
Government of Guam Retirement Fund

Actuarial Experience Study
October 1, 2007 to September 30, 2011

Prepared by:

Richard A. Wright
FSA, MAAA

Milliman, Inc.
650 California Street, 17th Floor
San Francisco, California 94108
Tel 415 403 1333 Fax 415 403 1334
milliman.com

April 11, 2013



650 California Street, 17th Floor
San Francisco, CA 94108-2702
USA

Tel +1 415 403 1333
Fax +1 415 403 1334

milliman.com

April 11, 2013

Government of Guam Retirement Fund
424 Route 8
Maite, Guam 96910

**Government of Guam Retirement Fund –
Actuarial Experience Study – October 1, 2007 to September 30, 2011**

At the request of the Trustees, we have completed an actuarial experience study for the Government of Guam Retirement Fund for the period from October 1, 2007 to September 30, 2011. 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, I 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, employee 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). 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 of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exception(s):

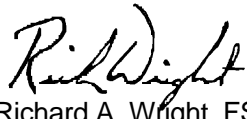
- (a) GGRF may provide a copy of Milliman's work, in its entirety, to its professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit GGRF.
- (b) GGRF may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

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,



Richard A. Wright, FSA, MAAA
Consulting Actuary

RAW:jh
n:\gua\corr\2013\gua2012exp-e (final).doc

Section	Page
I OVERVIEW	
Introduction	1
Key Findings	1
II ECONOMIC ASSUMPTIONS	
Exhibit 1. Investment Return	3
Exhibit 2. Member Salary Increases.....	5
Exhibit 3. Payroll Growth	7
Exhibit 4. Administrative Expenses	9
III DEMOGRAPHIC ASSUMPTIONS	
Exhibit 5. Healthy Retiree Mortality	10
Exhibit 6. Disabled Retiree Mortality	12
Exhibit 7. Disability Incidence.....	14
Exhibit 8. Active Withdrawal and Mortality	16
Exhibit 9. Retirement.....	18
Exhibit 10. Refund of Contributions.....	19
Exhibit 11. Marital Status	20
IV ACTUARIAL METHODS	
Exhibit 12. Actuarial Cost Method	21
Exhibit 13. Asset Valuation Method	22
V APPENDICES	
Appendix A. Summary of Current/Proposed Assumptions	23
Table 1. Healthy Mortality Rate	
Table 2. Disabled Mortality Rate	
Table 3. Disability Incidence Rate	
Table 4. Withdrawal Rate	
Appendix B. Glossary of Key Terms.....	31

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, 2007 through September 30, 2011. 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. Any changes that are adopted would first be effective with the actuarial valuation as of September 30, 2012.

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.

KEY FINDINGS

1. For employees with less than 20 years of service, the average salary increases have been lower than the current assumption. For employees with more than 20 years of service, the average salary increases have been higher than the current assumption. As a result, we propose changing this assumption to assume lower salary increases for employees with less than 20 years of service, and higher increases (from 4.0% to 4.5%) for employees with more than 20 years of service. [See Exhibit 2]
2. The total payroll (including defined benefit and defined contribution participants) has increased 1.9% per year over the last 10 years. Due to this and a reduction in expected future inflation, we propose lowering the assumption for future overall payroll growth from 3.5% to 3.0%. [See Exhibit 3]
3. There have been more retiree deaths during the study period than expected, especially among male retirees. Therefore, we propose changing the mortality table to assume lower life expectancies for males. [See Exhibit 5]
4. There have been fewer disability retirements during the study period than expected. Therefore, we propose changing the assumption to assume fewer future disabilities. [See Exhibit 7]
5. There have been fewer retirements during the study period than expected. Therefore, we propose changing the assumption to assume fewer future retirements. [See Exhibit 9]

The effect of these changes on the actuarial valuation as of September 30, 2012, is shown below:

	Actuarial Valuation as of 9/30/12	
	Actuarial Accrued Liability	Employer Contribution Rate
	<i>(in millions)</i>	
Before Changes	\$ 2,845.4	30.08%
1. Change member salary increase assumption	31.5	0.29%
2. Lower total payroll increase assumption	0.0	1.01%
3. Increase retiree mortality	(26.0)	(0.43%)
4. Reduce rates of disability incidence	2.9	(0.07%)
5. Modify retirement rates	<u>(42.3)</u>	<u>(0.85%)</u>
Total of all changes	(34.0)	(0.05%)
After Changes	\$ 2,811.4	30.03%

SECTION II. ECONOMIC ASSUMPTIONS

EXHIBIT 1. INVESTMENT RETURN

Current Assumption:	7.0% (effective 2003)
2002-2007 Study:	No change
Current Best Estimate Range:	5.35% to 8.60%
Proposed Assumption:	7.0% (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 a best estimate range for the investment return assumption in accordance with the guidance provided by this standard.

Milliman’s expected annual returns on various asset classes are shown below. The target asset allocation is the expected long-term asset allocation based on the Fund’s current investment policy. The expected returns are net of investment fees.

Asset Class	Target Asset Allocation	Expected Nominal Return ¹	Component Return
U.S. Equities (large cap)	30.00%	8.60%	2.58%
U.S. Equities (small cap)	10.00%	10.38%	1.04%
Non-U.S. Equities	14.25%	8.73%	1.24%
Non-U.S. Equities (emerging markets)	5.75%	11.51%	0.66%
U.S. Fixed Income (aggregate)	30.00%	4.70%	1.41%
Real Estate (REITs)	10.00%	8.41%	<u>0.84%</u>
Expected average return for one year			7.78%
Expected geometric mean (30 years)			6.99%
25 th to 75 th Percentile Return			5.35% - 8.60%

¹ Assumes annual inflation of 2.75%.

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%.

Using the expected returns and standard deviations of each asset class, we have calculated the geometric mean of the portfolio to be 6.99%.

SECTION II. ECONOMIC ASSUMPTIONS

Best Estimate Range

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
25 th Percentile	-1.55%	3.07%	4.19%	5.00%	5.35%	5.72%
75 th Percentile	16.22%	11.01%	9.81%	8.97%	8.60%	8.23%

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. Conversely, the 75th percentile indicates the rate at which there is a 25% probability that the investment return of the portfolio will exceed that rate. Overall, there is a 50% probability that the investment return of the portfolio will fall within the 25th and 75th percentiles. We have defined the best estimate range to be the 25th to 75th percentile range associated with a 30-year time horizon.

Investment Management Fees

Investment management fees typically vary according to the dollar value of assets managed. Actively managed accounts have higher fees than passively managed (indexed) accounts. Over the long run, it is reasonable to assume that investors will only pay active management fees if their active managers outperform their passive benchmarks by at least the difference between their active fee and the comparable fee for an index fund. Otherwise, the investor has the option to use an index fund.

We have assumed that long-term average returns net of active investment management fees can be approximated by returns on indexed investments net of their fees. The expected returns shown above are net of fees of 0.10% for fixed income, 0.06% for US equities, and 0.35% for non-US equities. For "alternative" asset classes such as real estate, the expected returns are net of the expected fee levels for that asset class.

Recommendation

Based upon the expected geometric mean return of 6.99%, and a best estimate range of 5.35% to 8.60%, the recommended assumption range is 6.75% to 7.0%. We recommend keeping the current assumption at 7.0%.

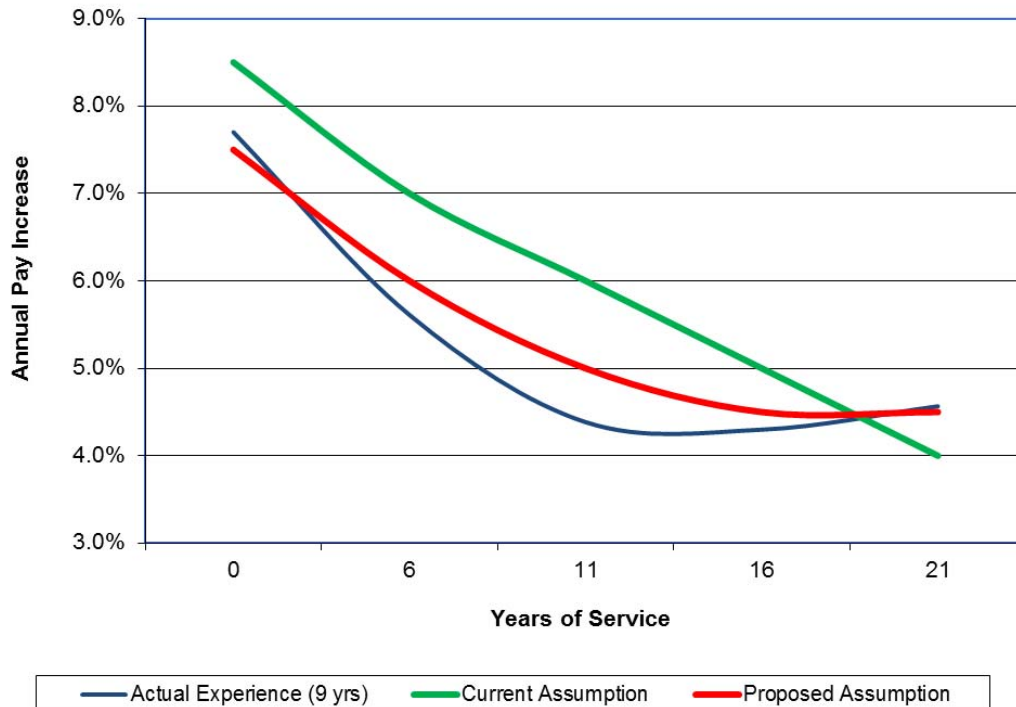
SECTION II. ECONOMIC ASSUMPTIONS

EXHIBIT 2. MEMBER SALARY INCREASES

Current Assumption:	Ranges from 8.5% for employees with between 0 and 5 years of service, to 4.0% for members with over 20 years of service (effective 2000)
2002-2007 Study:	Continued use of assumption developed in 2000
Proposed 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

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 current assumption was developed for the September 30, 2000 actuarial valuation based on an analysis of the pay grades used by the Government of Guam combined with salary inflation.

Years of Service	9/30/11 Count	Current Assumption	Proposed Assumption	Average Annual Increases		
				2010-2011	2007-2011	2002-2011
0 to 5	72	8.5%	7.5%	-12.1%	6.0%	7.7%
6 to 10	56	7.0%	6.0%	14.3%	4.9%	5.6%
11 to 15	137	6.0%	5.0%	15.1%	4.2%	4.4%
16 to 20	1,110	5.0%	4.5%	9.3%	4.5%	4.3%
Over 20	1,986	4.0%	4.5%	7.0%	4.3%	4.6%
Average for 30-year career		5.8%	5.4%	6.0%	4.7%	5.2%



This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

Recommendation

For employees with less than 20 years of service, the average annual increases over the 4-year study period (2007-2011) were lower than the current assumption. For employees with more than 20 years of service, the average annual increases over the 4-year study period were higher than the current assumption. This is also true for the experience over the last 9 years (2002-2011).

Overall, the actual salary increases over the 4 year study period would produce an average salary increase of 4.7% over a 30-year career. The actual salary increases over the most recent 9 years would produce an average salary increase of 5.2% over a 30-year career. This compares with an average salary increase of 5.8% 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 5.4% for a 30-year career.

SECTION II. ECONOMIC ASSUMPTIONS

EXHIBIT 3. PAYROLL GROWTH

Current Assumption: 3.5% per year (effective 2003)

2002-2007 Study: Maintained assumption of 3.5%

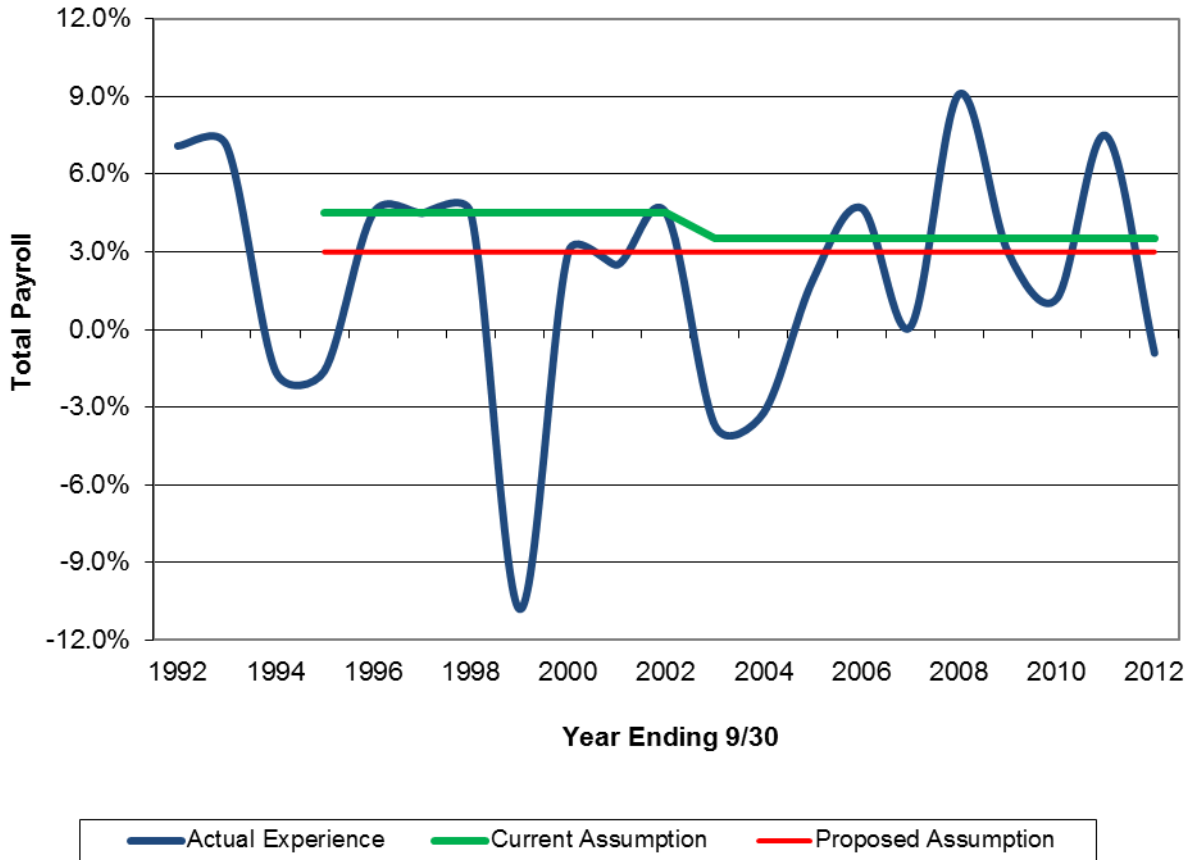
Proposed Assumption: 3.0% per year

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
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		3.9%
Average for Last 10 Years		1.9%
Average for Last 20 Years		1.7%

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

SECTION II. ECONOMIC ASSUMPTIONS



Recommendation

The current assumption of 3.5% has been in effect since 2003. From 1995 to 2002, the payroll growth assumption was 4.5%. The current assumption is based upon assumed inflation of 3.0%, wage productivity growth of 0.5%, and personnel growth of 0%.

Over the last 10 years, overall payroll growth has averaged 1.9%. We propose to lower the assumption from 3.5% to 3.0%, to reflect a new inflation assumption of 2.75%, wage productivity growth of 0.25%, and personnel growth of 0%.

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION II. ECONOMIC ASSUMPTIONS

EXHIBIT 4. ADMINISTRATIVE EXPENSES

Current Assumption:	Budgeted expenses (effective 2009)
2002-2007 Study:	Changed from using prior year's administrative expenses, net of adjustment for bad debts, to budgeted expenses
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.

Fiscal Year Ending 9/30	Budgeted Administrative Expenses			As % of Expected Payroll	Actual Admin Expenses	As % of Actual Payroll
	Defined Benefit	Defined Contribution	Total			
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 1.3% to 1.4% of the expected defined benefit and defined contribution payroll. Actual administrative expenses have ranged from 0.99% 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.

[This page intentionally left blank]

SECTION III. DEMOGRAPHIC ASSUMPTIONS

EXHIBIT 5. HEALTHY RETIREE MORTALITY

Current Assumption:	RP-2000 mortality table (Males +3, Females +1) – (Effective 2009)
2002-2007 Study:	Changed table from 1994 UP (+2, +0) to RP-2000 (+3, +1)
Proposed Assumption:	RP-2000 mortality table (Males +4, Females +1)

The current mortality assumption for non-disabled retired members and surviving spouses is the RP-2000 mortality combined table set forward by 3 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 was age 68, and the life expectancy for a 65 year old female is calculated as if she was age 66.

The following 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
<u>Current Study 2007-2011</u>						
Actual Deaths	374	200	574	49	178	227
Expected Deaths	<u>313</u>	<u>195</u>	<u>508</u>	<u>57</u>	<u>151</u>	<u>208</u>
Actual/Expected Ratio	119%	103%	113%	86%	118%	109%
<u>Prior Study 2002-2007</u>						
Actual Deaths	375	204	579	45	153	198
Expected Deaths	<u>311</u>	<u>148</u>	<u>459</u>	<u>32</u>	<u>93</u>	<u>125</u>
Actual/Expected Ratio	121%	138%	126%	141%	165%	158%

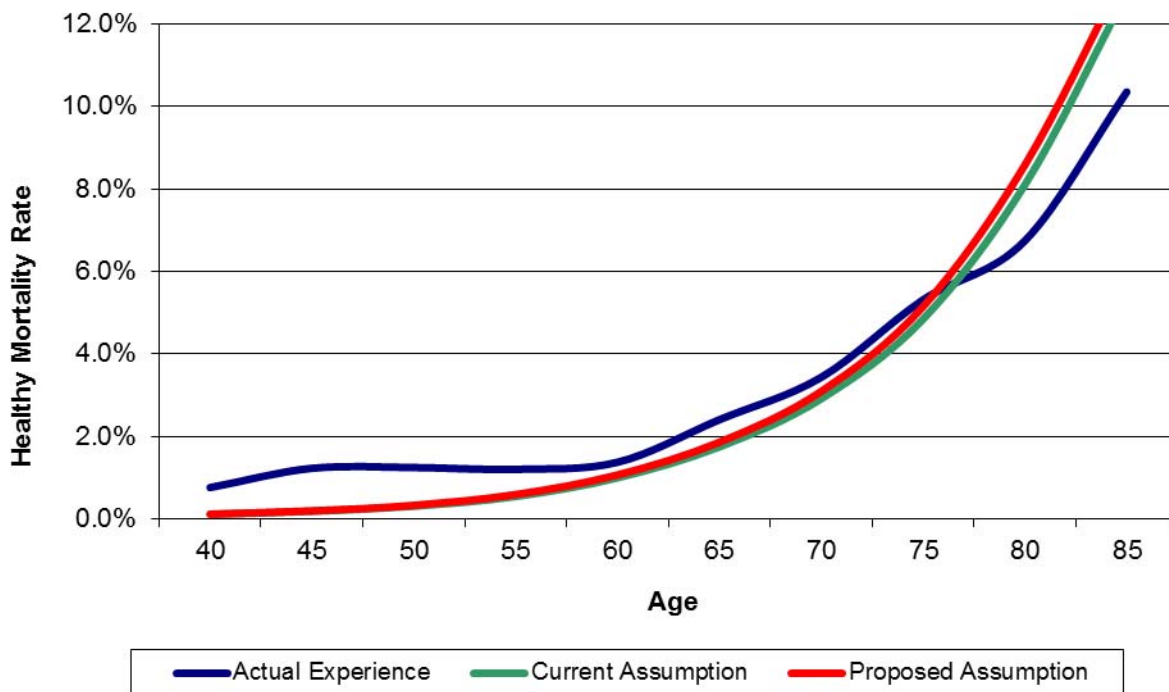
Recommendation

The actual mortality for male and female retirees and female surviving spouses is slightly higher than the mortality predicted by the current assumption. The male retiree experience has the highest actual/expected ratio. We recommend revising the healthy retiree mortality assumption for males to the RP-2000 mortality table, set forward by 4 years (up from 3 years). The female mortality would remain at RP-2000 mortality table, set forward by 1 year. A comparison of actual experience with mortality expected under the proposed assumption is shown below.

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION III. DEMOGRAPHIC ASSUMPTIONS

	Retirees			Surviving Spouses		
	Male	Female	Total	Male	Female	Total
Proposed Assumption						
Actual Deaths	374	200	574	49	178	227
Expected Deaths	<u>348</u>	<u>195</u>	<u>543</u>	<u>63</u>	<u>151</u>	<u>215</u>
Actual/Expected Ratio	107%	103%	106%	78%	118%	106%



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 a healthy 60 year old retiree in pay status.

	Life Expectancy	
	Current Assumption RP 2000 (+3,+1)	Proposed Assumption RP 2000 (+4,+1)
Male age 60	78.4	77.6
Female age 60	82.6	82.6

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION III. DEMOGRAPHIC ASSUMPTIONS

EXHIBIT 6. DISABLED RETIREE MORTALITY

Current Assumption:	RP-2000 Disability mortality table with no age adjustment (effective 2009)
2002-2007 Study:	Changed table from 1994 UP (+10, +8) to RP-2000 Disability
Proposed Assumption:	Maintain current assumption

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 (2002-2007) is also shown.

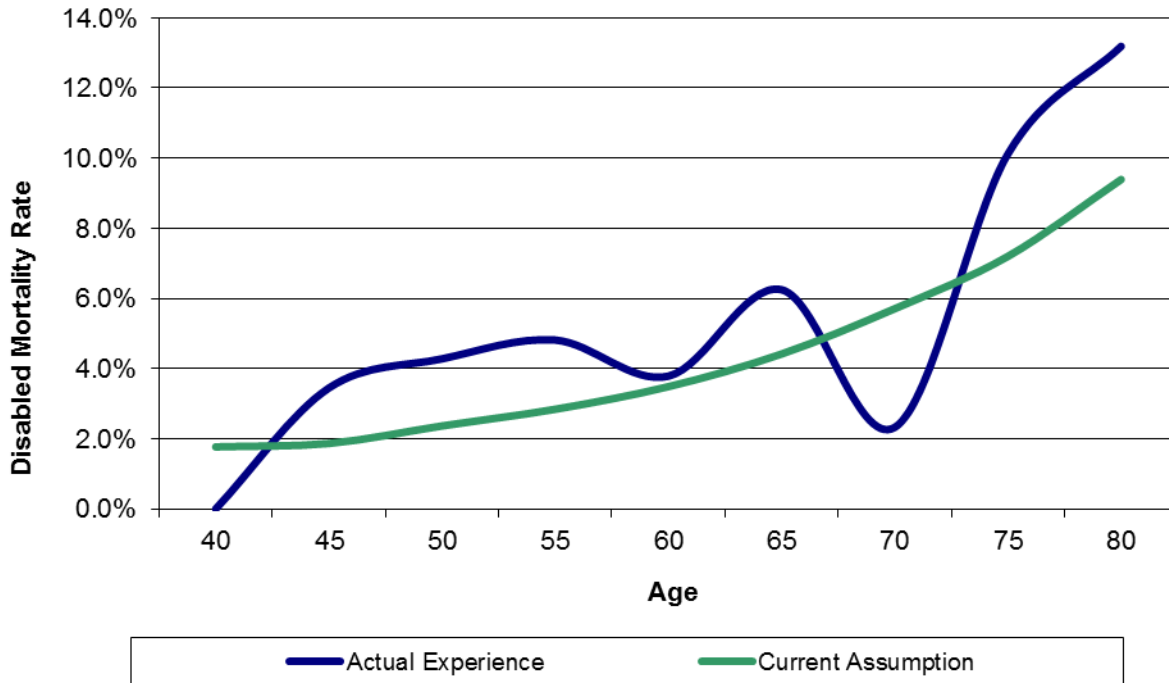
	Disabled Retirees		
	Male	Female	Total
<u>Current Study 2007-2011</u>			
Actual Deaths	53	41	94
Expected Deaths	<u>44</u>	<u>29</u>	<u>73</u>
Actual/Expected Ratio	120%	141%	129%
<u>Prior Study 2002-2007</u>			
Actual Deaths	73	57	130
Expected Deaths	<u>62</u>	<u>62</u>	<u>124</u>
Actual/Expected Ratio	118%	92%	105%

Recommendation

The actual mortality for male and female disabled retirees has been higher than the mortality predicted by the current assumption. However, due to the small sample size, we are not recommending a change to this assumption at this time.

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION III. DEMOGRAPHIC ASSUMPTIONS



The current mortality rates are shown in Appendix A – Table 2. The table below shows the life expectancy for the current assumption for a disabled 60 year old retiree in pay status.

	Life Expectancy Current Assumption RP 2000 Disability
Male age 60	73.4
Female age 60	78.0

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION III. DEMOGRAPHIC ASSUMPTIONS

EXHIBIT 7. DISABILITY INCIDENCE

Current Assumption:	1974-78 Society of Actuaries Long Term Disability Non-Jumbo table (effective 2009)
2002-2007 Study:	Removed the 30% increase for males
Proposed Assumption:	1974-78 Society of Actuaries Long Term Disability Non-Jumbo table, with male and female rates reduced by 50%

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

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 (2002-2007) is also shown.

	Disability Incidence		
	Male	Female	Total
<u>Current Study 2007-2011</u>			
Actual Disabilities	14	5	19
Expected Disabilities	<u>36</u>	<u>40</u>	<u>76</u>
Actual/Expected Ratio	39%	13%	25%
<u>Prior Study 2002-2007</u>			
Actual Disabilities	38	33	71
Expected Disabilities	<u>64</u>	<u>54</u>	<u>118</u>
Actual/Expected Ratio	59%	61%	60%

Recommendation

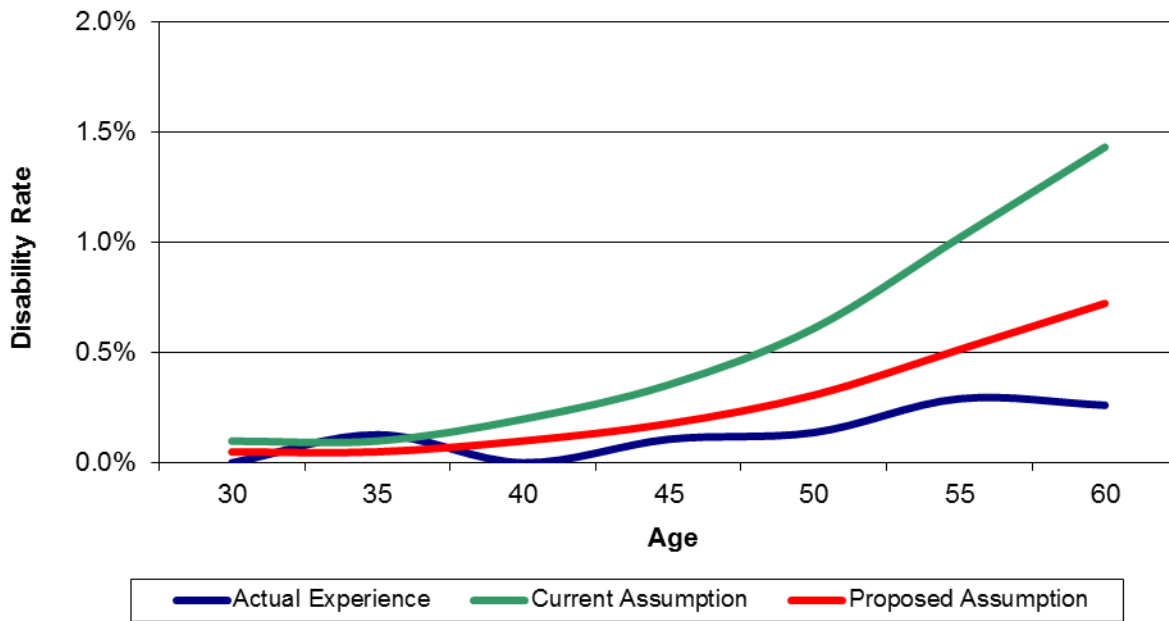
As shown above, the actual incidence of disability has been substantially lower than the incidence of disability predicted by the current assumption. In order to reduce the discrepancy, we recommend reducing the rates by 50%. A comparison of actual experience with the incidence of disability expected under the proposed assumption is shown below.

	Disability Incidence		
	Male	Female	Total
<u>Proposed Assumptions</u>			
Actual Disabilities	14	5	19
Expected Disabilities	<u>18</u>	<u>20</u>	<u>38</u>
Actual/Expected Ratio	78%	25%	50%

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

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION III. DEMOGRAPHIC ASSUMPTIONS



This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION III. DEMOGRAPHIC ASSUMPTIONS

EXHIBIT 8. ACTIVE WITHDRAWAL AND MORTALITY

Current Assumption:	Rates based upon actual experience that vary by service (effective 2009)
2002-2007 Study:	Changed from rates that vary by age to rates that vary by service
Proposed Assumption:	Maintain current 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 (2002-2007) is also shown.

	Active Withdrawals and Deaths		
	Male	Female	Total
<u>Current Study 2007-2011</u>			
Actual Withdrawals/Deaths	279	231	510
Expected Withdrawals	163	157	320
Expected Deaths	<u>28</u>	<u>19</u>	<u>47</u>
Expected Withdrawals/Deaths	191	176	367
Actual/Expected Ratio	146%	131%	139%
<u>Prior Study 2002-2007</u>			
Actual Withdrawals/Deaths	864	707	1,571
Expected Withdrawals	365	411	776
Expected Deaths	<u>52</u>	<u>25</u>	<u>77</u>
Expected Withdrawals/Deaths	417	436	853
Actual/Expected Ratio	207%	162%	184%

Recommendation

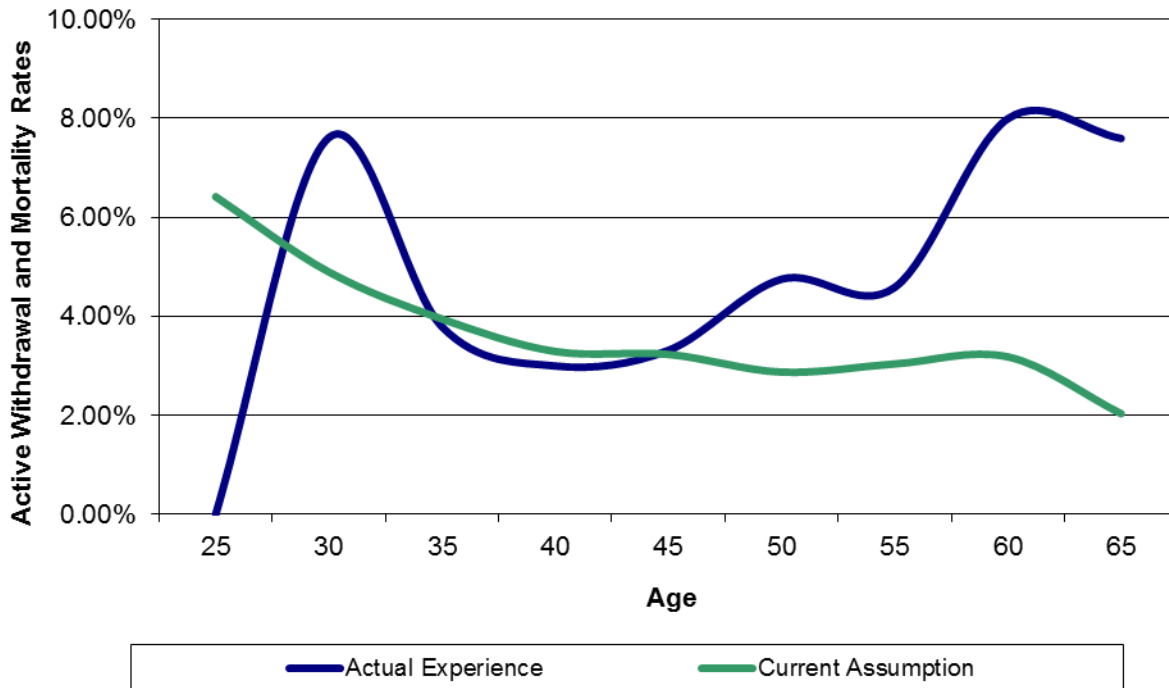
Active Withdrawal

The actual withdrawal/mortality experience has been higher than predicted by the current assumption, but the current assumption has been tracking the experience better than the previous assumption. Therefore, we are not recommending a change to the current assumption. The current withdrawal rate tables are provided in Appendix A – Table 4.

SECTION III. DEMOGRAPHIC ASSUMPTIONS

Active Mortality

To be consistent with the healthy retiree mortality rates, we propose to increase the set forward for the male mortality assumption from 3 years to 4 years. The female mortality rates will remain the same.



This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION III. DEMOGRAPHIC ASSUMPTIONS

EXHIBIT 9. RETIREMENT

Current Assumption:	50% retire at first eligibility for unreduced retirement 20% of the remaining members retire in each year until age 70 100% of the remaining members at age 70 retire immediately
2002-2007 Study:	No change
Proposed 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

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.

	Retired at or before Initial Year of Unreduced Retirement Eligibility	Retired Subsequent to Initial Unreduced Retirement Eligibility
<u>Current Study 2007-2011</u>		
Eligible Members	472	1,958
Actual Retirements	<u>130</u>	<u>176</u>
Percentage Retired	28%	9%
<u>Prior Study 2002-2007</u>		
Eligible Members	1,175	2,874
Actual Retirements	<u>230</u>	<u>369</u>
Percentage Retired	20%	13%

Recommendation

Actual retirement experience has been lower the current 50%/20% assumption. We recommend lowering the assumed percentage at initial retirement eligibility from 50% to 40%, and lowering subsequent years until age 65 from 20% to 15%. The rates from 65 to age 70 will remain at 20%.

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

SECTION III. DEMOGRAPHIC ASSUMPTIONS

EXHIBIT 10. 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 to not elect a refund and will retire when first eligible for unreduced benefits.
2002-2007 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 propose no change to the current assumption.

SECTION III. DEMOGRAPHIC ASSUMPTIONS

EXHIBIT 11. MARITAL STATUS

Current Assumption:	75% of active members will be married at retirement (effective 2009)
2002-2007 Study:	This assumption was increased from 65% to 75%
Proposed Assumption:	No change

Actual marital status is provided in the data for retired members. 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.



<u>Current Study 2007-2011</u>	
Retirements – Married	435
Retirements – Unmarried	<u>154</u>
Total Retirements (Including Disability)	589
Percentage of Married Retirements	74%
<u>Prior Study 2002-2007</u>	
Retirements – Married	530
Retirements – Unmarried	<u>177</u>
Total Retirements (Including Disability)	707
Percentage of Married Retirements	75%

Recommendation

Based on the actual experience, we recommend no change to the current assumption 75% of active members will be married at retirement.

[This page intentionally left blank]

EXHIBIT 12. ACTUARIAL COST METHOD

Current Method:	Entry Age Normal
2002-2007 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.

Recommendation

We recommend that the Fund continue to use the Entry Age Actuarial Cost Method.

EXHIBIT 13. ASSET VALUATION METHOD

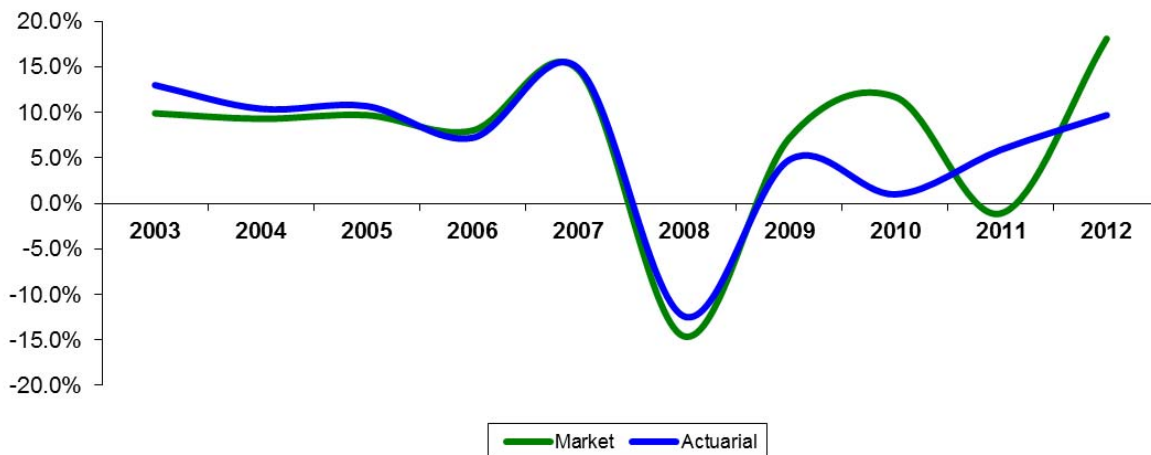
Current Method:	3-year phase-in of investment gains/losses that differ from assumed rate of return (effective 2009)
2002-2007 Study:	Changed from market value, plus amortized cost of bonds, to a 3-year phase-in of investment gains and losses
Proposed Method:	No change

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 more smooth than the market value returns.



This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

APPENDIX A. SUMMARY OF CURRENT AND PROPOSED ASSUMPTIONS

	Current Assumption		Proposed Assumption	
ECONOMIC ASSUMPTIONS				
Interest Rate	7.00%		Same	
Salary Increases	<u>Service</u>	<u>% Increase</u>	<u>Service</u>	<u>% Increase</u>
	0 – 5	8.5%	0 – 5	7.5%
	6 – 10	7.0%	6 – 10	6.0%
	11 – 15	6.0%	11 – 15	5.0%
	16 – 20	5.0%	16 – 20	4.5%
	Over 20	4.0%	Over 20	4.5%
Total Payroll Growth (DB and DC)	3.5%		3.0%	
Administrative Expenses	Budgeted expenses		Same	
DEMOGRAPHIC ASSUMPTIONS				
Mortality	RP-2000 Combined Healthy table +3 for males +1 for females		RP-2000 Combined Healthy table +4 for males +1 for females	
	No provision is made for future mortality improvement.		No provision is made for future mortality improvement.	
Disability				
Incidence	1974-78 SOA LTD Non-Jumbo		1974-78 SOA LTD Non-Jumbo, with rates reduced by 50%	
Post-disability mortality	RP 2000 Disability male/female tables		Same	
Withdrawal Rates	Service-based rates (see attached)		Same	
Retirement Age	50% assumed to retire at earliest eligibility for unreduced benefits.		40% assumed to retire at earliest eligibility for unreduced benefits.	
	20% per year thereafter until age 70		15% per year thereafter until age 65	
	100% at age 70		20% per year thereafter until age 70	
			100% at age 70	

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

	Current Assumption	Proposed Assumption
Return of Contributions	<p>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</p> <p>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.</p>	Same
Marital Status	For active and inactive employees, 75% are assumed to have spouses at retirement. The assumed age difference is 3 years (+3 for a male spouse; -3 for a female spouse).	Same
Sick Leave Adjustments	Assumed to add 1.5 years of service and increase average earnings by 10% at retirement	Same
Survivor Benefit – Minor Children	Assumed to increase value of retirement benefits by 0.67% and survivor benefits by 20% for active members	Same
ACTUARIAL METHODS		
Actuarial Cost Method	Entry Age Normal	Same
Asset Valuation Method	3-year phase-in of gains/losses relative to interest rate assumption	Same

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

TABLE 1. HEALTHY MORTALITY RATE ASSUMPTION

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		
21	0.04	0.02	21	0.04		
22	0.04	0.02	22	0.04		
23	0.04	0.02	23	0.04		
24	0.04	0.02	24	0.04		
25	0.04	0.02	25	0.04		
26	0.04	0.02	26	0.04		
27	0.04	0.02	27	0.05		
28	0.05	0.02	28	0.06		
29	0.06	0.03	29	0.06		
30	0.06	0.03	30	0.07		
31	0.07	0.04	31	0.08		Same as Current
32	0.08	0.04	32	0.08		
33	0.08	0.04	33	0.09		
34	0.09	0.05	34	0.10		
35	0.10	0.05	35	0.10		
36	0.10	0.06	36	0.11		
37	0.11	0.06	37	0.11		
38	0.11	0.06	38	0.12		
39	0.12	0.07	39	0.13		
40	0.13	0.08	40	0.14		
41	0.14	0.09	41	0.15		
42	0.15	0.09	42	0.16		
43	0.16	0.10	43	0.17		
44	0.17	0.11	44	0.19		
45	0.19	0.12	45	0.20		
46	0.20	0.13	46	0.21		
47	0.21	0.14	47	0.24		
48	0.24	0.16	48	0.27		
49	0.27	0.17	49	0.29		
50	0.29	0.19	50	0.32		
51	0.32	0.20	51	0.36		
52	0.36	0.22	52	0.42		
53	0.42	0.24	53	0.47		
54	0.47	0.27	54	0.53		
55	0.53	0.31	55	0.59		
56	0.59	0.35	56	0.67		
57	0.67	0.39	57	0.77		
58	0.77	0.44	58	0.88		
59	0.88	0.51	59	1.00		
60	1.00	0.58	60	1.13		

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

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

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

TABLE 2. DISABLED MORTALITY RATE ASSUMPTION

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			
21	2.26	0.75	21			
22	2.26	0.75	22			
23	2.26	0.75	23			
24	2.26	0.75	24			
25	2.26	0.75	25			
26	2.26	0.75	26			
27	2.26	0.75	27			
28	2.26	0.75	28			
29	2.26	0.75	29			
30	2.26	0.75	30			
31	2.26	0.75	31	Same	Same	
32	2.26	0.75	32	as	as	
33	2.26	0.75	33	Current	Current	
34	2.26	0.75	34			
35	2.26	0.75	35			
36	2.26	0.75	36			
37	2.26	0.75	37			
38	2.26	0.75	38			
39	2.26	0.75	39			
40	2.26	0.75	40			
41	2.26	0.75	41			
42	2.26	0.75	42			
43	2.26	0.75	43			
44	2.26	0.75	44			
45	2.26	0.75	45			
46	2.38	0.82	46			
47	2.51	0.90	47			
48	2.64	0.98	48			
49	2.77	1.06	49			
50	2.90	1.15	50			
51	3.03	1.25	51			
52	3.16	1.35	52			
53	3.29	1.45	53			
54	3.42	1.55	54			
55	3.54	1.65	55			
56	3.67	1.76	56			
57	3.80	1.87	57			
58	3.93	1.97	58			
59	4.07	2.08	59			
60	4.20	2.18	60			

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

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

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

TABLE 3. DISABILITY INCIDENCE RATE ASSUMPTION

Probabilities of Disability for Active Members (per 100 working at each age)						
Current Assumption			Proposed Assumption			
Age	Male	Female	Age	Male	Female	
20	0.10	0.10	20	0.05	0.05	
21	0.10	0.10	21	0.05	0.05	
22	0.10	0.10	22	0.05	0.05	
23	0.10	0.10	23	0.05	0.05	
24	0.10	0.10	24	0.05	0.05	
25	0.10	0.10	25	0.05	0.05	
26	0.10	0.10	26	0.05	0.05	
27	0.10	0.10	27	0.05	0.05	
28	0.10	0.10	28	0.05	0.05	
29	0.10	0.10	29	0.05	0.05	
30	0.10	0.10	30	0.05	0.05	
31	0.10	0.10	31	0.05	0.05	
32	0.10	0.10	32	0.05	0.05	
33	0.10	0.10	33	0.05	0.05	
34	0.10	0.10	34	0.05	0.05	
35	0.10	0.10	35	0.05	0.05	
36	0.10	0.10	36	0.05	0.05	
37	0.10	0.10	37	0.05	0.05	
38	0.10	0.10	38	0.05	0.05	
39	0.10	0.10	39	0.05	0.05	
40	0.20	0.20	40	0.10	0.10	
41	0.20	0.20	41	0.10	0.10	
42	0.20	0.20	42	0.10	0.10	
43	0.20	0.20	43	0.10	0.10	
44	0.20	0.20	44	0.10	0.10	
45	0.36	0.36	45	0.18	0.18	
46	0.36	0.36	46	0.18	0.18	
47	0.36	0.36	47	0.18	0.18	
48	0.36	0.36	48	0.18	0.18	
49	0.36	0.36	49	0.18	0.18	
50	0.63	0.63	50	0.32	0.32	
51	0.63	0.63	51	0.32	0.32	
52	0.63	0.63	52	0.32	0.32	
53	0.63	0.63	53	0.32	0.32	
54	0.63	0.63	54	0.32	0.32	
55	1.06	1.06	55	0.53	0.53	
56	1.06	1.06	56	0.53	0.53	
57	1.06	1.06	57	0.53	0.53	
58	1.06	1.06	58	0.53	0.53	
59	1.06	1.06	59	0.53	0.53	
60	1.51	1.51	60	0.76	0.76	
61	1.51	1.51	61	0.76	0.76	
62	1.51	1.51	62	0.76	0.76	
63	1.51	1.51	63	0.76	0.76	
64	1.51	1.51	64	0.76	0.76	

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

TABLE 4. WITHDRAWAL RATE ASSUMPTION

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			

This work product was prepared solely for the plan sponsor for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

APPENDIX B. GLOSSARY OF KEY TERMS

Actuarial Accrued Liability. The Present Value of Future Benefits allocated to past service in accordance with the actuarial cost method.

Actuarial Cost Method. A method of allocating the present value of benefits to past and future periods. Actuarial cost methods take 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.

ASOP. Any one of several Actuarial Standards of Practice that are developed by the Actuarial Standards Board and the American Academy of Actuaries.

GASB. Government Accounting Standards Board. GASB No. 25 and No. 27 are accounting standards issued by GASB that require certain items be disclosed in the Fund's financial statements.

Normal 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.

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 value of the Fund assets. A fully funded plan will have no unfunded actuarial accrued liability.