Government of Guam Retirement Fund

Actuarial Experience Study
October 1, 2011 to September 30, 2015

Prepared by:

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Government of Guam Retirement Fund –
Actuarial Experience Study – October 1, 2011 to September 30, 2015

As part of our engagement with the Board of Trustees, we have performed an actuarial experience study for the Government of Guam Retirement Fund for the period from October 1, 2011 to September 30, 2015. The purpose of this study is to review the actuarial assumptions used in the preparation of the actuarial valuation, and to provide the Fund with recommendations for revisions where appropriate.

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by the Government of Guam Retirement Fund's staff. This information includes, but is not limited to, financial information, member census data, and plan provisions. We found this information to be reasonably consistent and comparable with information used for other purposes. The results of the study depend on the integrity of this information. If any of this information is inaccurate or incomplete the results may be different and the calculations may need to be revised.

All costs, liabilities, rates of interest, and other factors for the Plan are to be determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the Plan and reasonable expectations); and which, in combination, offer our best estimate of anticipated experience affecting the Fund. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements. The Trustees have the final decision regarding the appropriateness of the assumptions.

The calculations in the enclosed report have been made on a basis consistent with our understanding of the Government of Guam Retirement Fund's funding requirements and goals. Determinations for other purposes may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes.

Milliman's work is prepared solely for the internal business use of the Government of Guam Retirement Fund. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient

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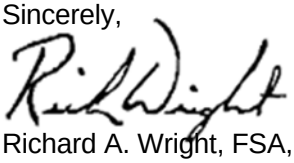
No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. The undersigned is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Sincerely,



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INTRODUCTION

Milliman, Inc. has been retained by the Government of Guam Retirement Fund to provide an actuarial experience study of the retirement fund for the period October 1, 2011 through September 30, 2015. The purpose of the study is to:

- Compare the actual experience of the Fund during the study period with the experience predicted by the actuarial assumptions.
- Review the current set of actuarial assumptions and propose changes where appropriate. We have calculated the impact of the changes if they were to be adopted effective with the actuarial valuation as of September 30, 2016.

An actuarial valuation of the fund is performed annually to determine the present value of future benefits and the required employer contribution rate. The valuation makes certain assumptions regarding future events. These include economic assumptions such as investment return and member salary increases, and demographic assumptions such as life expectancy and rates of retirement.

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KEY FINDINGS

1. Salary increases have been lower than expected during the study period. We therefore propose to lower assumed salary increases. See Exhibit 2.

2. Although payroll growth has been higher than expected during 10 years ending September 30, 2015, it has been lower than expected over the last 20 years and expected future inflation has decreased. We therefore propose to lower the assumed payroll growth assumption. See Exhibit 3.

3. Mortality rates for healthy male retirees have been lower than expected and for healthy female retirees they have been higher than expected during the study period. We therefore propose to reduce the mortality set forward for males from 4 years to 3 years and increase the mortality set forward for females from 1 year to 2 years. See Exhibit 5.

4. In order to provide for anticipated improvements in future mortality, we propose to project the mortality assumptions generationally from 2016 using 30% of mortality improvement scale BB. See Exhibit 6.

5. Mortality for disabled retirees has been higher than expected during the study period. We therefore propose to set forward the mortality rates by 6 years for males and 4 years for females. See Exhibit 7.

6. Disability incidence during the study period has been lower than expected for females. We therefore propose to lower the disability assumption for females. See Exhibit 8.

7. Retirement rates have been higher than expected at the earlier ages and lower than expected at later ages. We therefore propose to increase the assumed retirement rate first eligibility for unreduced benefits, and extend the retirement rates up to age 75. See Exhibit 10.

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8. For the survivor benefit payable to minor children, we propose to change the valuation method from percentage increases to active liabilities to a direct calculation assuming 0.2 minor child survivors for at death with payment for 6 years. See Exhibit 13.

9. For annual leave payouts included in average earnings, we propose to lower the assumption from 10% of compensation to 5%, based the experience observed. See Exhibit 14.

The table below shows the effect of these proposed assumptions and methods if they were to be effective for the actuarial valuation as of September 30, 2016:

	Actuarial Valuation as of 9/30/16	
	Actuarial Accrued Liability	Employer Contribution Rate
	(in millions)	
Current Actuarial Assumptions and Methods	$ 2,918.4	27.89%
Security Ratio	56.73%	
1. Change member salary increase assumption	(15.8)	(0.44%)
2. Lower total payroll increase assumption	0.0	0.38%
3,4,5. Revise mortality rates and add projection scale	14.0	0.26%
6. Reduce rates of disability incidence	0.9	0.00%
7. Increase rates of retirement	25.0	0.54%
8. Lower assumed earnings increases due to leave	(37.1)	(0.75%)
9. Revise valuation method for child survivor benefits	(0.5)	(0.05%)
Total of all changes	(13.5)	(0.06%)
With Proposed Actuarial Assumptions and Methods	$ 2,904.9	27.83%
Security Ratio	56.99%	

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EXHIBIT 1. INVESTMENT RETURN

Current Assumption:	7.0% (effective 2003)
2007-2011 Study:	No change
Current Expected Average Return:	7.19%
Proposed Assumption:	No change

Actuarial Standard of Practice No. 27 (ASOP 27), which was adopted by the Actuarial Standards Board in December 1996, provides guidance for selecting pension plan economic assumptions. We have calculated an expected average investment return in accordance with the guidance provided by this standard.

The Fund's expected 30-year returns on various asset classes, which have been provided to us by GGRF's investment consultant, are shown below. The target asset allocation is the expected long-term asset allocation based on the Fund's current investment policy.

Asset Class	Target Asset Allocation	Expected 30-Year Geometric Return[1]
U.S. Equities (large cap)	29%	7.63%
U.S. Equities (small cap)	7%	7.63%
Non-U.S. Equities	12%	7.63%
Non-U.S. Equities (small cap)	4%	7.63%
Non-U.S. Equities (emerging markets)	2%	7.63%
U.S. Fixed Income (aggregate)	25%	4.75%
Risk Parity	8%	7.50%
High Yield Bonds	8%	6.90%
Global Real Estate (REITs)	5%	6.80%
Total Expected Return		7.18%

An important distinction with long-term rates of return on assets is the difference between arithmetic means and geometric means. The arithmetic mean is determined by summing the periodic returns and dividing by the number of periods. The geometric mean is determined by taking the product of each year's return, and taking the nth root of the product, where n is the number of periods.

For example, a fund may have an expected 1 year average return of 8%, and experience actual returns over a 5 year period of 5%, 10%, -5%, 10%, and 20%. The arithmetic mean of those 5 year returns is 8%. However, if $1,000 was invested at the start of the 5 year period, and it earned those rates of return, the accumulated sum at the end of the 5-year period is $1,448, which translates into a geometric mean of 7.69%.

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Using the expected 30-year returns for each asset class and the standard deviations and correlations of each asset class, we have calculated the 30-year geometric mean of the portfolio to be 7.18%.

Ranges of Returns

The actual return of the portfolio will, of course, vary each year. In any given year, the difference between actual and expected results may be large. However, over longer time horizons, the accumulated returns should approach the expected long term returns. We have developed the following ranges of returns for different time horizons.

	Time Horizon (years)					
	1	5	10	20	30	50
25th Percentile	-0.38%	3.72%	4.72%	5.43%	5.74%	6.06%
50th Percentile	7.16%	7.16%	7.16%	7.16%	7.16%	7.16%
75th Percentile	15.27%	10.71%	9.66%	8.92%	8.60%	8.27%

The 25th percentile indicates the rate at which there is a 25% probability that the investment return of the portfolio will be less than that rate over the time period. Conversely, the 75th percentile indicates the rate at which there is a 25% probability that the investment return of the portfolio over that time period will exceed that rate.

Recommendation

Based upon the expected geometric mean return of 7.18%, we recommend no change to the current assumption of 7.0%.

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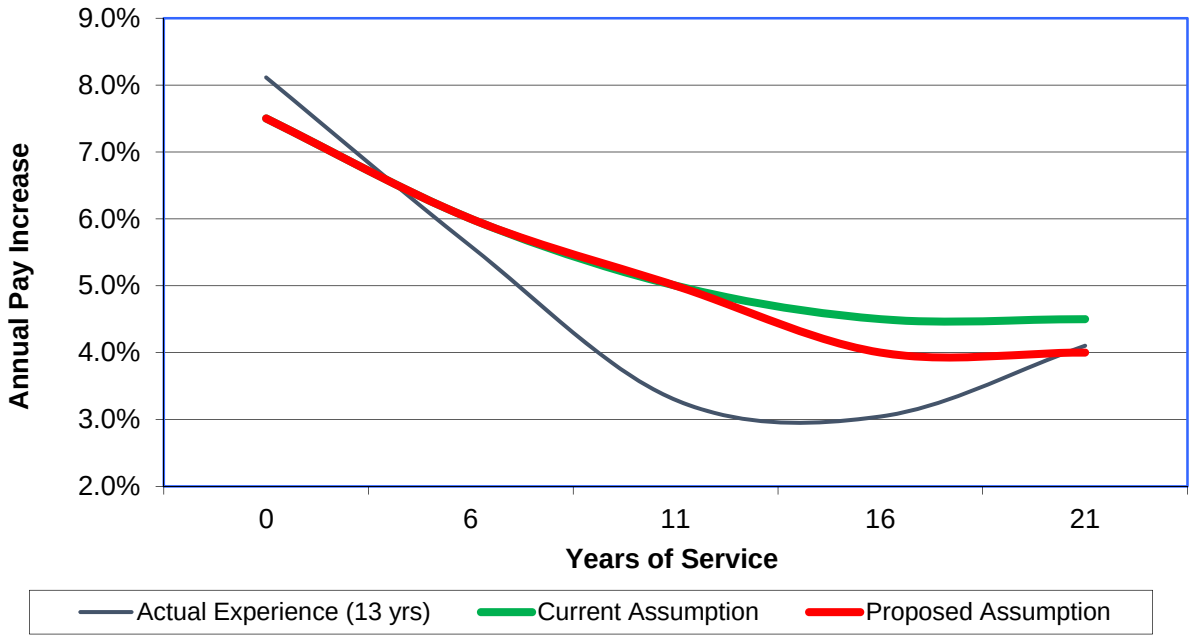
EXHIBIT 2. MEMBER SALARY INCREASES

Current Assumption:	Ranges from 7.5% for employees with between 0 and 5 years of service, to 4.5% for members with over 20 years of service (effective 2012)
2007-2011 Study:	Adopted current assumption. Previous assumption ranged from 8.5% for employees with between 0 and 5 years of service to 4.0% for members with over 20 years of service.
Proposed Assumption:	Ranges from 7.5% for employees with between 0 and 5 years of service, to 4.0% for members with over 20 years of service

Salaries of retirement fund members are assumed to increase each year by a percentage that depends on the member's years of service with the Government of Guam. The following table summarizes the average annual salary increases for various service groups.

				Average Annual Increases		
Years of Service	9/30/15 Count	Current Assumption	Proposed Assumption	2011-2015	2007-2015	2002-2015
0 to 5	34	7.5%	7.5%	9.0%	7.5%	8.1%
6 to 10	50	6.0%	6.0%	5.5%	5.2%	5.6%
11 to 15	48	5.0%	5.0%	0.9%	2.5%	3.3%
16 to 20	215	4.5%	4.0%	0.3%	2.3%	3.0%
Over 20	2,113	4.5%	4.0%	3.1%	3.7%	4.1%
Average for 30-year career		5.8%	5.0%	3.7%	4.2%	4.8%



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Recommendation

For employees with more than 5 years of service, the average annual increases over the 4-year study period (2011-2015) were lower than the current assumption. This is also true for the experience over the last 8 years (2007-2015) and over the last 13 years (2002-2015).

Overall, the actual salary increases over the 4 year study period would produce an average salary increase of 3.7% over a 30-year career. The actual salary increases over the most recent 8 years would produce an average salary increase of 4.2% over a 30-year career. The actual salary increases over the most recent 13 years would produce an average salary increase of 4.8% over a 30-year career. This compares with an average salary increase of 5.4% for a 30-year career using the current assumptions.

We recommend changing the member salary increase assumption to the rates shown in the table on the previous page. The proposed assumptions will produce an average salary increase of 5.0% for a 30-year career.

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EXHIBIT 3. PAYROLL GROWTH

Current Assumption:	3.0% per year (effective 2012)
2007-2011 Study:	Lowered assumption from 3.5% to 3.0%
Proposed Assumption:	2.75% per year

Payroll growth for the past 20 fiscal years is summarized below. For the years from 1993 to 1996, the payroll growth is smoothed over 2 years, since actuarial valuations were done every other year.

Fiscal Year Ending 9/30	Total Government Covered Payroll [1]	Percentage Increase [1]
2015	$ 511,366,411	1.3%
2014	504,943,471	9.7%
2013	460,347,780	0.7%
2012	456,985,288	-0.9%
2011	461,210,949	7.5%
2010	429,044,092	1.2%
2009	423,774,000	3.0%
2008	411,383,039	9.1%
2007	377,049,000	0.1%
2006	376,604,000	4.7%
2005	359,850,000	1.9%
2004	353,229,000	-3.2%
2003	364,936,000	-3.7%
2002	378,916,000	4.5%
2001	362,599,000	2.5%
2000	353,755,000	3.0%
1999	343,451,000	-10.8%
1998	385,035,000	4.5%
1997	368,455,000	4.5%
1996	352,589,000	4.5%
1995	337,406,000	-1.6%
1994	342,892,000	-1.6%
1993	348,467,000	7.1%
Average for Last 5 Years		3.6%
Average for Last 10 Years		3.6%
Average for Last 20 Years		2.1%

[1] Information for the years from 1993 to 2001 was derived from the 1997-2001 experience study.

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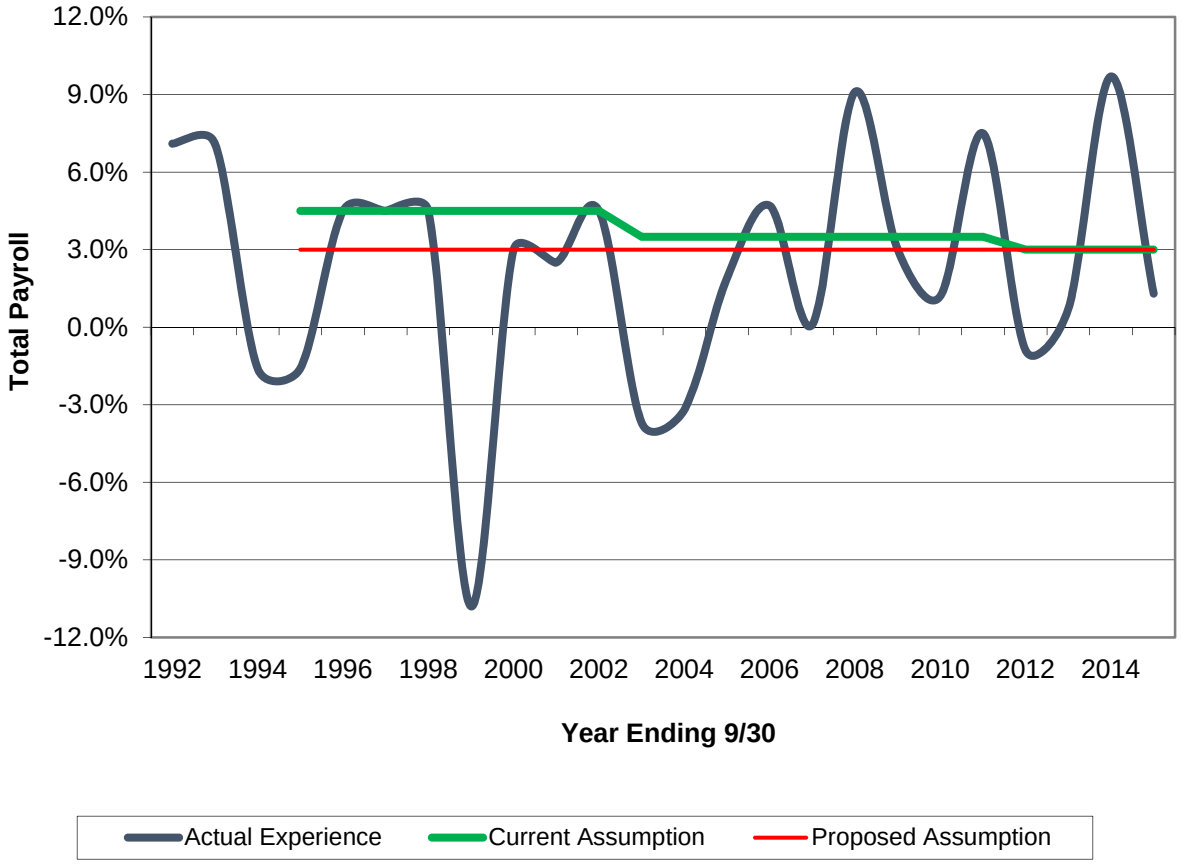

Recommendation

The current assumption of 3.0% has been in effect since 2012. From 1995 to 2002, the payroll growth assumption was 4.5%, and from 2003 to 2011, the assumption was 3.5%. The current assumption is based upon assumed inflation of 2.75%, wage productivity growth of 0.25%, and personnel growth of 0%.

Although payroll growth over the last 10 years has exceeded the assumption, the payroll growth over the last 20 years is below the current assumption. We recommend lowering the current assumption to 2.75%, to reflect a revised inflation assumption of 2.50%, wage productivity of 0.25%, and personnel growth of 0%.

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EXHIBIT 4. ADMINISTRATIVE EXPENSES

Current Assumption:	Budgeted expenses (effective 2009)
2007-2011 Study:	No change
Proposed Assumption:	No change

Administrative expenses are a component of the required employer contribution. The actual and budgeted administrative expenses for the past 5 fiscal years are summarized below.

	Budgeted Administrative Expenses			As % of	Actual	As % of
Fiscal Year Ending 9/30	Defined Benefit	Defined Contribution	Total	Expected Payroll	Admin Expenses	Actual Payroll
2015	$4,146,000	$1,660,000	$5,806,000	1.15%	$4,927,728	0.96%
2014	4,007,613	1,478,921	5,486,534	1.16%	4,584,718	0.92%
2013	5,228,000	1,435,000	6,663,000	1.41%	4,263,649	0.93%
2012	5,226,000	1,412,000	6,638,000	1.39%	4,515,418	0.99%
2011	4,616,000	1,379,000	5,995,000	1.35%	4,643,707	1.01%
2010	4,413,000	1,316,000	5,729,000	1.31%	4,364,901	1.02%
2009					4,579,453	1.08%
2008					4,838,147	1.18%

Recommendation

Budgeted administrative expenses have been between 1.1% and 1.4% of the expected defined benefit and defined contribution payroll. Actual administrative expenses have ranged from 0.92% to 1.18% of actual payroll. Although budgeted administrative expenses have been greater than actual administrative expenses, we recommend the continued use of budgeted expenses in the actuarial valuation.

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EXHIBIT 5. HEALTHY RETIREE MORTALITY

Current Assumption:	RP-2000 mortality table (Males +4, Females +1) – (Effective 2012)
2007-2011 Study:	Increased male set forward from 3 years to 4 years
Proposed Assumption:	RP-2000 mortality table (Males +3, Females +2) projected generationally from 2016 using 30% of mortality improvement scale BB

The current mortality assumption for retired members and surviving spouses is the RP-2000 mortality combined healthy table set forward by 4 years for males and 1 year for females. With the set forward, the life expectancy for a 65 year old male is calculated as if he were age 69, and the life expectancy for a 65 year old female is calculated as if she were age 66.

The following table summarizes total mortality experience for non-disabled retired members and surviving spouses during the study period and compares it with expected mortality based on the current assumption. Mortality experience for active members was not included in the review, because withdrawal and mortality experience are combined for active members.

	Retirees			Surviving Spouses		
	Male	Female	Total	Male	Female	Total
Current Study 2011-2015						
Actual Deaths	372	237	609	83	257	340
Expected Deaths	410	254	664	85	182	267
Actual/Expected Ratio	91%	93%	92%	98%	142%	128%
Prior Study 2007-2011						
Actual Deaths	374	200	574	49	178	227
Expected Deaths	313	195	508	57	151	208
Actual/Expected Ratio	119%	103%	113%	86%	118%	109%

Recommendation

In the current study, the actual mortality rates for male retirees and male surviving spouses are slightly lower than the mortality predicted by the current assumption. We therefore recommend reducing the set forward for males from 4 years to 3 years.

Although the mortality rates for female retirees is slightly lower than the mortality predicted by the current assumption, the mortality rates for female surviving spouses is much greater than the current assumption. We therefore recommend increasing the set forward for females from 1 year to 2 years.

In addition, in Exhibit 6 we propose adding a mortality improvement scale to account for possible future enhancement to mortality rates.

A comparison of actual experience with mortality expected under the proposed assumption is shown below.

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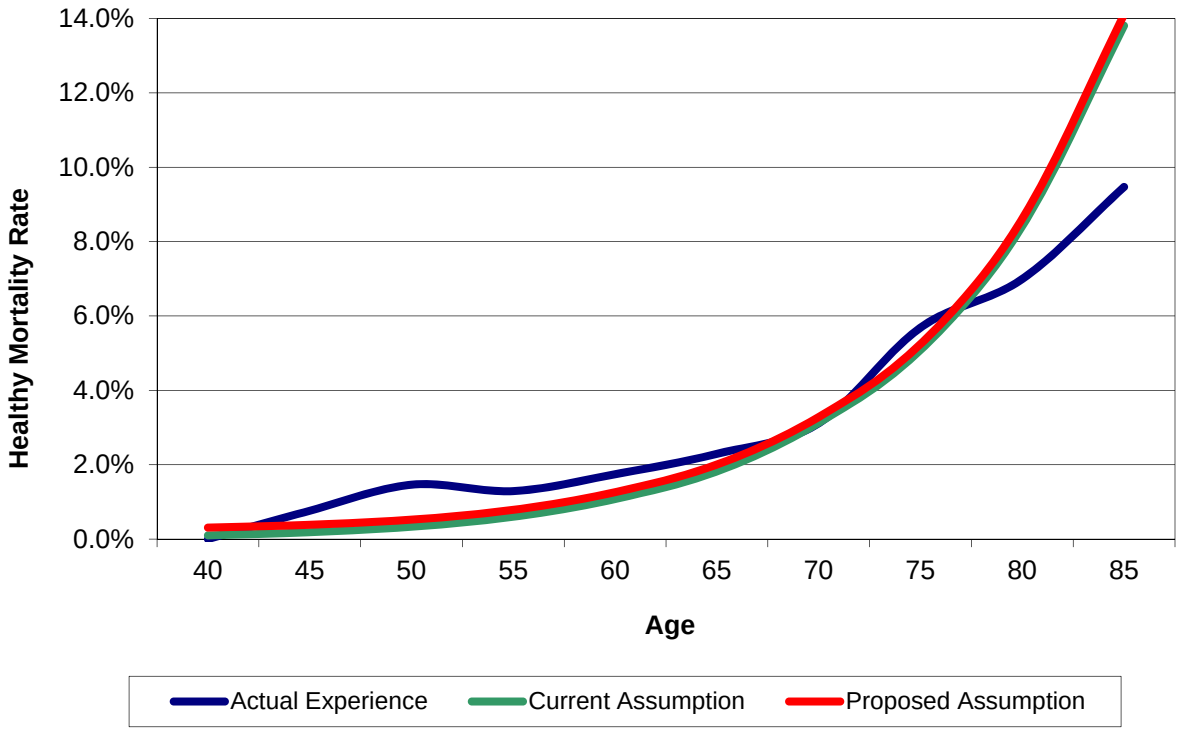
2011-2015	Retirees Male	Retirees Female	Retirees Total	Surviving Spouses Male	Surviving Spouses Female	Surviving Spouses Total
Proposed Assumption						
Actual Deaths	372	237	609	83	257	340
Expected Deaths	370	281	650	77	200	277
Actual/Expected Ratio	101%	84%	94%	107%	129%	123%



The current and proposed mortality rates are shown in Appendix A – Table 1. The table below shows the life expectancy for the current and proposed assumptions for healthy 65 year old retired males and females.

	Life Expectancy		
	Current Assumption RP 2000 (+4,+1)	RP 2000 (+3,+2) No projected improvement	Proposed Assumption RP 2000 (+3,+2) With projected Improvement
Male age 65 in 2016	79.6	80.3	80.7
Female age 65 in 2016	84.3	83.5	83.9

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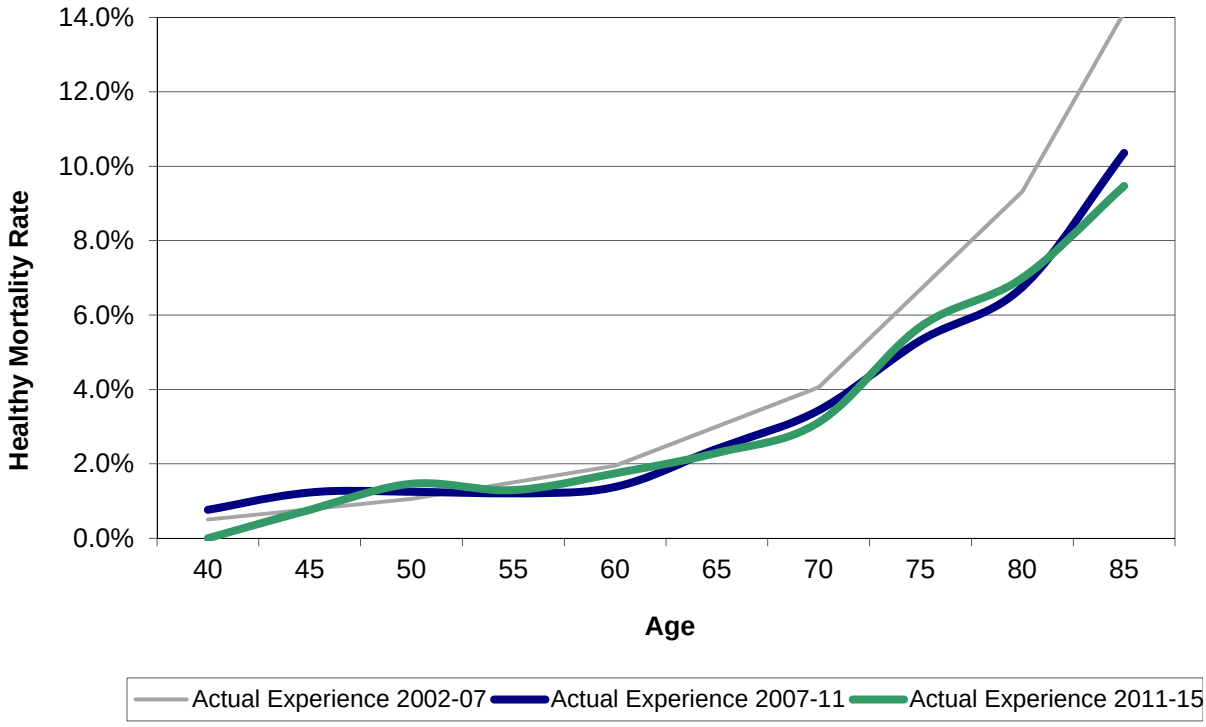
EXHIBIT 6. MORTALITY PROJECTION SCALE

Current Assumption:	No projected mortality improvement
2007-2011 Study:	No projected mortality improvement
Proposed Assumption:	Project generationally from 2016 using 30% of mortality improvement scale BB

The current mortality assumption does not assume any future improvement in mortality rates. The graph below summarizes the Fund's mortality experience for the current experience study as well as the two preceding studies (2007-2011 and 2002-2007).



Recommendation

Although the most recent study does not show any mortality improvement from the 2007 to 2011 experience period, there has been some mortality improvement since the 2002 to 2007 experience period. To account for possible future improvements in mortality, we recommend applying 30% of mortality improvement scale BB projected generationally to the RP-2000 mortality table (set forward 3 years for males and 2 years for females) starting from 2016. A generational mortality projection means that the mortality rates vary both by the age of the individual and the year of birth. For example, a retiree who attains age 65 in 2036 is projected to live longer than a retiree who attains age 65 in 2016. The following table shows member life expectancies under the proposed mortality assumption with and without mortality projection.

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	Life Expectancy		
	Current Assumption RP 2000 (+4,+1)	RP 2000 (+3,+2) No projected improvement	Proposed Assumption RP 2000 (+3,+2) With projected Improvement
Male age 65 in 2016	79.6	80.3	80.7
Female age 65 in 2016	84.3	83.5	83.9
Male age 65 in 2036	79.6	80.3	81.3
Female age 65 in 2036	84.3	83.5	84.5

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EXHIBIT 7. DISABLED RETIREE MORTALITY

Current Assumption:	RP-2000 Disability mortality table with no age adjustment (effective 2009)
2007-2011 Study:	No change
Proposed Assumption:	RP-2000 Disability mortality table (Males +6, Females +4) projected generationally from 2016 using 30% of mortality improvement scale BB

The current mortality assumption for disabled retired members is the RP-2000 Disability mortality table with no age adjustments.

The following summarizes the mortality experience for disabled retired members during the study period and compares it with expected mortality based on the current assumption. For comparison, the mortality experience for disabled retired members from the prior experience study (2007-2011) is also shown.

	Disabled Retirees		
	Male	Female	Total
Current Study 2011-2015			
Actual Deaths	60	36	96
Expected Deaths	36	25	61
Actual/Expected Ratio	168%	141%	157%
Prior Study 2007-2011			
Actual Deaths	53	41	94
Expected Deaths	44	29	73
Actual/Expected Ratio	120%	141%	129%

Recommendation

The actual mortality for male and female disabled retirees has been higher than the mortality predicted by the current assumption. We recommend revising the disabled retiree mortality assumption to the RP-2000 Disability mortality table set forward by 6 years for males and 4 years for females. The Fund's population of disabled retirees is not sufficiently large to review experience with regard to disabled mortality improvement. We recommend applying the same generational mortality projection as for the healthy retiree mortality assumption, projecting generationally from 2016 using 30% of mortality improvement scale BB (see Exhibit 6).

A comparison of actual experience with disabled mortality expected under the proposed assumption is shown below.

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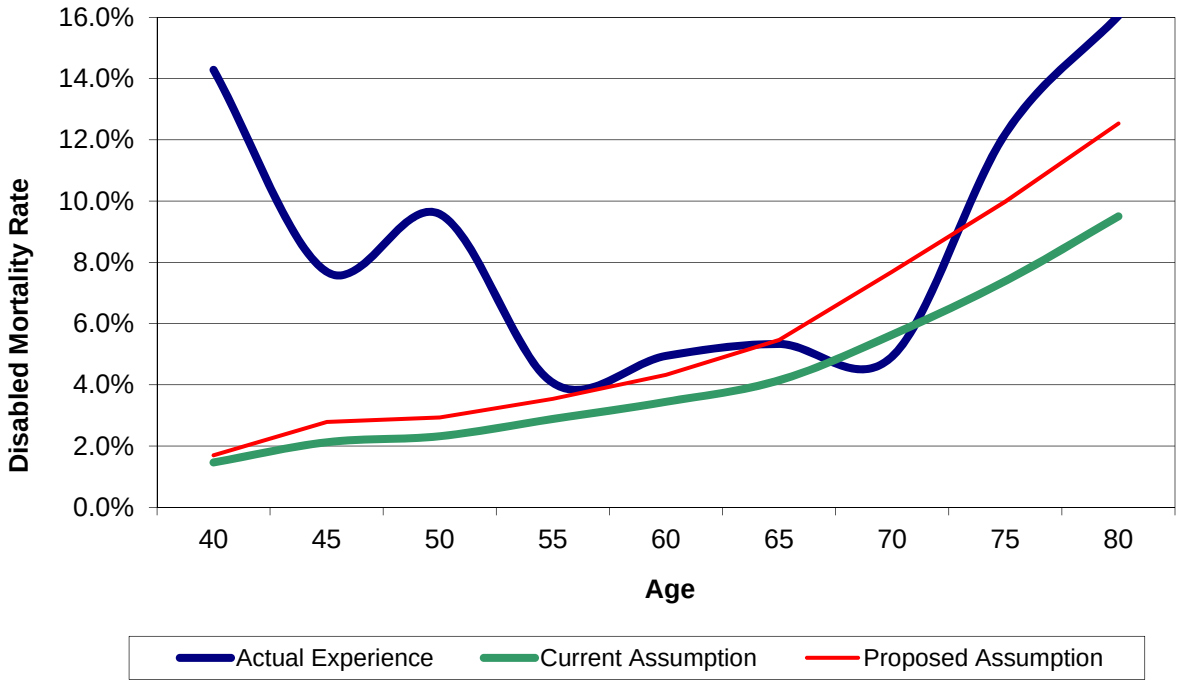
	Disabled Retirees		
	Male	Female	Total
Proposed Assumption			
Actual Deaths	60	36	96
Expected Deaths	48	33	81
Actual/Expected Ratio	125%	110%	119%



The current mortality rates are shown in Appendix A – Table 2. The table below shows the life expectancy for the current assumption and proposed assumptions for disabled 65 year old male and female retirees.

	Life Expectancy		
	Current Assumption RP 2000 Disabled	RP 2000 Disabled (+6,+4) No projected improvement	Proposed Assumption RP 2000 Disabled (+6,+4) With projected Improvement
Male age 65 in 2016	76.8	74.4	74.6
Female age 65 in 2016	80.7	78.5	78.8
Male age 65 in 2036	76.8	74.4	75.2
Female age 65 in 2036	80.7	78.5	79.4

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EXHIBIT 8. DISABILITY INCIDENCE

Current Assumption:	1974-78 Society of Actuaries Long Term Disability Non-Jumbo table, with male and female rates reduced by 50%
2007-2012 Study:	Applied 50% reduction to male and female rates.
Proposed Assumption:	Increase the reduction for female rates from 50% to 75%

The current assumption for the incidence of disability among active members is the 1974-78 Society of Actuaries Long Term Disability Non-Jumbo table reduced by 50%.

The following summarizes the incidence of disability for active members during the study period and compares it with expected disability based on the current assumption. For comparison, the disability experience for active members from the prior experience study (2007-2011) is also shown.

	Disability Incidence		
	Male	Female	Total
Current Study 2011-2015			
Actual Disabilities	13	6	19
Expected Disabilities	16	19	35
Actual/Expected Ratio	79%	32%	54%
Prior Study 2007-2011			
Actual Disabilities	14	5	19
Expected Disabilities	36	40	76
Actual/Expected Ratio	39%	13%	25%

Recommendation

As shown above, the actual incidence of disability for female members has been substantially lower than the incidence of disability predicted by the current assumption. In order to reduce the discrepancy, we recommend reducing the female rates from 50% of the rates specified by the 1974-78 Society of Actuaries Long Term Disability Non-Jumbo table to 25% of those rates. A comparison of actual experience with the incidence of disability expected under the proposed assumption is shown below.

	Disability Incidence		
	Male	Female	Total
Proposed Assumptions			
Actual Disabilities	13	6	19
Expected Disabilities	16	9	26
Actual/Expected Ratio	79%	65%	74%

The current and proposed disability rate tables are provided in Appendix A – Table 3.

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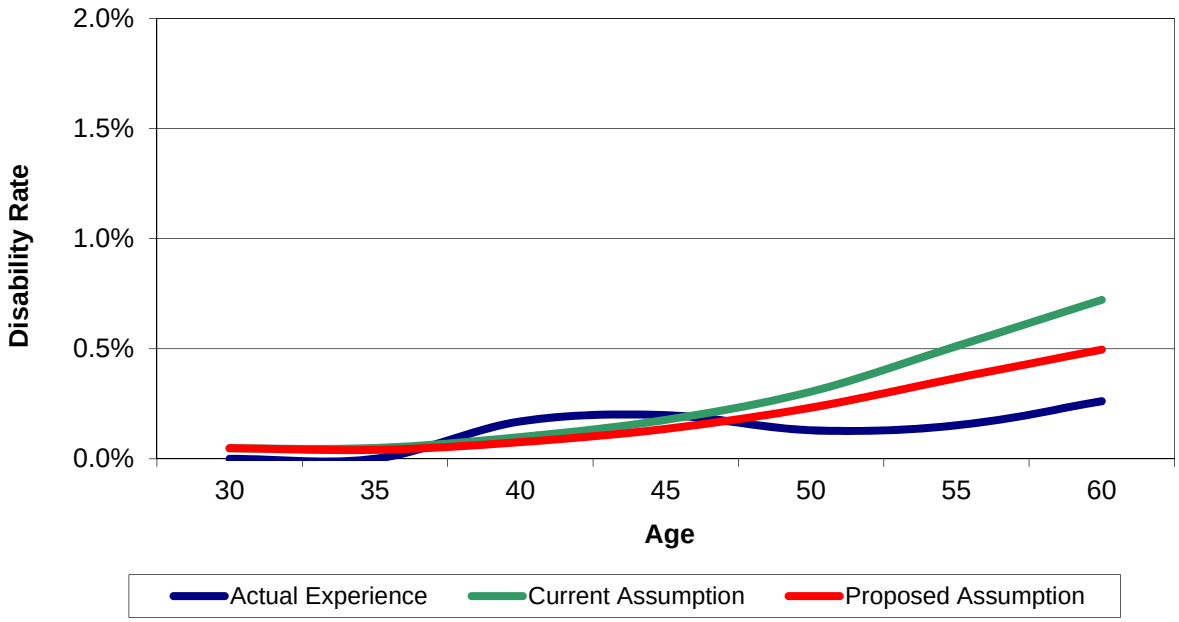

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EXHIBIT 9. ACTIVE WITHDRAWAL AND MORTALITY

Current Assumption:	Withdrawal rates based upon actual experience that vary by service (effective 2009)
2007-2011 Study:	No change to withdrawal assumption
Proposed Assumption:	No change to withdrawal assumption

In reviewing the withdrawal assumption, we have combined active member withdrawal with mortality, since the records reviewed for this study do not distinguish between active members who withdrew and received a return of contributions and those who died. Withdrawal occurs primarily for relatively young members, so the proportion of mortality in the combined totals is small.

The following summarizes total withdrawal/mortality experience for active members during the study period and compares it with expected withdrawal/mortality based on the current assumption. For comparison, the withdrawal/mortality experience for active members from the prior experience study (2007-2011) is also shown.

	Active Withdrawals and Deaths		
	Male	Female	Total
Current Study 2011-2015			
Actual Withdrawals/Deaths	153	111	264
Expected Withdrawals	115	114	229
Expected Deaths	28	19	47
Expected Withdrawals/Deaths	143	133	276
Actual/Expected Ratio	107%	84%	96%
Prior Study 2007-2011			
Actual Withdrawals/Deaths	279	231	510
Expected Withdrawals	163	157	320
Expected Deaths	28	19	47
Expected Withdrawals/Deaths	191	176	367
Actual/Expected Ratio	146%	131%	139%

Recommendation

Active Withdrawal

The actual withdrawal/mortality experience has been slightly higher than predicted by the current assumption for males and somewhat lower than predicted for females, but overall the current

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assumptions have been close to actual experience. As such, we propose to maintain the current withdrawal assumption, which is shown in Appendix A – Table 4.

Active Mortality

To be consistent with the healthy retiree mortality rates, we propose to revise the assumption from the current tables (RP-2000 mortality table set forward by 4 years for males and 1 year for females) to the RP-2000 mortality table (Males +3, Females +2) projected generationally from 2016 using 30% of mortality improvement scale BB.

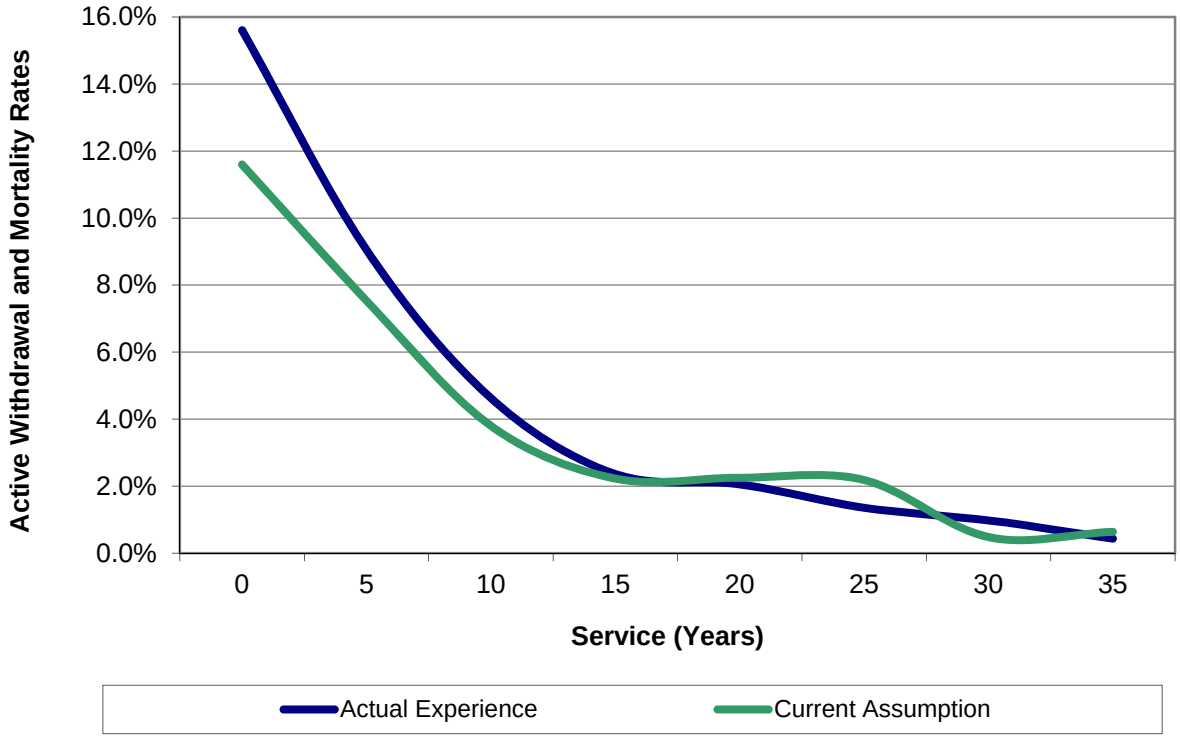

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EXHIBIT 10. RETIREMENT

Current Assumption:	40% retire at first eligibility for unreduced retirement 15% of the remaining members retire in each year until age 65 20% of the remaining members retire in each year from 65 to 69 100% of the remaining members at age 70 retire immediately
2007-2011 Study:	Lowered rates from 50% to 40% at first eligibility, and from 20% to 15% for ages up to 65. Maintained rates at 20% for 65 to 69.
Proposed Assumption:	50% retire at first eligibility for unreduced retirement 20% of the remaining members retire in each year until age 75 100% of the remaining members at age 75 retire immediately

For employees who became members prior to October 1, 1981, the Fund provides unreduced retirement benefits at age 60, or upon completion of 25 years of service if earlier. For employees who became members on or after October 1, 1981, the service requirement for unreduced retirement was increased to 30 years. For employees who became members on or after August 22, 1984, the unreduced retirement age was increased to age 65.

Uniformed personnel who became members prior to October 1, 1981 are eligible for unreduced benefits at age 55 if they have completed 10 years of service. Uniformed personnel who became members on or after October 1, 1981 are eligible for unreduced benefits at age 55 if they have completed 15 years of service. Uniformed personnel who became members on or after August 22, 1984 are eligible for unreduced benefits at age 60 if they have completed 15 years of service.

The following summarizes total retirement experience for active members under age 70 who are eligible to receive unreduced retirement benefits from the Fund.

	Retirements		
	Male	Female	Total
Current Study 2011-2015			
Actual Retirements	335	316	651
Expected Retirements	181	238	419
Actual/Expected Ratio	185%	133%	155%
Prior Study 2007-2011			
Actual Retirements	156	150	306
Expected Retirements	197	292	490
Actual/Expected Ratio	79%	51%	63%

Recommendation

Actual retirement experience has been higher than the current 40%/15% assumption. We recommend increasing the assumed percentage retiring at initial retirement eligibility from 40% to 50%, and increasing the assumed retirement rate for each subsequent year up to age 65 from 15% to 20%. The rates from age 65 to age 69 will remain at 20%.

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Also, as indicated below, actual retirements for members from age 70 to age 74 have been lower than the 100% currently assumed.

	Retirements		
	Male	Female	Total
Current Study 2011-2015			
Actual Retirements (age 70-74)	13	23	36
Expected Retirements (age 70-74)	74	84	158
Actual/Expected Ratio	18%	27%	23%

We therefore propose to assume a 20% retirement rate for each year from age 70 to age 74, with 100% of remaining members retiring at age 75.

A comparison of actual retirement experience for active members under age 70 with the retirement experience expected under the proposed assumptions shown below.

	Retirements		
	Male	Female	Total
Proposed Assumption			
Actual Retirements	335	316	651
Expected Retirements	226	296	522
Actual/Expected Ratio	148%	107%	125%

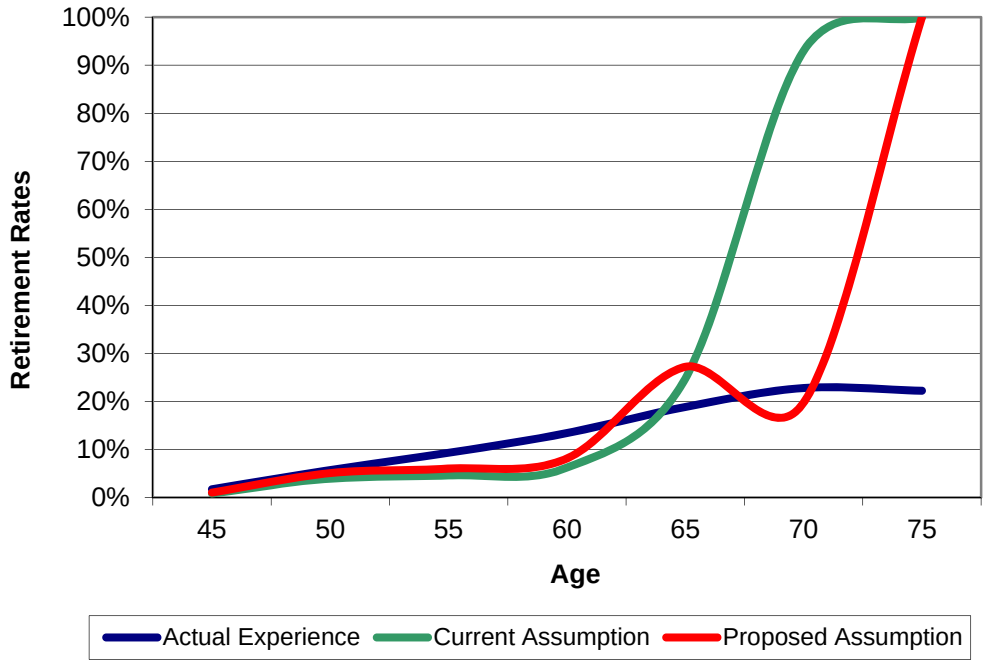

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EXHIBIT 11. REFUND OF CONTRIBUTIONS

Current Assumption:	Employees who separate from service before retirement age with less than 20 years of service will elect a refund of contributions Current inactive employees who have 5 years of service and at least $10,000 in contributions are assumed not to elect a refund and will retire when first eligible for unreduced benefits.
2007-2011 Study:	No change
Proposed Assumption:	No change

The Fund requires active members to contribute 9½% of base pay. Members who separate from service may elect to receive a refund of contributions, provided that they have not completed more than 25 years of service with the Fund. Members who receive a refund of contributions are not entitled to further benefits from the Fund unless they are later rehired and repay the contributions that were refunded.

The current assumption is that active members who separate from service in the future and who have less than 20 years of service will elect a refund of contributions. Inactive members who have at least 5 years of service and a contribution balance that exceeds $10,000, are assumed to retire when first eligible for unreduced benefits.

Recommendation

We recommend no change to the current assumption. Most of the inactive employees included in the actuarial valuation have small contribution balances because of previous withdrawals. A relatively few number have balances above $10,000 and very few of these members have elected to receive a distribution.

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EXHIBIT 12. MARITAL STATUS

Current Assumption:	75% of active members are married (effective 2009)
2007-2011 Study:	No change
Proposed Assumption:	No change

Actual marital status is provided in the data for retired members. The member's marital status determines eligibility for the surviving spouse annuity. The following summarizes marital status for active members who retired during the study period, including disabled retirees, and compares the results with the prior experience study. Marital status for all retiree records included in valuation data during the study period is also summarized.

Current Study 2011-2015	
Retirements – Married	542
Retirements – Unmarried	174
Total Retirements (Including Disability)	716
Percentage of Married Retirements	76%
Total Retiree Records – Married	16,984
Total Retiree Records – Unmarried	4,481
Total Retiree Records (Including Disability)	21,465
Percentage of Married Retirees	79%
Prior Study 2007-2011	
Retirements – Married	435
Retirements – Unmarried	154
Total Retirements (Including Disability)	589
Percentage of Married Retirements	74%

Recommendation

The percentage of members who retired during the study period and were married (76%) was consistent with the current assumption (75%), and the total percentage of retired members who are married (including those who retired prior to the study period) is slightly higher (79%). We propose no change to the current assumption.

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EXHIBIT 13. SURVIVOR BENEFIT – MINOR CHILDREN

Current Assumption:	The liability for retirement benefits for active members is increased by 0.67% and the liability for death benefits for active members is increased by 20%
2007-2011 Study:	No change
Proposed Assumption:	0.2 eligible child survivors age at the time of the retiree death, with payments to the minor child continuing for 6 years

A survivor benefit is payable to children under age 18 of a member whose death occurs while in service after at least three years of service, or if an annuitant or inactive member with at least 25 years of service. The benefit is payable until age 25 if the child is a full-time student in high school or an accredited undergraduate educational institution, or payable regardless of age if disabled and disability occurred before age 18, and terminates upon a child's death or marriage. The annuity amount for each eligible child is $2,880 per year, subject to a maximum payment to five or more minor children of $14,400 per year.

The current assumption for the value of this survivor benefit is to increase the liability for active members attributable to retirement (healthy or disability) by an amount equal to 0.67% of the liability. The active member liability attributable to death from active employment is increased by an amount equal to 20% of the total active member death benefit liability.

The following summarizes child survivor experience and retiree deaths during the current and prior study periods.

Current Study 2011-2015	
Child Survivors Added	94
Retiree Deaths	609
Child Survivors Per Retiree Death	0.15
Child Pensioners at End of Study Period	198
Prior Study 2007-2011	
Child Survivors Added	154
Retiree Deaths	574
Child Survivors Per Retiree Death	0.27
Child Pensioners at End of Study Period	263

Recommendation

In order to more accurately value of the child survivor benefit, we recommend assuming each deceased active, inactive, or retired member has 0.2 eligible child survivors at the time of death and that payments to the child survivor will continue for 6 years.

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EXHIBIT 14. LEAVE ADJUSTMENTS TO SERVICE/EARNINGS

Current Assumption:	Service increased by 1.5 years upon retirement Average earnings increased by 10% upon retirement
2007-2011 Study:	No change
Proposed Assumption:	No change to service increase assumption Average earnings increased by 5% upon retirement

A member may receive service credits for accumulated unused sick and annual leave at the time of retirement (1 month of service is credited for 12 days of leave). In addition, members who have elected to include non-base pay in their pension earnings may receive earnings credit for unused annual leave.

For members who retired during the study period, we have compared the service stored in the member's retiree record with the expected service based on the member's active record for the prior valuation. We have also compared the average of members' highest 3 years of earnings as active members for the period 2007-2015 with their final average earnings. We excluded any service/earnings decreases from these comparisons. The following table shows the average increase to retiree service and earnings during the study period and compares it with the current assumption.

	Actual	Assumed
Current Study 2011-2015		
Service Increase at Retirement (years)	1.8	1.5
Earnings Increase at Retirement	3.9%	10.0%

Recommendation

Based on the observed earnings increases, we recommend reducing the assumed increase upon retirement from 10% of average earnings to 5% of average earnings. We propose no change to the assumed service increase upon retirement.

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EXHIBIT 15. ACTUARIAL COST METHOD

Current Method:	Entry Age Normal
2007-2011 Study:	No change
Proposed Method:	No change

An actuarial cost method is used to calculate the plan's accrued liability and normal cost for active members. The most common actuarial cost methods are:

- Unit Credit – This method defines the accrued liability to be the present value of benefits accrued to date. The normal cost is the cost of benefits earned in the current year. This method is not appropriate for plans that base retirement benefits on salary, because this method does not consider the impact of future salary increases. Salary increases and aging can lead to rapidly accelerating normal costs.

- Projected Unit Credit – This method is similar to the Unit Credit method, but future salary increases are factored into the calculation of accrued liability and normal cost.

- Entry Age Normal – This method projects a member's retirement benefit to the expected retirement age and then assigns a cost to each year of service such that the resulting normal costs are level throughout the member's working career, either as a level dollar amount or as a level percentage of pay.

By far, the most common method for public plans is the Entry Age Method. This is generally the most conservative of the methods because it assigns a higher proportion of projected benefits to the accrued liability. This use of this method is required in order to determine the Total Pension Liability reported for accounting purposes under GASB 67.

Recommendation

We recommend that the Fund continue to use the Entry Age Actuarial Cost Method with costs allocated as a level percentage of pay.

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EXHIBIT 16. ASSET VALUATION METHOD

Current Method:	3-year phase-in of investment gains/losses that differ from assumed rate of return (effective 2009)
2007-2011 Study:	No change
Proposed Method:	No change

An asset valuation method determines the value of the fund assets to be reflected in the actuarial valuation. The most common asset valuation methods are:

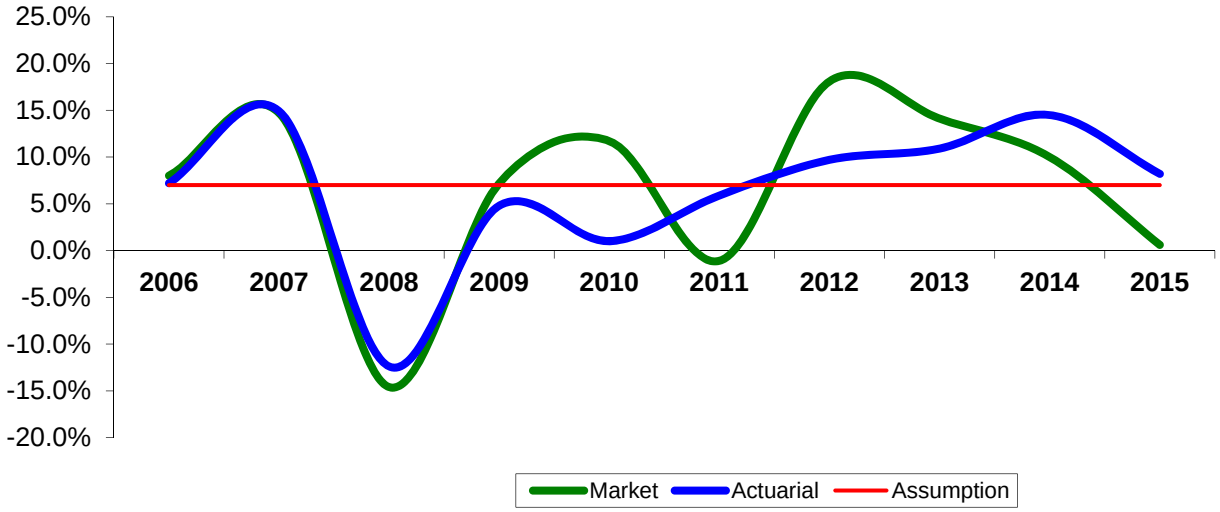
- Market Value – The asset value is the market value of the fund's assets. This provides the most up to date funding status, but the unfunded actuarial accrued liability and employer contribution rates may be volatile from year to year.

- Amortized Cost – This is useful for funds that hold fixed income securities to maturity. By using the amortized cost of bonds, rather than the market value, the value of the fund's assets will be more stable over time. However, most funds no longer hold fixed income securities to maturity. This method may still be useful for funds with dedicated bond portfolios.

- "X" year Smoothing Method – This method recognizes investment returns that differ from the actuarial assumption over a period of years that usually range from 3 to 10 years. Investment gains and losses are averaged over typical economic cycles so that favorable investment returns during good years can be deferred to help offset investment losses during poor years.

Recommendation

We recommend no change to the current asset valuation method. The investment returns based upon the smoothing method adopted in 2009 (Actuarial) are less volatile than the market value returns.



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APPENDIX A. SUMMARY OF CURRENT AND PROPOSED ASSUMPTIONS

	Current Assumption		Proposed Assumption	
ECONOMIC ASSUMPTIONS				
Interest Rate	7.00%		Same	
Salary Increases	Service	% Increase	Service	% Increase
	0 – 5	7.5%	0 – 5	7.5%
	6 – 10	6.0%	6 – 10	6.0%
	11 – 15	5.0%	11 – 15	5.0%
	16 – 20	4.5%	16 – 20	4.0%
	Over 20	4.5%	Over 20	4.0%
Total Payroll Growth (DB and DC)	3.0%		2.75%	
Administrative Expenses	Budgeted expenses		Same	
DEMOGRAPHIC ASSUMPTIONS				
Mortality	RP-2000 Combined Healthy table +4 for males +1 for females No provision is made for future mortality improvement.		RP-2000 Combined Healthy table +3 for males +2 for females Mortality is projected generationally using 30% of projection scale BB	
Disability				
Incidence	1974-78 SOA LTD Non-Jumbo, with rates reduced by 50%		1974-78 SOA LTD Non-Jumbo, with male rates reduced by 50% and female rates reduced by 75%	
Post-disability mortality	RP 2000 Disability male/female tables		RP-2000 Disability table +6 for males +4 for females Mortality is projected generationally using 30% of projection scale BB	
Withdrawal Rates	Service-based rates (see attached)		Same	

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	Current Assumption	Proposed Assumption
Retirement Age	40% assumed to retire at earliest eligibility for unreduced benefits. 15% per year thereafter until age 65 20% per year thereafter until age 70 100% at age 70	50% assumed to retire at earliest eligibility for unreduced benefits. 20% per year thereafter until age 75 100% at age 75
Return of Contributions	100% of any current employees who withdraw before retirement and who have less than 20 years of service are assumed to elect a return of contributions Inactive members with at least 5 years of service and $10,000 in contributions who have not withdrawn their contributions are assumed to retire upon eligibility for unreduced benefits. All other employees who have previously withdrawn are assumed to elect a return of contributions.	Same
Marital Status	For active and inactive employees, 75% are assumed to have spouses. The assumed age difference is 3 years (+3 for a male spouse; -3 for a female spouse).	Same
Survivor Benefit – Minor Children	Assumed to increase value of retirement benefits by 0.67% and survivor benefits by 20% for active members	An average of 0.2 eligible child survivors for each retiree with payments paid for 6 years. Payments to current child survivor are assumed to be payable through age 21
Leave Adjustments	Assumed to add 1.5 years of service and increase average earnings by 10% at retirement	Assumed to add 1.5 years of service and increase average earnings by 5% at retirement
ACTUARIAL METHODS		
Actuarial Cost Method	Entry Age Normal (level percentage of pay)	Same
Asset Valuation Method	3-year phase-in of gains/losses relative to interest rate assumption	Same

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TABLE 1. HEALTHY MORTALITY RATES

Probabilities of Death for Healthy Active/Retired Members *(per 100 at each age)*					
Current Assumption			Proposed Assumption		
Age	Male	Female	Age	Male	Female
20	0.04	0.02	20	0.04	0.02
21	0.04	0.02	21	0.04	0.02
22	0.04	0.02	22	0.04	0.02
23	0.04	0.02	23	0.04	0.02
24	0.04	0.02	24	0.04	0.02
25	0.04	0.02	25	0.04	0.02
26	0.04	0.02	26	0.04	0.02
27	0.05	0.02	27	0.04	0.02
28	0.06	0.02	28	0.05	0.03
29	0.06	0.03	29	0.06	0.03
30	0.07	0.03	30	0.06	0.04
31	0.08	0.04	31	0.07	0.04
32	0.08	0.04	32	0.08	0.04
33	0.09	0.04	33	0.08	0.05
34	0.10	0.05	34	0.09	0.05
35	0.10	0.05	35	0.10	0.06
36	0.11	0.06	36	0.10	0.06
37	0.11	0.06	37	0.11	0.06
38	0.12	0.06	38	0.11	0.07
39	0.13	0.07	39	0.12	0.08
40	0.14	0.08	40	0.13	0.09
41	0.15	0.09	41	0.14	0.09
42	0.16	0.09	42	0.15	0.10
43	0.17	0.10	43	0.16	0.11
44	0.19	0.11	44	0.17	0.12
45	0.20	0.12	45	0.19	0.13
46	0.21	0.13	46	0.20	0.14
47	0.24	0.14	47	0.21	0.16
48	0.27	0.16	48	0.24	0.17
49	0.29	0.17	49	0.27	0.19
50	0.32	0.19	50	0.29	0.20
51	0.36	0.20	51	0.32	0.22
52	0.42	0.22	52	0.36	0.24
53	0.47	0.24	53	0.42	0.27
54	0.53	0.27	54	0.47	0.31
55	0.59	0.31	55	0.53	0.35
56	0.67	0.35	56	0.59	0.39
57	0.77	0.39	57	0.67	0.44
58	0.88	0.44	58	0.77	0.51
59	1.00	0.51	59	0.88	0.58
60	1.13	0.58	60	1.00	0.67

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Probabilities of Death for Healthy Active/Retired Members (per 100 at each age)					
Current Assumption			Proposed Assumption		
Age	Male	Female	Age	Male	Female
61	1.27	0.67	61	1.13	0.76
62	1.44	0.76	62	1.27	0.86
63	1.61	0.86	63	1.44	0.97
64	1.79	0.97	64	1.61	1.10
65	1.98	1.10	65	1.79	1.22
66	2.22	1.22	66	1.98	1.34
67	2.46	1.34	67	2.22	1.49
68	2.73	1.49	68	2.46	1.67
69	3.04	1.67	69	2.73	1.86
70	3.39	1.86	70	3.04	2.07
71	3.78	2.07	71	3.39	2.30
72	4.22	2.30	72	3.78	2.55
73	4.69	2.55	73	4.22	2.81
74	5.21	2.81	74	4.69	3.10
75	5.79	3.10	75	5.21	3.41
76	6.44	3.41	76	5.79	3.76
77	7.20	3.76	77	6.44	4.15
78	8.05	4.15	78	7.20	4.59
79	8.97	4.59	79	8.05	5.08
80	9.98	5.08	80	8.97	5.63
81	11.08	5.63	81	9.98	6.25
82	12.28	6.25	82	11.08	6.95
83	13.60	6.95	83	12.28	7.74
84	15.06	7.74	84	13.60	8.64
85	16.64	8.64	85	15.06	9.63
86	18.34	9.63	86	16.64	10.73
87	19.98	10.73	87	18.34	11.92
88	21.66	11.92	88	19.98	13.17
89	23.37	13.17	89	21.66	14.46
90	25.07	14.46	90	23.37	15.76
91	26.75	15.76	91	25.07	17.04
92	28.39	17.04	92	26.75	18.28
93	29.99	18.28	93	28.39	19.45
94	31.53	19.45	94	29.99	20.54
95	33.02	20.54	95	31.53	21.52
96	34.46	21.52	96	33.02	22.39
97	35.86	22.39	97	34.46	23.14
98	37.17	23.14	98	35.86	23.75
99	38.30	23.75	99	37.17	24.48

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TABLE 2. DISABLED MORTALITY RATES

Probabilities of Death for Disabled Retired Members (per 100 at each age)					
Current Assumption			Proposed Assumption		
Age	Male	Female	Age	Male	Female
20	2.26	0.75	20	2.26	0.75
21	2.26	0.75	21	2.26	0.75
22	2.26	0.75	22	2.26	0.75
23	2.26	0.75	23	2.26	0.75
24	2.26	0.75	24	2.26	0.75
25	2.26	0.75	25	2.26	0.75
26	2.26	0.75	26	2.26	0.75
27	2.26	0.75	27	2.26	0.75
28	2.26	0.75	28	2.26	0.75
29	2.26	0.75	29	2.26	0.75
30	2.26	0.75	30	2.26	0.75
31	2.26	0.75	31	2.26	0.75
32	2.26	0.75	32	2.26	0.75
33	2.26	0.75	33	2.26	0.75
34	2.26	0.75	34	2.26	0.75
35	2.26	0.75	35	2.26	0.75
36	2.26	0.75	36	2.26	0.75
37	2.26	0.75	37	2.26	0.75
38	2.26	0.75	38	2.26	0.75
39	2.26	0.75	39	2.26	0.75
40	2.26	0.75	40	2.38	0.75
41	2.26	0.75	41	2.51	0.75
42	2.26	0.75	42	2.64	0.82
43	2.26	0.75	43	2.77	0.90
44	2.26	0.75	44	2.90	0.98
45	2.26	0.75	45	3.03	1.06
46	2.38	0.82	46	3.16	1.15
47	2.51	0.90	47	3.29	1.25
48	2.64	0.98	48	3.42	1.35
49	2.77	1.06	49	3.54	1.45
50	2.90	1.15	50	3.67	1.55
51	3.03	1.25	51	3.80	1.65
52	3.16	1.35	52	3.93	1.76
53	3.29	1.45	53	4.07	1.87
54	3.42	1.55	54	4.20	1.97
55	3.54	1.65	55	4.35	2.08
56	3.67	1.76	56	4.50	2.18
57	3.80	1.87	57	4.66	2.29
58	3.93	1.97	58	4.83	2.41
59	4.07	2.08	59	5.02	2.53
60	4.20	2.18	60	5.22	2.66

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Probabilities of Death for Disabled Retired Members (per 100 at each age)					
Current Assumption			Proposed Assumption		
Age	Male	Female	Age	Male	Female
61	4.35	2.29	61	5.44	2.80
62	4.50	2.41	62	5.69	2.96
63	4.66	2.53	63	5.96	3.13
64	4.83	2.66	64	6.26	3.32
65	5.02	2.80	65	6.58	3.53
66	5.22	2.96	66	6.94	3.76
67	5.44	3.13	67	7.33	4.01
68	5.69	3.32	68	7.75	4.29
69	5.96	3.53	69	8.21	4.58
70	6.26	3.76	70	8.70	4.89
71	6.58	4.01	71	9.21	5.22
72	6.94	4.29	72	9.76	5.58
73	7.33	4.58	73	10.34	5.95
74	7.75	4.89	74	10.94	6.35
75	8.21	5.22	75	11.55	6.78
76	8.70	5.58	76	12.19	7.23
77	9.21	5.95	77	12.83	7.71
78	9.76	6.35	78	13.49	8.23
79	10.34	6.78	79	14.16	8.78
80	10.94	7.23	80	14.84	9.38
81	11.55	7.71	81	15.52	10.02
82	12.19	8.23	82	16.22	10.71
83	12.83	8.78	83	16.92	11.45
84	13.49	9.38	84	18.34	12.25
85	14.16	10.02	85	19.98	13.10
86	14.84	10.71	86	21.66	14.00
87	15.52	11.45	87	23.37	14.97
88	16.22	12.25	88	25.07	15.99
89	16.92	13.10	89	26.75	17.04
90	18.34	14.00	90	28.39	18.28
91	19.98	14.97	91	29.99	19.45
92	21.66	15.99	92	31.53	20.54
93	23.37	17.04	93	33.02	21.52
94	25.07	18.28	94	34.46	22.39
95	26.75	19.45	95	35.86	23.14
96	28.39	20.54	96	37.17	23.75
97	29.99	21.52	97	38.30	24.48
98	31.53	22.39	98	39.20	25.45
99	33.02	23.14	99	39.79	26.60

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TABLE 3. DISABILITY INCIDENCE RATES

Probabilities of Disability for Active Members *(per 100 working at each age)*					
Current Assumption			Proposed Assumption		
Age	Male	Female	Age	Male	Female
20	0.05	0.05	20	0.05	0.03
21	0.05	0.05	21	0.05	0.03
22	0.05	0.05	22	0.05	0.03
23	0.05	0.05	23	0.05	0.03
24	0.05	0.05	24	0.05	0.03
25	0.05	0.05	25	0.05	0.03
26	0.05	0.05	26	0.05	0.03
27	0.05	0.05	27	0.05	0.03
28	0.05	0.05	28	0.05	0.03
29	0.05	0.05	29	0.05	0.03
30	0.05	0.05	30	0.05	0.03
31	0.05	0.05	31	0.05	0.03
32	0.05	0.05	32	0.05	0.03
33	0.05	0.05	33	0.05	0.03
34	0.05	0.05	34	0.05	0.03
35	0.05	0.05	35	0.05	0.03
36	0.05	0.05	36	0.05	0.03
37	0.05	0.05	37	0.05	0.03
38	0.05	0.05	38	0.05	0.03
39	0.05	0.05	39	0.05	0.03
40	0.10	0.10	40	0.10	0.05
41	0.10	0.10	41	0.10	0.05
42	0.10	0.10	42	0.10	0.05
43	0.10	0.10	43	0.10	0.05
44	0.10	0.10	44	0.10	0.05
45	0.18	0.18	45	0.18	0.09
46	0.18	0.18	46	0.18	0.09
47	0.18	0.18	47	0.18	0.09
48	0.18	0.18	48	0.18	0.09
49	0.18	0.18	49	0.18	0.09
50	0.32	0.32	50	0.32	0.16
51	0.32	0.32	51	0.32	0.16
52	0.32	0.32	52	0.32	0.16
53	0.32	0.32	53	0.32	0.16
54	0.32	0.32	54	0.32	0.16
55	0.53	0.53	55	0.53	0.27
56	0.53	0.53	56	0.53	0.27
57	0.53	0.53	57	0.53	0.27
58	0.53	0.53	58	0.53	0.27
59	0.53	0.53	59	0.53	0.27
60	0.76	0.76	60	0.76	0.38
61	0.76	0.76	61	0.76	0.38
62	0.76	0.76	62	0.76	0.38
63	0.76	0.76	63	0.76	0.38
64	0.76	0.76	64	0.76	0.38

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TABLE 4. WITHDRAWAL RATES

Probability of Withdrawal from Active Service *(per 100 working at each service duration)*					
Current Assumption			Proposed Assumption		
Service	Male	Female	Service	Male	Female
0	15.0	15.0	0		
1	14.0	14.0	1		
2	13.0	13.0	2		
3	12.0	12.0	3		
4	11.0	11.0	4		
5	10.0	10.0	5		
6	9.0	9.0	6	Same	Same
7	8.0	8.0	7	As	As
8	7.0	7.0	8	Current	Current
9	6.0	6.0	9		
10	5.0	5.0	10		
11	4.5	4.5	11		
12	4.0	4.0	12		
13	3.5	3.5	13		
14	3.0	3.0	14		
15	2.5	2.5	15		
16	2.0	2.0	16		
17	2.0	2.0	17		
18	2.0	2.0	18		
19	2.0	2.0	19		
20 & over	2.0	2.0	20 & over		

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APPENDIX B. GLOSSARY OF KEY TERMS

Actuarial Accrued Liability or **Total Pension Liability.** The Present Value of Future Benefits allocated to past service in accordance with the actuarial cost method. GASB 67 uses the term Total Pension Liability.

Actuarial Cost Method. A method of allocating the present value of benefits to past and future periods. The entry age normal cost method with costs allocated as a level percentage of pay takes into consideration the effect of wage inflation.

Actuarial Gains and Losses. Changes to the Actuarial Accrued Liability due to deviations from the actuarial assumptions. These can include gains and losses from investments, employee turnover, disability, retirement, mortality, and administrative expenses.

Actuarial Value of Assets. A method of valuing Fund assets that may smooth gains and losses that occur in the market value over a period of time.

GASB. Government Accounting Standards Board. GASB Statements No. 67, and 68 are accounting standards issued by GASB that require certain items be disclosed in the Fund's financial statements.

Fiduciary Net Position. The market value of Fund assets.

Net Pension Liability. The dollar value of the Total Pension Liability that exceeds the market value of Fund assets. A fully funded plan will have no Net Pension Liability.

Normal Cost or **Service Cost.** The value of benefits earned for one year of service. The normal cost is calculated in accordance with the actuarial cost method. The accumulation of all normal costs assigned to past service equals the Actuarial Accrued Liability. GASB 68 uses the term Service Cost.

Present Value of Benefits. The sum of all benefits expected to be paid in the future by the retirement system, with the payments discounted to the present using the valuation interest rate. This includes benefits to be earned in the future for current employees.

Present Value of Future Normal Cost. The sum of all future normal costs expected for current employees, with the costs discounted back to the present using the valuation interest rate.

Security Ratio. The percentage of the Actuarial Accrued Liability that is funded by the Fund assets. A fully funded plan will have a security ratio of 100%.

Unfunded Actuarial Accrued Liability. The dollar value of the Actuarial Accrued Liability that exceeds the Actuarial Value of Assets. A fully funded plan will have no unfunded actuarial accrued liability.

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