DULUTH TEACHERS' RETIREMENT FUND ASSOCIATION

Actuarial Experience Review

July 1, 2006 to June 30, 2011

SEGAL

SEGAL

THE SEGAL COMPANY
101 North Wacker Drive, Suite 500 Chicago, IL 60606-1724
T 312.984.8500 F 312.984.8590 www.segalco.com

June 11, 2012

Mr. J. Michael Stoffel
Duluth Teachers' Retirement Fund Association
625 East Central Entrance
Duluth, Minnesota 55811

Dear Mr. Stoffel:

We are pleased to submit this report on the actuarial experience of the Duluth Teachers' Retirement Fund Association for the period July 1, 2006 through June 30, 2011. This investigation is the basis for our recommendation of the assumptions and methods to be used for the July 1, 2012 actuarial valuation.

All current actuarial assumptions and methods were reviewed as part of this study. Some of our recommendations reflect changes to the assumptions and methods used in the July 1, 2011 actuarial valuation while other current assumptions and methods remain appropriate.

Our analysis was conducted in accordance with generally accepted actuarial principles as prescribed by the Actuarial Standards Board (ASB) and the American Academy of Actuaries. Additionally, the development of all assumptions contained herein is in accordance with ASB Actuarial Standard of Practice (ASOP) No. 27 (*Selection of Economic Assumptions for Measuring Pension Obligations*) and ASOP No. 35 (*Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations*).

The undersigned actuaries are experienced with performing experience studies for large public-sector pension plans and are qualified to render the opinions contained in this report.

Sincerely,

Thomas D. Levy, FSA, MAAA, EA
Senior Vice President and Chief Actuary

Matthew A. Strom, FSA, MAAA, EA
Consulting Actuary

5240838v3/05776.072

Table of Contents

Duluth Teachers' Retirement Fund Association

Experience Review for the Period July 1, 2006 through June 30, 2011

I. Executive Summary

A. Introduction

Actuarial valuations are prepared annually to determine whether the statutory contribution rates are sufficient to fund the Duluth Teachers' Retirement Fund Association ("DTRFA") on an actuarial reserve basis. Each actuarial valuation involves a projection of the benefits expected to be paid in the future to all members of DTRFA. The projection of expected future benefit payments is based on the characteristics of members as of the valuation date, the benefit provisions in effect on that date, and assumptions of future events and conditions.

The assumptions used in actuarial valuations can be grouped in two categories: (1) economic assumptions - the assumed long-term rates of investment return, salary increases, and payroll growth, and (2) non-economic or demographic assumptions - the assumed rates of withdrawal, disability, retirement, and mortality. Demographic assumptions are ordinarily selected primarily on the basis of recent experience (although a change in plan design or the employment environment may suggest otherwise), while economic assumptions rely more on a long-term perspective of expected future trends.

If actual experience exactly matches the expected experience, the actual annual cost of DTRFA will equal the annual cost determined by the actuarial valuation. However, this result is virtually never achieved, due to the long-term nature of the benefit projections and the numerous assumptions used in actuarial valuations. DTRFA recognizes actuarial gains or actuarial losses each year, reflecting the net difference between actual experience and anticipated experience. Determination of the funded status is updated in connection with each actuarial valuation to reflect the net gain or loss. A pattern of gains or losses with respect to one or more assumptions is the basis for recommended changes to the assumptions. Each valuation measures the effectiveness of each assumption and allows for the monitoring of the assumptions.

We are providing to DTRFA a recommendation of the assumptions and methods to be used in the 2012 actuarial valuation. If the assumptions on an overall basis prove to be a good indicator of actual experience, the actuarially determined contribution rates (i.e., Required Contribution) for the current level of benefits would be sufficient to meet the funding policy of DTRFA. On the other hand, if the assumptions understate or overstate the actual cost of DTRFA, the Required Contribution rates will vary accordingly. The comparison of the Statutory Contribution to the Required Contribution measures the sufficiency of the Statutory Contribution Rate to fund the benefits.

Actuarial experience studies are undertaken periodically and serve as the basis for recommended changes in actuarial assumptions and methods. A change in assumptions is recommended when it is demonstrated that the current assumptions do not accurately reflect the current trend determined from analysis of the data or anticipated future trends based upon reasonable expectations. The data analyzed include actual experience for demographic assumptions and economic forecasts for economic assumptions. The Actuarial Standards Board (ASB) provides actuaries with standards of practice that provide guidance and recommendations on acceptable methods and techniques to be used in developing both economic and demographic assumptions.

Specifically, these are the ASB Actuarial Standard of Practice (ASOP) No. 27 (*Selection of Economic Assumptions for Measuring Pension Obligations*) and ASOP No. 35 (*Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations*).

A change in actuarial methodology is recommended when such change adds stability to the actuarial valuation process. The methods considered in this study include the actuarial cost method and the amortization method.

This study reviews the actuarial experience of the Duluth Teachers' Retirement Fund Association for the five-year period from July 1, 2006 through June 30, 2011, compares this experience to the current actuarial assumptions, and recommends changes to the assumptions as necessary. The actuarial methods used in performing the valuation are also reviewed in this study and recommended changes are provided as appropriate.

A summary of the key points of our review and our recommendations follows.

B. Recommendations

At the direction of the Board of Trustees, we have performed a review of plan experience.

The experience review provides an opportunity for the Board, staff and actuary to consider how specific assumptions or methods may be affecting the Required Contribution rates and the proper funding of the plan. We have reviewed both economic and demographic experience of the plan as it relates to the expected actuarial experience based on the current plan assumptions. Included are recommendations for changes in assumptions and methods that we believe will more accurately reflect the future experience of DTRFA and will help to stabilize annual cost requirements from year to year.

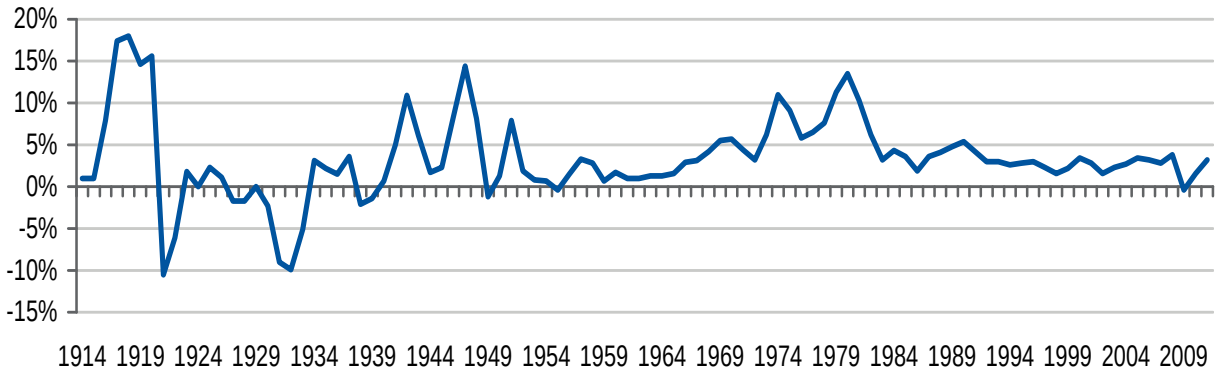
The detailed analysis of each individual assumption is discussed later in this report.

Economic Assumptions

Economic assumptions include inflation, investment rate of return (or discount rate), salary scale, payroll growth rate and administrative expenses.

Inflation

Inflation continues at relatively low levels from a historical perspective, as shown in the graph below.



The current inflation assumption is 4.50% per annum. The future outlook for inflation remains relatively low despite the volatile nature of energy and commodities prices. Therefore, we recommend a decrease in the current assumption of 4.50% to 3.25%. We also recommend changes to the other economic assumptions since these assumptions have an underlying inflation component.

We utilized the "building block" approach to develop economic assumptions. Under the "building block" approach, inflation is the basis for all economic assumptions. The investment return assumption is comprised of inflation and the expected risk premium for each asset class. The salary scale assumption is composed of inflation, merit increases, and productivity increases. Finally, payroll growth is a function of the inflation and productivity components of salary scale.

Investment Return

The Plan has averaged investment returns of 4.1%, 6.8%, and 8.2% over the last 10, 15, and 20 years, respectively. The current assumption is 8.5%. Thus, on average the plan has underperformed the assumption, but less-so as more years are included in the experience period. In fact, the average investment return for the 30-year period ending June 30, 2011 is 10.1%.

The 8.5% return assumption is at the high end of the range when compared to other public or quasi-public pension funds. The major source of discrepancy in the investment return assumption for most public plans is the investment mix of the portfolio. As of June 2010, the Plan's portfolio consisted of a 66% exposure to equities, compared to an average of 61% for 71 systems with June 30, 2010 measurement dates included in the NASRA Public Fund Survey. As of June 2011, the Plan's exposure to equities has increased to nearly 75%, which is on par with the Investment Policy Statement (IPS) target of 75%.

There has been a historical drop in the market and the short-to-mid-term outlook for stocks and bonds remains uncertain. Therefore, we recommend lowering the investment return assumption from 8.5% to an assumption in the range of 7.5% to 8.0%. For purposes of estimating the financial impact of a lower investment return assumption in this report, 8.0% is used.

Salary Scale

The average salary increases over the study period revealed a distinct pattern based on years of service. This result is not particularly surprising given the compensation structure in place for most of DTRFA's membership. Analysis of the distribution of salary increases by years of service for the current population shows the strongest service-related trend occurs within the first eight years of employment. There is no discernible service-driven pattern occurring after eight years of employment.

Therefore, we recommend changing from the current assumption of 8.00% for each of the first eight years of service, 7.25% for the 9th year, and 6.50% for the 10th year to 7.75% for service less than eight years. New age-based rates ranging from 6.00% to 3.25% would be applicable to actives with eight or more years of service. A detailed analysis is discussed in the Economic Assumptions section of this report. The proposed age-based ultimate salary increase rates are shown in Appendix A.

Payroll Growth Rate

The payroll growth rate is used for determining the amortization amount of the unfunded actuarial accrued liability (UAAL) when the Required Contribution rate is determined as a level percent-of-payroll. The current assumption for payroll growth is 4.5%. Actual increases in covered payroll have been consistently less than 4.5% over the past five (and even ten) years. In fact, covered payroll has remained relatively flat. At a minimum, we recommend this assumption be lowered to 3.5%, but consideration should also be given to a level dollar amortization policy. For purposes of estimating the financial impact of a lower payroll growth assumption in this report, a 3.5% payroll growth assumption and level percent-of-payroll amortization are used.

Administrative Expenses

It is typical for plans to include an assumption for administrative expenses as part of the normal cost. The current assumption for administrative expenses is prior year administrative expenses expressed as a percentage of prior year projected payroll. When administrative expenses are relatively constant as a percentage of payroll, this assumption provides a good estimate for expected administrative expenses in the upcoming fiscal year. Therefore, we are not recommending a change to the administrative expense assumption at this time.

Demographic Assumptions

Demographic assumptions include mortality, retirement, turnover (or withdrawal), disability incidence, percent married, and spouse age difference.

Mortality

The current mortality table for healthy lives is the 1994 Group Annuity Mortality Table set back two years for both males and females. The actual rate of male mortality was less than expected, while female mortality was greater than expected over the study period. In aggregate, mortality experience was close to expected. In order to reflect future improvements in mortality and minimize losses due to experience, we suggest changing the mortality assumption for healthy lives to the RP-2000 mortality table, set back 3 years with generational improvement from 2012.

Separate mortality tables are used for disabled lives prior to age 65. There is not enough experience of disabled retirees to warrant making a change at this time, and the impact of this assumption is not significant given the relatively small size of the disabled annuitant population of the plan.

Turnover

The number of participants terminating employment during the study period was lower than expected. Current withdrawal rates are based on the age and service of the member. During the three-year select period, the rates are 60% for the first year, 20% for the second year, and 15% for the third year for both males and females. Based on experience during the study period, we recommend decreasing the three-year period rates to 45% for the first year, 20% for the second year, and 12% for the third year. We are not recommending any changes to the ultimate age-based turnover rates at this time.

Retirement

The actual rate of retirements was lower than expected for most ages, meaning that employees are retiring later than expected. The current retirement assumption is age-based and includes a "kicker" each year a member is eligible for the Rule of 90 (employees first hired before July 1, 1989), unless the age-based rate is higher. Our recommendation is to adjust the current table by lowering the assumption for Rule of 90-eligibles from 40% to 30% and extending the last assumed retirement age from 67 to 70 while adjusting the age-based rates downward to reflect actual experience. A separate age-based table is recommended to apply to Tier 2 members.

Disability Incidence

The number of disabilities was on par with expected, given the limited number of exposures during the experience period. We are not suggesting a change in the disability assumption.

Other Demographic Assumptions

Other demographic assumptions that impact the valuation are the percent married and age difference assumptions. We did not collect spousal information for active employees but we have spousal information for retirees. The current percent married assumption is 80% for males and females. We found about 85% of males and 55% of females appeared married based on their annuity options elected. Additionally, we found the average age difference between retirees and their assumed spouses was approximately 2.2 years, compared to the assumption of 3 years. Given the limited information available and the magnitude of the impact of the percent married and age difference assumptions, we do not suggest a change in these assumptions.

Methods

Actuarial methods include actuarial cost method, asset valuation method and amortization method of the unfunded actuarial accrued liability (UAAL).

Actuarial Cost Method

The actuarial cost method is a mechanism to orderly fund benefits over a participant's lifetime. The actuarial cost method allocates liability for service already accrued (i.e., Actuarial Accrued Liability) and future service (i.e., Normal Cost). The current actuarial cost method is the "replacement life" Entry Age Normal (EAN) actuarial cost method. Under this method, a normal cost is calculated for each employee that is the level annual contribution as a percent of pay required to be made from the employee's date of hire for as long as he/she remains active so that sufficient assets will be accumulated to provide his/her benefit. The normal cost reflects current plan provisions in effect for members in Tier 2.

Given DTRFA's desire for a stable funding pattern and ability to recognize future plan changes when made, we do not suggest a change to the actuarial cost method. However, pending changes in GASB accounting standards will likely require the traditional Entry Age Normal cost method be used for reporting the Net Pension Liability on financial statements. The traditional EAN cost method reflects the plan provisions that apply to each member (i.e., Old Plan, Tier 1, or Tier 2). Using separate cost methods for funding policy contributions and financial statement accounting could lead to confusion in understanding the valuation results. The Board may wish to avoid this situation and adopt traditional EAN as the single actuarial cost method.

Asset Valuation Method

The current asset valuation method is the market value of assets, less a percentage of the Unrecognized Asset Return at the close of each of the four preceding fiscal years. Unrecognized Asset Return is the difference between actual net return on market value of assets and the asset return expected during the fiscal year (based on the assumed interest rate). Each year's Unrecognized Asset Return is recognized over 5 years (20% per year) on a straight-line basis. This use of an actuarial asset valuation method that smoothes investment returns over a period results in a more stable (or level) actuarial rate of return and Required Contribution rate.

Given the investment performance during the past several years and the volatile nature of the markets, we recommend continued use of the current valuation method based on 5-year smoothing. DTRFA may also wish to consider implementing a 20% corridor around the market value of assets where the computed actuarial value on a given valuation date cannot fall outside of 80% or 120% of the market value of assets. One of the desirable traits of an asset smoothing method is for the actuarial value to remain within a reasonable range of market. Applying a 20% corridor would assist in achieving this result. Note that during the experience period, the DTRFA actuarial value of assets has been more than 120% of market twice (133% in 2010 and 155% in 2009).

Amortization Method

The current amortization schedule under Minnesota Statutes is defined as a closed amortization period ending June 30, 2035, for years when there exists a positive unfunded actuarial accrued liability (UAAL). During the years where there is a negative UAAL, the surplus amount is amortized over 30 years as a level percentage of payroll.

This schedule creates volatility in the actuarial required contribution. Since gains and losses are amortized over a steadily decreasing (closed) period, this method can result in highly variable required contribution rates from year to year. As the amortization period approaches zero, the more variable the rate becomes (for example, a loss in 2034 would have to be paid off in one year).

Since actual contribution rates are set by statute, the variability in the actuarially calculated rate described above is only important when analyzing the sufficiency or deficiency of the current rate. If the Board's goal is to monitor the statutory rate by comparing it to a calculated rate that pays off the UAAL within a reasonable period of time, we do not see a need to change the amortization method at this time.

Summary of Actuarial Experience

For the 5-year period under review, the Plan has consistently experienced actuarial losses. While the investment gains and losses have varied from year to year during the study period, experience for all other assumptions has generally produced small actuarial gains. A summary of the historical gains and losses is shown below.

Valuation Date Beginning	Actuarial Accrued Liability (AAL)	Total Actuarial Gain/(Loss)		Investment Gain/(Loss)		Non-Investment Gain/(Loss)[1]	
		Amount (In $)	% of AAL	Amount (In $)	% of AAL	Amount (In $)	% of AAL
July 1, 2007	332,216,981	$11,767,835	3.4%	$9,743,992	2.9%	$2,023,843	0.5%
July 1, 2008	363,044,284	(1,449,267)	-0.4%	2,165,878	0.6%	(3,615,145)	-1.0%
July 1, 2009	364,811,453	(23,055,679)	-6.3%	(26,140,717)	-7.2%	3,085,038	0.9%
July 1, 2010	312,649,572	(27,955,592)	-8.9%	(29,239,035)	-9.4%	1,283,443	0.5%
July 1, 2011	321,065,000	(21,476,672)	-6.7%	(22,610,790)	-7.0%	1,134,118	0.3%

[1] Does not include changes in liability related to valuation program updates.

Summary of Assumptions and Recommended Changes

The following table summarizes the actuarial assumptions used in the valuation and the changes recommended in this report.

Description	Current Assumption	Proposed Assumption
Economic Assumptions		
1. Inflation	4.50%	3.25%
2. Investment Return	8.50%	Reasonable range of 7.50% to 8.00%
3. Salary Scale	Select and ultimate, with 10-year select period (8% for each of the first 8 years, 7.25% for the 9th year, 6.5% for the 10th year) and age-based ultimate rates ranging from 6.75% to 3.5%	Select and ultimate, with 8-year select period (7.75% for each of the first 8 years) and age-based ultimate rates ranging from 6% to 3.25%
4. Payroll Growth Rate	4.50%	3.50% or level dollar amortization
5. Administrative Expenses	Prior year administrative expenses expressed as a percentage of prior year projected payroll	No change
Demographic Assumptions		
6. Healthy Mortality	1994 Group Annuity Mortality Table set back 2 years for both males and females	RP-2000 Mortality Table set back 3 years with generational improvement from 2012
7. Disabled Mortality	Social Security Disability Mortality Table through age 54, blending into healthy mortality rates from 55 through 64 (healthy rates for age 65+)	No change
8. Turnover	Select and ultimate, with 3-year select period (60% the 1st year, 20% the 2nd year, and 15% the 3rd year) and age-based ultimate rates thereafter	Select and ultimate, with 3-year select period (45% the 1st year, 20% the 2nd year, and 12% the 3rd year) and no change to age-based ultimate rates
9. Retirement	Age-based rates that range from 15% at age 55 to 100% at age 67. In addition, 40% of members are assumed to retire each year they are eligible for Rule of 90.	Relatively lower age-based rates with 100% at age 70. Assumption for Rule of 90-eligibles lowered to 30%. Separate schedule of rates for Tier 2 members.
10. Disability Incidence	Schedule of age-based rates	No change
11. Percent Married	80% of members are assumed to be married	No change
12. Age of Spouse	Females are 3 years younger than males	No change

Impact of Assumption and Method Changes on Valuation Results

The following tables detail the impact of the change in assumptions and methods on the July 1, 2011 actuarial valuation results.

Description	Old Assumptions	New Mortality Assumption	New Mortality and Turnover Assumptions	New Mortality, Turnover and Retirement Assumptions
1. Actuarial Accrued Liability (AAL)	$321,065,000	$324,146,106	$322,969,733	$323,549,502
2. Actuarial Value of Assets (AVA)	235,071,975	235,071,975	235,071,975	235,071,975
3. Unfunded Actuarial Accrued Liability (UAAL) [(2) - (1)]	$85,993,025	$89,074,131	$87,897,758	$88,477,527
4. Funded Percentage [(2)/(1)]	73.2%	72.5%	72.8%	72.7%
5. Normal Cost	$3,298,919	$3,353,610	$3,564,391	$3,715,604
6. Payment on UAAL	5,574,484	5,775,318	5,699,327	5,737,322
7. Administrative Expenses	$483,086	$483,086	$483,086	$483,086
8. Total Required Contribution [(5) + (6) + (7)]	$9,356,489	$9,612,014	$9,746,804	$9,936,012
9. Projected Payroll	$54,279,300	$54,279,300	$54,279,300	$54,279,300
10. Contribution as a Percent of Payroll [(8)/(9)]	17.23%	17.70%	17.95%	18.30%

Description	New Demographic Assumptions and Old Economic Assumptions	New Demographic Assumptions and 8.00% Return	New Demographic Assumptions, 8.00% Return, and New Salary Scale/Payroll Growth
1. Actuarial Accrued Liability (AAL)	$323,549,502	$338,261,946	$334,260,715
2. Actuarial Value of Assets (AVA)	235,071,975	235,071,975	235,071,975
3. Unfunded Actuarial Accrued Liability (UAAL) [(2) - (1)]	$88,477,527	$103,189,971	$99,188,740
4. Funded Percentage [(2)/(1)]	72.7%	69.5%	70.3%
5. Normal Cost	$3,715,604	$4,150,812	$3,752,347
6. Payment on UAAL	5,737,322	6,394,102	6,747,328
7. Administrative Expenses	$483,086	$483,086	$479,642
8. Total Required Contribution [(5) + (6) + (7)]	$9,936,012	$11,028,000	$10,979,317
9. Projected Payroll	$54,279,300	$54,279,300	$53,892,395
10. Contribution as a Percent of Payroll [(8)/(9)]	18.30%	20.32%	20.38%

The recommended demographic changes would increase the July 1, 2011 actuarial accrued liability by approximately $2.5 million, or 0.8%, and increase the Required Contribution by approximately 1.1% of payroll. The change in the mortality assumption increased the actuarial accrued liability by about 1.0%, but was offset by the change in the turnover assumption. There was also a change in the retirement assumption that effectively delays the average assumed age at retirement. Due to offsetting forces resulting from this change (larger benefits earned and lower actuarial reductions versus shorter payment period and increased discount period), the impact on accrued liability was negligible (approximately 0.2%).

The net impact of the recommended economic assumption changes would increase the actuarial accrued liability by approximately $10.7 million, or 3.3%, and increase the July 1, 2011 Required Contribution by approximately 2.1% of payroll. The primary driver of the increase in the actuarial accrued liability is the lowering of the investment return assumption from 8.50% to 8.00% (selected for illustration purposes). A 50 basis point decrease in the investment return assumption would increase the actuarial accrued liability by approximately 4.5% and decrease the accrued liability funded percentage by 3.2 percentage points. However, an increase in actuarial accrued liability from lowering the investment return assumption is partially offset by lowering the salary scale assumption (1.2% decrease in accrued liability and a 0.8 percentage point increase in funded percentage).

The lower recommended salary scale assumption is accompanied by a decrease in assumed payroll growth, which increases the amortization factor used to calculate the payment towards the unfunded liability. The net effect on the Required Contribution is a slight decrease. However, when viewed as percentage of pay, the net effect is a slight increase due to the lower projected payroll.

Overall, the recommended economic and demographic changes (including a decrease in the assumed investment return to 8.00%) would increase the July 1, 2011 Required Contribution by 3.2% of pay, or $1.6 million, and increase the actuarial accrued liability by 4.1%, or $13.2 million.

II. Economic Assumptions

The economic assumptions have a significant impact on the development of plan liabilities. Changes to these assumptions can substantially alter the results determined by the actuary. The goal of an experience study is to produce a consistent set of economic assumptions that appropriately reflect expected future economic trends.

The primary economic assumptions that affect the Plan's funding are:

- Inflation;
- Investment Rate of Return;
- Salary Scale;
- Payroll Growth Rate; and
- Administration Expenses

The Actuarial Standards Board (ASB) has adopted Actuarial Standard of Practice No. 27 (ASOP 27 - *Selection of Economic Assumptions for Measuring Pension Obligations*) to provide actuaries guidance in developing economic assumptions. A key feature of the ASB's guidance is the "building block" approach in developing economic assumptions.

The "building block" approach uses the actuary's best estimate for key components of economic assumptions. The actuary begins with reasonable range of each component then selects a specific point within the range based on historical data, plan specific data and future economic environment.

The inflation component is included in all economic assumptions, and therefore is key to developing a consistent set of actuarial assumptions. The investment rate of return assumption includes an inflation component and a real rate of return component. The components of the salary increase assumption are inflation, productivity, and merit increases. The components of the payroll growth assumption include inflation and productivity.

A. Inflation

In developing the recommendation for the assumed inflation component, actuarial standards of practice suggest the actuary review appropriate inflation data. This data may include consumer price indexes, the implicit price deflator, forecasts of inflation, and yields on government securities of various maturities. For this study, we referred to commonly referenced historical measures of inflation, the "Minneapolis-St. Paul, MN-WI" consumer price index and National Consumer Price Index for all urban consumers (CPI-U).

The table below shows that recent inflation experience is well below the longer-term average rate.

Average Annual Change	Minneapolis – St. Paul, MN-WI	CPI-U
Past 5 Years	2.19%	2.15%
Past 10 Years	2.17%	2.40%
Past 20 Years	2.63%	2.57%

The average annual rate of increase in the CPI-U in the 2000s has been at its lowest levels since the early 1960s. Historical trend is a less important consideration for the assumed rate of inflation, but assists in determining the reasonable bounds of expected inflation.

Next, we consider the measure of future inflation expectation. An indication of future expectation is a market-based forecast. Treasury Inflation Protection Securities (TIPS) are government bonds, which, in addition to a fixed yield, add the actual percentage change in CPI to the principal value. Therefore, the spread between the TIPS and the Conventional Treasury note/bond of the same maturity is an indication of the market's forecast for inflation.

Because of the inflation protection, TIPS' yields are almost always considerably lower than those of regular Treasury securities of similar maturities. As of mid-February 2012, 30-year Treasuries yielded 2.43% more than 30-year TIPS. Meaning for 30-year TIPS to match the return of the conventional 30-year Treasury for a buy-and-hold income investor, inflation would have to measure 2.43% a year over the next 30 years. The market's expectation of inflation alone is not a definitive basis for an inflation assumption, but is useful as one indicator of future trend.

The typical range of expected inflation for actuarial assumptions in recent years is between 3.00% and 4.50%. A recent National Association of State Retirement Administrators (NASRA) survey of public plans indicated an average of 3.50%. The 25th percentile rate was 3.00% and the 75th percentile was 3.75%.

DTRFA's investment consultant, Slocum, notes that an explicit inflation assumption in the data they work with is usually 3.00%. Note that in general, the investment consultant's time horizon for this assumption is shorter than the time horizon used in the actuarial valuation.

Considering this information, as well as the bond market's current low future expectation, we have determined the current reasonable range to be between 2.50% and 4.00%.

As a check of the validity of this reasonable range, we reference the *2011 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds (2011 OASDI Trustees Report).* The range of inflation rates in this report was 1.80% for the low-cost projection, 2.80% for the intermediate projection, and 3.80% for the high-cost projection.

Once the reasonable range is set, we determine the specific point in the range that is the best estimate of long-term future inflation rates. The current inflation assumption is 4.50% per annum. Based on all of the above information, we recommend that the assumption be lowered to 3.25% for the July 1, 2012 actuarial valuation.

B. Investment Rate of Return

The investment rate of return is used to determine the present value of expected future plan payments. The current assumption is 8.50%, net of investment and administrative expenses.

For the five years under review, Plan returns have been less than the 8.50% return assumption. The actuarial (and market value) rates of return for the past four years are shown below. The average net investment return for the 5-year period ended June 30, 2011 was 3.60% and 1.32% for actuarial assets and market assets, respectively.

Year Ended June 30	Average Actuarial Value of Assets	Net Investment Income	
		Amount	Percent
2007	$263,523,475	$32,143,488	12.20%
2008	280,175,519	25,980,797	9.27%
2009	289,430,869	(1,539,093)	(0.53%)
2010	270,409,357	(6,254,241)	(2.31%)
2011	246,039,174	(1,697,460)	(0.69%)
Total	**$1,349,578,394**	**$48,633,491**	**3.60%**[1]

Year Ended June 30	Average Market Value of Assets	Net Investment Income	
		Amount	Percent
2007	$274,547,959	$51,827,785	18.88%
2008	310,884,300	(31,178,225)	(10.03%)
2009	262,980,628	(74,411,211)	(28.30%)
2010	171,086,998	30,161,751	17.63%
2011	183,132,307	39,504,927	21.57%
Total	**$1,202,632,191**	**$15,905,027**	**1.32%**[2]

The investment rate of return assumption is developed using the "building block" approach as outlined in ASOP 27. Under this approach, the investment rate of return assumption is made up of two components; the inflation component and the real rate of return component. The reasonable range of the real rate of return component is combined with the inflation assumption to determine a reasonable range of the investment return. The selection of an investment return assumption considers historical returns, capital market outlook and the Plan's portfolio mix.

[1] Average actuarial value investment return for the five years ended June 30, 2011.
[2] Average market value investment return for the five years ended June 30, 2011.

In developing the reasonable range for the real rate of return, we examined the capital market assumptions used by DTRFA's investment consultant, Slocum. The current assumptions for the asset classes included in the "Purpose Driven Investment Framework" (outlined in the current Investment Policy Statement) are shown below:

Asset Group[1]	Real Return[2]	Target Allocation	Weighted Average
Return Enhancers	5.2%	65%	3.38%
Portfolio Stabilizers	2.0%	25%	0.50%
Economic Hedge	3.8%	5%	0.19%
Opportunistic	7.0%	5%	0.35%
Total		**100%**	**4.42%**

Based on the targeted portfolio allocation, the weighted average expected real rate of return is 4.4%. Combining this result with the recommended assumed rate of inflation of 3.25% yields a gross investment rate of return assumption of 7.65% prior to expenses. In light of the above information, we recommend a range for the investment return assumption of 7.50% to 8.00%, with a final recommendation pending a discussion with the Board.

The above data regarding estimated real return by asset class is based on market-driven returns (passive indexes). Investment managers may be able to generate excess returns from actively managing portions of the portfolio that could result in "alpha" over and above the return on a passive portfolio.

[1] Return Enhancers consist primarily of domestic and international equities. Portfolio Stabilizers consist of fixed income and absolute return strategies. Economic Hedge consists of strategies designed to aid in the preservation of purchasing power. Opportunistic consists of short-term opportunities that do not fall into one of the other categories.

[2] Real return is estimated as the expected return for the group as reported by the investment consultant, less an underlying assumption for inflation of 3%.

C. Salary Scale

The salary scale is used to determine participants' benefits provided by the plan. Generally, a participant's salary will change over the long term in accordance with inflation, productivity growth, and merit scale. The actuary should review available compensation data when selecting this assumption, including: plan sponsor's current compensation practices and any anticipated changes; historical compensation increases and practices of the plan sponsor and other sponsors in the same industry or geographic area; and historical national wage and productivity increases.

The best estimate salary scale is generally constructed using the "building block" approach recommended in ASOP 27, which combines best-estimate ranges for the components of salary scale: inflation, productivity and merit. The inflation and productivity components are combined to produce the assumed rate of wage inflation. This 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.

The current salary increase assumption is based on a select and ultimate table with a ten-year select period. For service from hire through seven completed years, an 8.00% salary increase is assumed. With eight completed years, a 7.25% increase is assumed. With nine completed years, a 6.50% increase is assumed. With 10 or more completed years of service an age-based table of ultimate salary increases is used. The following table contains a sample of these ultimate rates:

Age	Rate
25	6.75%
30	6.50%
35	6.25%
40	6.00%
45	5.50%
50	5.00%
55	4.50%
60	4.00%
65	3.50%

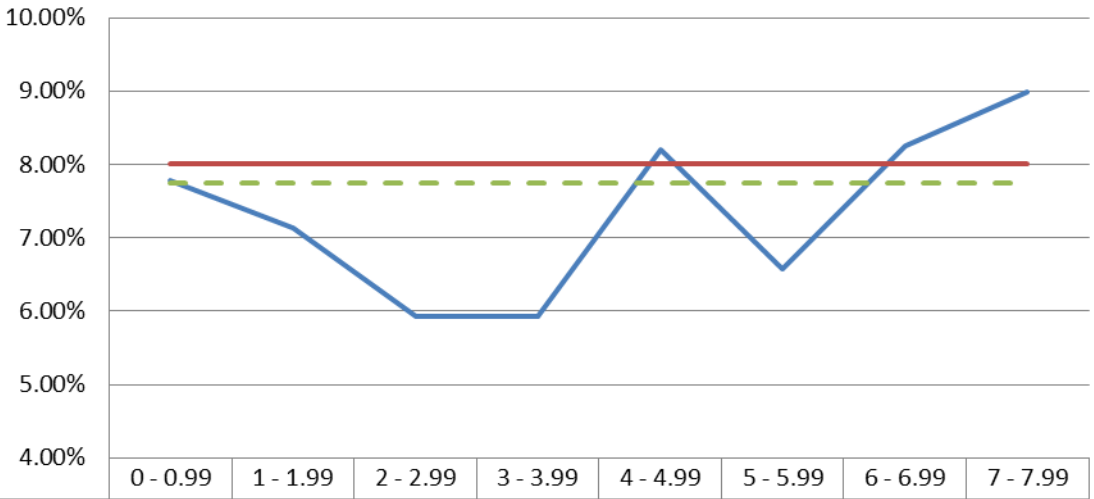
The historical compensation data for the experience period was evaluated based on age and service. For the first eight years of a member's career, the data still shows a strong service-related relationship. Beyond the first eight years, the experience produced a more clearly defined trend based on age. Therefore, we recommend continued use of a select and ultimate salary scale assumption based on years of service in the select period and age-based thereafter. The current select period is ten years; we would recommend shortening the period to eight years, with a flat pay increase assumption of 7.75% per year within the select period.

The recommended age-based ultimate rates include a merit component through age 54, with employees only receiving inflationary increases thereafter. The historical compensation data for the experience period included average increases in some age cohorts that was below assumed inflation. However, as noted earlier, actual inflation for the area (Minneapolis/St. Paul, MN-WI CPI) in the experience period averaged 2.19%. While we expect future salary increases to be lower across the board than those currently assumed, the recommended scale is based on expected future inflation (using the building block approach) rather than actual inflation.

Table 1A:
SALARY INCREASE EXPERIENCE—SERVICE RELATED RATES
For the Period July 1, 2006 through June 30, 2011

Service Range	Total Exposures	Actual Increase	Expected Increase	Proposed Increase[1]
0 – 0.99	50	7.77%	8.00%	7.75%
1 – 1.99	114	7.13%	8.00%	7.75%
2 – 2.99	95	5.92%	8.00%	7.75%
3 – 3.99	94	5.93%	8.00%	7.75%
4 – 4.99	79	8.20%	8.00%	7.75%
5 – 5.99	78	6.57%	8.00%	7.75%
6 – 6.99	79	8.25%	8.00%	7.75%
7 – 7.99	98	8.99%	8.00%	7.75%
Total	**687**	**7.33%**	**8.00%**	**7.75%**

Graph 1A:
SALARY INCREASE EXPERIENCE—SERVICE RELATED RATES



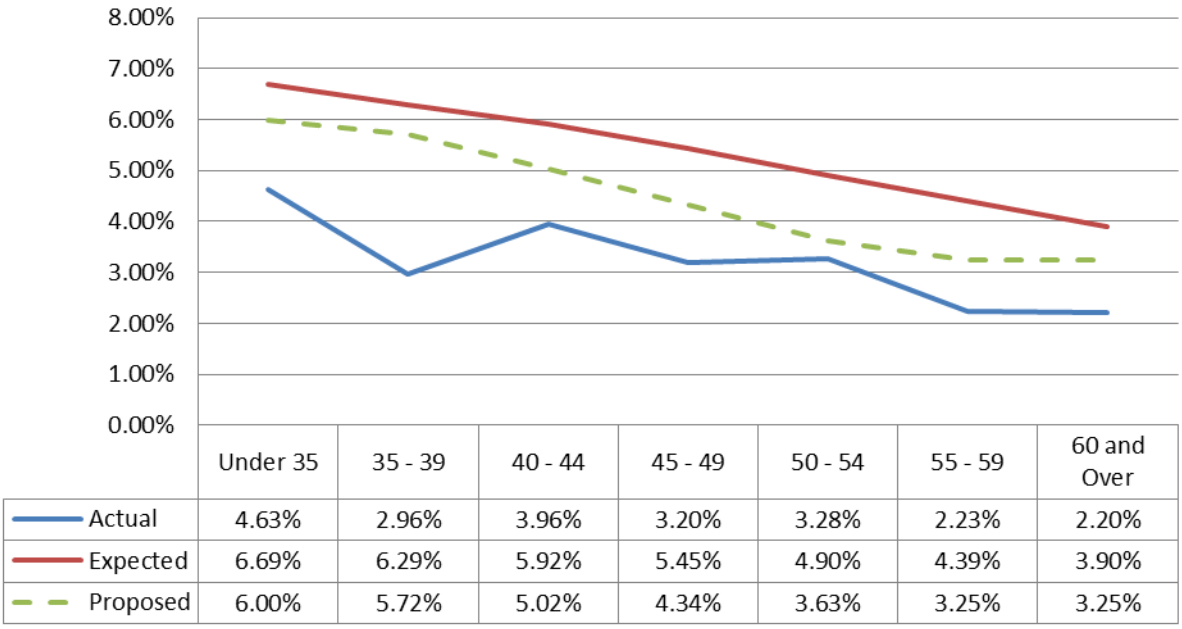
	0 - 0.99	1 - 1.99	2 - 2.99	3 - 3.99	4 - 4.99	5 - 5.99	6 - 6.99	7 - 7.99
Actual	7.77%	7.13%	5.92%	5.93%	8.20%	6.57%	8.25%	8.99%
Expected	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
Proposed	7.75%	7.75%	7.75%	7.75%	7.75%	7.75%	7.75%	7.75%

[1] Proposed salary scale table is based on completed years of service as of the valuation date.

Table 1B:
SALARY INCREASE EXPERIENCE—AGE RELATED RATES
For the Period July 1, 2006 through June 30, 2011

Age Range	Total Exposures[1]	Actual Increase	Expected Increase[2]	Proposed Increase[3]
Under 35	86	4.63%	6.69%	6.00%
35 – 39	288	2.96%	6.29%	5.72%
40 – 44	384	3.96%	5.92%	5.02%
45 – 49	465	3.20%	5.45%	4.34%
50 – 54	744	3.28%	4.90%	3.63%
55 - 59	913	2.23%	4.39%	3.25%
60 and Over	226	2.20%	3.90%	3.25%
Total	**3,106**	**2.95%**	**5.04%**	**4.00%**

Graph 1B:
SALARY INCREASE EXPERIENCE—AGE RELATED RATES



	Under 35	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 and Over
Actual	4.63%	2.96%	3.96%	3.20%	3.28%	2.23%	2.20%
Expected	6.69%	6.29%	5.92%	5.45%	4.90%	4.39%	3.90%
Proposed	6.00%	5.72%	5.02%	4.34%	3.63%	3.25%	3.25%

[1] Exclusive of the population with 0 to 7.99 years of service.
[2] The expected rates represent the weighted average salary scale for each range based on the members within that cohort.
[3] The complete table is shown in Appendix A.

D. Payroll Growth

The payroll growth assumption represents the expected annual increase in total covered payroll from one year to the next. This assumption is used to determine the amortization of unfunded actuarial accrued liability (in the actuarially determined contribution) as a level percentage of payroll. The current assumption for payroll growth is 4.5% per year. To the extent that actual payroll increases were than 4.5%, less dollars have gone toward paying off the unfunded liability than anticipated and future amortization payments are larger. Actual covered payroll amounts for the active population since the 2000 plan year are shown in the table below.

Year Ended June 30	Covered Payroll	% Increase/Decrease From Prior Year
2011	$44,483,736	-10.14%
2010	49,501,727	-2.97%
2009	51,019,447	-1.34%
2008	51,711,330	1.82%
2007	50,789,240	2.56%
2006	49,521,572	0.76%
2005	49,148,256	0.67%
2004	48,820,898	-3.62%
2003	50,656,000	-0.78%
2002	51,054,000	-1.81%
2001	51,996,000	-0.52%
2000	52,270,000	--

The 10-year average increase has actually been a decrease of 1.5% per year. Even if the large decrease from 2010 to 2011 is ignored, the resulting 10-year average from 2000 to 2010 is still a decrease of 0.5% per year. A portion of the consistent decrease in covered payroll is attributable to the declining population over the last 10 years (1,427 actives in 2001 compared to 1,006 in 2011). The payroll growth assumption used in the valuation is generally supposed to be for a constant workforce. Based on experience and a recommended decrease to the assumed inflation rate, at a minimum we recommend lowering the assumption from 4.5% to 3.5%, but consideration should also be given to a level dollar amortization policy. Under level percentage of payroll amortization, the payment toward the UAAL increases by the payroll growth assumption each year. Under level dollar amortization, the payment toward the UAAL is the same each year.

E. Administrative Expenses

The current assumption for administrative expenses is prior year administrative expenses expressed as a percentage of prior year projected payroll. The following presents recent plan experience for the last four years.

Year Ended June 30	Actual Expenses	Prior Year Projected Earnings	Expenses as a % of Projected Pay	Expected Expenses
2011	$497,009	$56,152,078	0.885%	$510,984
2010	505,672	55,344,873	0.914%	470,431
2009	505,164	59,548,231	0.848%	494,250
2008	487,944	58,666,809	0.832%	463,468
TOTAL	**$1,995,789**	**$229,711,991**	**0.869%**	**$1,939,133**

Actual administrative expenses have averaged approximately $500,000 over the past four years with little variability. The current methodology for estimating administrative expenses, on the other hand, has generated expected expenses anywhere between $35,000 lower to $14,000 higher than actual. Given the amount of variability in covered earnings from year to year during the experience period, the difference between actual and expected expenses seems acceptable. The basis of the current expense assumption attempts to minimize fluctuations in the administrative expense assumptions as a percentage of payroll. Therefore, we are not recommending a change to the assumption at this time.

III. Demographic Assumptions

The demographic assumptions used to value the plan reflect the expected occurrences of various events among participants of the plan. The assumptions should reflect specific characteristics of the plan and produce reasonable results. A reasonable assumption is one that is expected to model the contingency being measured and not expected to produce significant gains and losses. The types of demographic assumptions used to measure pension obligations include, but are not limited to the following:

- Mortality;
- Retirement;
- Termination of employment (turnover);
- Disability incidence; and
- Other assumptions such as percent married and age difference between spouses

The Actuarial Standards Board (ASB) has adopted Actuarial Standard of Practice No. 35 (ASOP 35 - *Selection of Demographic and Other Non-economic Assumptions for Measuring Pension Obligations*) to provide actuaries guidance in developing demographic assumptions. The standard recommends the actuary follow a general process for selecting demographic assumptions. The first step of the general procedure is to identify the types of assumptions to use. The actuary should consider relevant plan provisions that will affect timing and value of any potential benefit payments, all contingencies that give rise to benefits or loss of benefits and the characteristics of the covered group. The next step is to identify the relevant assumption universe. The assumption universe may include prior experience studies or general studies of trends relevant to the type of demographic assumption in addition to plan experience to the extent that it is credible. The third step is to consider the assumption format. The format may include different tables for different segments of the covered population (i.e. different turnover tables for males/females). The final step is the select the specific assumption and evaluate the reasonableness of each assumption. The specific experience of the plan should be incorporated but not given undue weight to past experience if recent experience is attributable to a phenomenon that is unlikely to continue. For example, if recent rates of termination were due to a one-time reduction in workforce it may be unreasonable to assume that such rates will continue.

A. Mortality Rates

One of the most basic actuarial assumptions is the probability of death. The mortality assumption takes the form of a mortality table that contains for each age in the table a probability of a person dying between that age and the next. There are two sets of mortality tables currently in use for DTRFA: one table is used for healthy members (actives, retirees and beneficiaries) and another table is used for disabled retirees.

1. Healthy Mortality

The mortality experience of active and terminated vested members is important for several reasons. First, in combination with withdrawal and disability rates, the pre-retirement mortality table enables the actuary to estimate the number of individuals who will eventually be eligible for a service retirement benefit, and thereby estimate the liability for those individuals. In addition, the death of a member before retirement may result in a benefit payable to a beneficiary, and the liability for these benefits must be taken into account in the valuation. The mortality experience among retirees and beneficiaries determines the durations over which retirement benefits are paid. Lower mortality rates mean longer benefit payment periods and, therefore, higher benefit costs.

Currently, DTRFA uses healthy mortality rates based on the sex-distinct 1994 Group Annuity Mortality Table, with a two-year age setback. The size of the covered group does not lend enough credible experience to base the mortality assumption for pre-retirement active mortality strictly on experience. Therefore, we have examined the experience of the healthy annuitant population and recommend applying the same assumption to active members.

The experience analysis for the past five years reveals that, in total, participants in pay status have been dying as expected. However, the actual experience for male annuitants was far less than expected while the experience for female annuitants was much greater than expected. The actual rate of death for females in pay status is 40% higher than expected while the same rate for males was 50% less than expected.

The following table provides a summary of service retiree and beneficiary mortality experience by gender for the study period:

Service Retiree and Beneficiary Mortality	Exposures	Actual Deaths	Expected Deaths	Ratio of Actual Deaths to Expected Deaths
Male	2,453	36	71.7	50.23%
Female	3,630	120	83.9	143.02%
Total	**6,083**	**156**	**155.6**	**100.27%**

In each year of the experience period, actual deaths among males were consistently at or below the expected number. Similarly, in each year, actual female annuitant deaths were consistently at or above expected. This demonstrates that it is less likely the ratio of actual to expected in the table above is due to data corrections or other related issues, and more likely that the actual pattern of mortality among healthy annuitants in this group is different than the sex-distinct 1994 Group Annuity Mortality Table, with a two-year age setback. However, given the relatively low number of exposures that the male and female groups have on their own, we are inclined to focus on the experience of the group as a whole when recommending a change in the mortality assumption.

In order to reflect future improvements in life expectancy and minimize losses due to experience, we recommend changing to the sex-distinct RP-2000 Mortality Table with a three-year age setback for both males and females, and applying this table on a generational basis from 2012 forward. This will initially produce a ratio of actual to expected deaths for the entire population of just over 102% (i.e., approximately 100% at the end of the study period). Applying a generational adjustment to the mortality table results in slight improvements in life expectancy in each future year and decreases the likelihood, for example, that the projected life expectancy of a 35-year old active member today will be understated when benefit payments are projected to start 30 years from now.

On the following pages, Table 2 shows the service retiree and beneficiary mortality experience for the study period. Graphs 2A and 2B present this information graphically for both males and females.

Table 2:
SERVICE RETIREE AND BENEFICIARY MORTALITY RATES
For the Period July 1, 2006 through June 30, 2011

Male

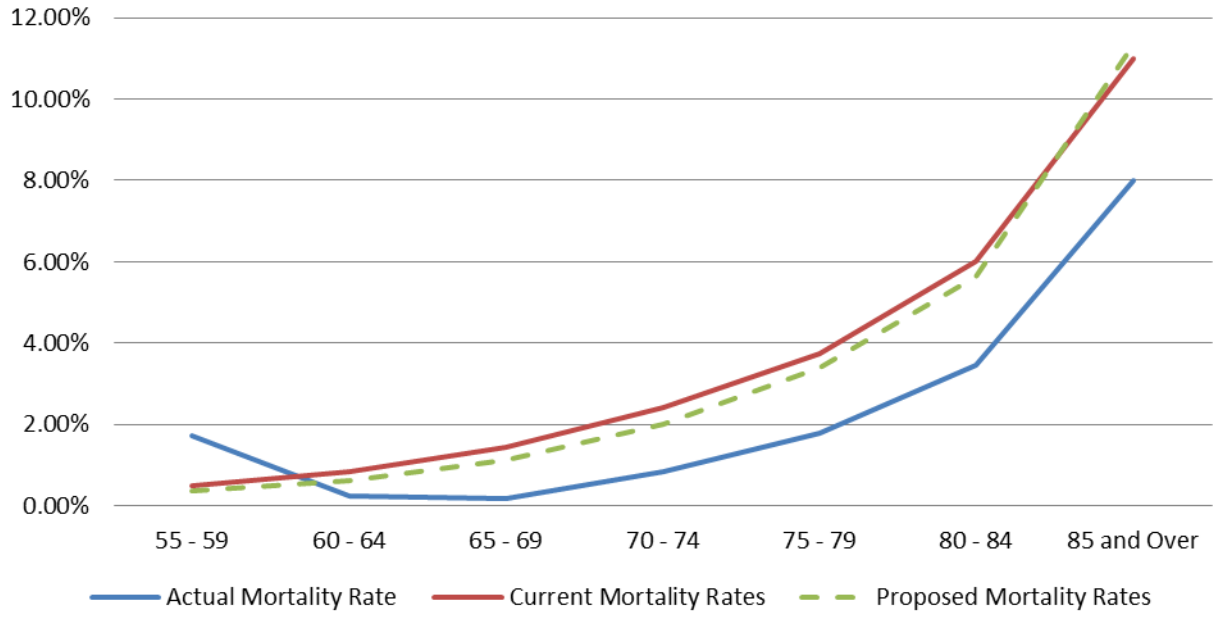
Age Range	Exposures	Actual Deaths	Actual Mortality Rate	Expected Deaths	Assumed Mortality Rate	Ratio of Actual Rate to Expected Rate
55 – 59	117	2	1.71%	0.6	0.49%	346.16%
60 – 64	436	1	0.23%	3.7	0.84%	27.24%
65 – 69	557	1	0.18%	8.1	1.45%	12.40%
70 – 74	483	4	0.83%	11.6	2.40%	34.47%
75 – 79	446	8	1.79%	16.7	3.74%	47.95%
80 – 84	289	10	3.46%	17.3	6.00%	57.65%
85 and Over	125	10	8.00%	13.7	10.98%	72.86%
Total	**2,453**	**36**	**1.47%**	**71.7**	**2.92%**	**50.23%**

Female

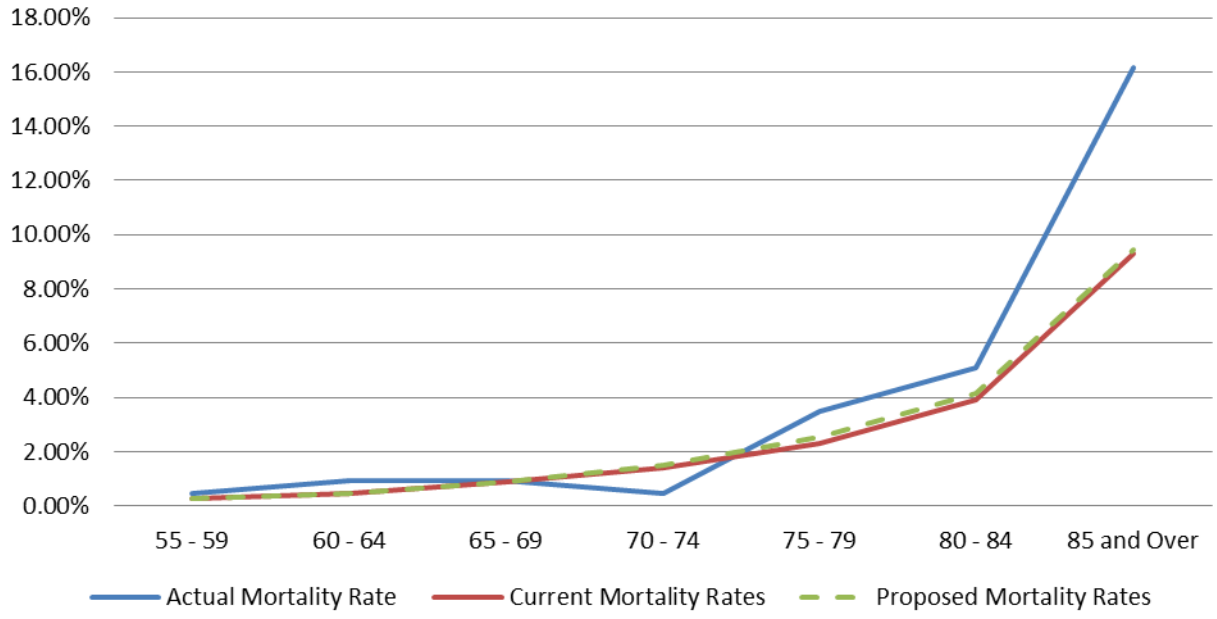
Age Range	Exposures	Actual Deaths	Actual Mortality Rate	Expected Deaths	Assumed Mortality Rate	Ratio of Actual Rate to Expected Rate
55 – 59	230	1	0.43%	0.6	0.26%	167.21%
60 – 64	659	6	0.91%	3.0	0.46%	197.14%
65 – 69	751	7	0.93%	6.5	0.86%	108.28%
70 – 74	642	3	0.47%	8.9	1.39%	33.68%
75 – 79	545	19	3.49%	12.5	2.29%	152.34%
80 – 84	413	21	5.08%	16.2	3.92%	129.78%
85 and Over	390	63	16.15%	36.2	9.29%	173.85%
Total	**3,630**	**120**	**3.31%**	**83.9**	**2.31%**	**143.02%**

Grand Total	**6,083**	**156**	**2.56%**	**155.6**	**2.55%**	**100.27%**

Graph 2A:
SERVICE RETIREE AND BENEFICIARY MORTALITY RATES—MALES ONLY
Initial Year Only



Graph 2B:
SERVICE RETIREE AND BENEFICIARY MORTALITY RATES—FEMALES ONLY
Initial Year Only



2. Disabled Annuitant Mortality

Mortality experience among disabled annuitants is studied separately from service retirees because of characteristically high levels of mortality exhibited by disability retirees. The current assumption is a published Social Security table (Disabled Eligible for Social Security Disability – ERISA Sec. 4044) for age 54 and younger that grades into the 1994 Group Annuity Mortality Table (set back 2 years) between the ages of 55 and 64. At age 65, the same table is used for both disabled and healthy annuitants.

For the study period, the number of actual deaths among disabled retirees was less than expected, however the exposure data was not credible. The following table summarizes the disabled annuitant mortality experience:

Disabled Annuitant Mortality	Exposures	Actual Deaths	Expected Deaths	Ratio of Actual Deaths to Expected Deaths
Male	29	1	0.7	153.10%
Female	56	0	0.8	0.00%
Total	**85**	**1**	**1.5**	**65.82%**

We do not recommend changing the mortality assumption for disabled lives, with the exception that beginning with age 55, the rates should blend into the new recommended healthy annuitant table rather than the 1994 Group Annuity Mortality Table with the two-year age set back. This table should provide for some improvement in disabled life expectancy while tying the healthy and disabled mortality assumptions into a complementary framework.

Table 3 summarizes the disabled annuitant mortality experience for the study period.

Table 3:
DISABLED RETIREE MORTALITY RATES
For the Period July 1, 2006 through June 30, 2011

Male

Age Range	Exposures	Actual Deaths	Actual Mortality Rate	Expected Deaths	Assumed Mortality Rate	Ratio of Actual Rate to Expected Rate
45 – 49	0	0	0.00%	0.0	--	0.00%
50 – 54	2	0	0.00%	0.1	5.11%	0.00%
55 – 59	4	0	0.00%	0.2	4.12%	0.00%
60 – 64	10	1	10.00%	0.2	2.16%	463.63%
65 – 69	13	0	0.00%	0.2	1.31%	0.00%
70 and Over	0	0	0.00%	0.0	--	0.00%
Total	**29**	**1**	**3.45%**	**0.7**	**2.25%**	**153.10%**

Female

Age Range	Exposures	Actual Deaths	Actual Mortality Rate	Expected Deaths	Assumed Mortality Rate	Ratio of Actual Rate to Expected Rate
45 – 49	0	0	0.00%	0.0	--	0.00%
50 – 54	5	0	0.00%	0.1	2.98%	0.00%
55 – 59	7	0	0.00%	0.1	2.14%	0.00%
60 – 64	34	0	0.00%	0.5	1.45%	0.00%
65 – 69	10	0	0.00%	0.1	0.74%	0.00%
70 and Over	0	0	0.00%	0.0	--	0.00%
Total	**56**	**0**	**0.00%**	**0.8**	**1.55%**	**0.00%**

Grand Total	**85**	**1**	**1.18%**	**1.5**	**1.79%**	**65.82%**

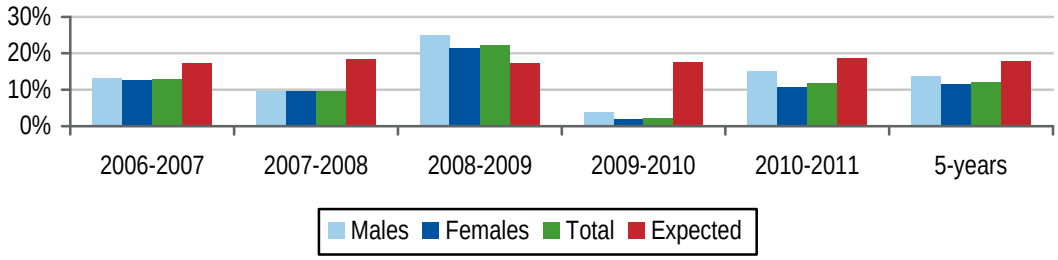
B. Turnover Rates

The assumed turnover rates used in annual actuarial valuations project the percentage of employees at each age or service duration that will terminate membership before retirement. These rates take account of possible terminations for all causes other than retirement, death, or disability. They include both voluntary and involuntary withdrawals from service.

Terminations before retirement give rise to some benefit rights, but may also involve the forfeiture of a portion of previously accrued benefits. Forfeitures resulting from turnover are anticipated in advance and help finance benefits that become payable to other members. In some cases, members who leave the plan with three or more years of service and are eligible for deferred vested benefits withdraw their deposits, thus forfeiting the portion of their accrued benefit rights based on employer contributions.

In this study, the turnover experience studied includes all terminations of active employment for members not vested at termination (since such members are not eligible for other benefits, termination of employment will, most likely, result in a withdrawal of employee contributions), and terminations of membership for members who were vested and withdrew their contributions. These terminations are offset by rehired members to arrive at "net" turnover for each year of the study period.

The average annual turnover rate observed during the study period is about 12.0% cumulative, 13.6% for males and 11.5% for females respectively.



As shown in the table below, the rate of terminations are about 30% less than expected.

Gender	Exposures	Actual Terminations	Expected Terminations	Ratio of Actual Terminations to Expected Terminations
Male	1,060	144	187.6	76.76%
Female	2,986	342	535.2	63.90%
Total	**4,046**	**486**	**722.8**	**67.24%**

Currently, the turnover assumption used in the valuation is based on the members' age and service. We did examine turnover experience by gender to determine whether there is enough difference in male and female experience to warrant using separate sex-distinct tables for the turnover assumption. However, we did not see a large enough difference in the experience data to recommend a change in this regard.

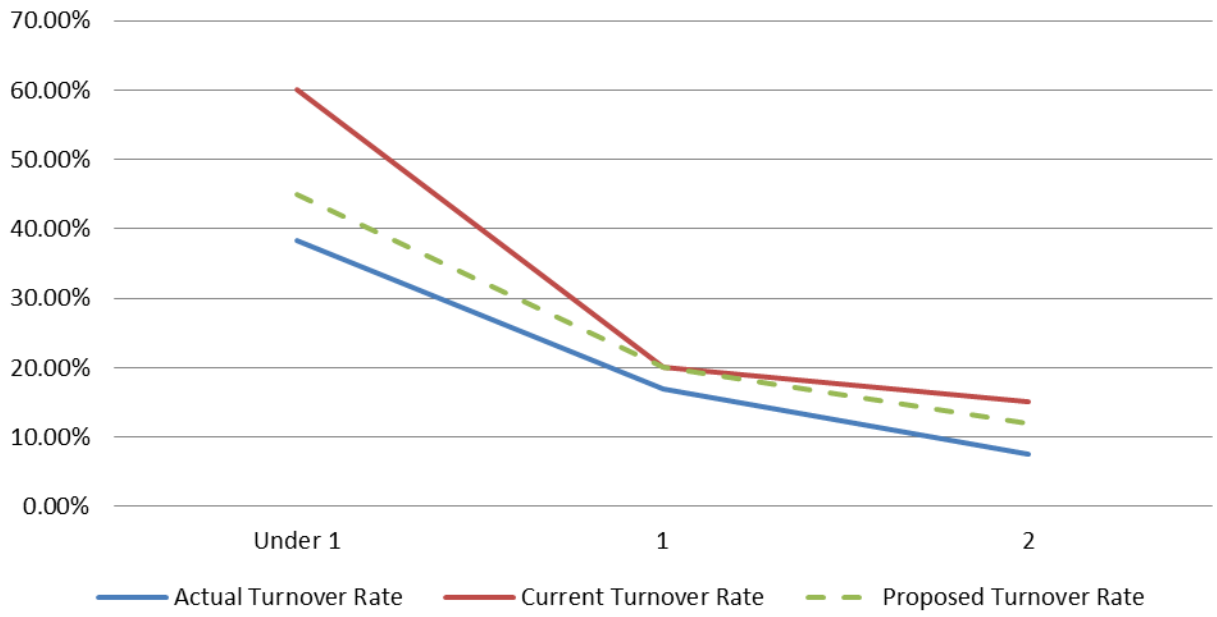
We recommend continued use of a 3-year select-and-ultimate turnover table, with select rates based on service and ultimate rates based on age. Actual turnover experience for members with less than three years of service was about 35% less than expected. We recommend changing the assumed rates in the select period from 60%, 20%, and 15% to 45%, 20%, and 12%. The actual experience for members with three or more years of service was within 3% of expected. We are not recommending any changes to the ultimate age-based turnover rates at this time.

A comparison of the actual experience, current rates and proposed rates by service are shown in Table 4 and by age in Table 5.

Table 4:
TURNOVER RATES (By Years of Service; Less Than 3)
For the Period July 1, 2006 through June 30, 2011

Years of Service	Exposures	Actual Terminations[1]	Actual Turnover Rate	Expected Terminations	Assumed Turnover Rate	Ratio of Actual Rate to Expected Rate	Proposed Turnover Rate
Under 1	978	374	38.24%	586.8	60.00%	63.74%	45.00%
1	302	51	16.89%	60.4	20.00%	84.44%	20.00%
2	174	13	7.47%	26.1	15.00%	49.81%	12.00%
Total	**1,454**	**438**	**30.12%**	**673.3**	**46.31%**	**65.05%**	**35.86%**

Graph 4:
TURNOVER RATES (By Years of Service; Less Than 3)

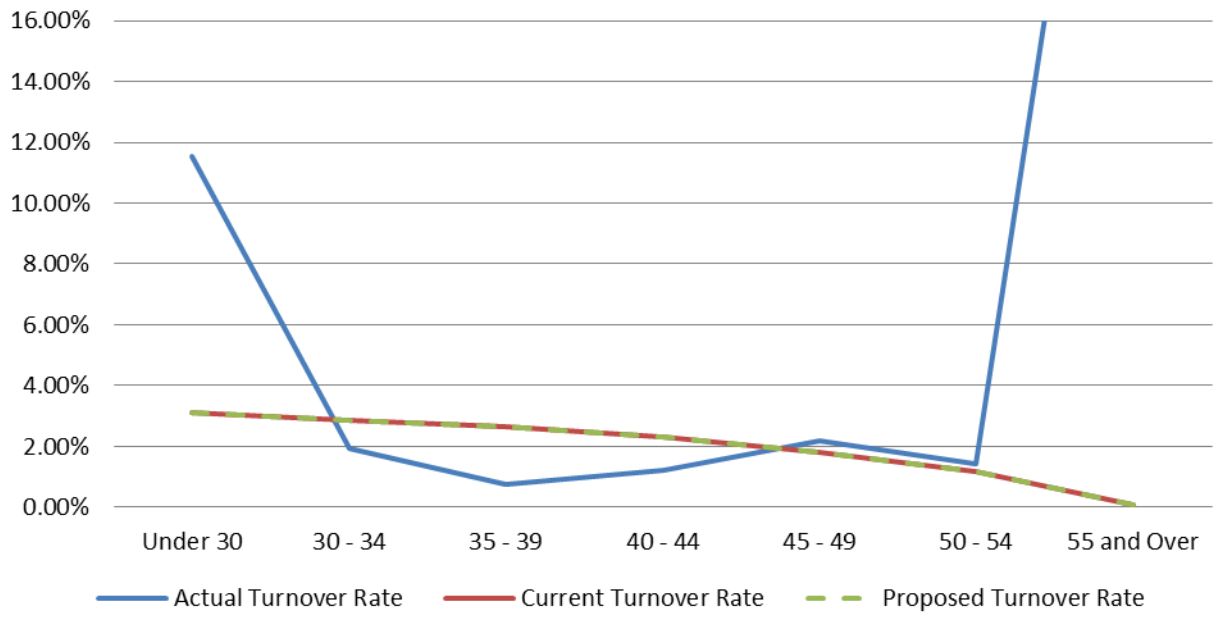


[1] Actual terminations as shown in the table are net of rehired employees.

Table 5:
TURNOVER RATES (By Age; 3 or More Years of Service)
For the Period July 1, 2006 through June 30, 2011

Age	Exposures	Actual Terminations[1]	Actual Turnover Rate	Expected Terminations	Assumed Turnover Rate	Ratio of Actual Rate to Expected Rate	Proposed Turnover Rate
Under 30	26	3	11.54%	0.8	3.11%	371.29%	3.11%
30 – 34	208	4	1.92%	6.0	2.87%	67.04%	2.87%
35 – 39	409	3	0.73%	10.8	2.65%	27.71%	2.65%
40 – 44	494	6	1.21%	11.3	2.29%	52.98%	2.29%
45 – 49	592	13	2.20%	10.6	1.79%	122.53%	1.79%
50 – 54	843	12	1.42%	9.9	1.18%	120.97%	1.18%
55 and Over	20	7	35.00%	0.0	0.08%	--	0.08%
Total	**2,592**	**48**	**1.85%**	**49.5**	**1.91%**	**97.03%**	**1.91%**

Graph 5:
TURNOVER RATES (By Age; 3 or More Years of Service)



[1] Actual terminations as shown in the table are net of rehired employees.

C. Retirement Rates

Under the plan, members are eligible to retire following attainment of various eligibilities. The normal retirement eligibility conditions for the various tiers are:

- Old Plan: Age 60 with 10 years of service
- New Plan Tier 1: Age 65 or age 62 with 30 years of service
- New Plan Tier 2: Age 66, in general

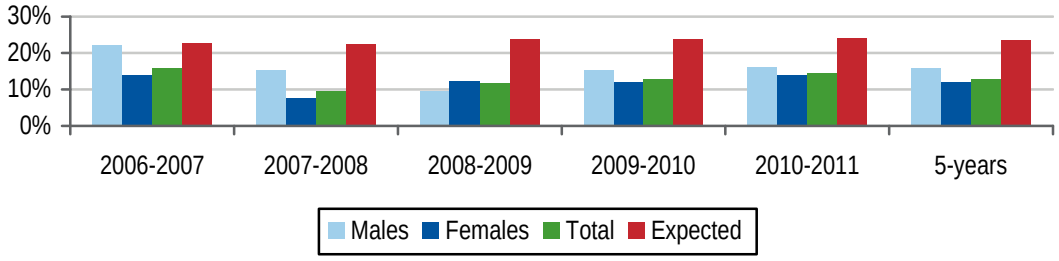
Participants are allowed to retire early with a reduced benefit if they meet the following eligibility:

- Old Plan: Age 55 with 10 years of service
- New Plan Tier 1: Age 55 and vested or any age with 30 years of service
- New Plan Tier 2: Age 55 and vested

Additionally, participants under the Old Plan and New Plan Tier 1 can retire early with an unreduced benefit if they meet the Rule of 90 (age plus credited service greater than or equal to 90).

Under the plan, early retirement is subsidized (with a greater subsidy provided to Old Plan and Tier 1 members than Tier 2 members). Therefore, an accurate prediction of the ages at which members will retire is essential in order to obtain a realistic assessment of the plan's liabilities for retirement benefits. Accuracy in this assumption remains important in order to predict the relative importance of retirement benefits versus ancillary (i.e., death and disability) benefits, and to properly measure the overall magnitude of retirement liabilities.

A total of 194 participants retired between the ages of 54 and 81 during the study period. As the graph below illustrates, the actual retirement experience has been consistently less than expected over the last five years.



The actual number of retirements is slightly more than half as many as expected (shown in the table below). Both male and female actual experience have been less than expected, though female experience is slightly more so than male experience. Table 6, Table 7 and Table 8 present comparisons of actual to expected retirements for the period.

Gender	Exposures	Actual Retirements	Expected Retirements	Ratio of Actual Retirements to Expected Retirements
Male	333	53	87.5	60.57%
Female	1,184	141	267.8	52.65%
Total	**1,517**	**194**	**355.3**	**54.60%**

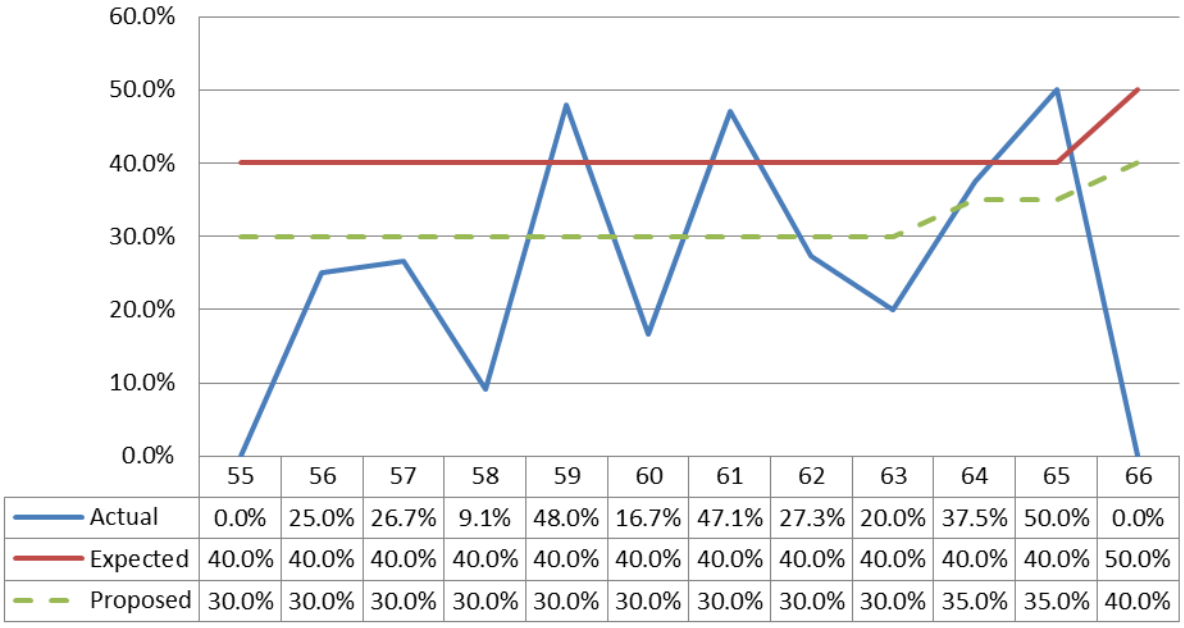
The current assumption for retirement uses a unisex table of age-based rates that begin at age 55 and cease with 100% probability of retirement at age 67. In addition, Old Plan and New Plan Tier 1 members are assumed to retire with 40% probability each year they are eligible for Rule of 90 (unless the age-based rate is higher).

Actual experience for Rule of 90 eligible members has been about 75% of expected. Therefore, we recommend lowering the 40% retirement rate to 30%. Actual experience for the non-Rule of 90 eligible group has also been less than expected. We recommend downward modifications to those rates as well, including a separate table applicable to Tier 2 members, as shown in the tables that follow. In addition, the historical data has shown a trend toward working beyond age 67. There were 58 exposures in the data with age 67 or older, and only 8 actual retirements. Therefore, we recommend extending the last assumed retirement age (i.e., 100% probability of retirement) to age 70.

Table 6:
RETIREMENT RATES (By Age; Old Plan and Tier 1 Eligible for Rule of 90)
For the Period July 1, 2006 through June 30, 2011

Age	Exposures	Actual Retirements	Actual Retirement Rate	Expected Retirements	Assumed Retirement Rate	Ratio of Actual Rate to Expected Rate	Proposed Retirement Rate
55	0	0	0.00%	0.0	40.00%	--	30.00%
56	4	1	25.00%	1.6	40.00%	62.50%	30.00%
57	15	4	26.67%	6.0	40.00%	66.67%	30.00%
58	22	2	9.09%	8.8	40.00%	22.73%	30.00%
59	25	12	48.00%	10.0	40.00%	120.00%	30.00%
60	18	3	16.67%	7.2	40.00%	41.67%	30.00%
61	17	8	47.06%	6.8	40.00%	117.65%	30.00%
62	11	3	27.27%	4.4	40.00%	65.18%	30.00%
63	10	2	20.00%	4.0	40.00%	50.00%	30.00%
64	8	3	37.50%	3.2	40.00%	93.75%	35.00%
65	6	3	50.00%	2.4	40.00%	125.00%	35.00%
66	1	0	0.00%	0.5	50.00%	--	40.00%
Total	**137**	**41**	**29.93%**	**54.9**	**40.07%**	**74.68%**	**30.58%**

Graph 6:
RETIREMENT RATES (By Age; Old Plan and Tier 1 Eligible for Rule of 90)

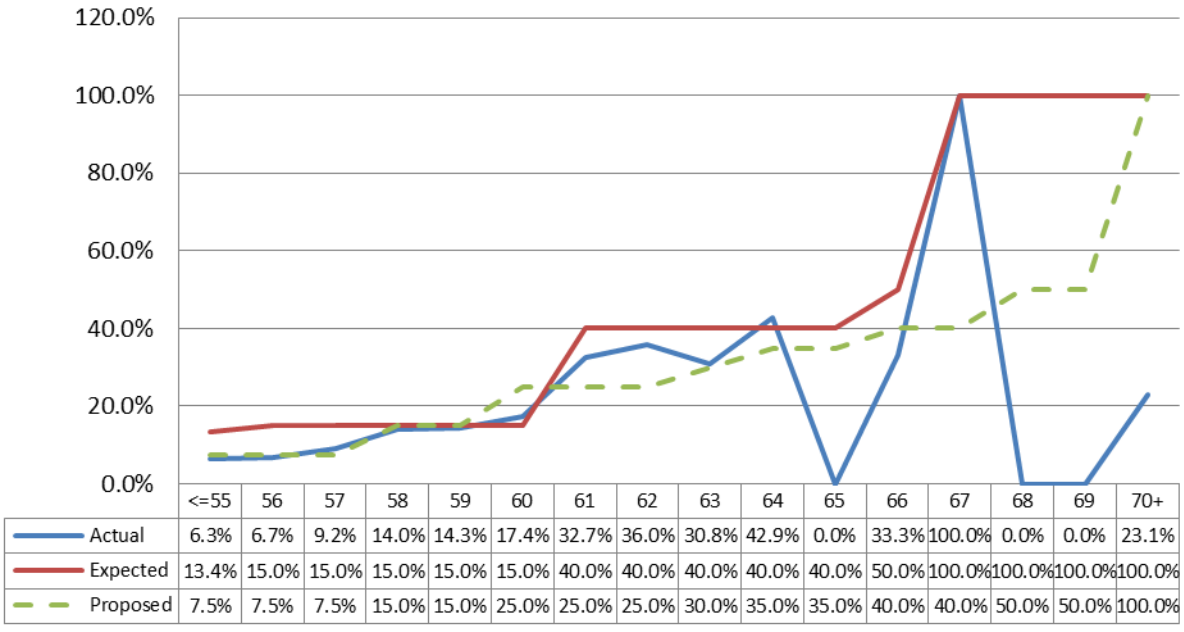


	55	56	57	58	59	60	61	62	63	64	65	66
Actual	0.0%	25.0%	26.7%	9.1%	48.0%	16.7%	47.1%	27.3%	20.0%	37.5%	50.0%	0.0%
Expected	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	50.0%
Proposed	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	35.0%	35.0%	40.0%

Table 7:
RETIREMENT RATES (By Age; Old Plan and Tier 1 Not Eligible for Rule of 90)
For the Period July 1, 2006 through June 30, 2011

Age	Exposures	Actual Retirements	Actual Retirement Rate	Expected Retirements	Assumed Retirement Rate	Ratio of Actual Rate to Expected Rate	Proposed Retirement Rate
Under 56	174	11	6.32%	23.4	13.45%	47.01%	7.50%
56	165	11	6.67%	24.8	15.00%	44.44%	7.50%
57	163	15	9.20%	24.5	15.00%	61.35%	7.50%
58	129	18	13.95%	19.4	15.00%	93.02%	15.00%
59	105	15	14.29%	15.8	15.00%	95.24%	15.00%
60	69	12	17.39%	10.4	15.00%	115.94%	25.00%
61	52	17	32.69%	20.8	40.00%	81.73%	25.00%
62	25	9	36.00%	10.0	40.00%	90.00%	25.00%
63	13	4	30.77%	5.2	40.00%	76.92%	30.00%
64	7	3	42.86%	2.8	40.00%	107.14%	35.00%
65	3	0	0.00%	1.2	40.00%	0.00%	35.00%
66	3	1	33.33%	1.5	50.00%	66.67%	40.00%
67	1	1	100.00%	1.0	100.00%	100.00%	40.00%
68	1	0	0.00%	1.0	100.00%	0.00%	50.00%
69	2	0	0.00%	2.0	100.00%	0.00%	50.00%
70 and Over	13	3	23.08%	13.0	100.00%	23.08%	100.00%
Total	**925**	**120**	**12.97%**	**176.6**	**19.09%**	**67.97%**	**14.35%**

Graph 7:
RETIREMENT RATES (By Age; Old Plan and Tier 1 Not Eligible for Rule of 90)

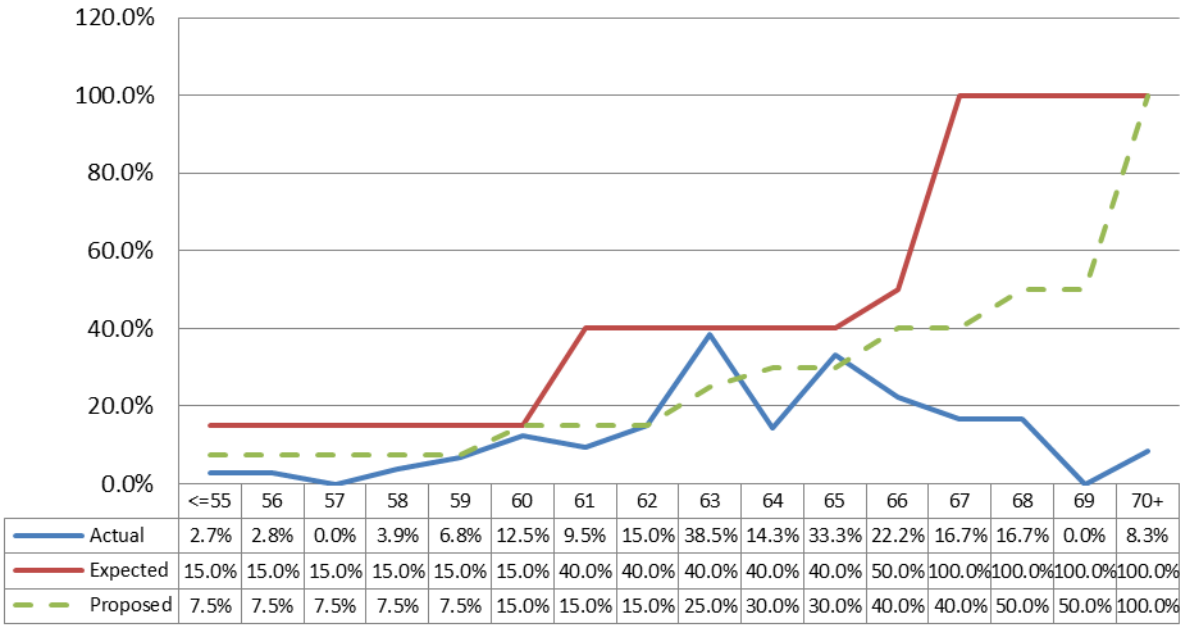


	<=55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70+
Actual	6.3%	6.7%	9.2%	14.0%	14.3%	17.4%	32.7%	36.0%	30.8%	42.9%	0.0%	33.3%	100.0%	0.0%	0.0%	23.1%
Expected	13.4%	15.0%	15.0%	15.0%	15.0%	15.0%	40.0%	40.0%	40.0%	40.0%	40.0%	50.0%	100.0%	100.0%	100.0%	100.0%
Proposed	7.5%	7.5%	7.5%	15.0%	15.0%	25.0%	25.0%	25.0%	30.0%	35.0%	35.0%	40.0%	40.0%	50.0%	50.0%	100.0%

Table 8:
RETIREMENT RATES (By Age; Tier 2 Members)
For the Period July 1, 2006 through June 30, 2011

Age	Exposures	Actual Retirements	Actual Retirement Rate	Expected Retirements	Assumed Retirement Rate	Ratio of Actual Rate to Expected Rate	Proposed Retirement Rate
Under 56	75	2	2.67%	11.3	15.00%	17.78%	7.50%
56	71	2	2.82%	10.7	15.00%	18.78%	7.50%
57	62	0	0.00%	9.3	15.00%	0.00%	7.50%
58	51	2	3.92%	7.7	15.00%	26.14%	7.50%
59	44	3	6.82%	6.6	15.00%	45.45%	7.50%
60	32	4	12.50%	4.8	15.00%	83.33%	15.00%
61	21	2	9.52%	8.4	40.00%	23.81%	15.00%
62	20	3	15.00%	8.0	40.00%	37.50%	15.00%
63	13	5	38.46%	5.2	40.00%	96.15%	25.00%
64	7	1	14.29%	2.8	40.00%	35.71%	30.00%
65	9	3	33.33%	3.6	40.00%	83.33%	30.00%
66	9	2	22.22%	4.5	50.00%	44.44%	40.00%
67	6	1	16.67%	6.0	100.00%	16.67%	40.00%
68	6	1	16.67%	6.0	100.00%	16.67%	50.00%
69	5	0	0.00%	5.0	100.00%	0.00%	50.00%
70 and Over	24	2	8.33%	24.0	100.00%	8.33%	100.00%
Total	**455**	**33**	**7.25%**	**123.8**	**27.20%**	**26.67%**	**16.97%**

Graph 8:
RETIREMENT RATES (By Age; Tier 2 Members)



	<=55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70+
Actual	2.7%	2.8%	0.0%	3.9%	6.8%	12.5%	9.5%	15.0%	38.5%	14.3%	33.3%	22.2%	16.7%	16.7%	0.0%	8.3%
Expected	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	40.0%	40.0%	40.0%	40.0%	40.0%	50.0%	100.0%	100.0%	100.0%	100.0%
Proposed	7.5%	7.5%	7.5%	7.5%	7.5%	15.0%	15.0%	15.0%	25.0%	30.0%	30.0%	40.0%	40.0%	50.0%	50.0%	100.0%

D. Disability Incidence

Disability rate tables function in the same way as mortality tables. The rate at each age indicates the probability of becoming disabled before the next age. Disability rates add liability for the value of the disability benefits, but lessen the value of retirement benefits ultimately payable, since anyone who becomes disabled is not projected to receive retirement benefits other than the disability benefit.

The current set of disability rates are unisex and range from 0.01% at age 35 to 0.21% at age 64. The following table summarizes the disability experience for the plan during the study period. Since there were only 4 disabilities during the study period, we did not separate disability experience by gender. Overall, the number of actual disabilities was close to the number assumed.

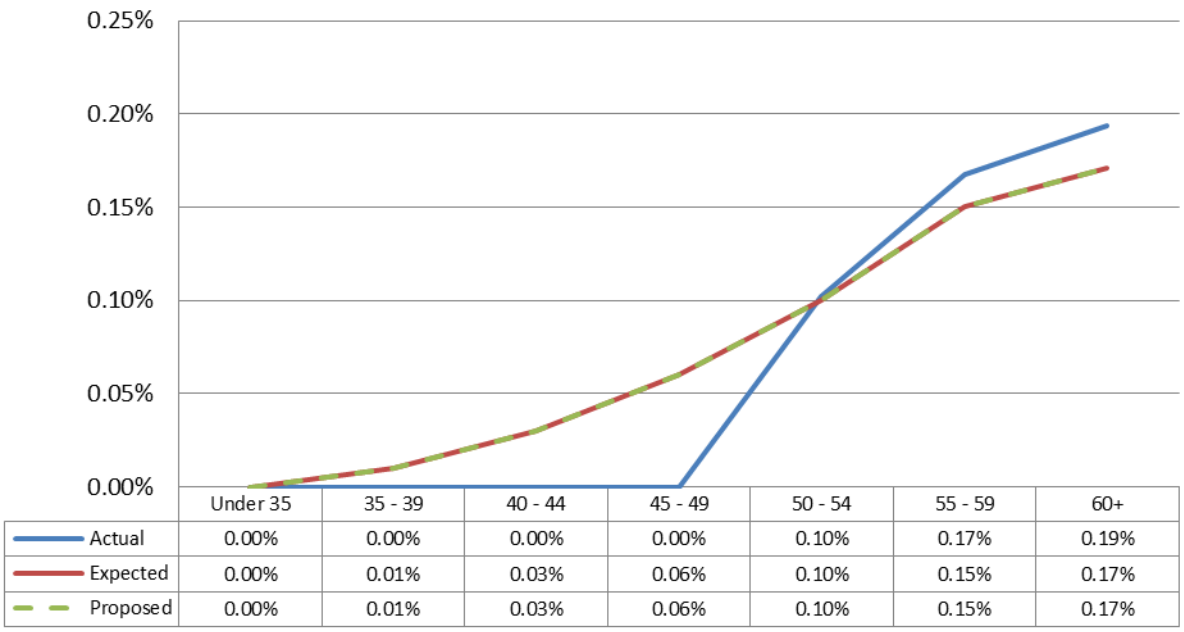
Gender	Exposures	Actual Disabilities	Expected Disabilities	Ratio of Actual Disabilities to Expected Disabilities
Male	1,384	1	1.1	94.54%
Female	4,150	3	3.2	92.08%
Total	**5,534**	**4**	**4.3**	**92.68%**

In light of the above, we do not recommend that the disability rates be modified from the current assumption. Table 9 presents the actual versus expected disability retirements by 5-year age groupings.

Table 9:
DISABILITY RATES (By Age)
For the Period July 1, 2006 through June 30, 2011

Age Range	Exposures	Actual Disabilities	Actual Disability Rate	Expected Disabilities	Assumed Disability Rate	Actual Rate to Expected Rate
Under 35	976	0	0.00%	0.0	0.00%	--
35 – 39	544	0	0.00%	0.1	0.01%	0.00%
40 – 44	621	0	0.00%	0.2	0.03%	0.00%
45 - 49	702	0	0.00%	0.4	0.06%	0.00%
50 – 54	981	1	0.10%	1.0	0.10%	101.94%
55 – 59	1,194	2	0.17%	1.8	0.15%	111.67%
60 & Over	516	1	0.19%	0.9	0.17%	113.38%
Total	**5,534**	**4**	**0.07%**	**4.3**	**0.08%**	**92.68%**

Graph 9:
DISABILITY rates (By Age)



IV. Actuarial Methods

The actuarial cost method is a mechanism to orderly fund benefits over a participant's lifetime. The actuarial cost method allocates liability for service already accrued (i.e., Actuarial Accrued Liability) and future service (i.e., Normal Cost). The current actuarial cost method is the "replacement life" Entry Age Normal (EAN) actuarial cost method. Under this method, a normal cost is calculated for each employee that is the level annual contribution as a percent of pay required to be made from the employee's date of hire for as long as he/she remains active so that sufficient assets will be accumulated to provide his/her benefit. The normal cost is based upon the Tier 2 benefit structure. The accrued liability is the difference between the present value of all future benefits and the present value of all future normal costs. For Old Plan and Tier 1 members, the accrued liability includes the difference between the value of the Old Plan and Tier 1 benefits over the Tier 2 benefits expected to be earned after the valuation date.

Under traditional EAN, each employee's normal cost is calculated based on the benefits applicable to their tier. For plans that have adopted new, lower tiers of benefits applicable to employees hired after a certain date, the normal cost calculation for existing actives does not reflect the plan changes as it does under the "replacement life" concept. In this situation, the aggregate normal cost over time will not be level as a percentage of payroll (it will decrease) since as existing members in a prior tier decrement from the active population, they will be replaced with members earning benefit in the new, lower benefit tier.

The difference between the two EAN methods is demonstrated below:

Description	Current Method ("Replacement Life")	Alternate Method ("Traditional")
Present Value of Future Benefits	$342,231,820	$342,231,820
Present Value of Future Normal Costs	21,166,820	23,553,842
Actuarial Accrued Liability (AAL)	321,065,000	318,677,978
Funding Percentage	73.22%	73.76%

Normal Cost	3,298,919	3,898,605
Amortization of Unfunded AAL	5,574,484	5,422,502
Administrative Expenses	483,086	483,086
Total Required Contribution	**$9,356,489**	**$9,804,193**
As a % of Projected Payroll	**17.23%**	**18.07%**

V. Appendix

Appendix A: Proposed Salary Scale (Ultimate Age-based Rates)

Age	Total Exposures[1]	Actual Increase	Expected Increase	Proposed Increase
35 and Under	137	4.45%	6.61%	6.00%
36	60	2.03%	6.38%	5.86%
37	59	3.03%	6.29%	5.73%
38	58	3.81%	6.22%	5.59%
39	60	1.92%	6.12%	5.45%
40	66	4.75%	6.13%	5.31%
41	72	4.68%	6.09%	5.18%
42	78	2.60%	5.98%	5.04%
43	86	3.65%	5.80%	4.90%
44	82	4.31%	5.68%	4.76%
45	84	3.23%	5.62%	4.63%
46	88	2.96%	5.55%	4.49%
47	90	3.49%	5.41%	4.35%
48	96	2.76%	5.41%	4.21%
49	107	3.52%	5.29%	4.08%
50	117	3.98%	5.14%	3.94%
51	135	3.85%	5.08%	3.80%
52	148	1.73%	4.96%	3.66%
53	169	2.47%	4.79%	3.53%
54	175	4.47%	4.69%	3.39%
55 and Over	1,139	2.23%	4.29%	3.25%
Total	**3,106**	**2.95%**	**5.04%**	**4.00%**

[1] Exclusive of the population with 0 to 7.99 years of service.