0.00	0.00	6	15.00	0.40	3.75	1.60
79	0	0.00	0.00	0.00	0.00	2	9.00	0.22	2.25	0.89
<Total>	404	410.89	0.98	405.29	1.00	1,533	1,692.85	0.91	1,544.23	0.99

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Teachers Males

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 80.





Section VI: Supporting Tables, Subsection 5 – Retirement

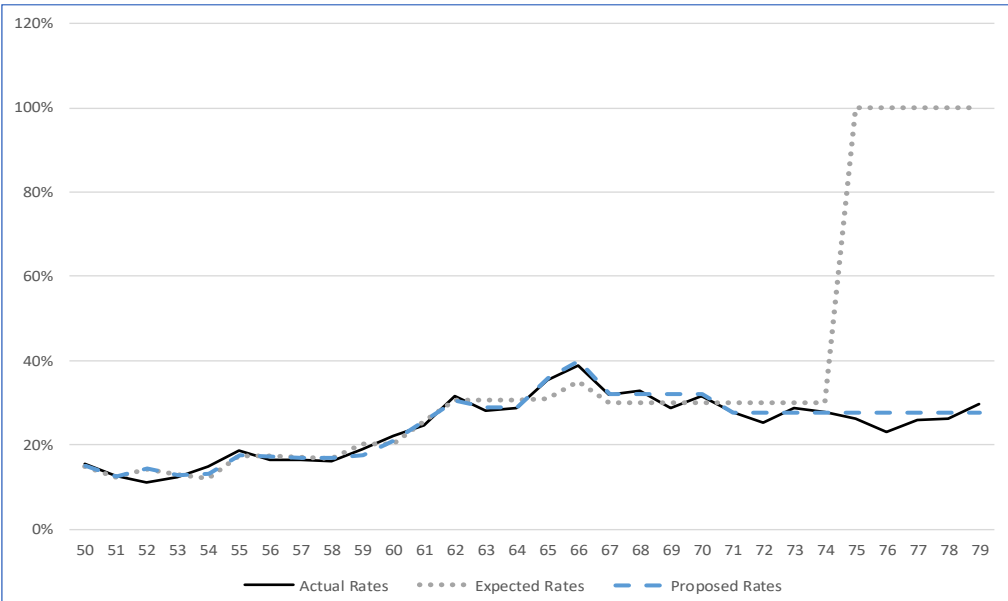
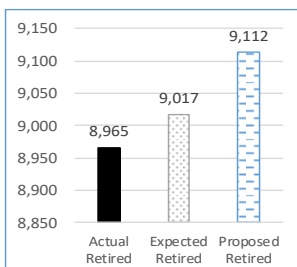
TEACHERS FEMALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	5	4.80	1.04	4.80	1.04	0	0.00	0.00	0.00	0.00
51	4	4.05	0.99	4.05	0.99	3	2.80	1.07	2.80	1.07
52	38	47.70	0.80	47.70	0.80	3	5.60	0.54	5.60	0.54
53	73	72.60	1.01	72.60	1.01	31	35.90	0.86	35.90	0.86
54	86	67.80	1.27	67.80	1.27	92	75.00	1.23	90.00	1.02
55	75	74.03	1.01	74.03	1.01	190	173.12	1.10	173.12	1.10
56	75	67.05	1.12	67.05	1.12	179	200.16	0.89	200.16	0.89
57	54	57.15	0.94	57.15	0.94	215	221.28	0.97	221.28	0.97
58	33	48.83	0.68	48.83	0.68	239	236.64	1.01	236.64	1.01
59	58	47.25	1.23	47.25	1.23	276	311.80	0.89	265.03	1.04
60	61	46.80	1.30	62.40	0.98	328	310.00	1.06	310.00	1.06
61	67	60.90	1.10	60.90	1.10	347	370.75	0.94	370.75	0.94
62	75	70.70	1.06	70.70	1.06	431	418.80	1.03	418.80	1.03
63	69	69.30	1.00	69.30	1.00	310	345.60	0.90	322.56	0.96
64	68	58.10	1.17	58.10	1.17	277	309.00	0.90	288.40	0.96
65	1,303	1,135.80	1.15	1,325.10	0.98	352	313.25	1.12	358.00	0.98
66	0	0.00	0.00	0.00	0.00	1,270	1,146.60	1.11	1,310.40	0.97
67	0	0.30	0.00	0.30	0.00	680	640.20	1.06	682.88	1.00
68	0	0.00	0.00	0.00	0.00	499	456.60	1.09	487.04	1.02
69	0	0.00	0.00	0.00	0.00	317	330.60	0.96	352.64	0.90
70	0	0.00	0.00	0.00	0.00	253	241.20	1.05	257.28	0.98
71	0	0.30	0.00	0.60	0.00	157	169.20	0.93	155.10	1.01
72	0	0.00	0.00	0.00	0.00	100	118.80	0.84	108.90	0.92
73	0	0.00	0.00	0.00	0.00	80	83.40	0.96	76.45	1.05
74	0	0.00	0.00	0.00	0.00	56	60.30	0.93	55.28	1.01
75	0	0.00	0.00	0.00	0.00	39	148.00	0.26	40.70	0.96
76	0	0.00	0.00	0.00	0.00	24	104.00	0.23	28.60	0.84
77	0	0.00	0.00	0.00	0.00	23	89.00	0.26	24.48	0.94
78	0	0.00	0.00	0.00	0.00	16	61.00	0.26	16.78	0.95
79	0	0.00	0.00	0.00	0.00	11	37.00	0.30	10.18	1.08
<Total>	2,144	1,933.46	1.11	2,138.66	1.00	6,798	7,015.60	0.97	6,905.75	0.98

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Teachers Females

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 80. There are still a number members who continue to work past age 80.





Section VI: Supporting Tables, Subsection 5 – Retirement

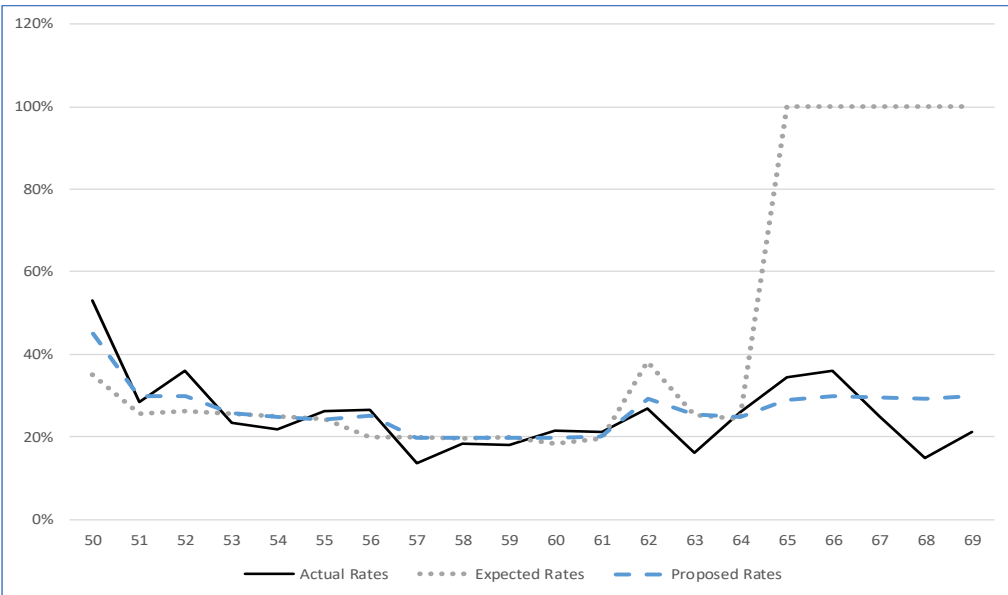
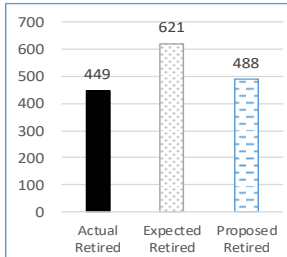
VALORS MALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	60	39.55	1.52	50.85	1.18	0	0.00	0.00	0.00	0.00
51	1	2.40	0.42	2.40	0.42	19	15.50	1.23	18.60	1.02
52	3	5.10	0.59	5.10	0.59	24	14.50	1.66	17.40	1.38
53	1	2.40	0.42	2.40	0.42	13	13.00	1.00	13.00	1.00
54	5	2.40	2.08	2.40	2.08	9	13.50	0.67	13.50	0.67
55	3	1.08	2.78	1.08	2.78	12	12.75	0.94	12.75	0.94
56	0	0.00	0.00	0.00	0.00	13	9.80	1.33	12.25	1.06
57	0	0.54	0.00	0.54	0.00	5	6.80	0.74	6.80	0.74
58	0	1.08	0.00	1.08	0.00	7	6.40	1.09	6.40	1.09
59	1	0.36	2.78	0.36	2.78	6	7.40	0.81	7.40	0.81
60	38	36.54	1.04	36.54	1.04	13	6.80	1.91	10.20	1.27
61	2	1.08	1.85	1.08	1.85	41	39.60	1.04	39.60	1.04
62	1	1.80	0.56	1.80	0.56	46	66.40	0.69	49.80	0.92
63	0	2.00	0.00	2.00	0.00	21	31.00	0.68	31.00	0.68
64	2	0.45	4.44	0.45	4.44	27	27.25	0.99	27.25	0.99
65	3	5.00	0.60	0.90	3.33	26	78.00	0.33	23.40	1.11
66	0	1.00	0.00	0.15	0.00	19	52.00	0.37	15.60	1.22
67	0	1.00	0.00	0.15	0.00	7	27.00	0.26	8.10	0.86
68	0	1.00	0.00	0.15	0.00	3	19.00	0.16	5.70	0.53
69	0	0.00	0.00	0.00	0.00	4	19.00	0.21	5.70	0.70
<Total>	120	104.78	1.15	109.43	1.10	315	465.70	0.68	324.45	0.97

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced VaLORS Males

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 70.





Section VI: Supporting Tables, Subsection 5 – Retirement

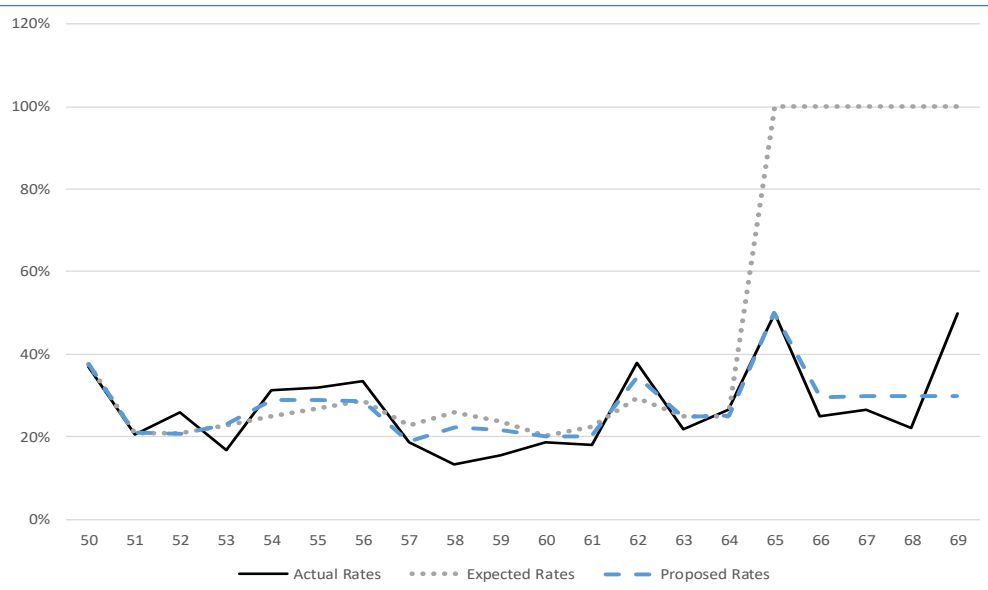
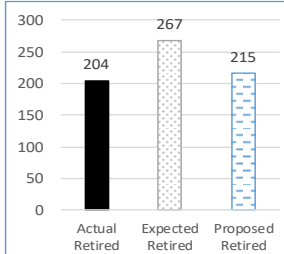
VALORS FEMALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	14	14.25	0.98	14.25	0.98	0	0.00	0.00	0.00	0.00
51	1	1.50	0.67	1.50	0.67	6	5.60	1.07	5.60	1.07
52	1	1.00	1.00	1.00	1.00	6	4.60	1.30	4.60	1.30
53	3	1.25	2.40	1.25	2.40	2	5.63	0.36	5.63	0.36
54	1	1.50	0.67	1.50	0.67	9	6.50	1.38	7.80	1.15
55	3	1.50	2.00	1.50	2.00	5	5.23	0.96	5.70	0.88
56	3	1.50	2.00	1.50	2.00	5	5.40	0.93	5.40	0.93
57	1	0.50	2.00	0.50	2.00	2	3.15	0.63	2.52	0.79
58	1	1.20	0.83	1.20	0.83	1	2.70	0.37	2.16	0.46
59	0	0.60	0.00	0.60	0.00	2	2.47	0.81	2.20	0.91
60	22	23.40	0.94	23.40	0.94	2	2.47	0.81	2.20	0.91
61	0	0.00	0.00	0.00	0.00	19	23.84	0.80	21.20	0.90
62	2	0.40	5.00	0.40	5.00	32	26.40	1.21	30.80	1.04
63	0	0.20	0.00	0.20	0.00	12	13.50	0.89	13.50	0.89
64	0	0.00	0.00	0.00	0.00	13	12.25	1.06	12.25	1.06
65	0	0.00	0.00	0.00	0.00	20	40.00	0.50	20.00	1.00
66	0	1.00	0.00	0.20	0.00	5	19.00	0.26	5.70	0.88
67	0	0.00	0.00	0.00	0.00	4	15.00	0.27	4.50	0.89
68	0	0.00	0.00	0.00	0.00	2	9.00	0.22	2.70	0.74
69	0	0.00	0.00	0.00	0.00	3	6.00	0.50	1.80	1.67
<Total>	52	49.80	1.04	49.00	1.06	150	208.74	0.72	156.26	0.96

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced VaLORS Females

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 70.





Section VI: Supporting Tables, Subsection 5 – Retirement

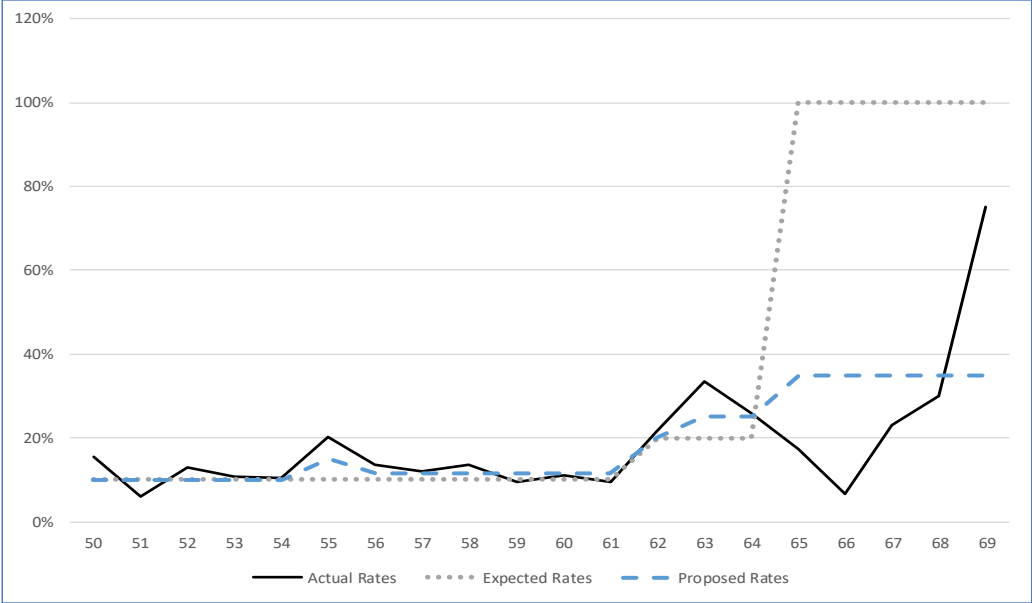
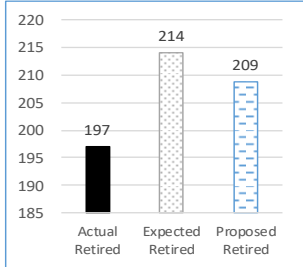
SPORS RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT					
AGE	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	19	12.20	1.56	12.20	1.56
51	8	13.10	0.61	13.10	0.61
52	18	14.00	1.29	14.00	1.29
53	14	13.10	1.07	13.10	1.07
54	12	11.50	1.04	11.50	1.04
55	22	10.90	2.02	21.10	1.04
56	13	9.60	1.35	12.45	1.04
57	10	8.30	1.20	10.64	0.94
58	10	7.40	1.35	9.56	1.05
59	7	7.30	0.96	9.46	0.74
60	8	7.20	1.11	9.03	0.89
61	6	6.30	0.95	7.89	0.76
62	13	12.00	1.08	12.00	1.08
63	13	7.80	1.67	11.10	1.17
64	7	5.40	1.30	7.60	0.92
65	4	23.00	0.17	10.06	0.40
66	1	15.00	0.07	7.50	0.13
67	3	13.00	0.23	6.50	0.46
68	3	10.00	0.30	5.00	0.60
69	3	4.00	0.75	2.00	1.50
<Total>	194	211.10	0.92	205.79	0.94

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced SPORS Males and Females

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 70.





Section VI: Supporting Tables, Subsection 5 – Retirement

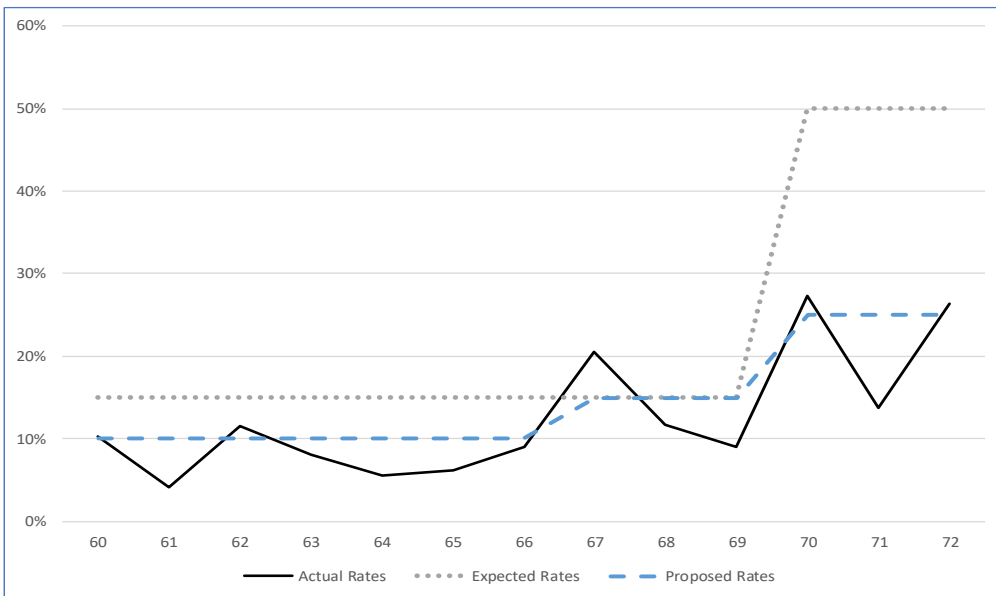
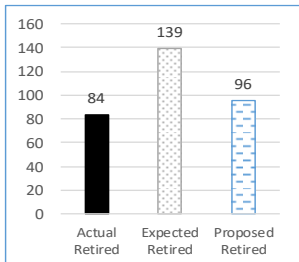
JRS ELIGIBLE FOR AN UNREDUCED BENEFIT					
AGE	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
60	5	7.35	0.68	4.90	1.02
61	2	7.35	0.27	4.90	0.41
62	6	7.80	0.77	5.20	1.15
63	4	7.50	0.53	5.00	0.80
64	3	8.10	0.37	5.40	0.56
65	5	12.00	0.42	8.00	0.63
66	7	11.70	0.60	7.80	0.90
67	14	10.20	1.37	10.20	1.37
68	6	7.65	0.78	7.65	0.78
69	4	6.60	0.61	6.60	0.61
70	12	22.00	0.55	11.00	1.09
71	4	14.50	0.28	7.25	0.55
72	5	9.50	0.53	4.75	1.05
<Total>	77	132.25	0.58	88.65	0.87

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced JRS Males and Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

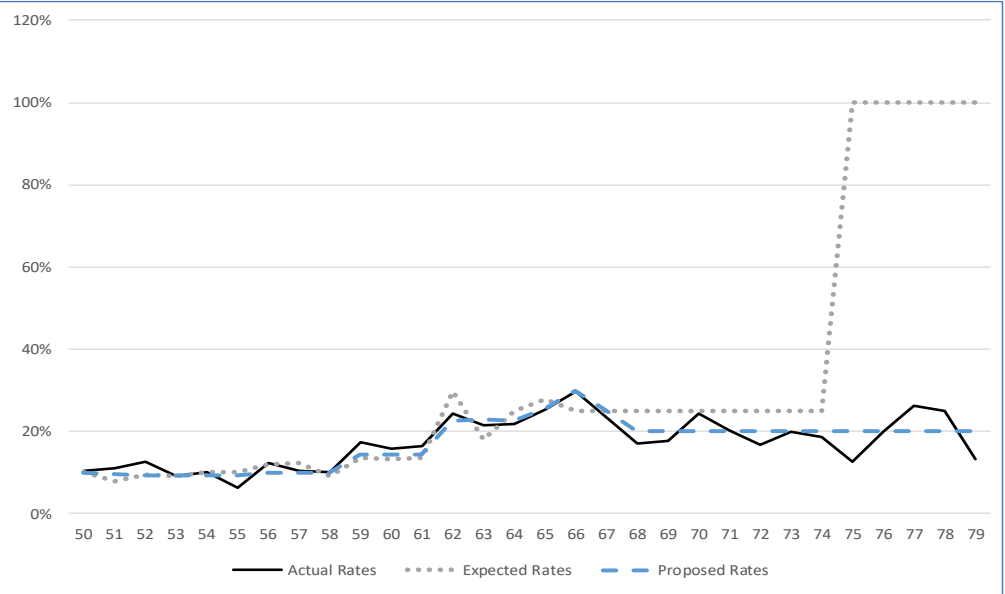
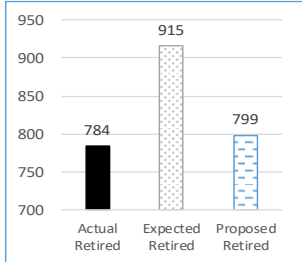
TOP 10 NON HAZARDOUS DUTY MALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	3	2.90	1.03	2.90	1.03	0	0.00	0.00	0.00	0.00
51	2	2.10	0.95	2.10	0.95	3	1.44	2.08	2.16	1.39
52	3	2.90	1.03	2.90	1.03	6	3.87	1.55	3.87	1.55
53	4	2.10	1.90	2.10	1.90	5	6.93	0.72	6.93	0.72
54	5	3.60	1.39	3.60	1.39	9	10.40	0.87	9.36	0.96
55	2	3.20	0.63	3.20	0.63	8	12.60	0.63	11.34	0.71
56	5	3.90	1.28	3.90	1.28	20	20.25	0.99	16.20	1.23
57	3	2.70	1.11	2.70	1.11	19	22.75	0.84	18.20	1.04
58	2	3.90	0.51	3.90	0.51	20	16.29	1.23	18.10	1.10
59	3	2.90	1.03	2.90	1.03	39	29.68	1.31	31.80	1.23
60	7	3.50	2.00	3.50	2.00	29	27.30	1.06	29.25	0.99
61	3	3.00	1.00	3.00	1.00	36	28.84	1.25	30.90	1.17
62	2	4.00	0.50	4.00	0.50	47	55.50	0.85	41.63	1.13
63	3	4.75	0.63	4.75	0.63	32	24.31	1.32	32.18	0.99
64	3	2.50	1.20	2.50	1.20	28	33.25	0.84	29.93	0.94
65	87	87.75	0.99	87.75	0.99	29	40.70	0.71	29.70	0.98
66	0	0.00	0.00	0.00	0.00	109	91.25	1.19	109.50	1.00
67	0	0.00	0.00	0.00	0.00	57	61.00	0.93	61.00	0.93
68	0	0.00	0.00	0.00	0.00	32	46.50	0.69	37.20	0.86
69	0	0.00	0.00	0.00	0.00	26	36.75	0.71	29.40	0.88
70	0	0.00	0.00	0.00	0.00	27	27.75	0.97	22.20	1.22
71	0	0.00	0.00	0.00	0.00	17	21.00	0.81	16.80	1.01
72	0	0.00	0.00	0.00	0.00	10	15.00	0.67	12.00	0.83
73	0	0.00	0.00	0.00	0.00	9	11.25	0.80	9.00	1.00
74	0	0.00	0.00	0.00	0.00	6	8.00	0.75	6.40	0.94
75	0	0.00	0.00	0.00	0.00	3	24.00	0.13	4.80	0.63
76	0	0.00	0.00	0.00	0.00	5	25.00	0.20	5.00	1.00
77	0	0.00	0.00	0.00	0.00	5	19.00	0.26	3.80	1.32
78	0	0.00	0.00	0.00	0.00	4	16.00	0.25	3.20	1.25
79	0	0.00	0.00	0.00	0.00	2	15.00	0.13	3.00	0.67
<Total>	137	135.70	1.01	135.70	1.01	642	751.61	0.85	634.84	1.01

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Top 10 Non Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 80.





Section VI: Supporting Tables, Subsection 5 – Retirement

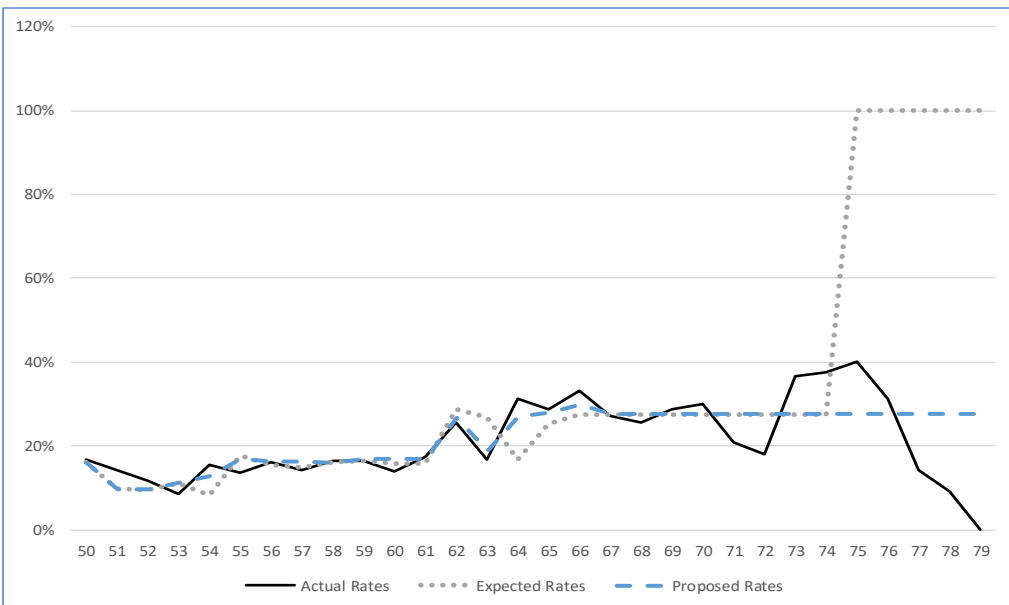
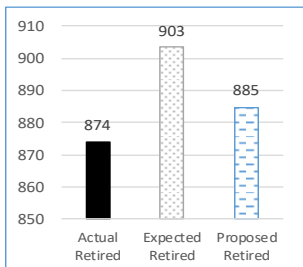
TOP 10 NON HAZARDOUS DUTY FEMALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	5	4.80	1.04	4.80	1.04	0	0.00	0.00	0.00	0.00
51	3	2.20	1.36	2.20	1.36	3	1.87	1.60	1.87	1.60
52	2	2.40	0.83	2.40	0.83	5	3.40	1.47	3.40	1.47
53	3	4.20	0.71	4.20	0.71	4	5.02	0.80	5.02	0.80
54	7	2.55	2.75	7.48	0.94	10	6.46	1.55	6.46	1.55
55	7	8.80	0.80	8.80	0.80	13	16.96	0.77	15.90	0.82
56	7	3.38	2.07	5.72	1.22	17	19.68	0.86	18.45	0.92
57	7	2.43	2.88	5.94	1.18	16	21.28	0.75	19.95	0.80
58	7	7.10	0.99	7.10	0.99	24	23.20	1.03	23.20	1.03
59	6	5.40	1.11	5.94	1.01	24	24.64	0.97	24.64	0.97
60	6	3.50	1.71	5.50	1.09	19	24.80	0.77	24.80	0.77
61	6	3.78	1.59	5.94	1.01	24	23.04	1.04	23.04	1.04
62	11	10.35	1.06	10.35	1.06	33	38.77	0.85	35.25	0.94
63	3	5.28	0.57	5.28	0.57	23	36.85	0.62	24.12	0.95
64	8	2.10	3.81	5.04	1.59	35	21.06	1.66	32.18	1.09
65	123	106.00	1.16	118.72	1.04	24	24.48	0.98	24.48	0.98
66	0	0.00	0.00	0.00	0.00	120	99.55	1.21	108.60	1.10
67	0	0.00	0.00	0.00	0.00	63	63.53	0.99	63.53	0.99
68	0	0.00	0.00	0.00	0.00	47	50.33	0.93	50.33	0.93
69	0	0.00	0.00	0.00	0.00	41	39.05	1.05	39.05	1.05
70	0	0.00	0.00	0.00	0.00	34	31.08	1.09	31.08	1.09
71	0	0.00	0.00	0.00	0.00	16	21.18	0.76	21.18	0.76
72	0	0.00	0.00	0.00	0.00	11	16.78	0.66	16.78	0.66
73	0	0.00	0.00	0.00	0.00	19	14.30	1.33	14.30	1.33
74	0	0.00	0.00	0.00	0.00	12	8.80	1.36	8.80	1.36
75	0	0.00	0.00	0.00	0.00	8	20.00	0.40	5.50	1.45
76	0	0.00	0.00	0.00	0.00	5	16.00	0.31	4.40	1.14
77	0	0.00	0.00	0.00	0.00	2	14.00	0.14	3.85	0.52
78	0	0.00	0.00	0.00	0.00	1	11.00	0.09	3.03	0.33
79	0	0.00	0.00	0.00	0.00	0	8.00	0.00	2.20	0.00
<Total>	211	174.27	1.21	205.41	1.03	653	705.11	0.93	655.39	1.00

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Top 10 Non Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 80.





Section VI: Supporting Tables, Subsection 5 – Retirement

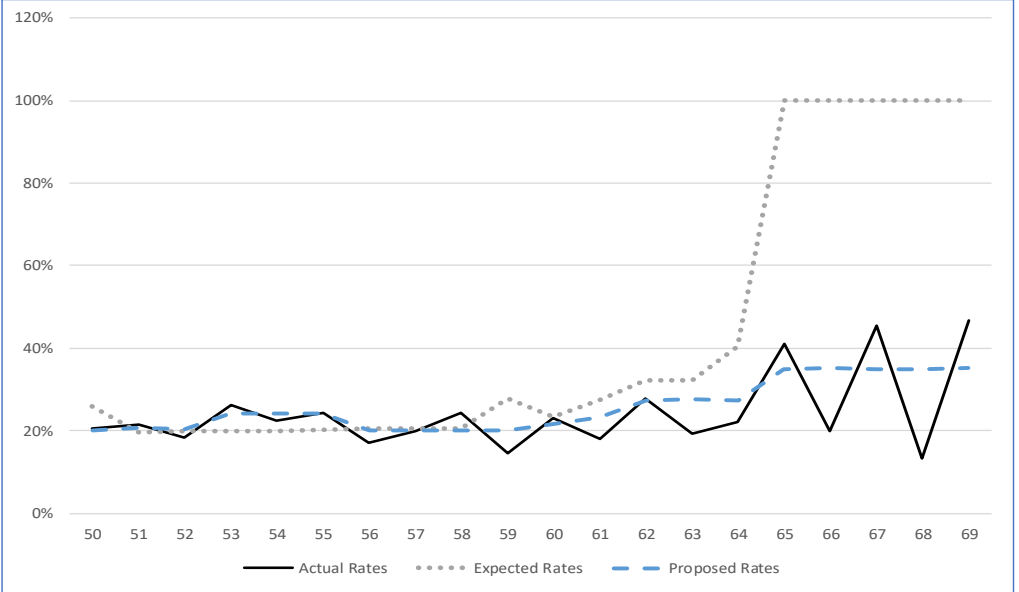
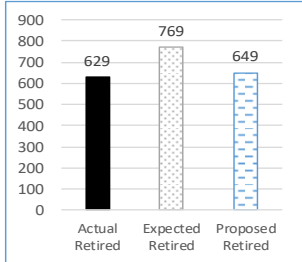
TOP 10 HAZARDOUS DUTY MALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	113	143.26	0.79	110.20	1.03	0	0.00	0.00	0.00	0.00
51	10	5.85	1.71	9.75	1.03	48	47.35	1.01	46.20	1.04
52	5	3.75	1.33	6.25	0.80	42	47.15	0.89	46.00	0.91
53	5	2.70	1.85	4.50	1.11	57	44.48	1.28	52.08	1.09
54	4	3.00	1.33	5.00	0.80	36	32.39	1.11	37.92	0.95
55	3	1.80	1.67	3.00	1.00	35	29.73	1.18	34.80	1.01
56	0	1.89	0.00	1.89	0.00	23	25.63	0.90	25.00	0.92
57	0	1.47	0.00	1.47	0.00	22	21.32	1.03	20.80	1.06
58	1	1.47	0.68	1.47	0.68	25	20.50	1.22	20.00	1.25
59	1	0.96	1.04	0.63	1.59	12	23.93	0.50	17.40	0.69
60	32	28.77	1.11	28.77	1.11	17	20.35	0.84	17.02	1.00
61	0	0.75	0.00	0.75	0.00	27	40.71	0.66	34.04	0.79
62	1	1.00	1.00	0.75	1.33	32	37.44	0.85	31.59	1.01
63	0	2.00	0.00	1.50	0.00	15	23.68	0.63	19.98	0.75
64	0	1.00	0.00	0.75	0.00	13	22.80	0.57	15.39	0.84
65	1	1.00	1.00	0.38	2.67	17	43.00	0.40	15.05	1.13
66	0	1.00	0.00	0.38	0.00	5	24.00	0.21	8.40	0.60
67	0	0.00	0.00	0.00	0.00	10	22.00	0.45	7.70	1.30
68	0	0.00	0.00	0.00	0.00	2	15.00	0.13	5.25	0.38
69	0	1.00	0.00	0.38	0.00	7	14.00	0.50	4.90	1.43
<Total>	176	202.67	0.87	177.81	0.99	445	555.46	0.80	459.52	0.97

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Top 10 Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 70.





Section VI: Supporting Tables, Subsection 5 – Retirement

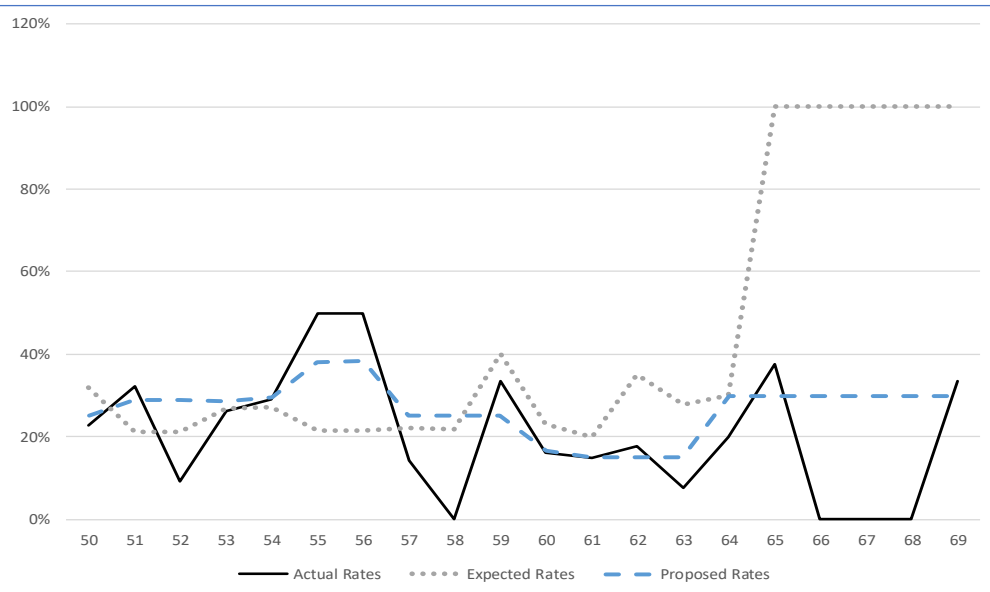
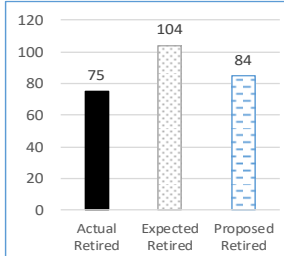
TOP 10 HAZARDOUS DUTY FEMALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	15	21.12	0.71	16.50	0.91	0	0.00	0.00	0.00	0.00
51	2	1.75	1.14	1.75	1.14	8	4.80	1.67	7.20	1.11
52	1	1.25	0.80	1.25	0.80	1	3.40	0.29	5.10	0.20
53	1	1.75	0.57	1.75	0.57	5	4.40	1.14	4.80	1.04
54	0	0.50	0.00	0.50	0.00	7	6.05	1.16	6.60	1.06
55	1	0.50	2.00	0.50	2.00	7	2.94	2.38	5.60	1.25
56	0	0.25	0.00	0.25	0.00	5	1.89	2.65	3.60	1.39
57	1	0.50	2.00	0.50	2.00	0	1.05	0.00	1.25	0.00
58	0	0.25	0.00	0.25	0.00	0	0.84	0.00	1.00	0.00
59	0	0.00	0.00	0.00	0.00	2	2.40	0.83	1.50	1.33
60	3	4.20	0.71	3.15	0.95	1	1.60	0.63	1.00	1.00
61	0	0.00	0.00	0.00	0.00	3	4.00	0.75	3.00	1.00
62	0	0.00	0.00	0.00	0.00	3	5.95	0.50	2.55	1.18
63	0	0.00	0.00	0.15	0.00	1	3.60	0.28	1.80	0.56
64	0	0.00	0.00	0.00	0.00	2	3.00	0.67	3.00	0.67
65	0	0.00	0.00	0.00	0.00	3	8.00	0.38	2.40	1.25
66	0	0.00	0.00	0.00	0.00	0	3.00	0.00	0.90	0.00
67	0	0.00	0.00	0.00	0.00	0	5.00	0.00	1.50	0.00
68	0	0.00	0.00	0.00	0.00	0	4.00	0.00	1.20	0.00
69	0	0.00	0.00	0.00	0.00	1	3.00	0.33	0.90	1.11
<Total>	24	32.07	0.75	26.55	0.90	49	68.92	0.71	54.90	0.89

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Top 10 Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 70.





Section VI: Supporting Tables, Subsection 5 – Retirement

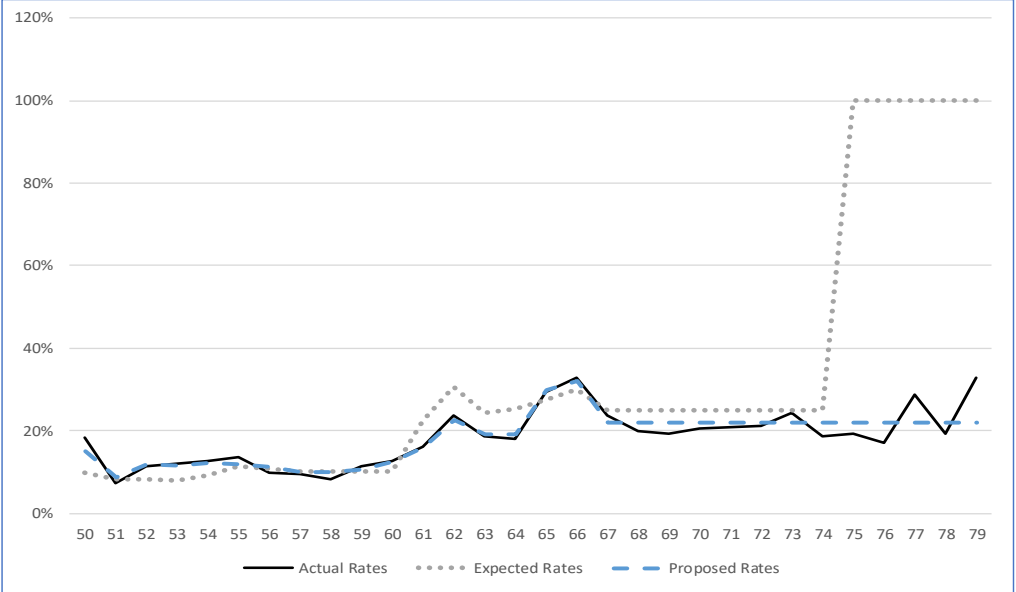
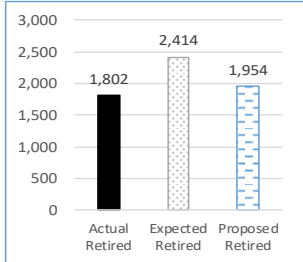
NON TOP 10 NON HAZARDOUS DUTY MALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	15	8.10	1.85	12.30	1.22	0	0.00	0.00	0.00	0.00
51	2	3.70	0.54	3.70	0.54	6	5.68	1.06	5.68	1.06
52	9	6.32	1.42	9.75	0.92	10	7.80	1.28	10.30	0.97
53	9	5.36	1.68	8.85	1.02	16	11.00	1.45	14.70	1.09
54	13	6.82	1.91	10.95	1.19	20	16.96	1.18	20.57	0.97
55	11	9.24	1.19	9.90	1.11	29	24.30	1.19	25.41	1.14
56	13	11.34	1.15	12.15	1.07	22	27.50	0.80	27.50	0.80
57	5	5.39	0.93	5.39	0.93	31	33.30	0.93	33.30	0.93
58	7	6.05	1.16	6.05	1.16	25	33.10	0.76	33.10	0.76
59	9	6.00	1.50	8.00	1.13	37	35.40	1.05	35.40	1.05
60	5	5.04	0.99	6.72	0.74	43	33.90	1.27	40.68	1.06
61	8	11.00	0.73	7.04	1.14	51	71.28	0.72	51.84	0.98
62	11	13.65	0.81	10.53	1.04	70	90.90	0.77	66.66	1.05
63	10	6.60	1.52	8.91	1.12	46	66.50	0.69	47.88	0.96
64	4	7.83	0.51	7.83	0.51	44	58.75	0.75	42.30	1.04
65	249	227.61	1.09	252.90	0.98	60	63.60	0.94	63.60	0.94
66	0	0.00	0.00	0.00	0.00	256	233.40	1.10	248.96	1.03
67	0	0.27	0.00	0.30	0.00	132	138.75	0.95	122.32	1.08
68	0	0.27	0.00	0.30	0.00	83	103.75	0.80	91.30	0.91
69	0	0.00	0.00	0.00	0.00	70	90.50	0.77	79.64	0.88
70	0	0.00	0.00	0.00	0.00	63	76.25	0.83	67.10	0.94
71	0	0.00	0.00	0.00	0.00	50	59.75	0.84	52.58	0.95
72	0	0.00	0.00	0.00	0.00	41	48.25	0.85	42.46	0.97
73	0	0.00	0.00	0.00	0.00	38	39.00	0.97	34.32	1.11
74	0	0.00	0.00	0.00	0.00	27	36.00	0.75	31.68	0.85
75	0	0.00	0.00	0.00	0.00	24	124.00	0.19	27.28	0.88
76	0	0.00	0.00	0.00	0.00	21	122.00	0.17	26.84	0.78
77	0	0.00	0.00	0.00	0.00	31	108.00	0.29	23.76	1.30
78	0	0.00	0.00	0.00	0.00	14	72.00	0.19	15.84	0.88
79	0	0.00	0.00	0.00	0.00	22	67.00	0.33	14.74	1.49
<Total>	380	340.59	1.12	381.57	1.00	1,382	1,898.62	0.73	1,397.74	0.99

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Non Top 10 Non Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 80.





Section VI: Supporting Tables, Subsection 5 – Retirement

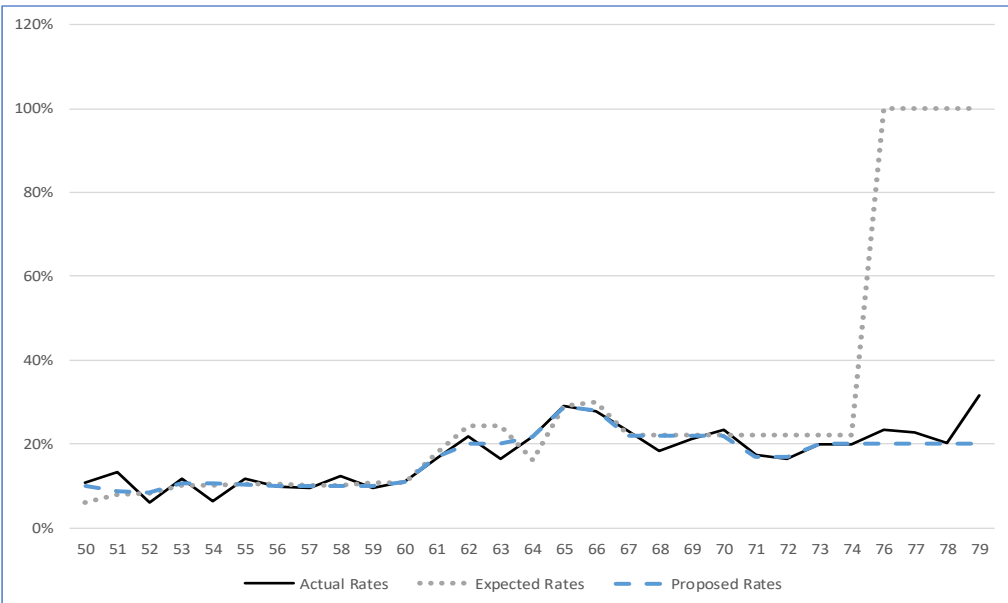
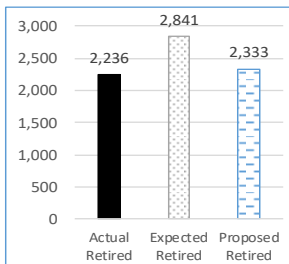
NON TOP 10 NON HAZARDOUS DUTY FEMALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	5	2.81	1.78	4.70	1.06	0	0.00	0.00	0.00	0.00
51	6	1.74	3.45	3.00	2.00	3	3.62	0.83	2.85	1.05
52	3	1.70	1.76	2.90	1.03	2	5.28	0.38	4.13	0.48
53	7	6.72	1.04	6.72	1.04	10	8.90	1.12	8.90	1.12
54	4	6.00	0.67	6.00	0.67	7	12.40	0.56	12.40	0.56
55	6	6.00	1.00	6.00	1.00	22	18.70	1.18	18.70	1.18
56	6	6.96	0.86	5.80	1.03	21	22.10	0.95	22.10	0.95
57	6	5.90	1.02	5.90	1.02	25	26.40	0.95	26.40	0.95
58	6	5.50	1.09	5.50	1.09	38	29.80	1.28	29.80	1.28
59	6	9.90	0.61	6.60	0.91	32	33.20	0.96	33.20	0.96
60	11	9.90	1.11	9.90	1.11	35	35.40	0.99	35.40	0.99
61	9	9.80	0.92	9.80	0.92	59	63.35	0.93	59.73	0.99
62	13	11.00	1.18	11.00	1.18	73	85.00	0.86	68.00	1.07
63	8	9.60	0.83	9.60	0.83	47	71.00	0.66	56.80	0.83
64	13	8.75	1.49	12.25	1.06	51	38.85	1.31	51.80	0.98
65	380	374.08	1.02	374.08	1.02	71	75.95	0.93	75.95	0.93
66	0	0.00	0.00	0.00	0.00	315	338.40	0.93	315.84	1.00
67	0	0.00	0.00	0.00	0.00	196	186.78	1.05	186.78	1.05
68	0	0.00	0.00	0.00	0.00	123	148.50	0.83	148.50	0.83
69	0	0.00	0.00	0.00	0.00	119	123.64	0.96	123.64	0.96
70	0	0.00	0.00	0.00	0.00	111	103.84	1.07	103.84	1.07
71	0	0.00	0.00	0.00	0.00	68	85.58	0.79	66.13	1.03
72	0	0.00	0.00	0.00	0.00	56	75.02	0.75	57.97	0.97
73	0	0.00	0.00	0.00	0.00	58	63.80	0.91	58.00	1.00
74	0	0.00	0.00	0.00	0.00	45	49.94	0.90	45.40	0.99
75	0	0.00	0.00	0.00	0.00	41	172.00	0.24	34.40	1.19
76	0	0.00	0.00	0.00	0.00	27	116.00	0.23	23.20	1.16
77	0	0.00	0.00	0.00	0.00	22	97.00	0.23	19.40	1.13
78	0	0.00	0.00	0.00	0.00	16	79.00	0.20	15.80	1.01
79	0	0.00	0.00	0.00	0.00	19	60.00	0.32	12.00	1.58
<Total>	489	476.36	1.03	479.75	1.02	1,712	2,229.45	0.77	1,717.06	1.00

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Non Top 10 Non Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 80.





Section VI: Supporting Tables, Subsection 5 – Retirement

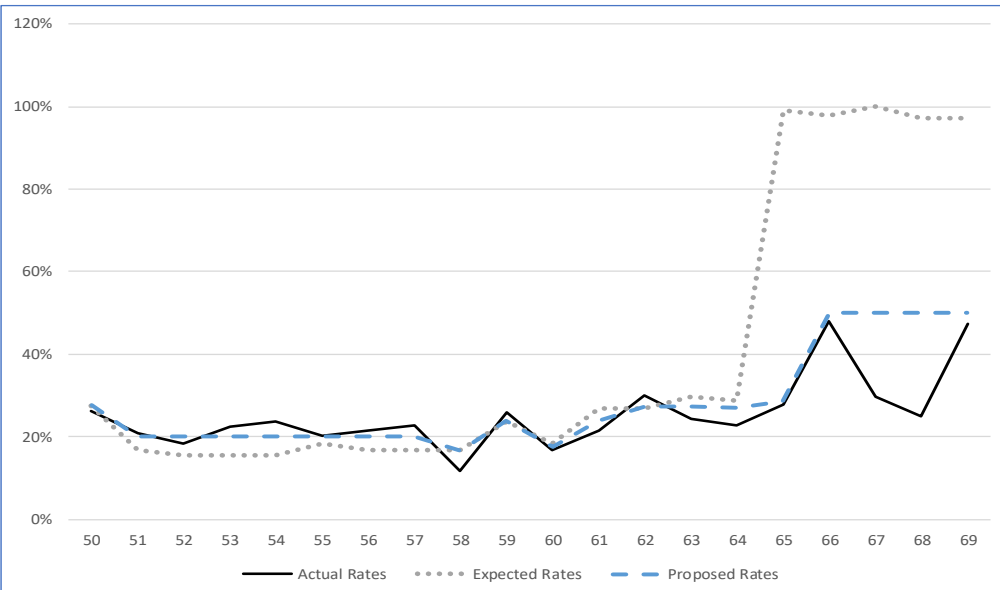
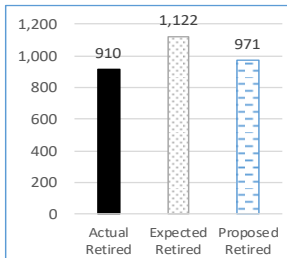
NON TOP 10 HAZARDOUS DUTY MALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	138	144.38	0.96	144.38	0.96	0	0.00	0.00	0.00	0.00
51	3	9.35	0.32	6.80	0.44	48	31.50	1.52	42.00	1.14
52	6	4.60	1.30	4.60	1.30	38	32.25	1.18	43.00	0.88
53	2	4.40	0.45	4.40	0.45	52	32.55	1.60	43.40	1.20
54	4	3.60	1.11	3.60	1.11	43	27.15	1.58	36.20	1.19
55	4	4.80	0.83	4.80	0.83	34	29.70	1.14	33.00	1.03
56	7	2.60	2.69	2.60	2.69	30	26.40	1.14	32.00	0.94
57	6	2.20	2.73	2.20	2.73	29	23.59	1.23	28.60	1.01
58	0	1.00	0.00	1.00	0.00	15	20.46	0.73	20.46	0.73
59	1	1.00	1.00	1.00	1.00	30	27.60	1.09	27.60	1.09
60	39	38.85	1.00	38.85	1.00	21	26.40	0.80	23.04	0.91
61	2	1.65	1.21	2.20	0.91	64	81.64	0.78	71.52	0.89
62	2	0.90	2.22	1.20	1.67	71	65.18	1.09	65.18	1.09
63	1	1.00	1.00	0.80	1.25	41	50.45	0.81	46.48	0.88
64	1	1.80	0.56	1.80	0.56	34	42.00	0.81	39.60	0.86
65	3	6.00	0.50	3.00	1.00	30	112.00	0.27	31.08	0.97
66	2	4.00	0.50	2.00	1.00	43	88.00	0.49	45.00	0.96
67	0	2.00	0.00	1.00	0.00	13	42.00	0.31	21.00	0.62
68	0	1.00	0.00	0.50	0.00	9	34.00	0.26	17.50	0.51
69	1	3.00	0.33	1.50	0.67	16	32.00	0.50	16.50	0.97
<Total>	222	238.13	0.93	228.23	0.97	661	824.87	0.80	683.16	0.97

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Non Top 10 Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 70.





Section VI: Supporting Tables, Subsection 5 – Retirement

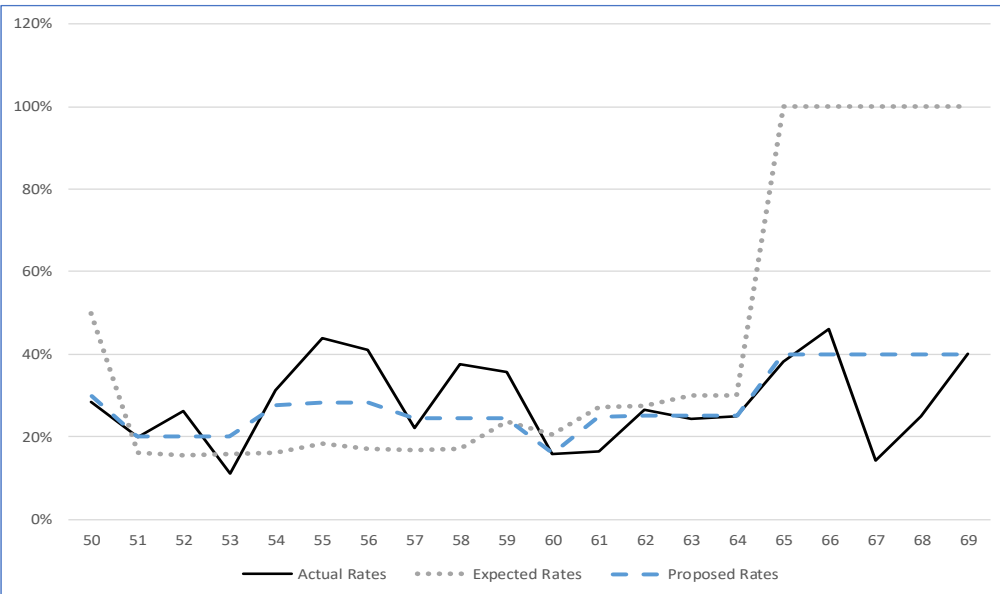
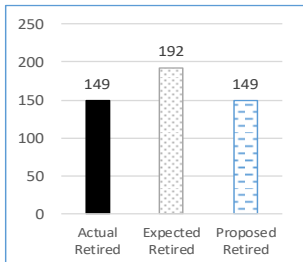
NON TOP 10 HAZARDOUS DUTY FEMALE RETIREMENTS ELIGIBLE FOR AN UNREDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	17	30.00	0.57	18.00	0.94	0	0.00	0.00	0.00	0.00
51	0	1.00	0.00	1.00	0.00	5	3.00	1.67	4.00	1.25
52	1	0.60	1.67	0.60	1.67	5	3.00	1.67	4.00	1.25
53	0	0.60	0.00	0.60	0.00	2	2.25	0.89	3.00	0.67
54	0	0.80	0.00	0.80	0.00	5	1.80	2.78	3.60	1.39
55	1	0.60	1.67	0.60	1.67	6	2.34	2.56	3.90	1.54
56	2	0.60	3.33	0.60	3.33	5	2.31	2.16	4.20	1.19
57	0	0.40	0.00	0.40	0.00	4	2.64	1.52	4.00	1.00
58	1	0.40	2.50	0.40	2.50	5	2.31	2.16	3.50	1.43
59	1	0.20	5.00	0.20	5.00	4	3.12	1.28	3.25	1.23
60	13	16.80	0.77	12.75	1.02	2	2.75	0.73	2.50	0.80
61	0	0.40	0.00	0.30	0.00	12	19.52	0.61	17.75	0.68
62	0	0.00	0.00	0.00	0.00	16	16.50	0.97	15.00	1.07
63	0	0.00	0.00	0.00	0.00	11	13.50	0.81	11.25	0.98
64	0	0.00	0.00	0.00	0.00	9	10.80	0.83	9.00	1.00
65	0	0.00	0.00	0.00	0.00	8	21.00	0.38	8.40	0.95
66	0	0.00	0.00	0.00	0.00	6	13.00	0.46	5.20	1.15
67	0	0.00	0.00	0.00	0.00	1	7.00	0.14	2.80	0.36
68	0	0.00	0.00	0.00	0.00	1	4.00	0.25	1.60	0.63
69	0	0.00	0.00	0.00	0.00	2	5.00	0.40	2.00	1.00
<Total>	36	52.40	0.69	36.25	0.99	109	135.84	0.80	108.95	1.00

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Unreduced Non Top 10 Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review and were extended to age 70.





Section VI: Supporting Tables, Subsection 5 – Retirement

STATE MALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	60	60.74	0.99	60.74	0.99	0	0.00	0.00	0.00	0.00
51	1	2.15	0.47	2.15	0.47	45	54.78	0.82	54.78	0.82
52	5	2.76	1.81	2.76	1.81	57	55.71	1.02	55.71	1.02
53	2	2.54	0.79	2.54	0.79	65	55.86	1.16	55.86	1.16
54	7	2.67	2.62	2.67	2.62	50	55.74	0.90	55.74	0.90
55	4	5.99	0.67	5.99	0.67	73	65.63	1.11	65.63	1.11
56	0	0.00	0.00	0.00	0.00	47	78.80	0.60	78.80	0.60
57	0	0.05	0.00	0.05	0.00	84	76.92	1.09	76.92	1.09
58	0	0.09	0.00	0.09	0.00	69	74.84	0.92	74.84	0.92
59	0	0.00	0.00	0.00	0.00	82	72.40	1.13	72.40	1.13
60	0	0.05	0.00	0.05	0.00	93	88.85	1.05	88.85	1.05
61	0	0.15	0.00	0.15	0.00	117	126.08	0.93	126.08	0.93
62	1	0.45	2.22	0.45	2.22	173	162.10	1.07	162.10	1.07
63	0	0.00	0.00	0.00	0.00	136	148.80	0.91	148.80	0.91
64	0	0.00	0.00	0.00	0.00	183	178.47	1.03	178.47	1.03
<Total>	80	77.64	1.03	77.64	1.03	1,274	1,294.98	0.98	1,294.98	0.98

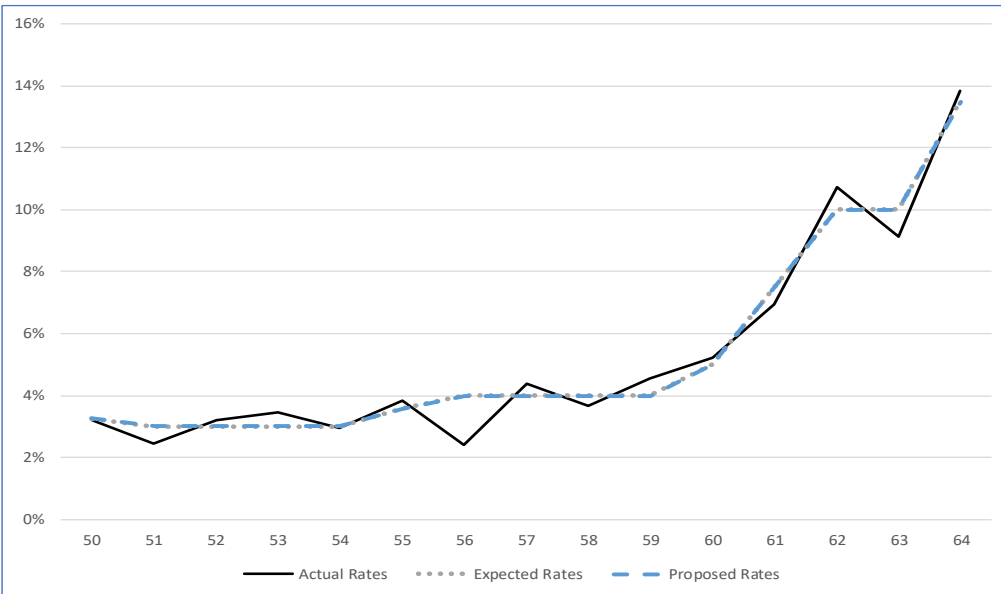
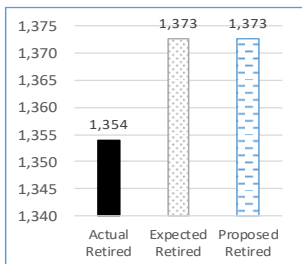
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Section VI: Supporting Tables, Subsection 5 – Retirement

Retirement Rates - Eligible for Reduced State Males

Comment: Current rates are still a good match to experience. We recommend no change.





Section VI: Supporting Tables, Subsection 5 – Retirement

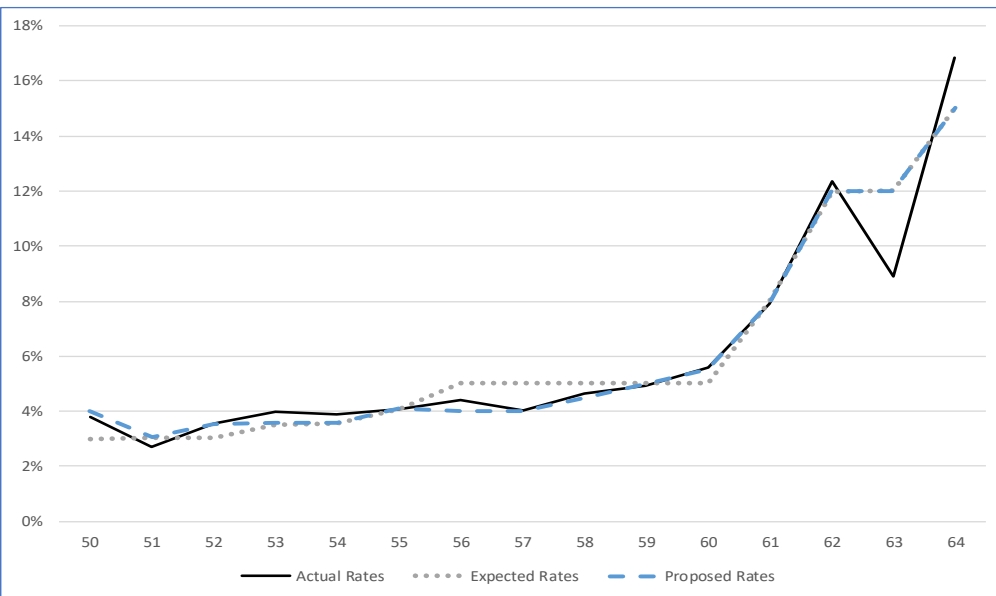
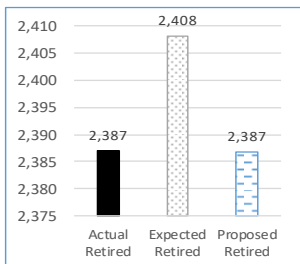
STATE FEMALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	97	76.86	1.26	102.48	0.95	0	0.00	0.00	0.00	0.00
51	5	5.56	0.90	6.36	0.79	67	75.30	0.89	75.30	0.89
52	5	4.37	1.14	5.00	1.00	97	81.97	1.18	95.62	1.01
53	14	5.39	2.60	7.70	1.82	102	96.99	1.05	96.99	1.05
54	7	6.85	1.02	6.85	1.02	110	100.42	1.10	100.42	1.10
55	15	14.15	1.06	14.15	1.06	115	115.88	0.99	115.88	0.99
56	0	0.10	0.00	0.10	0.00	140	158.80	0.88	127.04	1.10
57	0	0.05	0.00	0.05	0.00	126	156.40	0.81	125.12	1.01
58	0	0.10	0.00	0.10	0.00	141	151.80	0.93	136.62	1.03
59	0	0.10	0.00	0.10	0.00	145	146.80	0.99	146.80	0.99
60	0	0.05	0.00	0.05	0.00	156	139.59	1.12	153.56	1.02
61	0	0.15	0.00	0.15	0.00	211	213.28	0.99	213.28	0.99
62	0	0.00	0.00	0.00	0.00	307	298.44	1.03	298.44	1.03
63	1	0.35	2.86	0.35	2.86	193	261.60	0.74	261.60	0.74
64	0	0.70	0.00	0.70	0.00	333	296.10	1.12	296.10	1.12
<Total>	144	114.78	1.25	144.14	1.00	2,243	2,293.37	0.98	2,242.77	1.00

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced State Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

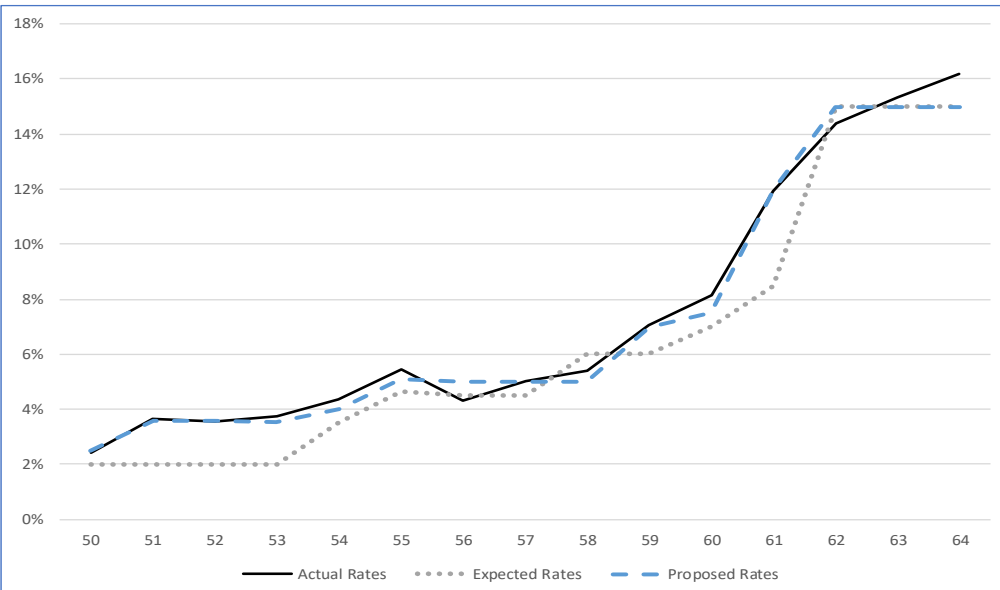
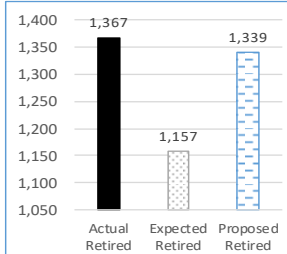
TEACHERS MALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	55	44.68	1.23	55.85	0.98	0	0.00	0.00	0.00	0.00
51	3	1.10	2.73	3.85	0.78	75	41.02	1.83	72.52	1.03
52	5	1.12	4.46	3.92	1.28	68	39.64	1.72	69.76	0.97
53	1	0.98	1.02	1.96	0.51	69	35.82	1.93	63.32	1.09
54	3	2.00	1.50	2.00	1.50	70	56.17	1.25	64.68	1.08
55	7	5.60	1.25	5.60	1.25	79	67.28	1.17	74.75	1.06
56	0	0.00	0.00	0.00	0.00	62	64.75	0.96	71.95	0.86
57	0	0.00	0.00	0.00	0.00	70	62.50	1.12	69.45	1.01
58	0	0.00	0.00	0.00	0.00	71	78.72	0.90	65.60	1.08
59	0	0.00	0.00	0.00	0.00	91	77.22	1.18	90.09	1.01
60	0	0.00	0.00	0.00	0.00	96	82.53	1.16	88.43	1.09
61	0	0.11	0.00	0.11	0.00	133	94.69	1.40	133.68	0.99
62	0	0.34	0.00	0.34	0.00	146	152.10	0.96	152.10	0.96
63	0	0.14	0.00	0.14	0.00	135	131.70	1.03	131.70	1.03
64	0	0.18	0.00	0.18	0.00	127	117.45	1.08	117.45	1.08
<Total>	74	56.25	1.32	73.95	1.00	1,292	1,101.59	1.17	1,265.48	1.02

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Teachers Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

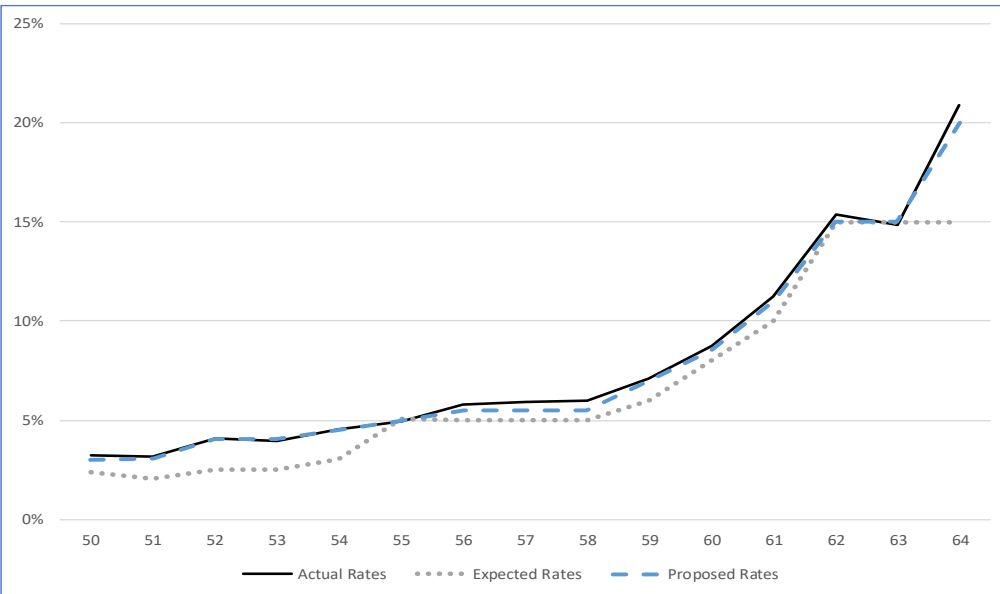
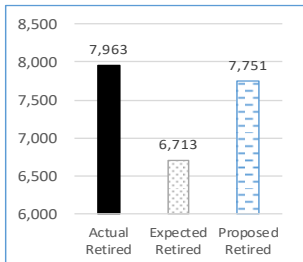
TEACHERS FEMALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	290	212.59	1.36	268.77	1.08	0	0.00	0.00	0.00	0.00
51	23	12.07	1.91	20.93	1.10	257	166.14	1.55	249.21	1.03
52	27	13.86	1.95	22.28	1.21	324	203.83	1.59	326.12	0.99
53	19	12.32	1.54	20.93	0.91	306	195.30	1.57	312.48	0.98
54	22	15.36	1.43	21.74	1.01	344	228.27	1.51	342.41	1.00
55	28	38.64	0.72	28.98	0.97	386	385.05	1.00	385.05	1.00
56	2	0.48	4.17	0.48	4.17	471	409.45	1.15	450.40	1.05
57	0	0.12	0.00	0.12	0.00	475	402.60	1.18	442.86	1.07
58	0	0.00	0.00	0.00	0.00	460	385.55	1.19	424.11	1.08
59	1	0.08	12.50	0.08	12.50	526	445.20	1.18	519.40	1.01
60	0	0.00	0.00	0.00	0.00	615	563.36	1.09	598.57	1.03
61	1	0.30	3.33	0.75	1.33	732	652.70	1.12	717.97	1.02
62	3	0.45	6.67	1.00	3.00	936	915.00	1.02	915.00	1.02
63	0	0.15	0.00	0.25	0.00	769	775.35	0.99	775.35	0.99
64	0	0.00	0.00	0.00	0.00	946	679.35	1.39	905.80	1.04
<Total>	416	306.42	1.36	386.31	1.08	7,547	6,407.15	1.18	7,364.73	1.02

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Teachers Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

VALORS MALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	71	45.21	1.57	62.25	1.14	0	0.00	0.00	0.00	0.00
51	1	2.10	0.48	2.10	0.48	37	26.64	1.39	26.64	1.39
52	3	2.10	1.43	2.10	1.43	31	25.12	1.23	25.12	1.23
53	1	2.40	0.42	2.40	0.42	20	23.60	0.85	23.60	0.85
54	2	1.50	1.33	1.50	1.33	25	24.40	1.02	24.40	1.02
55	2	1.30	1.54	1.30	1.54	22	23.68	0.93	23.68	0.93
56	3	1.90	1.58	1.90	1.58	20	24.21	0.83	24.21	0.83
57	2	1.60	1.25	1.60	1.25	26	26.80	0.97	26.80	0.97
58	0	1.30	0.00	1.30	0.00	11	22.90	0.48	22.90	0.48
59	0	1.00	0.00	1.00	0.00	28	26.88	1.04	26.88	1.04
<Total>	85	60.41	1.41	77.45	1.10	220	224.23	0.98	224.23	0.98

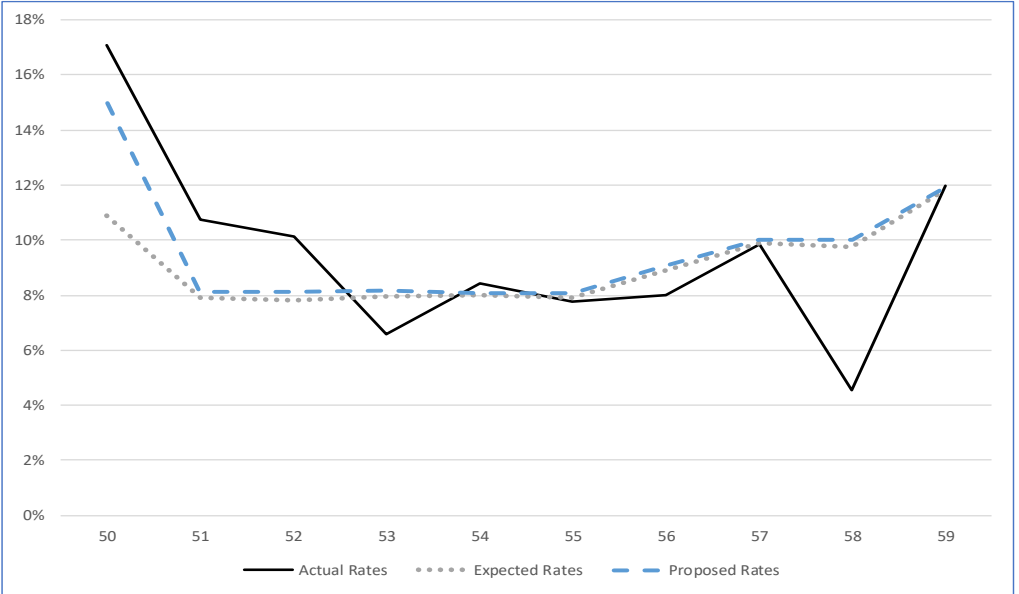
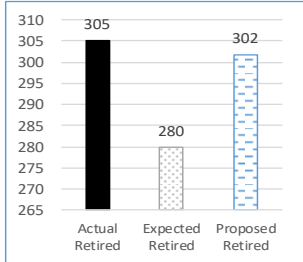
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Section VI: Supporting Tables, Subsection 5 – Retirement

Retirement Rates - Eligible for Reduced VaLORS Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

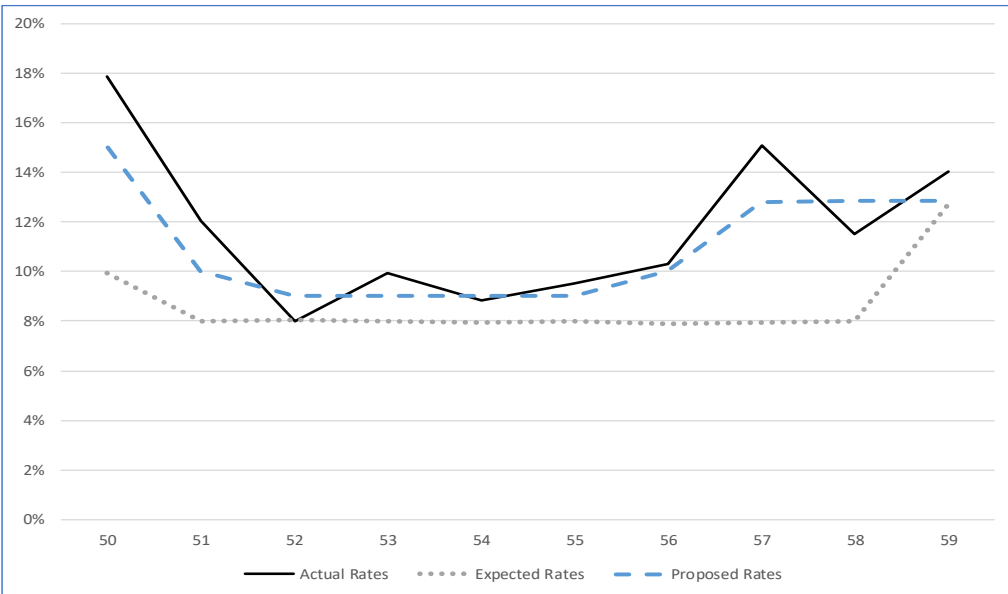
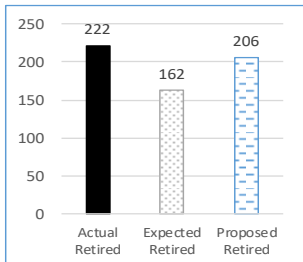
VALORS FEMALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	45	25.10	1.79	37.80	1.19	0	0.00	0.00	0.00	0.00
51	0	0.80	0.00	0.80	0.00	27	17.28	1.56	21.60	1.25
52	1	0.50	2.00	0.50	2.00	16	16.64	0.96	18.72	0.85
53	0	0.00	0.00	0.00	0.00	21	16.88	1.24	18.99	1.11
54	1	0.80	1.25	0.80	1.25	17	15.68	1.08	17.64	0.96
55	1	0.70	1.43	0.70	1.43	18	15.35	1.17	17.28	1.04
56	1	0.60	1.67	0.60	1.67	17	13.52	1.26	16.90	1.01
57	1	0.90	1.11	0.90	1.11	23	12.00	1.92	19.50	1.18
58	1	0.60	1.67	0.60	1.67	14	9.92	1.41	16.12	0.87
59	0	0.50	0.00	0.50	0.00	18	15.99	1.13	15.99	1.13
<Total>	51	30.50	1.67	43.20	1.18	171	133.26	1.28	162.74	1.05

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced VaLORS Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

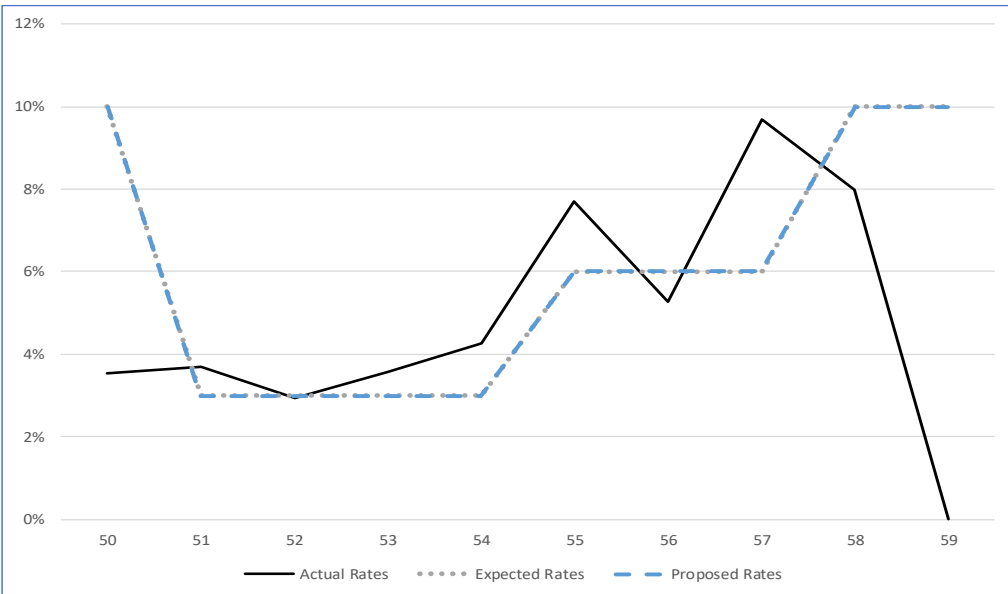
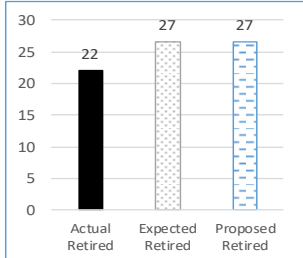
SPORS RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT					
AGE	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	3	8.50	0.35	8.50	0.35
51	3	2.43	1.23	2.43	1.23
52	2	2.04	0.98	2.04	0.98
53	2	1.68	1.19	1.68	1.19
54	2	1.41	1.42	1.41	1.42
55	3	2.34	1.28	2.34	1.28
56	2	2.28	0.88	2.28	0.88
57	3	1.86	1.61	1.86	1.61
58	2	2.50	0.80	2.50	0.80
59	0	1.60	0.00	1.60	0.00
<Total>	22	26.64	0.83	26.64	0.83

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced SPORS Males and Females

Comment: Current rates are still a good match to experience. We recommend no change.





Section VI: Supporting Tables, Subsection 5 – Retirement

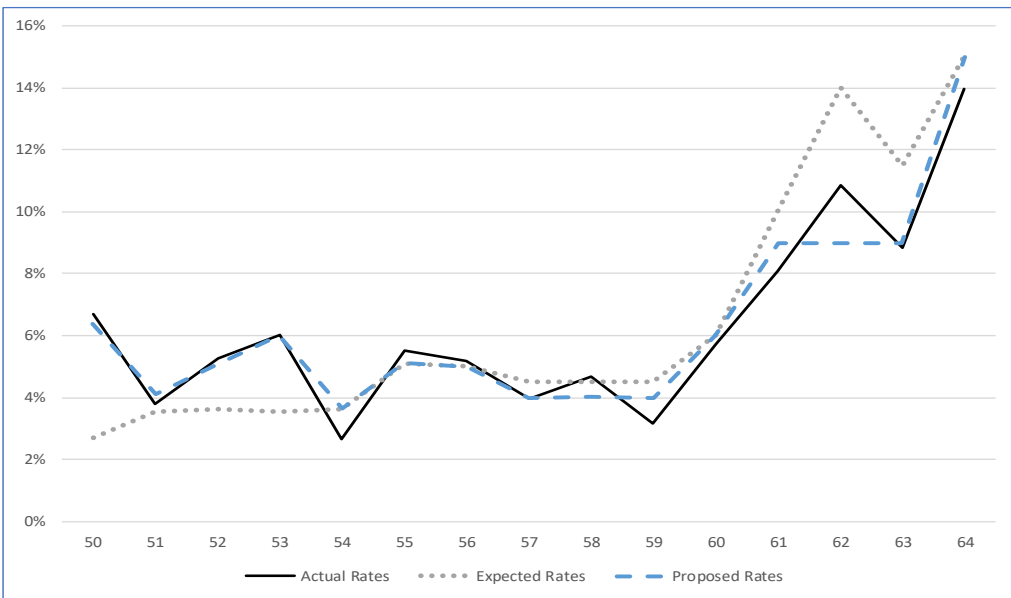
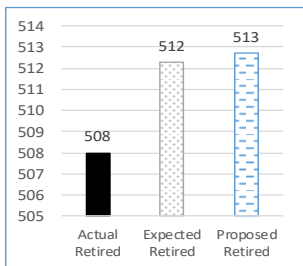
TOP 10 NON HAZARDOUS DUTY MALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	37	15.32	2.42	36.21	1.02	0	0.00	0.00	0.00	0.00
51	1	1.47	0.68	1.37	0.73	21	19.25	1.09	22.44	0.94
52	2	2.10	0.95	1.95	1.03	30	19.88	1.51	28.80	1.04
53	0	1.26	0.00	1.17	0.00	38	21.10	1.80	36.84	1.03
54	1	2.03	0.49	1.89	0.53	16	21.46	0.75	21.46	0.75
55	4	3.48	1.15	3.77	1.06	33	30.55	1.08	30.55	1.08
56	0	0.14	0.00	0.13	0.00	35	33.65	1.04	33.65	1.04
57	0	0.00	0.00	0.00	0.00	26	29.47	0.88	26.20	0.99
58	0	0.10	0.00	0.07	0.00	29	27.76	1.04	24.68	1.18
59	0	0.00	0.00	0.00	0.00	19	27.09	0.70	24.08	0.79
60	0	0.00	0.00	0.00	0.00	32	33.54	0.95	33.54	0.95
61	0	0.10	0.00	0.07	0.00	42	52.00	0.81	46.80	0.90
62	0	0.00	0.00	0.00	0.00	51	65.80	0.78	42.30	1.21
63	0	0.00	0.00	0.00	0.00	36	46.92	0.77	36.72	0.98
64	0	0.00	0.00	0.00	0.00	54	58.05	0.93	58.05	0.93
<Total>	45	26.00	1.73	46.63	0.97	462	486.52	0.95	466.11	0.99

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Top 10 Non Hazardous Duty Males

Comment: Current rates are still a good match to experience. We recommend very slight changes.





Section VI: Supporting Tables, Subsection 5 – Retirement

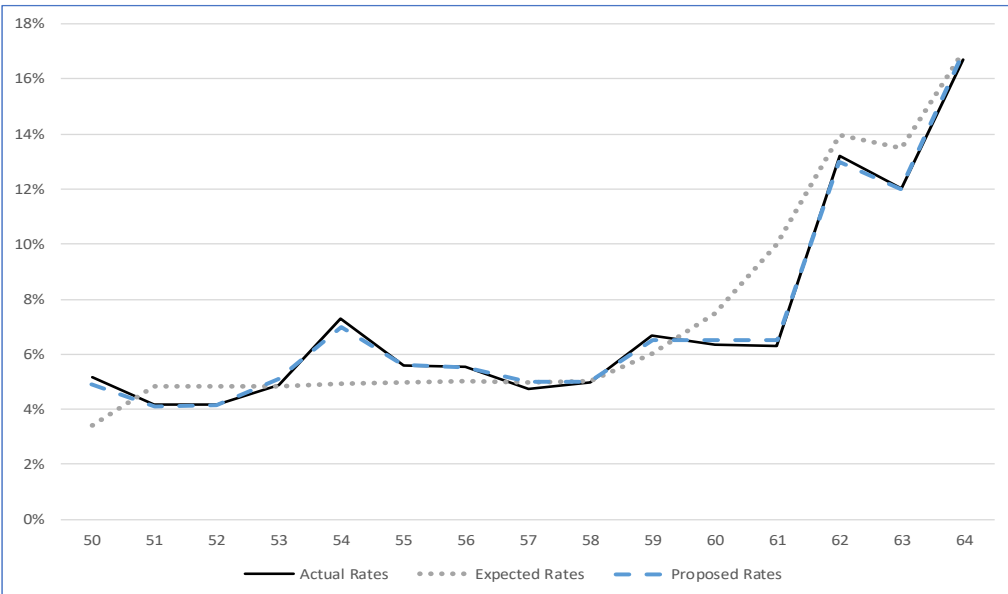
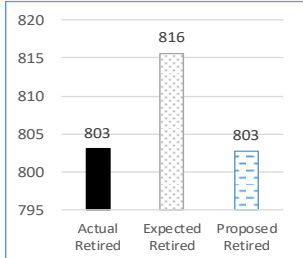
TOP 10 NON HAZARDOUS DUTY FEMALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	38	27.87	1.36	39.80	0.95	0	0.00	0.00	0.00	0.00
51	3	1.16	2.59	2.31	1.30	32	39.55	0.81	32.24	0.99
52	5	1.33	3.76	2.66	1.88	32	41.40	0.77	33.84	0.95
53	2	1.33	1.50	2.66	0.75	42	43.20	0.97	43.20	0.97
54	4	1.98	2.02	3.08	1.30	60	41.00	1.46	58.24	1.03
55	4	3.29	1.22	5.11	0.78	47	41.84	1.12	46.04	1.02
56	0	0.11	0.00	0.11	0.00	49	44.31	1.11	48.73	1.01
57	0	0.00	0.00	0.00	0.00	44	46.40	0.95	46.40	0.95
58	0	0.00	0.00	0.00	0.00	44	44.25	0.99	44.25	0.99
59	0	0.00	0.00	0.00	0.00	53	47.52	1.12	51.55	1.03
60	0	0.11	0.00	0.11	0.00	48	56.85	0.84	49.27	0.97
61	0	0.00	0.00	0.00	0.00	44	69.80	0.63	45.37	0.97
62	0	0.00	0.00	0.00	0.00	89	94.08	0.95	87.49	1.02
63	0	0.11	0.00	0.11	0.00	73	81.67	0.89	72.60	1.01
64	0	0.00	0.00	0.00	0.00	86	87.55	0.98	87.55	0.98
<Total>	56	37.29	1.50	55.95	1.00	743	779.42	0.95	746.77	0.99

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Top 10 Non Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

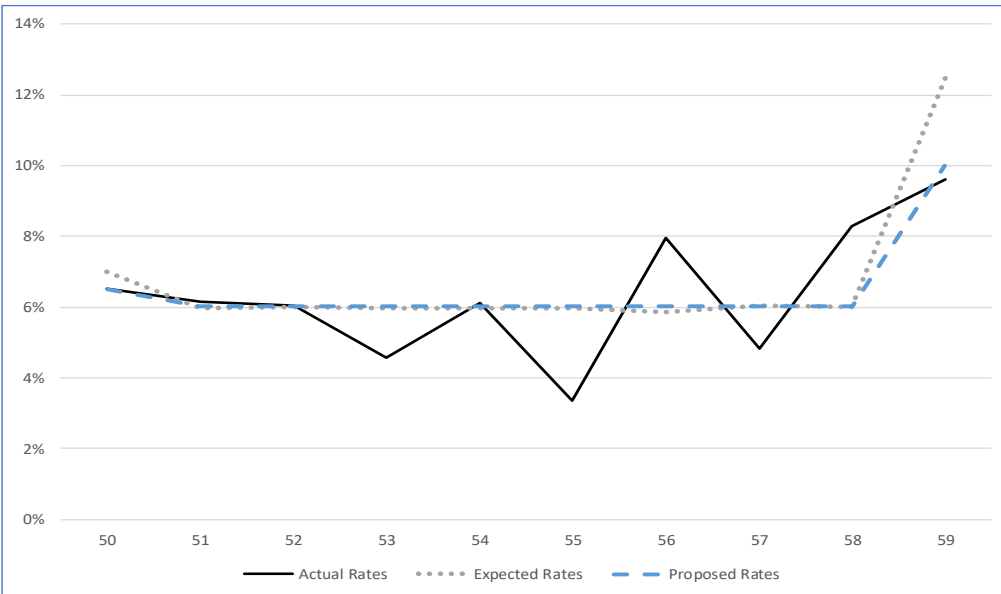
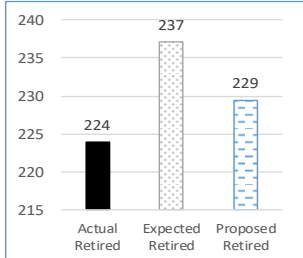
TOP 10 HAZARDOUS DUTY MALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	63	67.69	0.93	62.86	1.00	0	0.00	0.00	0.00	0.00
51	0	0.63	0.00	0.78	0.00	30	28.62	1.05	28.62	1.05
52	0	0.56	0.00	0.65	0.00	26	25.26	1.03	25.26	1.03
53	0	0.35	0.00	0.52	0.00	17	21.90	0.78	21.90	0.78
54	1	0.56	1.79	0.78	1.28	18	17.94	1.00	17.94	1.00
55	0	0.42	0.00	0.52	0.00	9	15.66	0.57	15.66	0.57
56	2	0.28	7.14	0.65	3.08	17	13.74	1.24	13.74	1.24
57	0	0.42	0.00	0.39	0.00	10	12.06	0.83	12.06	0.83
58	0	0.21	0.00	0.20	0.00	16	11.40	1.40	11.40	1.40
59	0	0.07	0.00	0.07	0.00	15	19.37	0.77	15.50	0.97
<Total>	66	71.19	0.93	67.41	0.98	158	165.95	0.95	162.08	0.97

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Top 10 Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

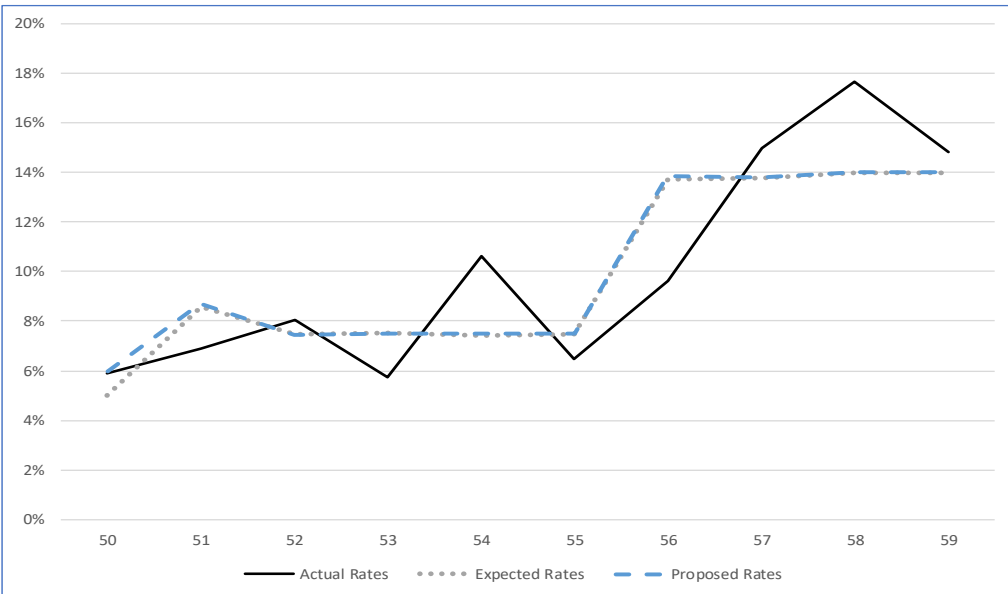
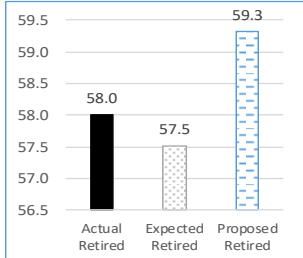
TOP 10 HAZARDOUS DUTY FEMALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	9	7.65	1.18	9.18	0.98	0	0.00	0.00	0.00	0.00
51	0	0.10	0.00	0.12	0.00	6	7.44	0.81	7.44	0.81
52	0	0.10	0.00	0.12	0.00	7	6.38	1.10	6.38	1.10
53	0	0.00	0.00	0.00	0.00	4	5.25	0.76	5.25	0.76
54	1	0.05	20.00	0.06	16.67	6	4.88	1.23	4.88	1.23
55	0	0.05	0.00	0.06	0.00	4	4.58	0.87	4.58	0.87
56	0	0.05	0.00	0.06	0.00	5	7.14	0.70	7.14	0.70
57	0	0.05	0.00	0.06	0.00	6	5.46	1.10	5.46	1.10
58	0	0.00	0.00	0.00	0.00	6	4.76	1.26	4.76	1.26
59	0	0.00	0.00	0.00	0.00	4	3.78	1.06	3.78	1.06
<Total>	10	8.05	1.24	9.66	1.04	48	49.67	0.97	49.67	0.97

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Top 10 Hazardous Duty Females

Comment: Current rates are still a good match to experience. We recommend very slight changes.





Section VI: Supporting Tables, Subsection 5 – Retirement

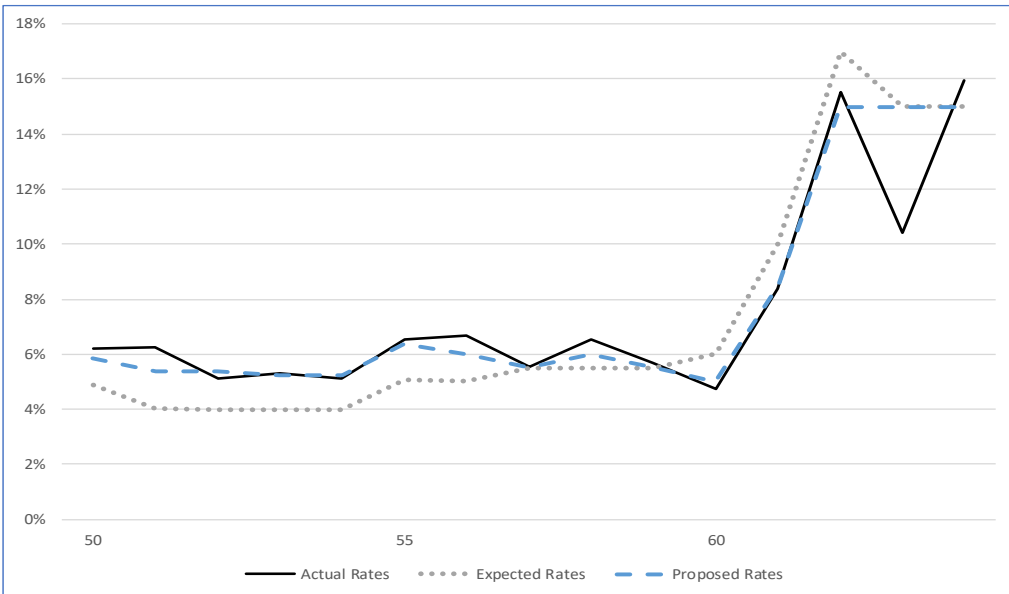
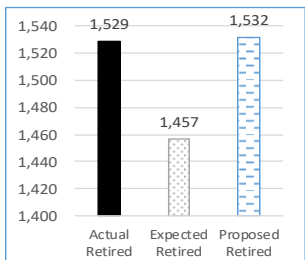
NON TOP 10 NON HAZARDOUS DUTY MALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	82	66.10	1.24	79.32	1.03	0	0.00	0.00	0.00	0.00
51	10	3.90	2.56	8.88	1.13	77	52.04	1.48	66.20	1.16
52	10	4.18	2.39	9.50	1.05	63	53.04	1.19	67.75	0.93
53	7	3.85	1.82	7.00	1.00	72	55.76	1.29	71.20	1.01
54	8	3.69	2.17	6.70	1.19	71	57.27	1.24	73.65	0.96
55	14	8.54	1.64	15.50	0.90	92	73.49	1.25	88.20	1.04
56	0	0.00	0.00	0.00	0.00	104	78.10	1.33	93.72	1.11
57	0	0.00	0.00	0.00	0.00	86	85.14	1.01	85.14	1.01
58	0	0.09	0.00	0.10	0.00	98	82.17	1.19	89.64	1.09
59	0	0.10	0.00	0.10	0.00	84	81.02	1.04	81.02	1.04
60	0	0.10	0.00	0.10	0.00	67	85.14	0.79	70.95	0.94
61	0	0.00	0.00	0.00	0.00	114	135.70	0.84	115.35	0.99
62	0	0.00	0.00	0.00	0.00	199	217.60	0.91	192.00	1.04
63	0	0.13	0.00	0.10	0.00	113	162.90	0.69	162.90	0.69
64	0	0.20	0.00	0.10	0.00	156	146.70	1.06	146.70	1.06
<Total>	131	90.88	1.44	127.40	1.03	1,396	1,366.07	1.02	1,404.42	0.99

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Non Top 10 Non Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

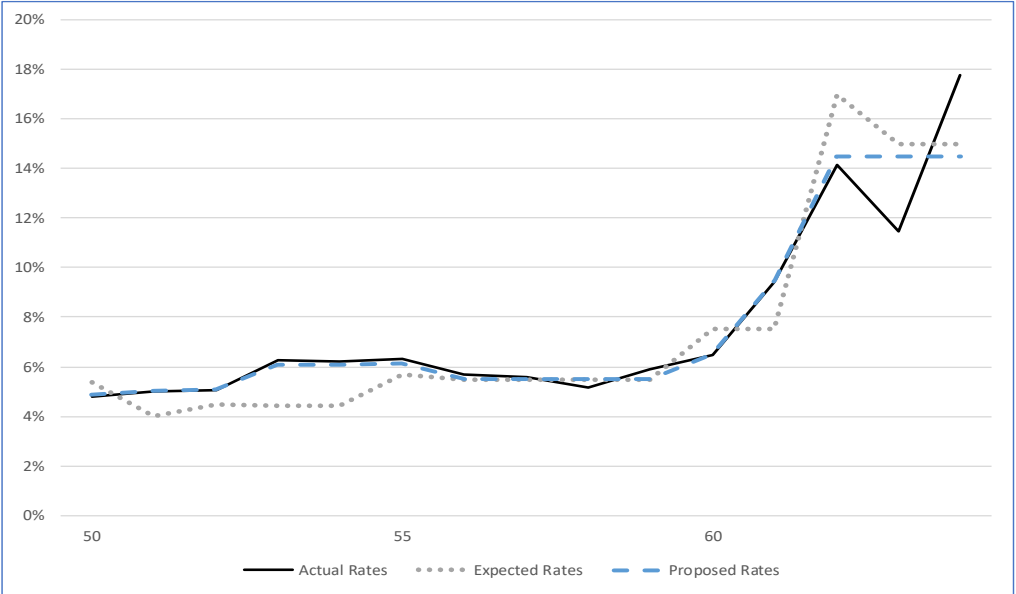
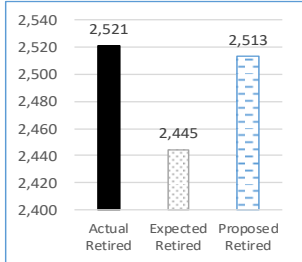
NON TOP 10 NON HAZARDOUS DUTY FEMALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	99	112.53	0.88	102.30	0.97	0	0.00	0.00	0.00	0.00
51	8	8.14	0.98	8.14	0.98	99	77.64	1.28	99.65	0.99
52	9	7.87	1.14	8.58	1.05	106	93.23	1.14	106.15	1.00
53	12	7.76	1.55	9.87	1.22	138	98.86	1.40	135.36	1.02
54	9	7.48	1.20	9.52	0.95	144	102.46	1.41	140.16	1.03
55	20	19.53	1.02	19.53	1.02	144	127.55	1.13	139.14	1.03
56	0	0.00	0.00	0.00	0.00	146	141.30	1.03	141.30	1.03
57	0	0.00	0.00	0.00	0.00	144	142.01	1.01	142.01	1.01
58	0	0.06	0.00	0.06	0.00	132	140.14	0.94	140.14	0.94
59	0	0.06	0.00	0.06	0.00	151	140.47	1.07	140.47	1.07
60	0	0.09	0.00	0.06	0.00	160	184.72	0.87	160.10	1.00
61	0	0.09	0.00	0.06	0.00	220	174.75	1.26	221.35	0.99
62	0	0.00	0.00	0.00	0.00	296	355.64	0.83	303.34	0.98
63	0	0.00	0.00	0.00	0.00	206	269.40	0.76	260.57	0.79
64	0	0.11	0.00	0.06	0.00	276	232.80	1.19	225.04	1.23
<Total>	157	163.72	0.96	158.24	0.99	2,362	2,280.97	1.04	2,354.78	1.00

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Non Top 10 Non Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 5 – Retirement

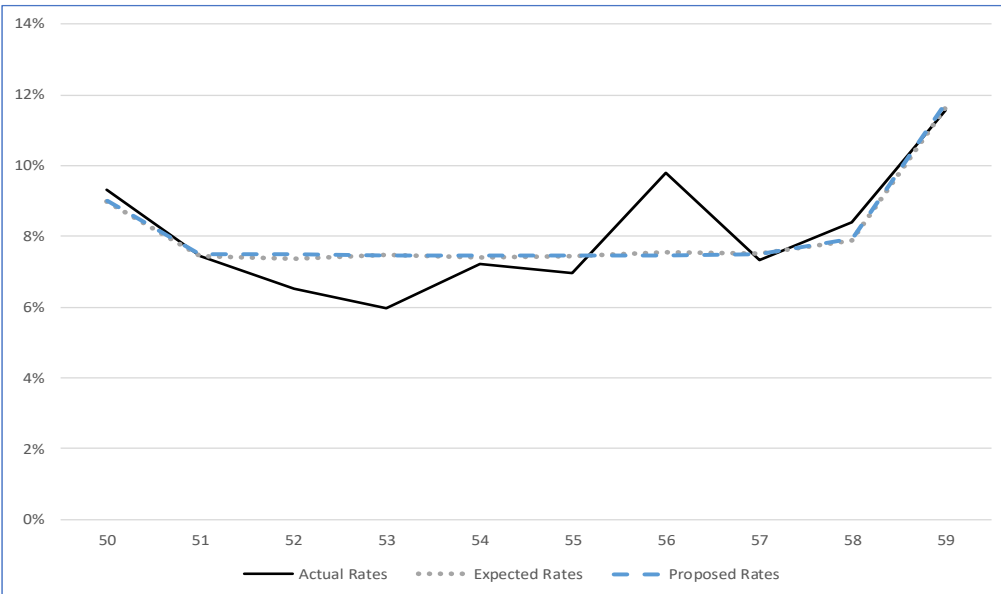
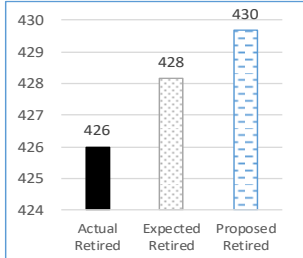
NON TOP 10 HAZARDOUS DUTY MALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	115	111.15	1.03	111.15	1.03	0	0.00	0.00	0.00	0.00
51	2	1.89	1.06	2.10	0.95	47	47.10	1.00	47.10	1.00
52	1	1.08	0.93	1.82	0.55	38	42.90	0.89	42.90	0.89
53	1	2.07	0.48	2.10	0.48	31	37.88	0.82	37.88	0.82
54	1	1.98	0.51	2.31	0.43	35	34.88	1.00	34.88	1.00
55	1	1.62	0.62	1.82	0.55	31	32.48	0.95	32.48	0.95
56	1	1.80	0.56	1.47	0.68	39	29.03	1.34	29.03	1.34
57	1	0.81	1.23	0.70	1.43	24	24.83	0.97	24.83	0.97
58	1	0.99	1.01	1.19	0.84	25	23.44	1.07	23.44	1.07
59	2	0.81	2.47	1.05	1.90	30	31.44	0.95	31.44	0.95
<Total>	126	124.20	1.01	125.71	1.00	300	303.98	0.99	303.98	0.99

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Non Top 10 Hazardous Duty Males

Comment: Current rates are still a good match to experience. We recommend very slight changes.





Section VI: Supporting Tables, Subsection 5 – Retirement

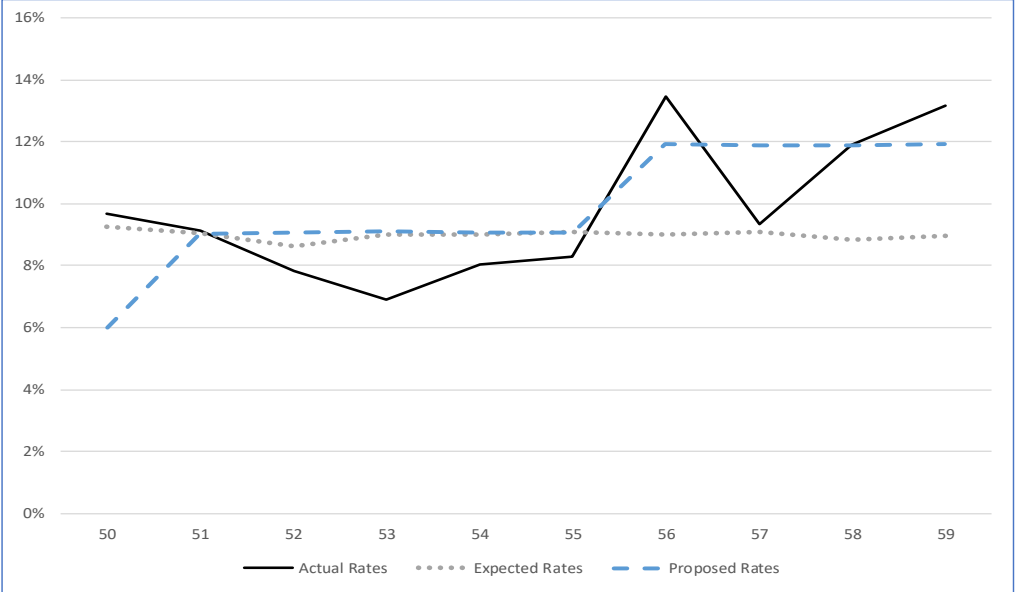
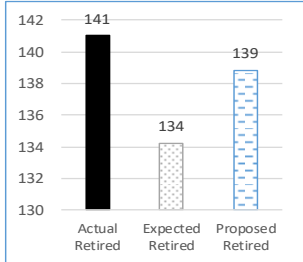
NON TOP 10 HAZARDOUS DUTY FEMALE RETIREMENTS ELIGIBLE FOR A REDUCED BENEFIT										
AGE	FIRST ELIGIBILITY					AFTER FIRST ELIGIBILITY				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
50	16	24.88	0.64	16.14	0.99	0	0.00	0.00	0.00	0.00
51	0	0.88	0.00	0.70	0.00	17	16.11	1.06	16.11	1.06
52	1	1.63	0.61	1.30	0.77	13	14.94	0.87	14.94	0.87
53	0	1.88	0.00	1.50	0.00	11	12.96	0.85	12.96	0.85
54	0	1.00	0.00	0.80	0.00	11	11.61	0.95	11.61	0.95
55	0	0.88	0.00	0.70	0.00	11	11.34	0.97	11.34	0.97
56	1	0.50	2.00	0.40	2.50	15	10.35	1.45	13.80	1.09
57	0	0.75	0.00	0.60	0.00	10	9.09	1.10	12.12	0.83
58	1	0.75	1.33	0.60	1.67	12	9.27	1.29	12.36	0.97
59	1	0.38	2.63	0.30	3.33	11	7.92	1.39	10.56	1.04
<Total>	20	33.53	0.60	23.04	0.87	111	103.59	1.07	115.80	0.96

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people retired



Retirement Rates - Eligible for Reduced Non Top 10 Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

STATE MALE TERMINATIONS										
CENTRAL AGE OF GROUP	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	197	183.10	1.08	184.12	1.07	0	0.00	0.00	0.00	0.00
25	1,227	1,214.24	1.01	1,199.34	1.02	0	0.00	0.00	0.00	0.00
30	1,420	1,419.41	1.00	1,437.14	0.99	17	15.53	1.09	20.99	0.81
35	1,102	1,085.47	1.02	1,130.92	0.97	143	99.05	1.44	127.45	1.12
40	769	754.42	1.02	791.58	0.97	208	144.00	1.44	184.03	1.13
45	649	569.85	1.14	599.56	1.08	220	190.86	1.15	243.97	0.90
50	527	483.91	1.09	515.37	1.02	118	106.26	1.11	144.69	0.82
55	432	406.03	1.06	445.47	0.97	30	8.03	3.74	16.88	1.78
60	269	242.13	1.11	290.61	0.93	20	4.19	4.77	11.41	1.75
65	120	82.81	1.45	119.73	1.00	2	0.00	0.00	0.00	0.00
70	57	24.29	2.35	45.94	1.24	1	0.00	0.00	0.00	0.00
<Total>	6,769	6,465.66	1.05	6,759.79	1.00	759	567.92	1.34	749.42	1.01

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

STATE MALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	132	112	45	47	18	20	2	3	0	0	0	0	0	0	0	0	0	0	0	
25	500	464	338	354	215	213	98	110	47	48	17	18	9	5	2	2	1	0	0	
30	315	298	299	294	242	255	172	194	121	141	117	101	75	61	31	37	28	25	20	
35	225	191	190	179	148	162	122	135	102	114	110	96	63	70	63	56	40	49	39	
40	173	138	111	120	93	102	85	84	58	72	77	64	67	55	33	47	33	41	39	
45	141	113	90	91	67	70	64	60	67	54	67	49	45	40	41	36	39	33	28	
50	119	109	75	76	55	58	47	46	50	42	49	43	41	35	36	29	25	26	30	
55	98	85	80	66	54	50	34	41	45	37	33	37	30	31	29	28	15	19	14	
60	71	60	46	43	29	33	38	34	38	30	12	12	7	11	7	9	11	7	10	
65	21	20	26	16	18	16	16	15	36	16	1	0	1	0	0	0	1	0	0	
70	11	6	12	6	4	4	17	4	13	4	0	0	0	0	0	0	0	0	0	
<Total>	1,806	1,596	1,312	1,292	943	984	695	726	577	557	483	421	338	307	242	242	193	200	180	

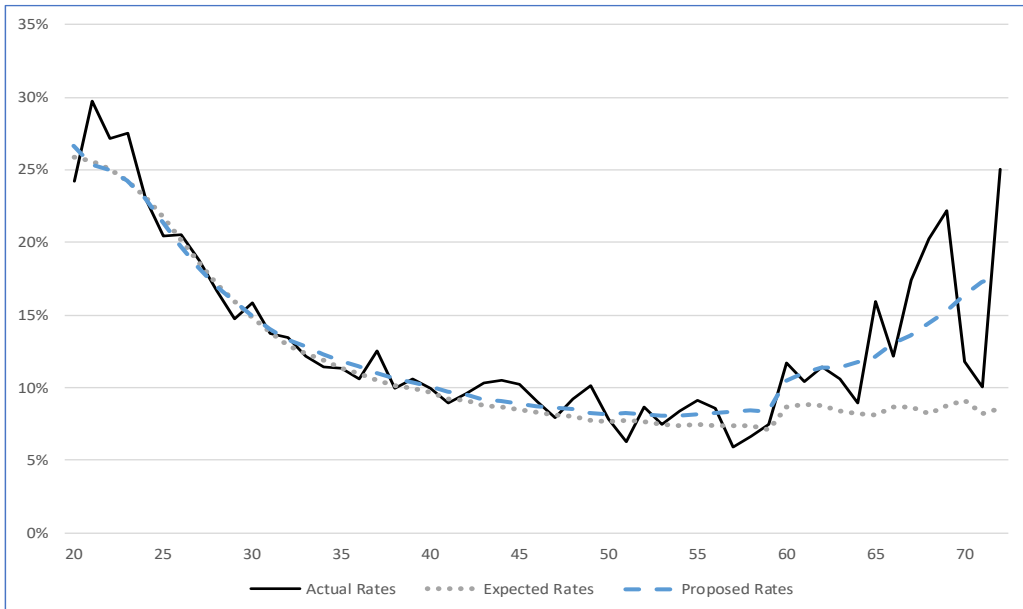
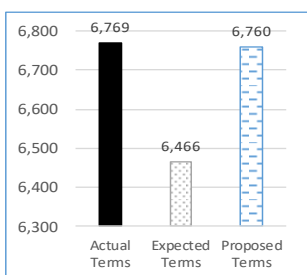
STATE MALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	132	119	45	45	18	17	2	3	0	0	0	0	0	0	0	0	0	0	0	
25	500	500	338	344	215	189	98	96	47	45	17	18	9	5	2	2	1	1	0	
30	315	336	299	297	242	238	172	180	121	137	117	104	75	65	31	38	28	26	20	
35	225	223	190	187	148	157	122	130	102	115	110	101	63	73	63	57	40	49	39	
40	173	159	111	126	93	100	85	82	58	73	77	69	67	59	33	48	33	41	39	
45	141	127	90	95	67	68	64	57	67	55	67	53	45	44	41	38	39	34	28	
50	119	122	75	80	55	56	47	44	50	42	49	45	41	38	36	32	25	29	30	
55	98	97	80	73	54	53	34	42	45	38	33	37	30	32	29	30	15	24	14	
60	71	69	46	52	29	41	38	41	38	38	12	13	7	11	7	10	11	9	10	
65	21	24	26	22	18	24	16	23	36	27	1	0	1	0	0	0	1	0	0	
70	11	8	12	10	4	9	17	10	13	10	0	0	0	0	0	0	0	0	0	
<Total>	1,806	1,784	1,312	1,331	943	952	695	708	577	579	483	441	338	328	242	256	193	213	180	

STATE MALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	1.17	1.11	0.95	1.00	0.89	1.05	0.62	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
25	1.08	1.00	0.95	0.98	1.01	1.14	0.89	1.02	0.98	1.05	0.96	0.95	1.79	1.66	1.04	0.94	2.04	1.81	0.00	
30	1.06	0.94	1.02	1.01	0.95	1.02	0.89	0.96	0.86	0.88	1.15	1.12	1.23	1.16	0.85	0.81	1.13	1.08	1.41	
35	1.18	1.01	1.06	1.02	0.91	0.94	0.90	0.94	0.90	0.89	1.14	1.09	0.91	0.86	1.13	1.11	0.82	0.82	1.15	
40	1.25	1.09	0.93	0.88	0.91	0.93	1.01	1.04	0.81	0.79	1.20	1.11	1.22	1.13	0.71	0.69	0.80	0.81	1.25	
45	1.25	1.11	0.99	0.95	0.95	0.98	1.07	1.12	1.23	1.21	1.36	1.25	1.13	1.02	1.15	1.07	1.19	1.15	1.18	
50	1.10	0.97	0.98	0.94	0.96	0.98	1.01	1.06	1.20	1.20	1.14	1.09	1.17	1.07	1.25	1.12	0.96	0.86	1.46	
55	1.16	1.01	1.21	1.09	1.08	1.02	0.83	0.82	1.23	1.19	0.89	0.89	0.98	0.94	1.05	0.96	0.78	0.62	1.09	
60	1.19	1.03	1.08	0.88	0.88	0.71	1.13	0.93	1.26	1.01	0.99	0.95	0.64	0.63	0.78	0.72	1.63	1.17	2.70	
65	1.04	0.89	1.67	1.20	1.11	0.74	1.09	0.69	2.23	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
70	1.80	1.46	2.04	1.19	0.94	0.45	4.14	1.77	3.29	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<Total>	1.13	1.01	1.02	0.99	0.96	0.99	0.96	0.98	1.04	1.00	1.15	1.10	1.10	1.03	1.00	0.95	0.96	0.91	1.28	



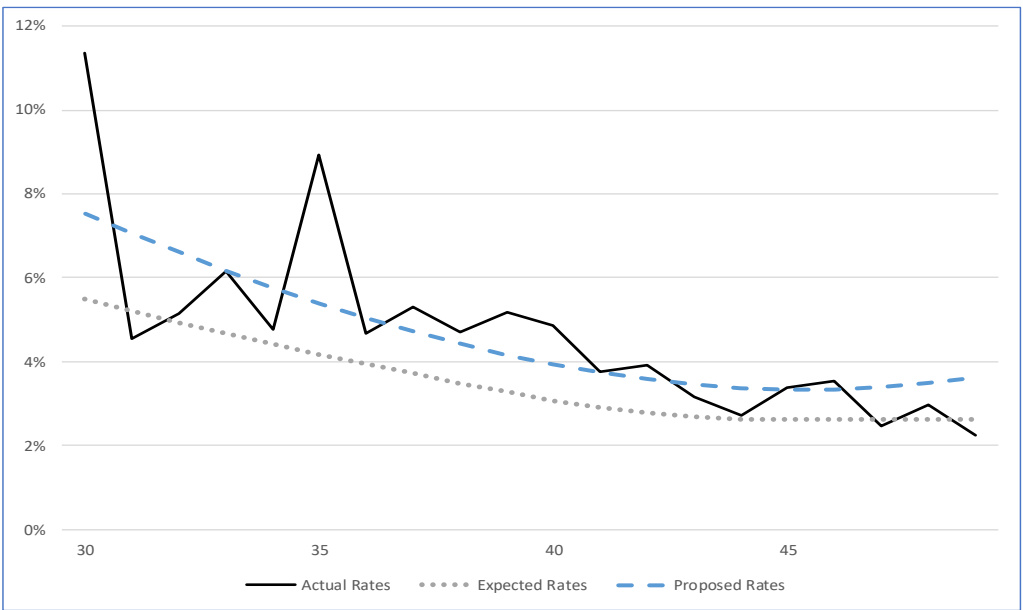
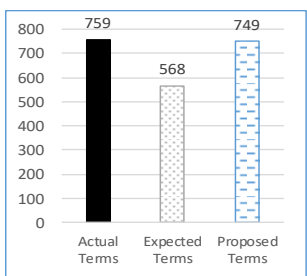
Termination Rates - <10 Years of Service State Males

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service State Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

STATE FEMALE TERMINATIONS										
CENTRAL AGE OF GROUP	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	305	249.82	1.22	244.69	1.25	0	0.00	0.00	0.00	0.00
25	2,211	2,266.80	0.98	2,231.92	0.99	0	0.00	0.00	0.00	0.00
30	2,502	2,562.83	0.98	2,530.76	0.99	28	25.01	1.12	23.73	1.18
35	1,795	1,874.36	0.96	1,875.73	0.96	221	215.86	1.02	216.93	1.02
40	1,422	1,319.25	1.08	1,334.39	1.07	316	262.15	1.21	305.08	1.04
45	1,065	1,011.44	1.05	1,026.68	1.04	387	292.67	1.32	393.60	0.98
50	921	889.71	1.04	908.74	1.01	223	160.74	1.39	248.64	0.90
55	710	727.55	0.98	744.07	0.95	42	14.90	2.82	38.63	1.09
60	379	398.74	0.95	414.94	0.91	29	5.14	5.64	17.85	1.62
65	145	106.76	1.36	125.30	1.16	5	0.00	0.00	0.00	0.00
70	41	23.85	1.72	33.40	1.23	1	0.00	0.00	0.00	0.00
<Total>	11,496	11,431.11	1.01	11,470.61	1.00	1,252	976.47	1.28	1,244.47	1.01

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

STATE FEMALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	225	174	67	57	11	16	2	3	0	0	0	0	0	0	0	0	0	0	0	0
25	916	938	644	674	385	374	164	176	67	74	23	22	8	6	2	3	2	1	0	0
30	611	594	544	525	435	441	291	339	221	249	176	177	114	108	58	62	31	40	21	27
35	408	393	319	325	236	260	182	208	174	175	142	151	102	116	76	95	85	79	71	71
40	338	286	252	231	183	182	145	141	126	118	89	97	76	82	79	67	65	60	69	54
45	253	229	188	169	142	128	114	106	69	88	71	80	71	66	62	55	45	48	50	42
50	226	215	135	148	89	105	83	85	84	76	77	68	67	55	55	48	45	45	60	46
55	172	175	124	122	90	85	67	71	46	62	49	58	48	48	39	40	41	34	34	32
60	80	100	77	72	49	55	49	54	49	52	16	19	16	15	17	14	13	10	13	8
65	29	25	18	21	28	20	21	19	48	22	1	0	0	0	0	0	0	0	0	0
70	9	7	6	5	2	4	6	3	16	5	2	0	0	0	0	0	0	0	0	0
<Total>	3,267	3,137	2,374	2,348	1,650	1,671	1,124	1,206	900	921	646	672	502	496	388	384	327	317	318	279

STATE FEMALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	225	172	67	55	11	15	2	2	0	0	0	0	0	0	0	0	0	0	0	0
25	916	956	644	663	385	354	164	163	67	67	23	20	8	5	2	2	2	1	0	0
30	611	626	544	532	435	429	291	322	221	234	176	165	114	101	58	59	31	38	21	25
35	408	424	319	338	236	257	182	199	174	166	142	142	102	109	76	92	85	78	71	70
40	338	312	252	243	183	180	145	133	126	110	89	92	76	79	79	67	65	62	69	56
45	253	247	188	177	142	125	114	97	69	80	71	76	71	67	62	59	45	52	50	47
50	226	221	135	154	89	103	83	78	84	69	77	64	67	58	55	54	45	53	60	55
55	172	168	124	126	90	87	67	68	46	58	49	55	48	51	39	45	41	43	34	43
60	80	90	77	73	49	60	49	58	49	57	16	20	16	16	17	15	13	13	13	12
65	29	21	18	22	28	25	21	25	48	32	1	0	0	0	0	0	0	0	0	0
70	9	6	6	6	2	7	6	6	16	9	2	0	0	0	0	0	0	0	0	0
<Total>	3,267	3,242	2,374	2,389	1,650	1,642	1,124	1,150	900	884	646	634	502	486	388	395	327	340	318	308

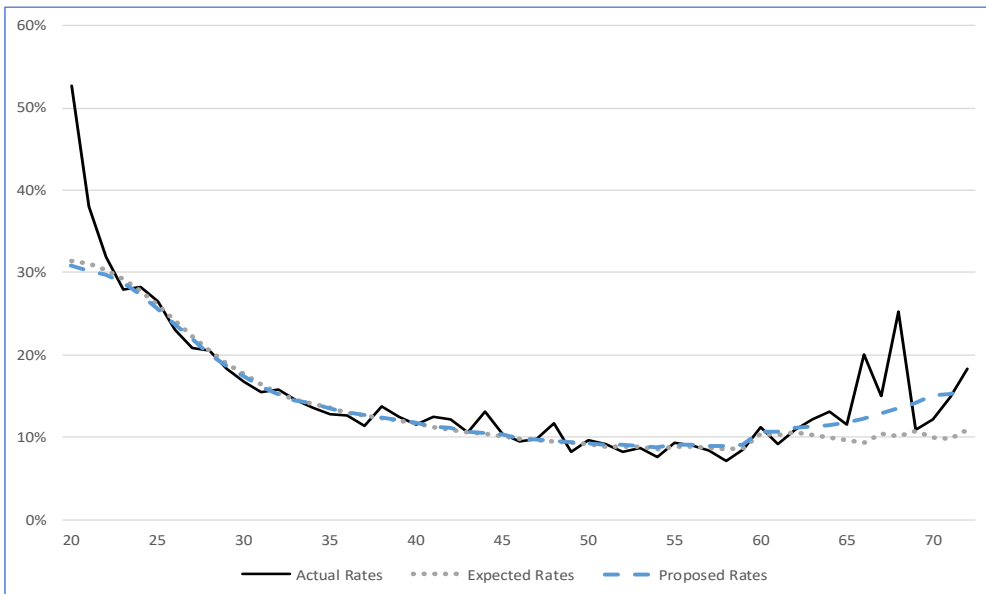
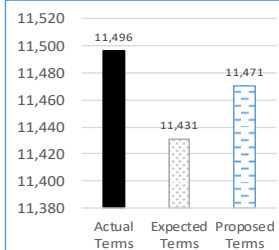
STATE FEMALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	1.29	1.31	1.18	1.22	0.69	0.74	0.75	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.98	0.96	0.96	0.97	1.03	1.09	0.93	1.01	0.91	0.99	1.05	1.14	1.40	1.48	0.77	0.81	2.41	2.63	0.00	0.00
30	1.03	0.98	1.04	1.02	0.99	1.01	0.86	0.90	0.89	0.95	0.99	1.06	1.05	1.12	0.93	0.98	0.78	0.83	0.79	0.84
35	1.04	0.96	0.98	0.94	0.91	0.92	0.88	0.91	0.99	1.05	0.94	1.00	0.88	0.93	0.80	0.83	1.07	1.09	0.99	1.01
40	1.18	1.08	1.09	1.04	1.00	1.02	1.03	1.09	1.07	1.14	0.92	0.97	0.93	0.96	1.19	1.18	1.08	1.04	1.28	1.23
45	1.10	1.03	1.11	1.06	1.11	1.14	1.08	1.18	0.78	0.86	0.88	0.94	1.08	1.07	1.12	1.04	0.95	0.86	1.18	1.06
50	1.05	1.02	0.92	0.88	0.85	0.86	0.98	1.07	1.10	1.21	1.14	1.21	1.21	1.15	1.15	1.01	1.00	0.85	1.31	1.10
55	0.98	1.02	1.02	0.99	1.06	1.03	0.94	0.99	0.74	0.79	0.85	0.88	1.00	0.95	0.97	0.86	1.19	0.95	1.07	0.79
60	0.80	0.89	1.07	1.05	0.89	0.81	0.90	0.84	0.95	0.86	0.83	0.82	1.08	1.03	1.22	1.11	1.29	0.99	1.68	1.07
65	1.17	1.38	0.87	0.82	1.39	1.11	1.09	0.83	2.19	1.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	1.26	1.53	1.28	1.08	0.46	0.29	1.92	1.04	3.53	1.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<Total>	1.04	1.01	1.01	0.99	0.99	1.01	0.93	0.98	0.98	1.02	0.96	1.02	1.01	1.03	1.01	0.98	1.03	0.96	1.14	1.03



Section VI: Supporting Tables, Subsection 6 - Termination

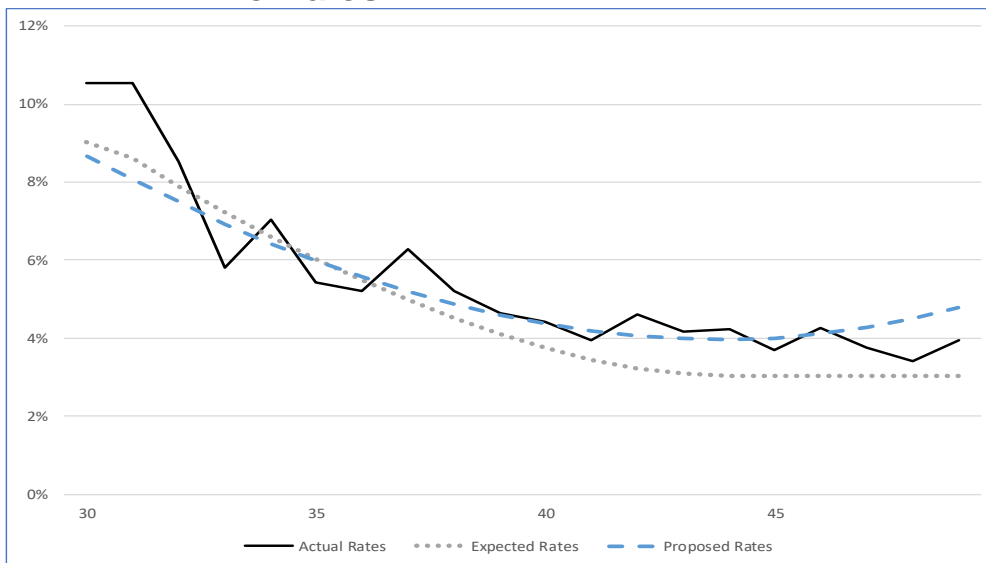
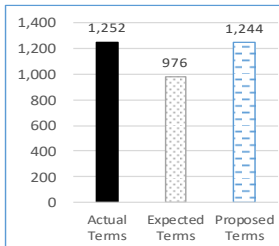
Termination Rates - <10 Years of Service State Females

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service State Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

TEACHERS MALE TERMINATIONS										
CENTRAL AGE OF GROUP	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	51	44.29	1.15	48.97	1.04	0	0.00	0.00	0.00	0.00
25	1,080	951.04	1.14	1,082.84	1.00	0	0.00	0.00	0.00	0.00
30	1,446	1,300.67	1.11	1,472.18	0.98	8	7.96	1.01	9.48	0.84
35	925	805.64	1.15	903.03	1.02	242	192.09	1.26	233.41	1.04
40	551	485.50	1.13	536.38	1.03	308	244.39	1.26	295.86	1.04
45	435	383.21	1.14	427.27	1.02	307	274.85	1.12	308.95	0.99
50	393	334.53	1.17	380.79	1.03	123	120.43	1.02	116.67	1.05
55	289	268.35	1.08	314.88	0.92	22	5.02	4.38	4.70	4.68
60	193	163.89	1.18	200.99	0.96	5	1.95	2.56	1.83	2.73
65	90	63.12	1.43	83.29	1.08	3	0.00	0.00	0.00	0.00
70	41	22.01	1.86	32.42	1.26	2	0.00	0.00	0.00	0.00
<Total>	5,494	4,822.25	1.14	5,483.06	1.00	1,020	846.69	1.20	970.91	1.05

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

TEACHERS MALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	23	24	23	16	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	168	163	409	361	270	220	139	133	69	59	20	14	3	1	2	0	0	0	0	0
30	114	105	263	246	238	219	211	195	175	169	182	147	118	101	67	63	48	37	30	19
35	57	63	151	138	127	122	124	102	110	83	87	72	75	61	67	57	60	54	67	53
40	57	49	90	101	85	78	56	60	58	48	55	38	37	32	33	27	40	28	40	25
45	47	46	99	84	64	61	65	48	36	33	30	27	28	24	28	22	22	20	16	18
50	62	46	94	73	49	53	44	43	41	29	25	22	23	20	15	18	26	18	14	12
55	37	33	69	60	37	45	42	37	24	22	20	18	20	16	9	15	22	14	9	9
60	29	24	48	40	35	31	27	29	24	19	9	5	7	4	4	5	5	4	5	3
65	19	11	23	18	24	16	7	11	15	7	1	0	1	0	0	0	0	0	0	0
70	3	4	16	7	6	4	9	5	6	3	0	0	1	0	0	0	0	0	0	0
<Total>	616	565	1,285	1,146	940	852	724	664	558	472	429	342	313	261	225	207	223	174	181	139

TEACHERS MALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	23	24	23	19	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	168	167	409	421	270	258	139	150	69	68	20	17	3	2	2	0	0	0	0	0
30	114	108	263	271	238	238	211	213	175	193	182	176	118	124	67	77	48	47	30	25
35	57	62	151	147	127	128	124	110	110	94	87	85	75	76	67	70	60	66	67	65
40	57	50	90	107	85	82	56	65	58	55	55	45	37	40	33	33	40	32	40	27
45	47	49	99	91	64	66	65	50	36	39	30	33	28	29	28	27	22	23	16	19
50	62	53	94	83	49	59	44	44	41	35	25	28	23	24	15	21	26	20	14	14
55	37	40	69	71	37	52	42	38	24	27	20	23	20	19	9	16	22	16	9	12
60	29	32	48	50	35	38	27	31	24	24	9	6	7	5	4	5	5	5	5	4
65	19	15	23	25	24	21	7	13	15	10	1	0	1	0	0	0	0	0	0	0
70	3	5	16	10	6	6	9	7	6	5	0	0	1	0	0	0	0	0	0	0
<Total>	616	605	1,285	1,297	940	952	724	722	558	550	429	413	313	319	225	250	223	208	181	167

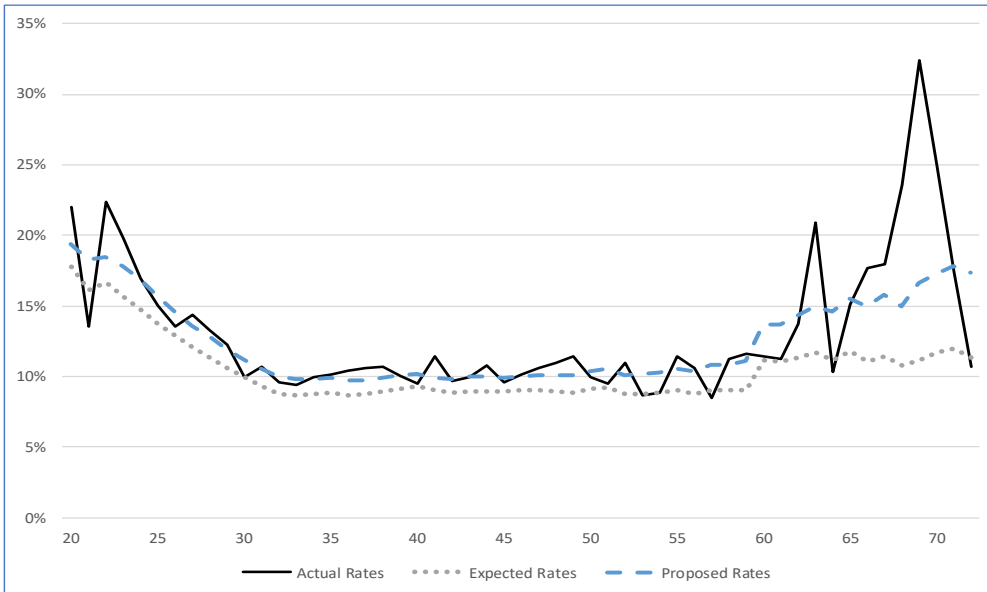
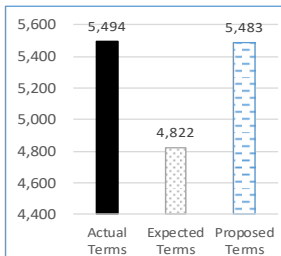
TEACHERS MALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	0.96	0.96	1.45	1.19	1.21	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	1.03	1.01	1.13	0.97	1.23	1.05	1.04	0.93	1.18	1.01	1.46	1.20	2.26	1.88	5.13	4.29	0.00	0.00	0.00	0.00
30	1.09	1.06	1.07	0.97	1.09	1.00	1.08	0.99	1.03	0.91	1.24	1.03	1.17	0.95	1.07	0.87	1.31	1.03	1.58	1.20
35	0.91	0.91	1.09	1.03	1.04	0.99	1.21	1.13	1.32	1.17	1.22	1.03	1.22	0.99	1.19	0.95	1.11	0.91	1.25	1.04
40	1.16	1.15	0.89	0.84	1.10	1.04	0.93	0.86	1.21	1.06	1.46	1.23	1.14	0.92	1.22	0.99	1.44	1.24	1.62	1.48
45	1.03	0.96	1.18	1.08	1.06	0.97	1.36	1.29	1.08	0.91	1.10	0.91	1.16	0.95	1.26	1.05	1.08	0.96	0.89	0.82
50	1.35	1.17	1.28	1.14	0.93	0.83	1.03	1.00	1.42	1.16	1.12	0.91	1.13	0.95	0.82	0.71	1.48	1.32	1.14	0.98
55	1.14	0.92	1.15	0.97	0.82	0.71	1.12	1.09	1.09	0.88	1.13	0.88	1.26	1.06	0.62	0.56	1.59	1.40	0.98	0.73
60	1.20	0.91	1.20	0.95	1.12	0.92	0.92	0.86	1.29	1.02	1.90	1.41	1.70	1.42	0.81	0.76	1.19	1.02	1.94	1.22
65	1.80	1.28	1.25	0.93	1.53	1.16	0.61	0.53	2.11	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.84	0.55	2.35	1.59	1.57	1.06	1.82	1.36	2.09	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<Total>	1.09	1.02	1.12	0.99	1.10	0.99	1.09	1.00	1.18	1.01	1.25	1.04	1.20	0.98	1.09	0.90	1.28	1.07	1.30	1.08



Section VI: Supporting Tables, Subsection 6 - Termination

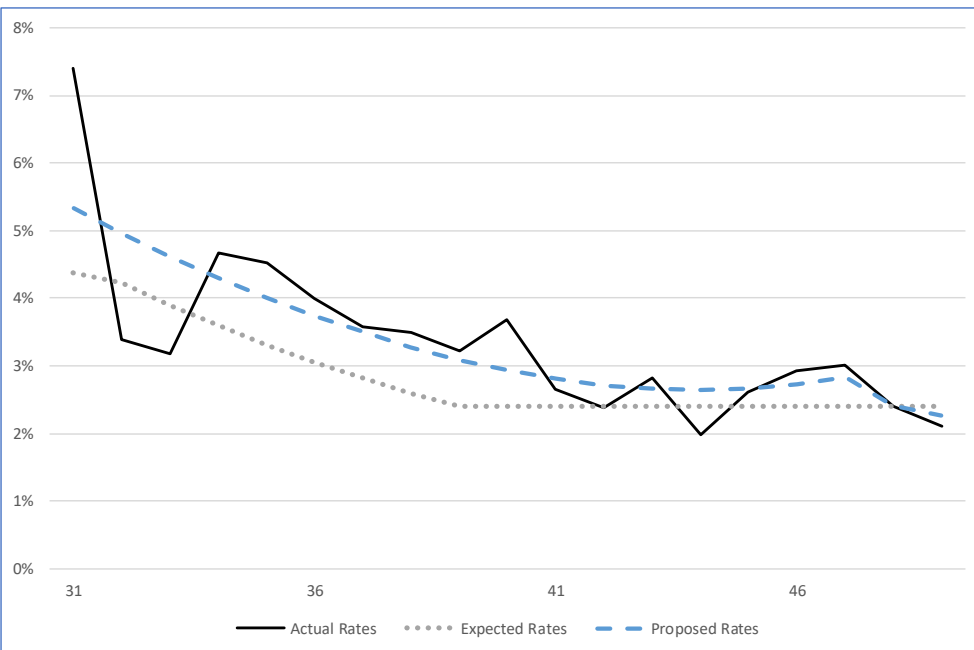
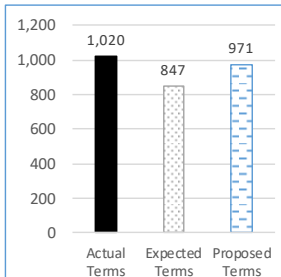
Termination Rates - <10 Years of Service Teachers Males

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service Teachers Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

TEACHERS FEMALE TERMINATIONS										
CENTRAL AGE OF GROUP	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
	20	180	101.55	1.77	114.21	1.58	0	0.00	0.00	0.00
25	4,837	4,201.08	1.15	5,030.35	0.96	0	0.00	0.00	0.00	0.00
30	6,072	5,315.67	1.14	6,045.97	1.00	43	41.62	1.03	53.10	0.81
35	3,790	3,216.15	1.18	3,582.20	1.06	1,097	869.34	1.26	1,069.55	1.03
40	2,627	2,392.64	1.10	2,685.57	0.98	1,193	857.67	1.39	1,146.04	1.04
45	2,471	2,185.82	1.13	2,487.32	0.99	1,115	907.35	1.23	1,041.53	1.07
50	2,054	1,804.85	1.14	2,041.83	1.01	573	446.93	1.28	483.92	1.18
55	1,343	1,196.24	1.12	1,389.93	0.97	111	27.87	3.98	30.19	3.68
60	666	526.14	1.27	670.37	0.99	51	9.36	5.45	10.13	5.04
65	243	141.20	1.72	215.17	1.13	9	0.00	0.00	0.00	0.00
70	84	43.01	1.95	86.69	0.97	3	0.00	0.00	0.00	0.00
<Total>	24,367	21,124.35	1.15	24,349.60	1.00	4,195	3,160.14	1.33	3,834.45	1.09

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

TEACHERS FEMALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	88	62	68	34	19	5	5	1	0	0	0	0	0	0	0	0	0	0	0	0
25	561	566	1,722	1,484	1,237	1,009	833	701	356	345	120	89	6	5	0	1	2	1	0	0
30	382	342	951	790	868	737	861	739	791	716	820	723	608	565	423	364	238	225	130	114
35	311	269	643	577	522	445	477	373	363	305	312	286	292	262	299	235	290	230	281	234
40	282	255	528	507	422	381	295	287	248	228	232	195	156	160	151	139	146	130	167	111
45	246	232	491	455	371	330	327	268	230	212	196	180	158	152	161	132	166	121	125	104
50	172	179	347	341	312	269	267	217	204	179	177	160	157	133	166	118	130	114	122	95
55	132	130	230	222	180	173	148	135	121	112	125	103	133	93	102	87	98	82	74	58
60	69	63	136	121	122	95	112	75	89	63	41	28	31	24	24	23	25	21	17	14
65	30	21	66	38	46	31	49	27	47	24	0	0	1	0	1	0	3	0	0	0
70	14	8	22	12	13	9	16	7	19	7	0	0	0	0	0	0	0	0	0	0
<Total>	2,287	2,128	5,204	4,580	4,112	3,484	3,390	2,830	2,468	2,191	2,023	1,764	1,542	1,395	1,327	1,099	1,098	923	916	731

TEACHERS FEMALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	88	61	68	45	19	7	5	1	0	0	0	0	0	0	0	0	0	0	0	0
25	561	576	1,722	1,865	1,237	1,257	833	812	356	404	120	108	6	6	0	2	2	1	0	0
30	382	363	951	911	868	837	861	826	791	816	820	823	608	643	423	422	238	268	130	138
35	311	289	643	634	522	490	477	416	363	344	312	310	292	283	299	268	290	269	281	279
40	282	272	528	556	422	430	295	331	248	261	232	214	156	175	151	161	146	154	167	132
45	246	241	491	501	371	380	327	313	230	244	196	200	158	173	161	160	166	150	125	126
50	172	180	347	366	312	302	267	246	204	202	177	182	157	157	166	145	130	144	122	118
55	132	132	230	240	180	195	148	157	121	132	125	125	133	118	102	104	98	104	74	84
60	69	69	136	143	122	120	112	100	89	89	41	38	31	33	24	28	25	28	17	24
65	30	27	66	54	46	47	49	45	47	43	0	0	1	0	1	0	3	0	0	0
70	14	12	22	21	13	19	16	17	19	17	0	0	0	0	0	0	0	0	0	0
<Total>	2,287	2,221	5,204	5,334	4,112	4,083	3,390	3,264	2,468	2,552	2,023	1,999	1,542	1,587	1,327	1,291	1,098	1,118	916	901

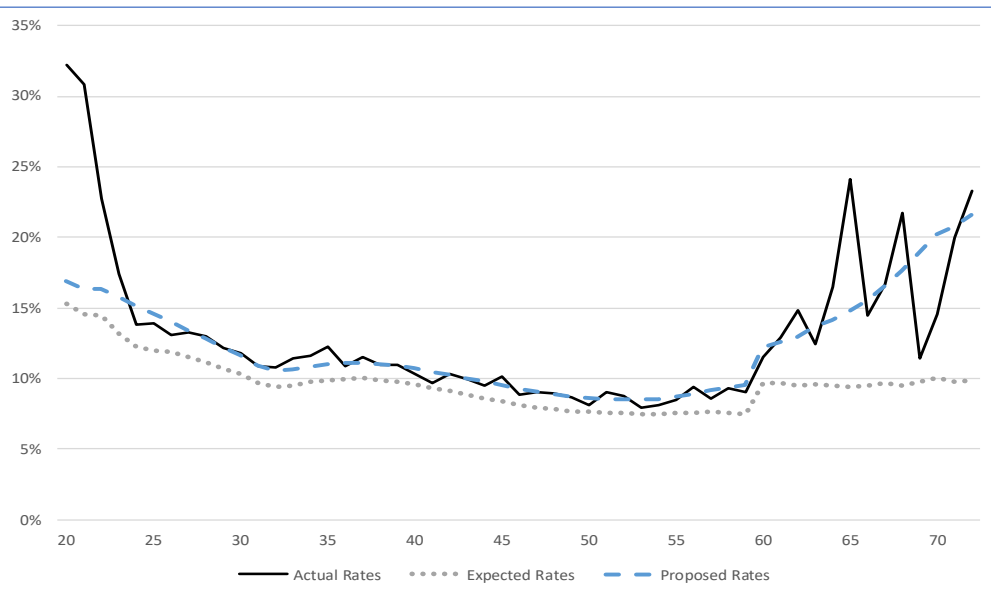
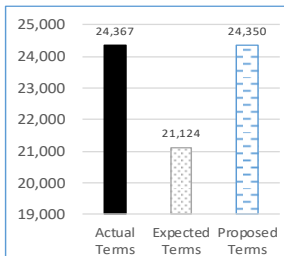
TEACHERS FEMALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	1.43	1.45	2.03	1.53	3.65	2.61	4.39	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.99	0.97	1.16	0.92	1.23	0.98	1.19	1.03	1.03	0.88	1.35	1.11	1.22	0.96	0.00	0.00	3.45	2.79	0.00	0.00
30	1.12	1.05	1.20	1.04	1.18	1.04	1.16	1.04	1.11	0.97	1.13	1.00	1.08	0.95	1.16	1.00	1.06	0.89	1.14	0.94
35	1.16	1.08	1.11	1.01	1.17	1.06	1.28	1.15	1.19	1.06	1.09	1.01	1.11	1.03	1.27	1.11	1.26	1.08	1.20	1.01
40	1.11	1.04	1.04	0.95	1.11	0.98	1.03	0.89	1.09	0.95	1.19	1.08	0.97	0.89	1.09	0.94	1.13	0.95	1.50	1.26
45	1.06	1.02	1.08	0.98	1.12	0.98	1.22	1.04	1.08	0.94	1.09	0.98	1.04	0.92	1.22	1.00	1.37	1.11	1.20	0.99
50	0.96	0.96	1.02	0.95	1.16	1.03	1.23	1.08	1.14	1.01	1.10	0.98	1.18	1.00	1.41	1.15	1.14	0.90	1.28	1.04
55	1.01	1.00	1.03	0.96	1.04	0.93	1.09	0.94	1.08	0.92	1.21	1.00	1.43	1.13	1.17	0.98	1.20	0.94	1.27	0.89
60	1.10	1.00	1.13	0.95	1.29	1.02	1.50	1.12	1.41	1.00	1.45	1.07	1.29	0.93	1.04	0.86	1.20	0.90	1.23	0.71
65	1.41	1.13	1.72	1.23	1.51	0.98	1.82	1.09	1.95	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	1.74	1.12	1.89	1.04	1.43	0.69	2.14	0.93	2.79	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<Total>	1.07	1.03	1.14	0.98	1.18	1.01	1.20	1.04	1.13	0.97	1.15	1.01	1.11	0.97	1.21	1.03	1.19	0.98	1.25	1.02



Section VI: Supporting Tables, Subsection 6 - Termination

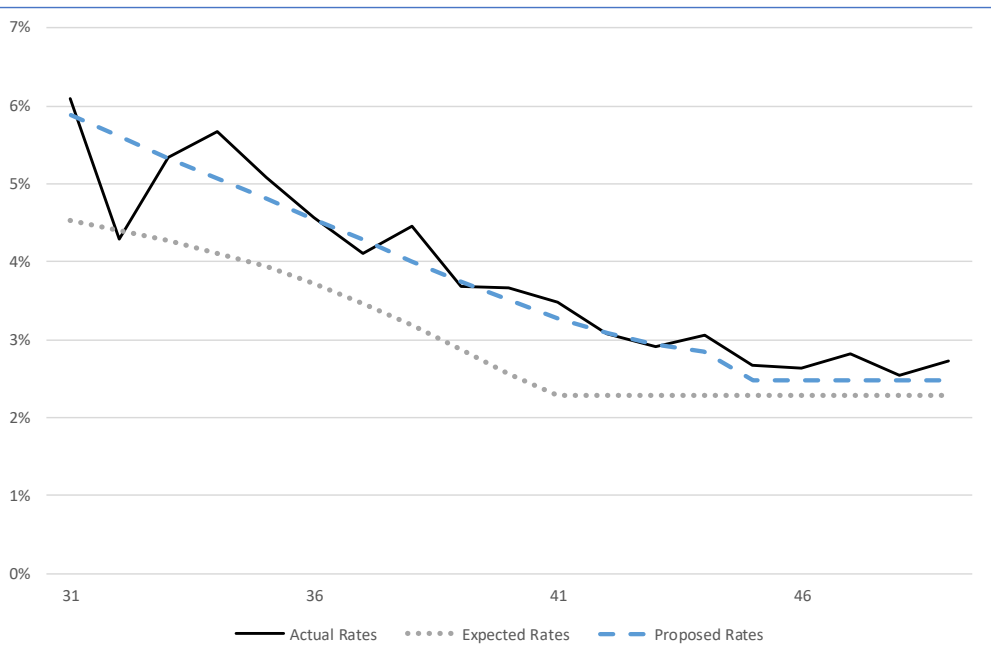
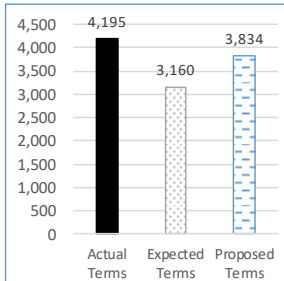
Termination Rates - <10 Years of Service Teachers Females

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service Teachers Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

VALORS MALE TERMINATIONS										
CENTRAL AGE OF GROUP	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	311	270.66	1.15	314.53	0.99	0	0.00	0.00	0.00	0.00
25	898	803.00	1.12	888.84	1.01	0	0.00	0.00	0.00	0.00
30	687	599.56	1.15	703.14	0.98	16	12.55	1.27	14.90	1.07
35	394	304.51	1.29	367.98	1.07	81	54.61	1.48	71.69	1.13
40	203	176.85	1.15	218.64	0.93	86	58.39	1.47	75.27	1.14
45	163	137.49	1.19	174.69	0.93	82	87.36	0.94	87.25	0.94
50	74	59.58	1.24	72.35	1.02	19	20.18	0.94	17.28	1.10
55	45	33.61	1.34	37.75	1.19	2	0.00	0.00	0.00	0.00
60	20	17.14	1.17	17.73	1.13	1	0.00	0.00	0.00	0.00
65	4	3.98	1.01	3.60	1.11	1	0.00	0.00	0.00	0.00
70	0	1.17	0.00	1.07	0.00	0	0.00	0.00	0.00	0.00
<Total>	2,799	2,407.55	1.16	2,800.32	1.00	288	233.09	1.24	266.38	1.08

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

VALORS MALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	216	183	73	69	20	16	2	2	0	0	0	0	0	0	0	0	0	0	0	0
25	372	295	191	203	149	144	84	84	51	45	36	22	12	7	3	3	0	0	0	0
30	185	157	126	115	84	82	60	66	56	53	73	46	39	30	26	21	21	17	17	13
35	99	77	57	55	54	44	33	29	32	22	31	20	30	15	23	13	19	15	16	14
40	49	46	32	34	26	25	21	18	21	13	12	12	8	7	12	7	13	7	9	8
45	42	33	23	20	20	17	15	14	17	13	8	11	14	9	13	8	7	7	4	5
50	21	20	15	13	7	9	10	8	4	2	5	2	2	2	4	2	4	1	2	1
55	17	14	10	8	7	6	9	5	0	0	0	0	1	0	0	0	0	1	0	0
60	8	7	5	4	4	3	2	3	0	0	0	0	0	0	0	0	0	0	1	0
65	2	2	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<Total>	1,011	833	533	523	372	348	236	230	181	148	165	112	106	71	81	53	64	48	50	42

VALORS MALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	216	225	73	72	20	15	2	2	0	0	0	0	0	0	0	0	0	0	0	0
25	372	355	191	215	149	141	84	84	51	51	36	29	12	11	3	4	0	0	0	0
30	185	182	126	124	84	86	60	71	56	63	73	62	39	43	26	31	21	24	17	17
35	99	89	57	62	54	49	33	33	32	27	31	26	30	22	23	20	19	20	16	19
40	49	52	32	40	26	30	21	22	21	16	12	16	8	11	12	9	13	11	9	11
45	42	38	23	24	20	22	15	18	17	16	8	14	14	13	13	12	7	10	4	8
50	21	21	15	16	7	12	10	10	4	3	5	2	2	3	4	2	4	2	2	1
55	17	14	10	10	7	8	9	6	0	0	0	0	1	0	0	0	0	1	0	0
60	8	7	5	5	4	3	2	2	0	0	0	0	0	0	0	0	0	0	1	0
65	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<Total>	1,011	985	533	570	372	367	236	248	181	176	165	150	106	103	81	78	64	68	50	56

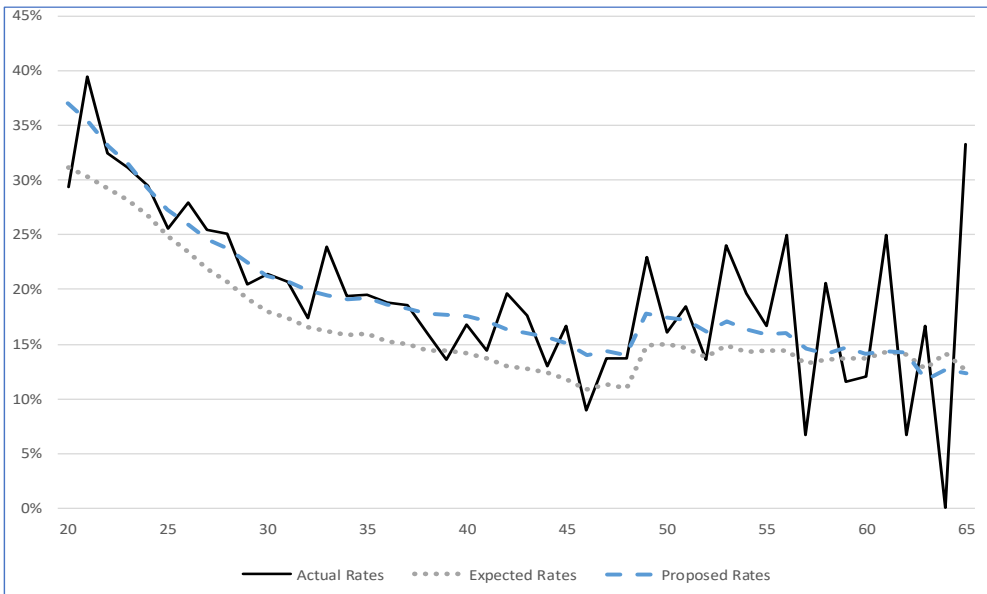
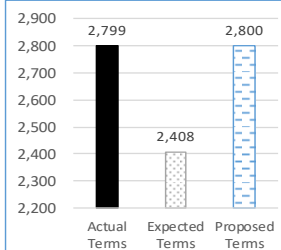
VALORS MALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	1.18	0.96	1.06	1.01	1.23	1.30	0.90	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	1.26	1.05	0.94	0.89	1.03	1.06	1.00	1.00	1.13	1.00	1.67	1.26	1.62	1.09	1.18	0.77	0.00	0.00	0.00	0.00
30	1.18	1.01	1.10	1.02	1.02	0.98	0.92	0.85	1.06	0.89	1.57	1.18	1.31	0.90	1.25	0.84	1.21	0.87	1.27	1.00
35	1.28	1.11	1.03	0.92	1.22	1.09	1.15	0.99	1.49	1.18	1.58	1.17	1.95	1.36	1.71	1.18	1.29	0.93	1.12	0.85
40	1.08	0.94	0.93	0.79	1.04	0.87	1.15	0.94	1.65	1.29	1.01	0.75	1.07	0.76	1.83	1.27	1.74	1.22	1.15	0.82
45	1.26	1.12	1.16	0.95	1.17	0.92	1.05	0.84	1.31	1.06	0.75	0.56	1.54	1.09	1.66	1.12	1.04	0.67	0.73	0.51
50	1.07	0.99	1.16	0.95	0.76	0.58	1.19	0.99	1.65	1.43	3.23	2.43	0.96	0.68	2.67	1.74	4.12	2.48	1.94	1.35
55	1.24	1.17	1.19	1.00	1.16	0.92	1.64	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	1.15	1.09	1.14	1.02	1.39	1.24	0.68	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	1.31	1.20	1.14	1.07	1.45	1.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<Total>	1.21	1.03	1.02	0.93	1.07	1.01	1.02	0.95	1.23	1.03	1.48	1.10	1.49	1.03	1.54	1.04	1.34	0.94	1.19	0.89



Section VI: Supporting Tables, Subsection 6 - Termination

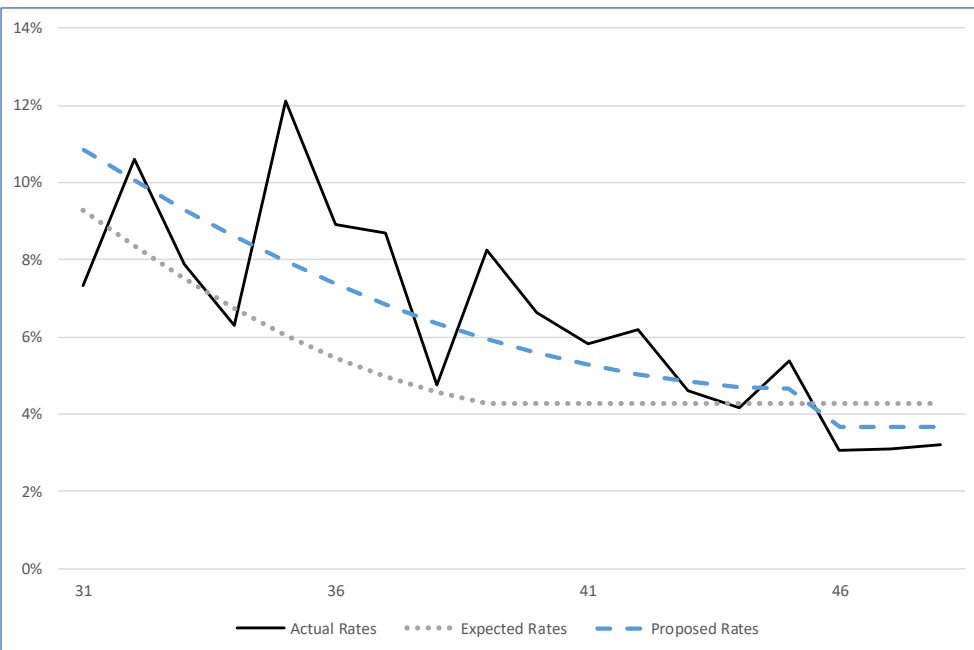
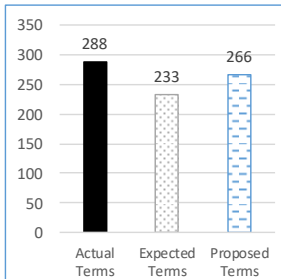
Termination Rates - <10 Years of Service VaLORS Males

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service VaLORS Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

VALORS FEMALE TERMINATIONS										
CENTRAL AGE OF GROUP	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	215	151.36	1.42	195.03	1.10	0	0.00	0.00	0.00	0.00
25	666	578.22	1.15	688.01	0.97	0	0.00	0.00	0.00	0.00
30	475	385.42	1.23	474.09	1.00	6	6.14	0.98	9.04	0.66
35	221	180.27	1.23	217.70	1.02	59	32.70	1.80	53.94	1.09
40	128	109.53	1.17	128.52	1.00	65	30.88	2.10	57.38	1.13
45	79	69.52	1.14	82.63	0.96	50	40.20	1.24	47.66	1.05
50	45	35.60	1.26	41.43	1.09	14	11.69	1.20	11.66	1.20
55	26	23.66	1.10	27.57	0.94	0	0.00	0.00	0.00	0.00
60	4	4.75	0.84	5.75	0.70	1	0.00	0.00	0.00	0.00
65	3	1.12	2.68	1.60	1.87	0	0.00	0.00	0.00	0.00
70	0	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
<Total>	1,862	1,539.45	1.21	1,862.32	1.00	195	121.61	1.60	179.67	1.09

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

VALORS FEMALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	172	118	36	29	6	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0
25	315	258	179	161	89	91	54	46	21	16	5	5	2	1	1	0	0	0	0	0
30	161	123	67	76	55	53	52	45	42	31	39	25	26	14	15	6	7	7	11	6
35	83	62	35	33	24	20	11	14	17	14	11	10	7	7	13	6	9	6	11	7
40	36	34	15	18	26	15	15	11	3	6	8	7	10	6	6	4	5	3	4	5
45	20	24	15	13	8	6	7	4	5	4	8	4	2	3	1	3	6	4	7	4
50	20	17	6	8	6	4	7	3	0	0	0	1	1	0	2	1	3	0	0	0
55	12	13	7	6	2	3	1	1	1	0	1	0	0	0	0	0	2	0	0	0
60	2	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<Total>	823	653	362	346	217	198	148	125	89	72	72	51	48	31	38	20	32	21	33	22

VALORS FEMALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	172	160	36	31	6	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0
25	315	336	179	179	89	94	54	49	21	20	5	7	2	2	1	1	0	0	0	0
30	161	149	67	88	55	59	52	51	42	38	39	34	26	20	15	13	7	12	11	10
35	83	69	35	39	24	24	11	17	17	17	11	12	7	9	13	9	9	9	11	11
40	36	35	15	21	26	19	15	14	3	7	8	8	10	7	6	5	5	4	4	7
45	20	23	15	15	8	8	7	6	5	5	8	5	2	4	1	4	6	5	7	6
50	20	17	6	10	6	6	7	5	0	1	0	1	1	1	2	1	3	1	0	1
55	12	13	7	7	2	5	1	3	1	0	1	0	0	0	0	0	2	0	0	0
60	2	3	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<Total>	823	805	362	392	217	221	148	146	89	89	72	68	48	43	38	33	32	32	33	34

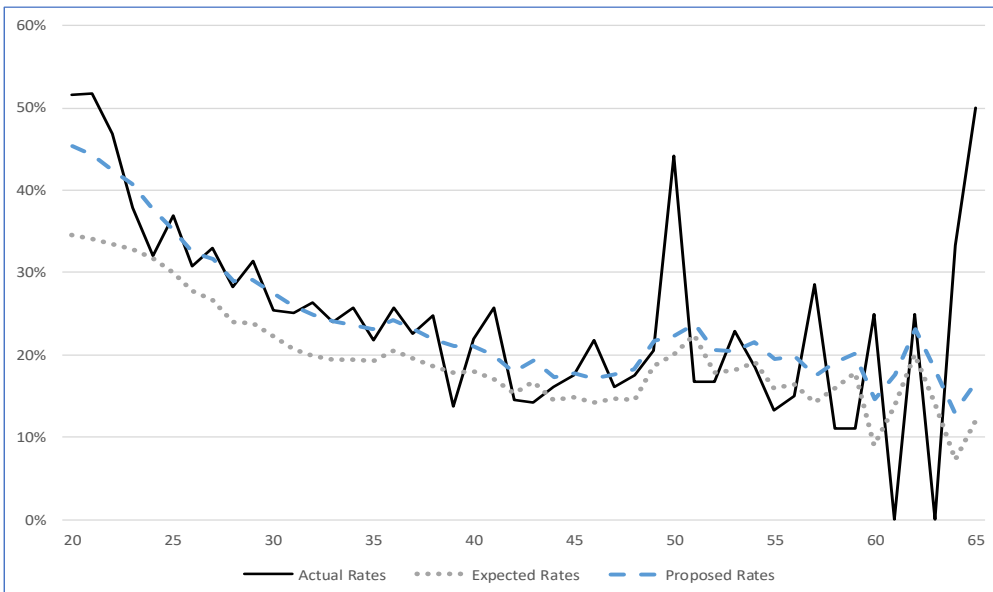
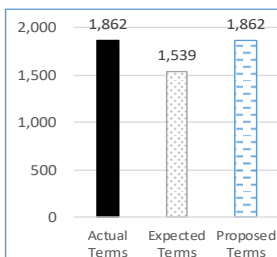
VALORS FEMALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	1.45	1.08	1.26	1.17	1.46	1.52	2.04	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	1.22	0.94	1.11	1.00	0.98	0.95	1.18	1.10	1.28	1.04	1.08	0.70	1.47	0.84	3.33	1.41	0.00	0.00	0.00	0.00
30	1.31	1.08	0.88	0.76	1.04	0.93	1.15	1.02	1.36	1.11	1.57	1.15	1.92	1.28	2.33	1.18	1.05	0.57	1.94	1.07
35	1.34	1.20	1.05	0.90	1.20	1.00	0.77	0.63	1.20	0.99	1.07	0.88	0.98	0.78	2.22	1.42	1.42	0.95	1.61	1.02
40	1.05	1.02	0.83	0.71	1.69	1.34	1.38	1.06	0.51	0.40	1.13	0.95	1.67	1.44	1.61	1.25	1.45	1.16	0.82	0.61
45	0.83	0.85	1.16	1.00	1.30	0.97	1.66	1.18	1.26	0.93	2.04	1.50	0.67	0.50	0.32	0.24	1.50	1.13	1.72	1.22
50	1.15	1.21	0.73	0.62	1.46	1.02	2.28	1.46	0.00	0.00	0.00	0.00	2.50	1.43	3.08	1.77	6.67	4.12	0.00	0.00
55	0.92	0.96	1.20	1.01	0.60	0.38	0.69	0.37	12.50	7.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.69	0.66	0.71	0.57	3.45	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	4.17	3.51	1.82	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<Total>	1.26	1.02	1.05	0.92	1.10	0.98	1.18	1.01	1.24	1.00	1.40	1.06	1.53	1.11	1.89	1.16	1.53	1.00	1.52	0.98



Section VI: Supporting Tables, Subsection 6 - Termination

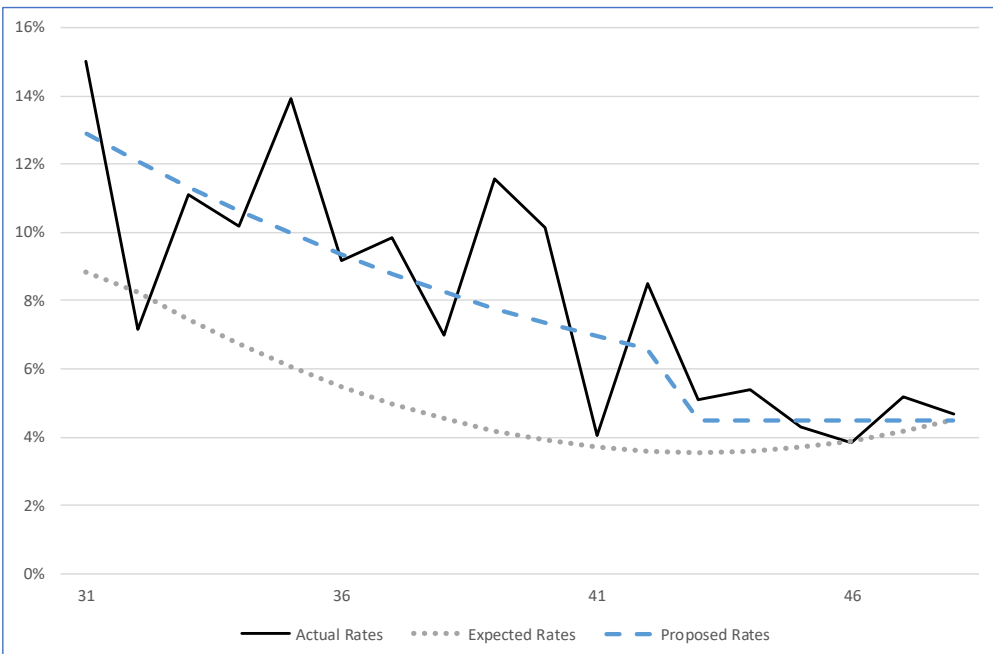
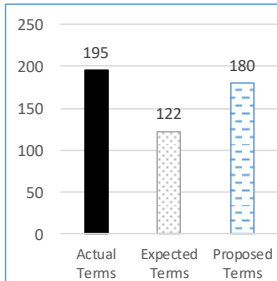
Termination Rates - <10 Years of Service VaLORS Females

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service VaLORS Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

SPORS TERMINATIONS					
YEARS OF SERVICE	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
0	16	25.45	0.63	20.88	0.77
1	11	10.17	1.08	12.84	0.86
2	12	11.50	1.04	14.52	0.83
3	17	14.62	1.16	18.48	0.92
4	21	15.44	1.36	19.50	1.08
5	20	17.34	1.15	21.90	0.91
6	21	14.05	1.49	17.76	1.18
7	6	6.36	0.94	6.36	0.94
8	6	5.64	1.06	5.64	1.06
9	8	4.74	1.69	4.74	1.69
10 or more	65	55.23	1.18	55.28	1.18
<Total>	203	180.54	1.12	197.90	1.03

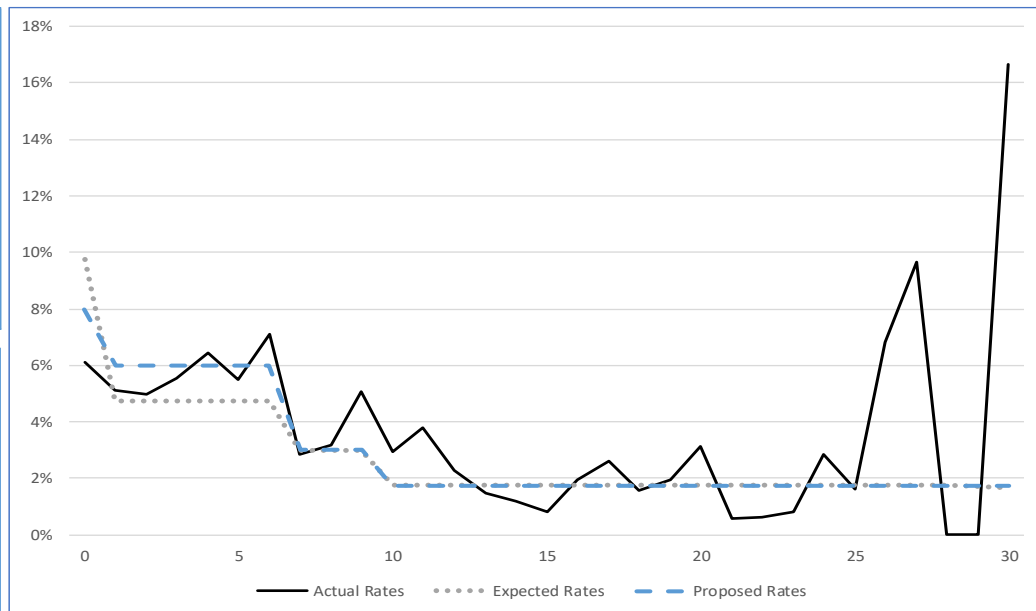
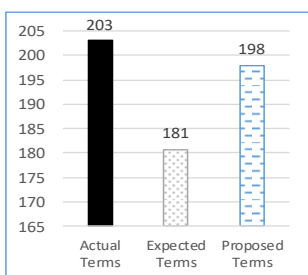
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Termination Rates SPORS Males and Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

CENTRAL AGE OF GROUP	TOP 10 NON HAZARDOUS DUTY MALE TERMINATIONS									
	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	95	69.66	1.36	93.05	1.02	0	0.00	0.00	0.00	0.00
25	590	417.39	1.41	568.12	1.04	0	0.00	0.00	0.00	0.00
30	753	544.03	1.38	745.43	1.01	16	8.99	1.78	16.34	0.98
35	507	415.28	1.22	532.68	0.95	81	44.46	1.82	79.78	1.02
40	326	285.22	1.14	329.19	0.99	133	72.17	1.84	111.70	1.19
45	272	233.71	1.16	250.86	1.08	140	91.71	1.53	115.86	1.21
50	218	211.75	1.03	220.03	0.99	57	45.99	1.24	49.34	1.16
55	158	165.51	0.95	175.36	0.90	10	2.52	3.97	2.99	3.34
60	122	100.60	1.21	112.52	1.08	3	1.35	2.22	1.89	1.59
65	42	31.51	1.33	38.98	1.08	0	0.00	0.00	0.00	0.00
70	18	9.71	1.85	18.86	0.95	0	0.00	0.00	0.00	0.00
<Total>	3,101	2,484.37	1.25	3,085.08	1.01	440	267.19	1.65	377.89	1.16

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

TOP 10 NON HAZARDOUS DUTY MALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	60	43	21	18	14	6	0	2	0	0	0	0	0	0	0	0	0	0	0	0
25	207	162	148	108	104	68	69	42	37	22	17	10	5	4	2	1	1	0	0	0
30	159	137	142	108	92	86	101	71	85	54	69	38	41	22	30	13	22	9	12	6
35	97	91	80	76	63	60	53	49	53	38	40	30	30	22	23	17	33	18	35	15
40	78	71	48	54	46	41	37	30	30	22	25	19	13	14	18	12	14	12	17	11
45	61	53	48	41	38	33	38	27	17	19	25	16	18	14	10	12	11	11	6	9
50	50	50	35	40	22	28	30	22	16	18	21	15	13	11	7	10	8	10	16	8
55	49	42	29	33	26	22	13	17	9	14	3	11	8	10	9	8	5	5	7	3
60	32	30	30	22	21	14	10	13	10	9	7	4	4	3	3	2	3	1	2	1
65	8	12	10	7	11	5	9	4	4	2	0	0	0	0	0	0	0	0	0	0
70	4	4	6	2	4	1	3	1	0	1	0	0	0	0	1	0	0	0	0	0
<Total>	805	695	597	511	441	363	363	277	261	200	207	144	132	100	103	74	97	66	95	53

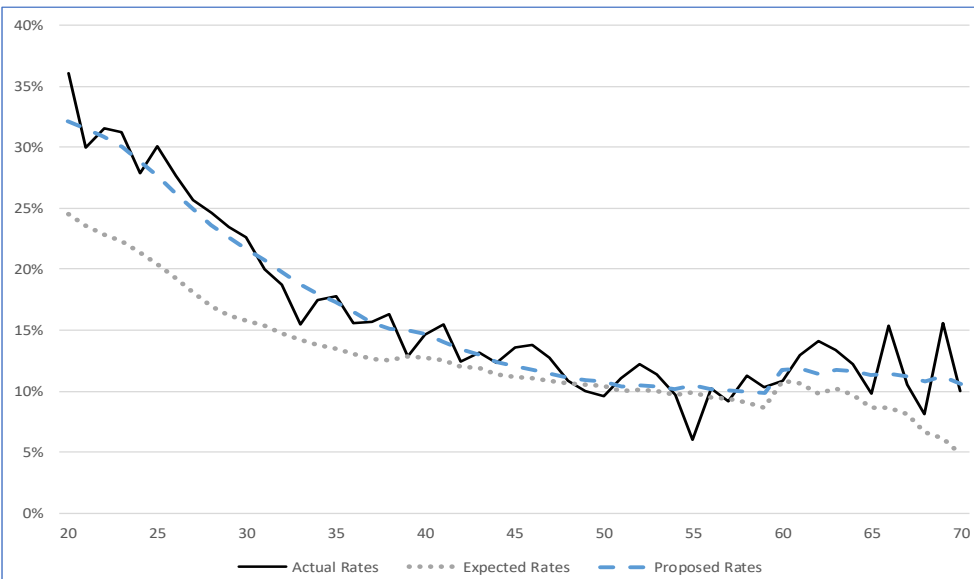
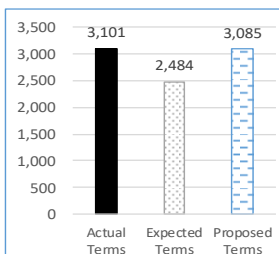
TOP 10 NON HAZARDOUS DUTY MALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	60	56	21	26	14	9	0	3	0	0	0	0	0	0	0	0	0	0	0	0
25	207	201	148	144	104	95	69	62	37	36	17	19	5	8	2	3	1	1	0	0
30	159	161	142	134	92	111	101	97	85	80	69	62	41	41	30	26	22	20	12	13
35	97	102	80	88	63	72	53	61	53	51	40	43	30	35	23	27	33	29	35	26
40	78	76	48	59	46	45	37	34	30	27	25	24	13	18	18	15	14	16	17	15
45	61	56	48	43	38	35	38	29	17	21	25	18	18	15	10	13	11	11	6	10
50	50	53	35	42	22	28	30	23	16	19	21	16	13	11	7	10	8	10	16	9
55	49	43	29	35	26	24	13	18	9	14	3	11	8	10	9	8	5	7	7	4
60	32	30	30	26	21	18	10	14	10	9	7	5	4	4	3	3	3	2	2	2
65	8	12	10	10	11	8	9	6	4	3	0	0	0	0	0	0	0	0	0	0
70	4	4	6	4	4	5	3	5	0	2	0	0	0	0	1	0	0	0	0	0
<Total>	805	793	597	610	441	450	363	352	261	261	207	197	132	141	103	105	97	96	95	80

TOP 10 NON HAZARDOUS DUTY MALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	1.38	1.08	1.14	0.82	2.28	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	1.28	1.03	1.37	1.03	1.54	1.09	1.65	1.11	1.66	1.04	1.63	0.91	1.36	0.64	1.54	0.62	3.03	1.19	0.00	0.00
30	1.16	0.99	1.31	1.06	1.08	0.83	1.43	1.04	1.56	1.06	1.81	1.11	1.87	1.01	2.36	1.14	2.32	1.09	2.01	0.91
35	1.07	0.95	1.05	0.91	1.04	0.87	1.09	0.87	1.40	1.05	1.35	0.93	1.33	0.86	1.39	0.86	1.86	1.13	2.30	1.35
40	1.10	1.02	0.88	0.81	1.13	1.02	1.25	1.09	1.34	1.09	1.33	1.05	0.93	0.73	1.55	1.21	1.15	0.90	1.52	1.13
45	1.15	1.09	1.18	1.13	1.16	1.10	1.41	1.31	0.90	0.79	1.52	1.37	1.31	1.20	0.85	0.80	1.03	0.98	0.67	0.59
50	1.00	0.95	0.87	0.84	0.80	0.77	1.37	1.32	0.90	0.86	1.37	1.35	1.14	1.15	0.70	0.70	0.83	0.80	2.00	1.74
55	1.17	1.13	0.88	0.82	1.16	1.07	0.75	0.72	0.63	0.66	0.28	0.28	0.84	0.82	1.20	1.07	0.93	0.70	2.32	1.59
60	1.07	1.06	1.36	1.18	1.47	1.19	0.78	0.69	1.06	1.09	1.57	1.50	1.19	1.04	1.33	0.95	2.61	1.29	2.50	1.24
65	0.65	0.68	1.35	1.01	2.22	1.38	2.01	1.44	1.68	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.93	1.05	2.76	1.47	3.05	0.89	2.22	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<Total>	1.16	1.01	1.17	0.98	1.21	0.98	1.31	1.03	1.30	1.00	1.44	1.05	1.32	0.94	1.40	0.98	1.46	1.01	1.79	1.19



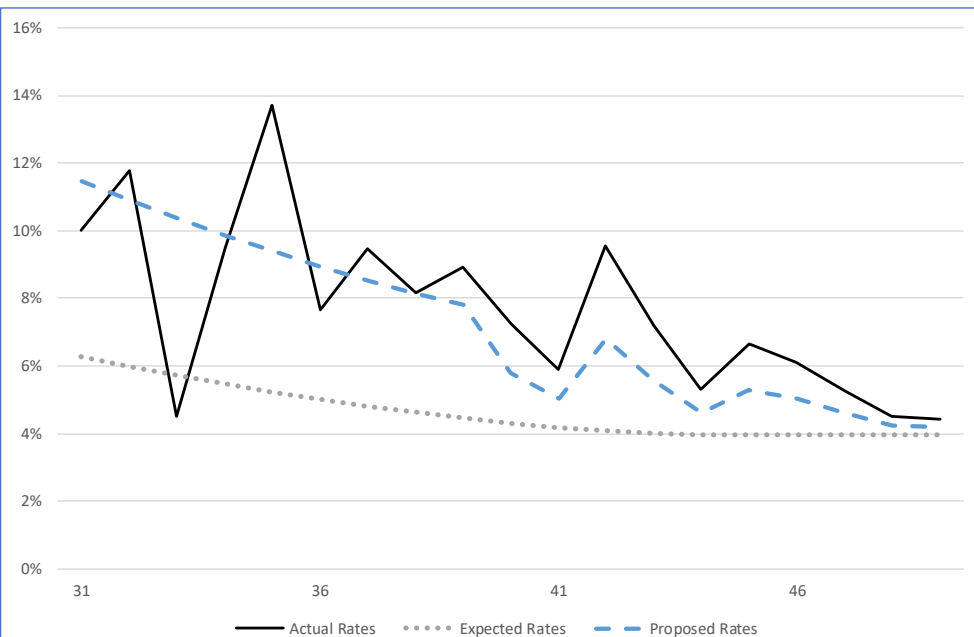
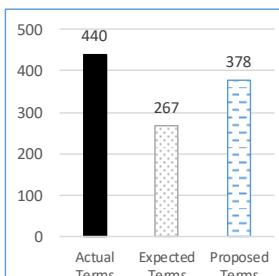
Termination Rates - <10 Years of Service Top 10 Non Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service Top 10 Non Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

CENTRAL AGE OF GROUP	TOP 10 NON HAZARDOUS DUTY FEMALE TERMINATIONS									
	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	41	31.31	1.31	39.35	1.04	0	0.00	0.00	0.00	0.00
25	563	453.06	1.24	532.62	1.06	0	0.00	0.00	0.00	0.00
30	915	847.73	1.08	931.51	0.98	5	8.32	0.60	8.97	0.56
35	698	681.94	1.02	719.22	0.97	90	70.54	1.28	82.36	1.09
40	477	468.25	1.02	477.15	1.00	133	91.23	1.46	132.57	1.00
45	406	366.47	1.11	374.09	1.09	149	114.05	1.31	154.02	0.97
50	315	310.37	1.01	326.35	0.97	81	60.96	1.33	78.38	1.03
55	239	224.34	1.07	243.83	0.98	8	4.95	1.62	7.67	1.04
60	114	105.87	1.08	117.60	0.97	1	1.76	0.57	3.32	0.30
65	39	31.38	1.24	35.36	1.10	1	0.00	0.00	0.00	0.00
70	9	8.57	1.05	9.43	0.95	0	0.00	0.00	0.00	0.00
<Total>	3,816	3,529.29	1.08	3,806.51	1.00	468	351.81	1.33	467.29	1.00

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

TOP 10 NON HAZARDOUS DUTY FEMALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	65	51	17	16	7	4	2	2	1	0	0	0	0	0	0	0	0	0	0	0
25	257	213	163	148	114	95	76	55	36	29	16	13	5	5	1	1	1	1	0	0
30	218	198	148	157	138	127	110	109	95	85	83	72	61	46	41	27	27	18	17	14
35	129	138	108	112	86	91	64	75	53	59	52	45	37	34	28	28	31	26	31	21
40	109	107	72	78	54	62	50	49	33	39	30	29	37	23	18	17	25	20	23	17
45	116	96	61	65	34	48	45	40	32	30	33	26	18	17	24	15	17	13	24	13
50	73	69	43	52	45	38	30	31	25	27	21	23	25	18	14	13	11	13	7	9
55	51	55	29	35	24	23	21	21	29	18	18	14	14	12	12	12	12	9	9	6
60	35	27	18	18	20	13	10	11	6	6	4	2	1	2	0	2	0	1	2	1
65	7	8	6	6	5	4	3	3	7	2	0	0	0	0	0	0	2	0	0	0
70	2	2	0	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
<Total>	1,062	963	665	689	528	507	412	397	317	297	257	224	198	158	138	114	126	100	113	81

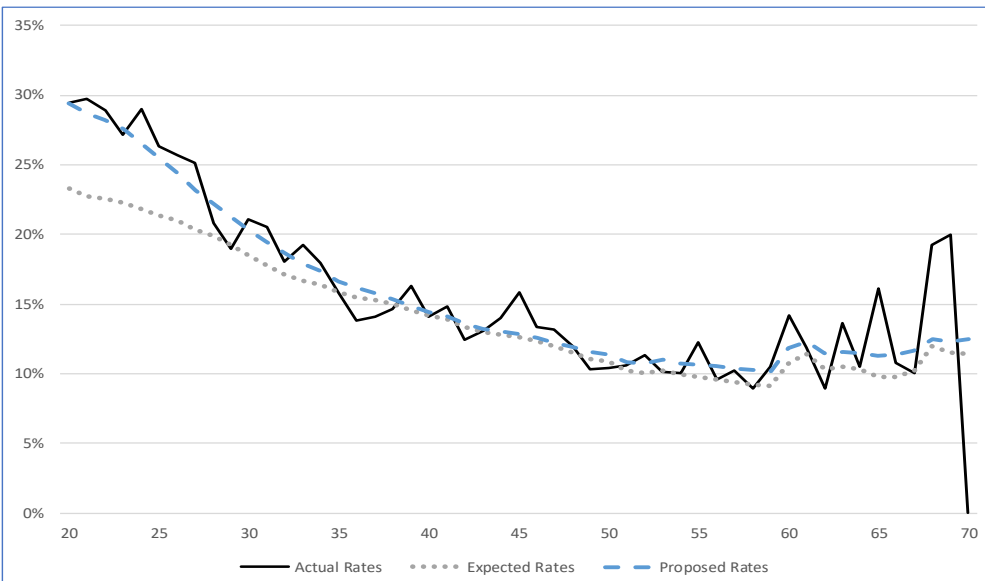
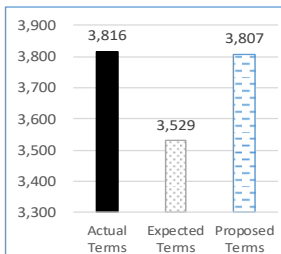
TOP 10 NON HAZARDOUS DUTY FEMALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	65	28	17	8	7	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0
25	257	233	163	143	114	79	76	46	36	20	16	8	5	2	1	1	1	1	0	0
30	218	224	148	175	138	143	110	115	95	91	83	75	61	49	41	27	27	20	17	11
35	129	149	108	120	86	97	64	80	53	64	52	54	37	46	28	41	31	35	31	32
40	109	110	72	84	54	60	50	50	33	40	30	33	37	28	18	24	25	27	23	22
45	116	98	61	61	34	46	45	36	32	31	33	27	18	21	24	19	17	18	24	16
50	73	74	43	56	45	40	30	33	25	28	21	27	25	22	14	17	11	17	7	13
55	51	62	29	40	24	29	21	24	29	21	18	18	14	15	12	15	12	12	9	8
60	35	31	18	23	20	18	10	16	6	9	4	6	1	5	0	4	0	4	2	3
65	7	9	6	9	5	7	3	6	7	4	0	0	0	0	0	0	2	0	0	0
70	2	3	0	2	1	2	1	2	0	1	0	0	0	0	0	0	0	0	0	0
<Total>	1,062	1,022	665	724	528	525	412	408	317	308	257	247	198	187	138	146	126	134	113	104

TOP 10 NON HAZARDOUS DUTY FEMALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	1.29	2.30	1.05	2.02	1.57	2.66	1.12	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	1.20	1.11	1.10	1.14	1.20	1.44	1.38	1.66	1.23	1.79	1.25	2.06	0.95	2.37	0.69	1.24	1.64	1.82	0.00	0.00
30	1.10	0.97	0.95	0.84	1.09	0.96	1.00	0.95	1.11	1.04	1.15	1.10	1.31	1.25	1.52	1.51	1.52	1.33	1.23	1.52
35	0.93	0.86	0.96	0.90	0.94	0.88	0.85	0.80	0.89	0.82	1.15	0.96	1.10	0.80	1.01	0.69	1.20	0.89	1.46	0.97
40	1.02	0.99	0.92	0.85	0.87	0.90	1.02	1.01	0.85	0.82	1.05	0.92	1.61	1.34	1.08	0.76	1.26	0.92	1.38	1.07
45	1.21	1.18	0.94	0.99	0.71	0.73	1.12	1.23	1.07	1.05	1.26	1.22	1.05	0.87	1.65	1.27	1.32	0.95	1.87	1.46
50	1.06	0.98	0.82	0.76	1.19	1.14	0.98	0.91	0.91	0.88	0.93	0.77	1.38	1.15	1.07	0.85	0.85	0.64	0.77	0.56
55	0.93	0.82	0.82	0.73	1.03	0.83	0.99	0.86	1.64	1.40	1.27	1.03	1.20	0.91	1.02	0.82	1.34	0.97	1.55	1.15
60	1.28	1.14	0.99	0.78	1.58	1.10	0.90	0.64	0.96	0.70	1.77	0.69	0.46	0.20	0.00	0.00	0.00	0.00	1.57	0.69
65	0.84	0.76	1.04	0.68	1.14	0.69	0.88	0.47	3.74	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	1.05	0.68	0.00	0.00	1.04	0.53	1.79	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<Total>	1.10	1.04	0.97	0.92	1.04	1.01	1.04	1.01	1.07	1.03	1.15	1.04	1.26	1.06	1.21	0.94	1.26	0.94	1.39	1.08



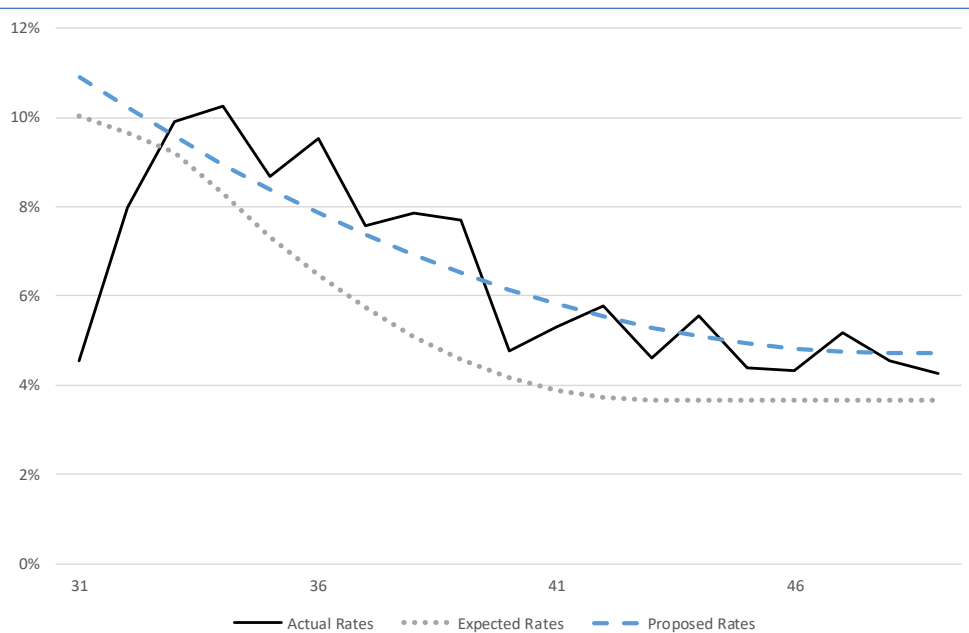
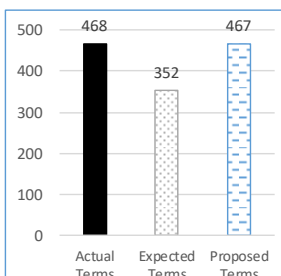
Termination Rates - <10 Years of Service Top 10 Non Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service Top 10 Non Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

TOP 10 HAZARDOUS DUTY TERMINATIONS										
YEARS OF SERVICE	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
0	96	182.50	0.53	100.38	0.96	35	71.40	0.49	33.32	1.05
1	74	159.37	0.46	75.00	0.99	29	38.70	0.75	30.10	0.96
2	75	130.88	0.57	65.44	1.15	22	30.78	0.71	23.94	0.92
3	48	107.70	0.45	57.44	0.84	15	25.29	0.59	14.05	1.07
4	54	70.29	0.77	51.12	1.06	13	22.14	0.59	12.30	1.06
5	34	57.00	0.60	34.20	0.99	10	17.37	0.58	9.65	1.04
6	21	49.31	0.43	25.95	0.81	5	15.93	0.31	5.31	0.94
7	25	44.60	0.56	24.78	1.01	3	9.66	0.31	4.83	0.62
8	24	40.24	0.60	25.15	0.95	6	6.09	0.99	6.09	0.99
9	16	31.38	0.51	15.69	1.02	2	3.44	0.58	2.58	0.78
10 or more	109	215.75	0.51	105.23	1.04	23	35.30	0.65	26.48	0.87
<Total>	576	1,089.02	0.53	580.37	0.99	163.00	276.10	0.59	168.65	0.97

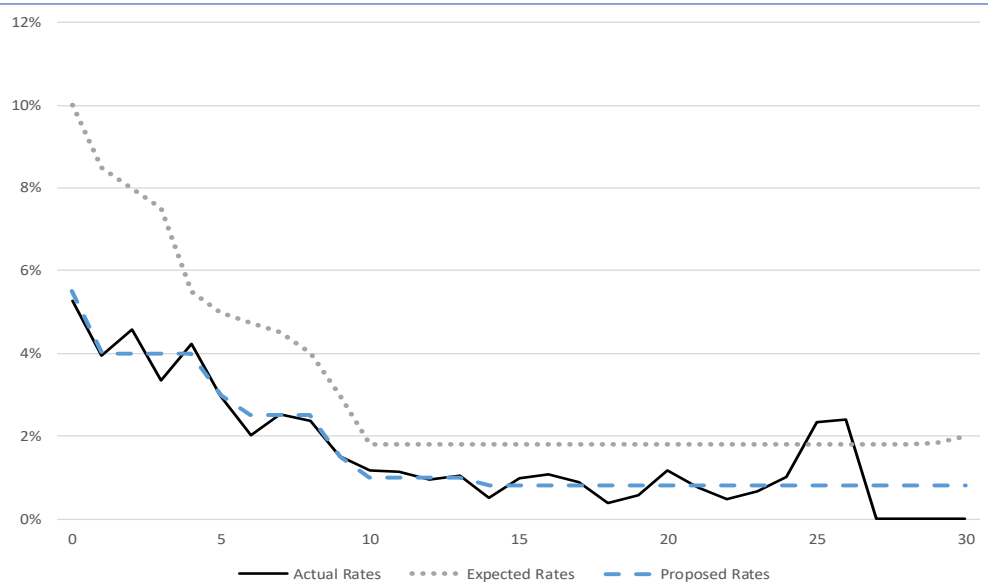
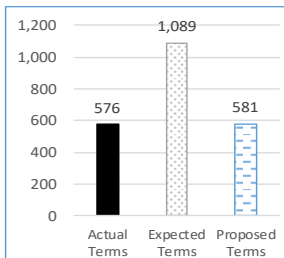
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

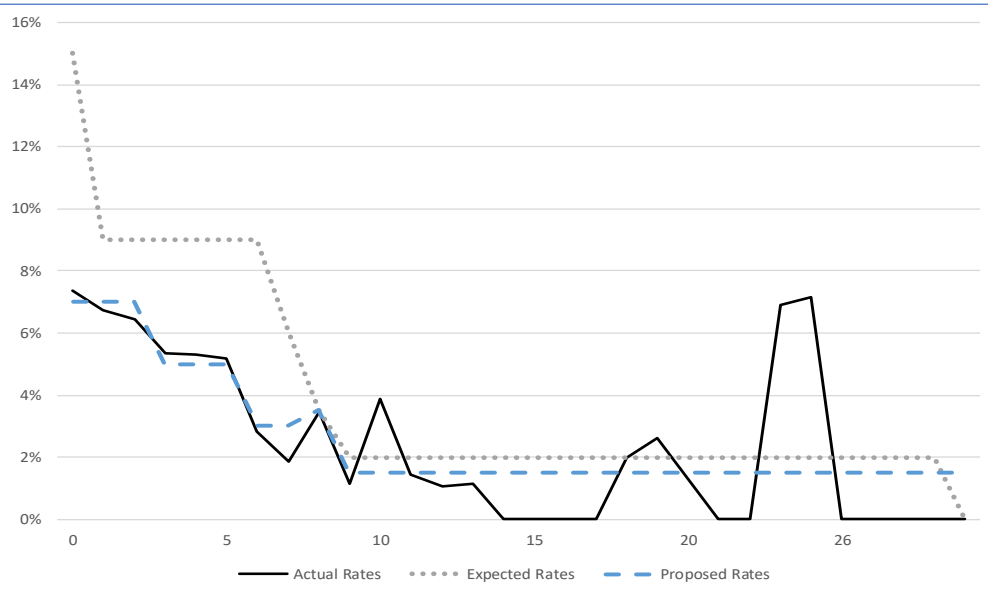
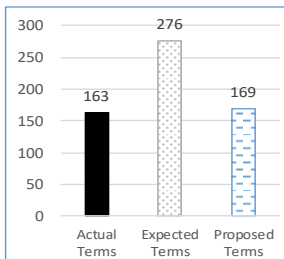
Termination Rates Top 10 Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates Top 10 Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

CENTRAL AGE OF GROUP	NON TOP 10 NON HAZARDOUS DUTY MALE TERMINATIONS									
	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	615	460.29	1.34	633.11	0.97	0	0.00	0.00	0.00	0.00
25	2,104	1,507.16	1.40	2,099.32	1.00	0	0.00	0.00	0.00	0.00
30	2,110	1,438.05	1.47	2,060.91	1.02	79	52.41	1.51	79.56	0.99
35	1,352	1,009.43	1.34	1,397.92	0.97	290	163.62	1.77	275.08	1.05
40	991	748.10	1.32	977.99	1.01	361	186.35	1.94	348.90	1.03
45	874	707.98	1.23	870.99	1.00	437	260.84	1.68	448.97	0.97
50	770	673.40	1.14	774.30	0.99	202	138.64	1.46	237.59	0.85
55	752	681.44	1.10	744.25	1.01	49	12.90	3.80	26.71	1.83
60	488	475.12	1.03	509.65	0.96	18	5.04	3.57	12.34	1.46
65	259	217.68	1.19	238.63	1.09	1	0.00	0.00	0.00	0.00
70	159	129.62	1.23	160.70	0.99	6	0.00	0.00	0.00	0.00
<Total>	10,474	8,048.27	1.30	10,467.77	1.00	1,443	819.80	1.76	1,429.15	1.01

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

Table: NON TOP 10 NON HAZARDOUS DUTY MALE TERMINATIONS-ACTUAL VERSUS EXPECTED. Columns: CENTRAL AGE OF GROUP, 0-9 Years of Service (Act, Exp). Rows: 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, <Total>

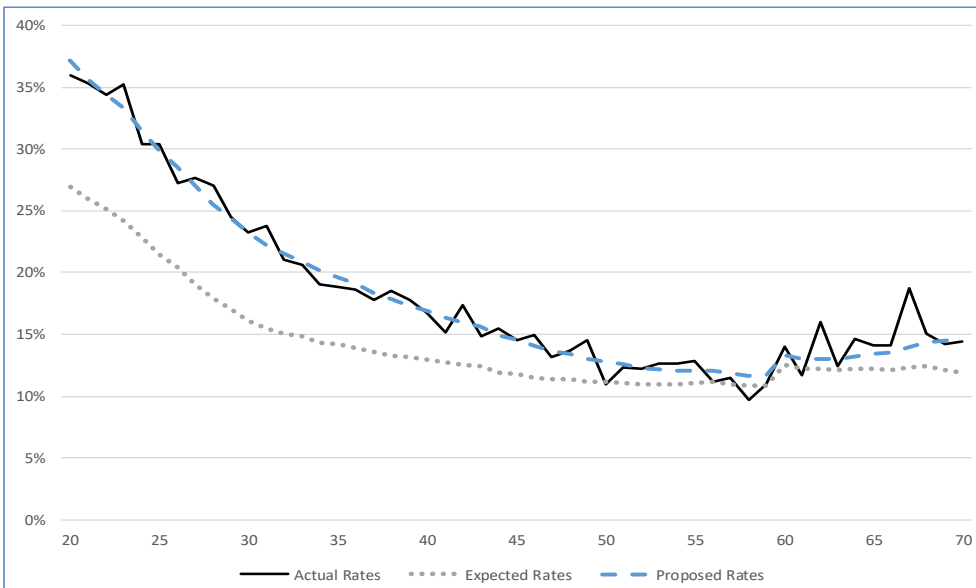
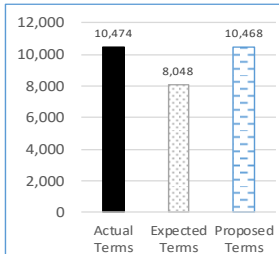
Table: NON TOP 10 NON HAZARDOUS DUTY MALE TERMINATIONS-ACTUAL VERSUS PROPOSED. Columns: CENTRAL AGE OF GROUP, 0-9 Years of Service (Act, Prop). Rows: 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, <Total>

Table: NON TOP 10 NON HAZARDOUS DUTY MALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED. Columns: CENTRAL AGE OF GROUP, 0-9 Years of Service (Act to Exp, Act to Prop). Rows: 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, <Total>



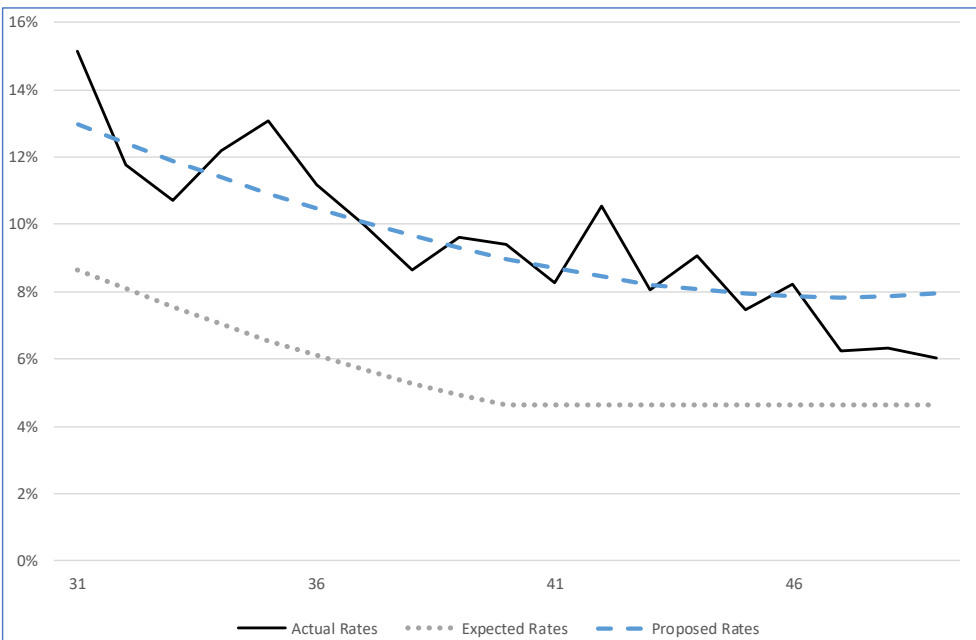
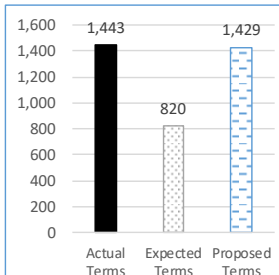
Termination Rates - <10 Years of Service Non Top 10 Non Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service Non Top 10 Non Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

CENTRAL AGE OF GROUP	NON TOP 10 NON HAZARDOUS DUTY FEMALE TERMINATIONS									
	0-9 YEARS OF SERVICE					10+ YEARS OF SERVICE				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
20	325	274.65	1.18	328.39	0.99	0	0.00	0.00	0.00	0.00
25	2,219	1,861.53	1.19	2,206.96	1.01	0	0.00	0.00	0.00	0.00
30	2,600	2,192.54	1.19	2,576.75	1.01	29	32.01	0.91	38.68	0.75
35	2,019	1,782.70	1.13	2,053.20	0.98	239	185.40	1.29	235.17	1.02
40	1,709	1,510.36	1.13	1,694.25	1.01	404	258.97	1.56	368.56	1.10
45	1,613	1,397.87	1.15	1,547.92	1.04	503	390.87	1.29	540.73	0.93
50	1,395	1,277.49	1.09	1,394.01	1.00	306	227.57	1.34	343.51	0.89
55	1,092	1,075.42	1.02	1,155.23	0.95	85	27.67	3.07	48.30	1.76
60	671	611.56	1.10	657.06	1.02	36	9.26	3.89	14.93	2.41
65	199	170.64	1.17	188.45	1.06	6	0.00	0.00	0.00	0.00
70	92	75.53	1.22	91.63	1.00	2	0.00	0.00	0.00	0.00
<Total>	13,934	12,230.29	1.14	13,893.86	1.00	1,610	1,131.75	1.42	1,589.90	1.01

- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

Year by Year Experience for 0-9 Years of Service

NON TOP 10 NON HAZARDOUS DUTY FEMALE TERMINATIONS-ACTUAL VERSUS EXPECTED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp	Act	Exp
20	231	193	68	61	24	17	2	3	0	0	0	0	0	0	0	0	0	0	0	0
25	890	758	666	547	359	303	158	145	81	69	42	28	17	9	5	2	1	1	0	0
30	637	541	540	477	396	360	312	270	240	196	166	135	123	91	87	58	64	38	35	25
35	482	412	362	342	281	262	182	190	179	156	146	123	107	94	100	77	100	69	80	57
40	387	341	340	296	229	219	173	170	154	134	127	105	104	78	56	61	68	58	71	48
45	364	305	286	259	220	193	169	151	143	124	110	103	81	81	71	65	80	62	89	55
50	292	262	253	236	183	170	147	128	112	107	104	91	84	82	84	76	68	70	68	56
55	219	208	178	191	143	141	117	117	101	98	95	83	71	73	68	67	55	60	45	37
60	146	128	159	131	102	106	95	86	56	54	41	27	30	27	16	22	15	18	11	13
65	33	38	52	44	52	39	35	33	19	18	2	0	2	0	3	0	0	0	1	0
70	28	17	17	20	13	16	23	16	10	7	0	0	0	0	1	0	0	0	0	0
<Total>	3,709	3,203	2,921	2,604	2,002	1,826	1,413	1,308	1,095	964	833	695	619	535	491	428	451	376	400	291

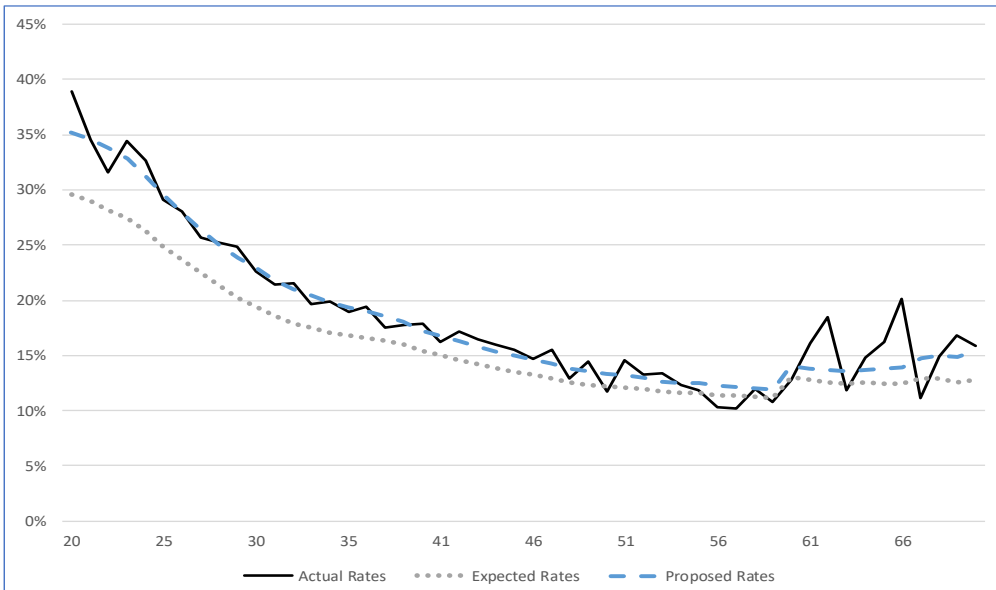
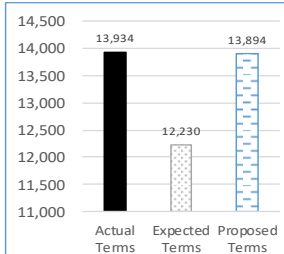
NON TOP 10 NON HAZARDOUS DUTY FEMALE TERMINATIONS-ACTUAL VERSUS PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop	Act	Prop
20	231	230	68	74	24	21	2	4	0	0	0	0	0	0	0	0	0	0	0	0
25	890	900	666	639	359	353	158	173	81	87	42	38	17	12	5	4	1	2	0	0
30	637	636	540	539	396	397	312	302	240	229	166	169	123	124	87	85	64	59	35	37
35	482	476	362	381	281	281	182	204	179	173	146	144	107	119	100	104	100	94	80	77
40	387	388	340	328	229	234	173	181	154	145	127	118	104	92	56	76	68	71	71	60
45	364	341	286	285	220	209	169	162	143	134	110	112	81	91	71	75	80	72	89	66
50	292	291	253	257	183	184	147	139	112	117	104	98	84	86	84	80	68	77	68	66
55	219	230	178	206	143	151	117	126	101	107	95	90	71	73	68	64	55	63	45	45
60	146	142	159	140	102	112	95	92	56	58	41	31	30	28	16	22	15	18	11	15
65	33	42	52	48	52	42	35	36	19	20	2	0	2	0	3	0	0	0	1	0
70	28	20	17	24	13	19	23	20	10	9	0	0	0	0	1	0	0	0	0	0
<Total>	3,709	3,697	2,921	2,920	2,002	2,003	1,413	1,440	1,095	1,078	833	799	619	626	491	509	451	455	400	365

NON TOP 10 NON HAZARDOUS DUTY FEMALE TERMINATIONS-RATIOS OF ACTUAL TO EXPECTED AND ACTUAL TO PROPOSED																				
YEARS OF SERVICE																				
CENTRAL AGE OF GROUP	0		1		2		3		4		5		6		7		8		9	
	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop	Act to Exp	Act to Prop
20	1.20	1.01	1.11	0.92	1.39	1.13	0.64	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	1.17	0.99	1.22	1.04	1.18	1.02	1.09	0.91	1.17	0.93	1.48	1.11	1.99	1.37	2.18	1.36	1.04	0.61	0.00	0.00
30	1.18	1.00	1.13	1.00	1.10	1.00	1.15	1.03	1.23	1.05	1.23	0.98	1.35	0.99	1.50	1.03	1.67	1.09	1.39	0.95
35	1.17	1.01	1.06	0.95	1.07	1.00	0.96	0.89	1.15	1.04	1.19	1.01	1.14	0.90	1.29	0.96	1.45	1.06	1.40	1.04
40	1.13	1.00	1.15	1.04	1.05	0.98	1.02	0.96	1.15	1.06	1.21	1.08	1.34	1.13	0.91	0.74	1.18	0.95	1.48	1.18
45	1.20	1.07	1.10	1.00	1.14	1.05	1.12	1.04	1.15	1.07	1.07	0.98	1.00	0.89	1.10	0.95	1.29	1.11	1.62	1.35
50	1.11	1.00	1.07	0.98	1.08	1.00	1.15	1.06	1.05	0.96	1.14	1.07	1.02	0.98	1.10	1.05	0.97	0.89	1.22	1.03
55	1.05	0.95	0.93	0.87	1.01	0.94	1.00	0.93	1.03	0.95	1.15	1.06	0.97	0.97	1.02	1.06	0.91	0.88	1.21	1.01
60	1.14	1.02	1.22	1.14	0.96	0.91	1.11	1.03	1.04	0.97	1.50	1.34	1.11	1.08	0.73	0.74	0.84	0.82	0.86	0.75
65	0.88	0.78	1.18	1.09	1.34	1.24	1.07	0.96	1.08	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	1.68	1.41	0.84	0.72	0.81	0.67	1.47	1.15	1.45	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<Total>	1.16	1.00	1.12	1.00	1.10	1.00	1.08	0.98	1.14	1.02	1.20	1.04	1.16	0.99	1.15	0.97	1.20	0.99	1.37	1.09



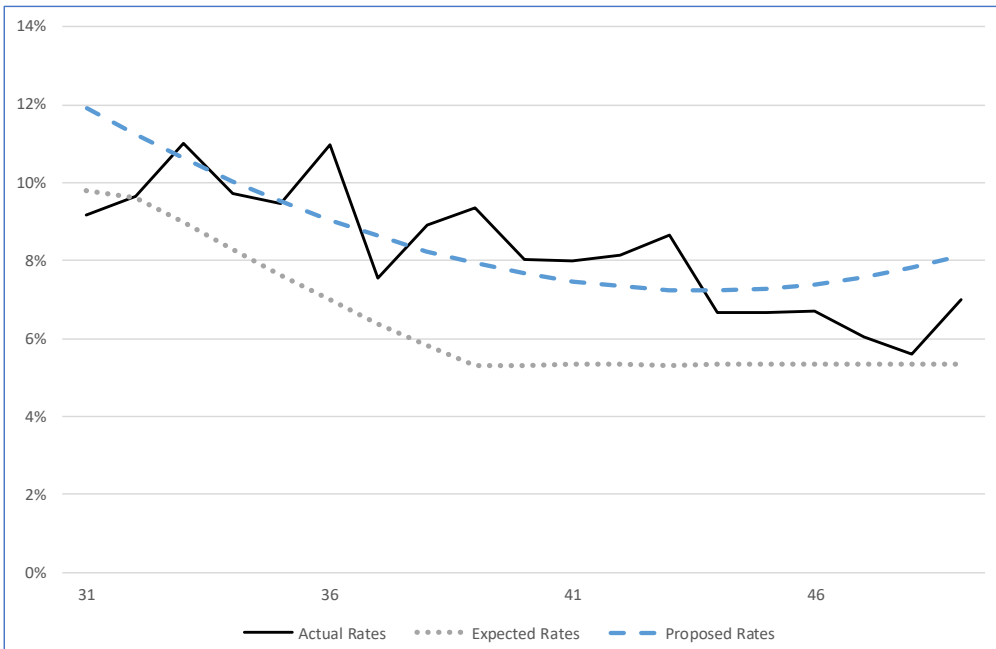
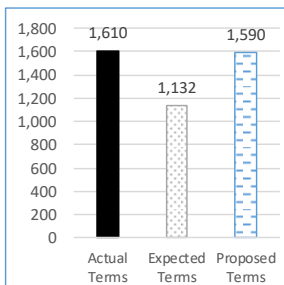
Termination Rates - <10 Years of Service Non Top 10 Non Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates - 10 + Years of Service Non Top 10 Non Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 6 - Termination

NON TOP 10 HAZARDOUS DUTY TERMINATIONS										
YEARS OF SERVICE	MALES					FEMALES				
	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
0	343	503.77	0.68	350.02	0.98	195	185.20	1.05	197.40	0.99
1	309	405.52	0.76	326.04	0.95	120	126.38	0.95	122.85	0.98
2	258	324.15	0.80	251.37	1.03	61	82.33	0.74	63.70	0.96
3	196	262.63	0.75	201.03	0.98	43	59.35	0.72	44.46	0.97
4	146	206.52	0.71	153.98	0.95	30	45.35	0.66	30.38	0.99
5	110	164.97	0.67	116.35	0.95	28	34.24	0.82	24.99	1.12
6	99	131.73	0.75	102.90	0.96	20	25.24	0.79	20.30	0.99
7	54	103.32	0.52	55.68	0.97	12	19.44	0.62	18.06	0.66
8	72	91.14	0.79	56.52	1.27	17	16.67	1.02	17.85	0.95
9	53	73.72	0.72	54.64	0.97	13	13.99	0.93	15.00	0.87
10 or more	316	490.46	0.64	316.88	1.00	70	95.98	0.73	70.32	1.00
<Total>	1,956	2,757.93	0.71	1,985.39	0.99	609	704.17	0.86	625.31	0.97

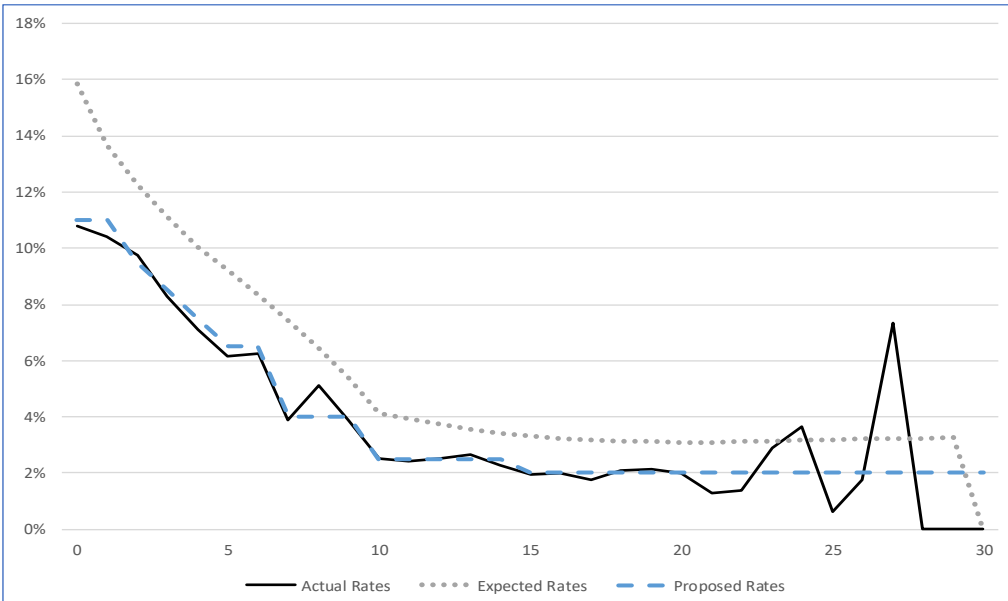
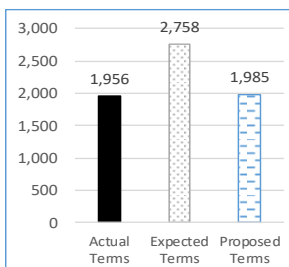
- All numbers in this table are for the four years studied combined
- The amounts in the actual, expected, proposed columns are the number of people terminated



Section VI: Supporting Tables, Subsection 6 - Termination

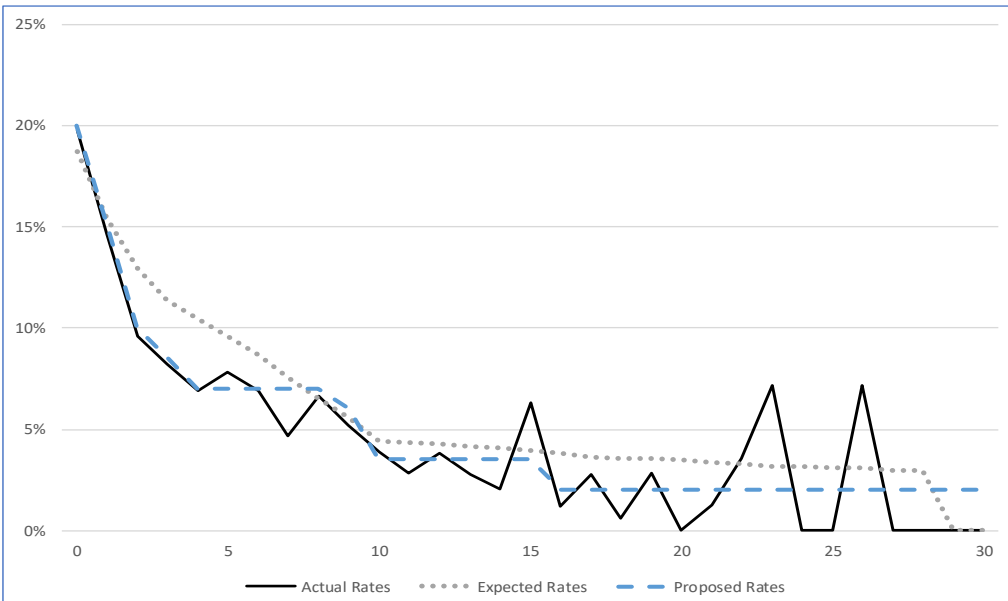
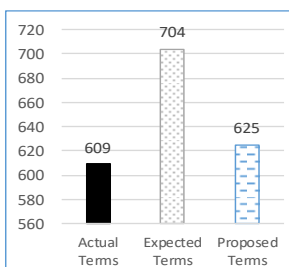
Termination Rates Non Top 10 Hazardous Duty Males

Comment: Rates adjusted to be closer to experience since the last experience review.



Termination Rates Non Top 10 Hazardous Duty Females

Comment: Rates adjusted to be closer to experience since the last experience review.





Section VI: Supporting Tables, Subsection 7 – Disability Incidence

CENTRAL AGE OF GROUP	STATE DISABILITIES					
	MALES			FEMALES		
	Actual	Expected/Proposed	Ratio of actual to expected/proposed	Actual	Expected/Proposed	Ratio of actual to expected/proposed
20	1	0.59	1.70	1	0.59	1.70
25	4	8.07	0.50	8	19.67	0.41
30	13	17.64	0.74	41	61.84	0.66
35	25	29.74	0.84	88	94.93	0.93
40	45	53.19	0.85	111	126.85	0.88
45	88	100.29	0.88	166	196.27	0.85
50	141	168.06	0.84	273	319.64	0.85
55	193	233.53	0.83	373	431.27	0.86
60	238	247.78	0.96	380	390.26	0.97
65	141	144.23	0.98	173	183.21	0.94
70	40	43.44	0.92	59	55.18	1.07
<Total>	929	1,046.55	0.89	1,673	1,879.72	0.89

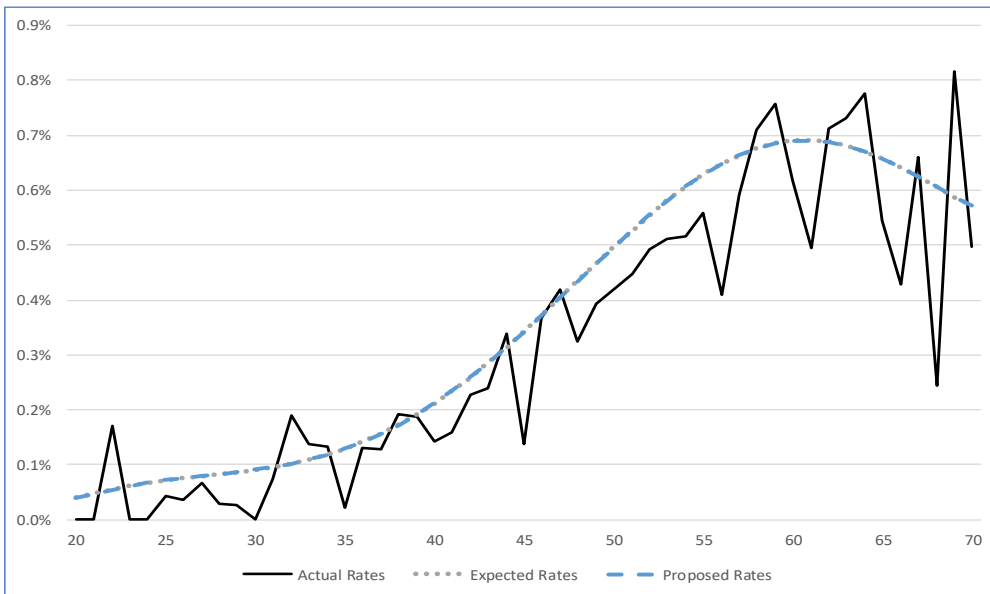
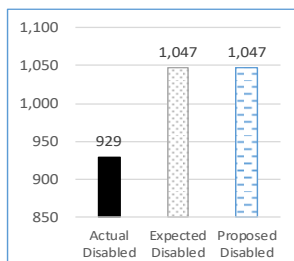
- All numbers in this table are for the four years studied as well as the four prior years
- The amounts in the actual, expected, proposed columns are the number of people disabled



Section VI: Supporting Tables, Subsection 7 – Disability Incidence

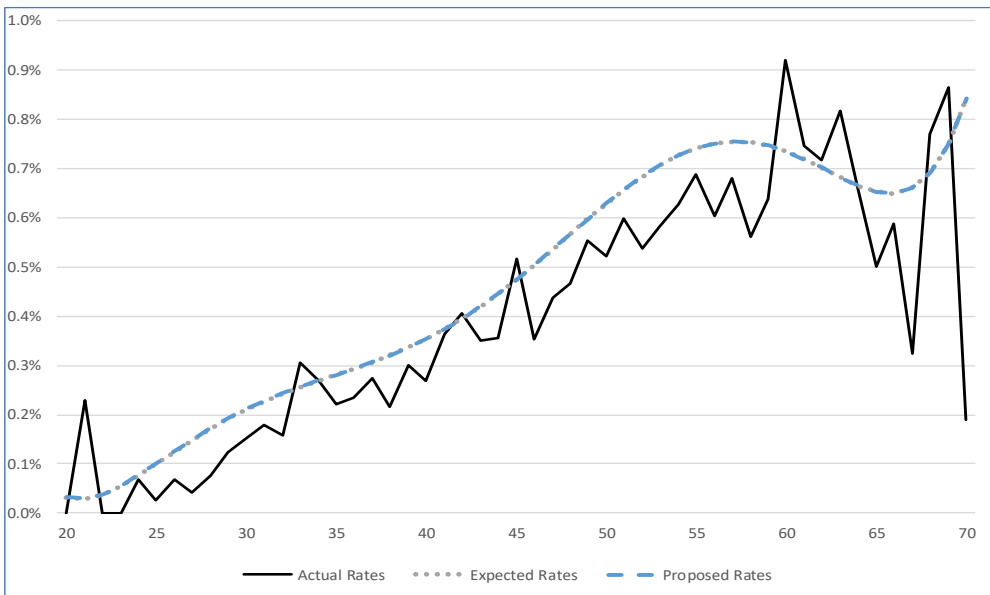
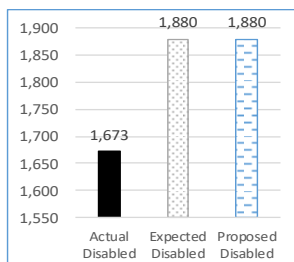
Disability Rates State Males

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.



Disability Rates State Females

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.





Section VI: Supporting Tables, Subsection 7 – Disability Incidence

CENTRAL AGE OF GROUP	TEACHERS DISABILITIES					
	MALES			FEMALES		
	Actual	Expected/Proposed	Ratio of actual to expected/proposed	Actual	Expected/Proposed	Ratio of actual to expected/proposed
20	0	0.00	0.00	0	0.00	0.00
25	1	0.21	4.78	1	2.00	0.50
30	2	1.73	1.16	9	8.90	1.01
35	5	4.26	1.17	18	22.02	0.82
40	13	10.09	1.29	50	54.96	0.91
45	25	22.84	1.09	100	107.65	0.93
50	28	41.19	0.68	175	219.74	0.80
55	47	61.84	0.76	266	331.70	0.80
60	71	72.40	0.98	308	352.21	0.87
65	29	41.76	0.69	112	177.64	0.63
70	6	10.40	0.58	19	35.64	0.53
<Total>	227	266.73	0.85	1,058	1,312.47	0.81

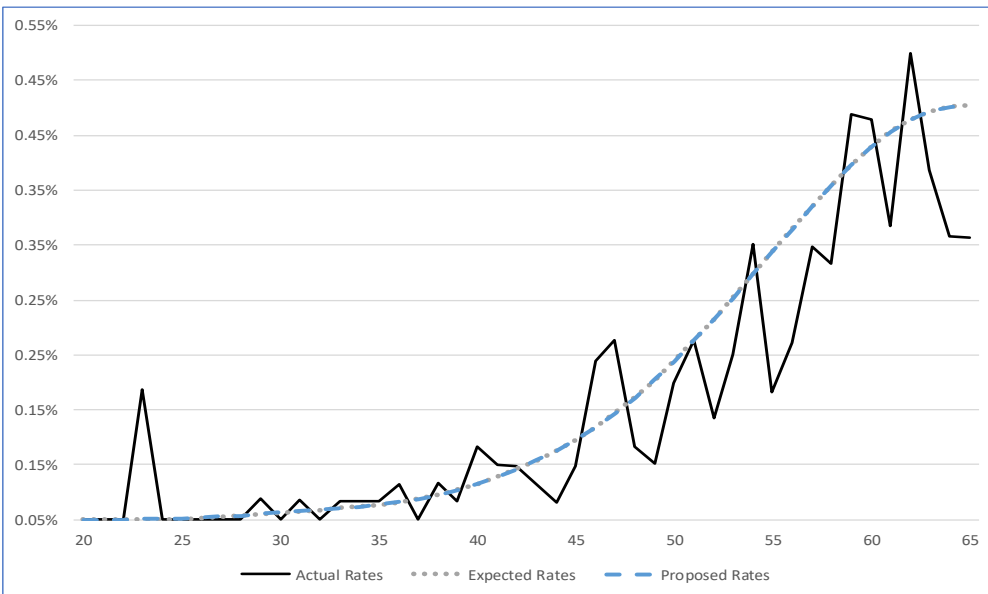
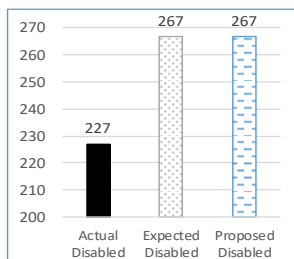
- All numbers in this table are for the four years studied as well as the four prior years
- The amounts in the actual, expected, proposed columns are the number of people disabled



Section VI: Supporting Tables, Subsection 7 – Disability Incidence

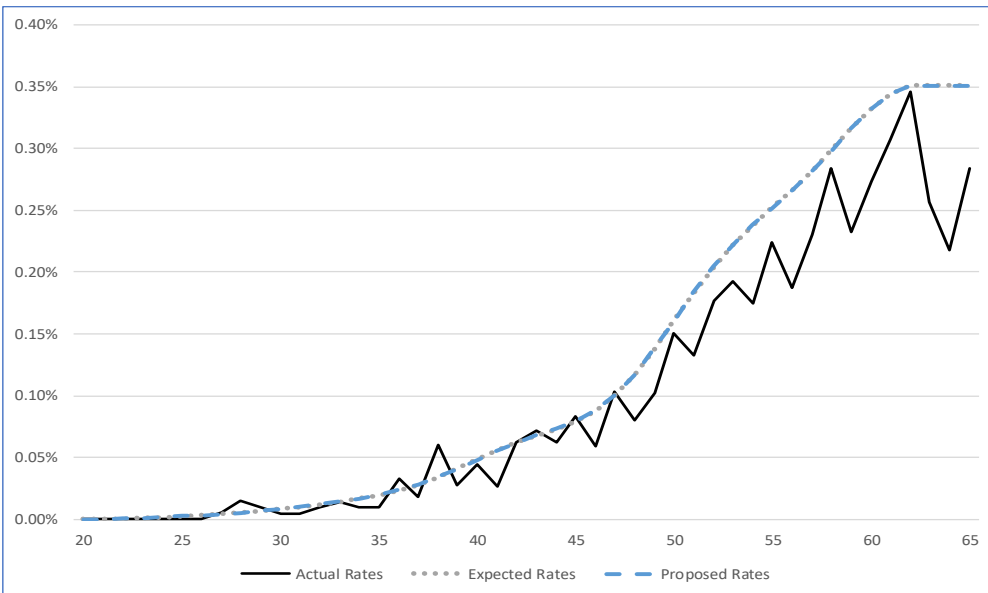
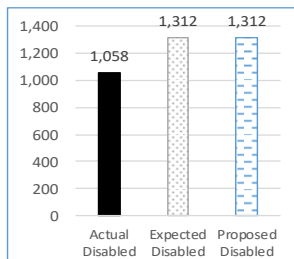
Disability Rates Teachers Males

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.



Disability Rates Teachers Females

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.





Section VI: Supporting Tables, Subsection 7 – Disability Incidence

CENTRAL AGE OF GROUP	VALORS DISABILITIES					
	MALES			FEMALES		
	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed
20	2	2.47	0.81	0	3.39	0.00
25	17	21.35	0.80	10	19.88	0.50
30	30	38.27	0.78	26	22.52	1.15
35	33	40.24	0.82	23	23.41	0.98
40	45	47.72	0.94	20	30.67	0.65
45	61	62.80	0.97	30	47.14	0.64
50	66	72.96	0.90	65	62.92	1.03
55	61	63.80	0.96	47	56.78	0.83
60	45	48.59	0.93	26	40.87	0.64
65	18	14.12	1.27	8	11.06	0.72
70	1	1.87	0.54	3	1.59	1.88
<Total>	379	414.20	0.92	258	320.23	0.81

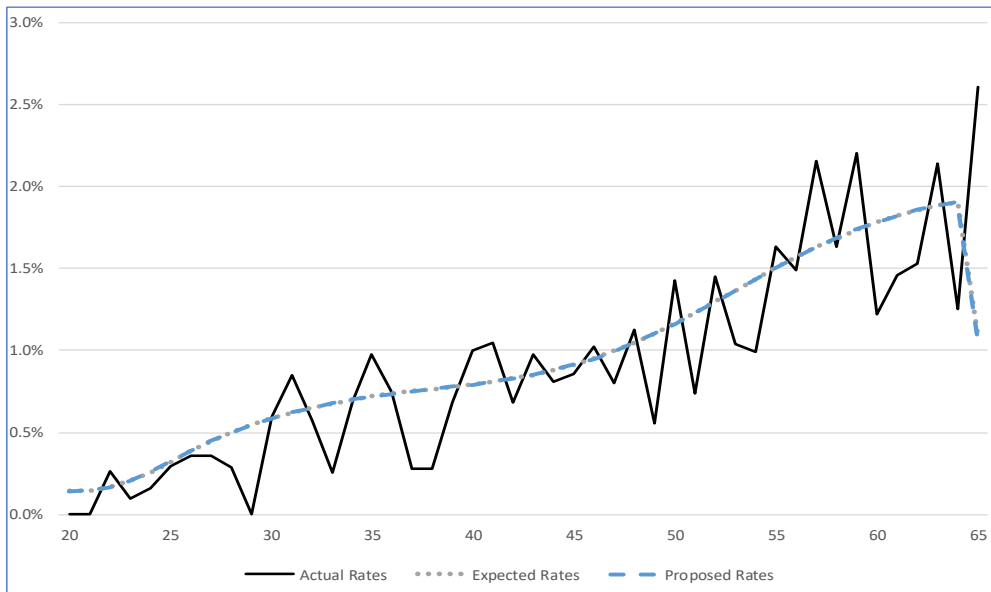
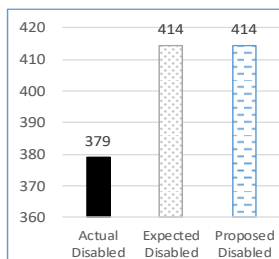
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Section VI: Supporting Tables, Subsection 7 – Disability Incidence

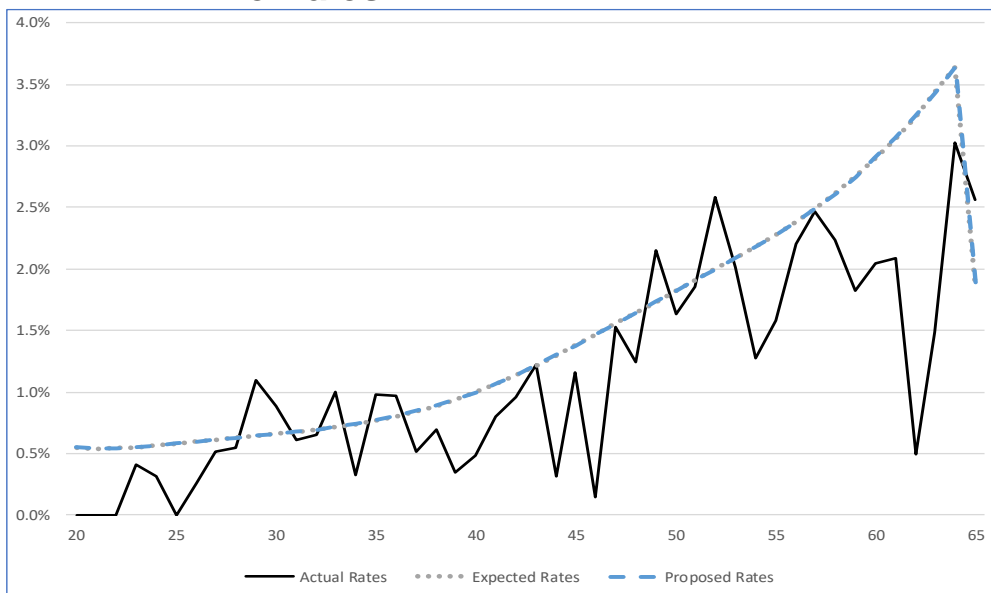
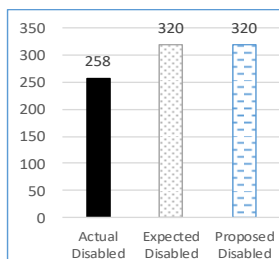
Disability Rates VaLORS Males

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.



Disability Rates VaLORS Females

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.





Section VI: Supporting Tables, Subsection 7 – Disability Incidence

SPORS DISABILITIES			
CENTRAL AGE OF GROUP	Actual	Expected/Proposed	Ratio of actual to expected/proposed
20	0	0.17	0.00
25	2	3.23	0.62
30	3	4.37	0.69
35	7	4.44	1.58
40	7	4.30	1.63
45	5	5.70	0.88
50	10	10.68	0.94
55	5	10.68	0.47
60	5	6.09	0.82
65	1	1.70	0.59
70	0	0.27	0.00
<Total>	45	51.63	0.87

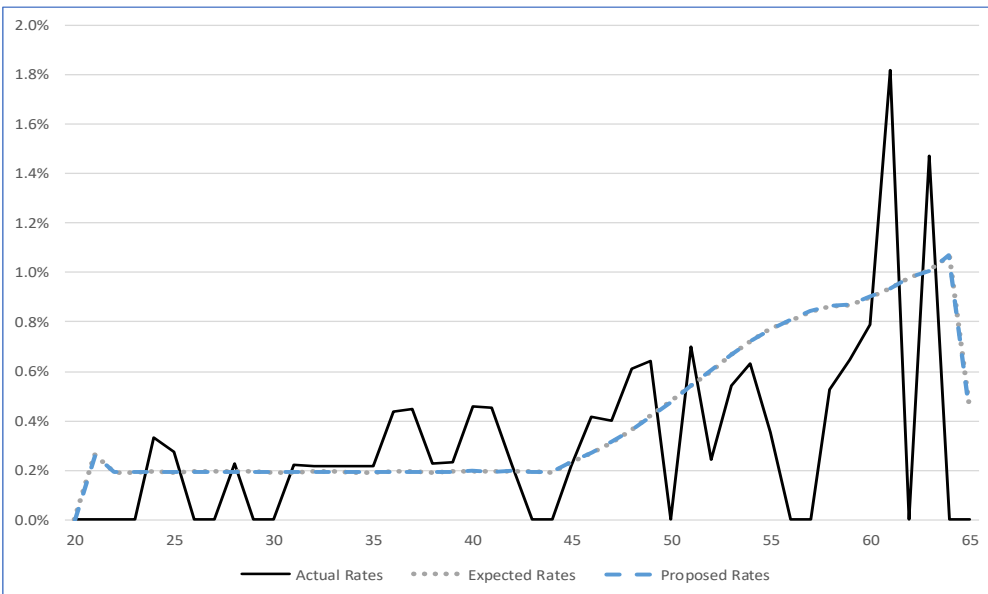
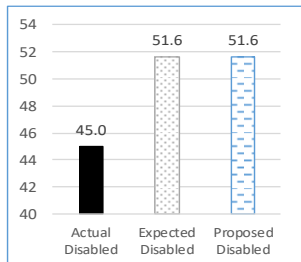
- All numbers in this table are for the four years studied as well as the four prior years
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Section VI: Supporting Tables, Subsection 7 – Disability Incidence

Disability Rates SPORS Males and Females

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.





Section VI: Supporting Tables, Subsection 7 – Disability Incidence

CENTRAL AGE OF GROUP	TOP 10 NON HAZARDOUS DUTY DISABILITIES					
	MALES			FEMALES		
	Actual	Expected/Proposed	Ratio of actual to expected/proposed	Actual	Expected/Proposed	Ratio of actual to expected/proposed
20	0	0.02	0.00	0	0.00	0.00
25	1	0.18	5.64	2	0.26	7.80
30	0	0.60	0.00	2	2.18	0.92
35	3	3.79	0.79	4	6.33	0.63
40	9	10.71	0.84	11	14.48	0.76
45	21	22.98	0.91	22	28.79	0.76
50	30	42.10	0.71	42	48.98	0.86
55	50	71.81	0.70	39	67.15	0.58
60	50	83.49	0.60	46	64.74	0.71
65	38	50.30	0.76	21	32.64	0.64
70	13	17.46	0.74	5	8.32	0.60
<Total>	215	303.43	0.71	194	273.86	0.71

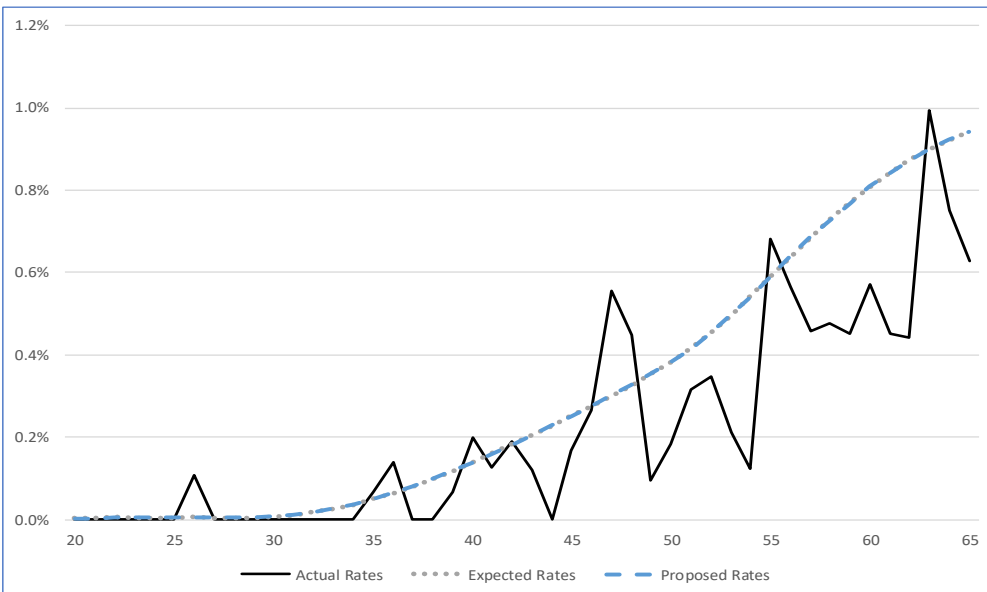
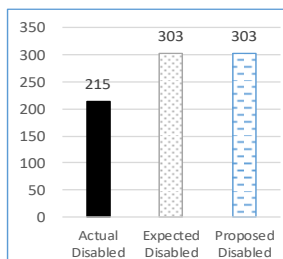
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Section VI: Supporting Tables, Subsection 7 – Disability Incidence

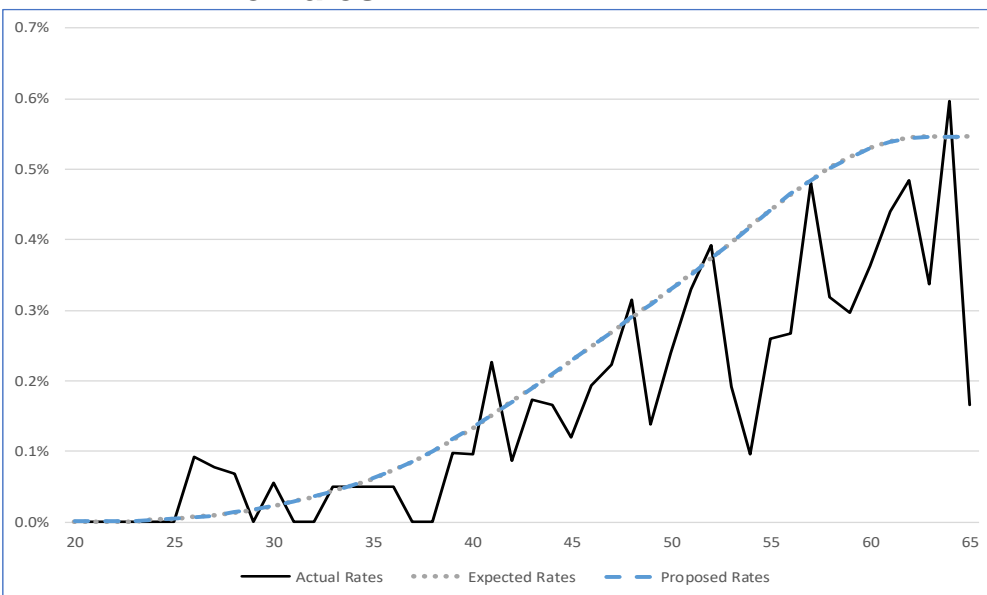
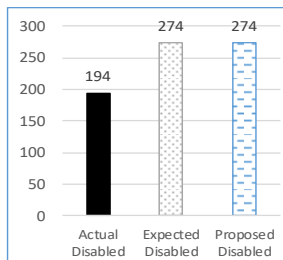
Disability Rates Top 10 Non Hazardous Duty Males

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.



Disability Rates Top 10 Non Hazardous Duty Females

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.





Section VI: Supporting Tables, Subsection 7 – Disability Incidence

CENTRAL AGE OF GROUP	TOP 10 HAZARDOUS DUTY DISABILITIES					
	MALES			FEMALES		
	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed
20	0	0.13	0.00	0	0.03	0.00
25	2	1.66	1.20	3	3.80	0.79
30	5	5.55	0.90	5	10.51	0.48
35	11	13.10	0.84	9	11.73	0.77
40	15	25.72	0.58	11	12.02	0.91
45	42	41.66	1.01	11	14.03	0.78
50	27	43.69	0.62	12	15.40	0.78
55	21	28.76	0.73	7	9.76	0.72
60	15	20.19	0.74	2	4.03	0.50
65	5	6.68	0.75	4	1.27	3.15
70	2	1.42	1.40	0	0.33	0.00
<Total>	145	188.55	0.77	64	82.91	0.77

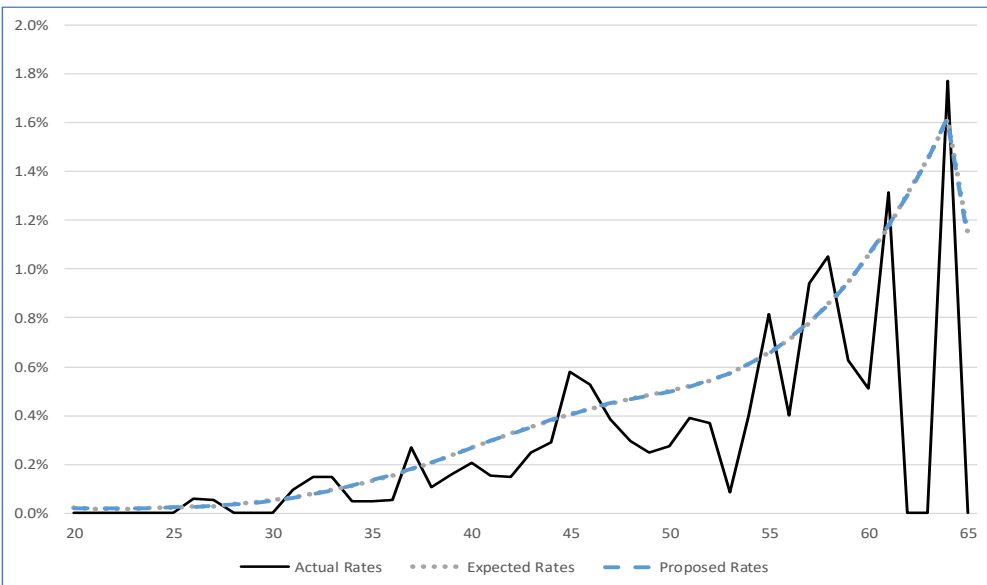
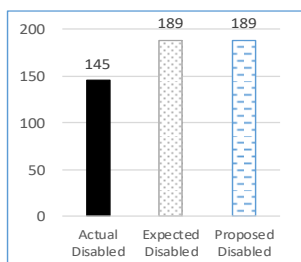
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Section VI: Supporting Tables, Subsection 7 – Disability Incidence

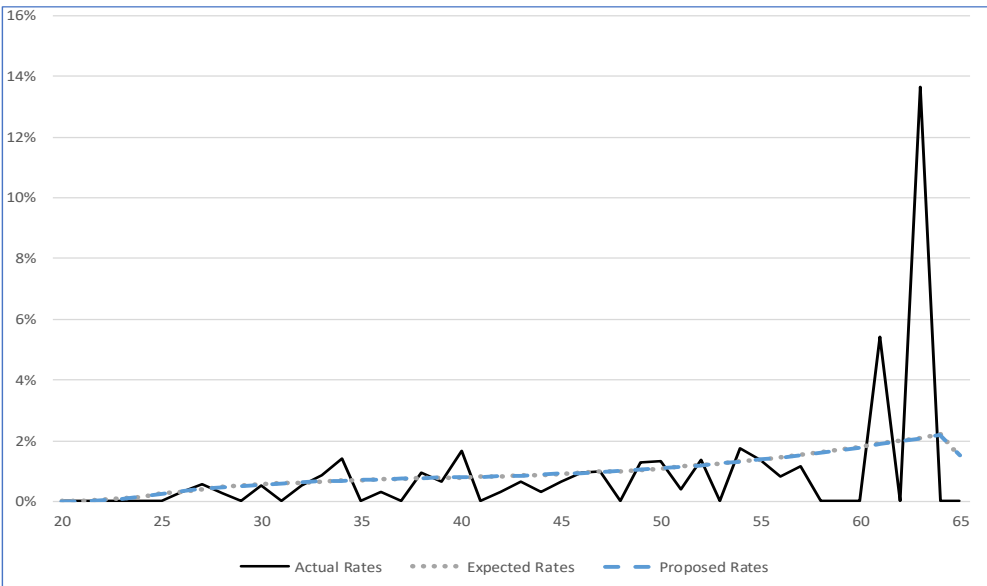
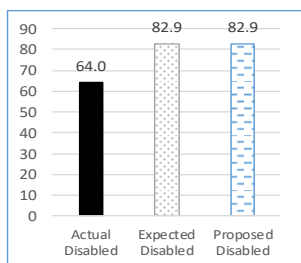
Disability Rates Top 10 Hazardous Duty Males

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.



Disability Rates Top 10 Hazardous Duty Females

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.





Section VI: Supporting Tables, Subsection 7 – Disability Incidence

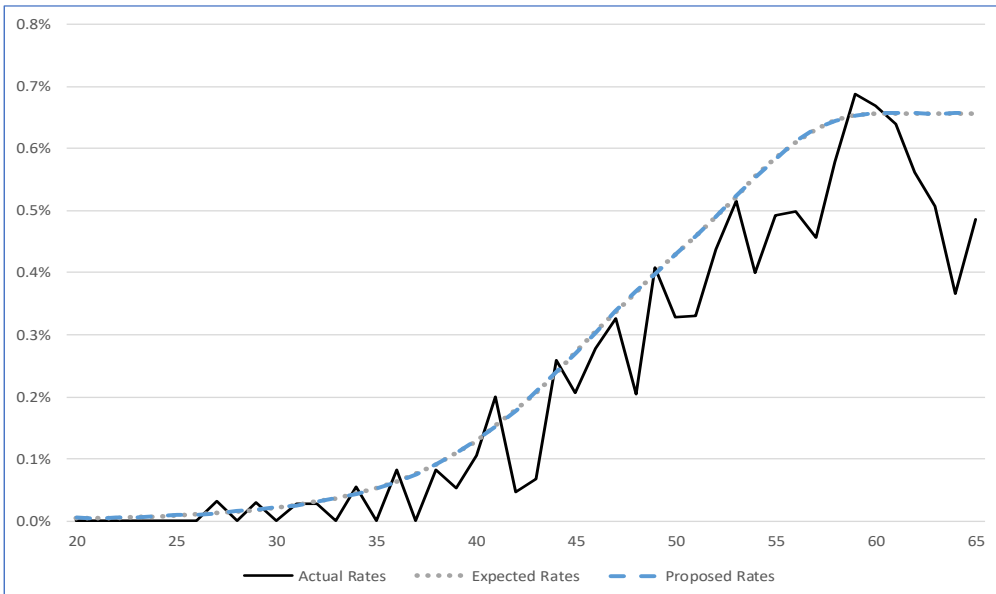
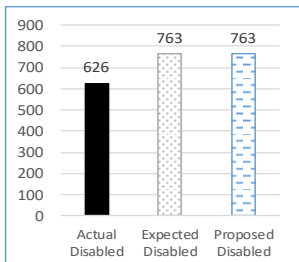
NON TOP 10 NON HAZARDOUS DUTY DISABILITIES						
CENTRAL AGE OF GROUP	MALES			FEMALES		
	Actual	Expected/Proposed	Ratio of actual to expected/proposed	Actual	Expected/Proposed	Ratio of actual to expected/proposed
20	0	0.15	0.00	0	0.01	0.00
25	1	1.21	0.83	1	0.11	9.35
30	3	3.82	0.79	1	0.64	1.56
35	5	9.83	0.51	5	6.19	0.81
40	19	26.06	0.73	21	17.74	1.18
45	56	66.06	0.85	46	49.12	0.94
50	100	125.32	0.80	108	124.25	0.87
55	152	186.75	0.81	183	228.46	0.80
60	182	189.10	0.96	187	253.03	0.74
65	67	105.18	0.64	102	135.23	0.75
70	41	49.37	0.83	27	54.37	0.50
<Total>	626	762.84	0.82	681	869.14	0.78

- All numbers in this table are for the four years studied as well as the four prior years
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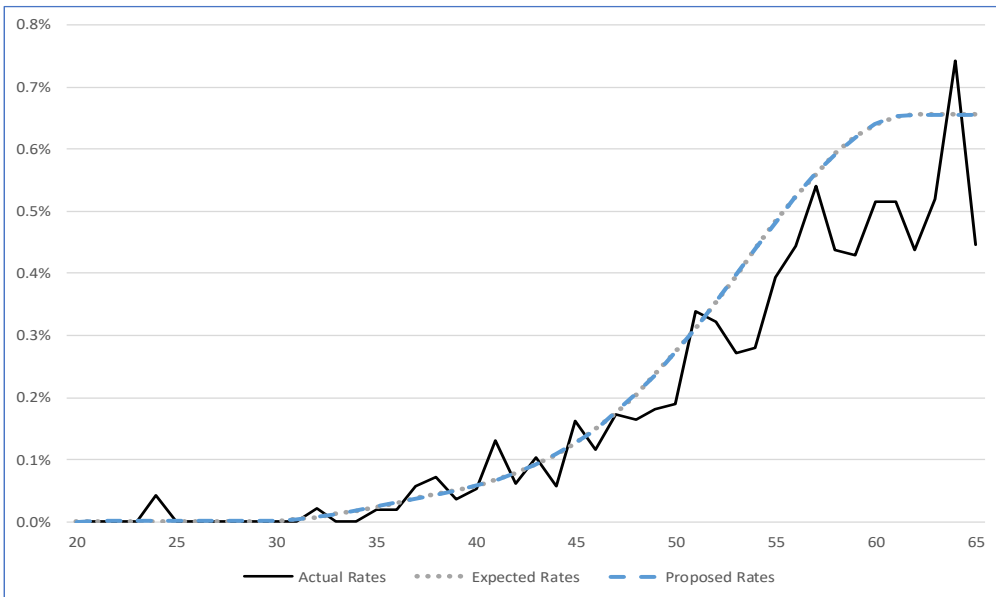
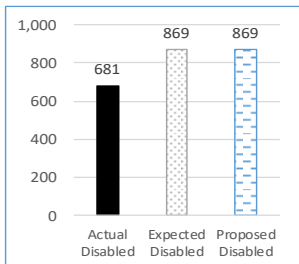
Disability Rates Non Top 10 Non Hazardous Duty Males

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.



Disability Rates Non Top 10 Non Hazardous Duty Females

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.





Section VI: Supporting Tables, Subsection 7 – Disability Incidence

CENTRAL AGE OF GROUP	NON TOP 10 HAZARDOUS DUTY DISABILITIES					
	MALES			FEMALES		
	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed
20	0	0.02	0.00	0	0.02	0.00
25	2	2.05	0.98	1	1.73	0.58
30	4	8.12	0.49	2	4.03	0.50
35	9	15.20	0.59	4	4.75	0.84
40	16	28.35	0.56	5	5.26	0.95
45	43	44.92	0.96	6	6.99	0.86
50	43	46.29	0.93	13	10.41	1.25
55	27	32.93	0.82	5	13.85	0.36
60	18	20.65	0.87	15	14.27	1.05
65	5	6.61	0.76	5	4.21	1.19
70	2	0.97	2.06	0	0.40	0.00
<Total>	169	206.11	0.82	56	65.93	0.85

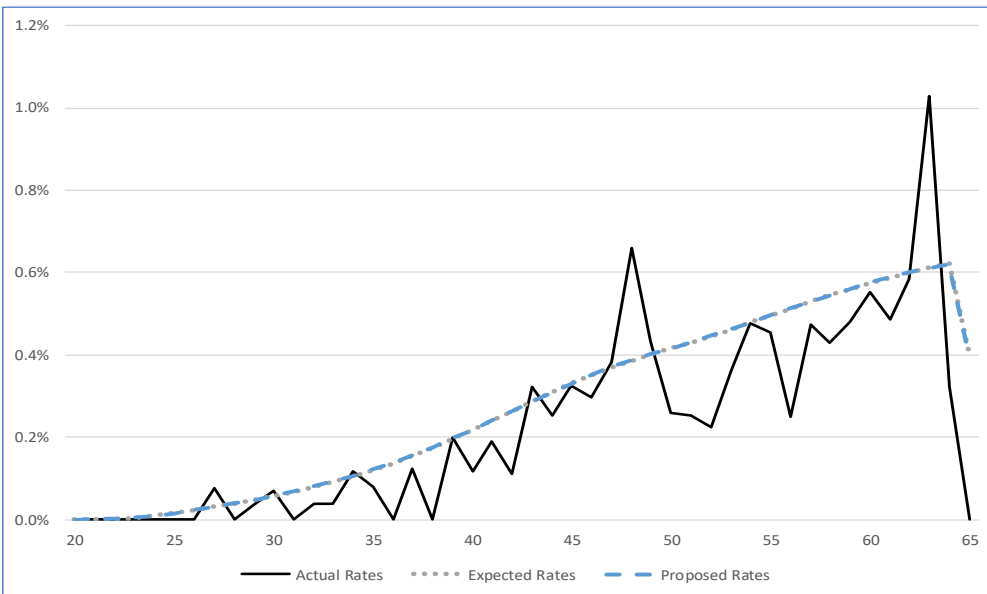
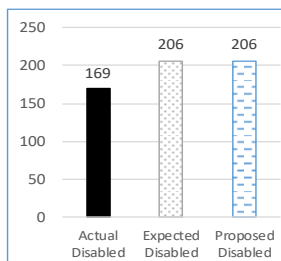
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Section VI: Supporting Tables, Subsection 7 – Disability Incidence

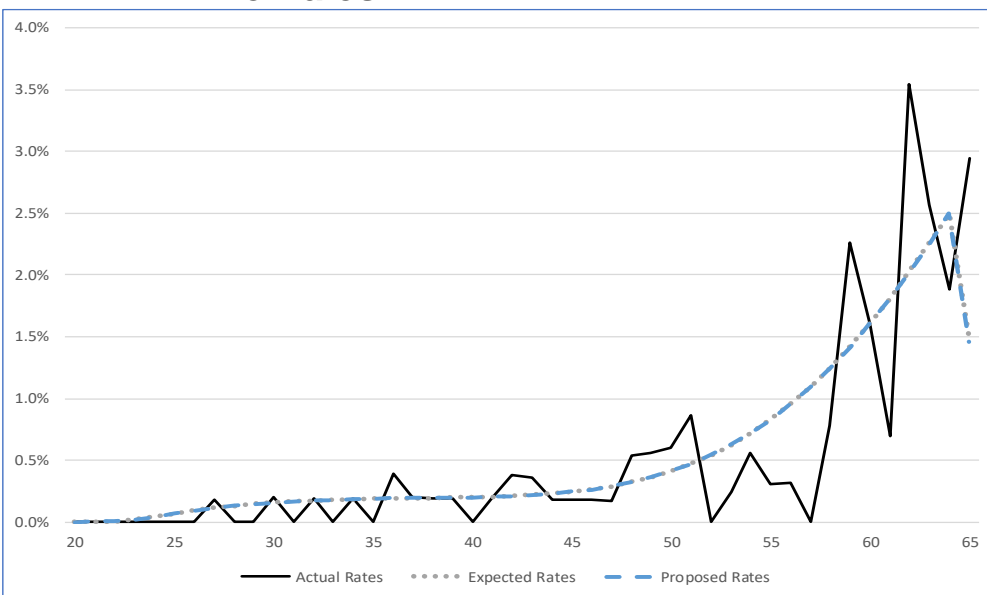
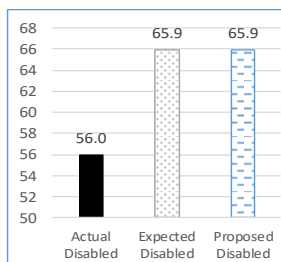
Disability Rates Non Top 10 Hazardous Duty Males

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.



Disability Rates Non Top 10 Hazardous Duty Females

Comment: Since disability incidence is a low frequency event, the number of disabilities in each age and gender band studied is small. Therefore we used data from the prior experience review as well as the current experience period. The current rates are still a good match to experience and we recommend retaining these rates. We prefer maintaining a margin in the rates since the number of incidences are small, but the liability associated with an occurrence can be large.





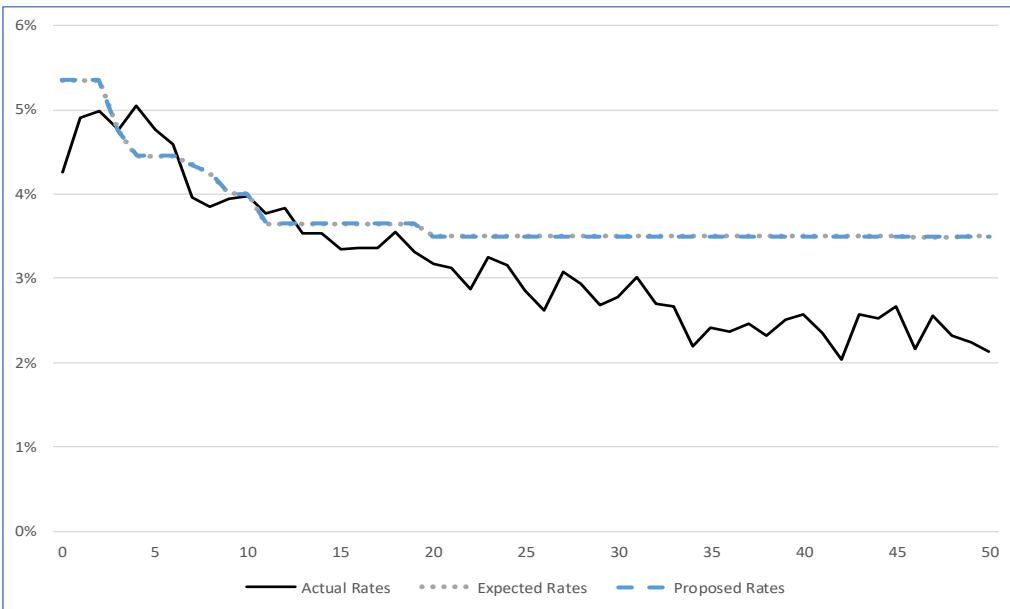
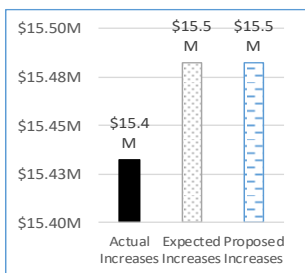
Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

STATE COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED/PROPOSED			
YEARS OF SERVICE	MALES AND FEMALES		
	Actual	Expected/Proposed	Ratio of actual to expected/proposed
0	\$1,582,829	\$1,599,256	0.99
1	\$907,094	\$910,954	1.00
2	\$819,416	\$822,245	1.00
3	\$739,617	\$739,531	1.00
4	\$697,249	\$693,311	1.01
5	\$619,334	\$617,492	1.00
6	\$530,183	\$529,492	1.00
7	\$507,160	\$509,073	1.00
8	\$516,012	\$517,988	1.00
9	\$542,298	\$542,581	1.00
10	\$578,625	\$578,759	1.00
11 to 19	\$3,653,248	\$3,657,244	1.00
20 or more	\$3,739,542	\$3,764,590	0.99
<Total>	\$15,432,607	\$15,482,516	1.00



Service Related Salary Increases State Males and Females

Comment: Current rates are still a good match to experience. We recommend no change.





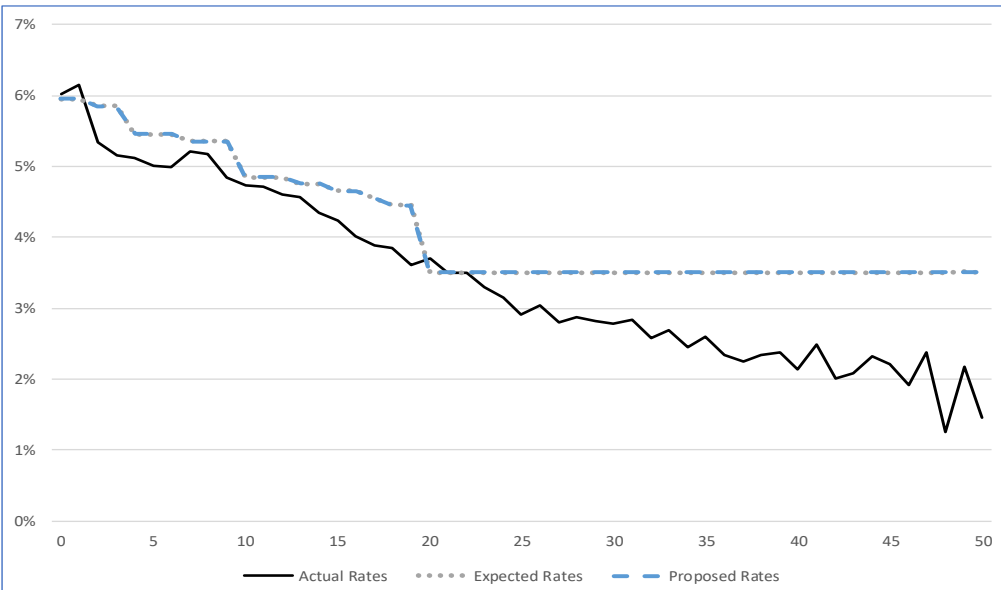
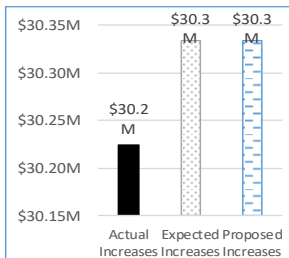
Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

TEACHERS COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED/PROPOSED			
YEARS OF SERVICE	MALES AND FEMALES		
	Actual	Expected/Proposed	Ratio of actual to expected/proposed
0	\$219,992	\$219,837	1.00
1	\$1,712,480	\$1,709,256	1.00
2	\$1,580,575	\$1,588,123	1.00
3	\$1,444,820	\$1,454,330	0.99
4	\$1,329,391	\$1,333,602	1.00
5	\$1,241,065	\$1,246,254	1.00
6	\$1,141,266	\$1,146,297	1.00
7	\$1,046,294	\$1,047,762	1.00
8	\$1,034,207	\$1,035,951	1.00
9	\$1,045,242	\$1,050,388	1.00
10	\$1,134,012	\$1,135,300	1.00
11 to 19	\$10,265,856	\$10,309,006	1.00
20 or more	\$7,028,984	\$7,057,338	1.00
<Total>	\$30,224,184	\$30,333,444	1.00



Service Related Salary Increases Teachers Males and Females

Comment: Current rates are still a good match to experience. We recommend no change.





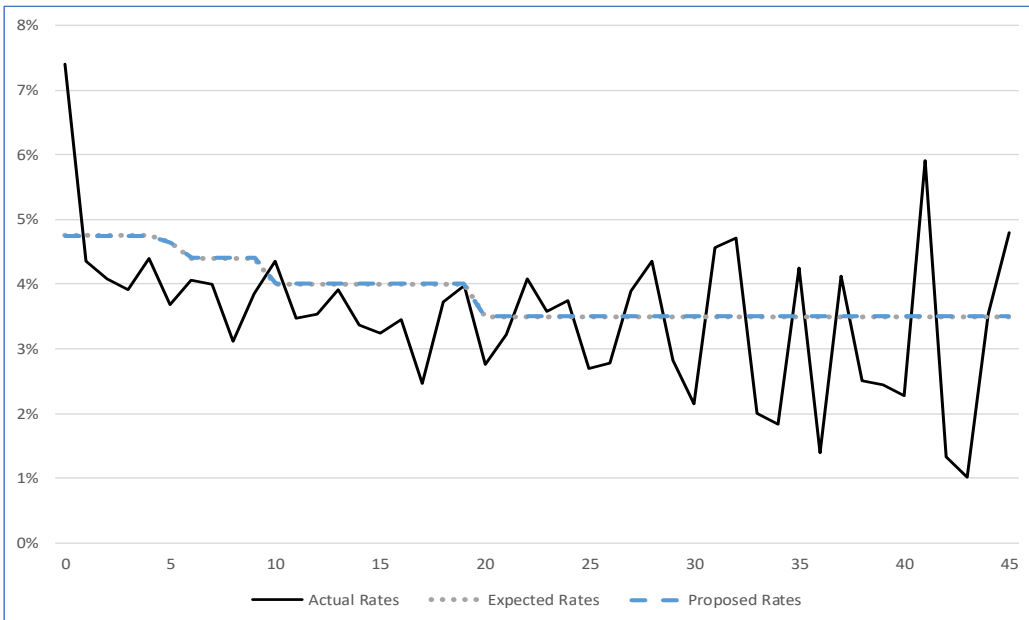
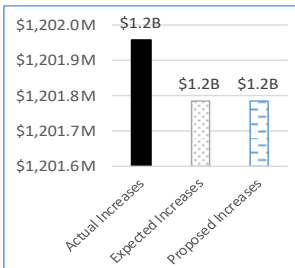
Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

VALORS COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED/PROPOSED			
YEARS OF SERVICE	MALES AND FEMALES		
	Actual	Expected/Proposed	Ratio of actual to expected/proposed
0	\$198,397,247	\$193,495,877	1.03
1	\$89,393,870	\$89,727,415	1.00
2	\$73,967,485	\$74,448,930	0.99
3	\$59,279,849	\$59,754,847	0.99
4	\$50,707,110	\$50,878,891	1.00
5	\$44,822,032	\$45,240,626	0.99
6	\$36,966,089	\$37,087,233	1.00
7	\$37,410,106	\$37,556,360	1.00
8	\$44,714,267	\$45,268,657	0.99
9	\$46,850,200	\$47,095,037	0.99
10	\$49,747,838	\$49,582,759	1.00
11 to 19	\$320,001,554	\$321,677,004	0.99
20 or more	\$149,699,771	\$149,969,259	1.00
<Total>	\$1,201,957,418	\$1,201,782,895	1.00



Service Related Salary Increases VaLORS Males and Females

Comment: Current rates are still a good match to experience. We recommend no change.





Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

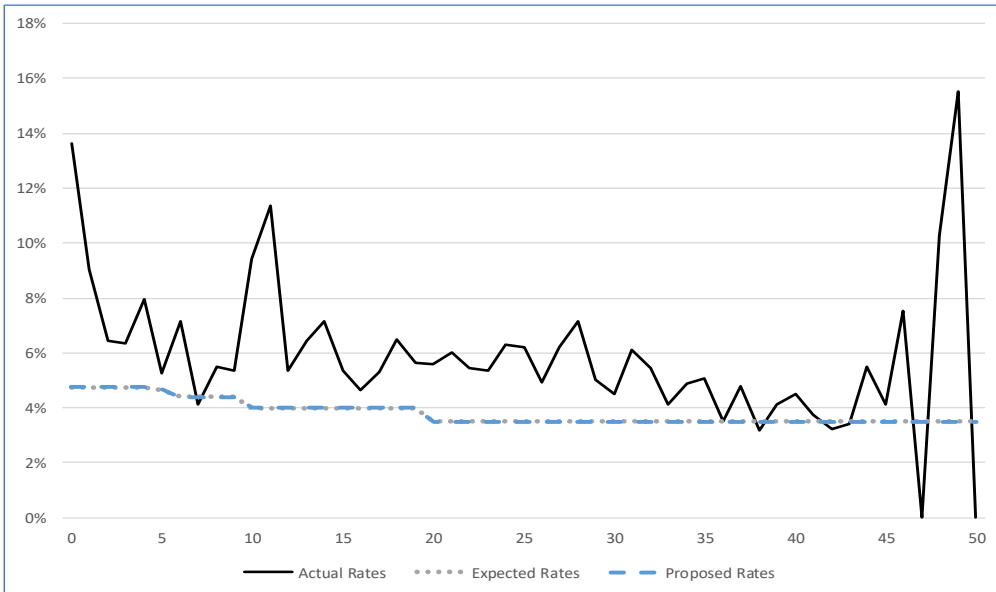
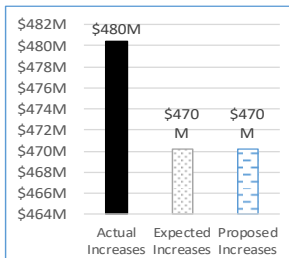
SPORS COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED/PROPOSED			
YEARS OF SERVICE	MALES AND FEMALES		
	Actual	Expected/Proposed	Ratio of actual to expected/proposed
0	\$12,097,558	\$11,152,255	1.08
1	\$10,096,134	\$9,698,365	1.04
2	\$11,478,030	\$11,293,225	1.02
3	\$14,492,383	\$14,272,434	1.02
4	\$16,074,819	\$15,597,766	1.03
5	\$18,459,276	\$18,350,802	1.01
6	\$15,573,414	\$15,175,597	1.03
7	\$11,870,344	\$11,904,194	1.00
8	\$10,845,461	\$10,732,348	1.01
9	\$9,080,318	\$8,999,028	1.01
10	\$12,874,291	\$12,235,282	1.05
11 to 19	\$146,113,035	\$142,908,887	1.02
20 or more	\$191,309,534	\$187,843,247	1.02
<Total>	\$480,364,597	\$470,163,430	1.02



Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

Service Related Salary Increases SPORS Males and Females

Comment: There was a large increase in 2018 (16%) that was a one-time occurrence. If we remove that year from the analysis, current rates are still a good match. We recommend no change.





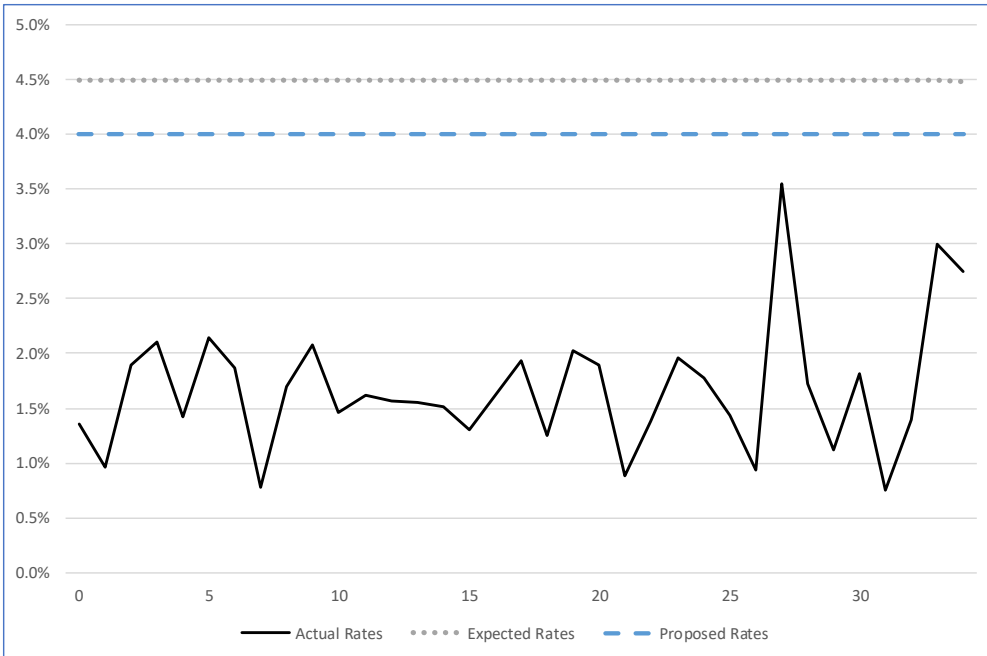
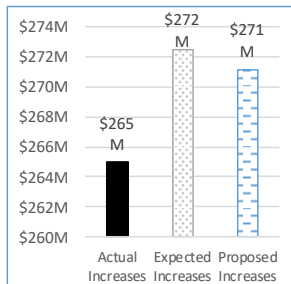
Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

JRS COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED AND PROPOSED					
MALES AND FEMALES					
YEARS OF SERVICE	Actual	Expected	Ratio of actual to expected	Proposed	Ratio of actual to proposed
0	\$10,493,230	\$10,818,327	0.97	\$10,766,566	0.97
1	\$14,790,616	\$15,308,375	0.97	\$15,235,131	0.97
2	\$18,028,566	\$18,490,669	0.98	\$18,402,199	0.98
3	\$20,519,851	\$21,001,060	0.98	\$20,900,578	0.98
4	\$23,057,990	\$23,758,006	0.97	\$23,644,333	0.98
5	\$17,657,928	\$18,064,105	0.98	\$17,977,676	0.98
6	\$12,514,254	\$12,836,922	0.97	\$12,775,502	0.98
7	\$11,031,648	\$11,438,824	0.96	\$11,384,094	0.97
8	\$8,748,312	\$8,989,946	0.97	\$8,946,933	0.98
9	\$9,706,958	\$9,936,920	0.98	\$9,889,376	0.98
10	\$12,149,058	\$12,512,459	0.97	\$12,452,592	0.98
11 to 19	\$74,867,946	\$77,021,077	0.97	\$76,652,562	0.98
20 or more	\$31,395,989	\$32,294,009	0.97	\$32,139,498	0.98
<Total>	\$264,962,346	\$272,470,699	0.97	\$271,167,040	0.98



Service Related Salary Increases JRS Males and Females

Comment: Because actual salary increases were lower than assumed we recommend lowering the rates from 4.5% to 4.0% for all years of service.





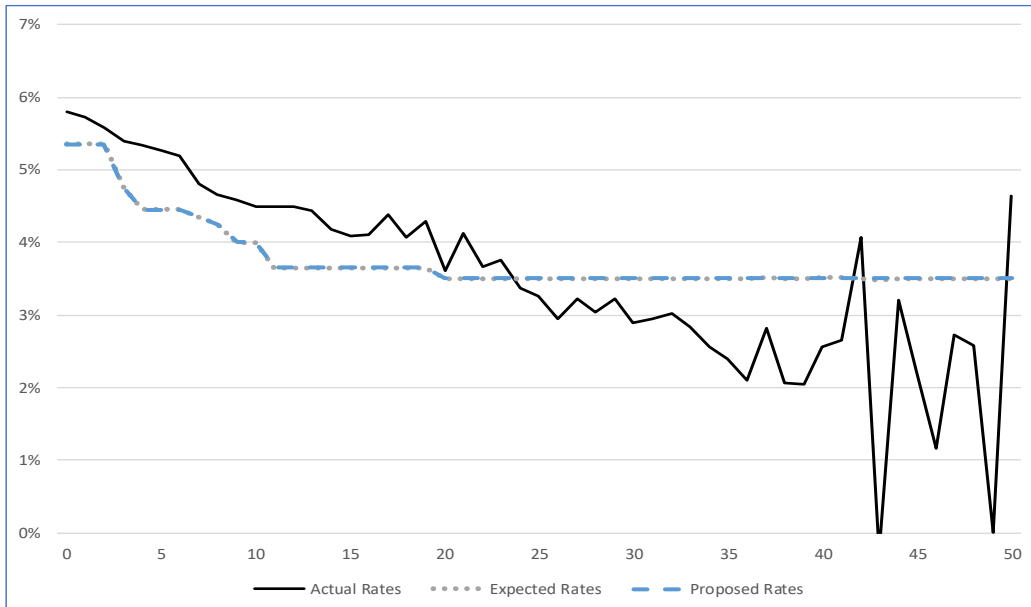
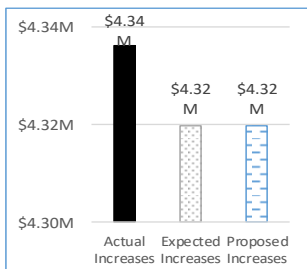
Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

TOP 10 NON HAZARDOUS DUTY COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED/PROPOSED			
YEARS OF SERVICE	MALES AND FEMALES		
	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed
0	\$569,121	\$566,663	1.00
1	\$303,785	\$302,723	1.00
2	\$261,082	\$260,541	1.00
3	\$218,421	\$217,078	1.01
4	\$179,710	\$178,206	1.01
5	\$146,609	\$145,485	1.01
6	\$121,675	\$120,812	1.01
7	\$118,651	\$118,139	1.00
8	\$126,201	\$125,703	1.00
9	\$143,506	\$142,702	1.01
10	\$159,859	\$159,118	1.00
11 to 19	\$1,153,792	\$1,146,705	1.01
20 or more	\$833,782	\$836,033	1.00
<Total>	\$4,336,194	\$4,319,908	1.00



Service Related Salary Increases Top 10 Non Hazardous Duty Males and Females

Comment: Current rates are still a good match to experience. We recommend no change.





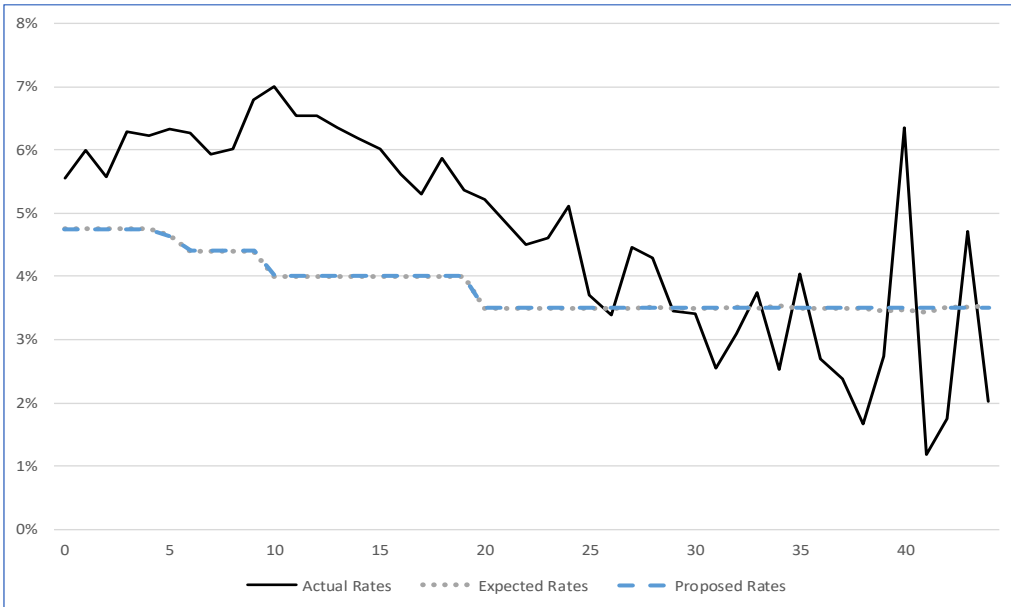
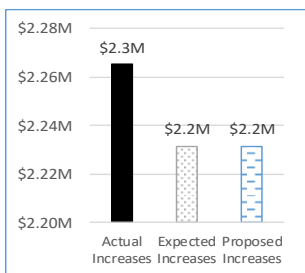
Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

TOP 10 HAZARDOUS DUTY COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED/PROPOSED			
YEARS OF SERVICE	MALES AND FEMALES		
	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed
0	\$193,487	\$192,026	1.01
1	\$108,152	\$106,878	1.01
2	\$95,445	\$94,691	1.01
3	\$81,681	\$80,499	1.01
4	\$76,252	\$75,199	1.01
5	\$70,583	\$69,463	1.02
6	\$64,571	\$63,436	1.02
7	\$74,109	\$73,030	1.01
8	\$77,573	\$76,395	1.02
9	\$89,730	\$87,719	1.02
10	\$101,479	\$98,629	1.03
11 to 19	\$804,467	\$789,092	1.02
20 or more	\$427,629	\$424,414	1.01
<Total>	\$2,265,158	\$2,231,471	1.02



Service Related Salary Increases Top 10 Hazardous Duty Males and Females

Comment: Current rates are still a good match to experience. We recommend no change.





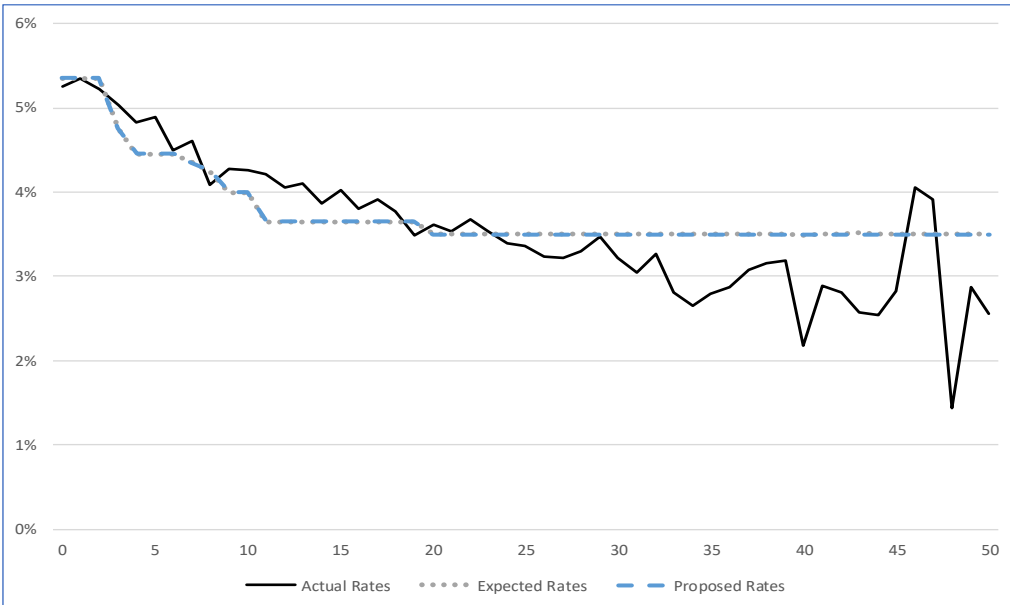
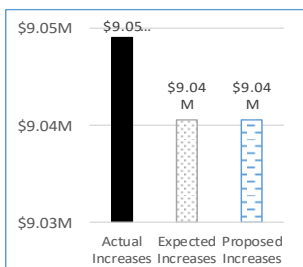
Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

NON TOP 10 NON HAZARDOUS DUTY COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED/PROPOSED			
YEARS OF SERVICE	MALES AND FEMALES		
	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed
0	\$1,273,308	\$1,274,470	1.00
1	\$673,559	\$673,585	1.00
2	\$570,604	\$571,262	1.00
3	\$487,976	\$486,695	1.00
4	\$433,007	\$431,430	1.00
5	\$375,904	\$374,345	1.00
6	\$321,058	\$320,933	1.00
7	\$306,631	\$305,889	1.00
8	\$316,813	\$317,330	1.00
9	\$333,748	\$332,856	1.00
10	\$349,088	\$348,218	1.00
11 to 19	\$2,166,835	\$2,160,627	1.00
20 or more	\$1,440,504	\$1,442,933	1.00
<Total>	\$9,049,035	\$9,040,573	1.00



Service Related Salary Increases Non Top 10 Non Hazardous Duty Males and Females

Comment: Current rates are still a good match to experience. We recommend no change.





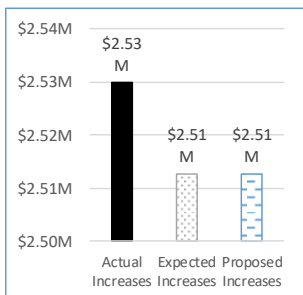
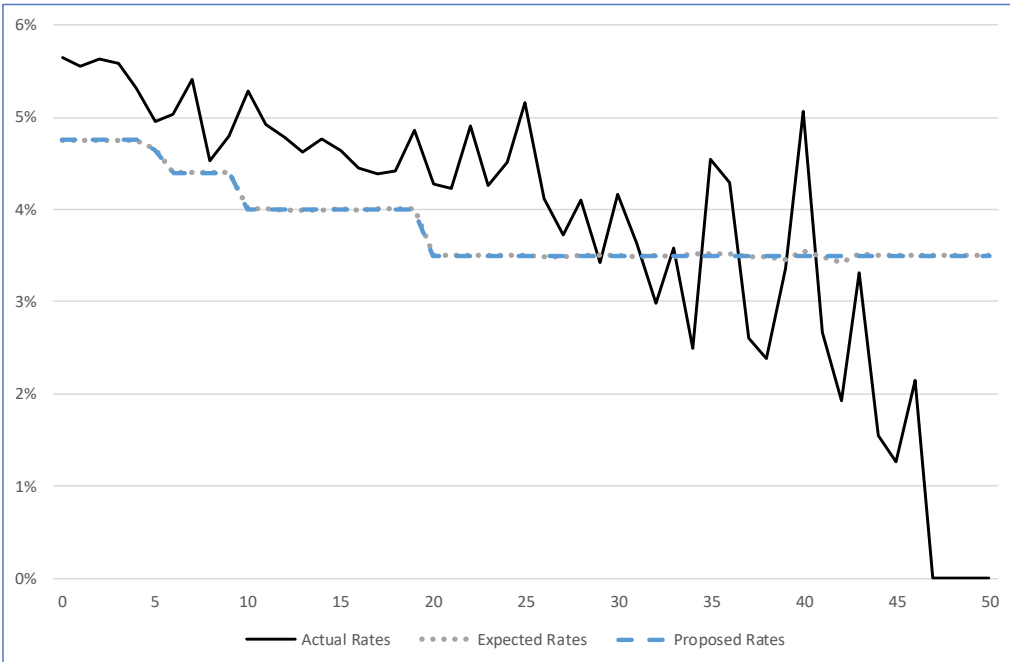
Section VI: Supporting Tables, Subsection 8 – Rates of Salary Increase

NON TOP 10 HAZARDOUS DUTY COMPARISON OF ACTUAL SALARY GROWTH TO EXPECTED/PROPOSED			
YEARS OF SERVICE	MALES AND FEMALES		
	Actual	Expected/ Proposed	Ratio of actual to expected/ proposed
0	\$337,068	\$334,220	1.01
1	\$170,362	\$169,072	1.01
2	\$143,268	\$142,072	1.01
3	\$123,237	\$122,266	1.01
4	\$109,846	\$109,256	1.01
5	\$100,676	\$100,382	1.00
6	\$90,913	\$90,368	1.01
7	\$91,814	\$90,939	1.01
8	\$95,348	\$95,225	1.00
9	\$99,701	\$99,319	1.00
10	\$107,257	\$105,956	1.01
11 to 19	\$735,722	\$731,110	1.01
20 or more	\$324,571	\$322,430	1.01
<Total>	\$2,529,783	\$2,512,615	1.01



Service Related Salary Increases Non Top 10 Hazardous Duty Males and Females

Comment: Current rates are still a good match to experience. We recommend no change.





OPEB SPECIFIC SUPPORTING TABLES



GLI – Life Only Retiree & ORP Benefit Estimation

Group Life Insurance Amount Paid for period 5/1/2017– 4/30/2020	
Life Only	18,047,857
All Group Life (Not Including Life Only)	1,115,498,488
Life Only Benefit Estimation	1.618%



LODA FUND

Historically the accumulation of LODA census data has been challenging and is collected from various sources with varying levels of completeness. The census data collection process has been steadily improving, but the data over the four-year period covered in this experience study has been limited. Therefore, we have used professional judgement and allowed for margin in setting certain assumptions specific to the LODA plan. The following charts summarize data which was considered.

LODA FUND – Percentage of Death and Disabilities Qualifying for Benefits

	Number of Approved and Denied Disabled Claims in Prior Four Year Period		
	Approved	Denied	Percent Approved
State	0	1	0%
SPORS	18	8	69%
VaLORS	21	18	54%
Non Top 10 LEOs	106	55	66%
Top 10 LEOs	84	32	72%
Total	229	114	67%

	Number of Approved and Denied Death Claims in Prior Four Year Period		
	Approved	Denied	Percent Approved
State	0	1	0%
SPORS	5	2	71%
VaLORS	2	0	100%
Non Top 10 LEOs	30	6	83%
Top 10 LEOs	4	3	57%
Total	41	12	77%



Section VII: OPEB Specific Supporting Tables

LODA FUND – Qualifying Deaths

Paid Date Fiscal Year Ending*	Number of Death Benefit Payments	Number Paid as Direct/Proximate Result of Duty	% Paid as Direct/Proximate Result of Duty
6/30/2018	3	0	100%
6/30/2019	1	3	25%
6/30/2020	1	1	50%
6/30/2021	0	1	0%
Total	5	5	50%

*Lagged one year to reflect time between death and DOA approval.



Section VII: OPEB Specific Supporting Tables

LODA FUND – Spouse Participation Rates

Valuation Date	Number of Disabled Participants	Number of Disabled Participants with Spouse Coverage	% of Disabled Participants with Spouse Coverage
6/30/2017	566	394	70%
6/30/2018	619	413	67%
6/30/2019	647	447	69%
6/30/2020	650	429	66%
Total	2,482	1,683	68%

Fiscal Year Ending*	Number of Death Benefit Payments	Number of Surviving Spouses Electing Coverage	% of Disabled Participants with Spouse Coverage
6/30/2017	3	3	100%
6/30/2018	4	4	100%
6/30/2019	2	1	50%
6/30/2020	1	1	100%
Total	10	9	90%

*Lagged one year to reflect time between death and DOA approval.



Section VII: OPEB Specific Supporting Tables

HIC – Benefit Election

Participation for Eligible Future Service Retirees from Active Status

Group	Current Assumption	Actual Participation for Eligible Future Service Retirees from Active Status	Proposed Assumption
All State Groups & Teachers	95%	83%	95%
Locals & Special Coverage Codes	85%	78%	85%

Participation for Eligible Future Disabled Members from Active Status

Group	Current Assumption	Actual Participation for Eligible Future Disabled Members from Active Status	Proposed Assumption
State/JRS	95%	90%	95%
Teachers	90%	61%	90%
SPORS/VaLORS	75%	84%	80%
Locals/Special Coverage Codes	45%	50%	50%

Participation for Eligible Future Service Retirees from Terminated Vested

Duration Since Retirement	Current Assumption		Actual Eligible Future Service Retirees from Deferred Vested		Proposed Assumption	
	All State Groups & Teachers	Locals & Special Coverage Codes	All State Groups & Teachers	Locals & Special Coverage Codes	All State Groups & Teachers	Locals & Special Coverage Codes
1st Year	55%	55%	76%	68%	95%	85%
2nd Year	65%	65%	78%	71%	95%	85%
3rd Year	70%	70%	78%	72%	95%	85%
4th Year	75%	75%	78%	71%	95%	85%
5th Year	80%	80%	78%	71%	95%	85%
6th Year	85%	85%	78%	71%	95%	85%
7th Year	90%	90%	78%	71%	95%	85%
8th Year & Beyond	95%	95%	78%	71%	95%	85%



Section VII: OPEB Specific Supporting Tables

HIC – Benefit Utilization

Percentage of Full Benefit Received for Those Eligible but Not Receiving the Maximum Benefit

Group	Current Assumption	Percentage of Full Benefit Received for Those Eligible but Not Receiving the Maximum Benefit		Proposed Assumption
		Retirees	Disabled	
	Retirees & Disabled	Retirees	Disabled	Retirees & Disabled
All State Groups & Teachers	70%	67%	67%	70%
Locals & Special Coverage Codes		55%	70%	

Percentage of Members Electing HIC Benefits but Not Receiving the Full Amount

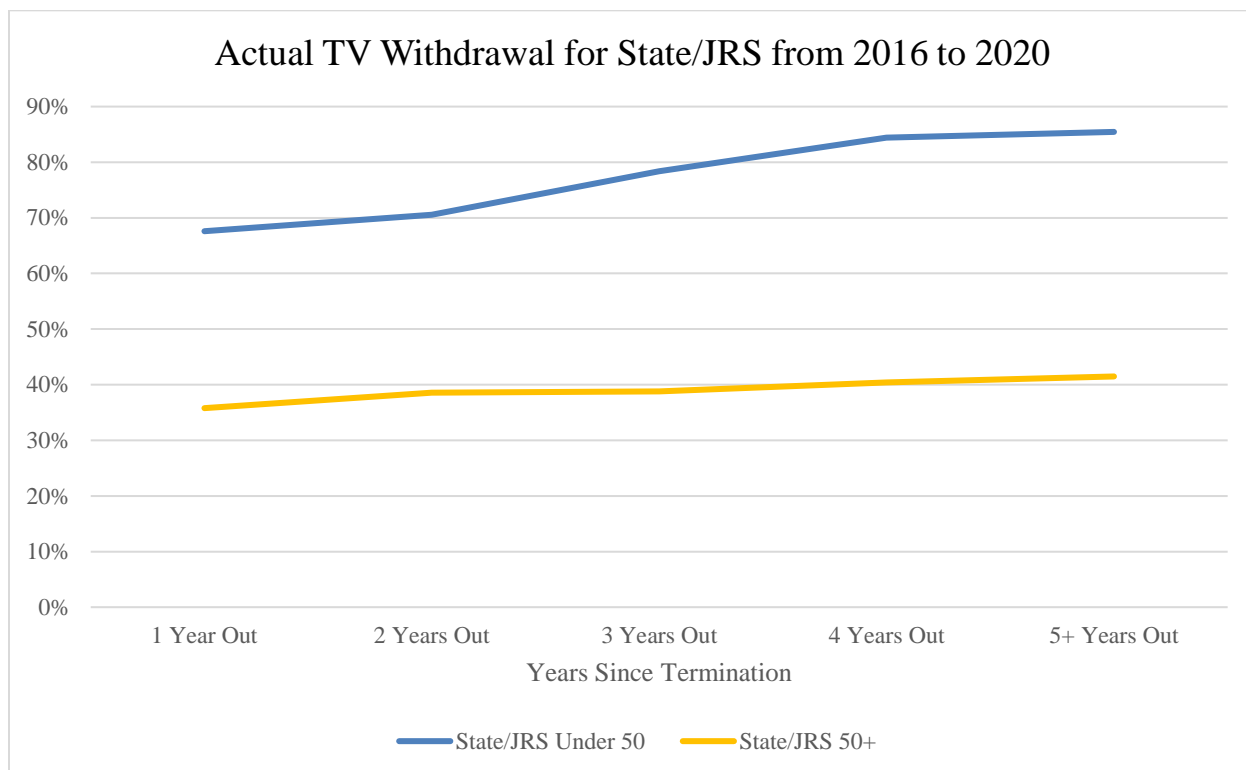
Group	Current Assumption	Actual Percentage Not Utilizing the Maximum Benefit		Proposed Assumption
		Retirees	Disabled	
	Retirees & Disabled	Retirees	Disabled	Retirees & Disabled
State/JRS	10%	7%	1%	5%
Teachers	20%	15%	16%	15%
SPORS/VaLORS	20%	9%	0%	10%
Locals/Special Coverage Codes	10%	7%	4%	5%



Section VII: OPEB Specific Supporting Tables

HIC – Terminated Member Vested Withdrawals

Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS



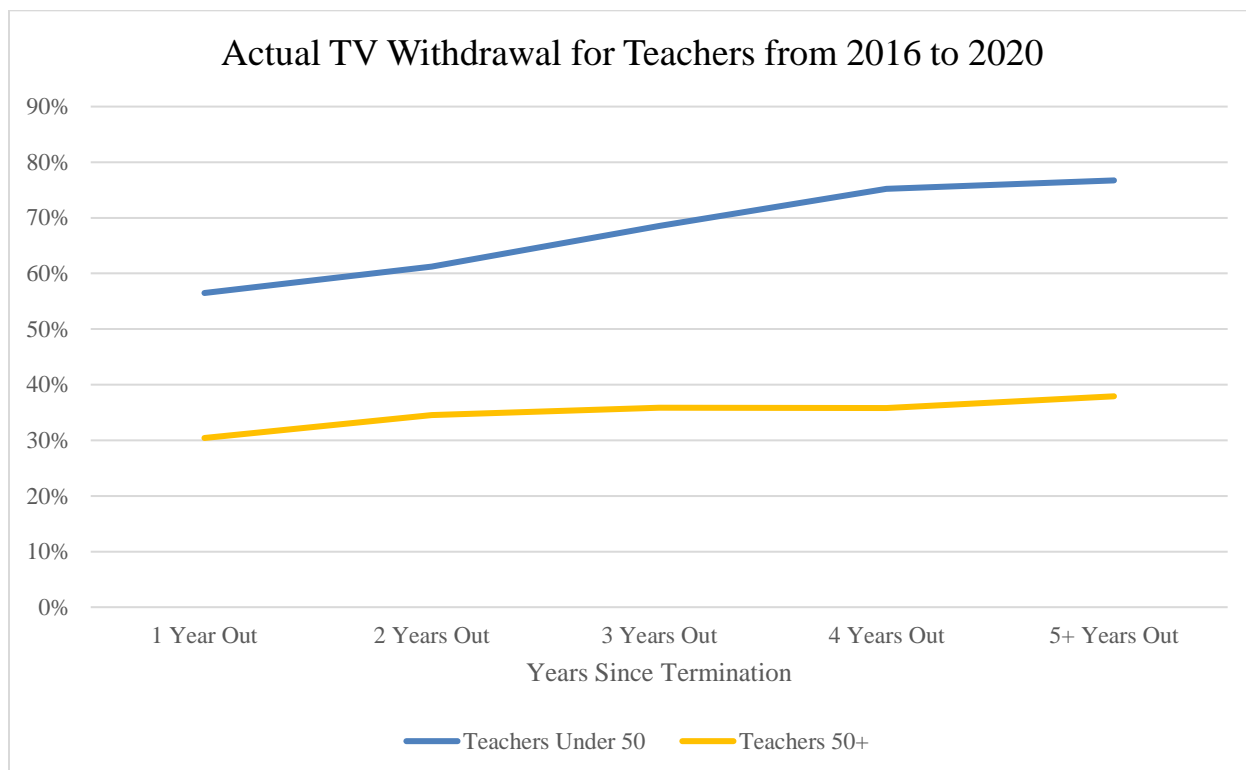
Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS						
Years Since Termination	State/JRS Current Assumption		Actual State/JRS		State/JRS Proposed Assumption	
	Under Age 50	Age 50 and Over	Under Age 50	Age 50 and Over	Under Age 50	Age 50 and Over
1st Year	50%		68%	36%	75%	35%
2nd Year			71%	39%		
3rd Year			78%	39%		
4th Year			84%	40%		
5th Year & Beyond			85%	41%		



Section VII: OPEB Specific Supporting Tables

HIC – Terminated Vested Member Withdrawals (continued)

Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS



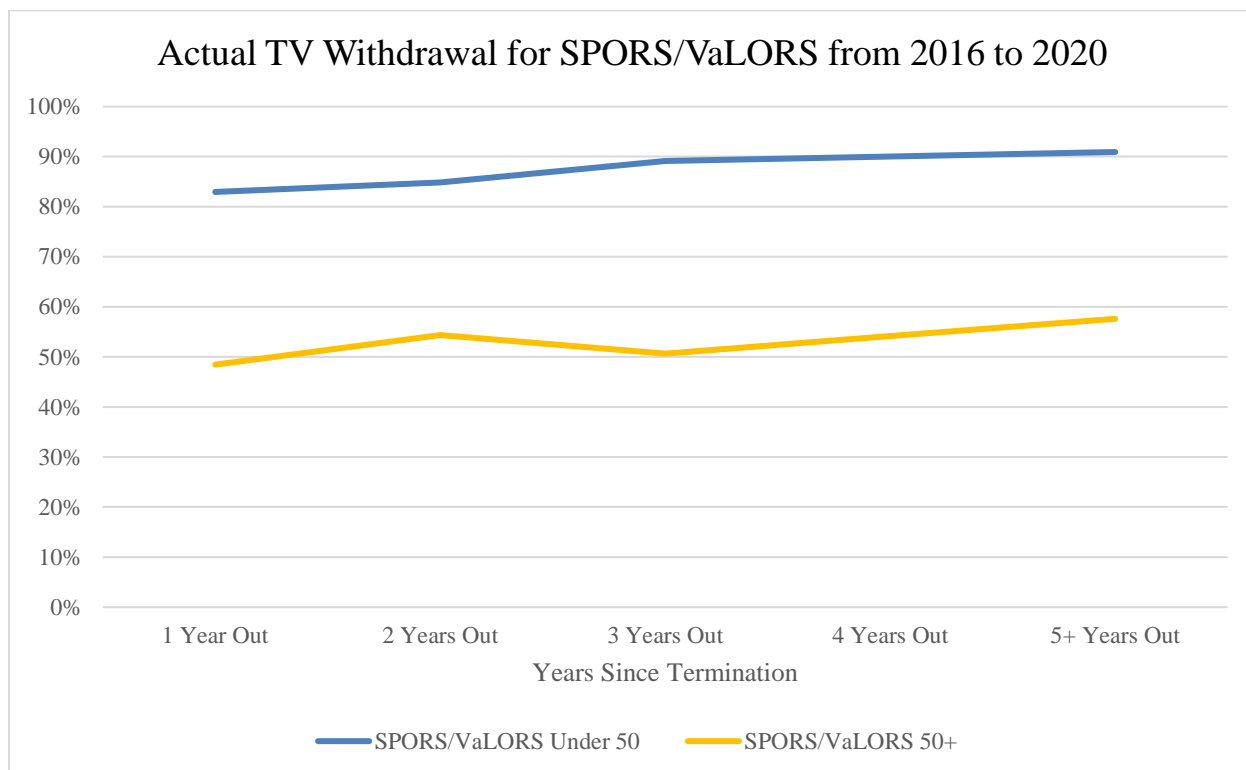
Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS						
Years Since Termination	Teachers Current Assumption		Actual Teachers		Teachers Proposed Assumption	
	Under Age 50	Age 50 and Over	Under Age 50	Age 50 and Over	Under Age 50	Age 50 and Over
1st Year	35%		56%	30%	75%	35%
2nd Year			61%	35%		
3rd Year			69%	36%		
4th Year			75%	36%		
5th Year & Beyond			77%	38%		



Section VII: OPEB Specific Supporting Tables

HIC – Terminated Vested Member Withdrawals (continued)

Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS



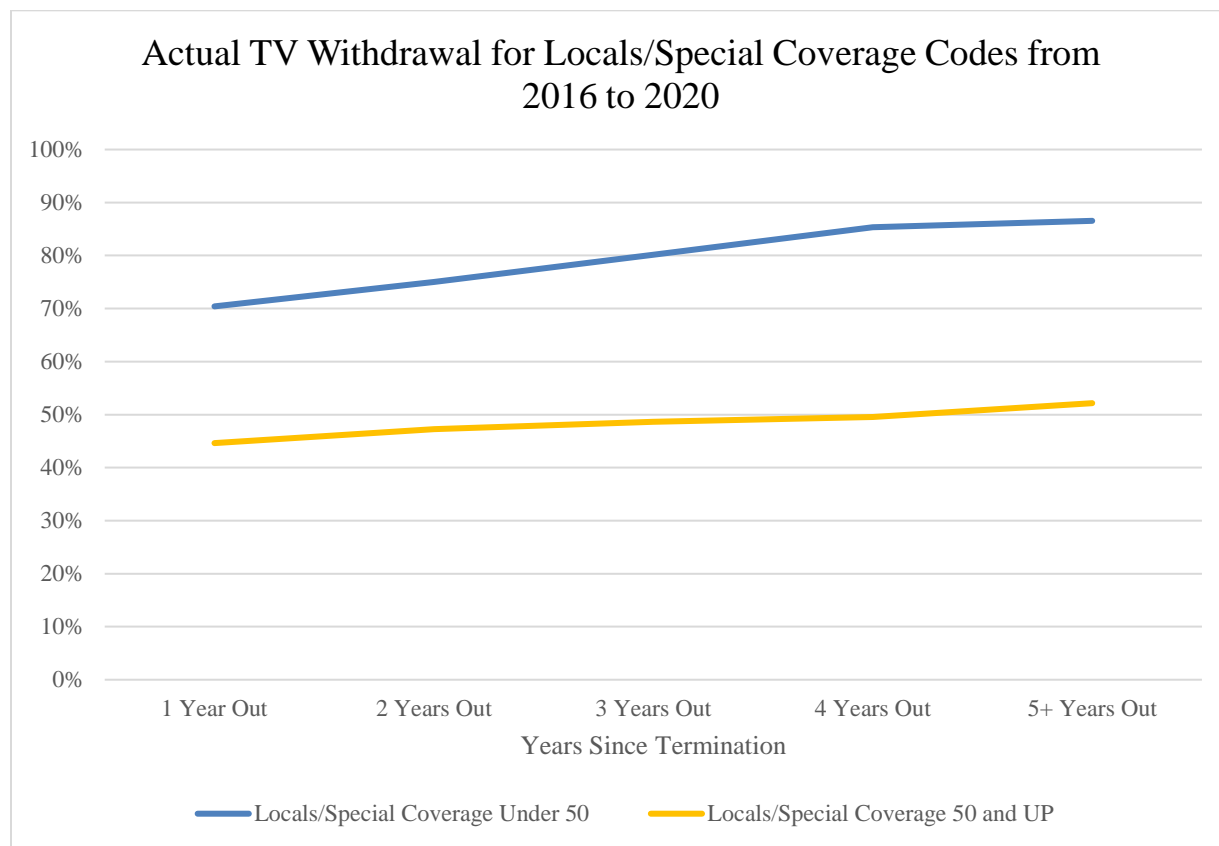
Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS						
Years Since Termination	SPORS/VaLORS Current Assumption		Actual SPORS/VaLORS		SPORS/VaLORS Proposed Assumption	
	Under Age 50	Age 50 and Over	Under Age 50	Age 50 and Over	Under Age 50	Age 50 and Over
1st Year	70%		83%	48%	90%	55%
2nd Year			85%	54%		
3rd Year			89%	51%		
4th Year			90%	54%		
5th Year & Beyond			91%	58%		



Section VII: OPEB Specific Supporting Tables

HIC – Terminated Vested Member Withdrawals (continued)

Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS



Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS						
Years Since Termination	Locals/Special Coverage Codes Current Assumption		Actual Locals/Special Coverage Codes		Locals/Special Coverage Codes Proposed Assumption	
	Under Age 50	Age 50 and Over	Under Age 50	Age 50 and Over	Under Age 50	Age 50 and Over
1st Year	45%		70%	45%	85%	50%
2nd Year			75%	47%		
3rd Year			80%	49%		
4th Year			85%	50%		
5th Year & Beyond			87%	52%		



Section VII: OPEB Specific Supporting Tables

HIC – Terminated Vested Member Retirement Age

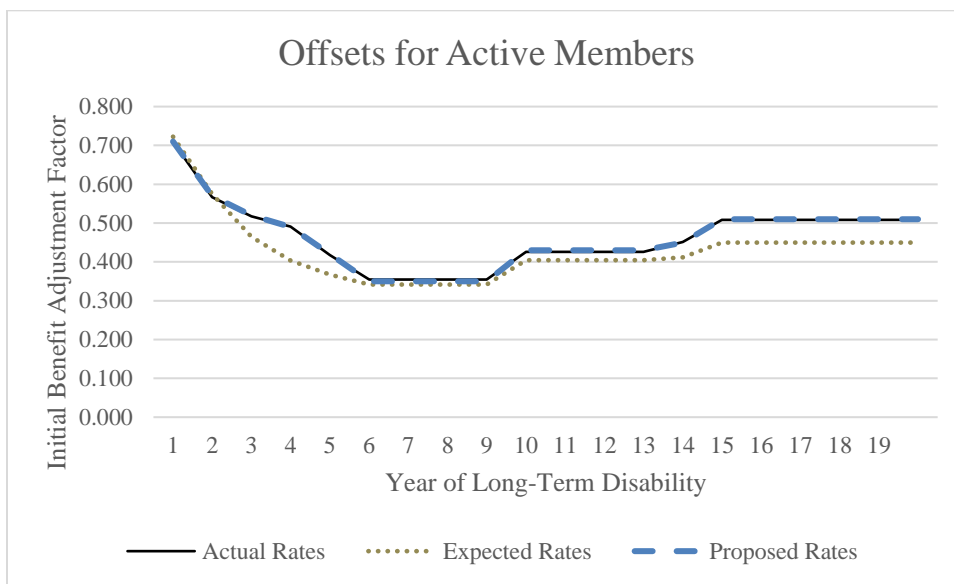
Group	Current Assumption	Actual State/JRS	Actual Teachers	Proposed Assumption
State/JRS/Teachers/Political Subdivisions/Special Coverage				
Plan 1 Members	60	64	62	60
Plan 2 and Hybrid Plan Members				
Born prior to 1938	60	N/A	N/A	60
Born after 1937 and before 1960	61	66	66	61
Born after 1959	62	61	N/A	62
SPORS/VaLORS				
Members with less than 25 years of service	55		58	55
Members with 25 or more years of service	50		56	50

Group	Current Assumption	Actual Locals & Special Coverage Codes	Proposed Assumption
State/JRS/Teachers/Political Subdivisions/Special Coverage			
Plan 1 Members	60	60	60
Plan 2 and Hybrid Plan Members			
Born prior to 1938	60	N/A	60
Born after 1937 and before 1960	61	N/A	61
Born after 1959	62	54	62
LEOs/Fire			
Members with less than 25 years of service	55	56	55
Members with 25 or more years of service	50	55	50



VSDP/VLDP – Benefit Offsets

Percentage of Full LTD Income Replacement Benefit Paid



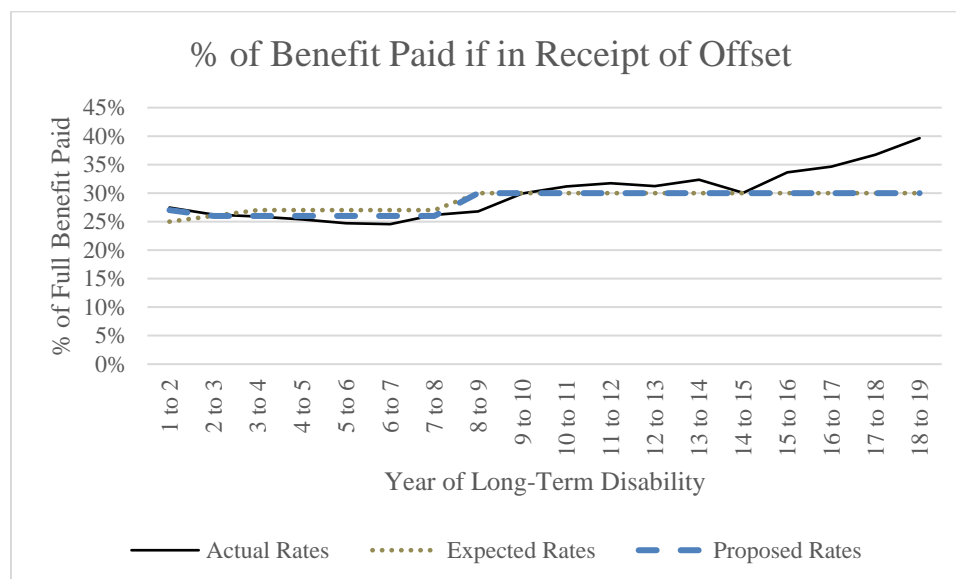
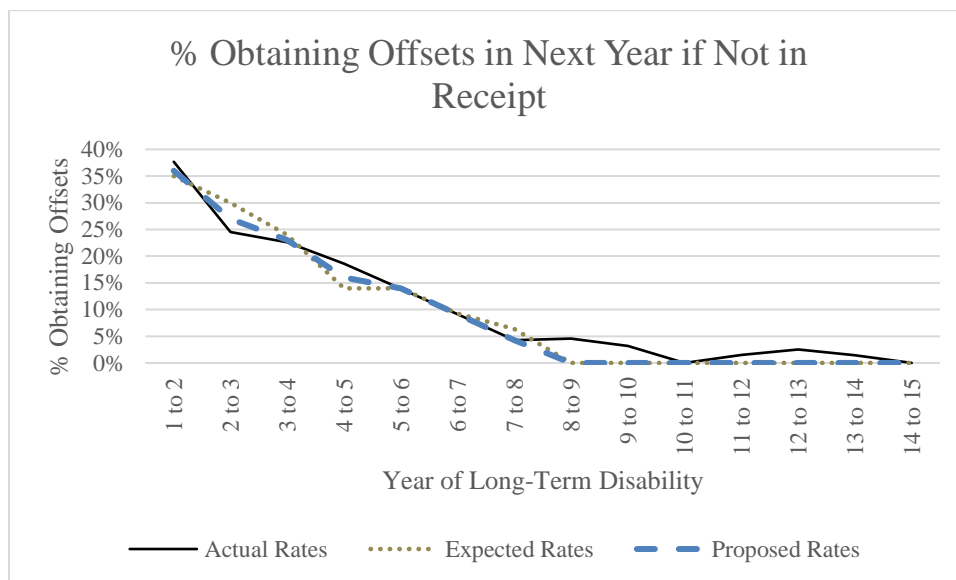
Year of Long-Term Disability	Average Percentage of Full Benefit Paid	Current Assumption	Proposed Assumption
1	70.9%	72.3%	71.0%
2	56.6%	57.5%	57.0%
3	51.7%	46.5%	52.0%
4	49.1%	40.3%	49.0%
5	41.7%	36.7%	42.0%
6-9	35.5%	34.2%	35.0%
10-13	42.6%	40.4%	43.0%
14	45.1%	41.1%	45.0%
15+	50.9%	45.0%	51.0%



Section VII: OPEB Specific Supporting Tables

VSDP/VLDP – Benefit Offsets (continued)

Probability of receiving a benefit offset in the future if not in current receipt and expected VSDP benefit payment amount





VSDP/VLDP – Benefit Offsets (continued)

Probability of receiving a benefit offset in the future if not in current receipt and expected VSDP benefit payment amount

Year of Long-Term Disability	Percentage of Beneficiaries Receiving Offsets in the Next Year if Currently Not in Receipt		Average Percentage of Full Benefit Paid if in Receipt of Offsets	
	Current Assumption	Proposed Assumption	Current Assumption	Proposed Assumption
1	35.0%	36.0%	25.0%	27.0%
2	30.0%	27.0%	26.0%	26.0%
3	24.0%	23.0%	27.0%	26.0%
4	14.0%	16.0%	27.0%	26.0%
5	14.0%	14.0%	27.0%	26.0%
6	9.0%	9.0%	27.0%	26.0%
7	6.0%	4.0%	27.0%	26.0%
8+	0.0%	0.0%	30.0%	30.0%



Section VII: OPEB Specific Supporting Tables

VSDP/VLDP – Rates of Disability Claim Termination

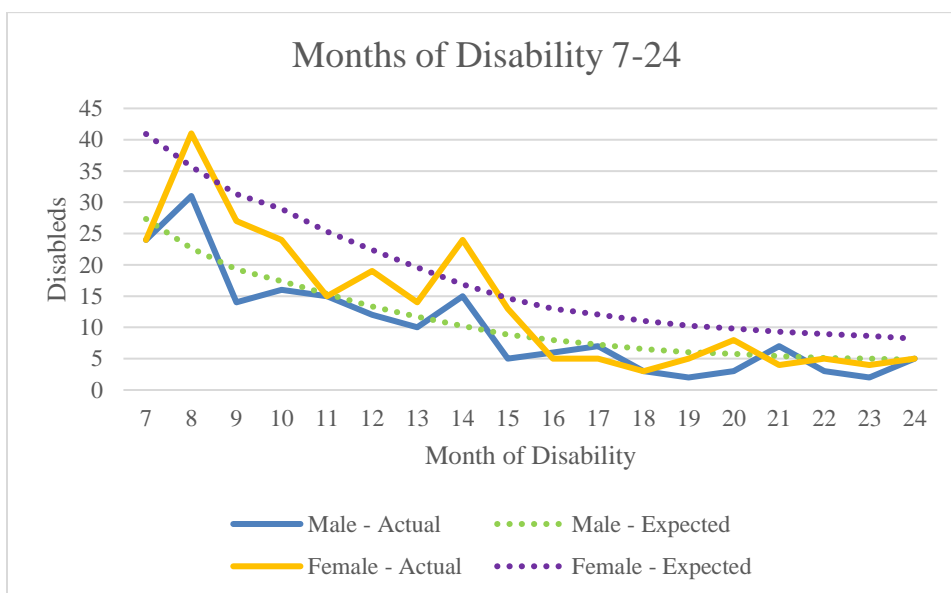
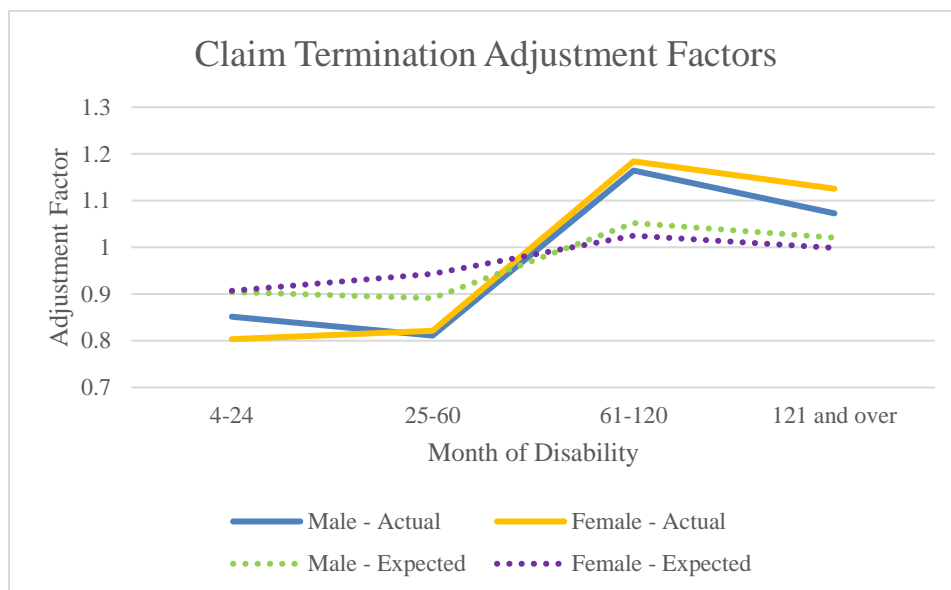
Claim termination rates are the rates at which those on long-term disability (LTD) are assumed to stop receiving VSDP/VLDP LTD income replacement benefits due to recovery or death.

We propose use of the standard presented by the American Academy of Actuaries Group Long-Term Disability Work Group to the National Association of Insurance Commissioners. This includes the use of the 2012 Group Long-Term Disability Valuation Table (2012 GLTD) as adopted by NAIC April 1, 2014. We have adjusted these rates for recent experience.

	Current Assumption		Actual/ Proposed Assumption	
Elimination Period	Six Months		Six Months	
Definition of Disability <i>First 24 Months of Disability</i> <i>Months 25+ of Disability</i>	Own Occupation Any Occupation		Own Occupation Any Occupation	
Initial Maximum Guaranteed Benefit*	\$1,900		\$1,900	
Cause of Disability	No Diagnosis		No Diagnosis	
Margin for Recovery	15%		15%	
Margin for Deaths	28%		28%	
Experience Adjustment Factors				
<i>Month of Disability</i>	Male	Female	Male	Female
4-24	0.904	0.907	0.852	0.803
25-60	0.891	0.943	0.811	0.821
61-120	1.052	1.025	1.164	1.184
121 and over	1.021	0.999	1.073	1.126

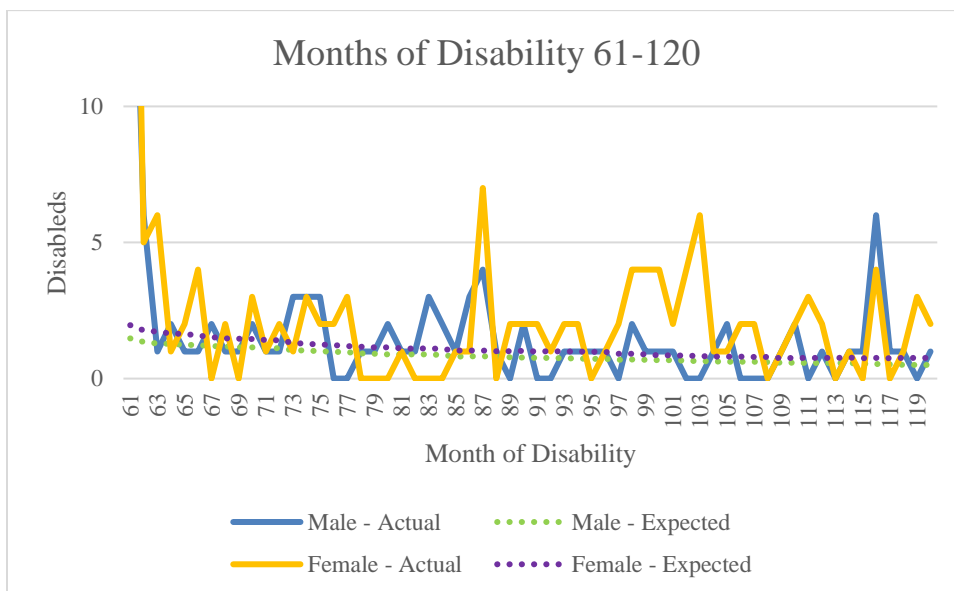
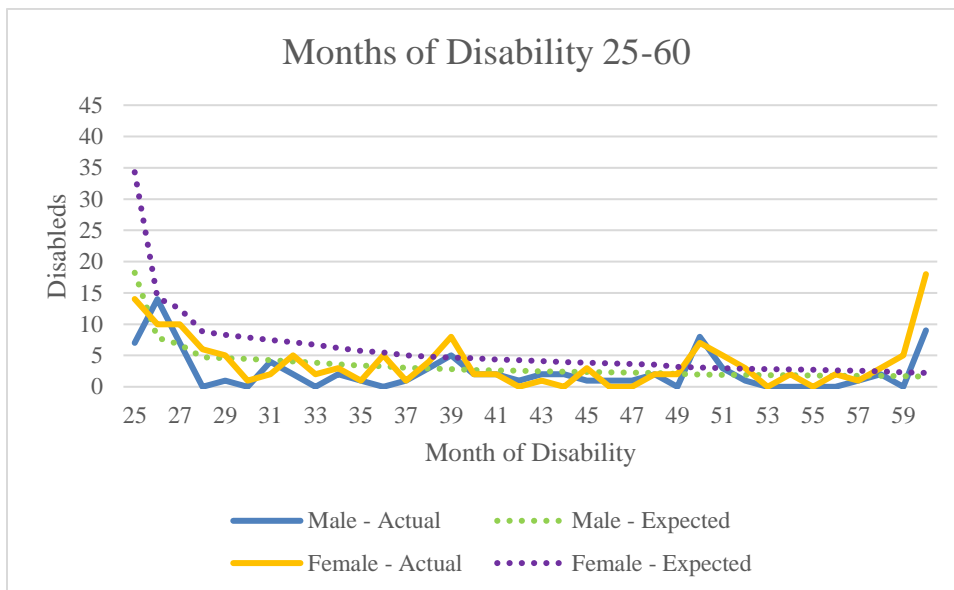


VSDP/VLDP – Rates of Disability Claim Termination (continued)



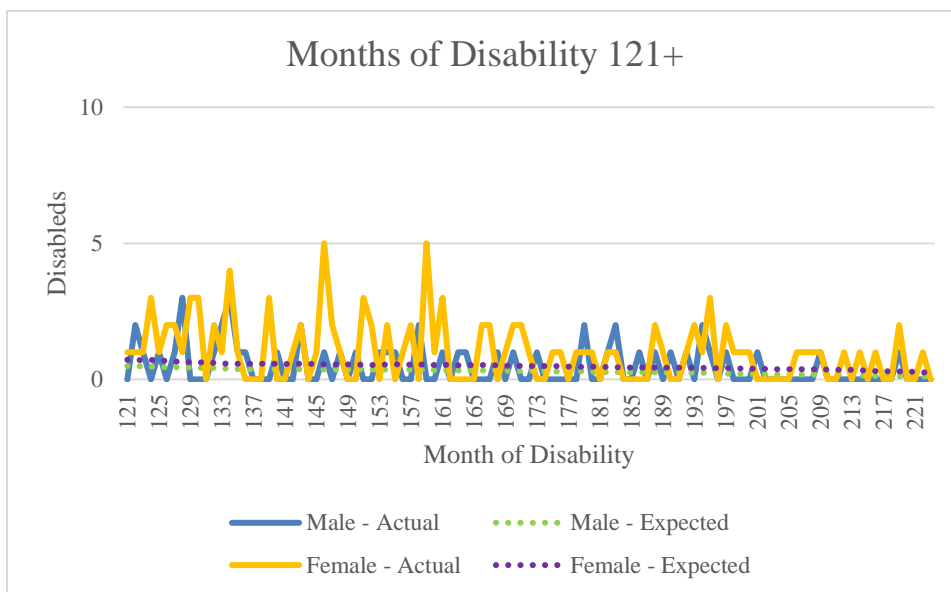


VSDP/VLDP – Rates of Disability Claim Termination (continued)





VSDP/VLDP – Rates of Disability Claim Termination (continued)





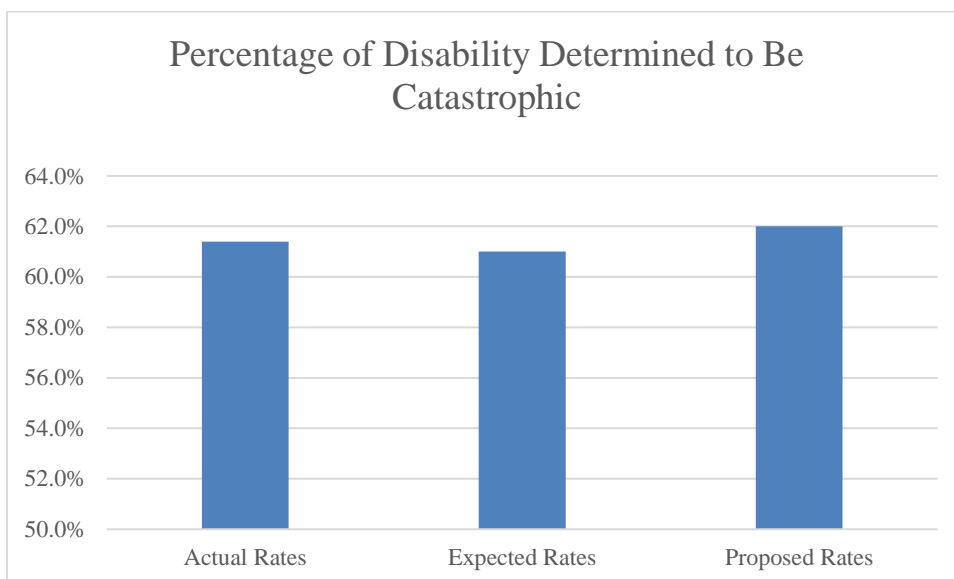
Section VII: OPEB Specific Supporting Tables

VSDP/VLDP – Catastrophic Claims

LTD income replacement benefits are higher if disability is determined to be catastrophic

- 80% income replacement level vs. the standard 60%

Approximately 7% of participants over the past four years had catastrophic coverage. Therefore, 7% * 80% catastrophic coverage + 93% * 60% standard coverage = 61.4%, which we rounded up to 62% for conservatism.



Experience	Current Assumption	Proposed Assumption
61.4%	61%	62%



VLDP Defined Contribution Benefit Utilization

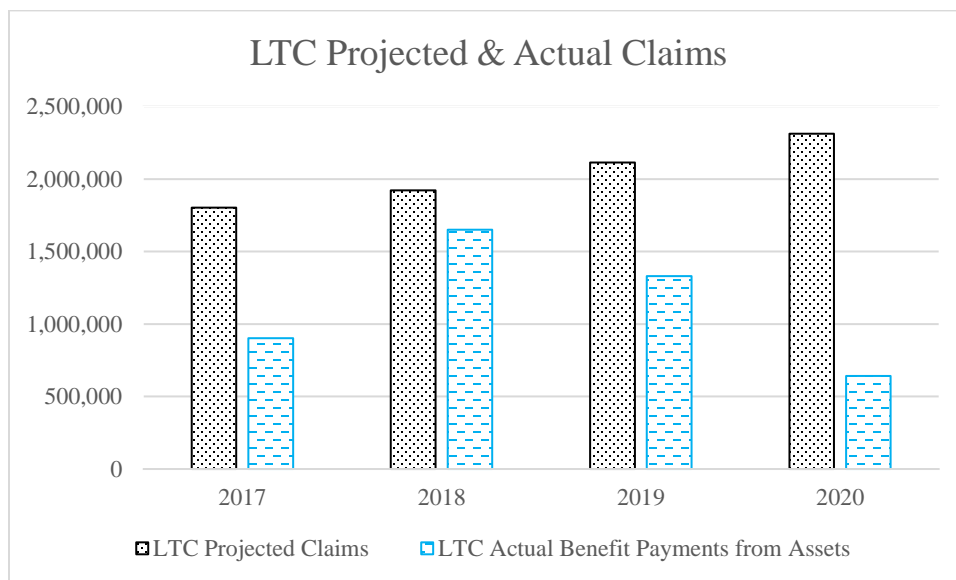
Based on our review of the percentage of members receiving an additional one percentage employer contribution, we recommend decreasing the defined contribution utilization assumption from 70.5% to 65%.

Year	Percentage Receiving Additional One Percentage Employer Contribution
2017	65.8%
2018	66.2%
2019	65.7%
2020	63.3%
Proposed	65.0%



VSDP/VLDP LTC – Morbidity, Claim Incidence, Porting Rates and Porting Premiums

Based on our analysis, projected LTC claims based on our assumptions have been larger than actual benefit costs paid over the experience period. Since we prefer to retain significant margin in these assumptions, particularly with the uncertainty around the COVID-19 pandemic, we recommend making no changes to the assumptions.



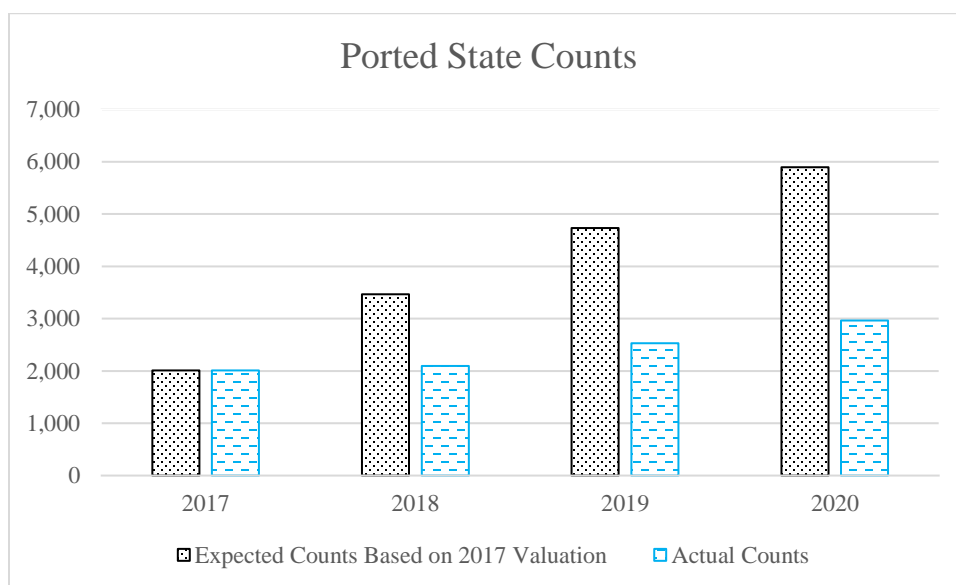
Year	LTC Projected Claims	LTC Actual Benefit Payments from Assets
2017	1,803,184	902,000
2018	1,921,994	1,652,000
2019	2,115,729	1,331,000
2020	2,313,969	642,740



Section VII: OPEB Specific Supporting Tables

**VSDP/VLDP LTC – Morbidity, Claim Incidence, Porting Rates and Porting Premiums
(continued)**

Based on our analysis, the expected number of ported members using our current assumptions have been larger than the actual number of ported members over the experience period. Since we prefer to retain significant margin in these assumptions, we recommend making no changes to the assumptions.



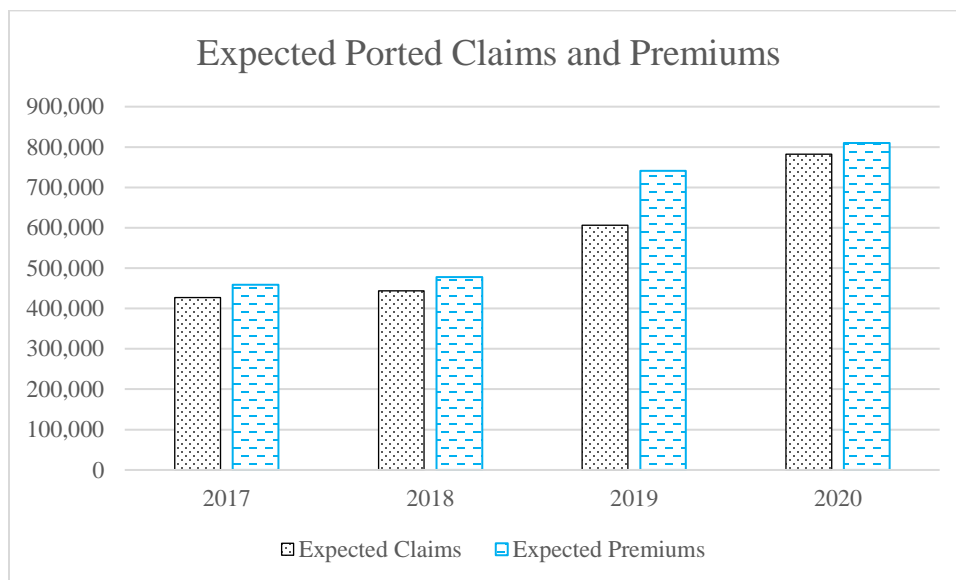
Year	Expected Counts Based on 2017 Valuation	Actual Counts
2017	2,009	2,009
2018	3,467	2,094
2019	4,736	2,528
2020	5,896	2,964



Section VII: OPEB Specific Supporting Tables

**VSDP/VLDP LTC – Morbidity, Claim Incidence, Porting Rates and Porting Premiums
(continued)**

Based on our analysis, expected porting premiums have been sufficient to cover expected benefit costs for ported members over the experience period. Therefore, we recommend making no changes to the current ported premiums.



Year	Expected Claims	Expected Premiums
2017	426,992	458,743
2018	443,546	478,080
2019	605,959	740,791
2020	782,286	809,735



COST IMPACT



Cost Impact Virginia Retirement System State

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio		Unfunded Liability	Normal Cost	DB Employer Contribution Rate
Valuation Results	75.1 %	\$	6,418	\$ 379	13.58 %
Impact of following recommendations:					
Mortality	(1.9)		647	15	1.39
Retirement	0.3		(126)	(3)	(0.33)
Other assumptions	0.2		(80)	(15)	(0.47)
Methods	0.2		(68)	16	0.28
Total Impact (not additive)	(1.1)		373	13	0.88
Results Based on Recommendations	74.0 %	\$	6,791	\$ 392	14.46 %

The update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in higher liabilities and employer contribution rates. The overall impact of other recommendations, in particular later retirements, helped partially offset the impact of mortality.



Cost Impact Virginia Retirement System Teachers

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio	Unfunded Liability	Normal Cost	DB Employer Contribution Rate	
Valuation Results	73.9 %	\$ 13,279	\$ 889	15.90	%
Impact of following recommendations:					
Mortality	(1.4)	964	25	1.08	
Retirement	0.4	(257)	(24)	(0.48)	
Other assumptions	(0.1)	46	(36)	(0.30)	
Methods	0.0	0	0	0.00	
Total Impact (not additive)	(1.2)	826	(34)	0.34	
Results Based on Recommendations	72.7 %	\$ 14,105	\$ 855	16.24	%

The update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in higher liabilities and employer contribution rates. The overall impact of other recommendations, in particular later retirements, helped partially offset the impact of mortality.



Cost Impact State Police Officers’ Retirement System

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)						
	Funded Ratio		Unfunded Liability		Normal Cost	DB Employer Contribution Rate
Valuation Results	73.0 %	\$	326	\$	21	26.72 %
Impact of following recommendations:						
Mortality	(2.7)		46		1	3.44
Retirement	(0.7)		11		0	1.01
Other assumptions	(0.1)		1		(1)	(0.07)
Methods	0.3		(5)		0	(0.17)
Total Impact (not additive)	(3.1)		53		1	4.09
Results Based on Recommendations	69.9 %	\$	379	\$	22	30.81 %

The update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in higher liabilities and employer contribution rates. The impact of disabled mortality tables increased cost further. Projected impact of earlier retirements increased costs as well. Other recommendations had minimal impact.



Cost Impact Virginia Law Officers’ Retirement System

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio	Unfunded Liability	Normal Cost	DB Employer Contribution Rate	
Valuation Results	68.5 %	\$ 712	\$ 45	22.13 %	
Impact of following recommendations:					
Mortality	(2.1)	71	4	2.76	
Retirement	0.0	(2)	0	(0.05)	
Other assumptions	0.1	(4)	(5)	(1.12)	
Methods	0.1	(4)	2	0.71	
Total Impact (not additive)	(1.8)	59	2	2.40	
Results Based on Recommendations	66.7 %	\$ 771	\$ 47	24.53 %	

The update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in higher liabilities and employer contribution rates. The impact of disabled mortality tables increased cost further. Projected impact of more terminations partially offset the increases.



Cost Impact Judicial Retirement System

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio		Unfunded Liability	Normal Cost	DB Employer Contribution Rate
Valuation Results	83.5 %	\$	112	\$ 18	27.47 %
Impact of following recommendations:					
Mortality	(7.7)		69	2	9.26
Retirement	2.1		(17)	(1)	(3.25)
Other assumptions	0.0		0	0	(0.57)
Methods	0.4		(4)	0	(0.12)
Total Impact (not additive)	(5.6)		49	1	5.15
Results Based on Recommendations	77.9 %	\$	161	\$ 19	32.62 %

The update to Pub-2010 public sector mortality tables specific to JRS and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in higher liabilities and employer contribution rates. The overall impact of other recommendations, in particular later retirements and lower projected salaries, helped partially offset the impact of mortality.



Cost Impact Political Subdivisions - Top 10

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio		Unfunded Liability	Normal Cost	DB Employer Contribution Rate
Valuation Results	81.9 %	\$	1,918	\$ 228	14.04 %
Impact of following recommendations:					
Mortality	(3.6)		483	12	2.41
Retirement	0.4		(48)	(1)	(0.28)
Other assumptions	(0.1)		8	4	0.31
Methods	0.2		(28)	5	0.17
Total Impact (not additive)	(3.0)		406	20	2.63
Results Based on Recommendations	78.9 %	\$	2,324	\$ 248	16.67 %

The update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in higher liabilities and employer contribution rates. The impact of disabled mortality tables increased cost further. Projected impact of later retirements partially offset the impact of mortality.



Cost Impact Political Subdivisions - Non Top 10 with Hazardous Duty

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio		Unfunded Liability	Normal Cost	DB Employer Contribution Rate
Valuation Results	87.4 %	\$	1,222	\$ 241	10.93 %
Impact of following recommendations:					
Mortality	(3.6)		430	11	1.98
Retirement	0.4		(40)	0	(0.20)
Other assumptions	0.1		(10)	2	0.21
Methods	0.3		(26)	8	0.32
Total Impact (not additive)	(2.9)		344	22	2.35
Results Based on Recommendations	84.5 %	\$	1,566	\$ 263	13.28 %

The update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in higher liabilities and employer contribution rates. The impact of disabled mortality tables increased cost further. Other recommendations had minimal impact.



Cost Impact Political Subdivisions - Non Top 10 without Hazardous Duty

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)						
	Funded Ratio		Unfunded Liability		Normal Cost	DB Employer Contribution Rate
Valuation Results	94.0 %	\$	297	\$	105	5.18 %
Impact of following recommendations:						
Mortality	(4.3)		239		5	1.70
Retirement	1.1		(57)		(2)	(0.53)
Other assumptions	0.4		(20)		(8)	(0.57)
Methods	0.2		(7)		5	0.39
Total Impact (not additive)	(2.7)		148		1	1.02
Results Based on Recommendations	91.3 %	\$	445	\$	106	6.20 %

The update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in higher liabilities and employer contribution rates. Projected impact of later retirements and more terminations partially offset the impact of mortality.



Cost Impact Group Life Insurance Program

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio	Unfunded Liability	Normal Cost	Employer Contribution Rate*	
Valuation Results	53.2 %	\$ 1,677.9	\$ 90.8	1.02 %	
Impact of following recommendations:					
Mortality	2.7	(173.2)	(8.3)	(0.11)	
Retirement	0.1	(8.6)	(0.1)	0.00	
Other assumptions	0.2	(12.2)	(4.9)	(0.03)	
Methods	(0.1)	7.8	0.7	0.00	
Life Only Retiree Liability Assumption	(0.4)	25.6	0.0	0.01	
Total Impact (not additive)	2.5	(160.6)	(12.6)	(0.13)	
Results Based on Recommendations	55.7 %	\$ 1,517.3	\$ 78.2	0.89 %	

* Contribution rate excludes 0.34% adjustment for Active Group Life Insurance.
 For life insurance benefits, unlike a pension annuity payable for life, the update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in lower liabilities and employer contribution rates. An update to our assumption for valuing Life Only retirees resulted in a small increase in liabilities and employer contribution rates.



Cost Impact Line of Duty Act Fund (LODA)

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)				
	Funded Ratio	Unfunded Liability	Normal Cost	FY 2022 & FY 2023 Contribution Rate (per FTE)*
Valuation Results	1.47 %	\$ 291.1	\$ 14.0	\$ 758.03
Impact of following recommendations:				
Mortality, Retirement				
Termination and Methods	0.01	(1.7)	1.0	(30.54)
LODA Specific Assumptions	(0.06)	11.8	10.4	70.78
Discount Rate (4.75% -> 6.75%)	0.31	(54.3)	(6.7)	(15.13)
Total Impact (not additive)	0.25	(44.2)	4.7	25.11
Results Based on Recommendations	1.72 %	\$ 246.9	\$ 18.7	\$ 783.14

*Rates are Informational.

The increase in the discount rate resulted in a lower liabilities, but had less impact on the pay-as-you-go employer contribution rate since the assets are projected to be depleted in 2 years in the pay-as-you-go calculation. The LODA specific assumptions resulted in an increase to the liabilities and the pay-as-you-go employer contribution rate because they generally increased the number of active deaths and disabilities assumed to be eligible for LODA benefits. These increases were somewhat offset by the decremental assumption changes.



Cost Impact Health Insurance Credit State

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)						
	Funded Ratio		Unfunded Liability		Normal Cost	Employer Contribution Rate
Valuation Results	12.7 %	\$	894.5	\$	19.1	1.08 %
Impact of following recommendations:						
Mortality	(0.3)		23.4		0.6	0.04
Retirement	0.1		(5.8)		0.0	0.00
Other assumptions	0.0		(3.9)		(0.8)	(0.02)
Methods	0.1		(5.5)		(0.1)	(0.01)
Percentage Not Utilizing Max Service Retirees	0.0		2.1		0.1	0.01
from TVs Utilization	(0.1)		1.7		0.1	0.00
First Year Benefit Increase	0.0		(0.5)		0.0	0.00
VaLORS/SPORS:						
Disabled Participation	0.0		0.0		0.0	0.00
Future VTs Refund	0.0		0.1		0.0	0.00
Total Impact (not additive)	(0.2)		11.6		(0.1)	0.02
Results Based on Recommendations	12.5 %	\$	906.1	\$	19.0	1.10 %

Similar to the pension plan, the assumption for mortality improvement was offset by other decremental and method changes. The OPEB specific assumptions did not have a significant impact on liabilities and employer contribution rates.



Cost Impact Health Insurance Credit Teachers

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio		Unfunded Liability	Normal Cost	Employer Contribution Rate
Valuation Results	10.5 %	\$	1,280.6	\$ 20.3	1.18 %
Impact of following recommendations:					
Mortality	(0.2)		18.7	0.5	0.02
Retirement	0.0		2.0	(0.2)	0.00
Other assumptions	0.1		(11.4)	(2.3)	(0.03)
Methods	0.0		0.0	0.0	0.00
Percentage Not Utilizing Max Service Retirees	0.0		2.8	0.1	0.00
from TVs Utilization	0.0		5.2	0.2	0.01
First Year Benefit Increase	0.0		(0.8)	0.0	0.00
VaLORS/SPORS:					
Disabled Participation	0.0		0.0	0.0	0.00
Future VTs Refund	0.0		(4.1)	(0.5)	(0.01)
Total Impact (not additive)	(0.1)		12.4	(2.2)	(0.01)
Results Based on Recommendations	10.4 %	\$	1,293.0	\$ 18.1	1.17 %

Similar to the pension plan, the assumption for mortality improvement was offset by other decremental and method changes. The OPEB specific assumptions offset each other and did not have a significant impact on liabilities and employer contribution rates.



Cost Impact Health Insurance Credit Political Subdivisions

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)						
	Funded Ratio		Unfunded Liability		Normal Cost	Employer Contribution Rate
Valuation Results	31.9 %	\$	52.2	\$	1.4	0.64 %
Impact of following recommendations:						
Mortality	(1.1)		2.7		0.1	0.02
Retirement	0.2		(0.5)		0.0	(0.01)
Other assumptions	0.1		(0.1)		(0.1)	0.00
Methods	0.1		(0.4)		0.0	0.00
Percentage Not Utilizing Max Service Retirees	(0.1)		0.2		0.0	0.00
from TVs Utilization	0.1		0.0		0.0	0.00
First Year Benefit Increase	0.0		0.0		0.0	0.00
Disabled Participation	(0.1)		0.0		0.0	0.00
Future VTs Refund	0.2		(0.3)		0.0	(0.01)
Total Impact (not additive)	(0.6)		1.6		0.0	0.00
Results Based on Recommendations	31.3 %	\$	53.8	\$	1.4	0.64 %

Similar to the pension plan, the assumption for mortality improvement was offset by other decremental and method changes. The OPEB specific assumptions did not have a significant impact on liabilities and employer contribution rates.



Cost Impact Health Insurance Credit Constitutional Officers

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)						
	Funded Ratio		Unfunded Liability		Normal Cost	Employer Contribution Rate
Valuation Results	15.9 %	\$	27.1	\$	0.7	0.35 %
Impact of following recommendations:						
Mortality	(0.5)		0.9		0.1	0.02
Retirement	0.1		(0.1)		0.0	0.00
Other assumptions	0.0		0.0		0.0	0.00
Methods	0.1		(0.3)		0.0	0.00
Percentage Not Utilizing Max Service Retirees	0.0		0.1		0.0	0.00
from TVs Utilization	0.0		0.0		0.0	0.00
First Year Benefit Increase	0.0		0.0		0.0	0.00
Disabled Participation	0.0		0.0		0.0	0.00
Future VTs Refund	0.1		(0.1)		0.0	(0.01)
Total Impact (not additive)	(0.2)		0.5		0.1	0.01
Results Based on Recommendations	15.7 %	\$	27.6	\$	0.8	0.36 %

Similar to the pension plan, the assumption for mortality improvement was offset by other decremental and method changes. The OPEB specific assumptions did not have a significant impact on liabilities and employer contribution rates.



Cost Impact Health Insurance Credit Social Services

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)						
	Funded Ratio		Unfunded Liability		Normal Cost	Employer Contribution Rate
Valuation Results	13.3 %	\$	12.6	\$	0.3	0.39 %
Impact of following recommendations:						
Mortality	(0.4)		0.5		0.0	0.01
Retirement	0.0		(0.1)		0.0	0.00
Other assumptions	0.1		0.0		0.0	(0.01)
Methods	0.0		(0.1)		0.0	0.00
Percentage Not Utilizing Max Service Retirees	0.0		0.0		0.0	0.00
from TVs Utilization	0.0		0.0		0.0	0.00
First Year Benefit Increase	0.0		0.0		0.0	0.00
Disabled Participation	0.0		0.0		0.0	0.00
Future VTs Refund	0.1		0.0		0.0	0.00
Total Impact (not additive)	(0.2)		0.3		0.0	0.00
Results Based on Recommendations	13.1 %	\$	12.9	\$	0.3	0.39 %

Similar to the pension plan, the assumption for mortality improvement was offset by other decremental and method changes. The OPEB specific assumptions did not have a significant impact on liabilities and employer contribution rates.



Cost Impact Health Insurance Credit Registrars

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)						
	Funded Ratio		Unfunded Liability		Normal Cost	Employer Contribution Rate
Valuation Results	21.9 %	\$	0.4	\$	0.0	0.37 %
Impact of following recommendations:						
Mortality	(0.6)		0.1		0.0	0.02
Retirement	0.2		0.0		0.0	(0.01)
Other assumptions	0.1		0.0		0.0	0.00
Methods	0.1		0.0		0.0	(0.01)
Percentage Not Utilizing Max Service Retirees	(0.1)		0.0		0.0	0.01
from TVs Utilization	0.0		0.0		0.0	0.00
First Year Benefit Increase	0.1		0.0		0.0	0.00
Disabled Participation	(0.1)		0.0		0.0	0.00
Future VTs Refund	0.1		0.0		0.0	(0.01)
Total Impact (not additive)	(0.2)		0.1		0.0	0.00
Results Based on Recommendations	21.7 %	\$	0.5	\$	0.0	0.37 %

Similar to the pension plan, the assumption for mortality improvement was offset by other decremental and method changes. The OPEB specific assumptions did not have a significant impact on liabilities and employer contribution rates.



Cost Impact VSDP

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio		Unfunded Liability	Normal Cost	Employer Contribution Rate
Valuation Results	203.01 %	\$	(256.4)	\$ 30.6	0.56 %
Impact of following recommendations:					
Mortality	(5.10)		6.4	0.6	0.02
Retirement	0.90		(1.2)	0.0	0.00
Other Assumptions	1.40		(1.8)	(0.2)	(0.01)
Methods	8.43		(10.2)	(0.4)	(0.02)
Rates of Termination					
due to Recovery or Death	0.36		(0.4)	0.6	0.01
Offsets for Active Members	(2.00)		2.3	1.7	0.05
Offsets for Disabled Members	(0.19)		0.2	0.0	0.00
Catastrophic Claims	(0.55)		0.7	0.5	0.01
Total Impact (not additive)	3.25		(3.9)	2.7	0.06
Results Based on Recommendations	206.26 %	\$	(260.3)	\$ 33.3	0.62 %

For VSDP benefits, which provide partial salary continuation until death, recovery or retirement, the update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in slightly higher liabilities and employer contribution rates. The impact is less than for pension benefits which are payable for life. Other decremental and method changes offset the mortality costs. Changes to assumptions regarding benefit offsets, termination from disability and catastrophic claims resulted in slight increases to costs.



Cost Impact VLDP Teachers

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)					
	Funded Ratio		Unfunded Liability	Normal Cost	Employer Contribution Rate
Valuation Results	89.20 %	\$	0.36	\$ 1.28	0.45 %
Impact of following recommendations:					
Mortality	(1.96)		0.08	0.05	0.01
Retirement	(1.44)		0.06	0.01	0.00
Other Assumptions	2.42		(0.10)	(0.04)	0.00
Methods	0.00		0.00	0.00	0.00
Rates of Termination					
due to Recovery or Death	(0.70)		0.03	0.02	0.00
Offsets for Active Members	(2.91)		0.12	0.05	0.01
Offsets for Disabled Members	0.00		0.00	0.00	0.00
Catastrophic Claims	(0.76)		0.03	0.01	0.01
Percentage Eligible for Additional 1% DC	0.07		0.00	0.00	0.00
Total Impact (not additive)	(5.29)		0.21	0.11	0.03
Results Based on Recommendations	83.91 %	\$	0.57	\$ 1.38	0.48 %

For VLDP benefits, which provide partial salary continuation until death, recovery or retirement, the update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in slightly higher liabilities and employer contribution rates. The impact is less than for pension benefits which are payable for life. Decremental changes other than retirements offset the mortality costs. Changes to assumptions regarding benefit offsets, termination from disability and catastrophic claims resulted in slight increases to costs.



Cost Impact VLDP Political Subdivisions

Impact of Recommendations on Results of the June 30, 2020 Actuarial Valuation (Dollar Amounts in Millions)						
	Funded Ratio		Unfunded Liability		Normal Cost	Employer Contribution Rate
Valuation Results	91.28 %	\$	0.33	\$	1.71	0.82 %
Impact of following recommendations:						
Mortality	(2.02)		0.09		0.08	0.03
Retirement	0.49		(0.02)		(0.01)	(0.01)
Other Assumptions	4.57		(0.19)		(0.07)	0.00
Methods	7.64		(0.27)		0.01	(0.01)
Rates of Termination						
due to Recovery or Death	(0.18)		0.01		0.01	0.00
Offsets for Active Members	(1.49)		0.05		0.08	0.03
Offsets for Disabled Members	(0.12)		0.00		0.00	0.00
Catastrophic Claims	(0.41)		0.01		0.02	0.00
Percentage Eligible for Additional 1% DC	0.06		0.00		0.00	0.00
Total Impact (not additive)	8.54		(0.32)		0.12	0.04
Results Based on Recommendations	99.83 %	\$	0.01	\$	1.82	0.86 %

For VLDP benefits, which provide partial salary continuation until death, recovery or retirement, the update to Pub-2010 public sector mortality tables and replacing the load with a modified Mortality Improvement Scale MP-2020 resulted in slightly higher liabilities and employer contribution rates. The impact is less than for pension benefits which are payable for life. Other decremental and method changes offset the mortality costs. Changes to assumptions regarding benefit offsets, termination from disability and catastrophic claims resulted in slight increases to costs.



APPENDIX



Appendix – Summary of Recommended Actuarial Assumptions

Assumptions and Methods Applicable to all VRS Pension Plans

Investment Return Rate: 6.75% per annum, compounded annually, net of investment expenses.

Inflation Assumption: 2.50% per year.

Actuarial Cost Method: Entry age normal cost method. Actuarial gains and losses are reflected in the unfunded actuarial accrued liability.

Funding Period: The legacy unfunded actuarial accrued liability less the deferred contribution as of June 30, 2013 is amortized over a closed 30-year period from June 30, 2013. The amortization period of the unfunded less the deferred contribution, will decrease by one each year until reaching 0 years. The deferred contribution, as defined under the 2011 Appropriations Act, Item 469(1)(6), has been paid off except for Teachers which is to be amortized using a level-dollar, closed 10-year period beginning June 30, 2011. The actuarial gains and losses and other changes in the unfunded due to benefit and actuarial assumption and method changes for each valuation subsequent to the June 30, 2013 valuation will be amortized over a closed 20-year period. See the Amortization Schedules for more detail. The amortization of the unfunded accrued liability assumes that payroll will increase by 3% annually and the amortization period will decrease by one year until reaching 0 years.

The amortization payment includes an adjustment of 1.018041 to account for the passage of time from the valuation date to the date the contribution is made.

Payroll Growth Rate: 3.00% per annum.

Asset Valuation Method: The method of valuing assets is intended to recognize a “smoothed” market value of assets. Under this method, the difference between actual return on market value from investment experience and the expected return on market value is recognized over a five-year period. The resulting



Appendix – Summary of Recommended Actuarial Assumptions

	actuarial value of assets cannot be less than 80% or more than 120% of the market value of assets.
Cost-of-living Increase:	2.50% per year compounded annually for Plan 1 members receiving benefits or vested as of January 1, 2013 and 2.25% compounded annually for all other members. The temporary supplement for SPORS and VaLORS members is assumed to be adjusted biennially based on increases of 2.50% per annum compounded annually.
Percent Electing a Deferred Termination Benefit:	Terminating members are assumed to elect a return of contributions or a deferred annuity, whichever is most valuable benefit at the time of termination. Termination benefits are assumed to commence at normal retirement age.
Marriage Assumption:	100% of active employees are assumed to be married, with males two years older than females.
Service-Related Disability:	The service-related disability benefits do not include an adjustment for Social Security or Worker’s Compensation benefits.
Hazardous Duty Service:	The valuations of SPORS and VaLORS assume that all VRS service is hazardous duty service for purposes of determining eligibility for the temporary supplement.
Administrative Expenses:	The employer contribution rates include a rate for anticipated non-investment expenses based on actual prior year experience.



STATE EMPLOYEES

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted General Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; females set forward 2 years

Post-Retirement:

Pub-2010 Benefits Weighted General Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for females

Post-Disablement:

Pub-2010 Benefits Weighted General Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale; males and females set forward 3 years

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted General Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males and females



Appendix – Summary of Recommended Actuarial Assumptions

State Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00037	0.00037	0.00316	0.00041	0.00011	0.00014	0.00176	0.00014
25	0.00028	0.00028	0.00321	0.00031	0.00011	0.00010	0.00215	0.00010
30	0.00036	0.00036	0.00411	0.00040	0.00018	0.00017	0.00336	0.00017
35	0.00047	0.00047	0.00555	0.00052	0.00028	0.00025	0.00524	0.00025
40	0.00066	0.00066	0.00834	0.00073	0.00043	0.00040	0.00825	0.00040
45	0.00098	0.00098	0.01342	0.00604	0.00066	0.00062	0.01267	0.00288
50	0.00149	0.00298	0.01921	0.00771	0.00097	0.00244	0.01640	0.00352
55	0.00219	0.00431	0.02355	0.00906	0.00144	0.00315	0.01874	0.00491
60	0.00319	0.00615	0.02785	0.01113	0.00222	0.00422	0.02110	0.00684
65	0.00468	0.00913	0.03524	0.01522	0.00362	0.00674	0.02569	0.00989
70	0.00703	0.01526	0.04599	0.02342	0.00598	0.01169	0.03464	0.01488
75	0.01096	0.02671	0.06347	0.03720	0.00986	0.02071	0.05075	0.02366
80	0.01730	0.04774	0.09259	0.05896	0.04276	0.03696	0.07811	0.03930
85		0.08591	0.13603	0.09617		0.06826	0.11878	0.06948
90		0.14672	0.20588	0.15860		0.12636	0.16740	0.12462

25% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 1.

State Employees Retirement Rates, Plan 1 Male							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0325	0.0325	0.1250	0.1250
51	0.0000	0.0000	0.0000	0.0325	0.0300	0.0800	0.0900
52	0.0000	0.0000	0.0000	0.0325	0.0300	0.0800	0.0900
53	0.0000	0.0000	0.0000	0.0325	0.0300	0.0800	0.0900
54	0.0000	0.0000	0.0000	0.0325	0.0300	0.0800	0.0900
55	0.0000	0.0450	0.0450	0.0450	0.0350	0.0800	0.0900
56	0.0000	0.0450	0.0400	0.0400	0.0400	0.0800	0.0900
57	0.0000	0.0450	0.0400	0.0400	0.0400	0.0800	0.0900
58	0.0000	0.0450	0.0400	0.0400	0.0400	0.1000	0.0900
59	0.0000	0.0450	0.0400	0.0400	0.0400	0.1000	0.0900
60	0.0000	0.0450	0.0500	0.0500	0.0500	0.1150	0.0900
61	0.0000	0.1500	0.0750	0.0750	0.0750	0.1700	0.1500
62	0.0000	0.1500	0.1000	0.1000	0.1000	0.1700	0.2000
63	0.0000	0.1500	0.1000	0.1000	0.1000	0.1700	0.1750
64	0.0000	0.1500	0.1350	0.1350	0.1350	0.1700	0.1750
65	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
66	0.0000	0.2750	0.2500	0.2500	0.2500	0.2500	0.2500
67	0.0000	0.2750	0.2200	0.2200	0.2200	0.2200	0.2200
68	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
69	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
70	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
71	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
72	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
73	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
74	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
75	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
76	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
77	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
78	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
79	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
>=80	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000



Appendix – Summary of Recommended Actuarial Assumptions

State Employees Retirement Rates, Plan 1 Female							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0400	0.0400	0.0750	0.0750
51	0.0000	0.0000	0.0000	0.0400	0.0300	0.0750	0.0600
52	0.0000	0.0000	0.0000	0.0400	0.0350	0.0750	0.0600
53	0.0000	0.0000	0.0000	0.0500	0.0350	0.0750	0.0800
54	0.0000	0.0000	0.0000	0.0500	0.0350	0.0750	0.0800
55	0.0000	0.0500	0.0500	0.0500	0.0400	0.0750	0.0800
56	0.0000	0.0500	0.0400	0.0400	0.0400	0.0750	0.0800
57	0.0000	0.0500	0.0400	0.0400	0.0400	0.1000	0.0900
58	0.0000	0.0500	0.0450	0.0450	0.0450	0.1000	0.0900
59	0.0000	0.0500	0.0500	0.0500	0.0500	0.1200	0.0900
60	0.0000	0.0500	0.0550	0.0550	0.0550	0.1200	0.1250
61	0.0000	0.0750	0.0800	0.0800	0.0800	0.1200	0.1600
62	0.0000	0.1000	0.1200	0.1200	0.1200	0.2250	0.2000
63	0.0000	0.1750	0.1200	0.1200	0.1200	0.2250	0.1750
64	0.0000	0.1750	0.1500	0.1500	0.1500	0.2250	0.1750
65	0.0000	0.2750	0.2750	0.2750	0.2750	0.2750	0.3000
66	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
67	0.0000	0.3000	0.2500	0.2500	0.2500	0.2500	0.2500
68	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
69	0.0000	0.2500	0.2700	0.2700	0.2700	0.2700	0.2700
70	0.0000	0.2500	0.2700	0.2700	0.2700	0.2700	0.2700
71	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
72	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
73	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
74	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
75	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
76	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
77	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
78	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
79	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
>=80	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 2 and the Hybrid Plan.

State Employees Retirement Rates, Plan 2 and Hybrid Male																			
Age	Years of Service																		
	0-4	5	6-24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	>=40
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
60	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
61	0.000	0.080	0.075	0.075	0.075	0.075	0.080	0.080	0.080	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
62	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
63	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
64	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
65	0.000	0.200	0.200	0.200	0.200	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
66	0.000	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
67	0.000	0.230	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
68	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
69	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
70	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
71	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
72	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
73	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
74	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
75	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
76	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
77	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
78	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
79	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

State Employees Retirement Rates, Plan 2 and Hybrid Female																			
Age	Years of Service																		
	0-4	5	6-24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	>=40
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
60	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
61	0.000	0.080	0.075	0.075	0.075	0.075	0.080	0.080	0.080	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
62	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
63	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
64	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
65	0.000	0.200	0.200	0.200	0.200	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
66	0.000	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
67	0.000	0.230	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
68	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
69	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
70	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
71	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
72	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
73	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
74	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
75	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
76	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
77	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
78	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
79	0.000	0.250	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

DISABILITY RATES: As shown below for selected ages. 25% of disability cases are assumed to be service related.

State Employees Disability Rates		
Age	Male	Female
20	0.00039	0.00033
25	0.00072	0.00100
30	0.00091	0.00211
35	0.00129	0.00281
40	0.00212	0.00354
45	0.00343	0.00474
50	0.00497	0.00629
55	0.00629	0.00742
60	0.00690	0.00735
65	0.00657	0.00653
70	0.00572	0.00841



Appendix – Summary of Recommended Actuarial Assumptions

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

State Termination Rates, Male											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.27455	0.24436	0.21876	0.19618	0.17376	0.15141	0.13019	0.11442	0.10694	0.11166	0.13006
25	0.23974	0.21579	0.19409	0.17424	0.15524	0.13693	0.11975	0.10595	0.09746	0.09732	0.10701
30	0.19848	0.17836	0.15985	0.14343	0.12952	0.11720	0.10578	0.09487	0.08505	0.07808	0.07539
35	0.17716	0.15218	0.13247	0.11805	0.10829	0.10087	0.09383	0.08541	0.07535	0.06447	0.05388
40	0.16592	0.13267	0.10974	0.09619	0.08963	0.08644	0.08292	0.07677	0.06737	0.05473	0.03929
45	0.15975	0.11918	0.09302	0.07949	0.07467	0.07461	0.07339	0.06905	0.06126	0.04945	0.03331
50	0.15528	0.11158	0.08401	0.07030	0.06578	0.06661	0.06592	0.06272	0.05733	0.04934	0.03819
55	0.15197	0.11087	0.08483	0.07159	0.06658	0.06381	0.06149	0.05872	0.05613	0.05509	0.05439
60	0.15091	0.11838	0.09735	0.08612	0.08094	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.15304	0.13450	0.12193	0.11472	0.11037	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.16014	0.16414	0.16565	0.16590	0.16406	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

State Termination Rates, Female											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.31051	0.30337	0.28078	0.24487	0.20381	0.16715	0.14191	0.11957	0.10836	0.11872	0.15981
25	0.27376	0.26249	0.24118	0.21199	0.18029	0.15160	0.13004	0.11112	0.09997	0.10375	0.12876
30	0.23050	0.21033	0.18887	0.16746	0.14755	0.12956	0.11392	0.10015	0.08933	0.08403	0.08671
35	0.20766	0.17777	0.15365	0.13514	0.12123	0.10996	0.09994	0.09070	0.08104	0.07066	0.05980
40	0.19406	0.15556	0.12786	0.10975	0.09881	0.09213	0.08715	0.08194	0.07420	0.06178	0.04364
45	0.18340	0.13974	0.10951	0.09110	0.08142	0.07776	0.07634	0.07404	0.06888	0.05803	0.04010
50	0.17198	0.12790	0.09781	0.08001	0.07116	0.06882	0.06860	0.06763	0.06550	0.06030	0.05125
55	0.16001	0.12044	0.09383	0.07856	0.07120	0.06731	0.06491	0.06383	0.06463	0.06942	0.07765
60	0.14937	0.11902	0.09937	0.08896	0.08486	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.14142	0.12453	0.11513	0.11187	0.11326	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.13651	0.14019	0.14662	0.15441	0.16495	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000



Appendix – Summary of Recommended Actuarial Assumptions

SALARY INCREASE RATES: The following total salary increase rates are used. The total salary increase rate consists of an inflation rate of 2.50%, a productivity component of 1.00%, and a variable merit component that is dependent on years of service.

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	5.35%
2	5.35
3	4.75
4	4.45
5	4.45
6	4.45
7	4.35
8	4.25
9	4.00
10	4.00
11-19	3.65
20 or more	3.50

DISABILITY ELECTION: All active members hired on or after January 1, 1999 will enter the Virginia Sickness and Disability Program (VSDP) and will not be eligible to receive non-VSDP disability benefits. For members hired before January 1, 1999 we measure the liabilities based upon the member’s actual election contained in the valuation data.

EMPLOYER CONTRIBUTION TO DEFINED CONTRIBUTION HYBRID PLAN: The valuation assumes an average employer defined contribution rate for members in the Hybrid Plan. This is reported by VRS each valuation.



TEACHERS

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted Teachers Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males

Post-Retirement:

Pub-2010 Benefits Weighted Teachers Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; males set forward 1 year; 105% of rates for females

Post-Disablement:

Pub-2010 Benefits Weighted Teachers Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males and females

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted Teachers Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale



Appendix – Summary of Recommended Actuarial Assumptions

Teachers Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00037	0.00030	0.00453	0.00034	0.00013	0.00014	0.00256	0.00013
25	0.00018	0.00017	0.00306	0.00016	0.00009	0.00010	0.00180	0.00009
30	0.00024	0.00024	0.00389	0.00022	0.00014	0.00015	0.00283	0.00014
35	0.00033	0.00032	0.00504	0.00030	0.00020	0.00021	0.00441	0.00020
40	0.00046	0.00046	0.00710	0.00042	0.00031	0.00033	0.00692	0.00031
45	0.00074	0.00074	0.01108	0.00549	0.00048	0.00050	0.01084	0.00262
50	0.00122	0.00122	0.01766	0.00701	0.00073	0.00077	0.01631	0.00320
55	0.00189	0.00245	0.02325	0.00824	0.00107	0.00203	0.01916	0.00446
60	0.00290	0.00393	0.02753	0.01012	0.00161	0.00301	0.02152	0.00622
65	0.00479	0.00662	0.03348	0.01384	0.00270	0.00468	0.02482	0.00899
70	0.00780	0.01214	0.04291	0.02129	0.00485	0.00809	0.03148	0.01353
75	0.01185	0.02312	0.05711	0.03382	0.00921	0.01534	0.04403	0.02151
80	0.02343	0.04363	0.08083	0.05360	0.01826	0.02959	0.06608	0.03573
85		0.08198	0.11897	0.08743		0.05655	0.10264	0.06316
90		0.14859	0.17878	0.14418		0.10594	0.15032	0.11329

5% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 1.

Teachers Employees Retirement Rates, Plan 1 Male							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.025	0.025	0.150	0.150
51	0.000	0.000	0.000	0.070	0.035	0.150	0.100
52	0.000	0.000	0.000	0.070	0.035	0.150	0.100
53	0.000	0.000	0.000	0.040	0.035	0.150	0.100
54	0.000	0.000	0.000	0.040	0.040	0.150	0.100
55	0.000	0.070	0.070	0.070	0.050	0.225	0.150
56	0.000	0.070	0.050	0.050	0.050	0.225	0.150
57	0.000	0.070	0.050	0.050	0.050	0.225	0.150
58	0.000	0.070	0.050	0.050	0.050	0.225	0.150
59	0.000	0.100	0.070	0.070	0.070	0.225	0.150
60	0.000	0.100	0.075	0.075	0.075	0.225	0.170
61	0.000	0.110	0.120	0.120	0.120	0.350	0.230
62	0.000	0.170	0.150	0.150	0.150	0.350	0.300
63	0.000	0.140	0.150	0.150	0.150	0.350	0.250
64	0.000	0.180	0.150	0.150	0.150	0.350	0.250
65	0.000	0.300	0.300	0.300	0.300	0.300	0.340
66	0.000	0.275	0.340	0.340	0.340	0.340	0.340
67	0.000	0.300	0.340	0.340	0.340	0.340	0.340
68	0.000	0.300	0.300	0.300	0.300	0.300	0.300
69	0.000	0.300	0.300	0.300	0.300	0.300	0.300
70	0.000	0.300	0.300	0.300	0.300	0.300	0.300
71	0.000	0.300	0.300	0.300	0.300	0.300	0.300
72	0.000	0.300	0.250	0.250	0.250	0.250	0.250
73	0.000	0.300	0.250	0.250	0.250	0.250	0.250
74	0.000	0.300	0.250	0.250	0.250	0.250	0.250
75	0.000	0.300	0.250	0.250	0.250	0.250	0.250
76	0.000	0.300	0.250	0.250	0.250	0.250	0.250
77	0.000	0.300	0.250	0.250	0.250	0.250	0.250
78	0.000	0.300	0.250	0.250	0.250	0.250	0.250
79	0.000	0.300	0.250	0.250	0.250	0.250	0.250
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Teachers Employees Retirement Rates, Plan 1 Female							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.030	0.030	0.150	0.150
51	0.000	0.000	0.000	0.045	0.030	0.150	0.100
52	0.000	0.000	0.000	0.045	0.040	0.150	0.100
53	0.000	0.000	0.000	0.045	0.040	0.150	0.100
54	0.000	0.000	0.000	0.045	0.045	0.150	0.120
55	0.000	0.045	0.045	0.045	0.050	0.225	0.160
56	0.000	0.060	0.055	0.055	0.055	0.225	0.160
57	0.000	0.060	0.055	0.055	0.055	0.225	0.160
58	0.000	0.070	0.055	0.055	0.055	0.225	0.160
59	0.000	0.080	0.070	0.070	0.070	0.225	0.170
60	0.000	0.090	0.085	0.085	0.085	0.300	0.200
61	0.000	0.250	0.110	0.110	0.110	0.300	0.250
62	0.000	0.250	0.150	0.150	0.150	0.350	0.300
63	0.000	0.250	0.150	0.150	0.150	0.350	0.280
64	0.000	0.250	0.200	0.200	0.200	0.350	0.280
65	0.000	0.350	0.350	0.350	0.350	0.350	0.400
66	0.000	0.300	0.400	0.400	0.400	0.400	0.400
67	0.000	0.300	0.320	0.320	0.320	0.320	0.320
68	0.000	0.300	0.320	0.320	0.320	0.320	0.320
69	0.000	0.300	0.320	0.320	0.320	0.320	0.320
70	0.000	0.300	0.320	0.320	0.320	0.320	0.320
71	0.000	0.300	0.275	0.275	0.275	0.275	0.275
72	0.000	0.300	0.275	0.275	0.275	0.275	0.275
73	0.000	0.300	0.275	0.275	0.275	0.275	0.275
74	0.000	0.300	0.275	0.275	0.275	0.275	0.275
75	0.000	0.300	0.275	0.275	0.275	0.275	0.275
76	0.000	0.300	0.275	0.275	0.275	0.275	0.275
77	0.000	0.300	0.275	0.275	0.275	0.275	0.275
78	0.000	0.300	0.275	0.275	0.275	0.275	0.275
79	0.000	0.300	0.275	0.275	0.275	0.275	0.275
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 2 and the Hybrid Plan.

Teachers Employees Retirement Rates, Plan 2 and Hybrid Male																			
Age	Years of Service																		
	0-4	5	6-24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	>=40
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
60	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
61	0.000	0.140	0.100	0.100	0.100	0.100	0.140	0.140	0.140	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
62	0.000	0.150	0.130	0.130	0.130	0.150	0.150	0.150	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
63	0.000	0.150	0.130	0.130	0.150	0.150	0.150	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
64	0.000	0.150	0.140	0.150	0.150	0.150	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140
65	0.000	0.300	0.300	0.300	0.300	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
66	0.000	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
67	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
68	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
69	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
70	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
71	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
72	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
73	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
74	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
75	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
76	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
77	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
78	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
79	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Teachers Employees Retirement Rates, Plan 2 and Hybrid Female																			
Age	Years of Service																		
	0-4	5	6-24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	>=40
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
60	0.000	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
61	0.000	0.140	0.100	0.100	0.100	0.100	0.140	0.140	0.140	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
62	0.000	0.150	0.130	0.130	0.130	0.150	0.150	0.150	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
63	0.000	0.150	0.130	0.130	0.150	0.150	0.150	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
64	0.000	0.150	0.140	0.150	0.150	0.150	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140
65	0.000	0.300	0.300	0.300	0.300	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
66	0.000	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
67	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
68	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
69	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
70	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
71	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
72	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
73	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
74	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
75	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
76	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
77	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
78	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
79	0.000	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

DISABILITY RATES: As shown below for selected ages. 5% of disability cases are assumed to be service related.

Teachers Disability Rates		
Age	Male	Female
20	0.000005	0.000003
25	0.000005	0.000023
30	0.000064	0.000081
35	0.000135	0.000196
40	0.000325	0.000481
45	0.000725	0.000792
50	0.001444	0.001609
55	0.002443	0.002521
60	0.003395	0.003321
65	0.003773	0.003509
70	0.003773	0.003509



Appendix – Summary of Recommended Actuarial Assumptions

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

Teachers Termination Rates, Male											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.21024	0.18133	0.15388	0.13077	0.11441	0.10289	0.09263	0.08171	0.07520	0.08410	0.10256
25	0.19207	0.16728	0.14515	0.12651	0.11200	0.10027	0.08948	0.07865	0.07114	0.07386	0.08326
30	0.17373	0.15296	0.13619	0.12212	0.10955	0.09763	0.08634	0.07569	0.06663	0.06067	0.05704
35	0.16839	0.14734	0.13071	0.11712	0.10510	0.09374	0.08315	0.07322	0.06329	0.05217	0.04003
40	0.17192	0.14706	0.12722	0.11176	0.09935	0.08902	0.07978	0.07098	0.06080	0.04704	0.02932
45	0.18182	0.15046	0.12547	0.10682	0.09330	0.08397	0.07608	0.06863	0.05924	0.04581	0.02657
50	0.19523	0.15641	0.12587	0.10367	0.08850	0.07924	0.07216	0.06603	0.05883	0.04925	0.02260
55	0.21008	0.16464	0.12933	0.10382	0.08670	0.07536	0.06833	0.06318	0.05973	0.05790	0.02260
60	0.22536	0.17534	0.13667	0.10856	0.08958	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.24063	0.18847	0.14805	0.11831	0.09792	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.25778	0.20650	0.16623	0.13612	0.11494	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Teachers Termination Rates, Female											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.18402	0.15181	0.13307	0.12138	0.10696	0.09610	0.08820	0.08060	0.06604	0.06553	0.08772
25	0.18376	0.15481	0.13758	0.12581	0.11260	0.10133	0.09186	0.08253	0.06911	0.06524	0.07704
30	0.18401	0.15920	0.14307	0.13106	0.11916	0.10734	0.09622	0.08548	0.07393	0.06510	0.06148
35	0.17757	0.15500	0.13863	0.12610	0.11452	0.10307	0.09292	0.08399	0.07473	0.06273	0.04807
40	0.16719	0.14495	0.12771	0.11411	0.10233	0.09214	0.08464	0.07905	0.07207	0.05823	0.03499
45	0.15616	0.13289	0.11458	0.10011	0.08846	0.07999	0.07497	0.07203	0.06668	0.05362	0.02476
50	0.14917	0.12446	0.10550	0.09113	0.08036	0.07318	0.06863	0.06593	0.06167	0.05381	0.02476
55	0.15060	0.12499	0.10614	0.09285	0.08348	0.07597	0.06925	0.06342	0.06066	0.06295	0.02476
60	0.16342	0.13817	0.12008	0.10819	0.10045	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.18831	0.16489	0.14798	0.13739	0.13130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.23251	0.21308	0.19795	0.18856	0.18426	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000



Appendix – Summary of Recommended Actuarial Assumptions

SALARY INCREASE RATES: Teachers are assumed to receive their first salary increase on the valuation date. The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	5.95%
2	5.85
3	5.85
4	5.45
5	5.45
6	5.45
7	5.35
8	5.35
9	5.35
10	4.85
11	4.85
12	4.85
13	4.75
14	4.75
15	4.65
16	4.65
17	4.55
18	4.45
19	4.45
20 or more	3.50

EMPLOYER CONTRIBUTION TO DEFINED CONTRIBUTION HYBRID PLAN: The valuation assumes an average employer defined contribution rate for members in the Hybrid Plan. This is reported by VRS each valuation.



STATE POLICE

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted Safety Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males; 105% of rates for females set forward 2 years

Post-Retirement:

Pub-2010 Benefits Weighted Safety Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males; 105% of rates for females set forward 3 years

Post-Disablement:

Pub-2010 Benefits Weighted General Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males set back 3 years; 90% of rates for females set back 3 years

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted Safety Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males and females set forward 2 years



Appendix – Summary of Recommended Actuarial Assumptions

SPORS Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00039	0.00045	0.00030	0.00044	0.00018	0.00019	0.00011	0.00019
25	0.00035	0.00041	0.00334	0.00043	0.00023	0.00025	0.00175	0.00024
30	0.00039	0.00045	0.00291	0.00047	0.00032	0.00034	0.00176	0.00033
35	0.00045	0.00052	0.00372	0.00055	0.00043	0.00045	0.00276	0.00045
40	0.00056	0.00065	0.00492	0.00074	0.00059	0.00062	0.00431	0.00062
45	0.00078	0.00134	0.00725	0.00656	0.00080	0.00126	0.00679	0.00312
50	0.00114	0.00211	0.01160	0.00822	0.00108	0.00217	0.01050	0.00403
55	0.00166	0.00337	0.01727	0.00976	0.00147	0.00376	0.01428	0.00559
60	0.00251	0.00559	0.02166	0.01243	0.00200	0.00649	0.01650	0.00789
65	0.00390	0.00969	0.02543	0.01791	0.00315	0.01121	0.01846	0.01158
70	0.00728	0.01725	0.03185	0.02818	0.00628	0.01936	0.02205	0.01781
75	0.01360	0.03109	0.04127	0.04466	0.01249	0.03344	0.02915	0.02881
80	0.02541	0.05613	0.05625	0.07148	0.05177	0.05774	0.04210	0.04901
85		0.10049	0.08137	0.11732		0.09971	0.06435	0.08833
90		0.17446	0.11975	0.19311		0.16715	0.09913	0.15347

85% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire.

SPORS Retirement Rates				
Age	Years of Service			
	0-4	5-24	25	>=26
<=49	0.000	0.000	0.000	0.000
50	0.000	0.100	0.100	0.100
51	0.000	0.030	0.100	0.100
52	0.000	0.030	0.100	0.100
53	0.000	0.030	0.100	0.100
54	0.000	0.030	0.100	0.100
55	0.000	0.060	0.100	0.200
56	0.000	0.060	0.100	0.130
57	0.000	0.060	0.100	0.130
58	0.000	0.100	0.100	0.130
59	0.000	0.100	0.100	0.130
60	0.000	0.100	0.100	0.130
61	0.000	0.100	0.100	0.130
62	0.000	0.200	0.200	0.200
63	0.000	0.200	0.200	0.300
64	0.000	0.200	0.200	0.300
65	0.000	0.200	0.200	0.500
66	0.000	0.200	0.200	0.500
67	0.000	0.200	0.200	0.500
68	0.000	0.200	0.200	0.500
69	0.000	0.200	0.200	0.500
>=70	0.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

DISABILITY RATES: As shown below for selected ages. 85% of disability cases are assumed to be service related.

SPORS Disability Rates	
Age	Unisex
<=44	0.00194
45	0.00233
50	0.00481
55	0.00770
60	0.00897
65	0.01108
70	0.01368

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

SPORS Termination Rates	
Service	Unisex
0	0.08000
1	0.06000
2	0.06000
3	0.06000
4	0.06000
5	0.06000
6	0.06000
7	0.03000
8	0.03000
9	0.03000
>=10	0.01750



Appendix – Summary of Recommended Actuarial Assumptions

SALARY INCREASE RATES: The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	4.75%
2	4.75
3	4.75
4	4.75
5	4.65
6	4.40
7	4.40
8	4.40
9	4.40
10 - 19	4.00
20 or more	3.50

It is assumed members covered under VSDP receive a 3.50% annual increase in pay while disabled and this adjusted pay is used to determine deferred benefits payable from the System.

DISABILITY ELECTION: All active members hired on or after January 1, 1999 will enter the Virginia Sickness and Disability Program (VSDP) and will not be eligible to receive non-VSDP disability benefits. For members hired before January 1, 1999 we measure the liabilities based upon the member’s actual election contained in the valuation data.



JUDICIAL

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted General Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; males set forward 2 years

Post-Retirement:

Pub-2010 Benefits Weighted General Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males and females set back 2 years

Post-Disablement:

Pub-2010 Benefits Weighted General Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted General Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale



Appendix – Summary of Recommended Actuarial Assumptions

JRS Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00033	0.00034	0.00412	0.00037	0.00013	0.00012	0.00233	0.00013
25	0.00031	0.00030	0.00278	0.00028	0.00009	0.00010	0.00164	0.00009
30	0.00040	0.00031	0.00354	0.00036	0.00015	0.00011	0.00257	0.00015
35	0.00053	0.00040	0.00458	0.00047	0.00023	0.00018	0.00401	0.00023
40	0.00077	0.00054	0.00645	0.00066	0.00036	0.00029	0.00629	0.00036
45	0.00116	0.00079	0.01007	0.00549	0.00056	0.00045	0.00985	0.00262
50	0.00175	0.00121	0.01605	0.00701	0.00083	0.00068	0.01483	0.00320
55	0.00255	0.00353	0.02114	0.00824	0.00123	0.00246	0.01742	0.00446
60	0.00371	0.00506	0.02503	0.01012	0.00186	0.00319	0.01956	0.00622
65	0.00548	0.00732	0.03044	0.01384	0.00296	0.00475	0.02256	0.00899
70	0.00837	0.01168	0.03901	0.02129	0.00489	0.00807	0.02862	0.01353
75	0.01315	0.02023	0.05192	0.03382	0.00808	0.01422	0.04003	0.02151
80	0.06052	0.03586	0.07348	0.05360	0.01330	0.02525	0.06007	0.03573
85		0.06471	0.10815	0.08743		0.04592	0.09331	0.06316
90		0.11350	0.16253	0.14418		0.08594	0.13665	0.11329

5% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire with an unreduced retirement benefit.

Judicial Retirement Rates	
Age	Unisex
<=59	0.000
60	0.100
61	0.100
62	0.100
63	0.100
64	0.100
65	0.100
66	0.100
67	0.150
68	0.150
69	0.150
70	0.250
71	0.250
72	0.250
>=73	1.000

DISABILITY RATES: There are no assumed rates of disability prior to service retirement for causes other than death or retirement.

TERMINATION RATES: There are no assumed rates of withdrawal prior to service retirement for causes other than death or retirement.

SALARY INCREASE RATES: Salary increase rates are 4.0%.

EMPLOYER CONTRIBUTION TO DEFINED CONTRIBUTION HYBRID PLAN: The valuation assumes an average employer defined contribution rate for members in the Hybrid Plan. This is reported by VRS each valuation.



VIRGINIA LAW OFFICERS

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted Safety Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males; 105% of rates for females set forward 2 years

Post-Retirement:

Pub-2010 Benefits Weighted Safety Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males; 105% of rates for females set forward 3 years

Post-Disablement:

Pub-2010 Benefits Weighted General Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males set back 3 years; 90% of rates for females set back 3 years

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted Safety Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males and females set forward 2 years



Appendix – Summary of Recommended Actuarial Assumptions

VaLORS Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00039	0.00045	0.00030	0.00044	0.00018	0.00019	0.00011	0.00019
25	0.00035	0.00041	0.00334	0.00043	0.00023	0.00025	0.00175	0.00024
30	0.00039	0.00045	0.00291	0.00047	0.00032	0.00034	0.00176	0.00033
35	0.00045	0.00052	0.00372	0.00055	0.00043	0.00045	0.00276	0.00045
40	0.00056	0.00065	0.00492	0.00074	0.00059	0.00062	0.00431	0.00062
45	0.00078	0.00134	0.00725	0.00656	0.00080	0.00126	0.00679	0.00312
50	0.00114	0.00211	0.01160	0.00822	0.00108	0.00217	0.01050	0.00403
55	0.00166	0.00337	0.01727	0.00976	0.00147	0.00376	0.01428	0.00559
60	0.00251	0.00559	0.02166	0.01243	0.00200	0.00649	0.01650	0.00789
65	0.00390	0.00969	0.02543	0.01791	0.00315	0.01121	0.01846	0.01158
70	0.00728	0.01725	0.03185	0.02818	0.00628	0.01936	0.02205	0.01781
75	0.01360	0.03109	0.04127	0.04466	0.01249	0.03344	0.02915	0.02881
80	0.02541	0.05613	0.05625	0.07148	0.05177	0.05774	0.04210	0.04901
85		0.10049	0.08137	0.11732		0.09971	0.06435	0.08833
90		0.17446	0.11975	0.19311		0.16715	0.09913	0.15347

35% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire.

VaLORS Retirement Rates, Male					
Age	Years of Service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.150	0.150	0.450	0.450
51	0.000	0.100	0.080	0.300	0.300
52	0.000	0.100	0.080	0.300	0.300
53	0.000	0.100	0.080	0.300	0.250
54	0.000	0.100	0.080	0.240	0.250
55	0.000	0.100	0.080	0.180	0.250
56	0.000	0.100	0.090	0.180	0.250
57	0.000	0.100	0.100	0.180	0.200
58	0.000	0.100	0.100	0.180	0.200
59	0.000	0.100	0.120	0.180	0.200
60	0.000	0.180	0.180	0.180	0.300
61	0.000	0.180	0.200	0.200	0.200
62	0.000	0.180	0.300	0.300	0.300
63	0.000	0.400	0.250	0.250	0.250
64	0.000	0.150	0.250	0.250	0.250
65	0.000	0.150	0.300	0.300	0.300
66	0.000	0.150	0.300	0.300	0.300
67	0.000	0.150	0.300	0.300	0.300
68	0.000	0.150	0.300	0.300	0.300
69	0.000	0.150	0.300	0.300	0.300
>=70	0.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

VaLORS Retirement Rates, Female					
Age	Years of Service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.150	0.150	0.375	0.375
51	0.000	0.100	0.100	0.250	0.200
52	0.000	0.100	0.090	0.250	0.200
53	0.000	0.100	0.090	0.250	0.225
54	0.000	0.100	0.090	0.250	0.300
55	0.000	0.100	0.090	0.250	0.300
56	0.000	0.100	0.100	0.250	0.300
57	0.000	0.100	0.130	0.250	0.180
58	0.000	0.100	0.130	0.400	0.180
59	0.000	0.100	0.130	0.300	0.200
60	0.000	0.200	0.200	0.200	0.200
61	0.000	0.200	0.200	0.200	0.200
62	0.000	0.200	0.350	0.350	0.350
63	0.000	0.200	0.250	0.250	0.250
64	0.000	0.200	0.250	0.250	0.250
65	0.000	0.200	0.500	0.500	0.500
66	0.000	0.200	0.300	0.300	0.300
67	0.000	0.200	0.300	0.300	0.300
68	0.000	0.200	0.300	0.300	0.300
69	0.000	0.200	0.300	0.300	0.300
>=70	0.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

DISABILITY RATES: As shown below for selected ages. 35% of disability cases are assumed to be service related.

VaLORS Disability Rates		
Age	Male	Female
20	0.00143	0.00543
25	0.00322	0.00581
30	0.00584	0.00659
35	0.00720	0.00769
40	0.00793	0.01001
45	0.00913	0.01381
50	0.01165	0.01821
55	0.01501	0.02277
60	0.01782	0.02901
65	0.01916	0.03865
70	0.01920	0.05499



Appendix – Summary of Recommended Actuarial Assumptions

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

VaLORS Termination Rates, Male											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.39130	0.29901	0.23922	0.21072	0.20801	0.21063	0.20749	0.19800	0.19643	0.19065	0.21396
25	0.36285	0.28479	0.23294	0.20555	0.19714	0.19438	0.18892	0.17882	0.17232	0.16314	0.17288
30	0.32624	0.26656	0.22474	0.19872	0.18316	0.17349	0.16486	0.15375	0.14058	0.12618	0.11671
35	0.29590	0.24719	0.21139	0.18685	0.16890	0.15650	0.14654	0.13513	0.11884	0.10094	0.07962
40	0.26990	0.22715	0.19453	0.17109	0.15383	0.14157	0.13160	0.12059	0.10400	0.08381	0.05579
45	0.24947	0.20776	0.17527	0.15163	0.13800	0.12852	0.11960	0.10962	0.09617	0.07511	0.04653
50	0.23564	0.19022	0.15449	0.12845	0.12136	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.22917	0.17523	0.13271	0.10157	0.10390	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
60	0.23045	0.16307	0.11015	0.07107	0.08562	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.23923	0.15385	0.08724	0.03755	0.06679	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.25880	0.14725	0.06100	0.00455	0.04490	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

VaLORS Termination Rates, Female											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.47177	0.35733	0.28556	0.25386	0.26029	0.28130	0.30657	0.32166	0.31215	0.30524	0.22840
25	0.43786	0.33985	0.27627	0.24458	0.24051	0.24937	0.26238	0.26963	0.25996	0.24867	0.18991
30	0.39363	0.31781	0.26502	0.23302	0.21502	0.20767	0.20420	0.20042	0.18976	0.17234	0.13686
35	0.35591	0.29532	0.25008	0.21852	0.19421	0.17876	0.16674	0.15620	0.14391	0.12349	0.09981
40	0.32307	0.27240	0.23204	0.20097	0.17622	0.15870	0.14410	0.12972	0.11499	0.09385	0.07347
45	0.29713	0.25007	0.21104	0.17970	0.16112	0.14777	0.13695	0.12161	0.10324	0.08381	0.04500
50	0.27965	0.22915	0.18712	0.15384	0.14876	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.27168	0.21009	0.16023	0.12279	0.13911	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
60	0.27367	0.19304	0.13033	0.08631	0.13217	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.28529	0.17815	0.09796	0.04508	0.12790	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.31084	0.16417	0.05830	0.00350	0.12656	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000



Appendix – Summary of Recommended Actuarial Assumptions

SALARY INCREASE RATES: The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	4.75%
2	4.75
3	4.75
4	4.75
5	4.65
6	4.40
7	4.40
8	4.40
9	4.40
10 - 19	4.00
20 or more	3.50

It is assumed members covered under VSDP receive a 3.50% annual increase in pay while disabled and this adjusted pay is used to determine deferred benefits payable from the System.

DISABILITY ELECTION: All active members hired on or after January 1, 1999 will enter the Virginia Sickness and Disability Program (VSDP) and will not be eligible to receive non-VSDP disability benefits. For members hired before January 1, 1999 we measure the liabilities based upon the member’s actual election contained in the valuation data.



LOCALS – TOP 10, NON-HAZARDOUS DUTY

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted General Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; males set forward 2 years; 105% of rates for females set forward 3 years

Post-Retirement:

Pub-2010 Benefits Weighted General Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males set forward 2 years; 95% of rates for females set forward 1 year

Post-Disablement:

Pub-2010 Benefits Weighted General Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males set forward 3 years; 110% of rates for females set forward 2 years

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted General Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale



Appendix – Summary of Recommended Actuarial Assumptions

Top 10 Non-Hazardous Duty Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00033	0.00031	0.00348	0.00037	0.00011	0.00011	0.00213	0.00013
25	0.00031	0.00030	0.00353	0.00028	0.00013	0.00010	0.00216	0.00009
30	0.00040	0.00038	0.00452	0.00036	0.00020	0.00015	0.00338	0.00015
35	0.00053	0.00050	0.00611	0.00047	0.00032	0.00024	0.00527	0.00023
40	0.00077	0.00073	0.00917	0.00066	0.00049	0.00038	0.00829	0.00036
45	0.00116	0.00110	0.01476	0.00549	0.00075	0.00058	0.01284	0.00262
50	0.00175	0.00329	0.02113	0.00701	0.00110	0.00221	0.01746	0.00320
55	0.00255	0.00472	0.02591	0.00824	0.00164	0.00286	0.02016	0.00446
60	0.00371	0.00677	0.03064	0.01012	0.00256	0.00395	0.02256	0.00622
65	0.00548	0.01053	0.03876	0.01384	0.00420	0.00648	0.02695	0.00899
70	0.00837	0.01809	0.05059	0.02129	0.00694	0.01132	0.03563	0.01353
75	0.01315	0.03193	0.06982	0.03382	0.01145	0.02006	0.05146	0.02151
80	0.06052	0.05749	0.10185	0.05360	0.05076	0.03598	0.07865	0.03573
85		0.10196	0.14963	0.08743		0.06689	0.12115	0.06316
90		0.16858	0.22647	0.14418		0.12191	0.17199	0.11329

20% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 1.

Top 10 Non-Hazardous Duty Retirement Rates, Plan 1 Male with 50/30 eligibility							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.065	0.065	0.100	0.100
51	0.000	0.000	0.000	0.065	0.040	0.100	0.090
52	0.000	0.000	0.000	0.065	0.050	0.100	0.090
53	0.000	0.000	0.000	0.065	0.060	0.100	0.090
54	0.000	0.000	0.000	0.065	0.035	0.100	0.090
55	0.000	0.065	0.065	0.065	0.050	0.100	0.090
56	0.000	0.065	0.050	0.050	0.050	0.100	0.100
57	0.000	0.065	0.040	0.040	0.040	0.100	0.100
58	0.000	0.065	0.040	0.040	0.040	0.100	0.100
59	0.000	0.065	0.040	0.040	0.040	0.100	0.150
60	0.000	0.065	0.060	0.060	0.060	0.100	0.150
61	0.000	0.065	0.090	0.090	0.090	0.100	0.150
62	0.000	0.065	0.090	0.090	0.090	0.250	0.225
63	0.000	0.065	0.090	0.090	0.090	0.250	0.225
64	0.000	0.065	0.150	0.150	0.150	0.250	0.225
65	0.000	0.250	0.250	0.250	0.250	0.250	0.270
66	0.000	0.300	0.300	0.300	0.300	0.300	0.300
67	0.000	0.150	0.250	0.250	0.250	0.250	0.250
68	0.000	0.150	0.200	0.200	0.200	0.200	0.200
69	0.000	0.275	0.200	0.200	0.200	0.200	0.200
70	0.000	0.275	0.200	0.200	0.200	0.200	0.200
71	0.000	0.275	0.200	0.200	0.200	0.200	0.200
72	0.000	0.275	0.200	0.200	0.200	0.200	0.200
73	0.000	0.275	0.200	0.200	0.200	0.200	0.200
74	0.000	0.275	0.200	0.200	0.200	0.200	0.200
75	0.000	0.275	0.200	0.200	0.200	0.200	0.200
76	0.000	0.275	0.200	0.200	0.200	0.200	0.200
77	0.000	0.275	0.200	0.200	0.200	0.200	0.200
78	0.000	0.275	0.200	0.200	0.200	0.200	0.200
79	0.000	0.275	0.200	0.200	0.200	0.200	0.200
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Top 10 Non-Hazardous Duty Retirement Rates, Plan 1 Female with 50/30 eligibility							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.050	0.050	0.160	0.160
51	0.000	0.000	0.000	0.070	0.040	0.110	0.085
52	0.000	0.000	0.000	0.070	0.040	0.120	0.085
53	0.000	0.000	0.000	0.070	0.050	0.175	0.085
54	0.000	0.000	0.000	0.070	0.070	0.220	0.085
55	0.000	0.070	0.070	0.070	0.055	0.220	0.150
56	0.000	0.105	0.055	0.055	0.055	0.220	0.150
57	0.000	0.105	0.050	0.050	0.050	0.220	0.150
58	0.000	0.105	0.050	0.050	0.050	0.165	0.160
59	0.000	0.105	0.065	0.065	0.065	0.220	0.160
60	0.000	0.105	0.065	0.065	0.065	0.220	0.160
61	0.000	0.105	0.065	0.065	0.065	0.220	0.160
62	0.000	0.105	0.130	0.130	0.130	0.345	0.250
63	0.000	0.105	0.120	0.120	0.120	0.240	0.180
64	0.000	0.105	0.170	0.170	0.170	0.240	0.275
65	0.000	0.280	0.280	0.280	0.280	0.280	0.275
66	0.000	0.200	0.300	0.300	0.300	0.300	0.300
67	0.000	0.150	0.275	0.275	0.275	0.275	0.275
68	0.000	0.150	0.275	0.275	0.275	0.275	0.275
69	0.000	0.150	0.275	0.275	0.275	0.275	0.275
70	0.000	0.150	0.275	0.275	0.275	0.275	0.275
71	0.000	0.150	0.275	0.275	0.275	0.275	0.275
72	0.000	0.150	0.275	0.275	0.275	0.275	0.275
73	0.000	0.150	0.275	0.275	0.275	0.275	0.275
74	0.000	0.150	0.275	0.275	0.275	0.275	0.275
75	0.000	0.150	0.275	0.275	0.275	0.275	0.275
76	0.000	0.150	0.275	0.275	0.275	0.275	0.275
77	0.000	0.150	0.275	0.275	0.275	0.275	0.275
78	0.000	0.150	0.275	0.275	0.275	0.275	0.275
79	0.000	0.150	0.275	0.275	0.275	0.275	0.275
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Top 10 Non-Hazardous Duty Retirement Rates, Plan 1 Male with 55/30 eligibility							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.065	0.065	0.065	0.065
51	0.000	0.000	0.000	0.065	0.040	0.040	0.040
52	0.000	0.000	0.000	0.065	0.050	0.050	0.050
53	0.000	0.000	0.000	0.065	0.060	0.060	0.060
54	0.000	0.000	0.000	0.065	0.035	0.035	0.035
55	0.000	0.065	0.065	0.065	0.050	0.100	0.100
56	0.000	0.065	0.050	0.050	0.050	0.100	0.100
57	0.000	0.065	0.040	0.040	0.040	0.100	0.100
58	0.000	0.065	0.040	0.040	0.040	0.100	0.100
59	0.000	0.065	0.040	0.040	0.040	0.100	0.150
60	0.000	0.065	0.060	0.060	0.060	0.100	0.150
61	0.000	0.065	0.090	0.090	0.090	0.100	0.150
62	0.000	0.065	0.090	0.090	0.090	0.250	0.225
63	0.000	0.065	0.090	0.090	0.090	0.250	0.225
64	0.000	0.065	0.150	0.150	0.150	0.250	0.225
65	0.000	0.250	0.250	0.250	0.250	0.250	0.270
66	0.000	0.300	0.300	0.300	0.300	0.300	0.300
67	0.000	0.150	0.250	0.250	0.250	0.250	0.250
68	0.000	0.150	0.200	0.200	0.200	0.200	0.200
69	0.000	0.275	0.200	0.200	0.200	0.200	0.200
70	0.000	0.275	0.200	0.200	0.200	0.200	0.200
71	0.000	0.275	0.200	0.200	0.200	0.200	0.200
72	0.000	0.275	0.200	0.200	0.200	0.200	0.200
73	0.000	0.275	0.200	0.200	0.200	0.200	0.200
74	0.000	0.275	0.200	0.200	0.200	0.200	0.200
75	0.000	0.275	0.200	0.200	0.200	0.200	0.200
76	0.000	0.275	0.200	0.200	0.200	0.200	0.200
77	0.000	0.275	0.200	0.200	0.200	0.200	0.200
78	0.000	0.275	0.200	0.200	0.200	0.200	0.200
79	0.000	0.275	0.200	0.200	0.200	0.200	0.200
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Top 10 Non-Hazardous Duty Retirement Rates, Plan 1 Female with 55/30 eligibility							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.050	0.050	0.050	0.050
51	0.000	0.000	0.000	0.070	0.040	0.040	0.040
52	0.000	0.000	0.000	0.070	0.040	0.040	0.040
53	0.000	0.000	0.000	0.070	0.050	0.050	0.050
54	0.000	0.000	0.000	0.070	0.070	0.070	0.070
55	0.000	0.070	0.070	0.070	0.055	0.220	0.220
56	0.000	0.105	0.055	0.055	0.055	0.220	0.150
57	0.000	0.105	0.050	0.050	0.050	0.220	0.150
58	0.000	0.105	0.050	0.050	0.050	0.165	0.160
59	0.000	0.105	0.065	0.065	0.065	0.220	0.160
60	0.000	0.105	0.065	0.065	0.065	0.220	0.160
61	0.000	0.105	0.065	0.065	0.065	0.220	0.160
62	0.000	0.105	0.130	0.130	0.130	0.345	0.250
63	0.000	0.105	0.120	0.120	0.120	0.240	0.180
64	0.000	0.105	0.170	0.170	0.170	0.240	0.275
65	0.000	0.280	0.280	0.280	0.280	0.280	0.275
66	0.000	0.200	0.300	0.300	0.300	0.300	0.300
67	0.000	0.150	0.275	0.275	0.275	0.275	0.275
68	0.000	0.150	0.275	0.275	0.275	0.275	0.275
69	0.000	0.150	0.275	0.275	0.275	0.275	0.275
70	0.000	0.150	0.275	0.275	0.275	0.275	0.275
71	0.000	0.150	0.275	0.275	0.275	0.275	0.275
72	0.000	0.150	0.275	0.275	0.275	0.275	0.275
73	0.000	0.150	0.275	0.275	0.275	0.275	0.275
74	0.000	0.150	0.275	0.275	0.275	0.275	0.275
75	0.000	0.150	0.275	0.275	0.275	0.275	0.275
76	0.000	0.150	0.275	0.275	0.275	0.275	0.275
77	0.000	0.150	0.275	0.275	0.275	0.275	0.275
78	0.000	0.150	0.275	0.275	0.275	0.275	0.275
79	0.000	0.150	0.275	0.275	0.275	0.275	0.275
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 2 and the Hybrid Plan.

Top 10 Non-Hazardous Duty Retirement Rates, Plan 2/Hybrid Male																			
Age	Years of Service																		
	0-4	5	6-24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	>=40
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
60	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
61	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
62	0.000	0.200	0.150	0.150	0.150	0.200	0.200	0.200	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
63	0.000	0.100	0.150	0.150	0.100	0.100	0.100	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
64	0.000	0.100	0.130	0.100	0.100	0.100	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
65	0.000	0.250	0.250	0.250	0.250	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
66	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
67	0.000	0.150	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
68	0.000	0.150	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
69	0.000	0.150	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
70	0.000	0.150	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
71	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
72	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
73	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
74	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
75	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
76	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
77	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
78	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
79	0.000	0.300	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Top 10 Non-Hazardous Duty Retirement Rates, Plan 2/Hybrid Female																			
Age	Years of Service																		
	0-4	5	6-24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	>=40
<=49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08
51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08
52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08
53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08
54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08
56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
60	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
61	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
62	0.00	0.20	0.15	0.15	0.15	0.20	0.20	0.20	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
63	0.00	0.10	0.15	0.15	0.10	0.10	0.10	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
64	0.00	0.10	0.13	0.10	0.10	0.10	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
65	0.00	0.25	0.25	0.25	0.25	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
66	0.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
67	0.00	0.15	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
68	0.00	0.15	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
69	0.00	0.15	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
70	0.00	0.15	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
71	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
72	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
73	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
74	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
75	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
76	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
77	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
78	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
79	0.00	0.30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
>=80	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00



Appendix – Summary of Recommended Actuarial Assumptions

DISABILITY RATES: As shown below for selected ages. 20% of disability cases are assumed to be service related.

Top 10 Non-Hazardous Duty Disability Rates		
Age	Male	Female
20	0.00005	0.00001
25	0.00005	0.00005
30	0.00007	0.00023
35	0.00050	0.00062
40	0.00139	0.00134
45	0.00252	0.00229
50	0.00384	0.00330
55	0.00591	0.00442
60	0.00808	0.00530
65	0.00942	0.00546
70	0.01022	0.00546



Appendix – Summary of Recommended Actuarial Assumptions

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

Top 10 Non-Hazardous Duty Termination Rates, Male											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.32543	0.31042	0.30208	0.30072	0.30427	0.30827	0.30643	0.29813	0.27932	0.24444	0.18652
25	0.28989	0.27432	0.26526	0.26242	0.26375	0.26558	0.26297	0.25458	0.23734	0.20701	0.15866
30	0.24454	0.22694	0.21572	0.20997	0.20770	0.20620	0.20225	0.19376	0.17891	0.15529	0.12067
35	0.21415	0.19378	0.17963	0.17076	0.16538	0.16121	0.15615	0.14808	0.13573	0.11801	0.09397
40	0.19294	0.16945	0.15202	0.13993	0.13167	0.12522	0.11929	0.11204	0.10236	0.09015	0.05781
45	0.17894	0.15267	0.13230	0.11737	0.10675	0.09865	0.09232	0.08627	0.07933	0.07192	0.05296
50	0.16934	0.14141	0.11910	0.10223	0.09004	0.08133	0.07525	0.07068	0.06652	0.06290	0.04605
55	0.16167	0.13384	0.11115	0.09363	0.08092	0.07311	0.06800	0.06512	0.06387	0.06264	0.04605
60	0.15428	0.12874	0.10758	0.09097	0.07895	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.14654	0.12546	0.10779	0.09372	0.08367	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.13705	0.12384	0.11269	0.10367	0.09758	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Top 10 Non-Hazardous Duty Termination Rates, Female											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.29606	0.27600	0.26872	0.26828	0.26794	0.26068	0.25184	0.24003	0.22638	0.21127	0.19613
25	0.26948	0.24864	0.23870	0.23584	0.23500	0.23043	0.22383	0.21351	0.19968	0.18230	0.16241
30	0.23747	0.21281	0.19801	0.19150	0.18990	0.18876	0.18525	0.17702	0.16297	0.14248	0.11600
35	0.21697	0.18644	0.16712	0.15790	0.15565	0.15609	0.15458	0.14802	0.13451	0.11314	0.08392
40	0.20303	0.16631	0.14281	0.13119	0.12810	0.12896	0.12867	0.12352	0.11116	0.09064	0.06153
45	0.19315	0.15196	0.12534	0.11170	0.10742	0.10776	0.10785	0.10381	0.09325	0.07535	0.04936
50	0.18459	0.14212	0.11414	0.09902	0.09329	0.09247	0.09213	0.08891	0.08086	0.06735	0.04769
55	0.17544	0.13552	0.10836	0.09258	0.08536	0.08303	0.08149	0.07885	0.07414	0.06668	0.05673
60	0.16477	0.13125	0.10723	0.09187	0.08344	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.15252	0.12880	0.11016	0.09645	0.08728	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.13663	0.12821	0.11849	0.10838	0.09910	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000



Appendix – Summary of Recommended Actuarial Assumptions

SALARY INCREASE RATES: The following total salary increase rates are used. The total salary increase rate consists of an inflation rate of 2.50%, a productivity component of 1.00%, and a variable merit component that is dependent on years of service.

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	5.35%
2	5.35
3	4.75
4	4.45
5	4.45
6	4.45
7	4.35
8	4.25
9	4.00
10	4.00
11-19	3.65
20 or more	3.50

EMPLOYER CONTRIBUTION TO DEFINED CONTRIBUTION HYBRID PLAN: The valuation assumes an average employer defined contribution rate for members in the Hybrid Plan. This is reported by VRS each valuation.



LOCALS – NON-TOP 10, NON-HAZARDOUS DUTY

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted General Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; males set forward 2 years; 105% of rates for females set forward 3 years

Post-Retirement:

Pub-2010 Benefits Weighted General Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males set forward 2 years; 95% of rates for females set forward 1 year

Post-Disablement:

Pub-2010 Benefits Weighted General Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males set forward 3 years; 110% of rates for females set forward 2 years

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted General Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale



Appendix – Summary of Recommended Actuarial Assumptions

Non-Top 10 Non-Hazardous Duty Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00033	0.00031	0.00348	0.00037	0.00011	0.00011	0.00213	0.00013
25	0.00031	0.00030	0.00353	0.00028	0.00013	0.00010	0.00216	0.00009
30	0.00040	0.00038	0.00452	0.00036	0.00020	0.00015	0.00338	0.00015
35	0.00053	0.00050	0.00611	0.00047	0.00032	0.00024	0.00527	0.00023
40	0.00077	0.00073	0.00917	0.00066	0.00049	0.00038	0.00829	0.00036
45	0.00116	0.00110	0.01476	0.00549	0.00075	0.00058	0.01284	0.00262
50	0.00175	0.00329	0.02113	0.00701	0.00110	0.00221	0.01746	0.00320
55	0.00255	0.00472	0.02591	0.00824	0.00164	0.00286	0.02016	0.00446
60	0.00371	0.00677	0.03064	0.01012	0.00256	0.00395	0.02256	0.00622
65	0.00548	0.01053	0.03876	0.01384	0.00420	0.00648	0.02695	0.00899
70	0.00837	0.01809	0.05059	0.02129	0.00694	0.01132	0.03563	0.01353
75	0.01315	0.03193	0.06982	0.03382	0.01145	0.02006	0.05146	0.02151
80	0.06052	0.05749	0.10185	0.05360	0.05076	0.03598	0.07865	0.03573
85		0.10196	0.14963	0.08743		0.06689	0.12115	0.06316
90		0.16858	0.22647	0.14418		0.12191	0.17199	0.11329

15% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 1.

Non-Top 10 Non-Hazardous Duty Retirement Rates, Plan 1 Male with 50/30 eligibility							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.060	0.060	0.150	0.150
51	0.000	0.000	0.000	0.125	0.050	0.100	0.080
52	0.000	0.000	0.000	0.125	0.050	0.150	0.100
53	0.000	0.000	0.000	0.100	0.050	0.150	0.100
54	0.000	0.000	0.000	0.100	0.050	0.150	0.110
55	0.000	0.100	0.100	0.100	0.060	0.150	0.110
56	0.000	0.100	0.060	0.060	0.060	0.150	0.100
57	0.000	0.100	0.055	0.055	0.055	0.110	0.100
58	0.000	0.100	0.060	0.060	0.060	0.110	0.100
59	0.000	0.100	0.055	0.055	0.055	0.160	0.100
60	0.000	0.100	0.050	0.050	0.050	0.160	0.120
61	0.000	0.100	0.085	0.085	0.085	0.160	0.160
62	0.000	0.100	0.150	0.150	0.150	0.270	0.220
63	0.000	0.100	0.150	0.150	0.150	0.270	0.180
64	0.000	0.100	0.150	0.150	0.150	0.270	0.180
65	0.000	0.300	0.300	0.300	0.300	0.300	0.300
66	0.000	0.300	0.320	0.320	0.320	0.320	0.320
67	0.000	0.300	0.220	0.220	0.220	0.220	0.220
68	0.000	0.300	0.220	0.220	0.220	0.220	0.220
69	0.000	0.300	0.220	0.220	0.220	0.220	0.220
70	0.000	0.300	0.220	0.220	0.220	0.220	0.220
71	0.000	0.300	0.220	0.220	0.220	0.220	0.220
72	0.000	0.300	0.220	0.220	0.220	0.220	0.220
73	0.000	0.300	0.220	0.220	0.220	0.220	0.220
74	0.000	0.300	0.220	0.220	0.220	0.220	0.220
75	0.000	0.300	0.220	0.220	0.220	0.220	0.220
76	0.000	0.300	0.220	0.220	0.220	0.220	0.220
77	0.000	0.300	0.220	0.220	0.220	0.220	0.220
78	0.000	0.300	0.220	0.220	0.220	0.220	0.220
79	0.000	0.300	0.220	0.220	0.220	0.220	0.220
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Non-Top 10 Non-Hazardous Duty Retirement Rates, Plan 1 Female with 50/30 eligibility							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.050	0.050	0.100	0.100
51	0.000	0.000	0.000	0.055	0.050	0.100	0.075
52	0.000	0.000	0.000	0.060	0.050	0.100	0.075
53	0.000	0.000	0.000	0.070	0.060	0.120	0.100
54	0.000	0.000	0.000	0.070	0.060	0.120	0.100
55	0.000	0.070	0.070	0.070	0.060	0.120	0.100
56	0.000	0.060	0.055	0.055	0.055	0.100	0.100
57	0.000	0.060	0.055	0.055	0.055	0.100	0.100
58	0.000	0.060	0.055	0.055	0.055	0.100	0.100
59	0.000	0.060	0.055	0.055	0.055	0.100	0.100
60	0.000	0.060	0.065	0.065	0.065	0.150	0.100
61	0.000	0.060	0.095	0.095	0.095	0.200	0.165
62	0.000	0.060	0.145	0.145	0.145	0.200	0.200
63	0.000	0.060	0.145	0.145	0.145	0.200	0.200
64	0.000	0.060	0.145	0.145	0.145	0.350	0.200
65	0.000	0.280	0.280	0.280	0.280	0.280	0.350
66	0.000	0.280	0.280	0.280	0.280	0.280	0.280
67	0.000	0.280	0.220	0.220	0.220	0.220	0.220
68	0.000	0.280	0.220	0.220	0.220	0.220	0.220
69	0.000	0.280	0.220	0.220	0.220	0.220	0.220
70	0.000	0.280	0.220	0.220	0.220	0.220	0.220
71	0.000	0.280	0.170	0.170	0.170	0.170	0.170
72	0.000	0.280	0.170	0.170	0.170	0.170	0.170
73	0.000	0.280	0.200	0.200	0.200	0.200	0.200
74	0.000	0.280	0.200	0.200	0.200	0.200	0.200
75	0.000	0.280	0.200	0.200	0.200	0.200	0.200
76	0.000	0.280	0.200	0.200	0.200	0.200	0.200
77	0.000	0.280	0.200	0.200	0.200	0.200	0.200
78	0.000	0.280	0.200	0.200	0.200	0.200	0.200
79	0.000	0.280	0.200	0.200	0.200	0.200	0.200
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Non-Top 10 Non-Hazardous Duty Retirement Rates, Plan 1 Male with 55/30 eligibility							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.060	0.060	0.060	0.060
51	0.000	0.000	0.000	0.125	0.050	0.050	0.050
52	0.000	0.000	0.000	0.125	0.050	0.050	0.050
53	0.000	0.000	0.000	0.100	0.050	0.050	0.050
54	0.000	0.000	0.000	0.100	0.050	0.050	0.050
55	0.000	0.100	0.100	0.100	0.060	0.150	0.150
56	0.000	0.100	0.060	0.060	0.060	0.150	0.100
57	0.000	0.100	0.055	0.055	0.055	0.110	0.100
58	0.000	0.100	0.060	0.060	0.060	0.110	0.100
59	0.000	0.100	0.055	0.055	0.055	0.160	0.100
60	0.000	0.100	0.050	0.050	0.050	0.160	0.120
61	0.000	0.100	0.085	0.085	0.085	0.160	0.160
62	0.000	0.100	0.150	0.150	0.150	0.270	0.220
63	0.000	0.100	0.150	0.150	0.150	0.270	0.180
64	0.000	0.100	0.150	0.150	0.150	0.270	0.180
65	0.000	0.300	0.300	0.300	0.300	0.300	0.300
66	0.000	0.300	0.320	0.320	0.320	0.320	0.320
67	0.000	0.300	0.220	0.220	0.220	0.220	0.220
68	0.000	0.300	0.220	0.220	0.220	0.220	0.220
69	0.000	0.300	0.220	0.220	0.220	0.220	0.220
70	0.000	0.300	0.220	0.220	0.220	0.220	0.220
71	0.000	0.300	0.220	0.220	0.220	0.220	0.220
72	0.000	0.300	0.220	0.220	0.220	0.220	0.220
73	0.000	0.300	0.220	0.220	0.220	0.220	0.220
74	0.000	0.300	0.220	0.220	0.220	0.220	0.220
75	0.000	0.300	0.220	0.220	0.220	0.220	0.220
76	0.000	0.300	0.220	0.220	0.220	0.220	0.220
77	0.000	0.300	0.220	0.220	0.220	0.220	0.220
78	0.000	0.300	0.220	0.220	0.220	0.220	0.220
79	0.000	0.300	0.220	0.220	0.220	0.220	0.220
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Non-Top 10 Non-Hazardous Duty Retirement Rates, Plan 1 Female with 55/30 eligibility							
Age	Years of Service						
	0-4	5	6-9	10	11-29	30	>=31
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.050	0.050	0.050	0.050
51	0.000	0.000	0.000	0.055	0.050	0.050	0.050
52	0.000	0.000	0.000	0.060	0.050	0.050	0.050
53	0.000	0.000	0.000	0.070	0.060	0.060	0.060
54	0.000	0.000	0.000	0.070	0.060	0.060	0.060
55	0.000	0.070	0.070	0.070	0.060	0.120	0.120
56	0.000	0.060	0.055	0.055	0.055	0.100	0.100
57	0.000	0.060	0.055	0.055	0.055	0.100	0.100
58	0.000	0.060	0.055	0.055	0.055	0.100	0.100
59	0.000	0.060	0.055	0.055	0.055	0.100	0.100
60	0.000	0.060	0.065	0.065	0.065	0.150	0.100
61	0.000	0.060	0.095	0.095	0.095	0.200	0.165
62	0.000	0.060	0.145	0.145	0.145	0.200	0.200
63	0.000	0.060	0.145	0.145	0.145	0.200	0.200
64	0.000	0.060	0.145	0.145	0.145	0.350	0.200
65	0.000	0.280	0.280	0.280	0.280	0.280	0.350
66	0.000	0.280	0.280	0.280	0.280	0.280	0.280
67	0.000	0.280	0.220	0.220	0.220	0.220	0.220
68	0.000	0.280	0.220	0.220	0.220	0.220	0.220
69	0.000	0.280	0.220	0.220	0.220	0.220	0.220
70	0.000	0.280	0.220	0.220	0.220	0.220	0.220
71	0.000	0.280	0.170	0.170	0.170	0.170	0.170
72	0.000	0.280	0.170	0.170	0.170	0.170	0.170
73	0.000	0.280	0.200	0.200	0.200	0.200	0.200
74	0.000	0.280	0.200	0.200	0.200	0.200	0.200
75	0.000	0.280	0.200	0.200	0.200	0.200	0.200
76	0.000	0.280	0.200	0.200	0.200	0.200	0.200
77	0.000	0.280	0.200	0.200	0.200	0.200	0.200
78	0.000	0.280	0.200	0.200	0.200	0.200	0.200
79	0.000	0.280	0.200	0.200	0.200	0.200	0.200
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 2 and the Hybrid Plan.

Non-Top 10 Non-Hazardous Duty Retirement Rates, Plan 2/Hybrid Male																			
Age	Years of Service																		
	0-4	5	6-24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	>=40
<=49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
60	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
61	0.000	0.110	0.090	0.090	0.090	0.090	0.110	0.110	0.110	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
62	0.000	0.150	0.110	0.110	0.110	0.150	0.150	0.150	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110
63	0.000	0.150	0.110	0.110	0.150	0.150	0.150	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110
64	0.000	0.130	0.140	0.130	0.130	0.130	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140
65	0.000	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
66	0.000	0.220	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
67	0.000	0.220	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
68	0.000	0.100	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
69	0.000	0.160	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
70	0.000	0.160	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
71	0.000	0.160	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
72	0.000	0.160	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
73	0.000	0.160	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
74	0.000	0.160	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
75	0.000	0.160	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
76	0.000	0.160	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
77	0.000	0.160	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
78	0.000	0.160	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
79	0.000	0.160	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
>=80	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Non-Top 10 Non-Hazardous Duty Retirement Rates, Plan 2/Hybrid Female																			
Age	Years of Service																		
	0-4	5	6-24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	>=40
<=49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08
51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08
52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08
53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08
54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08
56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
60	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
61	0.00	0.11	0.09	0.09	0.09	0.09	0.11	0.11	0.11	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
62	0.00	0.15	0.11	0.11	0.11	0.15	0.15	0.15	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
63	0.00	0.15	0.11	0.11	0.15	0.15	0.15	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
64	0.00	0.13	0.14	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
65	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
66	0.00	0.22	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
67	0.00	0.22	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
68	0.00	0.10	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
69	0.00	0.16	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
70	0.00	0.16	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
71	0.00	0.16	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
72	0.00	0.16	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
73	0.00	0.16	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
74	0.00	0.16	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
75	0.00	0.16	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
76	0.00	0.16	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
77	0.00	0.16	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
78	0.00	0.16	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
79	0.00	0.16	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
>=80	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00



Appendix – Summary of Recommended Actuarial Assumptions

DISABILITY RATES: As shown below for selected ages. 15% of disability cases are assumed to be service related.

Non-Top 10 Non-Hazardous Duty Disability Rates		
Age	Male	Female
20	0.00005	0.00001
25	0.00009	0.00001
30	0.00022	0.00001
35	0.00052	0.00024
40	0.00130	0.00058
45	0.00271	0.00127
50	0.00429	0.00274
55	0.00585	0.00483
60	0.00656	0.00640
65	0.00656	0.00656
70	0.00656	0.00656



Appendix – Summary of Recommended Actuarial Assumptions

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

Non-Top 10 Non-Hazardous Duty Termination Rates, Male											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.38626	0.34020	0.30446	0.27976	0.26553	0.25945	0.25319	0.24256	0.22942	0.21542	0.19829
25	0.34582	0.30879	0.27971	0.25872	0.24501	0.23668	0.22856	0.21758	0.20423	0.18923	0.17160
30	0.29499	0.26680	0.24458	0.22769	0.21478	0.20418	0.19421	0.18311	0.16980	0.15370	0.13533
35	0.26103	0.23300	0.21169	0.19604	0.18413	0.17401	0.16467	0.15478	0.14272	0.12727	0.10921
40	0.23608	0.20395	0.18048	0.16444	0.15346	0.14510	0.13781	0.13010	0.12027	0.10694	0.08984
45	0.21691	0.18002	0.15364	0.13656	0.12626	0.11997	0.11521	0.11013	0.10332	0.09373	0.07933
50	0.20077	0.16159	0.13368	0.11597	0.10614	0.10146	0.09880	0.09627	0.09310	0.08885	0.08086
55	0.18678	0.14934	0.12243	0.10520	0.09586	0.09185	0.09042	0.09022	0.09123	0.09336	0.09555
60	0.17555	0.14390	0.12073	0.10548	0.09702	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.16801	0.14540	0.12836	0.11667	0.10985	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.16495	0.15620	0.14895	0.14345	0.13973	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Non-Top 10 Non-Hazardous Duty Termination Rates, Female											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.35767	0.33669	0.30846	0.27527	0.24526	0.22704	0.22422	0.22176	0.21816	0.21568	0.21293
25	0.32508	0.30131	0.27509	0.24836	0.22591	0.21199	0.20768	0.20326	0.19626	0.18741	0.17582
30	0.28507	0.25605	0.23167	0.21264	0.19928	0.19055	0.18459	0.17765	0.16637	0.14940	0.12629
35	0.25792	0.22474	0.20062	0.18479	0.17509	0.16848	0.16228	0.15456	0.14215	0.12254	0.09510
40	0.23681	0.20100	0.17636	0.16123	0.15230	0.14605	0.14002	0.13263	0.12132	0.10320	0.07675
45	0.21851	0.18237	0.15746	0.14201	0.13248	0.12573	0.11969	0.11310	0.10459	0.09194	0.07283
50	0.20148	0.16715	0.14302	0.12750	0.11742	0.11005	0.10356	0.09770	0.09309	0.08937	0.08493
55	0.18709	0.15590	0.13351	0.11857	0.10862	0.10068	0.09333	0.08825	0.08825	0.08825	0.08825
60	0.17815	0.15052	0.13021	0.11626	0.10712	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.17656	0.15223	0.13387	0.12121	0.11334	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.18530	0.16398	0.14753	0.13688	0.13090	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000



Appendix – Summary of Recommended Actuarial Assumptions

SALARY INCREASE RATES: The following total salary increase rates are used. The total salary increase rate consists of an inflation rate of 2.50%, a productivity component of 1.00%, and a variable merit component that is dependent on years of service.

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	5.35%
2	5.35
3	4.75
4	4.45
5	4.45
6	4.45
7	4.35
8	4.25
9	4.00
10	4.00
11-19	3.65
20 or more	3.50

EMPLOYER CONTRIBUTION TO DEFINED CONTRIBUTION HYBRID PLAN: The valuation assumes an average employer defined contribution rate for members in the Hybrid Plan. This is reported by VRS each valuation.



LOCALS – TOP 10, HAZARDOUS DUTY

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted Safety Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males; 105% of rates for females set forward 2 years

Post-Retirement:

Pub-2010 Benefits Weighted Safety Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males; 105% of rates for females set forward 3 years

Post-Disablement:

Pub-2010 Benefits Weighted General Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males set back 3 years; 90% of rates for females set back 3 years

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted Safety Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males and females set forward 2 years



Appendix – Summary of Recommended Actuarial Assumptions

Top 10 Hazardous Duty Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00039	0.00045	0.00030	0.00044	0.00018	0.00019	0.00011	0.00019
25	0.00035	0.00041	0.00334	0.00043	0.00023	0.00025	0.00175	0.00024
30	0.00039	0.00045	0.00291	0.00047	0.00032	0.00034	0.00176	0.00033
35	0.00045	0.00052	0.00372	0.00055	0.00043	0.00045	0.00276	0.00045
40	0.00056	0.00065	0.00492	0.00074	0.00059	0.00062	0.00431	0.00062
45	0.00078	0.00134	0.00725	0.00656	0.00080	0.00126	0.00679	0.00312
50	0.00114	0.00211	0.01160	0.00822	0.00108	0.00217	0.01050	0.00403
55	0.00166	0.00337	0.01727	0.00976	0.00147	0.00376	0.01428	0.00559
60	0.00251	0.00559	0.02166	0.01243	0.00200	0.00649	0.01650	0.00789
65	0.00390	0.00969	0.02543	0.01791	0.00315	0.01121	0.01846	0.01158
70	0.00728	0.01725	0.03185	0.02818	0.00628	0.01936	0.02205	0.01781
75	0.01360	0.03109	0.04127	0.04466	0.01249	0.03344	0.02915	0.02881
80	0.02541	0.05613	0.05625	0.07148	0.05177	0.05774	0.04210	0.04901
85		0.10049	0.08137	0.11732		0.09971	0.06435	0.08833
90		0.17446	0.11975	0.19311		0.16715	0.09913	0.15347

70% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire.

Top 10 Hazardous Duty Retirement Rates, Male					
Age	Years of Service				
	0-4	5	6-24	25	>=26
<=49	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0650	0.0650	0.2000	0.2000
51	0.0000	0.0650	0.0600	0.2500	0.2000
52	0.0000	0.0650	0.0600	0.2500	0.2000
53	0.0000	0.0650	0.0600	0.2500	0.2400
54	0.0000	0.0650	0.0600	0.2500	0.2400
55	0.0000	0.0650	0.0600	0.2500	0.2400
56	0.0000	0.0650	0.0600	0.2100	0.2000
57	0.0000	0.0650	0.0600	0.2100	0.2000
58	0.0000	0.0650	0.0600	0.2100	0.2000
59	0.0000	0.0650	0.1000	0.2100	0.2000
60	0.0000	0.2100	0.2100	0.2100	0.2300
61	0.0000	0.3750	0.2300	0.2300	0.2300
62	0.0000	0.3750	0.2700	0.2700	0.2700
63	0.0000	0.3750	0.2700	0.2700	0.2700
64	0.0000	0.3750	0.2700	0.2700	0.2700
65	0.0000	0.3750	0.3500	0.3500	0.3500
66	0.0000	0.3750	0.3500	0.3500	0.3500
67	0.0000	0.3750	0.3500	0.3500	0.3500
68	0.0000	0.3750	0.3500	0.3500	0.3500
69	0.0000	0.3750	0.3500	0.3500	0.3500
>=70	0.0000	1.0000	1.0000	1.0000	1.0000



Appendix – Summary of Recommended Actuarial Assumptions

Top 10 Hazardous Duty Retirement Rates, Female					
Age	Years of Service				
	0-4	5	6-24	25	>=26
<=49	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0600	0.0600	0.2500	0.2500
51	0.0000	0.0600	0.0875	0.2500	0.3000
52	0.0000	0.0600	0.0750	0.2500	0.3000
53	0.0000	0.0600	0.0750	0.2500	0.3000
54	0.0000	0.0600	0.0750	0.2500	0.3000
55	0.0000	0.0600	0.0750	0.2500	0.4000
56	0.0000	0.0600	0.1400	0.2500	0.4000
57	0.0000	0.0600	0.1400	0.2500	0.2500
58	0.0000	0.0600	0.1400	0.2500	0.2500
59	0.0000	0.0600	0.1400	0.2500	0.2500
60	0.0000	0.1500	0.1500	0.1500	0.2500
61	0.0000	0.1500	0.1500	0.1500	0.1500
62	0.0000	0.1500	0.1500	0.1500	0.1500
63	0.0000	0.1500	0.1500	0.1500	0.1500
64	0.0000	0.1500	0.3000	0.3000	0.3000
65	0.0000	0.1500	0.3000	0.3000	0.3000
66	0.0000	0.1500	0.3000	0.3000	0.3000
67	0.0000	0.1500	0.3000	0.3000	0.3000
68	0.0000	0.1500	0.3000	0.3000	0.3000
69	0.0000	0.1500	0.3000	0.3000	0.3000
>=70	0.0000	1.0000	1.0000	1.0000	1.0000



Appendix – Summary of Recommended Actuarial Assumptions

DISABILITY RATES: As shown below for selected ages. 70% of disability cases are assumed to be service related.

Top 10 Hazardous Duty Disability Rates		
Age	Male	Female
20	0.00019	0.00012
25	0.00022	0.00248
30	0.00052	0.00558
35	0.00133	0.00705
40	0.00267	0.00794
45	0.00405	0.00906
50	0.00500	0.01090
55	0.00657	0.01376
60	0.01055	0.01788
65	0.01786	0.02327
70	0.03085	0.03105

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

Top 10 Hazardous Duty Termination Rates		
Service	Male	Female
0	0.05500	0.07000
1	0.04000	0.07000
2	0.04000	0.07000
3	0.04000	0.05000
4	0.04000	0.05000
5	0.03000	0.05000
6	0.02500	0.03000
7	0.02500	0.03000
8	0.02500	0.03500
9	0.01500	0.01500
10	0.01000	0.01500
11	0.01000	0.01500
12	0.01000	0.01500
13	0.01000	0.01500
>=14	0.00800	0.01500



Appendix – Summary of Recommended Actuarial Assumptions

SALARY INCREASE RATES: The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	4.75%
2	4.75
3	4.75
4	4.75
5	4.65
6	4.40
7	4.40
8	4.40
9	4.40
10 - 19	4.00
20 or more	3.50



LOCALS – NON-TOP 10, HAZARDOUS DUTY

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Benefits Weighted Safety Employee Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males; 105% of rates for females set forward 2 years

Post-Retirement:

Pub-2010 Benefits Weighted Safety Healthy Retiree Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males; 105% of rates for females set forward 3 years

Post-Disablement:

Pub-2010 Benefits Weighted General Disabled Rates projected generationally with a Modified MP-2020 Improvement Scale; 95% of rates for males set back 3 years; 90% of rates for females set back 3 years

Beneficiaries and Survivors:

Pub-2010 Benefits Weighted Safety Contingent Annuitant Rates projected generationally with a Modified MP-2020 Improvement Scale; 110% of rates for males and females set forward 2 years



Appendix – Summary of Recommended Actuarial Assumptions

Non-Top 10 Hazardous Duty Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00039	0.00045	0.00030	0.00044	0.00018	0.00019	0.00011	0.00019
25	0.00035	0.00041	0.00334	0.00043	0.00023	0.00025	0.00175	0.00024
30	0.00039	0.00045	0.00291	0.00047	0.00032	0.00034	0.00176	0.00033
35	0.00045	0.00052	0.00372	0.00055	0.00043	0.00045	0.00276	0.00045
40	0.00056	0.00065	0.00492	0.00074	0.00059	0.00062	0.00431	0.00062
45	0.00078	0.00134	0.00725	0.00656	0.00080	0.00126	0.00679	0.00312
50	0.00114	0.00211	0.01160	0.00822	0.00108	0.00217	0.01050	0.00403
55	0.00166	0.00337	0.01727	0.00976	0.00147	0.00376	0.01428	0.00559
60	0.00251	0.00559	0.02166	0.01243	0.00200	0.00649	0.01650	0.00789
65	0.00390	0.00969	0.02543	0.01791	0.00315	0.01121	0.01846	0.01158
70	0.00728	0.01725	0.03185	0.02818	0.00628	0.01936	0.02205	0.01781
75	0.01360	0.03109	0.04127	0.04466	0.01249	0.03344	0.02915	0.02881
80	0.02541	0.05613	0.05625	0.07148	0.05177	0.05774	0.04210	0.04901
85		0.10049	0.08137	0.11732		0.09971	0.06435	0.08833
90		0.17446	0.11975	0.19311		0.16715	0.09913	0.15347

45% of pre-retirement deaths are assumed to be service related. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with a modified MP-2020 Improvement Scale.



Appendix – Summary of Recommended Actuarial Assumptions

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire.

Non-Top 10 Hazardous Duty Retirement Rates, Male					
Age	Years of Service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.090	0.090	0.275	0.275
51	0.000	0.070	0.075	0.200	0.200
52	0.000	0.070	0.075	0.200	0.200
53	0.000	0.070	0.075	0.200	0.200
54	0.000	0.070	0.075	0.200	0.200
55	0.000	0.070	0.075	0.200	0.200
56	0.000	0.070	0.075	0.200	0.200
57	0.000	0.070	0.075	0.200	0.200
58	0.000	0.070	0.080	0.200	0.165
59	0.000	0.070	0.120	0.200	0.240
60	0.000	0.150	0.150	0.150	0.240
61	0.000	0.200	0.240	0.240	0.240
62	0.000	0.200	0.275	0.275	0.275
63	0.000	0.200	0.275	0.275	0.275
64	0.000	0.200	0.275	0.275	0.275
65	0.000	0.500	0.275	0.275	0.275
66	0.000	0.500	0.500	0.500	0.500
67	0.000	0.500	0.500	0.500	0.500
68	0.000	0.500	0.500	0.500	0.500
69	0.000	0.500	0.500	0.500	0.500
>=70	0.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

Non-Top 10 Hazardous Duty Retirement Rates, Female					
Age	Years of Service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.060	0.060	0.300	0.300
51	0.000	0.100	0.090	0.200	0.200
52	0.000	0.100	0.090	0.200	0.200
53	0.000	0.100	0.090	0.200	0.200
54	0.000	0.100	0.090	0.200	0.300
55	0.000	0.100	0.090	0.200	0.300
56	0.000	0.100	0.120	0.200	0.300
57	0.000	0.100	0.120	0.200	0.250
58	0.000	0.100	0.120	0.200	0.250
59	0.000	0.100	0.120	0.200	0.250
60	0.000	0.150	0.150	0.150	0.250
61	0.000	0.150	0.250	0.250	0.250
62	0.000	0.150	0.250	0.250	0.250
63	0.000	0.150	0.250	0.250	0.250
64	0.000	0.150	0.250	0.250	0.250
65	0.000	0.150	0.400	0.400	0.400
66	0.000	0.150	0.400	0.400	0.400
67	0.000	0.150	0.400	0.400	0.400
68	0.000	0.150	0.400	0.400	0.400
69	0.000	0.150	0.400	0.400	0.400
>=70	0.000	1.000	1.000	1.000	1.000



Appendix – Summary of Recommended Actuarial Assumptions

DISABILITY RATES: As shown below for selected ages. 45% of disability cases are assumed to be service related.

Non-Top 10 Hazardous Duty Disability Rates		
Age	Male	Female
20	0.00001	0.00005
25	0.00016	0.00067
30	0.00058	0.00157
35	0.00121	0.00189
40	0.00218	0.00201
45	0.00330	0.00244
50	0.00416	0.00413
55	0.00496	0.00831
60	0.00575	0.01605
65	0.00630	0.02747
70	0.00659	0.04509



Appendix – Summary of Recommended Actuarial Assumptions

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

Non-Top 10 Hazardous Duty Termination Rates		
Service	Males	Females
0	0.11000	0.20000
1	0.11000	0.15000
2	0.09500	0.10000
3	0.08500	0.08500
4	0.07500	0.07000
5	0.06500	0.07000
6	0.06500	0.07000
7	0.04000	0.07000
8	0.04000	0.07000
9	0.04000	0.06000
10	0.02500	0.03500
11	0.02500	0.03500
12	0.02500	0.03500
13	0.02500	0.03500
14	0.02500	0.03500
15	0.02000	0.03500
>=16	0.02000	0.02000



Appendix – Summary of Recommended Actuarial Assumptions

SALARY INCREASE RATES: The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	4.75%
2	4.75
3	4.75
4	4.75
5	4.65
6	4.40
7	4.40
8	4.40
9	4.40
10 - 19	4.00
20 or more	3.50



Assumptions and Methods Applicable to all OPEB Plans

Investment Return Rate: 6.75% per annum, compounded annually, net of investment expenses.

Inflation Assumption: 2.50% per year.

Actuarial Cost Method: Entry age normal cost method, allocated as a level percent of payroll, from first funding age to last age before terminal retirement age. Actuarial gains and losses, as they occur, are reflected in the unfunded actuarial accrued liability.

Funding Period: The amortization period of the legacy UAAL began at 30 years on June 30, 2013 and this amortization period is to decrease by one year on each subsequent valuation date until the legacy UAAL is fully amortized (amortization period of 0 years). With each subsequent valuation, a new amortization base will be used to amortize that portion of the UAAL not covered by the current balances of the previously established amortization bases. Here, each valuation's newly allocated share of the UAAL will be amortized over a closed 20-year period.

The amortization payment includes an adjustment of 1.018041 to account for the passage of time from the valuation date to the date the contribution is made.

LODA uses Pay-As-You-Go Funding that develops LODA Fund Employer Costs Per Full Time Employee (FTE) while the Actuarially Determined Employer Contribution Rate (ADEC) developed for GASB 74 purposes utilizes amortization as a level percentage of payroll over a 30-year period.

Payroll Growth Rate: 3.00% per annum.

Administrative Expenses: The employer contribution rates include a rate for anticipated non-investment expenses based on actual prior year experience.

LODA is assumed to be \$310,000 for fiscal year 2020 and \$520,000 for fiscal year 2021 with 3% increases in the future. Administrative expenses for the fund assume an offset of administrative fees collected from opt-out employers to process claims.



Appendix – Summary of Recommended Actuarial Assumptions

Assumptions and Methods Applicable to the Group Life Insurance Program

Asset Valuation Method: For the purposes of GASB 74/75, the value of assets is equal to the market value of assets.

To calculate the actuarially determined contributions, the method of valuing assets is intended to recognize a “smoothed” market value of assets. Under this method, the difference between actual return on market value from investment experience and the expected return on market value is recognized over a five-year period. The resulting actuarial value of asset value cannot be less than 80% or more than 120% of the market value of assets.

Minimum Benefit: Beginning with the fiscal year ending June 30, 2016, in no event will the death benefit be less than \$8,000 for members who retire with at least 30 years of creditable service. Between June 30, 2016 and the current valuation date, this minimum is indexed at the same rate as the post-retirement supplement for retirees hired on or after July 1, 2010. Beginning on the valuation date, this minimum is assumed to increase annually, effective July 1, by 2.25% (the same assumed annual increase percentage for any annual post-retirement supplement for retirees, as calculated for employees hired on or after July 1, 2010).

“Life Insurance Only” Retirees: Results include an estimate retiree liability for those groups not providing retiree census data. For the Life Only group, an estimation factor of actual benefit payments for the group to the rest of the actual benefit payments produces a ratio of 1.618% to estimate retiree liability. For the ORP group, a liability equaling 10% of the active employee liability times the average retiree to active liability ratio is assumed.



**Assumptions and Methods Applicable to the Health Insurance Credit Program
State Employees and Teachers**

Asset Valuation Method: For the purposes of GASB 74/75, the value of assets is equal to the market value of assets.

To calculate the actuarially determined contributions, the method of valuing assets is intended to recognize a “smoothed” market value of assets. Under this method, the difference between actual return on market value from investment experience and the expected return on market value is recognized over a five-year period. The resulting actuarial value of asset value cannot be less than 80% or more than 120% of the market value of assets.

Participation Rates: 95% of eligible future service retirees from active status are assumed to utilize the benefit plan.

Eligible future service retirees from deferred vested status are assumed to utilize the benefit plan at 95%.

Eligible future disabled benefit recipients from active status are assumed to utilize the benefit plan as follows:

System	Participation
State/JRS	95%
Teachers	90%
SPORS/VaLORS	80%



**Assumptions and Methods Applicable to the Health Insurance Credit Program
State Employees and Teachers (continued)**

**Percentage Not Utilizing the
Maximum Benefit:**

The percentage of eligible future benefit recipients assumed to utilize the benefit plan, but not receive the maximum benefit for which they are eligible is as follows:

System	Percentage
State/JRS	5%
Teachers	15%
SPORS/VaLORS	10%

**Percentage of Maximum Benefit
Received:**

Eligible future benefit recipients assumed to utilize the benefit plan, but not receive the maximum benefit for which they are eligible are assumed to initially receive 70% of the maximum benefit for which they are eligible.

**Annual Increase in Benefit
for Those Not Receiving the
Maximum Benefit:**

Benefit recipients assumed to utilize the benefit plan, but not receiving the maximum benefit for which they are eligible are assumed to have their benefit increase at the following rates:

Duration Since Retirement	Annual Increase in HIC benefit
1 Year	4.50%
2 – 3 Years	4.25%
4 or More Years	3.00%



**Assumptions and Methods Applicable to the Health Insurance Credit Program
State Employees and Teachers (continued)**

**Percentage of Future Eligible
Deferred Vested Members
Electing to Withdraw from VRS:**

The percentage of future eligible deferred vested members assumed to withdraw from VRS is as follows:

System	Percentage	
	Under Age 50	Age 50 and Over
State/JRS	75%	35%
Teachers	75%	35%
SPORS/VaLORS	90%	55%

Deferred Vested Deferral Period: Eligible deferred vested members are assumed to begin receiving benefits at the following ages:

System	Age of Initial Benefit Receipt
State/JRS/Teachers	
Plan 1 Members	60
Plan 2 and Hybrid Plan Members	
Born prior to 1938	60
Born after 1937 and before 1960	61
Born after 1959	62
SPORS/VaLORS	
Members with less than 25 years of service	55
Members with 25 or more years of service	50

ORP and UVA Deferred Vested Participants:

Results include an estimate of deferred vested liability for those groups providing limited deferred vested census data. The estimate is derived from a ratio of retired to vested liabilities for the other HIC Plans.



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Health Insurance Credit Program
Political Subdivisions and Special Coverage Groups**

- Asset Valuation Method:** Market value of assets.
- Participation Rates:** 85% of eligible future service retirees from active status are assumed to utilize the benefit plan. 50% of eligible future disability retirees will utilize the benefit.
- Eligible future service retirees from deferred vested status are assumed to utilize the benefit plan at 85%.
- Percentage Not Utilizing the Maximum Benefit:** 5% of eligible future benefit recipients are assumed to utilize the benefit plan, but not receive the maximum benefit for which they are eligible.
- Percentage of Maximum Benefit Received:** Eligible future benefit recipients assumed to utilize the benefit plan, but not receive the maximum benefit for which they are eligible are assumed to initially receive 70% of the maximum benefit for which they are eligible.
- Annual Increase in Benefit for Those Not Receiving the Maximum Benefit:** Benefit recipients assumed to utilize the benefit plan, but not receiving the maximum benefit for which they are eligible are assumed to have their benefit increase at the following rates:

Duration Since Retirement	Annual Increase in HIC benefit
1 Year	4.50%
2 – 3 Years	4.25%
4 or More Years	3.00%



**Assumptions and Methods Applicable to the Health Insurance Credit Program
Political Subdivisions and Special Coverage Groups (continued)**

Percentage of Future Eligible Deferred Vested Members Electing to Withdraw from VRS: 85% of future eligible deferred vested members under the age of 50 are assumed to withdraw from VRS. 50% of future eligible deferred vested members that are age 50 and above are assumed to withdraw from VRS.

Deferred Vested Deferral Period: Eligible deferred vested members with LEOs/Fire Pension Benefit Coverage are assumed to receive benefits at age 55 (if the member has less than 25 years of service at retirement) and at age 50 (if the member has 25 or more years of service at retirement). Eligible deferred vested members with General Employee Pension Benefit Coverage are assumed to receive benefits as follows:

Political Subdivisions and Special Coverage Groups	Age of Initial Benefit Receipt
Plan 1 Members	60
Plan 2 and Hybrid Plan Members	
Born prior to 1938	60
Born after 1937 and before 1960	61
Born after 1959	62

Employer Groups: The political subdivisions have been divided into two groups. The Top 10 group consists of: City of Virginia Beach, Henrico County, Prince William County, Chesterfield County, City of Chesapeake, City of Alexandria, City of Hampton, Loudoun County, City of Lynchburg, and the City of Portsmouth. The Non-Top 10 is all other political subdivisions not included in the Top 10 group.

Plan Surcharge: The additional contribution rate applied to plans with low funding levels to bring the plan to a more sustainable funding position as determined by the Plan Actuary.

Additional Funding Charge: An additional funding charge will be included in the contribution rate, if needed, to allow the use of the 6.75% investment return assumption to be used as the single equivalent interest rate assumption for GASB 74/75 purposes.



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Disability Benefits and Long-Term Care Benefits**

Asset Valuation Method: For the purposes of GASB 74/75, the value of assets is equal to the market value of assets.

The method of valuing assets is intended to recognize a “smoothed” market value of assets. Under this method, the difference between actual return on market value from investment experience and the expected return on market value is recognized over a five-year period. The resulting actuarial value of asset value cannot be less than 80% or more than 120% of the market value of assets.

Health Insurance Credit and Group Life Insurance Benefits: Health Insurance Credit and Group Life Insurance benefits provided by VSDP are valued under the respective plans.

Disability: A Plan 1 Member hired prior to January 1, 1999 and who has elected VSDP coverage or any member hired on or after January 1, 1999. Applicable members hired prior to July 1, 2009 are eligible from the first day of employment for work related and non-work related VSDP disability benefits. Applicable members hired on or after July 1, 2009 are eligible from the first day of employment for work-related VSDP disability benefits, but must have a minimum of one year of service to be eligible for non-work related VSDP disability benefits.



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Disability Benefits**

Cost-of-Living Increase:

Plan 1 Members: 2.50% per year, compounded annually.

Plan 2 and Hybrid Members: 2.25% per year, compounded annually.

**Liability Assumed for Disabled
Members in Waiting Period:**

The liability associated for those disabled and not yet eligible to receive benefits was based upon the development method in which plan experience was applied to those claims reported in the second half of the most recent fiscal year.

**Income Replacement for Future
Disabled Members:**

62% of a member’s pre-disability income.

**Percentage of Members with
1% Employer Contribution:**

65% of members are assumed to meet the Social Security definition of Disability, and are thus eligible for an additional 1% of employer contribution.

Offsets for Active Members:

The following benefit adjustments are assumed for the expected future monthly benefits to be paid to future disabled members. The benefit adjustments are consistent with recent experience.

Year of Long-Term Disability	Benefit Adjustment Factor
1	70.9%
2	56.6%
3	51.7%
4	49.1%
5	41.7%
6-9	35.5%
10-13	42.6%
14	45.1%
15 and Longer	50.9%



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Disability Benefits (continued)**

Offsets for Disabled Members: It is assumed that the offset amounts reported by the administrator will continue to apply to each member’s benefit until the benefit expires. For members with less than eight years of disability and no current benefit offsets, benefit amounts are adjusted to reflect future offsets as follows:

Year of Long-Term Disability	Percentage Receiving Offsets in the Next Year if Currently Not in Receipt	Average Percentage of Full Benefit Paid if in Receipt of Offsets
1	36.0%	27.0%
2	27.0%	26.0%
3	23.0%	26.0%
4	16.0%	26.0%
5	14.0%	26.0%
6	9.0%	26.0%
7	4.0%	26.0%
8 and Longer	0.0%	30.0%

Rates of Termination of Benefits Due to Death or Recovery: 2012 Group Long Term Disability Valuation Table (2012 GLTD) as proposed by the Society of Actuaries’ Group Disability Experience Committee for use by the National Association of Insurance Commissioners. Used as a basis those rates applicable to plans with a six-month elimination period, “Own Occupation” definition of disability in the first twenty-four months and “Any Occupation” definition of disability for the twenty-fifth month onward, initial maximum guaranteed benefit of \$1,900, “No Diagnosis” cause of disability, 15% margin for recovery, 28% margin for deaths, and adjusted for prior five years of VRS experience with the following adjustment factors:

Month of Disability	Male	Female
4 - 24	0.852	0.803
25 - 60	0.811	0.821
61 - 120	1.164	1.184
121 and over	1.073	1.126



**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Care Benefits**

Disabled Life Reserve:	The liability associated for those participants assumed to be in a current benefit period was based upon the development method in which prior experience was applied to the current claim duration and prior payments made for each individual.
Incurred But Not Reported Reserve:	The liability associated for those participants with claims that have been incurred but not reported (IBNR), as of the valuation date, to the administrator was based upon the development method in which prior experience for claim incidence and expected benefits payments was applied to the covered population.



**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Care Benefits (continued)**

Morbidity:

Rates were compared against rates developed using the Society of Actuaries (SOA) Long Term Care basic experience rate tables. We also compared rates against a Milliman LTC study performed on behalf of the SOA for reasonableness. Because actuarial experience (gains)/losses have fluctuated over the past several years, we recommend no modifications.

Unadjusted Claim Incidence Rates				
Attained Age	Nursing Facility		Home Health	
	Male	Female	Male	Female
25	0.00001	0.00001	0.00008	0.00008
30	0.00003	0.00002	0.00010	0.00010
35	0.00008	0.00005	0.00012	0.00013
40	0.00013	0.00009	0.00018	0.00015
45	0.00021	0.00014	0.00028	0.00017
50	0.00031	0.00020	0.00039	0.00029
55	0.00047	0.00029	0.00053	0.00047
60	0.00060	0.00065	0.00085	0.00092
65	0.00100	0.00107	0.00150	0.00162
70	0.00210	0.00191	0.00249	0.00295
75	0.00480	0.00507	0.00482	0.00541
80	0.01023	0.01327	0.00895	0.00917
85	0.02155	0.03171	0.01541	0.01511
90	0.04111	0.06180	0.02249	0.02042
95	0.05844	0.08370	0.02522	0.02190
100	0.07276	0.09756	0.02598	0.02198
105	0.09059	0.11372	0.02677	0.02206
110+	0.11279	0.13255	0.02758	0.02213



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Care Benefits (continued)**

Morbidity (continued):

For actively employed members, the unadjusted claim incidence rates are adjusted by the following selection factors based upon length of VSDP membership and age of entry into VSDP.

Claim Incidence Selection Factors			
Actively Employed Members			
Years of VSDP Membership	VSDP Entry Age		
	<50	50 - 64	65+
1	0.133	0.138	0.164
2	0.217	0.222	0.256
3	0.284	0.289	0.342
4	0.334	0.341	0.438
5	0.367	0.375	0.520
6	0.439	0.447	0.547
7	0.473	0.482	0.573
8	0.500	0.511	0.593
9	0.527	0.538	0.612
10	0.561	0.573	0.634
11	0.599	0.612	0.673
12	0.643	0.658	0.719
13	0.702	0.718	0.755
14	0.769	0.787	0.797
15	0.836	0.836	0.840
16	0.851	0.851	0.855
17	0.869	0.869	0.872
18	0.890	0.890	0.893
19	0.915	0.915	0.918
20+	0.945	0.945	0.947



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Care Benefits (continued)**

Morbidity (continued):

For ported members, the unadjusted claim incidence rates are adjusted based upon the likelihood of porting and the number of years since porting.

Claim Incidence Selection Factors		
Ported Members		
Porting Rate	Initial Year Of Porting	Ultimate Rate*
0%	2.35	1.19
5%	2.29	1.18
10%	2.22	1.18
15%	2.16	1.17
20%	2.09	1.16
25%	2.03	1.16
30%	1.96	1.15
35%	1.90	1.14
40%	1.83	1.13
45%	1.77	1.13
50%	1.70	1.12
55%	1.64	1.11
60%	1.57	1.11
65%	1.51	1.10
70%	1.44	1.09
75%	1.38	1.09
80%	1.31	1.08
85%	1.25	1.07
90%	1.18	1.06
95%	1.12	1.06
100%	1.05	1.05

* The selection factors are assumed to decrease linearly over a 10-year period.



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Care Benefits (continued)**

Morbidity (continued):

The duration of a claim is based upon the attained age at incidence, gender, and type of claim.

Attained Age	Length of Stay (Months)			
	Nursing Facility		Home Health	
	Male	Female	Male	Female
25	11.15	13.96	19.14	12.54
30	11.60	14.42	18.81	12.47
35	12.04	14.98	18.67	12.45
40	12.29	14.87	16.77	13.48
45	12.50	14.77	14.99	14.56
50	12.90	14.16	15.36	13.78
55	13.30	13.52	15.77	13.02
60	12.99	14.12	15.15	12.40
65	13.36	14.30	12.84	12.80
70	14.00	14.32	11.80	13.53
75	13.99	15.09	11.50	13.50
80	13.76	15.61	10.90	13.18
85	13.62	15.90	10.05	12.86
90	13.09	16.19	8.78	12.70
95	12.30	16.51	8.23	12.66
100	11.32	16.10	8.70	13.34
105	9.84	14.77	9.56	14.60
110+	8.31	13.32	9.33	14.89



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Care Benefits (continued)**

Daily Benefit Amount: \$96 per day indemnity benefit paid for service in a nursing home. The daily benefit for home health care coverage is 50% of the nursing home benefit.

Daily Benefit Amount Increases: The valuation does not include a provision for increases (i.e., 5% compound increase every five years). If the benefit policy is to provide increases at regular intervals, the resulting liability will be materially greater than the results presented (i.e., inflation increases are not assumed to be pre-funded).

Benefit Maximums: A lifetime maximum benefit of \$70,080 (reflects a two-year maximum coverage period based upon a \$96 per day indemnity benefit).



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Care Benefits (continued)**

Porting Rates:

Porting rate assumptions are based upon experience over the first five years of the program, with substantial increases over the life of the program. Because actuarial experience (gains)/losses have fluctuated over the past several years, we made no modifications. Porting rates by age of entry into VSDP and length of VSDP membership are provided in the following table.

VSDP Entry Age	Years of VSDP Membership										
	0	5	10	15	20	25	30	35	40	45	50+
25	0.1000	0.1010	0.1144	0.1313	0.1739	0.2555	0.3693	0.5263	0.6812	0.8874	1.0000
30	0.1000	0.1019	0.1234	0.1534	0.2185	0.3194	0.4537	0.5822	0.7574	0.9609	1.0000
35	0.1000	0.1021	0.1303	0.1778	0.2683	0.3935	0.5001	0.6454	0.8406	1.0000	1.0000
40	0.1000	0.1063	0.1608	0.2383	0.3423	0.4320	0.5526	0.7169	0.9230	1.0000	1.0000
45	0.1001	0.1177	0.2001	0.2931	0.3754	0.4755	0.6119	0.7978	0.9983	1.0000	1.0000
50	0.1027	0.1304	0.2244	0.3262	0.4116	0.5247	0.6790	0.8833	1.0000	1.0000	1.0000
55	0.1072	0.1410	0.2422	0.3585	0.4524	0.5804	0.7549	0.9624	1.0000	1.0000	1.0000
60	0.1162	0.1596	0.2667	0.3924	0.4986	0.6434	0.8407	1.0000	1.0000	1.0000	1.0000
65	0.1329	0.1887	0.2999	0.4307	0.5508	0.7146	0.9257	1.0000	1.0000	1.0000	1.0000
70	0.1485	0.2129	0.3308	0.4741	0.6099	0.7952	0.9985	1.0000	1.0000	1.0000	1.0000
75	0.1700	0.2444	0.3693	0.5231	0.6768	0.8863	1.0000	1.0000	1.0000	1.0000	1.0000
80	0.1875	0.2682	0.4043	0.5786	0.7524	0.9645	1.0000	1.0000	1.0000	1.0000	1.0000
85	0.1941	0.2770	0.4310	0.6413	0.8379	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
90	0.2012	0.2863	0.4601	0.7123	0.9347	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
95	0.2088	0.2960	0.4917	0.7925	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.2171	0.3063	0.5261	0.8833	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
105	0.2259	0.3171	0.5635	0.9860	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
110	0.2354	0.3284	0.6042	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
115	0.2457	0.3404	0.6485	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
120	0.2567	0.3529	0.6966	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000



**Assumptions and Methods Applicable to the Virginia Sickness and Disability Program
Long-Term Care Benefits (continued)**

Porting Premiums:

While actively employed or receiving LTD benefits, a member receives coverage in the amount currently in place for the entire actively employed group. Upon termination of employment, a member has the option to port the amount of coverage current for the group by paying a premium. We reviewed that the premiums below adequately cover the expected costs as a part of the experience study and, therefore, no adjustments are recommended.

Monthly Porting Premium Rates Per \$1 of Daily Benefit Amount							
VSDP Entry Age	Rate	VSDP Entry Age	Rate	VSDP Entry Age	Rate	VSDP Entry Age	Rate
20	0.018	38	0.070	56	0.233	74	1.212
21	0.019	39	0.075	57	0.255	75	1.331
22	0.020	40	0.078	58	0.278	76	1.466
23	0.022	41	0.084	59	0.305	77	1.619
24	0.023	42	0.089	60	0.335	78	1.786
25	0.025	43	0.095	61	0.368	79	1.968
26	0.028	44	0.100	62	0.406	80	2.153
27	0.030	45	0.106	63	0.448	81	2.329
28	0.033	46	0.112	64	0.497	82	2.503
29	0.035	47	0.121	65	0.539	83	2.676
30	0.038	48	0.128	66	0.596	84	2.835
31	0.041	49	0.136	67	0.662	85	2.971
32	0.046	50	0.144	68	0.717	86	3.134
33	0.050	51	0.155	69	0.777	87	3.277
34	0.053	52	0.166	70	0.845	88	3.405
35	0.057	53	0.180	71	0.922	89	3.522
36	0.061	54	0.196	72	1.007	90	3.610
37	0.065	55	0.213	73	1.105		



**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Disability Benefits and Long-Term Care Benefits**

Asset Valuation Method:	<p>For the purposes of GASB 74/75, the value of assets is equal to the market value of assets.</p> <p>The method of valuing assets is intended to recognize a “smoothed” market value of assets. Under this method, the difference between actual return on market value from investment experience and the expected return on market value is recognized over a five-year period. The resulting actuarial value of asset value cannot be less than 80% or more than 120% of the market value of assets.</p>
Health Insurance Credit and Group Life Insurance Benefits:	<p>Health Insurance Credit (if applicable) and Group Life Insurance benefits provided under VLDP are valued under the respective plans.</p>
Disability:	<p>Applicable members covered under the Hybrid Plan are eligible from the first day of employment for work-related VLDP disability benefits, but must have a minimum of one year of service to be eligible for non-work related VLDP disability benefits.</p>



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Disability Benefits**

- Cost-of-Living Increase:** 0.00% per year, compounded annually.
- Liability Assumed for Disabled Members in Waiting Period:** The liability associated for those disabled and not yet eligible to receive benefits was based upon the expected number of long-term disabilities incurred during the period of January 1, 2016 and June 30, 2016.
- Income Replacement for Future Disabled Members:** 62% of a member’s pre-disability income.
- Percentage of Members with 1% Employer Contribution:** 65% of members are assumed to meet the Social Security definition of Disability, and are thus eligible for an additional 1% of employer contribution.
- Offsets for Active Members:** The following benefit adjustments are assumed for the expected future monthly benefits to be paid to future disabled members. The benefit adjustments are consistent with recent experience.

Year of Long-Term Disability	Benefit Adjustment Factor
1	70.9%
2	56.6%
3	51.7%
4	49.1%
5	41.7%
6-9	35.5%
10-13	42.6%
14	45.1%
15 and Longer	50.9%



**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Disability Benefits (continued)**

Offsets for Disabled Members: It is assumed that the offset amounts reported by the administrator will continue to apply to each member’s benefit until the benefit expires. For members with less than six years of disability and no current benefit offsets, benefit amounts are adjusted to reflect future offsets as follows:

Year of Long-Term Disability	Percentage Receiving Offsets in the Next Year if Currently Not in Receipt	Average Percentage of Full Benefit Paid if in Receipt of Offsets
1	36.0%	27.0%
2	27.0%	26.0%
3	23.0%	26.0%
4	16.0%	26.0%
5	14.0%	26.0%
6	9.0%	26.0%
7	4.0%	26.0%
8 and Longer	0.0%	30.0%

Rates of Termination of Benefits Due to Death or Recovery: 2012 Group Long Term Disability Valuation Table (2012 GLTD) as proposed by the Society of Actuaries’ Group Disability Experience Committee for use by the National Association of Insurance Commissioners. Used as a basis those rates applicable to plans with a six-month elimination period, “Own Occupation” definition of disability, initial maximum guaranteed benefit of \$1,900, “No Diagnosis” cause of disability, 15% margin for recovery, 28% margin for deaths, and adjusted for prior five years of VRS experience with the following adjustment factors:

Month of Disability	Male	Female
4 - 24	0.852	0.803
25 - 60	0.811	0.821
61 - 120	1.164	1.184
121 and over	1.073	1.126



**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Care Benefits**

Disabled Life Reserve:	The liability associated for those participants assumed to be in a current benefit period was based upon the development method in which prior experience was applied to the current claim duration and prior payments made for each individual.
Incurred But Not Reported Reserve:	The liability associated for those participants with claims that have been incurred but not reported (IBNR) as of the valuation date to the administrator was based upon the development method in which prior experience for claim incidence and expected benefits payments was applied to the covered population.



**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Care Benefits (continued)**

Morbidity:

Rates were compared against rates developed using the Society of Actuaries (SOA) Long Term Care basic experience rate tables. We also compared rates against a Milliman LTC study performed on behalf of the SOA for reasonableness. Because actuarial experience (gains)/losses have fluctuated over the past several years, we recommend no modifications.

Unadjusted Claim Incidence Rates				
Attained Age	Nursing Facility		Home Health	
	Male	Female	Male	Female
25	0.00001	0.00001	0.00008	0.00008
30	0.00003	0.00002	0.00010	0.00010
35	0.00008	0.00005	0.00012	0.00013
40	0.00013	0.00009	0.00018	0.00015
45	0.00021	0.00014	0.00028	0.00017
50	0.00031	0.00020	0.00039	0.00029
55	0.00047	0.00029	0.00053	0.00047
60	0.00060	0.00065	0.00085	0.00092
65	0.00100	0.00107	0.00150	0.00162
70	0.00210	0.00191	0.00249	0.00295
75	0.00480	0.00507	0.00482	0.00541
80	0.01023	0.01327	0.00895	0.00917
85	0.02155	0.03171	0.01541	0.01511
90	0.04111	0.06180	0.02249	0.02042
95	0.05844	0.08370	0.02522	0.02190
100	0.07276	0.09756	0.02598	0.02198
105	0.09059	0.11372	0.02677	0.02206
110+	0.11279	0.13255	0.02758	0.02213



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Care Benefits (continued)**

Morbidity (continued):

For actively employed members, the unadjusted claim incidence rates are adjusted by the following selection factors based upon length of VLDP membership and age of entry into VLDP.

Claim Incidence Selection Factors			
Actively Employed Members			
Years of VLDP Membership	VLDP Entry Age		
	<50	50 - 64	65+
1	0.133	0.138	0.164
2	0.217	0.222	0.256
3	0.284	0.289	0.342
4	0.334	0.341	0.438
5	0.367	0.375	0.520
6	0.439	0.447	0.547
7	0.473	0.482	0.573
8	0.500	0.511	0.593
9	0.527	0.538	0.612
10	0.561	0.573	0.634
11	0.599	0.612	0.673
12	0.643	0.658	0.719
13	0.702	0.718	0.755
14	0.769	0.787	0.797
15	0.836	0.836	0.840
16	0.851	0.851	0.855
17	0.869	0.869	0.872
18	0.890	0.890	0.893
19	0.915	0.915	0.918
20+	0.945	0.945	0.947



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Care Benefits (continued)**

Morbidity (continued):

For ported members, the unadjusted claim incidence rates are adjusted based upon the likelihood of porting and the number of years since porting.

Claim Incidence Selection Factors		
Ported Members		
Porting Rate	Initial Year Of Porting	Ultimate Rate*
0%	2.35	1.19
5%	2.29	1.18
10%	2.22	1.18
15%	2.16	1.17
20%	2.09	1.16
25%	2.03	1.16
30%	1.96	1.15
35%	1.90	1.14
40%	1.83	1.13
45%	1.77	1.13
50%	1.70	1.12
55%	1.64	1.11
60%	1.57	1.11
65%	1.51	1.10
70%	1.44	1.09
75%	1.38	1.09
80%	1.31	1.08
85%	1.25	1.07
90%	1.18	1.06
95%	1.12	1.06
100%	1.05	1.05

* The selection factors are assumed to decrease linearly over a 10-year period.



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Care Benefits (continued)**

Morbidity (continued):

The duration of a claim is based upon the attained age at incidence, gender, and type of claim.

Length of Stay (Months)				
Attained Age	Nursing Facility		Home Health	
	Male	Female	Male	Female
25	11.15	13.96	19.14	12.54
30	11.60	14.42	18.81	12.47
35	12.04	14.98	18.67	12.45
40	12.29	14.87	16.77	13.48
45	12.50	14.77	14.99	14.56
50	12.90	14.16	15.36	13.78
55	13.30	13.52	15.77	13.02
60	12.99	14.12	15.15	12.40
65	13.36	14.30	12.84	12.80
70	14.00	14.32	11.80	13.53
75	13.99	15.09	11.50	13.50
80	13.76	15.61	10.90	13.18
85	13.62	15.90	10.05	12.86
90	13.09	16.19	8.78	12.70
95	12.30	16.51	8.23	12.66
100	11.32	16.10	8.70	13.34
105	9.84	14.77	9.56	14.60
110+	8.31	13.32	9.33	14.89



**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Care Benefits (continued)**

- Daily Benefit Amount:** \$96 per day indemnity benefit paid for service in a nursing home. The daily benefit for home health care coverage is 50% of the nursing home benefit.
- Daily Benefit Amount Increases:** The valuation does not include a provision for increases (i.e., 5% compound increase every five years). If the benefit policy is to provide increases at regular intervals, the resulting liability will be materially greater than the results presented (i.e., inflation increases are not assumed to be pre-funded).
- Benefit Maximums:** A lifetime maximum benefit of \$70,080 (reflects a two-year maximum coverage period based upon a \$96 per day indemnity benefit).



Appendix – Summary of Recommended Actuarial Assumptions

**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Care Benefits (continued)**

Porting Rates:

Porting rate assumptions are based upon experience over the first five years of the program, with substantial increases over the life of the program. Because actuarial experience (gains)/losses have fluctuated over the past several years, we made no modifications. Porting rates by age of entry into VLDP and length of VLDP membership are provided in the following table.

VLDP Entry Age	Years of VLDP Membership										
	0	5	10	15	20	25	30	35	40	45	50+
25	0.1000	0.1010	0.1144	0.1313	0.1739	0.2555	0.3693	0.5263	0.6812	0.8874	1.0000
30	0.1000	0.1019	0.1234	0.1534	0.2185	0.3194	0.4537	0.5822	0.7574	0.9609	1.0000
35	0.1000	0.1021	0.1303	0.1778	0.2683	0.3935	0.5001	0.6454	0.8406	1.0000	1.0000
40	0.1000	0.1063	0.1608	0.2383	0.3423	0.4320	0.5526	0.7169	0.9230	1.0000	1.0000
45	0.1001	0.1177	0.2001	0.2931	0.3754	0.4755	0.6119	0.7978	0.9983	1.0000	1.0000
50	0.1027	0.1304	0.2244	0.3262	0.4116	0.5247	0.6790	0.8833	1.0000	1.0000	1.0000
55	0.1072	0.1410	0.2422	0.3585	0.4524	0.5804	0.7549	0.9624	1.0000	1.0000	1.0000
60	0.1162	0.1596	0.2667	0.3924	0.4986	0.6434	0.8407	1.0000	1.0000	1.0000	1.0000
65	0.1329	0.1887	0.2999	0.4307	0.5508	0.7146	0.9257	1.0000	1.0000	1.0000	1.0000
70	0.1485	0.2129	0.3308	0.4741	0.6099	0.7952	0.9985	1.0000	1.0000	1.0000	1.0000
75	0.1700	0.2444	0.3693	0.5231	0.6768	0.8863	1.0000	1.0000	1.0000	1.0000	1.0000
80	0.1875	0.2682	0.4043	0.5786	0.7524	0.9645	1.0000	1.0000	1.0000	1.0000	1.0000
85	0.1941	0.2770	0.4310	0.6413	0.8379	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
90	0.2012	0.2863	0.4601	0.7123	0.9347	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
95	0.2088	0.2960	0.4917	0.7925	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.2171	0.3063	0.5261	0.8833	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
105	0.2259	0.3171	0.5635	0.9860	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
110	0.2354	0.3284	0.6042	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
115	0.2457	0.3404	0.6485	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
120	0.2567	0.3529	0.6966	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000



**Assumptions and Methods Applicable to the Virginia Local Disability Program
Long-Term Care Benefits (continued)**

Porting Premiums:

While actively employed or receiving LTD benefits, a member receives coverage in the amount currently in place for the entire actively employed group. Upon termination of employment, a member has the option to port the amount of coverage current for the group by paying a premium. We reviewed that the premiums below adequately cover the expected costs as a part of the experience study and, therefore, no adjustments are recommended.

Monthly Porting Premium Rates Per \$1 of Daily Benefit Amount							
VLDP Entry Age	Rate	VLDP Entry Age	Rate	VLDP Entry Age	Rate	VLDP Entry Age	Rate
20	0.018	38	0.070	56	0.233	74	1.212
21	0.019	39	0.075	57	0.255	75	1.331
22	0.020	40	0.078	58	0.278	76	1.466
23	0.022	41	0.084	59	0.305	77	1.619
24	0.023	42	0.089	60	0.335	78	1.786
25	0.025	43	0.095	61	0.368	79	1.968
26	0.028	44	0.100	62	0.406	80	2.153
27	0.030	45	0.106	63	0.448	81	2.329
28	0.033	46	0.112	64	0.497	82	2.503
29	0.035	47	0.121	65	0.539	83	2.676
30	0.038	48	0.128	66	0.596	84	2.835
31	0.041	49	0.136	67	0.662	85	2.971
32	0.046	50	0.144	68	0.717	86	3.134
33	0.050	51	0.155	69	0.777	87	3.277
34	0.053	52	0.166	70	0.845	88	3.405
35	0.057	53	0.180	71	0.922	89	3.522
36	0.061	54	0.196	72	1.007	90	3.610
37	0.065	55	0.213	73	1.105		



Assumptions and Methods Applicable to the Virginia Line of Duty Act

Asset Valuation Method: Market Value of Assets

Service-Related Disabilities: Disabilities are assumed to be service related and result in coverage under the Plan based on the following:

Group	Qualifying Disability %
State	25%
SPORS	85%
VaLORS	35%
Non Top 10 LEOS	65%
Top 10 LEOS	70%

Service-Related Deaths: Active employee death are assumed to be service related and result in coverage under the Plan based on the following:

Group	Qualifying Death %
State	25%
SPORS	85%
VaLORS	35%
Non Top 10 LEOS	45%
Top 10 LEOS	70%

Of the service-related deaths, 50% are assumed to be paid as a direct or proximate result of the performance of duty, with the remainder paid under the presumptive clause.

Spouse Health Care Coverage: Actual data provided is used for current beneficiaries. 80% of service-related deaths and 80% of service-related disabilities assumed to result in spouse coverage, with wives assumed to be three years younger than husbands.

VRS Health Insurance Credit: Health care costs of the Plan are assumed to be reduced by an amount equal to the disabled health insurance credit paid by the VRS Health Insurance Credit Program for eligible disabled employees. An annual credit of \$1,440 or \$48 per year of service, whichever is greater, is assumed for those employees who are members of the VRS State, VaLORS, or SPORS plans and an annual credit of \$540 is assumed for those employees who are members of a VRS political subdivision participating in the VRS Health Insurance Credit Program.



Assumptions and Methods Applicable to the Virginia Line of Duty Act (continued)

Health Care Cost Trend Rate: The initial per capita health care costs are expected to increase each year with inflation (trend). The following chart details the trend assumption.

Fiscal Year Ended	Under Age 65	Ages 65 and Older
2020	7.00%	5.375%
2021	6.75%	5.250%
2022	6.50%	5.125%
2023	6.25%	5.000%
2024	6.00%	4.750%
2025	5.75%	4.750%
2026	5.50%	4.750%
2027	5.25%	4.750%
2028	5.00%	4.750%
2029 and Beyond	4.75%	4.750%

Additionally, the following chart details the trend assumption for the Medicare Part B premium. The trend rate assumption is based on the 2020 Medicare Trustees Report.

Fiscal Year Ended	
2020	2.6971%
2021	6.1953%
2022	5.7070%
2023	5.9388%
2024	6.0589%
2025	5.6594%
2026	5.8615%
2027	5.7279%
2028	5.6885%
2029	5.5000%
2030	5.2500%
2031 and Beyond	5.0000%



Assumptions and Methods Applicable to the Virginia Line of Duty Act (continued)

**Eligibility for Medicare
Due to Age:**

For Plan beneficiaries who become eligible for health care benefits as the result of a death or disability occurring after June 30, 2017, 75% of disabled employees who become disabled 29 or more months prior to their sixty-fifth birthday are assumed to be eligible for Medicare due to age (age 65) and 25% are assumed to become eligible for Medicare earlier than age 65 due to disability. 100% of all other Plan beneficiaries who become eligible for health care benefits as the result of a death or disability occurring after June 30, 2017 are assumed to be eligible for Medicare due to age rather than due to disability.

**Initial Per Capita
Health Care Costs:**

Health care premium amounts were provided by DHRM. CMC accepted this information without audit and has relied upon the sources for the accuracy of the data.

Assumed adult per capita costs are based on actual premiums and tier elections trended forward to the valuation period. As some beneficiaries elect to cover dependents, the assumed adult costs include the additional costs for the coverage of dependent children.

Initial Monthly Per Capita Adult Health Care Costs		
Valuation Date	Under Age 65*	Ages 65 and Older
June 30, 2017	\$1,065.7	\$505.00
June 30, 2018	\$1,186.0	\$506.50
June 30, 2019	\$1,137.6	\$406.60
June 30, 2020	\$1,222.5	\$431.50

*Includes the assumed additional cost for the coverage of dependent children.



Assumptions and Methods Applicable to the Virginia Line of Duty Act (continued)

Age Related Morbidity:

All health care costs assumed not to be related to covered dependent children are age-adjusted. The following chart details the expected health care claims, age-adjusted to age 65, and the associated assumed increases to the net incurred claims:

Beneficiary Attained Age	Annual Increase
<30	0.0%
30 – 34	1.0%
35 – 39	1.5%
40 – 44	2.0%
45 - 49	2.6%
50 – 54	3.3%
55 – 59	3.6%
60 – 64	4.2%
65 – 69	3.0%
70 – 74	2.5%
75 – 79	2.0%
80 – 84	1.0%
85 – 89	0.5%
90 and Older	0.0%